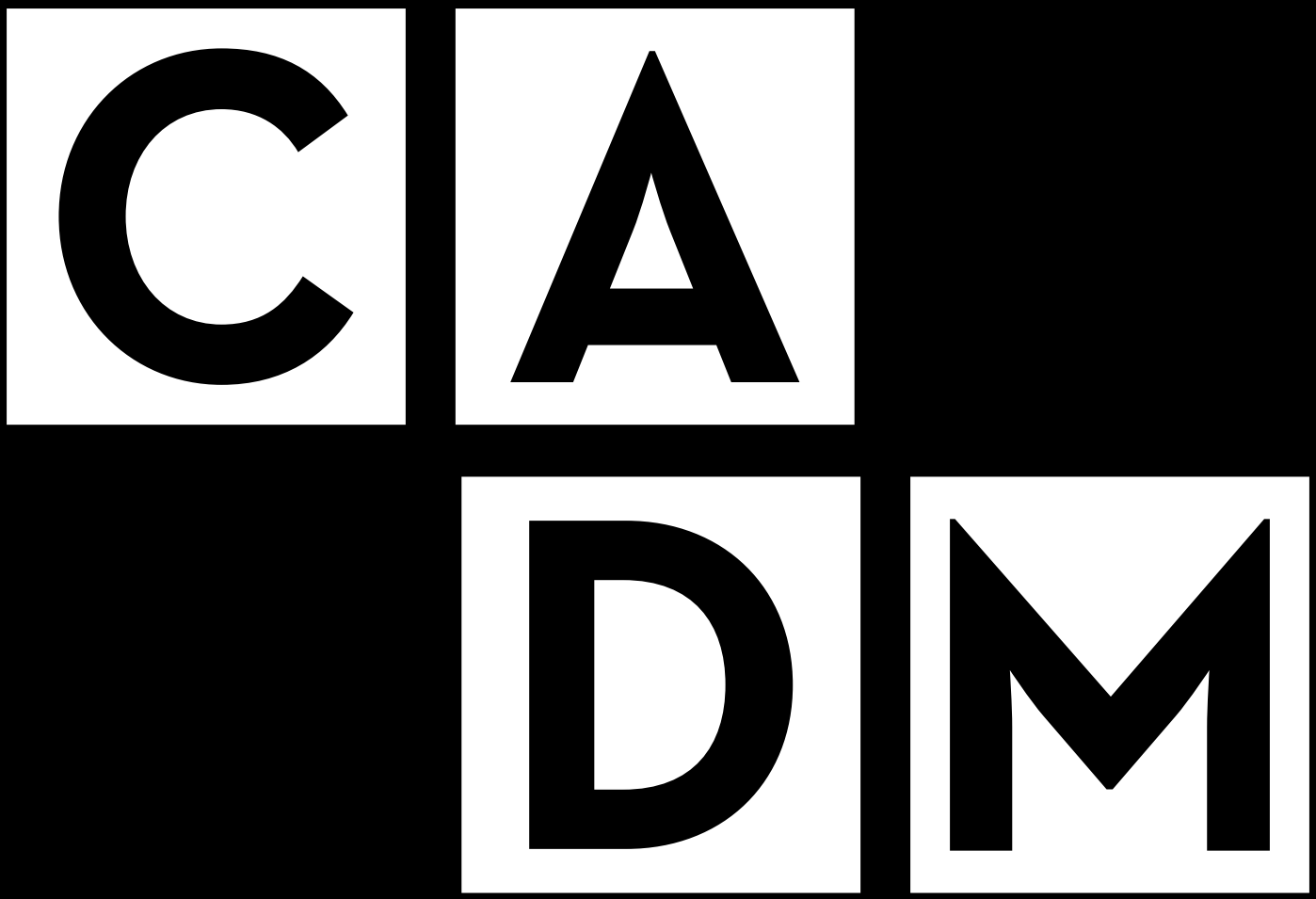
UNIVERSITY OF CAMBRIDGE

Conference Proceedings



2nd Cambridge Academic
Design Management Conference
4-5 September 2013

#CADMC13

DESIGN MANAGEMENT: PAST, PRESENT & FUTURE

Conference Proceedings

Contents

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Programme Overview

Wednesday 4 September

08.30	Registration
09.00	Conference opening and welcome
09.30	Parallel sessions 1
11.00	Refreshment break
11.30	Parallel sessions 2
13.00	Lunch
13.45	Parallel Sessions 3
15.15	Refreshment break
15.30	**Keynote presentation** ***Alan Topalian*** *Alto Design Management*
16.15	**Keynote presentation** ***Natalie W Nixon*** *Philadelphia University*
17.00	**The future of design management**
17.15	Discussion
18.00	Sessions close
19.30	Dinner, Selwyn College

Thursday 5 September

09.00	Parallel Sessions 4
11.00	Refreshment break
11.30	Parallel Sessions 5
13.00	Lunch
13.45	Parallel Sessions 6
15.45	**Best paper award and closing comments**
16.30	Conference close

Keynote Speakers

Alan Topalian

Alto Design Management

Alan Topalian, Principal of Alto Design Management in London, has researched the management of design since 1976. In its 1984 report Managing Design — sponsored jointly by the Department of Trade and Industry and the Design Council in the United Kingdom — the Council for National Academic Awards concluded an international survey of work in the field by stating, "... Probably the most comprehensive and widely researched views on design management are those of Topalian". Firsts arising out of this programme include the analysis of design leadership, board-level responsibility for design, and what constitutes corporate design management; teaching of designers and managers together in class; and detailed corporate design management case studies.

As Visiting Professor of Design Management at Middlesex University Business School from 1989 to 1991 Alan introduced pioneering design management modules into MBA programmes (mandatory on full-time, part-time and tailored) as well as law and hospitality management courses.

He established the Design Leadership Forum in 2002 to bring together business executives, design professionals and other parties to explore issues and share experience of common interest, particularly relating to leading through design. Alan is a principal author of four British Standards: BS7000-1 (2008) Guide to managing innovation, BS7000-2 (1997) Guide to managing the design of manufactured products, BS7000-6 (2005) Guide to managing inclusive design, and BS7000-10 (1995) Glossary of terms used in design management.

Synopsis:

With mounting realization that all aspects of business come about through design processes – not least how enterprises are created, what they offer, how they operate, the way they relate to their environments, and develop – how might design professionals prepare to take on roles at the core of creating 'business DNA'?

Those who seek to pitch their contributions at the highest level in business increasingly describe the service they offer as 'strategic design', a term prone to misinterpretation and overuse.

This presentation will 'unpack' that term, highlighting its various dimensions and where distinctive contributions might be sought throughout the design management value chain – consequently, how design professionals might lead through design.

Natalie W Nixon

Philadelphia University

Natalie is a hybrid thinker, synthesizing the creative and the analytical to arrive at innovative opportunities. A design thinking researcher, she has 15+ years' experience as an educator and worked in the fashion industry as an entrepreneurial hat designer and in sourcing for The Limited Brands in Sri Lanka and Portugal. Natalie's work is in business design and applying strategies from the fashion industry to other realms. At Philadelphia University she is an Associate Professor in the Fashion Merchandising & Management program, and Director of the Strategic Design MBA. Natalie earned her BA (Cum Laude) from Vassar College- Anthropology and Africana Studies; MS from Philadelphia University- Global Textile Marketing; and PhD from the University of Westminster, London- Design Management. Personal interests include swimming, dance and anything related to Brazilian culture! Natalie lives in Philadelphia, Pennsylvania (USA) with her husband, John, an attorney.

Synopsis:

The overwhelming current issue in the field of design management is one of ownership. How do we move from the old paradigm of ownership, to a newer paradigm of sharing? Design management researchers and practitioners alike have beleaguered conversations around having a seat at the table; some designers take a purist stance and are fearful that design thinking will dilute the value of design; there are emerging camps based around those practitioners who value a more open sourced approach and are fearless about ‚giving it away'. Meanwhile, the business press and trends in higher education reflect a very different stance. Natalie will discuss the need for a lingua franca in all of these spaces and will point out from which parallel worlds design management might learn to inform its internal debate around ownership, language and integration. Design management ultimately is a potent heuristic and lens which informs innovation in very ambiguous environments.

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Leading through design: How design professionals enhance their strategic role

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Keywords: Design management, leading through design, strategic design, strategic change

> *"There are those who look at things the way they are, and ask why? I dream of things that never were, and ask why not?"* Robert Kennedy

Abstract: The strategic potential of design cannot be exploited fully without a carefully nurtured expertise in design management. Similarly, the full potential of design management will not be revealed until there is a clearer understanding of the characteristics of 'world class performance' throughout the discipline.

This paper outlines various interpretations of the term 'strategic' in business, and discusses characteristics of strategic contributions that design and design professionals make. A value chain proposed, featuring design management practices, points to potential sources of strategic outcomes when design professionals lead through design. It brings together various aspects of work, especially preparing the British Standard on managing innovation (British Standards Institution, 2008) and benchmarking design management (Topalian, 1993). As with other initiatives relating to strategy in business, this is all 'work in progress'.

Design – at all points of contact in business and society

Design is present at every point of contact between an organization, its target audiences, and the environment in which it operates – variously acting as lubricant and glue between the three (Topalian, 1989). Therefore all organizations are involved with design; indeed the ubiquity of design – defined most basically as *devising effective means to achieve desired ends* – makes it the single discipline that underlies all activities in business (Topalian, 2012). All business executives have personal and collective responsibilities to ensure that design, in all its guises, is

handled in a professional, enlightened manner. Neglect of those responsibilities, and failure to nurture the requisite expertise, is tantamount to corporate sabotage.

As such, design and its management should be strategic resources. This is certainly the case when design work, in the traditional sense, exerts a significant influence on the fundamental relationship between an organization and its environment. Occasionally they are the principal determinants of how target audiences perceive and interact with the organization.

Yet it would be fair to say that the importance of the design dimension of business is rarely reflected in corporate systems, infrastructure or formal documentation. Moreover, it is still in only a tiny proportion of organizations that design features significantly in corporate language, culture and mythology. No business will fulfill its long-term potential unless design is taken seriously for, without enlightened and stretching design leadership, that potential is unlikely to be revealed, and expenditure that precedes and follows design activities cannot be optimal.

All design and all designers

Exploring the impact of design in business and society should encompass all categories of design. These include product/industrial, graphic/communication, pack, exhibition, interior and exterior environmental design, with visual identification and brand encompassing them all. More recently interaction, inclusive, digital, video game and service design have attracted increasing attention.

The contributions of all professional designers – whatever their backgrounds, training and specializations – should also be encompassed. However, it is rare for designers to be ranked as the equals of engineers and scientists. The latter's work is seen to occupy the 'harder, serious' end of the spectrum at the core of business – research & development (R&D), breakthrough innovation, and so on. By contrast, confusion persists about design college graduates whose work is still viewed as being at the 'softer, styling' end of the spectrum, often considered peripheral to business. These perceptions are changing, partly because of the growth in online businesses where effective business models, a fresh presence on the web and smooth, unhindered interaction with websites are essential.

Yet, it is business executives who make up the most powerful body of 'designers' in the world. They decide the design problems to be tackled, the concepts that go forward, the resources committed to their development, and how solutions are presented to, and supported in, markets (Topalian, 1990). The vast majority of them are 'silent designers' (Gorb and Dumas, 1987) unaware of their influence and involvement in design. However an increasing number merit being classed with design specialists as 'design professionals': individuals without design training who, nonetheless, have considerable experience handling design requirements in enlightened ways, are very professional in their approach to design problem-solving, and demonstrate a firm commitment to raise design standards (Topalian, 1994).

To work effectively, prime players need to get involved in many fields beyond design (Topalian, 1973). They draw together people with novel mixes of skills, different values and complementary networks to spark off each other with distinctive contributions. Such teams tend to be more adept at interpreting the languages and cultures of different disciplines and parties. Working in synchrony, members are able to go beyond their respective capabilities, even accomplishing things they had not thought possible – experiences that significantly affect their future thinking and actions. Moreover, as integrators, design professionals are frequently the key drivers to enhance performance in associated areas where they might not be considered to have any role. They do so because outcomes will be superior. As such, design professionals make significant 'non-design' contributions to business success (Topalian, 2012).

Consequently, explorations of design as a strategic resource ought to cover the contributions of the following:

- design as a discipline in design and other activities
- design professionals in relation to design matters, undertaken in design projects and other activities
- design professionals in non-design matters, sometimes leading through design
- clients (and sponsors) who are ultimately responsible for the outcomes of design initiatives, and often have greater influence on the quality of solutions than the creative specialists involved.

Despite internal competition and politics, much activity in business is collaborative and mutually reinforcing. Consequently it is difficult to establish direct and unique causality, thus isolating the contribution of one factor to the exclusion of all others. Yet, when necessary, business executives are rarely hesitant in assessing contributions, at least of mainstream disciplines. Sadly, achievements through design are rarely acknowledged, nor are design professionals who propose and drive initiatives, often succeeding against the odds.

Two case histories provide examples of strategic contributions when design professionals lead through design:

In 1973, a prestigious wallpaper manufacturer commissioned an interior design practice to create a dedicated display to encourage smaller retailers to stock its products rather than just placing customer orders. A survey of stores undertaken by the designers revealed that the company was not coping with its vast range of designs created over a century: delivery dates were routinely missed and disgruntled stockists cancelled many orders when customers got fed up waiting. On a positive note, the survey also yielded a useful map of the wallpaper buying process: a typical sequence of events, with timescale, that indicated the interactions of principal players, their perceptions, information requirements, decision points and the factors that influence decisions – an approach recognized today as the 'customer journey', a foundation of service design. These findings pointed to a radically different project proposal that recommended pruning the range offered, introducing ways of enhancing the wallpaper buying experience, and overhauling the order-processing system.

In the 1980s, a manufacturer of specialist processing equipment was being hammered as foreign competitors matched the specifications of its principal product at a lower price. To stave off bankruptcy, the board briefed design consultants to act as catalysts for change: prior to redesigning the product, they were to scrutinize and rethink the company's approach to manufacturing, marketing and servicing. The redesign incorporated a radical innovation in the product's configuration that simplified its operation. This enabled a ten-fold reduction in the number of components and a similarly dramatic cut in fabrication time. Moreover, in a field where tight deadlines make machine down-time most unwelcome, servicing time was slashed from two days to 30 minutes. To cap it all, these improvements enabled a new price benchmark to be set in the market at just 30% of the previous price.

Several points can be drawn from these cases. The designers had no previous experience of the clients or their requirements, yet both delivered radical, creative solutions that had strategic significance. They were brought in at the start of projects and undertook crucial groundwork that gave them the chance to change perceptions of the primary problems that needed to be addressed, partly by extracting the 'back stories' that led to the revailing situation. They influenced briefs using hard data generated during the introductory phase through a survey of retailers and a detailed analysis of internal practices.

In both instances, the designers were interested in more than a final physical design: they sought to solve whole problems which led them into terrain beyond the brief and design. For example, the focus in the first shifted from designing a dedicated display to upgrading the buying experience for customers and retailers. The range offered, buying process and ordering procedure were treated as mutually-supportive elements of a system. In the second, the preliminary examination of manufacturing, marketing and servicing practices provided the opportunity to create a better integrated company-wide system.

Both projects generated new thinking on how customer needs might be fulfilled; follow-through benefits then led to competitive advantages. In the first case, a relatively circumscribed requirement revealed corporate shortcomings in performance and feedback. In the second, fresh eyes examining the product's operation enabled an innovation in its physical configuration that set competitors a challenging lower price point in a tough market.

What is 'strategic' in business?

Many who use the term 'strategic' in business mean little more than 'vitally important'. The most basic interpretation – *an aspect of strategy* – suggests that inputs into the formulation and substance of a business (or other) strategy could be termed 'strategic', as could inputs that facilitate implementation and subsequently enhance the effectiveness of strategies. However, low aspirations, unambitious objectives and inadequate resources stunt the power of strategies; in those circumstances, outcomes are unlikely to rise above the routine.

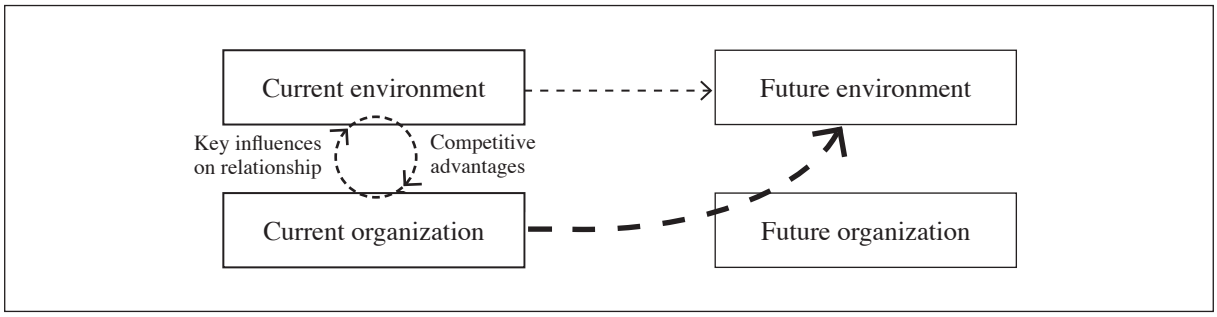

Figure 1: An organization's strategic influence on its environment (pro-active / leader)

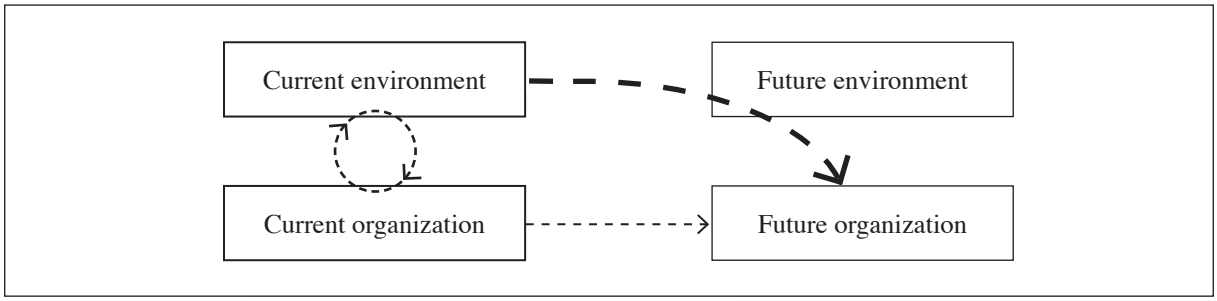

Figure 2: Strategic impact of environment on organization (responsive / follower)

A deeper understanding is gained when strategy is defined as incorporating requirements to differentiate organizations positively and create competitive advantages, typically by using relative strengths and satisfying customer needs more effectively (Ohmae, 1982). Differentiation includes separating out as well as distancing organizations from competitors, ideally creating gaps that are difficult to close quickly, so providing precious extra time to manoeuvre and strengthen positions in markets. Relative strengths include novel mixes of skills, while satisfying customer needs more effectively includes anticipating customer requirements as well as distinctive ways of addressing such needs.

The most demanding interpretation requires that strategic activities and achievements have a direct, positive impact, not just on an organization and the environment in which it operates, but more specifically on the vital interactions between them. For example, do design initiatives originating within the organization lead to significant influence and change in its environment (say, through R&D and new concepts for products and services)? Do they enable the organization to interact more productively with the environment and create competitive advantages (not least to respond to competitor threats or harness new disruptive technologies)? Does the organization grasp opportunities thrown up by changes in its environment (perhaps making use of innovations from elsewhere, catering for a new market segment, or forming alliances with competitors)? (see Figure 1). Alternatively, do internal shortcomings and external circumstances confine the organization to responding to changes prompted and imposed from outside? (see Figure 2).

Overall, does the organization anticipate and respond with agility to relevant changes in its environment in ways that shape new realities? Or is it constantly being overtaken by developments elsewhere and has to play 'catch-up', never quite matching the responses of competitors? In other words, is it a pro-active leader or a struggling follower where change is concerned?

Added characteristics in relation to 'strategic design'

A common misconception is to link 'strategic' solely with the long term, typically initiated at and relating to the corporate level. Certainly it is essential, when required, that strategic initiatives have a long-term perspective and relevance. These provide direction and continuity during the journey to a desired future, maintaining focus, avoiding unnecessary deviations from the set course, and building efficiently on experience. There are associated presumptions – not always correct – that strategic initiatives take a fair time to formulate (typically during planning cycles), are documented in formal plans, and yield benefits slowly, so returns may take some time to materialize. However, some need an explosive, short-term focus – for example, to respond rapidly to competitor actions, or exploit opportunities as soon as they appear. Agility is demonstrated both in how quickly action is taken and benefits are reaped. Clearly, a strategy that fails to deliver within a critical timescale is inadequate, as are an organization's internal processes that are blind to, and cannot keep pace with, changes in its environment.

There are 'windows of relevance' when strategic contributions are likely to prove effective (Abell, 1978), and periods after which they should be refreshed or superseded, perhaps because several competitors have adopted similar approaches (Hamel, 2002). Moreover, lead times for developing new offers and introducing significant changes demand considerable expertise to anticipate what is likely to resonate with target audiences, perhaps many years ahead. Designers can offer leaps forward in thinking, act as catalysts to co-ordinate work on and around requirements, and build the confidence to by-pass 'me too' strategies and solutions. They can be uncannily accurate when pitching designs: what seem far-fetched when proposed turn out to be just right at launch (Rawlinson, 2003). Often pioneers create truly original designs by going against mainstream thinking, dominant processes and solution formats in their fields. This may involve refining what they 'borrow with pride' from the experience of others, making it their own, then turning out distinctive results (Topalian, 2011).

Organizations need to be true to themselves in order to engage more effectively with their environments. That requires executives getting to grips with their organizations' corporate identities which, in turn, affect perceptions of how environmental factors affect them, as well as those they think can be influenced (Topalian, 1984). Executives need to upgrade expertise and practices to enable finer tuning into what goes on in the environment, making sense of it all and intervening creatively. Perhaps this is achieved through alliances with external partners with complementary expertise at the leading edge. Together

they draw more out of circumstances and exploit experiences fully to improve positioning and lead change.

Addressing whole problems and creating comprehensive solutions increase complexity and uncertainty. Now user experiences have many entry and exit points – in terms of stage, time, choice of platforms, products and services in play. Increasingly, they encompass extra senses – taste, smell and sound – requiring mastery of related expertise (Topalian, 2011). Solutions have to be tolerant and robust to accommodate the idiosyncracies of users doing their own thing in their own way, some of which may change from day to day.

Briefing with 'static' specifications providing isolated snapshots of planned 'standard' uses are no longer adequate. By contrast, 'living briefs' provide a vision of experiences to be generated through solutions, bringing to life requirements and desired futures over a range of circumstances (Topalian, 1997 and 2010). They stimulate sustained exploration to bring out the richness of issues, problems and outcomes – the details and back stories behind the headlines – so designers and other stakeholders gain a deep understanding of opportunities.

Organizations also rise to the challenge by unbundling complexity to make it more tangible: elements, interactions and inter-dependencies are disaggregated to elucidate different layers of meaning, then re-integrated in novel combinations sometimes taking satisficing short-cuts to make the process and solution manageable. This requires the ability to encapsulate 'the big picture' then distil experiences that excite and engage, spun into elegant, tightly configured systems (Elliot and Deasley, 2007). Connectivity and inter-operability between components, and interfaces with users, are crucially important. Increasingly, these are brought about through serial innovation. In a world of expanding complexity, it is essential to guard against jettisoning complexity that enlightens to end up with opaque simplicity. The demands to KISS – Keep It Simple, Stupid – often mask intellectual apathy, insensitivity and a lack of understanding.

Generally, designers are more at home in strategic situations: after all, design is about change (sometimes radical), and design professionals need to reduce the perceived uncertainties that surround change to improve the chances of smoother implementation. They tend to approach situations with open minds, ask many questions to determine what goes on, test assumptions and stretch boundaries. The designerly approach to problem-solving – with emphases on user perceptions, motivations and behaviour – tends to reveal opportunities to do things differently. Risk is contained through simulations and prototyping: these provide insights into how various options might perform in a range of circumstances, together with opportunities to eliminate shortcomings that come to light.

Creative solutions require creative implementation to protect their integrity, as well as creative support after launch to sustain their effectiveness over time. Investment in projects needs to be supplemented with investments in the transitions to subsequent initiatives: these ensure continuity, help to maintain levels of energy and enthusiasm, and draw greater benefit from accumulated experience. An effective arrangement is to evolve client-specialist

partnerships to create and exploit business opportunities fully by combining the knowledge, skills and experience of external specialists with those of internal staff (Topalian, 1973).

Different levels of strategic design contributions

> *"Vision without action is a daydream; action without vision is a nightmare"*
> Japanese proverb

A further perspective on how design professionals might contribute strategically in business is set out in a six-level hierarchy relating to formal planning (Topalian, 1995). The top four are of most interest here:

Level 1: Contributions to strategic thinking
Level 2: Contributions to business plans
Level 3: Formulation of design strategies and corporate design plans
Level 4: Formulation of design programmes
Level 5: Interpretation and evaluation of design-related data
Level 6: Supply of raw design data.

Design professionals contribute most powerfully, and at the highest level, when they have a credible role in strategic thinking. In these cases they could exert the greatest influence on the corporate identities of organizations as well as the fundamental relationships with their environments. In the process, they challenge conventional wisdom and long-held assumptions, identify shortcomings, stretch horizons and extend boundaries to gain fresh insights that point towards new directions.

Design professionals may also be key interpreters of what goes on and could be done in key areas of interest, recommending new terrain to explore and setting road maps to guide developments into the future. They identify opportunities, champion initiatives, then harness corporate capabilities with distinctive mixes of expertise to generate novel outcomes. Counter-intuitive arrangements may be suggested, for example collaborating with rivals in particular development projects or to break into specialist markets. Sometimes asking for what seems impossible opens up new avenues to pursue that may, in turn, bring tough goals within reach.

Such thinking is crucial during the formulation and communication of business missions, objectives, strategies and plans – the second level of design professionals' contributions. It opens clients' minds, raising their willingness to consider different ways of doing things, and builds their confidence to develop and implement novel solutions. Problems are recast to make them more meaningful and allow wider interpretation. Design provides new frameworks, networks, discipline, benchmarks and stories to share in building corporate spirit. In the process, design data become part of the core information on which the organization operates and strategic decisions are taken.

Design professionals (and design issues) could also be instrumental in thinking through the design implications of strategic decisions taken in other functions (say, after market and competitive analyses), then organizing so the necessary design resources and solutions are available when required. Indeed, the development of design management skills into a distinctive corporate competency might become a strategic goal.

Some business plans and other key documents, such as annual reports and corporate brochures, have separate sections devoted to design issues and their implications; others feature them explicitly in sections throughout. All these widen exposure to design and reinforce the importance of design as a strategic discipline that needs to be managed professionally.

The third level encompasses the formulation of design strategies and the preparation of a corporate design plan, building on corporate objectives and strategies specified by others. Working closely with other functions ensures that the implications of design objectives and strategies are understood and valued, actions are properly co-ordinated with clear links between design decisions and those in other functions. This integration raises the chances that resources will be invested wisely, with greatest effect.

> *"Design tactics without design strategies that flesh out business strategies are the noise before defeat"* (adapted from Sun Tzu, Chinese military philosopher)

At the fourth level, design specialists flesh out tactical design programmes to implement design 'strategies' formulated on the basis of analyses and decisions taken by others.

Positive engagement also includes a formal requirement that there is appropriate consultation so design issues are always taken into account seriously before major decisions are made. This is greatly facilitated when design professionals are active and influential at all meetings that lead to key decisions. Their power is enhanced considerably when they can alter, even veto, activities undertaken within other functions that have significant design implications.

External domains where strategic contributions might be sought

Where should executives seek opportunities for strategic change outside their organizations? Figure 3 sets out some external domains for exploration.

With respect to society, do different communities consider the organization to be a good citizen? Does it uphold human rights in all operations, pay its fair share of taxes, and support local initiatives? Are responsibilities towards the environment taken seriously (for example, its carbon footprint and record in sustainability). What is the organization's standing in business generally? Is it held up as an exemplar, perhaps with an enviable reputation relating to particularly sensitive or demanding aspects of business – say, protecting privacy or countering corruption?

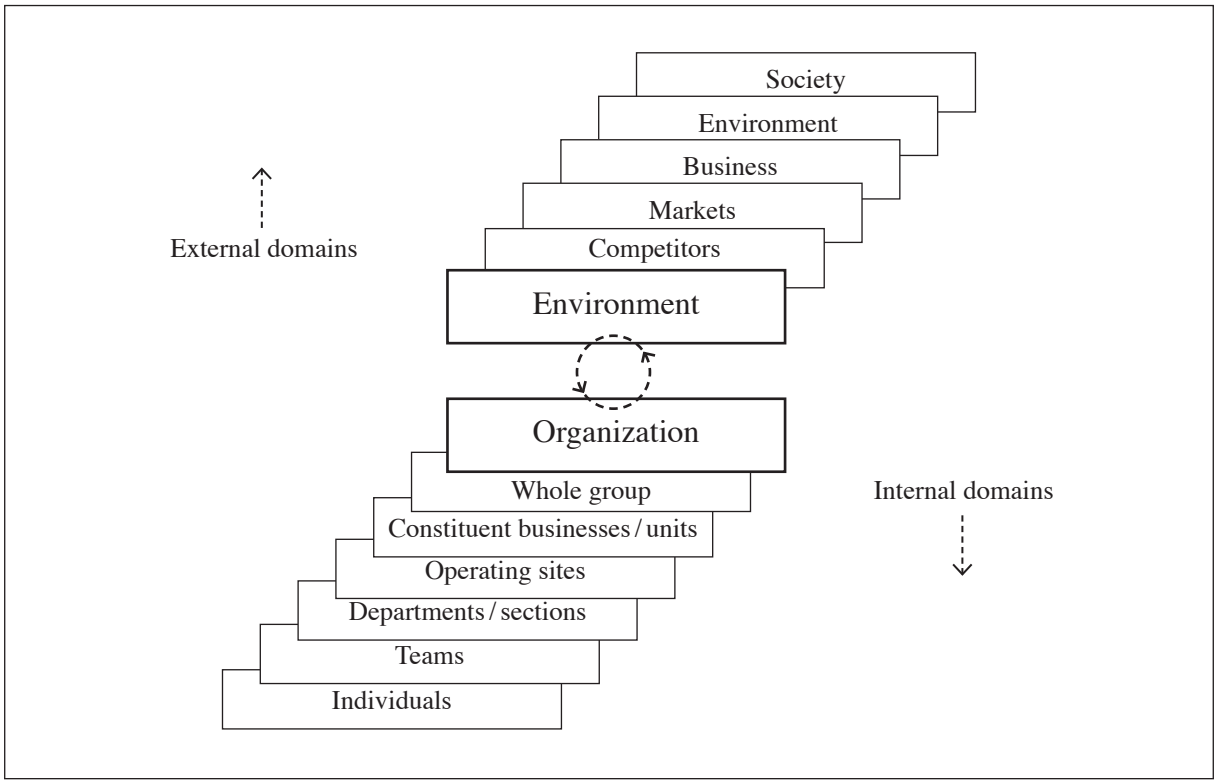

Figure 3: Some external and internal domains of the value chain where strategic contributions could arise

Regarding markets, has the organization altered the rules of the game, created new markets, reshaped channels, upgraded service support, or re-set price points? Have the organization's activities changed the aspirations of customers, what they think about (or expect from) products and services, and the degree to which these have affected their private lives and work? Have these changes raised the profile of the organization, or transformed mainstream thinking, perhaps through novel interpretations of needs, significant changes in materials and processes used, or the visual presentation of solutions?

In relation to competitors, where is the organization positioned in terms of performance and reputation? Is it considered among the 'best in class' in any principal area of interest, technology or practice? Does the way it differentiates itself, or resonates with publics, make it hard for competitors to respond effectively?

Design and design professionals could, and should, have a significant influence in all these domains as well as the internal ones below – either directly through their own actions in design or other involvements, or indirectly through others by influencing their thinking and behaviour. Design leaders should encourage colleagues to be different, change mindsets, expand networks, update their ways of working and challenge top executives, even in adverse circumstances, often operating as opportunistic innovators to turn perceptive ideas into new realities.

Internal domains to explore

Strategic contributions originating within organizations could be triggered at group level or within constituent businesses, operating sites, departments and teams by individuals at most levels of seniority (Figure 3).

Sometimes these act as springboards for significant external contributions such as developing distinctive corporate competencies around new skills sets (some imported) to offer innovative services, remedying a current weakness to gain entry into tough new markets, or the adoption of a standard that enables a small enterprise to bid credibly for leading-edge contracts against global competitors.

Intellectual property (IP) can be a powerful means of creating competitive advantage. Designers, as creators of IP, are in an advantageous position to apply it to best effect within their own organizations, as well as generating new revenue streams outside. Licensing IP with design management support could provide considerable added value. Design professionals can also ensure that IP is protected and, where appropriate, withheld from alliances to avoid compromising an organization's competitive position.

The positioning, status and performance of design and designers vis-a-vis other disciplines and professionals within an organization provide further fertile ground for exploration – as sources of complementary expertise, comparative performance and competitive advantage. What do executives aspire to and demand from design compared with other disciplines? Are they rigorous in co-ordinating the practices and systems of different disciplines? Do they commit to providing solid, enlightened support for design activities? And how does the approach adopted compare with those in other client organizations and independent design agencies? Relevant domains are set out in Figures 4 and 5.

Special interest might be taken in how design specialists, in-house or members of independent design agencies, perform when assigned to work with other departments and professionals in the organization. For example, added value will result when they help to do more with 'design' budgets and expertise under a marketing manager's control, or ensure that colleagues in other disciplines are better prepared and work productively in multi-disciplinary teams, so delivering results that have greater punch.

Creating advantage through a design management value chain

How might a professional approach to managing design add strategic value to corporate activities? Experiences with an organization, its products and services are powerful influences on customer satisfaction, loyalty, competitive positioning and reputation. Encouraging suppliers, contractors, and sales outlets (among others) to become partners expands the expertise and re-

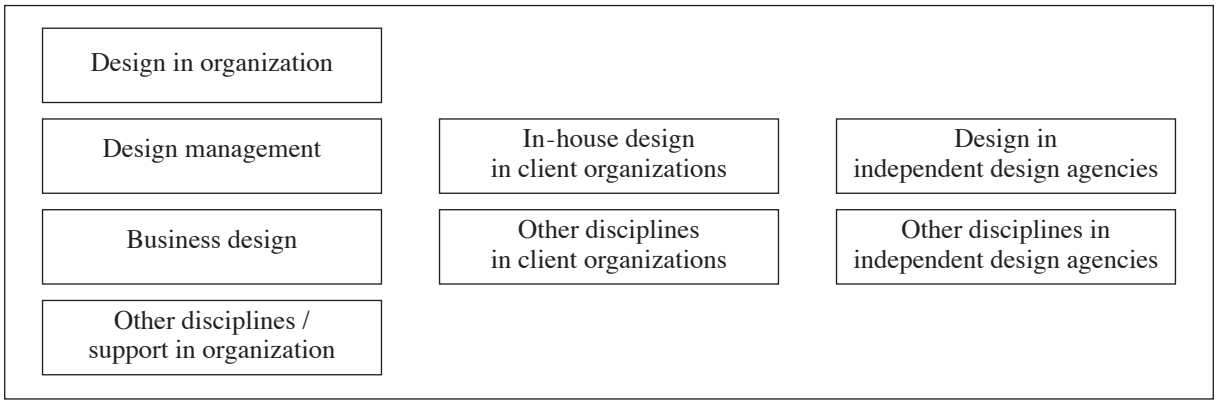

Figure 4: Internal domains of the value chain – Design and other disciplines

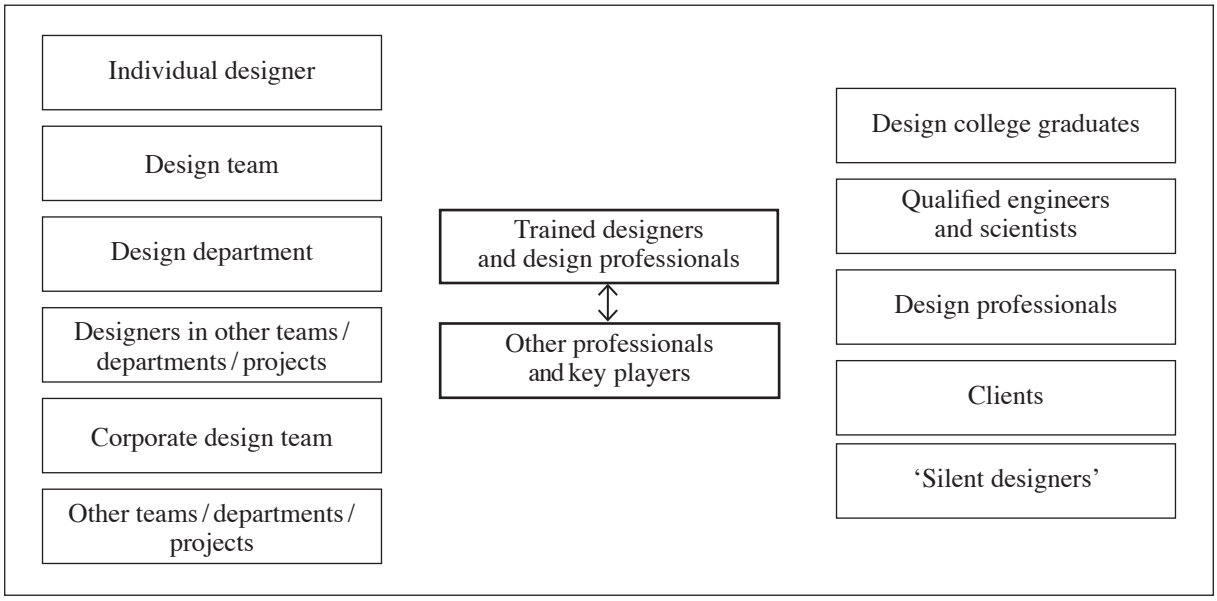

Figure 5: Internal domains of the value chain – Designers and other professionals

sources brought to bear when exploiting opportunities, and helps to spread development work and costs. It often facilitates buy-in and shortens implementation times, so raising the chances of success.

Porter, when introducing his concept of the 'value chain', stressed that a firm's activities should be disaggregated for systematic examination into "designing, producing, marketing, delivering, and supporting its product" to gain insights into the sources of competitive advantage (Porter, 1985). Though he highlights "designing" repeatedly, and fairly significant design inputs would be required to execute all the primary and support activities encompassed, the discipline is not named in his value chain. Where design is out of sight, it tends to be psychologically out of reach (Topalian, 1989); therefore, business executives are less likely to know where to look or how to harness design. In such circumstances, they will struggle to exploit fully their

organizations' potential to create competitive advantage. More recently, it was suggested that a design strand be added to Porter's support activities (Stevens et al, 2008).

The British Standard on managing innovation sets out a more immediate approach (British Standards Institution, 2008). A 'world first' when published in 1999, this guide was unusual in that it extended beyond 'technology on product' to encompass services and processes; the update covers business models, too. The content – backed by surveys that, unusually, were required by the drafting contracts – arose principally from experience in design practice not those of R&D, technology and marketing common up to that time. One figure lists nearly 100 potential sources of innovation (hence strategic impact) along a value chain, the headings of which are given below together with a selection of those sources (in brackets):

- *Strategic development* (Future vision, charting the Innovation Highway, corporate software / Knowledge Management)
- *Creation of right offerings and processes* (Customer-Product Experience Cycles, project configuration, whole-life assessment)
- *Procurement of expertise and inputs* (Relationships with suppliers and other partners, negotiation of contracts, quality control)
- *Preparation / Fabrication of offerings* (Bringing together all components of services, minimization of waste and effluents, licensing and other revenue streams)
- *Distribution / Access* (Selection of channels, delivery environment, chain of command, accessibility)
- *Marketing / Sales / Customer experience* (Buying experience, out-of-box experience, repurchase patterns, next generation wish list, incentive schemes)
- *Customer and market support* (Observation / Customer feedback, termination / phasing out / disposal, disassembly and recycling).

Working through this value chain – say, by examining an organization's design management system and infrastructure, or following design projects from initiation through to completion – provides a powerful framework for creating comprehensive seamlessly-integrated solutions. It is also the best means of protecting the integrity of those solutions throughout their life-cycles: for a small, ill-conceived variation in one part of the chain may lead to several unintended consequences and forced compromises in other parts that undermine the final impact as well as returns on investment.

However, pointing executives to key issues does not necessarily reveal the range of possibilities open to them, or the actions they will need to take when managing design. Benchmarking during the Total Quality Management era started as a means for organizations to compare their performance with those considered to be leading exponents. Unfortunately, a high proportion of benchmarking exercises ended up as 'talking shops of equals' that failed, certainly in relation to design management, to reach any consensus on what represents exemplary performance; neither were participants spurred on to new levels of achievement.

Key issues at the corporate level

- Design responsibility and leadership
- Corporate design philosophy and strategy formulation
- Positioning and 'visibility' of design
- Degree of integration and centralization of design within organization
- Auditing corporate design and design management practices
- Introducing appropriate design management systems and infrastructure
- Establishing and maintaining corporate design standards / best practices
- Environmental dimension of design (including sustainability, etc)
- Legal dimension of design (including exploitation of intellectual property)
- Design awareness / design management skills development programmes
- Corporate design capability
- Design and the manifestation of corporate identity
- Evaluation of design's contribution to, and impact on, corporate performance
- Funding of design activities

Key issues at the project level

- The design process and different types of design project
- Formulation of project proposals and the briefing process
- Selection of design specialists and suppliers
- Composition and management of 'augmented' project teams
- Planning and administration of design projects
- Costing design work and drawing up project budgets
- Design research and sources of new investments in design
- Presentation of design recommendations
- Design project documentation and control systems
- Implementation and long-term survival of design solutions
- Evaluation of design projects

Figure 6: The Design Management Universe: a value chain embracing key issues that define the discipline

A workbook produced at the time (Topalian, 1993) outlined, in descriptive vignettes, an organization's progression from 'novice' to 'world class performer' in five stages for each of the 25 key issues in the *'Design Management Universe'* (see Figure 6). Executives select issues of greatest concern to them and come to a preliminary assessment of where their organizations are along the 'design management journey'. Then they can examine their practices in greater detail through a series of statements characterizing performance at the extremes of the spectrum. Further questions – for example, relating to likely candidates for critical success factors, possible measurables, and what represents 'excellence' – provide insights into goals, internal benchmarks, priorities, and prime areas for external audits. All

these help formulate action programmes to improve performance. Figures 7 and 8 show spreads relating to *corporate design philosophy and strategy formulation*.

These exercises can be customized with respect to the issues and range of practices examined. There is also scope to update the framework as organizations pioneer new practices and refine others.

Though prepared specifically for benchmarking, this workbook has wider uses because the practices encompassed could represent – individually or in differing combinations – design management contributions with strategic potential. Some contributions may have short-term relevance, or apply only in particular circumstances. Others may have wider-ranging applications, perhaps as models for other departments and also for export as preferred practices to partners outside. Those that become embedded as corporate best practices are likely to survive longer.

It is worth noting that no organization, even one with abundant resources and considerable luck, can ease its way quickly to world-class performance. Performance depends on people, culture and identity, in addition to techniques, procedures and infrastructure. To make significant changes in all these areas is especially challenging, so progressing up the hierarchy takes several years, and the going gets tougher near the top. Indeed, maintaining an organization's competitive position at the forefront is a never-ending battle.

Conclusions

Design management is evolving as a discipline in business. Evolution 'progresses' with the fittest: the strongest practitioners with the vision to pursue new directions as well as the agility to stay ahead in their constantly changing fields. Therefore, apart from drilling down to reveal the layers of detail and meaning in the discipline's key issues, the way design practitioners operate should also be examined to understand better where design leadership emerges and how it yields strategic contributions. Clearly it is essential to recognize and acknowledge when strategic changes have been achieved, and to know how to exploit them. That feeds the virtuous spiral of innovation and leadership.

When executives recognize weaknesses that need to addressed in their practices, they invariably seek the most convenient, and complete, off-the-shelf remedies. However these are unlikely to yield deep-rooted, productive options because leaders, whether individuals or organizations, rarely emerge by aping others. Ultimately, each leads in a unique way, though common characteristics are evident. They evolve practices, adopt values and execute their work in ways that they make their own, duly moulded to their particular circumstances. Then, to maintain positions at the forefront, they refine and push their 'systems' to inspire higher levels of performance.

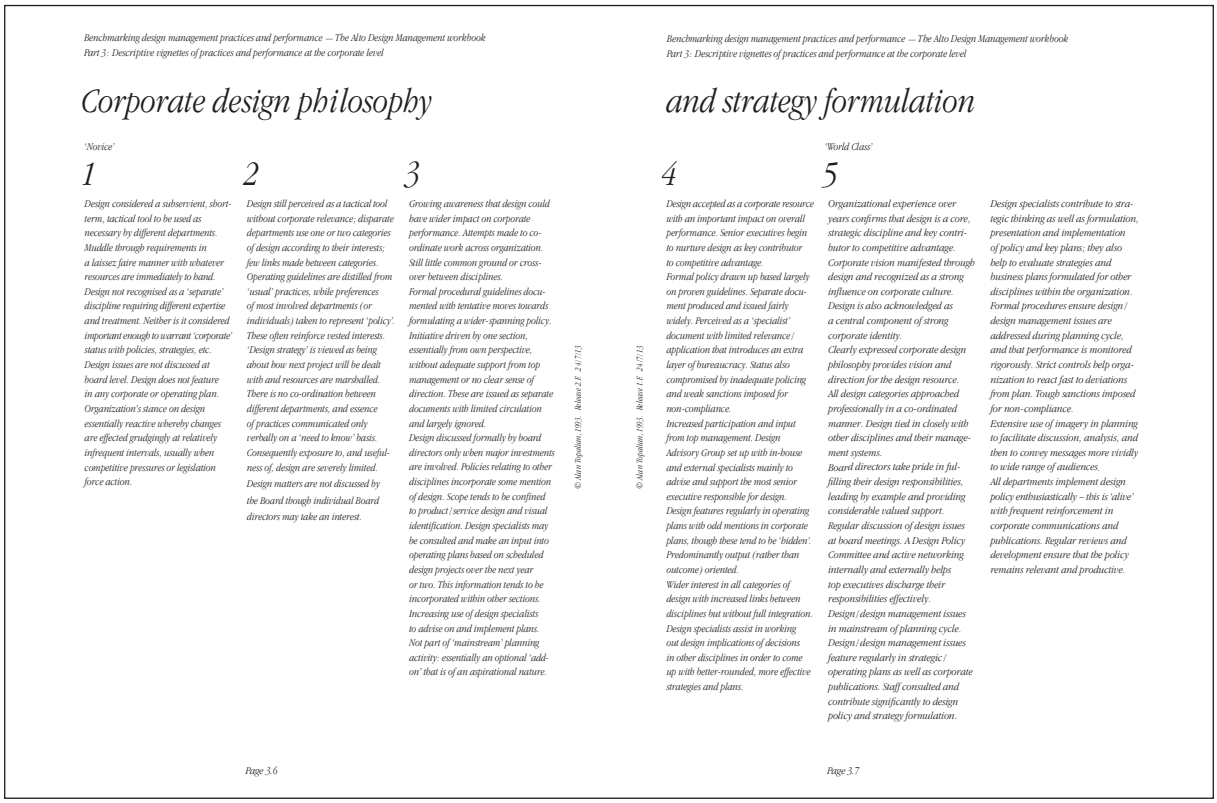

Figure 7: Descriptive vignettes of an organization's progress from 'novice' to 'world-class performer' (Alto Workbook)

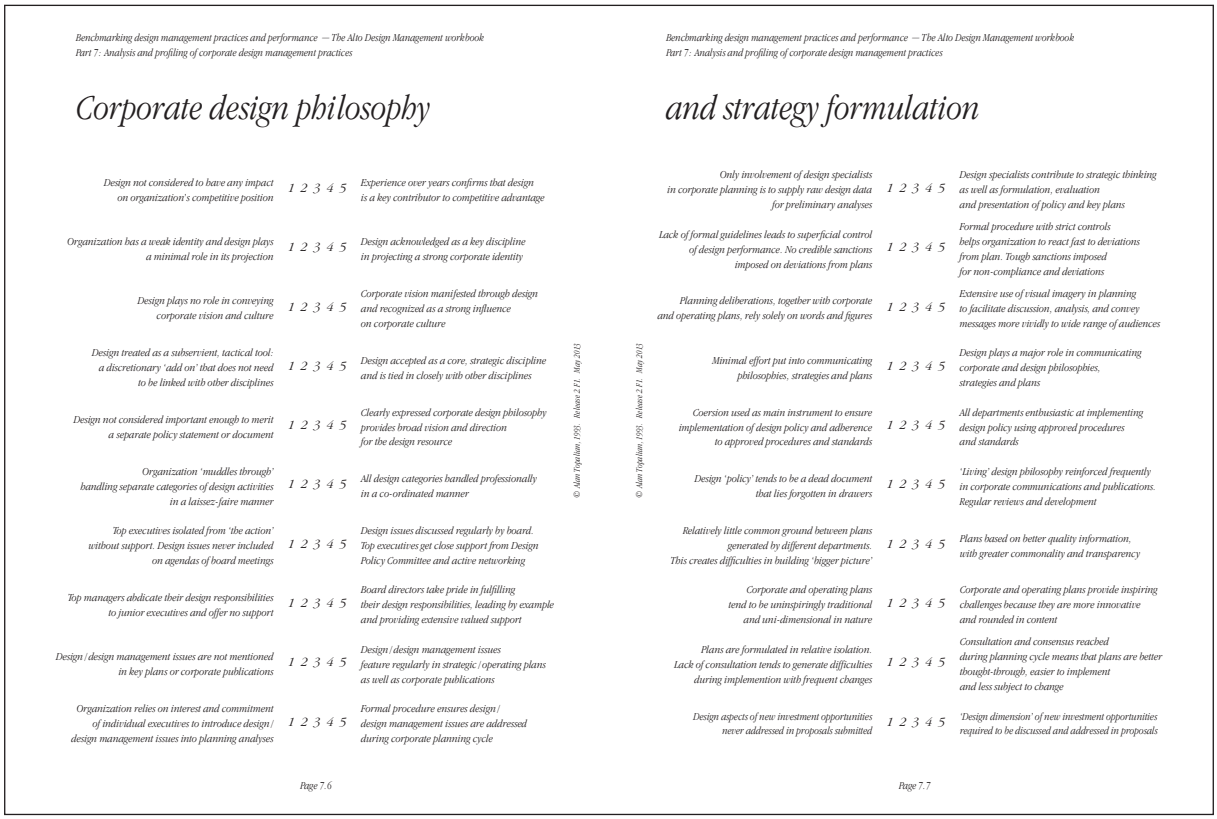

Figure 8: More detailed analysis of practices (Alto Workbook)

This paper has brought together various strands of work undertaken over the years to provide further pointers to what might be achieved in future through a professional approach to managing design, especially when design professionals adopt leadership roles. Considerable extra effort needs to be put into researching all key issues of design management to fill gaps, add finer detail, test views of individual factors (and combinations) that are critical to success, and determine how they might best be handled in professional practice. The focus should be firmly on design management practices and the contributions of design professionals as they lead through design.

The piecemeal documentation of frontline experience – without proper links or integration within a conceptual framework – does not help. Top performers can be modest about their expertise and achievements: what is relatively common in design practice may be considered exceptional in other disciplines. Therefore experience that is shared may appear to describe performances well beyond the reach of the majority. Yet it is precisely such experience that will help develop design management into a more robust discipline and exploit its full potential.

Ideally this work should be undertaken by practising design professionals so they are seen to care about the development of their discipline through systematic documentation that conveys the rigour, richness and sheer creativity of practices and achievements. That expanding shared body of knowledge will benefit both design specialists and others in business and society who need to harness the full potential of design management. It is highly likely that many practices could be exported as exemplars to other business disciplines.

Acknowledgements

I am grateful to Andrew Gunn (Board member, Employee Ownership Association), Jeremy Lindley (Global Design Director, Diageo), Armen Topalian (Business Unit Director, Birds Eye Iglo), and Leslie Wynn (Manager, Experience Design, HCL Technologies) for sharing their views on the terms ‘strategic’ and ‘strategic design’.

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A Classification of Factors Defining the Context of Product Experience

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Design theory; Product experience; Industrial design; Fashion design; Contextual factors

The way a consumer experiences a product is, to a great extent, influenced by the context in which it is encountered. Many factors define the context of experience and such factors must be considered during the design process in order to minimise the chance of designing a product that consumers would find unattractive in various contexts. This paper argues that the context of product experience can be defined by two types of factors: 'meeting form' and 'situational factors.' Based upon a literature review, this paper derives six types of meeting forms and four overall categories of situational factors in relation to such meetings. The relevance of their consideration in design processes is investigated through a series of eight interviews with industrial and fashion designers. This study supports the relevance of the defined meeting forms and situational factors.

INTRODUCTION

The way that a product appears to consumers is, to a great extent, influenced by the context in which it is experienced. As the famous quote by Oscar Wilde goes, “No object is so beautiful that, under certain conditions, it will not look ugly.” This observation is particularly important for consumer goods, which may be encountered in different types of contexts. Such considerations involve more than the design of the commercial spaces, but also the types of contact the consumer will have with the product, as well as other types of situational factors. For example, although a product may appear beautiful when standing alone in neutral settings, it also needs to look good when in use, feel good to use and be presented to the right consumer segment at the right time. Such considerations must be made during the design process in order to minimise the chances of designing a product that consumers would find unattractive in some contexts.

The overall question addressed by this paper is: "What types of factors affect how consumers experience products?" The question is investigated by conducting a literature review on contextual factors and upon which basis the paper classifies the types of factors that can influence how a consumer experiences a product. The classification is investigated through a series of interviews with industrial designers and fashion designers.

LITERATURE REVIEW

The literature review in this section consists of three parts. The first part is a structured review of literature on contextual factors, after which literature on indirect interaction and design of commercial spaces is briefly discussed.

Contextual factors

A literature review was conducted by searching for peer reviewed journal papers in the databases: Web of Science (WS) (which includes Science Citation Index Expanded, Social Sciences Citation Index and Arts & Humanities Citation Index), and Design and Applied Arts Index (DAAI). Searches were made by titles, abstracts and keywords. The terms used in the searches and the number of results are shown in Table 1. As shown, the searches in the Web of Science database were delimited by including only those papers using one of the terms "product design," "industrial design" or "marketing." This was done to avoid a high number of irrelevant results (i.e. not related to industrial design or marketing), which searches without this delimitation implied.

WS		**DAAI**	**WS**		**DAAI**
("product design" OR "industrial design" OR "marketing") AND			*("product design" OR "industrial design" OR "marketing") AND*		
"contextual factors"	42	0	"situational factors"	22	0
context* AND aesthetic*	35	65	situational AND aesthetic*	0	1
context* AND beauty	10	4	situational AND beauty	1	0
context* AND liking	90	1	situational AND liking	4	0
context* AND attractive*	57	5	situational AND attractive*	2	0
context* AND appearance	20	8	situational AND appearance	1	0
context* AND judgment	97	6	situational AND judgment	7	0
context* AND "product evaluation"	5	0	situational AND "product evaluation"	0	0

Table 1. Searches in relation to contextual/situational factors

Several of the identified papers provided classifications of contextual factors that can affect the experience of a product or references to such. First, Belk (1975) makes a distinction between situational and non-situational factors. Non-situational factors refer to general and lasting characteristics of an individual or an object. For an individual, this includes personality, intellect, gender, race, etc. For an object, it includes brand, quality, size, function, etc. Situational factors refer to those factors that are particular to a time and place of observation. According to Belk (1975), these include: (1) physical surroundings, (2) social surroundings, (3) temporal perspective, (4) task definition, and (5) antecedent states. The

physical surroundings include location, decor, sounds, lighting, music, colour, scent, weather, visible configuration of merchandise and other material surrounding the stimulus object; social surroundings refer to other individuals in the particular situation; the temporal perspective refers to the effect of point of time and the duration of situation; task definition refers to the reasons behind situations, such as intent to select, shop for or obtain information about a general or specific purchase; and antecedent states refer to momentary moods (e.g. anxiety, pleasantness, hostility and excitation) and momentary conditions (e.g. cash on hand, fatigue and illness). The effects of these dimensions have been described in several papers (see the review in Zhuang et al., 2006).

Next, Krippendorff (1989) distinguishes between four types of contexts: (1) operational context, (2) socio-linguistic context, (3) genesis context, and (4) ecological context. In the operational context, "people are seen as interacting with design objects in use." In the socio-linguistic context, "people are seen as communicating with each other about particular artifacts, their uses and users, and thereby co-constructing realities of which objects become constitutive parts." In the genesis context, "designers, producers, distributors, users, and others are seen as participating in creating and consuming artifacts and as differentially contributing to the technical organization of culture and material entropy." In the ecological context, "populations of artifacts are seen as interacting with one another and contributing to the autopoiesis (self-production) of technology and culture."

With a basis in existing research, Crilly et al. (2004) state that responses to designs typically have been described as involving: (1) innate, (2) personal and (3) cultural factors, to which Crilly et al. note that Bloch (1995) adds situational factors. The innate factors concern the relatively universal and constant aspects of product design, for example, the Gestalt principles. The personal factors concern how personal characteristics influence design preference. This includes characteristics such as age, gender, experience and personality (Crilly et al., 2004). The cultural factors may be largely defined by cultural agreements on "what looks good," "which materials are to be valued," "what is worth aspiring towards" and "how aspirations can be reinforced with material goods" (Crilly et al, 2004, based on Dormer, 1990). Such agreements are not just established conventions of taste, but also general trends and transient fashions. The situational factors mentioned by Crilly et al. (2004) include: (1) consumer motivation, (2) financial constraints, (3) match with existing possessions, (4) people surrounding the consumer during the encounter with the product, and (5) marketing programme that surround a product.

Desmet and Hekkert (2007) argue that human-product interaction can occur in three dimensions: (1) instrumental interaction, (2) non-instrumental interaction, and (3) non-physical interaction. Instrumental interaction includes using, operating and managing products. Non-instrumental interaction refers to interactions that are not directly a function in operating a product, such as caressing a product. Non-physical interaction refers to fantasising about, remembering or anticipating the use of a product. Such thoughts can be related to both imagining how the interaction with the product will be, as well as the

consequences of this interaction. Examples of such consequences include: the wearing of a fashionable new suit may produce positive remarks from colleagues; using a laptop may imply that the work is done more efficiently; and eating too much ice cream may result in a stomach ache (Desmet and Hekkert, 2007). Furthermore, Desmet and Hekkert (2007) argue that product experience is shaped by the characteristics of three elements: (1) the characteristics of the user (e.g., personality, skills, background, cultural values and motives); (2) the characteristics of the product (e.g., shape, texture, colour and behaviour); and (3) the context (e.g., physical, social and economic factors).

Schifferstein (2010) states that the contexts in which a product is typically encountered are defined by: (1) the physical surroundings (e.g. a store or a room), (2) the usage situation (different products have different uses), and (3) the socio-cultural context (social and cultural elements). According to Schifferstein (2010), these aspects can become part of the product definition.

Indirect product interaction

In addition to direct experiences with products, products can also be experienced in an indirect manner. There are important differences between direct and indirect product contact. More specifically, when consumers use a product, they have the opportunity to investigate their expectations with regard to how the product works, which can be seen as engaging in active learning rather than passive learning (Hoch and Deighton, 1989). Furthermore, direct product experiences often provide consumers with what appears to be more credible information than indirect experiences (e.g. advertising) (Smith and Swinyard, 1983; 1988).

Direct and indirect product experiences are often associated with different evaluation contexts. More specifically, prior to purchase consumers tend to compare products to each other (i.e. joint evaluation), whereas when trying out a product, they tend to focus their attention on that single product (i.e. separate evaluation) (Hamilton and Thompson, 2007). Compared to separate evaluation, joint evaluation increases the importance of quantitative differences among alternatives (Hsee and Zhang, 2004). Another aspect related to evaluation contexts is described by Hamilton and Thompson (2007), who note that consumers tend to prefer products with many features and capabilities before using them, while after using products, consumers tend to prefer the ones that are simpler and easier to use. In this vein, they argue that consumers may select products based upon indirect experiences, but that this does not maximise their satisfaction during subsequent usage.

An important type of indirect product experience is the one produced by the packaging, which some products come in. It has been shown that product packaging can bias consumer perception by drawing attention to prominent physical properties (e.g. Wansink and Van Ittersum, 2003; Deng and Kahn, 2009). Furthermore, when consumers do not have prior knowledge of the qualities of a product, package aesthetics may be a central marketing action in the attempt to affect consumer expectations (Honea and Horsky, 2012).

Other important types of indirect product experiences are brand and advertising efforts. A great deal of literature deals with the importance of brand names in relation to evaluation and choice (see e.g. Hoeffler and Keller, 2003). In fact, in some cases brand cues can be so powerful that they block the process of evaluating product quality (Van Osselaer and Alba, 2000). One aspect of this phenomenon is that a product can be seen as more than its appearance, function and price, but as representing a certain lifestyle. For example, a Ferrari does not only differ from a Skoda in terms of functional properties (top-speed, horsepower, etc.) and structural properties (shape, colour, finish, etc.), but also in relation to the lifestyle that is associated with the car type itself (Ritterfeld, 2002).

Design of commercial spaces

In the 1970s, marketing research began to increase its focus on the more subtle aspects of commercial spaces, not in the least part because of Philip Kotler, who drew attention to what he called “atmospherics,” or “the conscious designing of space to create certain effects in buyers” (Kotler, 1973). Different types of cues in commercial spaces can stimulate different types of consumer behaviour. Such studies focus on the effects of visual, auditory, olfactory and tactile cues; and their findings include information to the effect that: arousing colours can stimulate or stress consumers, which increases the likelihood of (impulse) purchases; uplifting music can promote pro-social behaviours and steer perceptions of 'store personality'; and spacious (as opposed to secluded) layouts can heighten pleasure in retail settings (e.g. Bellizzi et al., 1983; Baker et al., 2002; Chebat and Morrin, 2007; Van Rompay et al., 2012). However, this type of research is inconclusive, partly due to the fact that environmental aspects are complex combinations of different types of stimuli that are linked to nontangible variables, such as colour and scent, and tangible variables, such as decorations, layout and interior design elements (Bitner, 1992; Van Rompay et al., 2012).

In relation to commercial spaces, the surrounding products can have a great influence on the experience of the product in focus. The concept of 'hedonic contrast' describes the phenomenon of how sensory stimuli are perceived as more intense when preceded by a weak stimulus and as less intense when preceded by a strong one, given that what produces the stimuli shares significant resemblance (Cogan et al., 2013). For design objects, this mean that the perceived attractiveness of these may be affected by the objects they are placed together with. In other words, it is not enough to create a product that the consumers like, if it does not stand out as compared to the alternatives around it.

FACTORS DEFINING THE CONTEXT OF PRODUCT EXPERIENCE

Based on the literature review, a product experience may be defined as being shaped by the two non-contextual aspects, personal characteristics and product characteristics, together with meeting form and situational factors. This is illustrated in Figure 1. Subsequently, product meeting forms and situational factors are discussed.

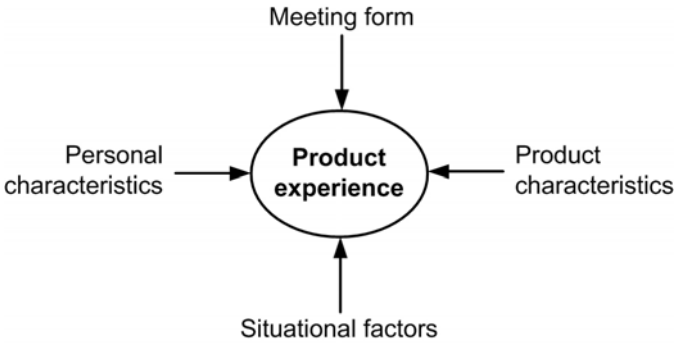

Figure 1. Product experience

Product meeting forms

As the literature review demonstrated, several researchers have touched upon the topic of product meeting forms. As mentioned, Desmet and Hekkert (2007) operate with the three dimensions of instrumental interaction, non-instrumental and non-physical interaction, while other researchers (e.g. Hoch and Deighton, 1989; Smith and Swinyard, 1983, 1988; Hamilton and Thompson, 2007) differentiate between direct and indirect interaction. This paper argues that instead of just two or three dimensions, there are, in fact, six meetings forms that may be relevant to consider when designing a product. First, a distinction can be made between the two principal types of activities in which a consumer engages in relation to a product, namely observation (one-way effect) and interaction (two-way effect). Next, a product can be experienced in both a direct and indirect manner, wherein the latter can be subdivided into 'through users' and 'through representations'. In this manner, six forms of product meetings can be defined, as shown in Figure 2. It should be noted that a product experience would often be a combination of several of these meeting forms. The six meeting forms are subsequently explained.

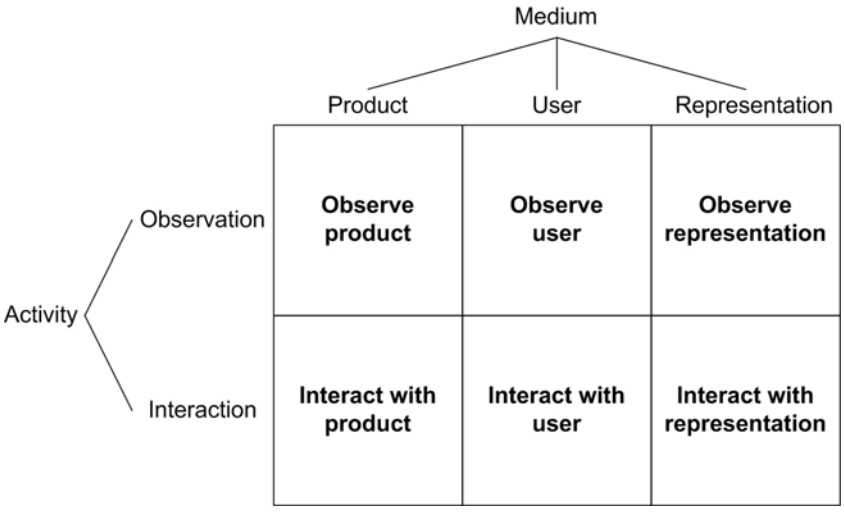

Figure 2. Product meetings types

The first type of product meeting, 'observe product,' refers to a situation wherein a consumer observes a product while it is not in use. A typical example of this type of situation is when a

consumer sees a product in a store. Some products, such as furniture, are often judged on their aesthetic qualities in a manner similar to art objects. However, in contrast to art, consumer goods (typically) also have practical functions, for which reason observations can also produce reflections with regard to how the product is to use. Other possible reflections related to observing products include how the product will look together with existing possessions, the status the product will produce and what the product's qualities are as compared to other products.

The second type of product meeting, 'interact with product,' refers to a situation wherein the consumer in focus, instead of merely observing the product, uses/tries the product. This includes situations such as sitting on a sofa, operating a smartphone, trying on some trousers, etc. Obviously, interacting with a product produces experiences different than observation alone.

The third type of product meeting, 'observe user,' refers to a situation wherein another person using the product is observed. Examples of this type of situation include seeing someone operating a smartphone, seeing someone wearing a particular clothing item, seeing someone sitting in a chair, etc. Observation of someone using a product may give impressions of how a product is to use, as well as how the product may become associated with the lifestyle of the particular user.

The fourth type of product meeting, 'interact with user', refers to a situation in which the consumer in focus interacts with a user of a product. Besides actual users of a product, this meeting form also includes interacting with a sales person, who by telling about the product acts like a user. Since the interaction is with a 'user' rather than the product itself, the impression of the product is produced by what others say about it. Such descriptions of the product may include descriptions of aesthetic qualities, functionality, price, durability, etc. Thus, in this type of context, the relationship to the one telling about the product is important, since the way such descriptions are received depends upon if the one describing the product is considered competent, believable, having good taste, etc.

The fifth type of product meeting, 'observe representation,' describes a situation wherein a product is encountered through texts, pictures or videos, typically in relation to marketing efforts. As mentioned, brand cues can be so powerful that they override the process of evaluating actual product quality, and commercials can associate a product with desirable lifestyles, which in some cases can be more important than the actual design. Since the designer knows the product best, inputs from the designer seem relevant in this context.

The sixth type of product meeting, 'interact with representation,' describes a situation wherein the product is explored by interacting with various representations of the product. Examples of this meeting form include: interacting with a website to discover different information about a product, investigating a 3D model of a product, and the use of web-based interior decoration applications.

Obviously, the six product meeting forms defined are typically given different emphasis by a designer; and some of the meeting forms are often even beyond the influence of the designer, in particular, the two forms related to 'representation.' However, if a designer has ideas about how a design is best presented, it seems natural that the designer would provide relevant marketers with such information, although not being the one making the final decisions. This issue is investigated through empirical studies later in this paper.

The six meeting forms defined are closely connected to the physical surroundings of the product. For the first product meeting form, 'observe product,' the physical surroundings can have a great effect on how a product is perceived. For example, a chair in a classical design may appear old-fashioned and clumsy if placed in a functionalistic interior, but if placed in a more classical interior, it may appear elegant. The physical surroundings also include the effects from other similar products. As mentioned, if a similar product is observed before the product in focus, the relative quality of the previous product may positively or negatively affect how the product in focus is perceived, i.e. the 'hedonic contrast.' For the second form of product experience, 'interact with product,' the physical surroundings can also have a great effect on the experience using the product. For example, if trying on some trousers under hot and humid settings, the pants may appear uncomfortable, while in a well-tempered setting, they may appear comfortable. Furthermore, hedonic contrast may also be a relevant factor in relation to use of a product. For example, if trying out a laptop, which is considered to have an uncomfortable keyboard, this may positively affect the evaluation of the keyboard on the next laptop tried. For the third and fourth product meeting forms, 'observe user' and 'interact with user,' studies have shown that the physical surroundings in which a person appears can influence how this person is perceived (Campbell, 1979; Morrow and McElroy, 1981). This means that if a 'user,' for example, is observed in an interior considered ugly or uncomfortable, it may become less desirable to own the product in use, since the unpleasant emotions produced by the room can become associated with the usage activity or the user. Such negative effects can also be relevant when a 'user' tells about a product, since negative impressions of the person can affect the perceived credibility, competency and taste of this person. For the last two product meeting forms, the product is experienced through representation. For products encountered in magazines and on websites, these are often seen among other products. As for the first meeting form, this implies that the consumer often will compare the product to others.

Situational factors

Among the classifications of situational factors identified in literature, the one by Belk (1975) appears to be the most relevant for this paper because of its focus and breadth. To simplify matters, the five categories of Belk (1975) may be reduced to four by merging the 'task definition' and 'antecedent states' factors into a one category, since they both refer to the personal context of the one experiencing the product. In addition to the contexts mentioned by Belk (1975), it could be argued that the 'cultural context' should also be considered (Crilly et al., 2004; Schifferstein, 2010). However, since the relevant cultural aspects in the situation

in focus are embedded in the people and the physical settings of the situation, the inclusion of this dimension would imply overlap.

A combination of the four categories emerging from the classification from Belk (1975) and the discussion of product meeting forms in the last section can be illustrated as shown in Figure 3. As seen, the consumer is placed within a 'personal context,' which includes the reasons for the person being in this situation, as well as the momentary moods and conditions of the person. In the same manner, the product is placed in a 'medium context' to show that it can appear in different forms (i.e. product itself, through user and through representation). The "meeting" is placed in a dotted 'activity type' circle, which serves to illustrate that such meetings can be produced by different activities, i.e. observation and interaction. The last part of the model seems to be more debatable, since it can be discussed if it is reasonable to illustrate the contexts as being part of each other. The applied rationale is that the meeting with the product takes place in a social context, which takes place in a physical context at a certain point of time (temporal context).

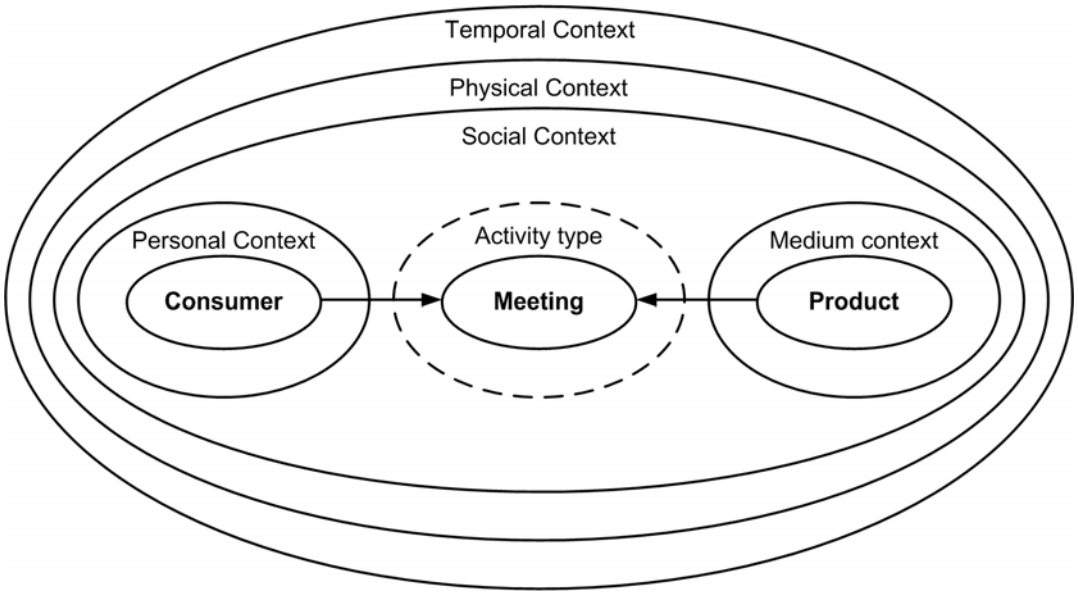

Figure 3. Factors defining the context of product experience

RESEARCH METHOD

To investigate the proposed framework, studies of eight designers were carried out. The designers were identified by a regional business development and advisory organisation, instructed to find designers of consumer-oriented products for which appearance plays an important role. To investigate the classification in a broader manner, designers with experience from different types of products were chosen.

The study of the eight designers was carried out in four overall steps: (1) analysis of reference projects of the designers; (2) semi-structured interviews and follow-up; (3) selective transcription of interviews; and (4) analysis of interviews. The interviews focused on design processes in relation to consideration of contextual factors, types of design foci and design

expertise. The interviews lasted around 1.5 hours (Interview 4, only about half that time) and were digitally recorded. Notes were taken during the interviews in order to register impressions not captured by the recorder. Further information about the interviewed designers is shown in Table 2.

	Years of experience	Education	Design focus	Design assignments
1	2	MA Industrial Design	Furniture, lamps, textiles	Freelance
2	2	MA Textile Design	Textile products, interiors, furniture, clothes and bags	Freelance
3	4	Diploma in media graphics	Shoes (earlier graphic design)	Employed at producer
4	11	Tailor, diploma in fashion design	Clothing (mainly for women)	Producer/freelancer
5	13	MA Fashion Design	Clothing (mainly for children)	Producer/freelancer
6	20	BA Industrial Design	Furniture, toys, medical products, footwear, process facilitation, etc.	Freelance
7	22	MA Arch	Furniture, lamps, household appliances, etc.	Freelance
8	25	MA Arch	Furniture, industrial equipment, household appliances, etc.	Freelance

Table 2. Interviewed designers

RESULTS

First the designers were asked about the amount of consideration paid to different meeting forms during design processes. Table 3 shows how the designers, in a rough manner, estimated the amount of consideration paid to each of the defined meeting forms in general.

Amount of consideration paid to product meeting forms during the design process						
	Observe product	**Interact with product**	**Observe use**	**Interact with user**	**Observe representation**	**Interact with representation**
1	Much	Much	Much	Much	Little	None
2	Much	Much	Much	Some/Much	Little	None
3	Much	Much	Much	Much	Some/Much	Little
4	Much	Much	Much	Much	Some	Little
5	Much	Much	Much	Much	some	Little
6	Much	Much	Much	Much	Some/Much	Little
7	Much	Much	Much	Some/Much	Some	Little
8	Much	Much	Much	Some/Much	None	None

Table 3. Amount of consideration paid to product meeting forms

As seen in Table 3, the first three meeting forms were claimed to be given 'much' consideration during the design process by all the designers. The fourth meeting form, 'interact with user,' was also claimed to be given 'much' consideration by most of the designers, in the sense that considerations were paid to the special qualities that consumers were expected to find particularly noticeable and, thus, worth mentioning to others. The considerations paid to the category "observe representation" varied from 'none' to 'some/much.' The ones paying 'much' attention to this category mentioned considerations of how the product would appear on packages, websites and magazines. In particular, this type of consideration was related to how the product would look as compared to other products

represented in the same media. The last category, 'interact with representation,' was given only 'none' or 'little' attention. The designers giving this aspect 'little' attention mentioned considering how websites were able to allow for different kinds of product exploration through interaction. All the designers, except the two sometimes involved in package design, stated that the two last categories were typically not something they had responsibility for, but that their influence was rather in the form of inputs to marketers.

The four types of situational factors were in general given 'much' attention by all the designers, except for 'physical context,' which was considered only to be given 'little-to-some' attention by one of the designers. This designer was employed by a shoe producer with its own stores, implying that there were no products from competitors in the most common physical surroundings in which consumers encountered the designed product, i.e. store contexts. Furthermore, this shoe producer had another department responsible for the store design. Thus, the designer did not feel she had to consider this aspect much, besides the physical contexts in which the product would be used. In relation to social context, all the designers stated that they made, to some degree, attempts to understand potential users and their lifestyles. In relation to temporal contexts, all the designers considered fashion aspects when relevant for the product in focus. For five of the designers, this sometimes involved making designs that broke away from the 'fashion' or 'norm.' Other mentioned aspects in relation to temporal contexts included: how the product would age, restyling options after having used the product for some time, at what times the product is used, and for how long the product is used each time.

After the having discussed the defined product meeting forms and categories of situational factors, the designers were asked if they could mention aspects not included in these. This was not the case.

Next, the designers were asked if they ever overlooked any of the defined meeting forms and situational factors. The designers, to varying extents, cared little to admit having overlooked such factors; in fact, three of them were somewhat reluctant to do so. Instead, they stated that it normally was a marketing task to ensure that all relevant contexts are considered, since marketers are the ones with the greatest insights into who the consumers are. Several of the designers also mentioned that consumers sometimes use a product in other ways than intended and that sometimes the product appeals to others than it was designed to. Such aspects can, obviously, imply that a product appears in and is used in contexts not considered during the design phase, without this necessarily having to be categorized as having been an overlooked context. On the other hand, all the designers agreed that there is a clear correlation between the experience of the designer and the ability to avoid overlooking important contexts.

Next, the designers were asked if their considerations of product meeting forms and situational factors during design processes were made on an intuitive basis or through the use of some sort of checklist. All the designers said that they did this on an intuitive basis without any form of predefined checklists and they did not believe that they had much need for these

when designing products. On the other hand, they could all, to varying degrees, see the useful of the classification in relation to education; and five of the designers also mentioned that the classification in some contexts could be useful for organising discussions about designs with marketers, business customers or colleagues.

Finally, the designers were given the question of how they handled situations in which product design ideas seemed of high quality in some contexts, but little in others. While all the designers claimed that they always strived for creating designs that have qualities in all relevant context types, they also recognized that this was not always possible. For example, all the designers had designed products that were not very practical in use because of aesthetic considerations, and/or products for which appearance qualities were sacrificed in order to improve functional characteristics (e.g. pleasantness of use and durability). In this context, three of the designers also mentioned that that sometimes a product can actually 'look too good,' meaning that if a product looks very expensive or fragile, some individuals may be afraid of using it. Additionally, it was mentioned that if the design of a product is very original, it may not be clear to the consumer what kind of product it is and, thus, they might not consider it.

CONCLUSION

The purpose of this paper was to identify and organise the factors that define the context of product experience in relation to consumer goods. Based on a literature review, the paper developed six distinct product meeting forms and four types of situational factors, which define the context in which such meetings take place. The meeting forms include 'observe product,' 'interact with product,' 'observe use,' interact with user,' 'observe representation' and 'interact with representation,' while the four types of situational factors include 'personal,' 'social,' 'physical' and 'temporal.'

The classifications of meeting forms and situational factors were investigated through interviews with eight designers from the fields of fashion and industrial design. The purpose of these studies was to determine to what extent the defined categories are considered by designers when creating new products. The most important findings from the empirical studies include that: (1) the six product meeting forms and the four types of situational factors are all considered in practice by industrial designers (although not all designers consider all meeting forms); (2) the designers could not come up with additional categories (i.e. this is an indication of the completeness of the classification); (3) the designers consider product meeting forms and situational factors on an intuitive basis; and (4) the classification was considered to be potentially useful in relation to education and for organising discussions of designs.

Future research should further investigate the relevance of the defined types of product meeting forms and situational factors through further empirical studies. In particular, the

collaboration between designers and marketers in relation to the defined categories may shed further light on the topic.

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A Critical Assessment of the Design Management Staircase Model Factors

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Keywords: Design Management Staircase Model, Success factors, NPD factors

Since the 1970s a great deal of research has been conducted into the implementation of successful new product development. Current research has demonstrated Design Management to be a vital aspect of NPD. The Design Management Staircase Model has its own key factors for the assessment of DM. In this paper a comparison is made between NPD success factors and the DM Staircase Model, showcasing both similarities and differences. The origins of the factors and their meanings are covered along with an explanation of how the factors are utilised.

INTRODUCTION

The paper forms part of a wider research project investigating the suitability and validity of the Design Management (DM) Staircase model (Kootstra, 2009) as a method to assess current DM capabilities in European Businesses.

The DM Staircase model was developed during the Award for Design Management Innovating and Reinforcing Enterprises (ADMIRE) programme as part of the PRO-INNO Europe initiative formed by the European Commission (EC) Directorate General for Industry and Enterprise in 2009. Despite finding evidence of a positive correlation between DM and business performance, the EC identified a substantial lack of knowledge concerning the manner and extent to which European businesses integrate design into their management structures. Therefore, one of the key objectives of the ADMIRE programme was to investigate DM practices within European businesses and to identify obstacles preventing businesses from implementing DM structures.

In the absence of a validated model to assess European businesses' DM capability, Kootstra (2009) developed the DM Staircase. The model aims to enable European businesses to assess and improve their DM capabilities in order to increase their effective use of design and improve their competitiveness and business success. To assess DM capabilities a process

perspective was taken, classifying the DM capabilities of businesses into four different levels, ranging from an immature stage, level 1, through to level 4, where design is managed strategically. All four levels are further defined by five factors that influence the success or failure of design and are indicative of good DM. The level ranking is dependent on the extent to which businesses implemented these five factors. Subsequently, the DM Staircase model was tested on a large scale study amongst 605 European businesses. The results of this study were presented in "The Incorporation of Design Management in Today's Business Practices" (Kootstra, 2009).

Prior investigation regarding the Staircase model structure and levels demonstrated that it represents a robust model to assess DM capabilities in European businesses (Hesselmann et al., 2012). However, the five underlying factors of the Staircase model have not been examined regarding their appropriateness to assess DM capabilities of European businesses. Therefore, this paper will examine the five factors that underlie the model. The research is based on the results of a literature review covering 64 studies published between 1974 and 2009 (i.e. from Chakrabarti (1974) to Barczak et al. (2009)). The studies predominantly examine success factors for new product development (NPD). Previous research (Hesselmann et al., 2011) has demonstrated that predictive success factors for NPD are also suitable predictors of DM success. This paper will critically comment on the choice of the five Staircase Model factors based on the established NPD success factors. This critical analysis focuses on the question of how appropriate are the five factors in assessing current DM practices and identifying obstacles preventing businesses from implementing DM structures.

METHOD

The format of the paper is structured as follows:

- A presentation of the Staircase Model and its five underlying factors
- A comprehensive literature review on NPD success factors
- The establishment of a list of the most frequently referenced NPD success factors from literature
- An analysis of the five DM Staircase Model factors based on the findings of the literature review

Following a literature review on essential factors within the NPD process, it was discovered that the same factors that drive the NPD process are also the most influential for successful DM (Hesselmann et al., 2011). Thus, a list of the most frequently referenced NPD success factors was derived from the literature. Based on an empirical data analysis of 313 questionnaires gathered from the DME Award entrants as part of a Europe wide investigation into best DM practice, the data showed that the majority of the DME awardees employed the established success factors and thus it may be reasonably argued that these activities are universally adopted by successful companies (Hesselmann et al., 2011). However, universal adoption of a particular set of factors does not necessarily mean that those factors are the most relevant factors to use to assess effective DM.

DESIGN MANAGEMENT STAIRCASE MODEL

Staircase Model Levels

Kootstra (2009) describes the structure of the DM Staircase Model. He states that the DM Staircase model is based on a method comparable to the Design Ladder (Ramlau and Melander, 2004) of the Danish Design Centre. The DM Staircase model describes the characteristic DM behaviour and capability of businesses at four levels. The level classification ranges from the lowest level "No DM" to the highest level where DM is used strategically and is part of the business culture (Figure 1) (Kootstra, 2009). The four levels are presented as:

Level 1	No Design Management	In this level, businesses make no use of DM. Design has no role in the business objectives and is only applied occasionally.
Level 2	Design Management as a project	In this level, the use of design is limited to meeting direct business needs as a marketing tool. Design is not recognised as a tool for innovation or implemented in the NPD process.
Level 3	Design Management as a function	In this level businesses start to recognise design as a tool for innovation, design is integrated in the NPD process.
Level 4	Design Management as a culture	In this level, businesses are highly design driven; design is an essential part of the differentiation strategy.

Table 1: Staircase model levels

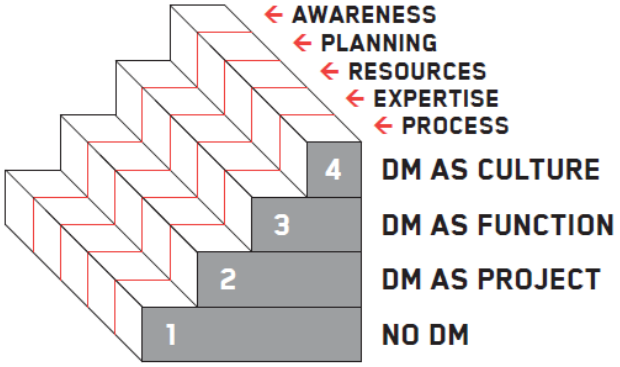

Figure 1: Design Management Staircase model
Source: Kootstra, Gert. (2009)

Staircase Model Factors

All four levels of the DM Staircase model are further defined by five factors influencing the success or failure of design and indicating good DM. The level ranking is dependent on the extent to which businesses have implemented these five factors:

1. *Factor Awareness: degree of awareness of benefits*
   The extent to which businesses are aware of the benefits and the potential value that design and DM can offer.

Management's attitude towards design is a critical factor affecting whether design actually contributes to the success of a product or not. A lack of awareness of the possibilities and potential benefits forms a barrier preventing effective use of design. In today's practice, this lack is down to the education and background of senior managers (cultural background, design training, technical and business knowledge, etc.), as well as their attitude towards so-called 'soft' assets, i.e. brands and reputation. It is also important for there to be a common belief in the importance and value of design among employees.

2. *Factor Planning: whether design plans and objectives are developed*
   The extent to which businesses have developed a strategy for design, articulated in business plans and communicated widely.

   This concerns the formal documentation of basic principles and objectives, and the dissemination thereof among employees, with an intention of gaining their interest and inciting them to action. Whenever business plans are devoid of objectives for design, DM will only be rolled out on a limited scale. Another key aspect is whether a company is able to formulate design targets (in line with their business or market targets) to drive design activities. When it is unclear what design is supposed to achieve, and what effects are to be strived for, developing a good strategy is simply impossible. It will therefore have to be clear what the competition strategy is, and how design should dovetail with that.

3. *Factor Resources: people (design staff), funding (budgets) and means of production (facilities)*
   The extent to which businesses invest in design. Resources are considered as the sum of all design investment.

   This is mainly about the right design capacity (the number of people), but also about the ability to adequately budget for design projects. Design investments also go into training budgets and production facilities (for example, staff training, hardware and software for design, and an inspiring work environment). One of DM’s jobs is to ensure the best possible use of the means available within an organisation. A lack of resources is considered an impediment for good DM practices.

4. *Factor Expertise: the level of DM experience, skills and expertise*
   The quality of the design staff and the range of tools and methods applied.

   This is all about the quality of the available staff (professional designers, design managers, advisors, multi-disciplinary design team, and the directorship/management) and the advanced nature of the applied tools and methods.

5. *Factor Process: whether an effective process is followed*
   The extent to which businesses follow a professional and effective design management process, embedded in core business processes.

Timing, i.e. when design is applied in development processes, also plays a key role here. Is there a systematic policy for product development and innovation processes, into which design was embedded from the start, in place? DM comprises of a formal programme of design activities as opposed to a mishmash of ad-hoc design activities. DM at process level has a formal set up, meaning that it is part of a company's wider policy-making process, and that it interfaces with other areas of the business. Implementation of such a programme within an organisation will depart from an earlier created organisational structure; it is not merely a 'hobby' of one individual manager, but 'interlinks' all involved parties and responsible managers by facilitating effective collaboration.

NPD SUCCESS FACTORS

Method

A systematic literature review of NPD success factor research from 1974 to 2009 was performed. The primary sources for the literature review were the databases Emerald, JSTOR and Business Source Premier. The search terms "New Product Development" and "Success" were used for all three database searches, using the Boolean logic approach (Oliver, 2012). Emerald produced ten results in journal article titles. JSTOR produced 39 results in journal and article abstracts (a search for these terms within titles displayed no results). Business Source Premier generated 57 academic journal articles which contained both search terms in their title. The database search findings contained two articles, Montoya-Weiss and Calantone (1994) and Ernst (2002), that reviewed and analysed existing literature on NPD success factor analyses. A further 45 references were derived from the bibliography of the two aforementioned articles. According to Montoya-Weiss and Calantone (1994) the existing research about NPD success factors can be summarised in three main research strings; NPD factors with a positive correlation to the project outcome, NPD factors with a negative correlation to the project outcome and NPD factors that differentiate between a positive and negative correlation to the project outcome. The scope of the analysed papers was limited to studies with empirical analyses of the correlation between NPD factors and product success based on large scale studies. In total, 64 studies on NPD success factors were considered for the literature review. Each of the 64 studies on NPD success factors was examined and the presented NPD success factors of each study were compiled in a comprehensive list. Further, from each study the definition of the different NPD success factors was examined and terms were clustered and grouped according to definition. The results of the amalgamated terms and the derived definitions are presented in Table 2.

Summary

Extensive research on NPD processes occurred during the 1980s and 1990s. In particular, during this period, different specific NPD process factors were identified and tested to discriminate which activities were critical for success. For example, a study conducted by

Cooper and Kleinschmidt (1986) on 123 different firms indicated that success is related not just to addressing these critical success factors, but also how to well these activities are managed. During the later period of NPD research, a study of 86 electronic product pairs in a comparative study for success factors showed the critical need for managerial excellence (Zirger and Maidique, 1990). Overall, these study results abetted a paradigm shift. Within this four year period the direction in the NPD success factor research changed from emphasising operational type activities to stressing the importance of the desired outcome. The results of Zirger and Madique placed managerial excellence as a predictor for success in NPD. Later, Cooper and Kleinschmidt (1993a) published their research findings based on a study with 103 projects in the chemical industry in Europe and North America. In contrast to previous studies, Cooper and Kleinschmidt created a conceptual model combining all product and non-product advantages into a new category, 'The Strategy'. Later, Cooper (1994) analysed 103 new products from 21 different firms to deduce their key success factors. This study resulted in a framework of eleven different criteria for NPD to be profitable. These factors, in contrast to Zirger and Maidique (1990), incorporate and combine both operational and managerial type activities as important for success. The shift from operational importance to an emerging managerial importance, and then to a combination of the both, makes it apparent that these categories should work synergistically with an underscore of quality management overall. After the advent of this NPD structure, a study by Balbontin et al. (1999) showed more progress in the evolution of success factors. Forty-nine companies from the United Kingdom and 38 companies from the USA from key industrial sectors were questioned about their NPD practices with successful and unsuccessful projects. The majority of the results concentrated on management skills. Furthermore, Brentani and Kleinschmidt (2004) found that to achieve outstanding results, senior management and appropriate resources that are committed to NPD must be incorporated. A “NPD” culture must be adopted. The companies that Brentani and Kleinschmidt analysed had a corporate culture that supported their NPD process, i.e. company values were instilled with the importance of the NPD process. The message that was conveyed to management was:

> ***“Focus on the softer elements that make up the behavioural environment in order to set the tone of an organization for successful…NPD” (Brentani and Kleinschmidt, 2004, p. 324)***

It is now widely known that management is an issue of major importance. Table 2 presents a table created based on 64 studies on NPD success factors. This table lists the most frequently referenced success factors listed in descending order of most referenced.

Reference Count	Factor	References	Definition
28	User involvement and testing	(Balbontin et al., 1999, Barczak et al., 2009, Bronnenberg and Engelen, 1988, Cooper, 1979, Cooper, 1980, Cooper and Kleinschmidt, 1986, Cooper and Kleinschmidt, 1987b, Cooper and Kleinschmidt, 1987c, Cooper, 1988, Cooper and Kleinschmidt, 1993c, Cooper and Kleinschmidt, 1993b, Cooper, 1994, Cooper and Kleinschmidt,	User involvement and testing refers to the understanding that a new product has to respond to user needs. A frequent interaction with users is required in order to gain all necessary information regarding their needs, to understand what benefits are desired, what superior performance is, what quality means and what the user value depends on. A verification that the product

		1995c, Cooper et al., 2002, Cooper and Edgett, 2008, Edgett et al., 1992, Gemünden et al., 1992, Huang et al., 2002, Jervis, 1975, Johne and Snelson, 1988, Lilien and Yoon, 1989, Mishra et al., 1996, Pinto and Slevin, 1987, Rochford and Rudelius, 1997, Rothwell et al., 1974, Rubenstein et al., 1976, Song and Parry, 1997a, Utterback et al., 1976)	responds to the customers' needs and the customer acceptance is obtained through testing the product or prototype before the full scale launch or development. Hereby, testing can refer to the technical inspection in a lab or under controlled conditions or field trials in collaboration with the end users.
26	Cross-functional project teams	(Balbontin et al., 1999, Barczak et al., 2009, Barczak, 1995, Cheng and Shiu, 2008, Cooper and Kleinschmidt, 1993d, Cooper, 1994, Cooper and Kleinschmidt, 1995b, Cooper and Kleinschmidt, 1995a, Cooper and Kleinschmidt, 1995c, Cooper and Kleinschmidt, 2007, Cooper and Edgett, 2008, Ebadi and Utterback, 1984, Hopkins, 1981, Jervis, 1975, Johne and Snelson, 1988, Lilien and Yoon, 1989, Pinto and Slevin, 1987, Pinto and Pinto, 1990, Rothwell et al., 1974, Song and Parry, 1997a, Song and Parry, 1997b, Szakasits, 1974, Verworn, 2009, Voss, 1985, Yap and Souder, 1994, Zirger and Maidique, 1990)	Cross-functional project teams refers to having a core project team with members from different functions within the company. This cross-functional team is committed to and accountable for the project from the beginning to the end and all team members have an overall business understanding. Good internal communications within the cross-functional teams are essential to ensure the close interaction between the different team members and functions within the company. It is suggested to install adequate and formal communication channels just as feedback mechanism and regular meetings to ensure high quality interdepartmental coordination and cooperation.
21	Top management	(Baker et al., 1986, Balbontin et al., 1999, Barczak et al., 2009, Brentani and Kleinschmidt, 2004, Cooper and Kleinschmidt, 1987a, Cooper and Kleinschmidt, 1993d, Cooper, 1994, Cooper and Kleinschmidt, 1995b, Cooper and Kleinschmidt, 1995a, Cooper and Kleinschmidt, 2007, Cooper and Edgett, 2008, Hopkins, 1981, Johne and Snelson, 1988, Kleinschmidt et al., 2007, Lilien and Yoon, 1989, Maidique and Zirger, 1984, Pinto and Slevin, 1987, Rubenstein et al., 1976, Utterback et al., 1976, Yap and Souder, 1994, Zirger and Maidique, 1990)	The factor top management refers to the strong involvement of the top management in the NPD process with a high level of support from the beginning to the end. By involving the top management which is accountable for the project outcome it is ensured that all necessary resources are committed to the project and that it receives the necessary support for a successful product launch.
20	Market research	(Barczak et al., 2009, Cooper, 1984a, Cooper and Kleinschmidt, 1986, Cooper, 1988, Cooper and Kleinschmidt, 1993c, Cooper and Kleinschmidt, 1993a, Cooper and Kleinschmidt, 1993b, Cooper, 1994, Cooper and Kleinschmidt, 1995b, Cooper and Kleinschmidt, 1995c, Cooper and Edgett, 2008, Edgett et al., 1992, Hopkins, 1981, Huang et al., 2002, Maidique and Zirger, 1984, Mishra et al., 1996, Rothwell et al., 1974, Rubenstein et al., 1976, Szakasits, 1974, Zirger and Maidique, 1990)	Market research refers to undertaking a detailed assessment of the market. Aim of market research is to obtain a qualitative and quantitative understanding of the market, the customer needs and wants and the competitive situation.
16	Preliminary technical assessment	(Cooper and Kleinschmidt, 1986, Cooper, 1988, Cooper and Kleinschmidt, 1993c, Cooper, 1994, Cooper and Kleinschmidt, 1995b, Cooper and Kleinschmidt, 1995c, Cooper and Edgett, 2008, Dwyer and Mellor, 1991a, Dwyer and Mellor, 1991b, Hopkins, 1981, Huang et al., 2002, Pinto and Slevin, 1987, Rochford and Rudelius, 1997, Song and Parry, 1997a, Szakasits, 1974, Verworn, 2009)	Preliminary technical assessment precedes the development phase of the new product idea. It is concerned about the technical feasibility of the proposed product to eliminate technical problems and uncertainties before development and manufacturing. Key questions of the assessment are: Can it be developed? What technical solutions are required? At what costs? Can it be manufactured?
15	Preliminary financial analysis	(Barczak et al., 2009, Cooper and Kleinschmidt, 1986, Cooper, 1988, Cooper and Kleinschmidt, 1993b, Cooper and Kleinschmidt, 1993c, Cooper, 1994, Cooper and Kleinschmidt, 1995b, Cooper and Kleinschmidt, 1995c, Cooper and Edgett, 2008, Dwyer and Mellor, 1991a, Hopkins, 1981, Huang et al., 2002, Rochford and Rudelius, 1997, Song and Parry, 1997a, Szakasits, 1974)	Preliminary financial analysis refers to the activity of developing an economical plan and budget for the new product. Costs, a sales forecast, a potential return on investment and the payback period are assessed. This analysis is typically performed before the development stage and thereafter repeatedly performed to adjust to changed circumstances.
15	New product strategy	(Barczak, 1995, Barczak et al., 2009, Cooper, 1984b, Cooper and Kleinschmidt, 1993a, Cooper and Kleinschmidt, 1993d, Cooper, 1994, Cooper and Kleinschmidt, 1995a, Cooper and Kleinschmidt, 1995b, Cooper and Kleinschmidt, 1995c, Cooper, 2000, Cooper and Kleinschmidt, 2007, Johne and Snelson, 1988, Meyer and Roberts, 1986, Pinto and Slevin, 1987, Zirger and Maidique, 1990)	New product strategy refers to the development of an appropriate strategy for the new product. This strategy is defined early on in the development process and sets out the new product goals and objectives, the target market and the product concept. This strategy has to be aligned to the company strategy and defines how the new product contributes to achieving the company objectives. Furthermore, the new product strategy describes the new product and non-product advantages to be achieved.
15	Product champion	(Barczak, 1995, Barczak et al., 2009, Chakrabarti, 1974, Cooper and Kleinschmidt,	Product champion refers to the leader of the cross-functional NPD teams. This individual leads and drives

		1993d, Cooper, 1994, Cooper and Kleinschmidt, 1995b, Cooper and Kleinschmidt, 1995c, Cooper and Edgett, 2008, Hopkins, 1981, Keller, 2004, Rothwell et al., 1974, Rubenstein et al., 1976, Voss, 1985, Yap and Souder, 1994, Zirger and Maidique, 1990)	the new product development from the beginning to the end of the project. He has sufficient authority and power to efficiently coordinate the different involved parties and to integrate them into a continuous process. He typically possesses technical competence and a deep knowledge about the company and market.
12	Preliminary market analysis	(Cooper and Kleinschmidt, 1986, Cooper, 1988, Cooper and Kleinschmidt, 1993c, Cooper, 1994, Cooper and Kleinschmidt, 1995b, Cooper and Kleinschmidt, 1995c, Cooper and Edgett, 2008, Dwyer and Mellor, 1991a, Dwyer and Mellor, 1991b, Huang et al., 2002, Song and Parry, 1997a, Zirger and Maidique, 1990)	Preliminary market analysis refers to the activity of undertaking a first and quick assessment of the market to gain initial insights about the market size and potential, customer interest and needs, requirements and value, and the competitive situation. The scope of this analysis is limited and makes use of e.g. focus groups, key customers and experts.

Table 2: NPD success factors

ANALYSIS

The NPD success factor literature review revealed a range of main points to be considered for the development and innovation process. The key points were:

- Develop a strategy and implement this into your business
- Follow a structured process
- Get up-front work right
- Involve your users
- Allocate sufficient resources
- Create an innovation culture

Defining a strategy for the new product is a recurring topic throughout the literature. This strategy needs to be defined early in the development process and defines the target market, product concept, positioning, benefits and features of the new product. This strategy not only guides the NPD process but also defines how the new product contributes to achieving the company objectives (e.g. Cooper and Kleinschmidt, 1993d, Kahn et al., 2006, Pinto and Slevin, 1987). Once a strategy has been established, it becomes important to implement a rigorously structured and complete process to increase the likelihood of succeeding in the NPD efforts (Utterback et al., 1976). This formalised process is designed to take the product through all necessary development stages. It focuses on the completeness of the process and on the quality of execution of the different stages, which in particular includes the up-front work leading to the definition of the product (e.g. Cooper and Kleinschmidt, 1995a, Hopkins, 1981). Another salient point is that the up-front work before the actual new product development should receive much attention. High quality execution of these factors is required as it determines the product definition and all following steps in the development or innovation process (e.g. Cooper and Kleinschmidt, 1987a). This includes all work which has to be undertaken to be able to establish a detailed product definition e.g. idea generation, idea screening, preliminary assessments, market research and detailed user tests (e.g. Cooper, 1988). A dominant recurring topic in the literature is user involvement and customer focused new product development. It has been found to be critical to involve users throughout the process, especially at the beginning in order to gain vital information about perceived value, wants, needs and quality for the new product (e.g. Cooper et al., 2002, Cooper and Kleinschmidt, 1995c, Gemünden et al., 1992, Pinto and Slevin, 1987). Furthermore, it is important to allocate a sufficient amount of resources to each project to ensure that all NPD

efforts can be carried out sufficiently. This encompasses not only resources in the form of materials and budgets, but also an allocation of adequately skilled human resources (e.g. Cooper and Kleinschmidt, 1995a, Cooper and Kleinschmidt, 2007, Kleinschmidt et al., 2007). These efforts can be enhanced by creating an innovation culture within the company which rewards creativity and innovation. This is achieved by giving the employees freedom to work on their own creative projects and offering conferences and workshops.

The NPD success factors have been studied and peer reviewed extensively; however, the DM Staircase model is still in its infancy. Still, in comparing the definitions of the Staircase model factors against the definitions of the NPD success factors, a wide range of similarities are found. However, there is no direct match between the two sets of factors due to differences in the definitions and numbers of factors. The only two factors which can be seen in both datasets are "planning" and the NPD success factor "new product strategy". Both factors are described as defining a strategy. The factor planning refers to outlining a design strategy for design whereas the factor new product strategy refers to a product strategy. However, considering that DM is the "management portion" of the NPD process that functions under the consideration of design principles, they both refer to the same principle, but in different contexts (Hesselmann et al., 2011). Furthermore, both NPD and the Staircase Model set out that the definitions and objectives of the item to be developed must be established and not only be aligned to the overall corporate strategy, but contribute to it as well.

Partial overlap can be found between the Staircase "awareness of benefits" and the NPD "top management". In both, the attitude that the management reflects is a crucial role. It is important that the management is convinced and supportive of the NPD and design process. However, it appears that the Staircase factor "awareness of benefits" acts on a slightly different level. The Staircase Model contains a taught awareness that results in the necessary support for the design process while the NPD factor "top management" simply refers to the involvement, commitment and support of top management to ensure a smooth process.

The Staircase factor "resources" is not reflected in the presented most referenced NPD success factors (Table 2). It has been excluded from the list due to an insufficient amount of references. However, this should not result in a complete mismatch as both different factors are defined as the same with the only difference that the Staircase factor is more clearly defined. Both request the allocation of sufficient resources to ensure the best possible project outcome and include assessing and budgeting the available resources before the start of the project.

The Staircase factor "expertise" is also not reflected in the listed NPD success factors. However, the NPD factor "product champion" includes limited information about a necessary skill set and level of expertise.

The definition for the Staircase factor "process" outlines the necessity to follow a structured, formalised and implemented process for innovation and development activities. This factor is

not reflected in any single factor of the listed NPD success factors. However, every single listed NPD factor represents one step of an innovation or development process.

CONCLUSION

The Staircase model provides a valuable tool for businesses and academics alike, establishing a DM assessment model that can be used to refine and discover research areas, enabling company self-evaluation. It offers a simple and effective way for companies to discover their own weaknesses and obstacles that prevent them from implementing design in their management structures whilst also highlighting strong areas and increasing the awareness of DM and company capabilities.

The nine NPD success factors derived from the literature are not exclusive to the NPD process but are considered as the most important factors. A wide range of additional factors have to be considered to establish a complete NPD process, such as the allocation of sufficient resources, creating an innovation culture or an initial screening of new product ideas. However, as shown in the previous section, the five Staircase factors are not exclusive. It is clear that these Staircase factors are defined on a broader level than the NPD success factors. Whilst the NPD factors naturally describe in detail which factors are the most prominent for the NPD process, the Staircase factors are defined on a superordinate level. Instead of describing the required process in detail, the Staircase factor "process" only states that a professional and effective design management process which is embedded in core business processes must be followed. Evidently, the Staircase model is using a much wider approach than the process oriented NPD factors. It can be concluded that aside from some similarities and overlap in the definitions to the NPD success factors, the Staircase factors have their own unique discipline. However, it is premature to negate that the Staircase factors do not reference the crucial points of NPD. The literature review of the NPD success factor research over the past 40 has revealed that all five factors of the Staircase model are still covering key points in the NPD literature, though not the most crucial ones.

Next, the authors intend to examine the questionnaire that is used to calculate the Staircase scores. This step will be necessary to analyse how appropriate the choice of questions for the provision of insights into the five factors is. In particular, the questions informing the Staircase factor process will undergo a rigorous investigation to examine the extent the NPD factors are reflected in these questions.

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A critical examination of service systems' role in implementing customer experience (CX) strategies

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Keywords: Customer Experience, Customer Experience Management, Marketing Strategy, Marketing Practice, Service Design, Service Systems, Co-creation, Managerial Practice, Customer Experience Strategy Loop, CXSL, EXQ.

Service systems enable value propositions based on creation of favorable customer experiences and business value. Value is experiential, individual, contextual, and meaning-laden. Scholars posit that companies must (a) create a value proposition based on customer perceptions of value, (b) align service systems with these value perceptions, and (c) incorporate customers as a resource to co-create value. This study examines customer experience strategies and service systems from a company viewpoint. Results suggest experience strategies and their value propositions are connected, and service systems connect strategies to propositions. A revenue dimension always and exclusively drives a company's strategy and subsequent practice. This driver is based on the belief that competitive value creation results in loyal and profitable customer relations. However, quantifiable evidence of this relationship is sparse. Findings suggest most companies execute strategies on goods-dominant rather than service-dominant logic. Particularly, companies exclude the customer from the value co-creation process. We propose an empirically based and theoretically grounded framework connecting value co-creation to customer experience strategy and profitability. This framework, the customer experience strategy loop (CXSL), will assist companies develop and execute strategies based on and driven by customer value perceptions.

INTRODUCTION

Contemporary companies focus on creating customer loyalty and competitive advantage by creating favorable customer experiences (CX) (Badgett, Boyce, and Kleinberger 2007). Johnston and Clark (2008) posit that CX recently received significant attention as a business

driver, and scholars and companies submit CX as a key strategic objective (Verhoef et al. 2009). Some companies develop a CX strategy to emphasize the strategic importance of experiential value, but both academicians and practitioners struggle to understand fully the multifaceted concept of CX and its impact on financial performance (Klaus and Maklan 2012). Berry, Carbone, and Haeckel (2002, p. 88) suggest "customers always have an experience—good, bad or indifferent—whenever they purchase a product or service from a company." This notion resonated with managers like Steve Jobs who highlighted that at Apple, everything begins and ends with CX (Sanders 2012), but a question remains of how companies can create memorable and favorable CX. Vargo and Lusch (2006) posit experiences are not only associated with hedonic consumption but are also part of utilitarian value. Rather than simply develop and offer products, companies design and communicate value propositions to create memorable and favorable CXs (Vargo, Lusch, Akaka, and Yi 2010), building a profitability foundation. Rogers (2005) argues, "we need to learn more about the leading indicators of customer value tomorrow (measurable today)" to "better understand the strong tie between customer equity, enterprise and shareholder value" (p. 263). Regrettably, researchers provide little guidance on how to achieve this purpose (Payne, Storbacka and Frow 2008). In line with service-dominant logic, we posit CX drives value (Vargo and Lusch 2008a, 2008b). We define customer experience as a customer's cognitive, emotional, and behavioral responses to interactions, resulting in mental conception (Johnston and Clark 2008). Meyer and Schwager (2007) suggest these interactions include encounters with self-service technologies, servicescapes, experience rooms, frontline employees, and other customers (Klaus and Maklan, 2011). Mental conceptions drive outcomes including benefits, emotions, intentions, and judgments, which encompass perceived value (Shaw 2005).

CX is always created in the context of a service system (Edvardsson, Tronvoll, and Gruber 2011), the fundamental context of CX formation and the basis for resource integration, value co-creation, and, subsequently, value-in-context (Vargo and Lusch 2008b). Service systems provide customers with desirable, favorable, and memorable CX, resulting in business value simultaneously. Consequently, service systems are value-creation systems in which actors co-create favorable experiences and value for themselves. Service companies interested in attracting customers and their purchasing power need not only acknowledge the crucial influence of customer value co-creation on customer behavior (Xie, Bagozzi, and Troye, 2008), but must also design internal and external service systems to meet customer demand.

This study contributes to the debate on how to design service systems to create CX in line with a company's value proposition and CX strategy. These strategies enable value proposition through resource configurations that allow a company to meet and exceed a market's needs and expectations. Markets are "collections of individual actors reconciling tensions in their direct contexts with respect to indirect forces from overlapping complex networks. Over time, these can be viewed as service ecosystems, within which value lies at the tensions of micro and macro pulls" (Chandler and Vargo 2011, p.46). This study explores the strategic role of service systems as both a resource and enabler of CX strategy. We

emphasize business value in which CX ultimately drives revenues and profits (Gilmore and Pine 2002).

THEORETICAL FRAMING

CX strategy refers to how organizations create sustained value for stakeholders (Kaplan and Norton 2004). We focus on resource integration and use of resources to create superior CXs. CX is the primary driver of customer value and long-term profitability. CX strategies and value propositions are created in the context of service systems. Concepts such as value-creating systems have been described variously as early as 1965 (Alderson 1965). Related constructs such as value chains (Porter 1985), value constellations (Normann and Ramírez 1993), and business networks (Håkansson and Snehota 1995) have existed for some time. More recently, constructs such as service systems (Spohrer et al. 2007) and service ecosystems (Lusch, Vargo, and Tanniru 2010) focus on the role of operant resources, which refer to actors using operand resources, products, or other static resources that must be activated and used. A major difference between the latter and earlier constructs is that the service-system view—under services science and service-dominant (SD) logic—emphasizes value co-created with customers and other actors in a service system. Earlier conceptualizations focused on creating value for the customer in which the provider defines value, representing goods-dominant logic (GDL). If the same principle of resource optimization anchors SD logic and a company's strategy to create profitability, we must investigate the connection between these constructs empirically. While co-creation and co-creation strategies are often explored only conceptually, this study addresses scholars' calls for empirical research on the connections among these constructs by exploring strategy practice (Karpen et al. 2012). Despite highlighting the importance of service systems in the strategic focus of value co-creation, no empirical study exploring a direct or explicit link to business strategy exists. Researchers do explore relationships between service systems and parts or certain contexts of CX such as online flow experiences and customer satisfaction (Ding, Hu, Verma and Wardell 2010). We conclude research exploring connections between service systems and business performance in terms of profitability is sparse, fragmented, and underrepresented (Papazoglou, Traverso, Dustar and Leymann 2007). Similar to Edvardsson et al. (2011), we define a service system as a configuration of social and economic actors (operant resources), technology, and other resources (operand resources) that interact with institutions and other service systems to enable value co-creation, including value propositions and shared information (e.g., language, laws, measures, methods, etc.). We argue value is experiential, contextual, and meaning-laden (Vargo and Lusch 2008b, 2011). Accordingly, this study focuses on the co-creation of favorable CXs in the context of a service system shaped by social forces such as norms, habits, and rules in society. The literature lacks research examining the role of service systems designed to realize value propositions from a company's strategic perspective, particularly in the context of CX strategy (Ding et al. 2010).

Value is posited as experiential and co-created by customers and other actors in a service system. Most research focuses on the configuration of resources in a service system, enabling CX co-creation. This study addresses the dearth of empirical research focusing explicitly on CX strategies from provider and business perspectives. Although terms like value proposition are included in the most common definitions of service systems (Spohrer et al. 2007), we posit CX, service systems, and value co-creation lack strategic conceptualizations (Karpen, Bove, and Lukas 2012). Based on the literature review and the definition of CX mentioned earlier, we define CX strategy as:

> a company's long-term direction and capacity to align value propositions and configurations of actors (including roles and responsibilities), resources (operant-knowledge, skills, motivation and the necessary operand resources), and schemas (norms and rules) using a service system capable of realizing value propositions effectively—given a societal context—to create favorable customer behaviors.

We investigate how value propositions align with service systems for realization of CX strategy, exploring if—and if yes, how—companies (a) create a value proposition based on customers' perception of value, (b) align service systems with this value perception, and (c) incorporate customers as a resource to co-create value and assist them in delivering CX strategy.

METHOD

To develop a conceptual framework for the role of service systems in service companies executing a CX strategy or CX management program, we created an interview protocol to articulate the meaning and domain of strategies and service systems. The protocol is based on a literature review and prominent studies exploring marketing strategies (Coviello et al. 2002). We examined these topics through interviews with a representative sample of managers responsible for CX strategy or CX management programs. While some marketing scholars create awareness of the context-specific nature of CX (Klaus and Maklan 2011; Lemke, Clark, and Wilson 2011), this study explores which approaches are common across various service providers. We adopt and extend Silvestro et al.'s (1992) validated service classification scheme. To ensure cross-validation, we chose service companies from three archetypes (Guenzi and Georges 2010): (a) professional services (e.g., management consultancy, corporate bank, investment banking), (b) mass services (e.g., telecommunication, online banking, transport, fuel stations), and (c) service shops (e.g., retail, hotel, retail banking, airlines). Managers were selected based on three criteria: (a) employed with the company at least since the introduction of a CX program, (b) involved with the CX program's creation and introduction, and (c) responsible for current CX management and program development. A detailed sample description appears in the Appendix.

Generating an initial item pool through qualitative research is possible with an experience survey conducted with "a judgment sample of persons who can offer some ideas and insights into the phenomenon" (Churchill 1979, p.67). The objective is to create an initial pool of items that are scrutinized thoroughly with testing. We achieved data saturation

(Glaser and Strauss 1967) after conducting in-depth interviews with CX managers from 22 service companies, each lasting 30 to 90 minutes. Guidelines for determining non-probabilistic samples are sparse, but according to Guest, Bunce, and Johnson (2006), the sample exceeds the evidence-based recommendation of 12 interviews. In accord with the exploratory nature of the study (Hair et al. 2009), the interviews were conducted face-to-face in English following a standardized, open-ended format. In some cases, telephone interviews and follow-up e-mails were used. This approach allowed flexibility to discuss unexpected though relevant topics (Bryman 2004). It also created the opportunity to develop a holistic overview of the context under study by capturing in-depth data based on perceptions of subjects on the inside (Miles and Huberman 1994). The method depended on availability and convenience of the respondents. Interviewees were recruited from the research team's network and were not offered participatory compensation. Interviews were transcribed and coded with the support of NVivo 8.0, software that allows a researcher to reflect on key themes, and code and compare data (Di Gregorio 2000). Coding followed the grounded approach described by Ryan and Bernard (2003), which draws heavily from Strauss and Corbin (1990). This approach is regarded well and recommended in business research similar to this study (Belk 1988). We started with open coding within the interviews and extended analyses to axial coding to compare interviews. We incorporated systemic, constant line-by-line comparison and hierarchical coding exploring repetitions, similarities, and differences to ensure we observed and explored all data thoroughly. This coding approach keeps the researcher focused on data rather "than theoretical flights of fancy" (Ryan and Bernard 2003, p. 91), positing that categories are the classification of more discrete concepts. Initial categorization of all attributes was the outcome of an extended workshop involving the primary researchers, naming and defining each attribute. To warrant inclusion, an item had to appear in at least one interview. In a subsequent stage, we discussed differences in attribute categorization and agreed on revised attributes and category definitions. Some constructs appeared in more than one interview. The researchers examined transcriptions and individual codes to identify such repetitions, and defined standard construct names, resulting in a coherent coding structure. Based on the interviews, three primary, five sub-dimensions, and 16 attributes were generated. To maximize content and face validity, a panel of expert judges reviewed the dimensions (Klaus 2013). The panel was comprised of six marketing expert academicians knowledgeable in the fields of CX strategy and service systems. The panel commented on the clarity, conciseness, and labeling of the items, and defined its own labels. Panel members were asked about item similarity, clarity of phrasing, and terms used in the scale. They rated each item with respect to relevance to item descriptions. Ratings were recorded on a seven-point scale from 1 (not at all representative) to 7 (strongly representative). Item purification began with the exclusion of items rated 1 or 2. Three members had to rate an item 6 or 7 for inclusion in the final scale. Next, panel members were shown conceptual descriptions of the dimensions and asked to rate them as *very applicable*, *somewhat applicable*, or *not applicable* relative to the respective dimension. Items needed to be rated at least *somewhat applicable* for retention. This procedure resulted in inclusion of all three main and five sub-dimensions. Finally, five CX managers reviewed the readability and

applicability of the dimensions, confirming findings. The corresponding coding structure is shown in Table 1.

Table 1: Coding structure

Dimension	Description	Description and label of **sub-dimension**	**Attributes/items** based upon reports/quotes, and references stating…
Value Propositions/Intended Value Co-Creation	References to definitions and reports of value propositions and/or intended actions to co-create value based on either the company's or customers perceptions of value	References to definitions and reports of value propositions and/or intended actions to co-create value based on the **company's perceptions of value**	A connection to **revenues** and **profits** via - **customer satisfaction** - positive recommendations (WOM) - customer **loyalty** - **service quality**
		References to definitions and reports of value propositions and/or intended actions to co-create value based on the **customers' perceptions of value**	A connection to receiving a good **customer experience** leading to/or based upon an increase in - **satisfaction** - **quality of service** received - recommendations (WOM) - **loyalty**
Alignment between service systems and value perception	References to definitions and reports of service systems reflecting the company's value perception	References to the **company's internal service systems (GDL)**	The importance of service delivery through - **back-office integration** - **personnel** (in particular references to **recruitment, training,** and **reward structures**)
		References to the **company's external service systems (GDL)**	The increasing importance of services connected to, but not delivered by the service company, in particular - **outsourced services** - other fulfiller of the company promises, referred to as the **CE supply chain**
Incorporate customers as a resource to co-create value	Evidence and references to the company's aim to integrate customers as a resource in the value creation process	**Indirect evidence** of customer value creation integration	Hypothesizing that a **good customer experience** will lead to **an increase in customer satisfaction and loyalty**. Subsequently positing customers as **source for** - **recommendation** - leading to the **belief of an increase in revenues and profits**

FINDINGS

Value Propositions

Managers described a wide range of value propositions, often expressed in terms of outcomes for both the company and customers. We concluded only a minority of companies possesses a clear view of the nature of value propositions and how these propositions relate to customers. Most managers articulated non-specific value propositions. For example, the manager of a financial services group defines value proposition as, "It's simple. We satisfy our customers." Most companies distinguished creating business value from creating value

for customers. While distinguishing these perceptions, managers highlighted the connection between the two:

> Task number one is to generate revenues for our business. One way to achieve this is by looking out for our customers.

The CEO of a professional services firm declared that the company's value proposition will "ultimately relate to customer behavior, i.e. come back, repurchase, and recommend."

We detected multiple references to an underlying causal chain between favorable customer outcomes (e.g., increase in customer satisfaction, service quality, loyalty, recommendations) and increases in revenues and profitability. A number of managers expressed a view of changing competitive landscapes in which customer service and value expectations increase constantly. Though one respondent mentioned that delighting customers is neither "manageable nor sustainable," the majority believed customers look for better experiences. The manager of an airline articulated this notion precisely by stating, "The single idea is that we should look at the experience through the eyes of our customer." Their views conveyed that in simple terms, customer experience holds the key to success in a more competitive environment. Managers again referred to the link between CX and profitability. As one head of CX highlighted, "The main target is to be profitable, so you cannot manage the customer experience without making profit."

A large portion of managers asserted they struggle with value propositions based on delivering favorable or, more commonly, great CX. The reasons are two-fold. First, most managers expressed they are troubled by a lack of an ongoing CX definition. This is consistent with research challenging existing conceptualizations of CX as too vague (Lemke et al. 2011; Klaus and Maklan 2011; 2013):

> The missing point was that we don't know what the customer thinks, what the customer was thinking about what we were doing, because we knew what we were doing and we thought we knew what we should, what things we should do to improve our customer experience. But the thing is we didn't have a lot of information of what the customer thought [about the experience we delivered].

One CCO of a consultancy firms bluntly expresses his viewpoint:

> And in fact, I can't think of anybody that I still believe, either an employee or other consultants, where they are clear of what customer experience means to them.

Second, lack of a coherent method to measure CX and demonstrate its impact on organizational performance causes most managers distress:

> I couldn't say why this year's customer experience is rated as 8.5, because I don't know. I don't have a specific metric to measure customer experience so that's maybe the problem.

The consensus was that to succeed, the company had to commit to long-term CX: "building [a CX program] conflicts with the short-term goals of shareholders, and so on." These challenges are interdependent and cannot be considered in isolation. In spite of the lack

of definitions and driven by belief rather than evidence, CX became a key value proposition for companies because it enhances a customer's "emotional attachment to the brand."

Alignment between Service Systems and Value Perceptions

If CX management enhances customers' emotional attachments to the company through service systems, its opposites are disconnected services across touchpoints, indifferent customer-facing stages, and undifferentiated delivery to a rigidly enforced service-level agreement. Managers, therefore, define service systems in the context of integrating companies around delivery at the point of customer contact. Managers referred to an outside-in rather than inside-out approach to process management based on the challenge that there is a lack of information of what—and more importantly why—customers behave the way they do. "The single idea [was] that we should look at the experience from the eyes of the customer."

Most managers highlighted the importance of both back and front-office integration, defining integration as a state in which customer-facing people have perfect visibility of service delivery processes and customer insights so they are able to respond as needed. Primarily, the integration procedure begins with some form of touchpoint mapping, often supported by process-mapping tools and consultants. Mapping identifies the presence and occurrence of critical incidents altering CX perceptions. Managers reported their goals of creating 360-degree views of the customer, allowing them to learn from experience and improve future interactions. The interviewees highlighted the risk that this—like other quality-driven programs previously—focuses excessively on process and inadequately on customers. Out of precaution, these managers ensure mapping is conducted from a customer's viewpoint:

> It is more a checklist [from the customer's viewpoint], and in the quality process it is not yes and no questions, it is more of a dialogue.

In addition to process control and integration, managers underlined the crucial role of customer-facing employees delivering value propositions consistently, however vague they define proposition. Most managers recognize that experience creation is contextual; each business relationship, transaction, interaction, and subsequent CX is distinct. Managers illustrated challenges synthesizing human capital policies across human resources, brand marketing, and operations (i.e., customer service). Some managers reported support for such changes is difficult to achieve, especially when crossing departmental boundaries. Managers acknowledge that this holistic form of value proposition is difficult to operationalize through rigid procedures. Consensus suggests published standards and operating procedures deliver homogenous service quality, but may not create the emotional experiences companies believe attach customers to brands. Companies recognized the value of people's judgment in CX delivery, and look to hire people with personal values supportive of the value proposition:

> We are looking for people who believe in and act upon our philosophy, [which is] customer first.

Personnel development programs in these companies include encouraging customer-facing employees to become self-reflective practitioners, continually improving their ability to deliver the firm's brand values. Once the right people are hired, value propositions influence training, ranging from mentoring and communication to staff academies. Training is commonly designed as a continuous interactive process where employees are given time and support to embed new working practices and perceptions. Firms with a highly articulated program included their own suppliers in training, referring to a "CX supply chain." This is largely true for companies in which outsourced supplier performance is a crucial part of value proposition delivery and is visible to customers:

> We realized that our supplier's are another crucial part of our customers' overall perception of our service. Thus, it was only logical that we shared our values with them and supported them in the delivery of these values.

We posit delivering value proposition skills to a firm's broader network is an evolutionary step in the use and definition of service systems, practices consistent with co-creation in value literature. Rewarding structures align with training programs. Companies with well-developed programs reward customer-facing people using a combination of financial targets (sales), service quality measures (on-time delivery), and customer overall experience assessments, consistent with early market orientation literature (Jaworski and Kohli 1993). Most of the managers voiced concerns about a reward structure focused purely on CX. They mentioned this is due to a lack of a definition for how customers perceive experiences connected to the delivery of value propositions. Most managers took a risk-averse approach, connecting rewards to traditional measures despite being aware of its shortcomings:

> And if you had quite strong incentives tied to just sales results and weaker incentives to just providing the good service or good experience of the customer, then [customer-facing personnel] were already a bit frustrated. So, we went back to the easier measurable incentives.

For the most part, managers sought to ensure customers enjoyed the target experience repeatedly across channels, an approach originating from the total quality management movement in which companies reduced service variability commensurate with similar advances in product quality. A number of interviewees suggested their firm's CX program emerged from service quality and customer satisfaction initiatives. Such programs demonstrated a need to focus on satisfaction, loyalty, and improving recommendations, linking CX to profitability implicitly:

> We started with measuring service quality and customer satisfaction, and now we are trying to expand on these measures and programs by adding some more [experiential] aspects.

Findings suggest the role of the customer in the value proposition process and alignment of the corresponding service systems are limited. Customers were referred to in terms of measured outcomes and as recipients of company actions, what service research considers unidirectional.

Incorporating Customers as a Resource to Co-create Value

While nearly every respondent highlighted the importance of delivering favorable CXs, we found sparse evidence of how companies incorporate customers as a resource to co-create value. Most managers offered varying outlooks on how much involvement the customer requires or saliency of the experience desired. For some, the service should be ubiquitous, smooth, and unobtrusive; the customer should not be aware of the provider. The manager of an IT service provider believes:

> The best experience is that our customer doesn't even realize how smooth the service works in the background.

This utilitarian perspective, expressed as a focus on "service rather than on emotional attachments," is contrasted in the literature on extraordinary and sensorial experiences. The business' nature for most of the interviews suggests an intermediate position between these perspectives. Most companies use CX as a process of entrenching an emotional attachment to a service function:

> The opportunity for building the relationship is where you run your business where customers truly value the idea of getting it fast and help and understanding and caring and those things.

Verification of using customers as an operant resource was found only in terms of customer insight, using opinions or feedback from customers to create new value propositions. Most managers referred to customer responses to experiences and measurements, rather than using them more actively. "We use customer experience only as a tool in terms of customers' complaints and customer satisfaction ratings."

In summary, the data reflect there is a struggle between the purpose of building a customer co-created experiential value proposition and creation of service systems supporting this purpose. One interviewee synthesized this thought well:

> Our and other companies seem to understand that they should identify customer experience as the main part of the way that they do business. However, there is a quite a gap between that high-level thinking and what actually happens in practice.

DISCUSSION

The purpose of this study is to develop a conceptual framework exploring the role of service systems in managing value co-creation for companies implementing CX strategies. This study investigates the strategic role of service systems as enablers of CX strategies, emphasizing the business value of CX strategy in which CX drives revenues and profits (Gilmore and Pine 2002; Michelli 2007; Sanders 2012). We examine 22 in-depth reports of CX strategies to explore three phenomena: (1) how value propositions can be developed and the content of such propositions, particularly looking for evidence of these propositions based on customer value perception; (2) whether and how service systems align with value propositions to ensure value realization for customers and other actors; and (3) how customers are incorporated in the design of value propositions, the configuration of resources and actors, and delivery of CX strategy. We probe for norms and values in the focal service

system. We submit that norms and values determine customer behaviors such as loyalty (Hsu and Lu 2007). Therefore, companies must design CX strategies and service systems accordingly (Edvardsson et al. 2011). Our data did not support this proposition, leading us to suggest that another component of what scholars determine to be SD logical thinking is missing from the companies' CX strategies we investigated. The CX strategies we examined focus on favorable customer outcomes, emphasizing the company's strategic viewpoint that customers search for favorable experiences and are prepared to pay for them. Results suggest CX strategies and value propositions share common ground, and service systems permit links among them as long as implementation of CX strategy permits. A revenue dimension grounded in the assumption that competitive value creation results in loyal and profitable customer relationships that exist intuitively always and exclusively drives this practice. Hard evidence for its existence and accountability inside a service company is sparse. Based on the inductive approach of this study, we establish that despite our SDL-based position, the data are an expression of a goods-dominant mindset (Vargo and Lusch 2006). In particular, the data highlight (a) a focus on products rather than experiences due to a lack of conceptualization and definition; (b) reports of how organizations add value for, rather than co-create with, customers; (c) practices centered on profit maximization rather than financial feedback and learning; and (d) offerings are brought to market rather than to market with (Lusch and Vargo 2006). We conclude that a GDL rather than a SDL mindset functions as a basis for CX strategy development and the aligned service systems we investigated. Analysis demonstrated little evidence of what—from a SDL viewpoint—research considers efficient CX strategies and service systems supporting them (Lusch et al. 2007). When analyzing value co-creation from an SDL perspective, the unit of analysis shifts from development and offering output (goods and services in the production view) to formulation of value propositions and design of aligned service systems. Such systems enable effective resource integration and value co-creation processes, emphasizing outcomes not output as the unit of analysis. Payne et al. (2008, p. 85) argue there is "a surprising lack of work directed at providing frameworks to help companies manage the co-creation process." We expand this notion by suggesting there is also a lack of frameworks guiding companies in developing value propositions and service systems to incorporate the customer as a resource to co-create value. We posit a framework highlighting the role of service systems that enable the strategic realization of value propositions, focusing on delivery of favorable CX. The subsequent strategies reflect what researchers refer to as proactive customer orientation, leading to positive influences on value creation and important marketing outcomes such as customer satisfaction and loyalty (Blocker et al. 2011). Our framework titled Customer Experience Strategy Loop (CXSL) demonstrates how companies (a) create value propositions based on customer perceptions of value, (b) align service systems with value perceptions, and (c) incorporate customers as resources to co-create value and assist them in delivering CX strategy (Figure 1).

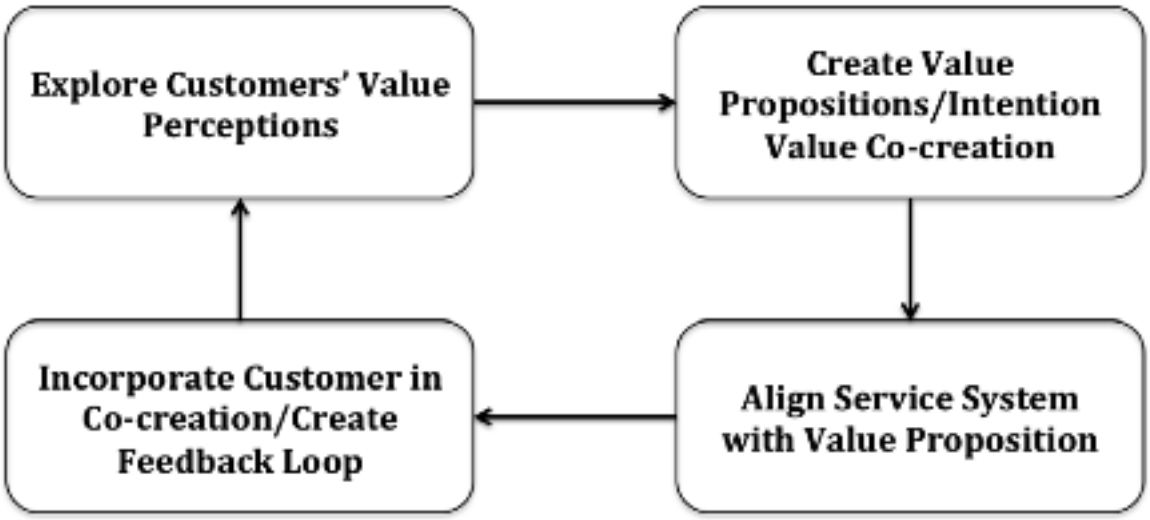

Figure 1 Customer Experience Strategy Loop (CXSL)

Exploring customers' value propositions - Understanding precisely what value customers are looking for, including favorable experiences, in any context is essential. Customers in different mind states perceive different needs and wants, and focus on different value outcomes. These are just some examples of this phenomenon in line with defining experiences as the customer's cognitive, emotional, and behavior responses in a context (Johnston and Clark 2008). Our theoretical framing suggests value propositions must be grounded in what customers are prepared to pay for, what value and attractive experiences they seek, and how to capture this value (Osterwalder and Pigneur 2010).

Creating value propositions - Value proposition development concerns promising new and attractive—sometimes unique—forms of customer value through service experiences. Since service is abstract and not easily tested (Edvardsson et al. 2008), companies must create value propositions that are easy to communicate and make sense to the customer. We define sense to the customer as a proposition that creates the intended cognitive, emotional, and behavioral responses.

Alignment of service systems - The roles of service systems are to enable value propositions and simultaneously create value for beneficiaries. Beneficiaries can be customers, the company, and other stakeholders such as suppliers, consultants, facility and infrastructure service providers, and society. The role of the service system is to facilitate, direct, and support the value creation process. Alignment of service systems and value creation results in favorable experiences, achieved by configuring resources and integrating and assigning actor roles. Configuration should subsequently lead to and form the basis for the intended CX in practice in the context of service systems. Moreover, operand resources (Vargo and Lusch 2004, 2008a, 2008b) such as buildings, physical products, computers, infrastructure, and organizational structure play a role in the company's service system. The challenge of effective service system creation and design is two-fold. First, clarify the actors' roles and responsibilities and second, benefit from actors' knowledge and skills in the value creation and sharing process.

Incorporate customer in co-creation - Customers can be involved in the value-creation process in various ways (Mathing et al. 2004). For example, customers assist in the design and development of the service system, achieved by feedback from complaints, suggestions, or contributions delivered through user platforms. Various tools and techniques are available (Alam and Perry 2002) including social media such as Facebook and Twitter, and websites for an array of industries (e.g., airlinequality.com in the airline industry and trip advisors in hotel and travel industries). Based on our findings, we posit that using our framework functions as a proactive market research tool that, according to Witell et al. (2011), leads to higher profit margins.

Based on SD logic, the CXSL framework combines the unique perceptions of value co-creation from all actors' viewpoints (Peñaloza and Mish 2011), overcoming the apparent obstacle of integrating the value co-creation potential of all actors in designing and implementing a CX strategy (Leavy 2012).

Managerial Implications

The CXSL framework provides companies with valuable guidance in efforts to develop useful and dynamic CX strategies (Karpen et al. 2012). We divide this discussion according to the four building stones of the CXSL framework, starting with *exploring customers' value propositions*. Scholars posit co-creation of value as a non-homogeneous process (McColl-Kennedy et al. 2012), suggesting customers choose different levels of involvement and approaches in the value co-creation process. The first step in the framework addresses this challenge by exploring these individual approaches. CXSL highlights customer viewpoints and stresses the importance of exploring what value and experiences customers seek and are willing and able to pay for. This is only achievable through an exploratory approach in which companies first qualify and then quantify customer value perceptions. One way to do this is by adopting validated measurements of CX quality such as EXQ (Klaus and Maklan 2012) or customer value co-creation (Yi and Gong 2012). Connecting CX to important marketing outcomes (Klaus and Maklan 2013), EXQ assists companies explore customers' value perceptions in detail. CXSL's focal point is to define strategic windows of experience opportunities as a basis for the next component in the framework, *creating value propositions* directed toward matching the CX search. Based on insights gained from exploratory findings and/or measurements, companies develop and communicate strategic value propositions grounded in customer value-creating systems. These propositions convey a distinct and customer-specific experience based on the customers' value perceptions. The third step is to execute a*lignment of service systems*. Companies design or redesign the service system according to the value propositions explored, defined, and validated previously. This service system incorporates not only all means the company uses to fulfill its portion of the value proposition such as delivering desired CX, but also all resources necessary for customers to co-create value in line with the value proposition. IT such as open and coherent data exchange platforms drive and enable these service systems (Grover and Kohli 2012). The service system should clarify the role of customers and co-opt knowledge, skills, norms, and values, achieved through orchestration of resources and actors. Tools to achieve this range from service blueprinting (Bitner, Ostrom, and Morgan 2008) to CX blueprinting (Danaher

1998) to touchpoint mapping (Zomerdijk and Voss 2010) and customer scripts (Eichentopf, Kleinaltenkamp and van Stiphout 2011). We believe technology plays a major role in design of resource configurations (Rust and Espinoza 2006). Social media and other online brand-related activities such as brand communities are already highlighted as practices to create value for customers and companies (Schau, Muñiz, and Arnould 2009). We recommend development of shared norms and values, forming the basis for service culture and service convenience as the mechanisms that shape activities and interactions favorably in value co-creating processes. These norms are achieved and exchanged through new media activities since "consumers' new media activities can be seen by others. Entries made by a consumer in forums, blogs, and social communities can be tracked by other consumers as well as companies" (Hennig-Thurau et al. 2010, p. 312). The fourth component, *incorporate customer in co-creation,* focuses on how customers are involved and utilized as co-designers of the value proposition and corresponding service system. This component of the process can be accomplished by soliciting feedback from customers, use of open-source techniques (Reay and Seddighi 2012), and consideration of various user-contribution system designs (Cova and Salle 2008). Some examples of involving customers as co-designers are open-source products developed by Mozilla Firefox, Wikipedia, and eBay. The latter two are prime examples of how value proposition is based solely on a user-contribution system. According to Cook (2008), a growing number of companies in more traditional industries such as Honda, Proctor & Gamble, and Hyatt hotels are incorporating user production in multiple ways. These and other companies use customer involvement to improve products, generate business, reduce costs, increase customer service, and even boost employee performance (Cook 2008). The CXSL framework proposes an ongoing business process as a set of logically related tasks to achieve a defined business outcome (Davenport and Short 1990). The business outcomes include (a) create value propositions based on customer perceptions of value, (b) align service systems with value perceptions, and (c) incorporate customers as resources to co-create value and assist them in delivering CX strategy. The framework highlights the consistent, dynamic flow of information and processes required to achieve this purpose (Vargo, Lusch, and Akaka 2010).

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A Framework of Product Design Foci

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Design theory; Design foci; Industrial design; Fashion design; Design expertise

In design and marketing literature, different authors emphasise different aspects of a product's design. From the perspective of industrial designers, many such aspects are relevant to consider during design processes. However, most existing classifications of product design aspects appear to be incomplete and/or do not include justifications for why their particular set of categories is appropriate. To address this issue, this paper develops an overall framework of design foci that is comprised of four principal levels connected by three processes. The proposed framework is investigated via mapping to existing classifications and interviews with eight industrial/fashion designers. These studies support the framework's usefulness.

INTRODUCTION

In the intense global competition, producers of consumer goods are always on the lookout for ways to gain a competitive advantage to protect or improve their market position. In this context, an obvious strategy is to offer products that 'stand out from the crowd.' From a design perspective, there are different ways of achieving this, i.e. particular aspects of a product's design upon which emphasis can be placed. The aim of this paper is to provide classification of such design foci.

The topic of this paper is not an issue that existing literature has neglected to give attention to; in fact, design literature offers several taxonomies of design foci, as the literature review of this paper later demonstrates. However, many of these classifications would appear to be incomplete if they were to be used from the perspective of industrial designers and/or do not include justifications for why their particular set of categories is appropriate. To address this issue, this paper develops an overall classification of design foci through the use of basic principal distinctions in the context of industrial and fashion design.

The completeness and relevance of the proposed framework are investigated by mapping it to existing classifications, followed by interviews with eight industrial/fashion designers. More

specifically, these empirical studies investigate the categories of the framework with regard to: relevancy for industrial/fashion designers, mutual dependencies, relationships to design failures, and importance for industrial/fashion design expertise.

LITERATURE REVIEW

With regard to product design, a basic distinction can be made between engineering design and industrial design. According to Kim and Lee (2010), engineering design is about "internal design," which means "actualizing functions, working out performance and product architecture," while industrial design focuses primarily on "external design or user facing design components, such as the user experience," which includes "aesthetics, ergonomics and user interface." This section first resumes a stream of research that may be seen as a classical engineering perspective on design. Hereafter, the section discusses different classifications of product design foci that are relevant in the context of consumer goods.

Engineering design perspectives

Within the field of engineering design, one stream of research deals with different perspectives on technical systems. In 1973, Hubka and Eder's book "Theorie der Maschinensysteme" [Theory of Machine Systems] was published and became a point of departure for much engineering design research. The 1984 second edition of the book was renamed to "Theorie Technischer Systeme" [Theory of Technical Systems] and in 1988 the English edition, "Theory of Technical Systems," was published (Hubka and Eder, 1988). In the book, a central concept is 'transformation system.' This type of system has the purpose of transforming 'input operands' to 'output operands.' Examples of input and output operands include: 'soft steel object' to 'hard steel object,' 'raw material' to 'private car', and 'human in London' to 'human in Paris' (Hubka and Eder, 1988, p. 25). Transformations take place through the interplay between the three types of elements in the transformation system: human(s), a technical system and the environment (Hubka and Eder, 1988, p. 23). Hubka and Eder (1988, p. 72) describe the three levels that define 'technical systems': (1) function structures, (2) organ structures and (3) component structures. Function structures refer to the functions that a technical system can perform and the sub-functions that realise such functions. Organ structures (or functions carriers) are the means by which functions are realised. Hubka and Eder (1988, p. 80) give the example of a turbine regulator, which, for example, includes the organs: shaft, gearing, centrifugal regulator, and pump. Components are the actual physical parts that comprise the technical systems and the structure of these realise the organs.

With a basis in the work of Hubka and Eder, Andreasen (1980) introduced "the theory of domains." This 'theory' describes mechanical systems as consisting of four domains: (1) process, (2) function, (3) organ and (4) construction (later termed the part domain). Another similar model is the so-called "chromosome model," launched by Ferreirinha et al. (1990), which includes the following levels: (1) activity; (2) function; (3) organ; and (4) part. In

relation to such models, Mortensen (1999) argued that technical systems can be seen as including both constitutive and behavioural aspects, wherein 'behaviour' can be subdivided into 'intended behaviour' and 'resulting behaviour.' From this perspective, functions are the behaviours of organs, for which reason only three domains remain, which in Mortensen's terminology are named: (1) transformation, (2) organ, and (3) part.

Industrial design perspectives

In the context of industrial design, several classifications of perspectives with regard to a product's design exist. Such classifications are subsequently discussed.

Dreyfuss (2012, p. 178, original from 1955) defines five principles for design: (1) utility and safety, (2) maintenance, (3) cost, (4) sales appeal, and (5) appearance. According to Dreyfuss (2012, pp. 178-183), 'utility and safety' refer to the product's ease and intuitiveness of use, as well as the chance of getting injured by using the product; 'maintenance' refers to how easy the product is to maintain; 'cost' refers to tool costs (relevant if produced in small quantities) and production costs; 'sales appeal' refers to an amalgam of how a product feels, how it operates and the associations it produces; and 'appearance' refers to how it looks, how it visually stands out next to other products and how well it is remembered.

According to Kotler and Rath (1984), "designers seek to blend creatively the major elements of the design mix," which includes: (1) performance, (2) quality, (3) durability, (4) appearance, and (5) cost. In this context, 'performance' refers to the fulfilment of functional consumer demands; 'quality' refers to material and production quality; 'durability' refers to the time period in which the product performs functionally and visually; 'appearance' refers to a distinctive, pleasing and/or form-follows-function look; and 'cost' refers to the price of the product.

Roy et al. (1987) argue that at different stages of purchasing processes, different design factors are relevant, more specifically: (1) before purchase: brochure characteristic; (2) during purchase: showroom characteristics; during initial use: performance characteristics; and (4) long-term use: value characteristics. 'Brochure characteristics' include the manufacturer's specifications, advertised performance and appearance, test results, image of company's products and list prices; 'showroom characteristics' include overall design and quality, special features, materials, colours, finish, first impressions of performance and purchase price; 'performance characteristics' include actual performance, ease of use, safety, etc.; and 'value characteristics' include reliability, ease of maintenance, durability, running cost, etc.

Papanek (1995, pp. 32-34) argues that a product life cycle can be understood through a 'six-sided function matrix,' which includes the dimensions: (1) method; (2) association; (3) aesthetics; (4) need; (5) consequences; and (6) use. 'Method' includes tools, materials and processes; 'association' includes family, early environment, education and culture; 'aesthetics' include gestalt, perception, eidetic and biosocial aspects; 'need' includes survival, identity and goal formation; 'consequences' include ecological-environmental, social-societal, material use and energy use; and 'use' includes the use as a tool, as communication and as a symbol.

Ulrich and Eppinger (2000, pp. 227-230) define five categories to assess the quality of a product design: (1) quality of the user interfaces; (2) emotional appeal; (3) ability to maintain and repair the product; (4) appropriate use of resources; and (5) product differentiation. The 'quality of user interfaces' refers to how easy the product is to use, which is related to the product's appearance, feel and interaction modality. The 'emotional appeal' refers to an overall rating of how well the product appeals to a consumer, which is related to the product's appearance, feel, sound and smell. The 'ability to maintain and repair the product' refers to how easy and intuitive such actions are. 'Appropriate use of resources' refers to how well resources have been used in order to satisfy customer needs, i.e. the costs and environmental impact of producing the product in relation to the customer's needs or desires (e.g. avoiding unnecessary product features). 'Product differentiation' refers to a rating of the product's uniqueness and its consistency with the corporate identity.

Based upon a review of previously used classifications of choice reasons and product functions, as well as subsequent empirical work, Snelders and Schoormans (2004) define a classification of product aspects that are important to consumers. Their classification scheme includes the categories: (1) ergonomic, (2) price, (3) hedonic, (4) symbolic, (5) quality, (6) altruism, (7) low involvement, and (8) health. 'Ergonomic aspects' include arguments with regard to practicality and usefulness of features; 'price aspects' include arguments in favour of a low price; 'hedonic aspects' include arguments about pleasure to the senses, including aesthetic considerations; 'symbolic aspects' include arguments about the status of the product, brand image, and self-expressive motives; 'quality aspects' include arguments about global product performance and not harming the environment; 'altruism aspects' include arguments about helping or avoiding conflict with friends or family; 'low involvement aspects' include short statements about the product being unimportant or easily noticed or classified; and 'health aspects' include arguments about safety or health.

According to Rindova and Petkova (2007), some lines of organisational research on human-created objects suggest that these are characterized by (1) functional, (2) symbolic and (3) aesthetic dimensions that jointly determine how individuals respond to them. Rindova and Petkova (2007) define the 'functional dimension' as the degree of technological change (incremental or radical), the 'symbolic dimension' as the degree of visual similarity to existing products (single product category or multiple product categories) and the 'aesthetic dimension' as the degree of visual appeal. According to Rindova and Petkova (2007), both the functional and aesthetic dimension can affect the symbolic dimension, while all three dimensions can affect the 'apparent novelty' of a product.

Based upon a synthesis of prior research and insights from working with designers and consumers, Noble and Kumar (2008) define three types of design strategies: (1) utilitarian design, (2) kinesthetic design, and (3) visual design. 'Utilitarian design' focuses on the practical benefits a product may provide and includes effectiveness, reliability, durability, safety, multi-functionality and architecture. Thus, this strategy can lead to functional differentiation. 'Kinesthetic design' emphasizes how a user physically interacts with the

product and includes ergonomics, human factors, sensory cues and intuitive operation. This strategy can lead to both functional differentiation and emotional value. 'Visual design' is driven by form and communicates value to the consumers without them necessarily interacting with the product. Visual design includes zeitgeists, metaphors, personality, novelty and 'high design,' and it is a strategy that can lead to emotional value.

Boehe and Cruz (2010) distinguish between three types of product differentiation: (1) product quality, (2) product innovation, and (3) CSR (corporate social responsibility). 'Product quality differentiation' refers to product characteristics, such as product performance, durability, reliability and consistency with specifications. 'Product innovation differentiation' refers to the inclusion of innovative features in products. 'CSR differentiation' refers to the improvement of processes from a socially responsible perspective, such as avoiding waste, pollution and the exposure of employees to unhealthy working conditions and improving a firm’s reputation.

Carpenter et al. (1994) point out that brands may successfully differentiate with regard to attributes that appear valuable, but upon closer examination are irrelevant in relation to creating the suggested benefit. Carpenter et al. (1994) give the example of "Folgers Instant Coffee," which is differentiated by its "flaked coffee crystals," created through a "unique, patented process." Although it is not explicitly stated, the statement could be interpreted that 'flaked coffee crystals' improve the taste of coffee. However, the shape of coffee particles is irrelevant with regard to the taste of instant coffee (as opposed to ground coffee). Another example given is Alberto Culver's "Alberto Natural Silk Shampoo." Including silk in the shampoo, and advertising with the slogan "we put silk in a bottle," may be seen as suggesting that silk would make the user's hair soft; however, according to a spokesman from the company, silk really does not do anything for hair (Carpenter et al., 1994).

FOUR LEVELS OF DESIGN FOCI

As the literature review suggested, engineering design research has its main focus upon how products are structured and the functions they perform, while industrial design research gives more attention to the experience the product induces. On this basis, a basic distinction can be made between a focus on products (objects) and a focus on consumers/users (subjects). Another observation from the literature review is that some categories are of a structural nature, while others are more related to action. Using these two distinctions, a two-by-two matrix can be constructed, as shown in Figure 1. In the figure, the black arrow indicates the relationships between the four levels, i.e. that choices made at the component level result in certain product performances, which produce certain experiences for consumers, which produce certain associations. The four levels are connected by three processes, which each enable movement from one level to the next. The grey arrows serve to illustrate that the focus in the design process does not move sequentially through the four levels, but rather back and forth between levels, as well as being on multiple levels simultaneously. The four levels are subsequently explained.

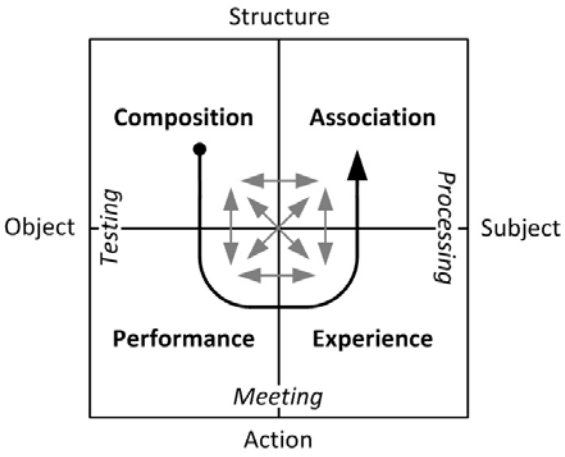

Figure 1. Four levels of design foci

In the 'composition perspective,' the focus is on choosing the elements of which the product consists (i.e. materials and components) and the ways in which these elements are combined. The latter includes both definitions of how materials/components are physically combined and the production methods needed to do so. Each element choice and production method choice has a range of direct effects, such as material costs, production costs, material quality, environmental impacts, etc.

In the 'performance perspective,' the focus is on how the product 'performs' in different situations, i.e. evaluations of the product in relation to certain activities. Performance aspects can include (depending upon the product type): durability, speed, operation duration, power, strength, etc. Thus, to evaluate a product's performance, tests, calculations and/or simulations are necessary. The performance level is, to some extent, also related to the visual aspects of the product. However, this does not hinge upon how humans perceive it, but what actually happens under certain conditions, e.g. how the product in different situations reflects light, which can produce a visual experience.

In the 'experience perspective,' the focus is turned to how consumers experience the product. Thus, this perspective includes experiences of beauty, elegance, efficiency, user-friendliness, comfort, etc. There is a basic difference between evaluations from the performance perspective and the experience perspective in the sense that performance measurements most often can be made in quantitative form, while consumer evaluations have a more qualitative nature. For example, if the focus is on the speed of a car, in the performance perspective this would be measured in kilometres/miles per hour, while in the experience perspective the evaluation would be of the sort "this is a fast car," which refers only to a particular consumer's perception of what defines a car as being fast.

In the 'association perspective,' the focus is on the relationship between the product experience and the existing memory that these experiences get connected to. Examples include associations to other products, personal experiences, people, lifestyles, cultural events, design styles, etc. The argument for categorizing associations as being related to

'structure' is that in this context they refer to mental relationships between product perception and other memory.

To investigate the completeness of the proposed classification of design foci, it was mapped to relevant categories mentioned in the literature review, as shown in Table 1. It should be noted that for some of the categories mentioned in literature, it is debatable as to which of the defined four perspectives they belong. This is because some of this literature is rather unclear with regard to what exactly their categories refer to and because some of the categories appear to overlap several of the suggested levels of design foci. In such cases, the categories are placed under the design foci to which they seem to mainly belong.

	Composition	**Performance**	**Experience**	**Association**
Dreyfuss (2012, org. 1955)	Cost		Utility and safety; Maintenance; Sales appeal; Appearance	
Kotler and Rath (1984)	Quality; Cost	Performance; Durability	Appearance	
Roy et al. (1987)	Product specification; List price; Materials; Colour; Finish; Purchase price	Performance; Test results; Special features; Reliability; Durability; Running cost	Appearance; Image of product; Impressions of performance; Ease of use; Safety; Ease of maintenance	
Papanek (1995)	Method; Consequences	Need (survival); Use (as tool)	Aesthetics	Need (identity, goal formation); Association; Use (as communication, as symbol)
Ulrich and Eppinger (2000)	Appropriate use of resources		Quality of user interfaces; Emotional appeal; Ease of maintenance; Product differentiation	
Snelders and Schoormans (2004)	Price; Quality	Health	Ergonomic; Hedonic; Low involvement; Altruism	Symbolic
Petkova (2007)		Functional	Aesthetic	Symbolic
Noble and Kumar (2008)			Utilitarian; Kinesthetic; Visual design	
Boehe and Cruz (2010)	CSR	Product quality; Product innovation		
Carpenter at al. (1994)				Irrelevant attributes

Table 1. Relationship to existing literature

Design strategies

By using the four defined levels of design foci, four distinctive design strategies can be defined: (1) composition focused design strategy, (2) performance focused design strategy, (3) experience focused design strategy, and (4) association focused design strategy. An example of a 'composition focused design strategy' is a laptop in the lower price range. Compared to other laptops, it may not have performance advantages, provide better use experiences or produce advantageous associations; instead, the only real argument for purchasing this laptop would be that it has a low price for a product of its kind. An example of a 'performance focused design strategy' is a battery with superior lifetime. Compared to other batteries, it may be more expensive, while not necessarily producing significantly

different use experiences or associations. Thus, in this case, the decisive argument for consumers choosing this product would be its performance. An example of an 'experience focused design strategy' is a tea pot, which has been designed with a focus upon creating a beautiful and original appearance at the expense of high performance quality and low price. Thus, compared to most other tea pots, the one in focus may be pricier, while not being significantly better at keeping the tea warm or producing any advantageous associations. In this case, the argument for choosing this tea pot would be that the consumer finds it beautiful to look at. An example of an 'association focused design strategy' is an exclusive bottle of water. Compared to other bottles of water it is pricier, but not necessarily healthier (performance) or tastier (experience). In this case, the argument for choosing this bottle of water could be that the consumer associates the product with a certain desirable lifestyle; and it is this association with a particular lifestyle, rather than the product itself, that produces value. Obviously, in many cases, products are designed with a focus on more than one of the four design strategies. Furthermore, though only some of the four design strategies are in focus, all four levels need to be considered during a design process. Thus, different types of expertise are required.

The relationship to design expertise

In relation to relevant expertise on the four levels, it appears that, from the point of a designer, relevant knowledge becomes increasingly more abstract when moving from 'composition' to 'association.' This assumption is illustrated in a principal manner in Figure 2 and subsequently discussed.

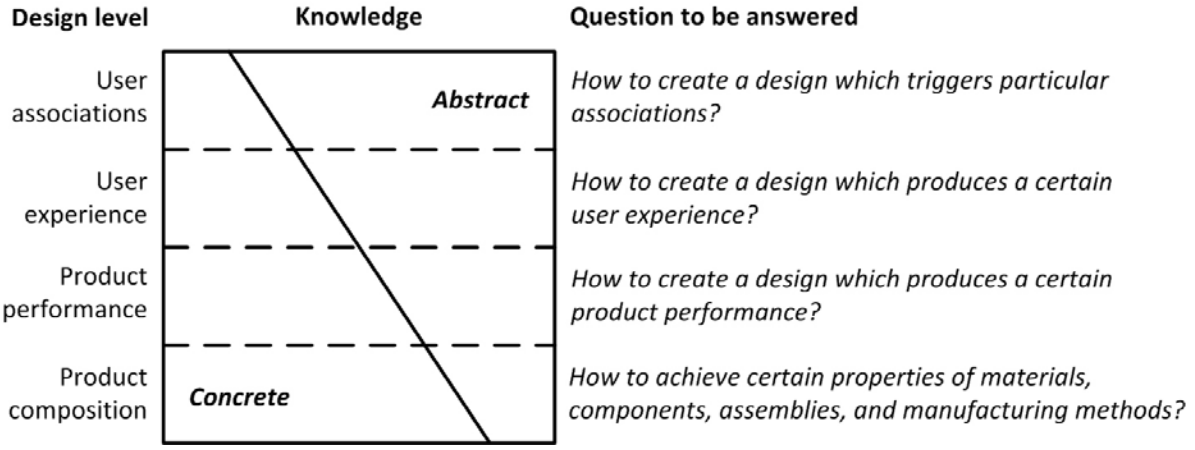

Figure 2. The nature of relevant design knowledge

The main argument for claiming that abstract knowledge plays a relatively small role on the composition level is that the identification of materials, components, assemblies and production methods with certain properties often involves nothing more than researching this information in a basic manner (e.g. looking at product specification sheets). In a similar fashion, when creating a product with certain performance demands, often industrial and fashion designers can use experiences from similar products. However, this transfer of

experience from existing products to a new and different design is somewhat more complex than merely looking up properties, since often such experiences cannot be used directly, but need to be adjusted based on differences in the designs. Furthermore, for many types of consumer products, calculations, simulations or prototype tests are required in order to determine relevant performance aspects (e.g. smartphones, cars, running shoes, etc.). Although, such tasks are often beyond the responsibility of an industrial (or fashion) designer, this person still needs to consider such results and modify the design if performance aspects are not satisfactory. Thus, there are strong arguments for claiming that the move from the composition level to the performance level implies an increase in the amount of abstract knowledge necessary. When focusing on the move from the performance to the experience level, the "rules" with regard to achieving certain effects seem to become increasingly abstract. More specifically, in contrast to the explicit rules for calculating performance aspects of products, "rules" for how to achieve certain user experiences are most often of a much more abstract and tacit nature (e.g. Lawson, 2004; Lawson and Dorst, 2009). What seems to be the most controversial aspect of the claim that relevant knowledge becomes increasingly abstract when moving from the composition to association level is the move from the experience level to the association level. In this context it should be emphasised that the task of creating a design that produces certain associations should not be seen in isolation but in relation to the other levels. For example, if a designer is to design a tablecloth that produces associations to Christmas, it may appear to be an easy task that, for example, could be solved by placing Christmas tree prints all over the tablecloth. However, if relevant consumers find such a tablecloth in poor taste, this way of achieving the desired association is not useful. In fact, it may be the case that the target group do not like prints or figurative elements, which would make the design task much more difficult. Another example could be the task of designing a chair that consumers associate with cosiness. The challenge in this context is that people have very different ideas of what a cosy chair is and, thus, it is likely that many consumers would not associate a particular design with this mood, no matter how it appears. At an overall level, it appears to be more predictable how relevant consumers would experience a product (e.g. visually pleasing, user-friendly or comfortable) as compared to predicting the wide range of associations that a given design produces for different consumers.

In general, the main expertise of an industrial/fashion designer is considered to be at the experience level, while product composition and product performance are typically more related to engineering expertise (Kim and Lee, 2010). The association level may primarily be linked to marketing expertise, since it relates to the understanding of relevant consumer segments. However, although such types of expertise are typically associated with different types of experts, these fields of expertise need to connect during a design project. This topic, as well as the usefulness of the framework, is investigated in the subsequent sections.

RESEARCH METHOD

To investigate the proposed framework, studies of eight designers were carried out. The designers were identified by a regional business development and advisory organisation that was instructed to find designers of consumer-oriented products for which appearance plays an important role. In order to investigate the classification in a broad manner, designers with experience from different types of products were chosen.

The study of the eight designers was carried out in four overall steps: (1) analysis of reference projects of the designers, (2) semi-structured interviews and follow-up, (3) selective transcription of interviews, and (4) analysis of interviews. The interviews focused on design processes in relation to contextual factors, types of design foci and expertise. The interviews lasted around 1.5 hours (except Interview 4, which took around 45 minutes) and were digitally recorded. Notes were taken during the interviews to register impressions that were not captured by the recorder. Further information about the designers is shown in Table 2.

	Years of experience	Education	Design focus	Design assignments
1	2	MA Industrial Design	Furniture, lamps, textiles	Freelance
2	2	MA Textile Design	Textile products, interiors, furniture, clothes and bags	Freelance
3	4	Diploma in media graphics	Shoes (earlier graphic design)	Employed at producer
4	11	Tailor, fashion design diploma	Clothing (mainly for women)	Producer/freelancer
5	13	MA Fashion Design	Clothing (mainly for children)	Producer/freelancer
6	20	BA Industrial Design	Furniture, toys, medical products, footwear, process facilitation, etc.	Freelance
7	22	MA Arch	Furniture, lamps, household appliances, etc.	Freelance
8	25	MA Arch	Furniture, industrial equipment, household appliances, etc.	Freelance

Table 2. Interviewed designers

RESULTS

First the designers were asked about their considerations with regard to each level during the design processes. To this question, all the designers answered that they usually considered all four levels wherein the 'experience' level in general was considered above the others. On the composition level, considerations related to materials included environmental issues, low prices, quality and various other properties (weight, size, colour, etc.). For production methods and construction principles, considerations related to quality, cost, work conditions and environmental issues were mentioned. On the performance level, considerations mentioned included durability, weather resistance, health issues, strength (in relation to weight and size) and quality of technical functions. Some of the designers had, in fact, experienced cases wherein both the composition and performance level were almost fixed in the sense that the only aspects that the designer could decide upon were colours and print (e.g. tablecloths, handkerchiefs and bed linens). On the experience level, aspects mentioned

included appearance, user friendliness, comfort and pleasurable use. Without exceptions, the designers claimed to give this aspect substantial consideration and considered expertise on this level as their primary competence. However, the designers were divided in relation to how much emphasis they gave in general upon appearance as compared to function (use); some emphasised appearance more and some emphasised function more. On the association level, examples of associations that they sought to trigger included naturalness, various lifestyles, being fashionable, being practical, use contexts (e.g. office, party and Easter), elegance and exclusiveness. All the designers had experienced designing products that were targeted at certain consumer groups, and in some cases this involved considerations of producing certain associations according to the typical preferences of these persons.

Next, the designers were asked to describe the 'reasons for' and 'consequences of' a lack of quality on the four levels according to their experience. On the composition and performance level, all the designers stated that most often others (such as engineers or product managers) were responsible for ensuring component/material quality. Two of the designers (a shoe designer and a clothing designer) mentioned that supplier related issues, such as errors and lack of competencies, were the main reasons why the end-product did not have adequate performance quality. More specifically, the desired material could not always be found in the local markets and compromises were necessary. In fact, sometimes such design changes were made by the suppliers without informing about this, for which reason the delivered products differed from the approved production samples. Additionally, four designers mentioned poor product lifetime, caused by pressure to reduce prices from the producer and lack of understanding of how consumers uses such products. On the experience level, it was mentioned that decisions were often made in close cooperation with marketers, who often have better insight into who the relevant consumers are and their preferences. In many cases, marketers were also the ones evaluating design proposals. Problems mentioned on this level were related to misinterpretations of target group preferences, such as products looking 'too practical' (too rough, too big, too heavy, etc.), products looking 'too elegant' (fragile, non-durable, non-pleasant for long term use, etc.), products not being in the taste of the target group (wrong colours, wrong style, etc.), products looking/being too complex (too many functions, too complex interfaces, too difficult to control, etc.) and products having poor ergonomic qualities for the actual use (typically, longer usage periods and more demanding use than expected). As for the experience level, on the association level it was mentioned that marketers were often very much involved in such considerations. Mentioned problems encountered on this level included: products being associated with lifestyles of others than intended (e.g. a jacket for girls being associated with older women), products being associated with other types of uses than those intended (e.g. a medical apparatus looking too fragile to use as intended), and products being associated with other usage contexts than the intended ones (e.g. a shoe looking too informal for office work). Other mentioned reasons for a lack of design quality, more related to the designers themselves, included: having too little understanding of relevant consumers, assuming that consumers have the same taste as the designer, being too focused on being original in relation to appearance, lack of craft insights,

and poor research on existing products. Four of the designers stated that they most often did not see themselves as being particularly responsible for whether a product would do well; but that this was something that marketers should figure out before approving the final design.

The designers were then asked to consider how prioritising certain levels could affect other levels. On the composition level, the maximum prices of components, materials and production had, by all the designers to some extent or other, been experienced as a priority, and were often seen as negatively affecting the three other levels. Two designers also mentioned environmental considerations, which could imply that less attractive or less functional materials were chosen. On the performance level, seven of the designers experienced performance demands or goals (most often in relation to durability), which had impacted the choices to be made on the other levels, in particular on the experience level in relation to appearance. In this context, three of the designers mentioned that good design is often characterised by 'form following function,' for which reason performance-related constraints were not necessarily a bad thing. On the experience level, all the designers had experienced situations wherein appearance considerations affected choices on the other levels, with the composition level, obviously, being the most directly affected. Also mentioned on this level were considerations of usability and ergonomics, which besides affecting the three other levels also could imply less attractive appearance, i.e. a conflict within one level. On the association level, all the designers, to some extent, experienced that desired associations related to a product placed constraints on the choices on the other levels, in particular on the experience level with regard to appearance. In this context, two of the designers mentioned that it can sometimes be difficult to be very original in relation to the appearance of a new product, because if a product does not generate associations to similar products, consumers may fail to recognize what the product is for and, therefore, ignore it.

Next, the designers were asked about the value of having expertise on all four levels, as opposed to only on the experience level. With regard to this question, all the designers saw value in composition and performance-related knowledge in the sense that this improved communication with engineers/construction-employees, while some also mentioned that it allowed them to challenge the ideas of these individuals. Having such insights was also seen as making the design process more efficient, because unrealistic ideas would be abandoned instead of keeping working on them until someone stopped the process. In relation to associations, having relevant insights into (or a feel for) consumers was seen as important, since it improved communication with marketers and could be utilised to challenge assumptions of marketers; and it could help avoid going in unfruitful directions during design processes. All the designers believed that as they had gained experience on each of the four levels, their job had become easier. In fact, some of the experienced designers saw this as a key reason for them being able to charge significantly more than some designers with similar skills on the experience level, but with less expertise on the three other levels.

Finally, the designers were asked about the usefulness of the classifications, i.e. whether all four levels are relevant from a designer's perspective, whether they found it easy to

distinguish between the four levels and whether there are additional relevant levels in addition to the ones in the framework. The designers all confirmed that all the four levels are relevant and found them easily distinguishable. None of the designers could identify other relevant levels than the four included.

CONCLUSIONS

This paper proposed a framework of design foci derived by using the two fundamental distinctions of 'object versus subject' and 'structure versus action.' The combination of these distinctions resulted in four levels of design foci, which, from the perspective of industrial and fashion designers, are relevant to consider in design processes, i.e. product composition, product performance, user experience and user associations.

The proposed framework was mapped against existing classifications, which demonstrated its completeness in the sense that all the categories mentioned in literature could be placed within the framework. Next, the framework was investigated through a series of interviews with eight industrial and fashion designers. These studies showed that the proposed framework can be a useful means for organising experiences from design processes and different types of design expertise. Furthermore, all the interviewed designers believed that the division of foci in the framework was meaningful and easily understandable. The designers were not able to mention aspects not included in the framework, which can be seen as an indication of its completeness.

Other findings from the studies included the fact that all eight designers believed: (1) the more expertise an industrial/fashion designer has on the composition and performance levels, the less time the designer wastes on ideas that are not realistic from a construction perspective, and the more efficient the communication with engineers and construction personnel becomes; and (2) the more expertise an industrial/fashion designer has on the association level, the less time the designer wastes on ideas that do not address the consumers in focus in the right manner and the more efficient the communication with marketing personnel becomes, and (3) as industrial/fashion designers gain expertise, it is not just on the 'experience level', but also on the three other levels.

The proposed framework of design foci may provide future research with common ground for investigations of design strategies and expertise. For practitioners, the framework may provide a structured basis for design strategic discussions and considerations.

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A New Institutional Economics View of Strategic Design

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Keywords: Strategic Design, New Institutional Economics, Design in India

Strategic design is seen as highest level of integration of Design and business. The paper reviews the industry-based and resource based view of strategy for strategic design. In the industry-based approach Design is a tool for differentiation, reducing the threat of substitution and buyer bargaining power and raising the industry entry barriers for competitors. Whereas in the resource based view Design is seen as an internal dynamic capability that the organisation uses to gain competitive advantage in the market place.

The paper discusses how both the above approaches are inadequate as they fail to relate Design with the underlying economic concepts of strategic management. The paper further proposes New Institutional Economics as an alternative framework that is more broad-based and enables to integrate Design in the discourse of strategy by considering the underlying economic concepts of strategic management. The paper concludes with discussing how this discussion is relevant in case of India to develop a model for strategic design.

DESIGN AND STRATEGIC MANAGEMENT THEORIES

Of the many intersections of Design and business the discourse on strategic deign is one thread that has gained importance off-late. In practice many organisations have attempted to integrate design in their business strategy and researchers have proposed models to describe this integration. Since strategic management itself was a thriving discipline there was a ready body of knowledge which was used by researchers to locate Design in business strategy. Two prominent approaches that have been widely used are the Industry-based approach and the Resource-based view.

Industry Based Approach:

An industry-based view argues that largely conditions within an industry determine firm strategy and performance. Porter's work in 1980s remains the most influential in this approach. Porter brought the rigour of economic thinking in strategic management. Porter's concepts of entry and exit barriers, industry analysis, and generic strategies became broadly accepted and the mainstay of strategic management.

In the Industry-based approach to fit Design in existing strategy thinking Stevans et al (Stevens, J. et al, 2008) relate it to the Porter's generic strategies and the value chain. They propose that in the generic strategies of either cost leadership or differentiation Design can play an important role and offer the firm a competitive edge in the market. Design process, if thoughtfully followed, can help reduce costs thus strengthening the firm position as a cost leader. Further, Design enables to build differentiation at product and communication level and protects against competition. Of the 5-forces, threat of new entrants, threat of substitutes, buyer bargaining power, supplier bargaining power and rivalry within the market Design can give crucial leverage to a firm. Design when looked in relation of these 5-forces can be strategic as it has multiple touch points with the external environment of the firm and hence is an integrated view of Design.

Where the 5-Forces give the external linkages for Design the value chain enables to view Design in relation to the internal activities. Although Porter recognised design in its technological sense, as a primary activity in ‘operations’ and ‘technology development’ only, researchers have proposed a Design-led view of value chain. The design-led view argues that apart from product, Design can add value at other stages of the value chain as well and is explicitly accorded a place in the value chain. In one, Borja de Morzota [2003] finds design acts at three levels in the value chain, as simultaneously a differentiator, co-ordinator, and transformational process.

The other important works that build on the Industry-based approach are (Bruce, M., & Bessant, J. R., 2002), (Mozota, B. B., 1998) and (Olson, E. M., et al 1998) and they largely use the same Porterian tenets for defining strategic design.

Resource Based View

The other significant approach to strategy is the Resource Based View (RBV). Resource based view gained importance in response to the rapid technological and economic changes and globalisation scaling new heights. This moved the focus to resources internal to the firm as the principal driver of firm profitability and strategic advantage. Barney(1991) presented a more concrete and comprehensive framework that established RBV as a significant approach in strategic management. In the RBV the firm is seen as a unique bundle of tangible and intangible resources and capabilities (Wernerfelt, 1984). Resources are the tangible (financial or physical) or intangible (employee’s knowledge, experiences and skills, firm’s reputation, brand name, organizational procedures) assets that a firm uses to develop, manufacture, and deliver products and services to its customers (Barney, 1991).

In this tradition too it was possible to identify Design an internal dynamic capability that the organisation has. The most significant thread in the RBV discourse about Design is Design thinking (Brown, 2008). Design consultancies like IDEO, Ziba, Frog etc positioning themselves as strategy strengthened the case that thinking like a Designer can help organisations transform their products, services and strategy. The underlying notion here is that Design needs to be viewed as a resource that the firm can exploit to gain competitive advantage. Either by developing this capability in-house or with close partnership with external agencies Design is positioned as a source of competitive advantage. Design Driven Innovation (Verganti, 2008), Integrative Thinking (Martin 2009) and Design as core competence (Rosensweig, R. R. 2011) are the other important approaches that emerge from the RBV.

Other studies on Design and strategy are either derivates of either of the above two approaches or their combination. The notable among these studies are (Liedtka, J. 2004), (Cooper, R & Evans, M , 2011), (Seidel, 2000), (Stevans 2008) and (Joziasse, F. 2000)

INSTITUTION BASED VIEW OF STRATEGY

Both the industry- and resource-based views although good at explaining the competitive strategy in contexts that are relatively stable have strong market-based institutional framework. However, with the newer emerging economies, uncertain economic environment and socio-economic changes in the developed world research in strategic management has to look for models that can accommodate this changed context. An institution based view, better known as New Institutional Economics (NIE) view of strategy is proposed as an alternative that considers the formal and informal institutions as the drivers of strategy and performance of firms. The increasing interest of researchers in emerging economies with institutions significantly different from those in developed economies (Hoskisson, Eden, Lau, & Wright, 2000; Wright, Filatotchev, Hoskisson, & Peng, 2005) has brought to fore the institution based view as an important approach towards strategy.

NIE traces its origins to Coase's analysis of the firm and social cost (Coase, 1937). It was further enriched by contributions of Simon (1947), North (1991), Williamson (1985) and others. NIE is strongly rooted in the Transactions Cost Economics (TCE) and addresses questions about why firms exist, how firms define their boundaries, why do firms differ , how they ought to govern operations and what determines firm's performance. These are the very questions that are pertinent in strategy formulation and implementation.

Institutions are formally defined as humanly devised constraints that structure human interaction by North (1995) and basically are the rules of the game by which firms and individuals are governed. Institutions are classified into formal and informal institutions. Laws, regulatory frameworks and policy matters constitute the formal institutions and social norms, cultural values and ethics are the informal institutions.

Strategic Design and Institution Based View

The NIE view is relevant in research of strategic design for two reasons. First is the inadequacy of the industry and resource based approaches in relating Design to the underlying economic foundations of strategy. Strategy at its core has amalgamation of two disciplines; economics and organisation theory (Haberberg, A., & Rieple, A. 2007). As seen in previous sections, most of the research in strategic design focuses on the final models and applied tools like Porter 5-Forces, Value Chain and Design as strategic resource. Thus, to bring out the strategic importance of Design it is necessary to relate Design with sub-structures of strategy rather than just the final models and tools of strategic management.

Secondly, with Design becoming glocal, the Euro-American version of modern Design also needs to become more responsive the socio-cultural diversity and varied economic settings in which Design has to now operate. If Design is to be leveraged strategically the institutions of the emerging economies cannot be ignored. The industry and resource based view do consider the institutions but are treated as a background and often assume that the institutions will function as efficiently as they do in the developed economies.

However, recent research suggests that institutions are much more than background conditions, and directly impact the strategy formulation and implementation (Ingram and Silverman, 2002: 20). In emerging economies, institutional frameworks differ greatly from those in developed economies (Khanna, Palepu, and Sinha, 2005; Wright et al., 2005).

The key aspects in which institutional framework in emerging economies vary from those of developed economies as follows; (Wright et al., 2005)

- Markets are less efficient due to less transparency, more extensive information asymmetries, and higher monitoring and enforcement costs
- Governments and government-related entities are not only setting the rules, but are active players in the economy, for example through state-owned or state-controlled firms
- Network-based behaviours are common, in part as a consequence of the less efficient markets, but arguably also due to social traditions, and they influence how firms interact with each other
- Risk and uncertainty are high due to high volatility of key economic, political, and institutional variables. Hence, businesses find it harder to predict parameters they need for strategic decisions, including for example business cycles, government actions, or the outcome of legal proceedings

Given these settings and the increasing importance of emerging economies mandates that alternate models be employed first for strategic management itself and then to define the role of Design in business strategy. The overlapping boundaries of marketplace and the pace with which worldwide economies are transforming it is necessary that researchers better recognize the underlying forces of globalization.

Moreover, in past few years, "business as usual" has been criticised for the economic problems that the world is facing. It is necessary that the mistakes done in the developed world are not repeated by emulating the flawed models in the emerging economies. Mainstream strategy and business researchers themselves have admitted have pointed out structural flaws in existing thinking and models and concern over business being viewed as a major cause of social, environmental, and economic problems. (Porter, 2011), (Kotler, 2012) and (Martin, 2011).

An institutional approach for Strategic Design in India

India is at an Interesting intersection where modern Design and traditional Design coexist. With a renewed interest in Design globally, India is also witnessing unprecedented growth in Design sector. Various sections of the government, industry and the social sector are looking at Design as a tool for positive change. However, a diverse country like India has its own challenges when it comes to integrating Design in existing systems.

A glance at history of Design in India shows that Design is quite well entrenched and interwoven in the socio-cultural fabric of India. Although modern Design arrived quite recently in India, existence of Design at both thinking and doing levels can be traced back right up to the Indus valley and Vedic period of Indian history. This early Design process has been passed on generations after generations and can be best termed as Evolved Design and is manifested in the arts, crafts, architecture and technique even today.

Therefore at one end of the spectrum lies this version of Design that has evolved over a very long period and the other end is the modern Design that the Industry is adopting. Modernisation and globalisation has no doubt changed the Indian markets and economic scenario however replicating Western products, services and business models by organisations has not always been a successful attempt. While some part of these failures can be attributed to factors like flawed market research or inappropriate timing, an Institutional view sheds new light on this issue.

Before we consider the role of Design in business strategy, first let us consider the Institutional view in Indian context. India often considered as an emerging economy because the formal institutions are perceived to be weak or absent and less efficient infrastructure and factor markets. Thus the formal institutions typically assumed to be present and function efficiently in developed economies can't be relied on when formulating strategy. Thus informal institutions gain importance and act as beacons in strategy making and implementing.

We consider following cases that bring out this importance of informal Institutions and how it has affected the strategy of businesses.

FDI in Retail

Till 2011, foreign direct investment (FDI) in multi-brand retail was not allowed in India and In November 2011, India's central government announced retail reforms. These reforms opened up the Indian markets for multi-brand retailers such as Walmart, Carrefour and Tesco to open outlets in India. This step sparked a nationwide controversy over the entry of the foreign players. The reforms met with stiff opposition from certain quarters of the society and polity following which the Indian government placed the retail reforms on hold till it reaches a consensus. While there is a political angle to the whole chapter it is also a case which brings out the importance of institutions and informal institutions specifically.

Retail in India comprises majorly of unorganised players. These players over a period of time have formed highly interconnected networks and bonded by economic and non-economic ties. These bonds give rise to certain unwritten code of conduct and socially accepted behaviour among these players and essentially form the Informal institutional framework. This framework evolves as a response to either bypass or replace the formalized institutions. Crucial factors like access to credit, working capital , supplier network and customer base catered all are directly determined by these informal institutions .These institutions are enforced by the players of the networks rather than a 3rd-party entity and form a mutually agreed upon code that gets interwoven in the business practices.

Thus an Institution based view can bring out these dimensions clearly and suggests that considering these parameters in formulating the strategy is imperative for a successful entry in the Indian market. Having established this view it is now easy to define the Design strategy for such a scenario. If Design has to strategic it has to have a strong connect with these underlying economic forces. The models of strategic design based on the industry and resource based view are not able to fully accommodate these underpinnings and hence design has to follow the conventional strategies aligned to cost-leadership, differentiation by hi-design or branding.

An Institution based view would liberate Design from these shackles and bring it to level where it can create long-term sustained value for not only the businesses but also to the other stakeholders.

The case outlined above is indicative and many developments in the past decade In India have been increasingly shaped by the dynamic interplay of formal and informal Institutions.

The ambitious Tata Nano project got a setback when farmer’s agitations forced Tata Motors to move the plant from West Bengal to Gujarat. If Design would have been considered from a broader Institution based perspective Tata could have come up with a different strategy for the world's cheapest car and the outcome could have been different.

Innovation in Furniture industry

As other retail segments in India the furniture industry also majorly comprises of unorganised players with the organised players constituting only 20% of the industry. The players are

individual carpenters who provide highly customised solutions that a diverse market like India needs and their services are affordable for a middle-class Indian family. For a organised player in furniture industry to compete with the unorganised sector has been a daunting task and in spite national and global players present in the market the share of unorganised players remains substantially higher. Since the players are connected by informal networks the business comes to them largely through referrals which limit the share that an organised player can have.

Godrej Interio is a player from the organised sector and part of business conglomerate Godrej group. They realised that competing with the unorganised players will be a futile exercise and instead took the strategy of co-creation where in the individual carpenters were part of a platform called "U and Us". U & US closely works with the carpenter community to co-create the furniture aspired by the customers. This involves various interventions including providing them training and resources. The business model is innovative and embodies social responsibilities. The model also ensures maintaining of ecological balance as it attempts to satisfy the needs of multiple stakeholders. This model ensures that skills of carpenters are updated and work standards at wood working units are continually improved. As the solutions are co-created and appropriate technology is deployed for manufacturing, the resultant products are of good quality and cost-effective.

This strategy can be best explained from the institutional point of view as it acknowledges the importance of informal networks and all the stakeholders involved in a broad based way.

The above two examples bring out the importance of how informal institutions play a very important role in determining business strategy when it comes to Indian economy. These institutions also contain within themselves the ingenuity, Design thinking and Design doing that exists at grassroots level In India and which is now seen as powerhouse to drive growth. Moreover this is not a recent phenomenon and as early as 1959, case in point being Shri Mahila Griha Udyog Lijjat Papad.

Popularly known as Lijjat, is an Indian women's cooperative involved in manufacturing of various fast moving consumer goods. The organization's main objective is empowerment of women by providing them employment opportunities. Started in the year 1959 with a seed capital of Rs. 80, Lijjat has an annual turnover of around Rs. 650 crore, with Rs. 29 crore in exports (As of 2010). Starting as a small group of seven women in 1959, today Lijjat has more than 40,000 members in 62 branches across 17 Indian states.

Lijjat was the brain child of seven Gujarati women from Bombay (now Mumbai). The women lived in Lohana Niwas, a group of five buildings in Girgaum. They wanted to start a venture to create a sustainable livelihood using the only skill they had i.e. cooking. [11]

The women borrowed Rs 80 from Chhaganlal Karamsi Parekh, a member of the Servants of India Society and a social worker. They took over a loss-making papad making venture by one Laxmidasbhai and bought the necessary ingredients and the basic infrastructure required to manufacture papads. On March 15, 1959, they gathered on the terrace of their building and

started with the production of 4 packets of Papads. They started selling the papads to a known merchant in Bhuleshwar.

Every morning a group of women goes to the Lijjat branch to knead dough, which is then collected by other women who roll it into papads. When these women come in to collect the dough, they also give in the previous day's production, which is tested for quality. Yet another team packs the tested papads. Every member gets her share of vanai (rolling charge) every day for the work she does and this is possible only because the rest of the system is geared to support it.

Thus informal Institutions comprising numerous such systems and networks essentially form the socio-cultural and socio-economic fabric in India. Design can be strategic in its true spirit if it is located using a framework that considers these institutions and an Institutions based view is thus relevant in discussing strategic Design in India.

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He comes with a rich industry experience of 5+ years in Marketing & Operations. He has worked on Projects of diverse nature and has a very good understanding of business processes. In his earlier stint he was heading the Pan-India Operations for Content Sourcing for Database Creation of all Small & Medium Businesses in India. During this project he has gained an excellent know-how of functions like Marketing, Distribution, GIS, IT Applications and Business Research.

He has a special interest in User Research and has done varied projects for capturing user feedback. He primarily dealt with understanding consumers Information usage and buying behavior. He has travelled a lot across the country and has a firsthand experience of Markets in Metros, Mini-Metros and Tier-2 cities of India. This has also enriched his knowledge about the people, culture and socio-economic profile of various regions of India.

Articulating Style and Design in Strategic Ventures

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Keywords: style, design, strategy, experience design, transmedia

AIMS

In this paper we explore how businesses define and qualify style and balance it with design to add more value than either of these two parts might in isolation. Style is the social currency of the 21st century. As a gestalt it creates value for organizations. Where design is process, style is a result of that process and a system in and of itself which can be managed. We assert that style is a corporate resource, a management tool, a strategic asset, and a competitive advantage. We outline a framework which explains style as a repeatable competitive and strategic advantage for business- not merely a superficial afterthought confined to logo.

To illustrate our framework linking definitions of style and design, we present new case studies of organizations regarding their style strategies.

LITERATURE REVIEW

This initial research is grounded in an understanding of how style has been referenced historically. We then extend our framework into the context of experience design and transmedia storytelling.

Style

This investigation is important because minimal research has been done to date that examines the meaning of style's articulation with design and integration into business strategy. Where design is a process, we define style as a quality and a form of communication. Style functions like a

language and is held together like a system (Meadows, 2008). Style is an escape from what Benjamin (1968) envisioned as the prison of modernity, and Foucault (1972) saw as the trap of historical interpretation. On the individual level, style is a means to reinvent the self, a personal calling card, and a visual persona. Style leads to insights about a person- and we argue that it can also lead to insights about an organization. On a collective level, style is a key signifier of group identification; as such it can be used to identify brands and other collective organizations as "networks" (Brummett, 2008). Here is where its relevance to branding is significant. Style is a crucial element of branding, pointing to the intangible qualities that lead consumers to form meaningful connections to products and services. A large number of businesses (e.g., Apple, Whole Foods and W Hotels) have a style component in their business model and brand proposition. These brands use style as the key to opportunity identification because it is a way for the brand to state things that it cannot articulate by relying on words, or visual interpretations. Style guides include details about colour, tonality, pattern, texture; these are guidelines for consistency. They become the filtering criteria when strategizing about best ways to gain profitability and win market share. In an experience economy (Pine and Gilmore, 1999), style leads to insights about a brand and helps to tell the brand story.

The idea that one can practice a particular style is prevalent today and reflected in everything from the traditional practice of styling a look - as is done in the fashion industry- to the plethora of cable television channels, such as The Style Channel, where there is broad exploration of applying the practice of styling to cooking and house hunting. Style has a placeholder in society as design once did thirty years ago; but currently it is being pursued in an intuitive way by organizations and by individuals (Postrel, 2003). It has not been unpacked or analysed as a significant differentiator, yet it does have strategic value.

Experience Design

The mission of experience design is "to persuade, stimulate, inform, envision, entertain and forecast events, influencing meaning and modifying behaviour*"* (Jones, 2008). Through the designing of experiences, companies can evoke meaning with less of an attachment to objects and more to the relationship, meaning and feelings that the objects represent (Norman, 2004; Csikszentmihalyi and Rochberg-Halton, 1981): "designing experiences that evoke meaning is the heart and soul of innovation" (Diller et al., 2006). It is important to clarify that companies do not actually design experiences or create meaning; rather, they design the conditions and contexts to evoke meaningful experience. Experience design is about making meaning in the consumption

and transaction of services and products where usability and functionality are key components. The word ‘experience’ has spread through the business community with frequency as branding and design have evolved over the past decade (Diller et al., 2006).

Transmedia Storytelling

Transmedia storytelling is largely discussed in the context of film and multi-media. Henry Jenkins (2011) explains that in a branding context, transmedia is storytelling using multiple platforms: integral elements of a fiction are systematically dispersed across multiple delivery channels and then delivered as a unified and coordinated experience (Jenkins, 2007). Due to the co-creation between firm and consumer, transmedia storytelling requires a higher degree of coordination across different sectors and functional areas- this is in contrast, for example, to classic licensing models. Transmedia storytelling reflects a synergy through the horizontal integration of multiple channels. It is world-building, where there is an absence of closure, as found in classically constructed narratives.

METHODOLOGY

Our methodology utilized semi-structured interviews with practitioners in a range of sectors including consumer goods, hospitality, finance, advertising, brand strategy, and social media. We have plotted this preliminary data on a matrix from several perspectives. The interviews included progressive focusing, where interview questions were built upon as the research progressed. The multiple case method examines a collective group of cases to draw both comparisons and contrasts while upholding the integrity of the singular issues which may not be evident across all cases (Stake, 2006). While the case can be representative, the effort should not be to generalize, but rather to particularize.

KEY FINDINGS

We investigate the strategic value of style in three distinct forms: as rhetoric, as a curatorial tool, and as organizational behaviour.

Style as rhetoric

Rhetoric is the use of persuasive language or a (visual) code used to communicate. This is evident in the area of branding. Just as rhetoric is not an actual thing, but is a way of speaking, so also is style a way of speaking visually, sensorially and intangibly.

Style as curation

Curators collect, develop, and manage tangible objects. Organizations also collect, manage and disseminate tangible and intangible artefacts. Businesses act as style conduits, collecting style value (and by extension, valuation for their company) and arranging access for their customers.

Style as organizational behaviour

Style is a projection of organizational performance and seen best through organizational behaviour and culture: e.g., dress code, language, ritual and protocol. Self-definition and self-actualization are universal human desires, so individuals are powerfully motivated to participate in- and even evangelize- style systems with which they feel connection. This gives organizations' investments in style tremendous leverage, as employees and consumers carry them forward. Organizational style is consumed in order to communicate.

The following three examples- of IKEA, Virgin Air, and Exxon- demonstrate ways that our style framework can be mapped.

Figure 1: Style Maps by Brand: IKEA

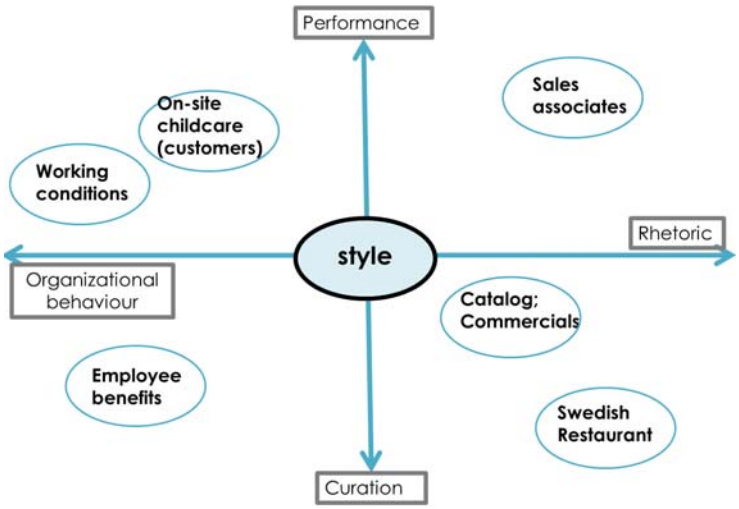


Figure 2: Style Maps by Brand: Virgin Air

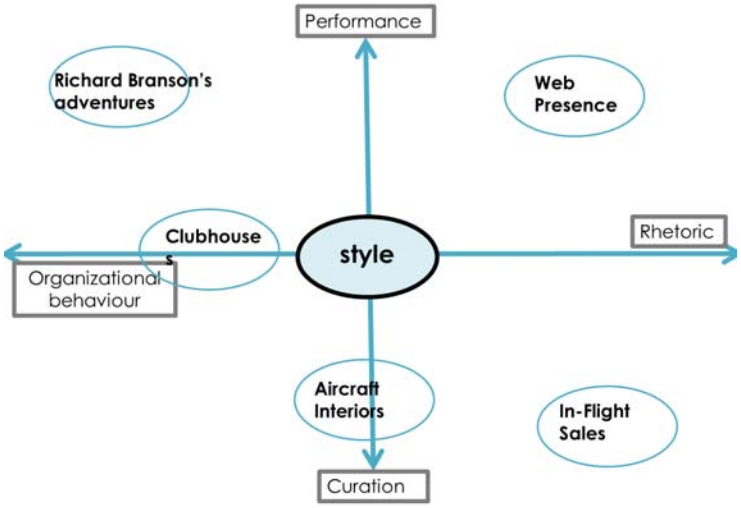
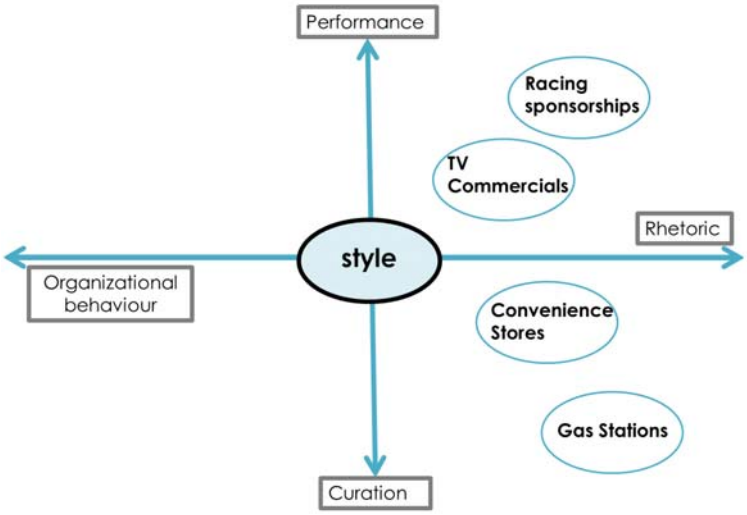


Figure 3: Style Maps by Brand: Exxon



CASES

Having explored our model of style as a strategic advantage with the above examples from a theoretical perspective, we conducted interviews and developed the following cases to further test our style matrix.

Josh Owen, Industrial Designer

When Josh Owen, a well-known industrial designer who both designs his own product lines and consults for corporate clients, was asked to describe his use of style strategies, he both validated and expanded them. While he acknowledges that designing for rhetorical effect is common, he claims not to design primarily with rhetorical intent, seeing his work instead as a natural

outgrowth of his background and psychology. In his personal work, he uses a distinctive form and colour language, including radius corners and frequent use of a monochromatic black and white palette, to define a coherent collection with a distinct personal imprint. When asked whether this was the result of a conscious curatorial impulse, he replied that it was more an outgrowth of the organization of his mind and his work processes. He described these as a combination of earnestness and idealism:

> "I'm a kind of romantic pragmatist, and this in some ways drives the aesthetic outcomes. There is humility...and a utility which evolves from a mix of old-world sensibilities with futuristic articulation. Any 'cool' in my work probably comes from the absence of 'cool' in my approach."

Interestingly, he does admit to using a curatorial strategy, but applies it to his working relationships, rather than the resulting products. Over the years, he's assembled a collection of like-minded clients:

> "I suppose I've always worked on commercial projects using my own metric for success. I count myself lucky to have had a career where I have been fortunate enough to work with many enlightened clients. I have also been privileged to be selective about working with partners... with a healthy respect for the designer's role in bringing value to their brands."

In curating a collection of working relationships, Owen has very successfully combined curatorial and organizational culture strategies.

Paul Rowan, Co-Founder of Umbra

Paul Rowan, cofounder and creative director of Umbra, a major North American housewares company, describes a very different take on style strategy. Because Umbra sells more than $100 million (Canadian dollars) of goods annually (Smith, 2013) and distributes its products through thousands of style-conscious independent retailers in 75 countries, rather than through its own stores, the company has to satisfy multiple audiences with conflicting needs. Rowan describes this as a knife-edge situation where style considerations are paramount. According to him, if Umbra's product mix becomes perceived as "trend-based" or "novelty-oriented," the company is likely to have a short run with a given retailer, but then be quickly replaced by another supplier." For this reason, Umbra strives to commission "timeless" or "classic" designs, such as Karim Rashid's "Garbo" trashcan or Miron Lior's "Conceal" bookshelf, to act as retail "anchors" for its product line. On the other hand, a changeless product line composed entirely of "classic" products won't help Umbra or its retailers build excitement or enter new markets, so Rowan also needs to have a stream of new, fresh products which reflect the latest style trends.

Every quarter, Rowan, as creative director, coordinates a dedicated series of product development meetings, at which he and his staff determine and curate Umbra's specific "style mix" for the upcoming season, commissioning new products and phasing out old ones to keep

the product mix mature but still fresh. Rowan credits these meetings and the resulting continuous improvement of the product line with the company's success, and he's not sentimental about the products that don't make it. For example, Umbra- which means "shade" in Latin- was founded to market a line of colourful printed window shades Rowan designed himself. However, Umbra currently sells only one style of window shade- in white, designed by a young Brazilian designer. The ability to have fluid guidelines and inputs for style enables continuous growth.

Jennifer Merchant, Associate Director for Personal Healthcare Design at Proctor & Gamble

Jennifer Merchant explains style from a brand management perspective in her work in consumer package goods at Proctor & Gamble. With a background in graphic design, she manages brand development across the over-the-counter category, including brands such as Vicks and Pepto-Bismol. In her mind, design is a process to achieve style. Merchant equates style with brand-building work and views style as a definition-tool, a means to distinguish the features which dictate the organization's ethos and mission: colour, tonality, texture. Those design elements that make up a style guide provide parameters that are important for strategic innovation.

> "In the healthcare space, most products on the market are not new inventions- there are multiple brands playing with the same types of products, so there's lots of competition. Then what is it that provides the delight or the defining experience? Why choose our brand over another? …It is difficult to win on functionality alone- you must create an experience beyond which defines aspects of your brand to make it a desirable choice. We teach our organization to aspire to that, and invest in communication, r&d and marketing as we build the total experience."

Merchant goes on to explain that her team looks at defining aspects that cue the user to the brand and that represent the experience. Those aspects could be brand mark, colour, typography, tonality. Thus style helps to define the offering beyond functionality from a look, tone and feel perspective.

When asked to reflect on the idea of style as rhetoric she emphasized the investment in communication and r&d to develop compelling messaging. Merchant pointed out that there has been a shift in advertising, away from a focus on the product itself, to a focus on what the overall brand stands for.

> "So look at Dove's *Real Beauty Sketches* campaign – with the tag line, "When did you stop thinking you were beautiful?" It launched in April 2013 and has won awards at the Cannes film festival. It is about so much more than the product. The style components that Dove uniquely

owns are used to persuade. … Dove is not MaxFactor. Dove is tapping into elements that are deeply human, that are about natural beauty."

In this provocative and compelling example, the Dove *Real Beauty Sketches* campaign (http://realbeautysketches.dove.us/) never once showcases a bar of soap, or directly advertises any product. Instead, through storytelling from real consumers, Dove overtly takes a stand for natural beauty, and covertly allows you to conclude that their product is women's advocate. Dove also uses film as a rhetorical device in their *Girls Unstoppable* campaign and in their girls' self-esteem short films, which showcases interviews with girls sharing disturbing reflections about self-image. These viral videos are both curatorial tools and rhetorical devices. They are delivering a series of touchpoints to convey messaging to the consumer and persuade usage.

Organizationally, P&G has a distinctive way to deploy design thinking by working with institutions such as Stanford's d-school and deploying design thinkers throughout the organization. They then created a network for those facilitators to learn from each other. They hold sessions with teams regarding the organizational design, working top down and bottom up. In terms of its organizational behaviour, P&G is known for smart minds; it is also known for being heavily data and process driven, and having a culture of collaboration: "Test, test, test shows credibility and trust- so there is a level of expectation that is there." This manifests with the consumer as products that have superior technology, and a fun experiential communication brand experience that has been developed in a holistic way.

Manoj Fenelon, Director of Foresight at PEPSICO

Manoj Fenelon views style as a relational expression- for both consumers and investors: "The outside world gives us a lot of credit for this. There is a challenge when branding a product of *leading* the world versus *responding* to sources." To illustrate the rhetorical role of style, Fenelon shares an anecdote about how in 1989, shortly after the Berlin Wall fell, PEPSICO launched an ad that the world was opening up due to the force of a new generation, and then leveraged that to communicate that Pepsi was "the choice of a new generation". At the time, the ad received a response time of 24 hours- a record time, unheard of previously. Today, people would say that a 24-hour response time is slow; however, it points to a legacy at PEPSICO of incorporating the grit and zeitgeist of the world into their branding strategy. It also shows a merger of leading the world in awareness of a new aspiration by quickly responding to what can

be anticipated. Across categories, each PEPSICO brand has a distinctive style. Thus, Mountain Dew and Gatorade are each very good in different ways at meaningfully connecting to their particular consumers. How do they do this?

> "It involves a lot of sacrifice- to have forgone short term gain to hold on to that signature style. For example- should Gatorade be sold as fountain soda? That is a great business opportunity, but from a brand point of view, if the brand is about fuelling athletic experience, then …you must ask if you want your brand imprint to be so visible in a place not associated with athletic achievement?"

Fenelon credits the team of brand management leaders with having a long term value of staying true. To explain style as a curatorial tool, he points out Mountain Dew's Green Label Sound record label which promotes Indie music specifically, and more generally the Green Label website focuses on art, music, youth culture and fashion.

> "It's not about Mountain Dew slapping its label on the music, but promoting it from the inside. Over time, people are willing to thank Mountain Dew openly and be part of Mountain Dew shows, but the label is very indigenous. It is essentially a curatorial tool."

In fact, when one visits the Green Label website, it asserts that

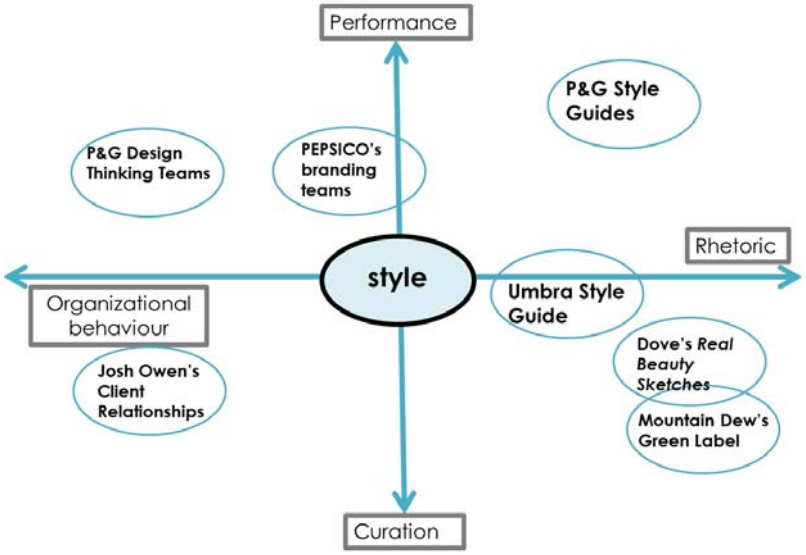
> "Green Label Sound is a record label curated by Mountain Dew. Designed to elevate and empower independent artists, music fans can come here to download free music, watch exclusive videos and discover new acts while keeping up to date on their favourites." (http://www.greenlabelsound.com/about/)

Fenelon believes that PEPSICO's style is an ethos, and insists that if the organizational behaviour is consistent with the communication extending from that behaviour, then style as a curatorial tool and style as rhetoric will extend from it. This is seen, for example, with Patagonia, Patagonia, Whole Foods, The Body Shop or Tom & Jerry's- these are very ethos driven enterprises, which are probing a model of the way style can drive ethos in an organization. Performance with purpose is PepsiCo's mantra; and it strives to integrate 'doing good' throughout- from internal drivers to how product is sold.

FINDINGS

Based on the cases outlined above, the following map collates the style practices of Josh Owen, Umbra, P&G and PEPSICO.

Figure 4: Collated style practices of Josh Owen, Umbra, P&G and PEPSICO

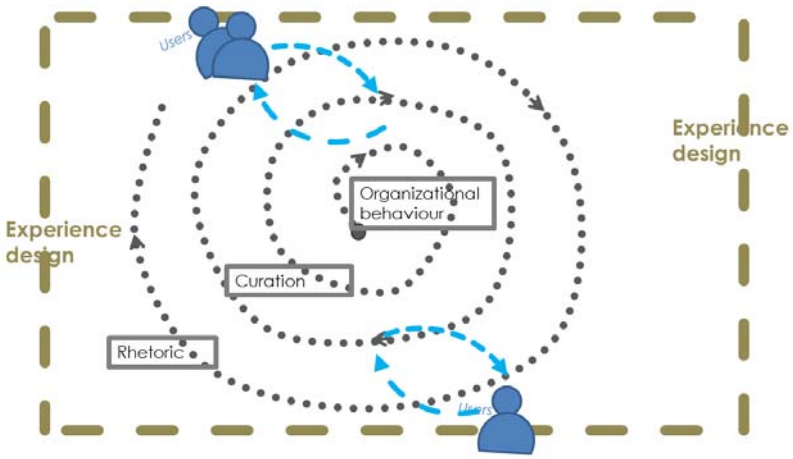


Based on this early stage research, the following insights surfaced about style when unpacked as a strategic advantage: 1) style is an integrative platform; 2) style is an experience network; and 3) style's platform enables transmedia storytelling.

Style is an integrative platform

Figure 5 demonstrates that style is a feedback loop. This is most clearly seen in an ethos driven organization where style is utilized in 3 specific layers, from the inside out. Starting at the core of the organization, a particular and clearly identifiable organizational behaviour and culture drives the offering, which then influences the ways in which that offering is curated as a dynamic repository through documentation and cataloguing -for employees within the organization and for consumers outside of the organization. Finally, the curated offering is a basis for developing rhetorical messaging in the form of logo and advertising. For example, Dove's *Real Beauty Sketches* is a video documentation of a value (women's natural beauty) that stems from the core of the organization, documented in video, and then communicated outward to potential customers to persuade them- style's rhetorical dimension- to ultimately buy soap.

Figure 5: Style spiral: style is an integrative experience network



Style is an experience network

Experience design is evident in those organizations which make meaning in the consumption and transaction of services and products where usability and functionality are key components. Organizations design experiences both rhetorically and in the context of their organizational culture. Companies do not design meaning; rather, they design the conditions and contexts- see Figure 5- to evoke meaningful experience through curatorial devices such as Mountain Dew's Green Label, Josh Owen's curated client network to diffuse 'the coolness' one experiences from his work, or Umbra's mix of classic and fresh designs.

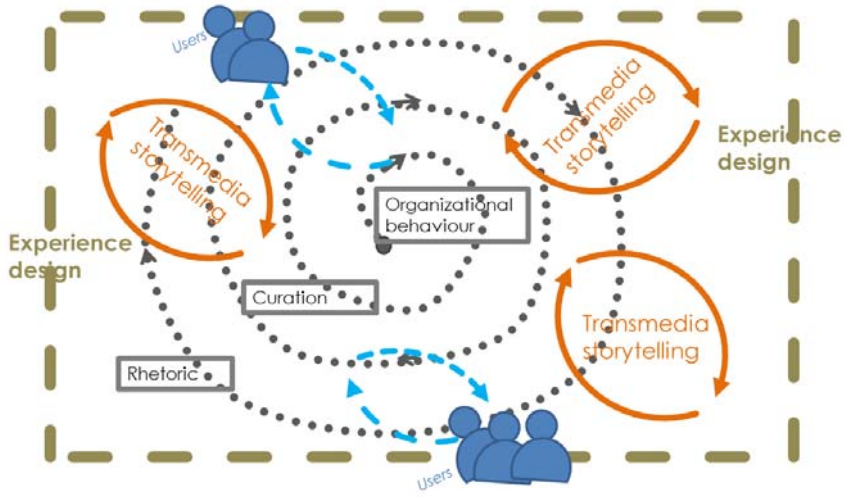
The integrated style platform offers nodes of touchpoints to deliver experiential meaning for the customer. In the case of Dove, the compelling digital story one views about girls triumphing over low self-esteem is a rhetorical touchpoint style node that compels one to identify in a meaningful way with a brand that sells soap. That video, used as a rhetorical device, compels subsequent consumption of the soap, a second touchpoint node resulting in recognition of value: a functionally effective soap with a social mission. Carefully curated brands are consistent throughout the experience network.

Style's platform enables transmedia storytelling

Transmedia produces roles and goals for consumers- thus, there is a performative nature to it. While a firm does not perceive its product or service as a fiction, the co-creation that occurs in the making of that product or service through open ended rhetorical devices such as interactive websites and music festivals (note Mountain Dew's Green label) allows us to extend the use of the word 'fiction'. Transmedia platforms produce from the inside, out. In the integrated style

platform there can be systematic diffusion of brand meaning across multiple delivery channels. Ultimately, world-building occurs, where there is an absence of closure (versus the closed ending found in classically constructed narratives). Companies which curate across a spectrum of media- in store, on the website and smart phone apps- are developing holistic campaigns across touchpoints, as visualized in Figure 6. The company's style must be consistent and evident across multiple platforms in terms of tonality, look, feel and character. Ethos driven companies provide inspiration both internally and externally, starting with the core value of *why* they exist (Sinek, 2011), and extending that to telling the brand story across multiple platforms in an open-ended way.

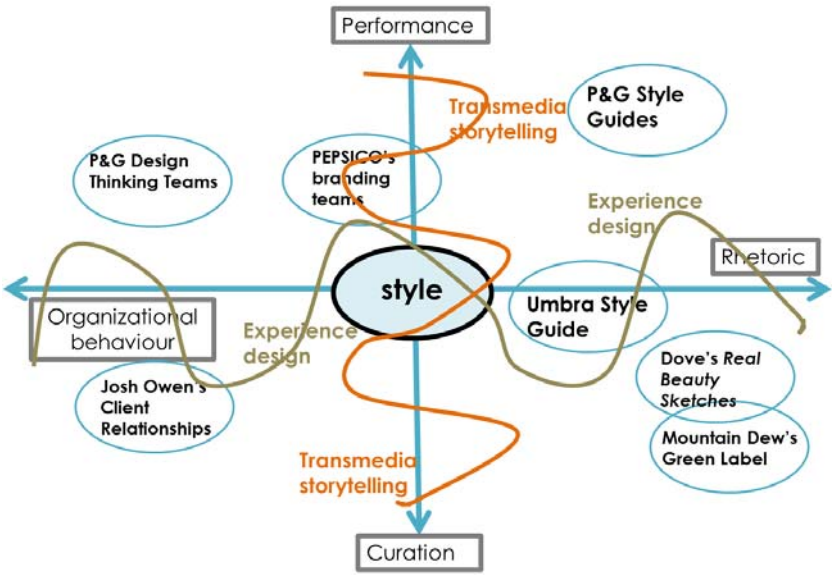
Figure 6: Style's network enables transmedia storytelling



IMPLICATIONS FOR THEORY AND PRACTICE

This research will contribute to the fields of design management, strategy and design thinking by identifying a framework for articulating style's penetration and usefulness in business development. More broadly, it will shed light on what Brooke Hodge et al (2006) called "hybrid practices of the future": In an age where boundaries between disciplines and industries are blurring for the sake of creative innovation, it is useful to have a study that examines how those practices come about and the effects of those hybrid practices. For theory, our paper extends the reach of discussions around rhetoric into business strategy and incorporates style into theoretical discussions of rhetoric and organizational culture. For practice, our paper provides a framework for practioners to map current uses of style in their organizational and marketing strategies. It also provides a framework for practitioners to plan effective future uses of style as a competitive advantage.

Figure 7: Overlay of transmedia storytelling & experience design on Style Matrix



More interestingly, the two frameworks offered in this research- 1) the style maps and the 2) style spiral – can be overlaid as in Figure 7 and demonstrate that experience design occurs mainly along the organizational behavior and rhetoric continuums, and transmedia storytelling occurs mainly along the curation and performance continuum.

Next steps for this research are to test these frameworks and the transmedia idea of co-creation by including consumers in our data collection.

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Boundary objects in business-to-business marketing

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Keywords: Design management, participatory design, business-to-business marketing

In recent years, there has been a growing focus in the marketing literature on co-creation in collaborative processes, both in regards to BtC and BtB. This focus runs parallel to the work in participatory design research, where different design artifacts, in the form of drawings and models, are used as boundary objects. However, there are major differences between collaborative processes in a BtC and a BtB context. This paper seeks to investigate how the design management literature currently describes the use of boundary objects in processes involving firms and other stakeholders.

INTRODUCTION

Recently, there has been an increasing focus within the marketing literature on co-creation in collaborative processes, both in regards to research in business-to-consumer (BtC) (Prahalad & Ramaswamy, 2004) and business-to-business (BtB) (Vargo & Lusch, 2008). This focus runs parallel to research on co-creation within participatory design (Sanders, 2008), and the growing awareness that design offers methods, techniques and tools that can facilitate collaboration on different levels and subject matters. Kumar (2009) and Michlewski (2008) have described how the use of design tools can create shared narratives and visions in groups, in which stakeholders with various backgrounds need to to make sense of a complex situation. In such settings, design artifacts, in the form of drawings and models, can function as boundary objects (Bjögvinsson et al., 2012) that can meditate an open and visual dialogue between the different stakeholders. □□The aim of this paper is to describe how the use of such boundary objects is currently described in the design management literature, and what types of stakeholders it involves in regards to BtC and BtB settings. The paper is structured in

the following way. First, it describes the current understanding of the concepts boundary objects and BtB marketing in the research literature, and uses this as an outset for the paper's research question. Thereafter, it describes the approach to and findings from a systematic literature review of boundary objects in the design management literature. Finally, it presents the key results in regards to answering the research question and the implications for theory and practice.

Boundary objects

The concept of a boundary object was introduced in sociology by Star & Griesemer (1989) with the following definition:

"Boundary objects are objects which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual site use. These objects may be abstract or concrete. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation. The creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting social worlds" (p. 393).

Since then the use of the boundary objects concept has spread to other fields, and especially gained popularity as a way to describe interaction through artifacts within design engineering (Henderson, 1991), as well as new product development (Carlie, 2002). In the literature within new product development, there is a focus on how the various professions involved in this process can improve their communication. In the perspective of Leonard-Barton (1991), boundary objects can be used to span professional language barriers between hardware and software engineers: "Physical representations of the product or tool under development span these language boundaries, enabling diverse parties to converse meaningfully and constructively" (p. 64). Boujut & Laureillard (2002) describe how the use of simple sketches beside detailed CAD drawings can function as boundary objects, and help various professions discuss how a certain design may actually be produced. Finally, Bucciarelli (2002) concludes that boundary objects can help more technical oriented professions to move away from a purely analytical approach to the innovation process, and have a more creative dialogue with other involved actors: "If participants relied upon their respective proper languages alone (of their individual object worlds), without bringing these artifacts into play, exchange would bog down and dry up in analytical exactness" (p. 230-231).

A more recent perspective on boundary objects is that they may be used by a variety of actors within a firm, as well as end-users, to discuss different business topics (Bjögvinsson et al., 2012). In this context, other aspects of the boundary object come into focus, besides its ability to cross language barriers between professions. It is acknowledge by Perry & Sanderson (1998) that boundary objects can reveal disagreements within a team about the project at hand, because the artifacts specify what is being discussed: "Objects can be pointed to, talked

about or sketched on. Artefacts also become the terrain on which conflicts and collaboration occur. Agreements are reified in artefacts" (p. 277). Redström (2008) describes how boundary objects used in participatory design processes often are made to look rough or unfinished deliberately to make sure the involved actors do not discuss aesthetics, but focus on what the artifacts may represent: "However, while it might seem to diminish in importance, or even disappear from focus as a potential end-product, the object shifts back into attention as a 'boundary object'...or prop setting the stage for action" (p. 416). That the meaning given to the boundary objects becomes central when they are used in discussions of business development, is emphasized by Brandt et al. (2008) when they describe a design game session: "This forces the players to make the game materials their own by giving meaning to the different elements, and by trying out various combinations. As the materials are fragmented and rich, this can be interpreted in various ways" (p. 60).

To sum up, boundary objects are described in the design literature as being various forms of design artifacts that can function as an interface between different actors and professions. They can function as a bridge between different professional languages, by being a center of the negotiation that the actors can point to, transform and give their own meaning. Through this interaction it is both possible to see disagreements and create new ideas. Boundary objects are primarily used for internal projects within a firm, such as new product development or other innovation activities, and the involved external actors are primarily end-users.

Business-to-business marketing

There has been a long tradition for looking at relationships and interaction between firms in BtB marketing, both from the IMP group (Håkansson et al., 2009) and in service marketing (Grönroos, 2011). With the recent focus on the so-called service dominant logic (Vargo et al., 2008), and a general shift from exchange of value through goods to co-creation of value through services, it is argued that interaction between suppliers and buyers is becoming increasingly central (Lindgreen et al., 2005). However, the focus on interaction has rarely been extended to the specific interactions between groups of actors and artifacts when firms meet. Meetings has always been a focus area in the sales literature, but only recently there has been a focus on how such events might be seen in a more relational perspective or involve several actors from the two firms (Moncrief & Marshall, 2005). Within BtC marketing there has been a more specific focus on co-creation through direct interaction, when firms meet their customers (Prahalad & Ramaswamy 2004). However, there are major differences between the aims of collaborative processes in a BtC and a BtB context. In the BtC context the involved stakeholders are typically firm representatives and end-users, and the purpose of the process is to create a specific product or service, whereas the BtB context involves stakeholders that are representatives from different firms, and the purpose of the process is to negotiate the broader value co-creation between the parties involving the interaction of resources, activities, and the relationship itself (Grönroos, 2011).

Aim

This paper seeks to investigate how the research literature on design management currently describes the use of boundary objects in collaborative processes, involving firms and other stakeholders, with the aim of identifying the implications for BtB marketing. The key research question is thus:

What are the views in the research literature on design management on firms' use of boundary objects in collaborative process, and what types of boundary objects are used for different stakeholders, processes, and focus areas?

APPROACH

A focus on the design artifacts of the design process is especially evident in the Scandinavian brand of participatory design (Bjögvinsson et al., 2012), where there is a long tradition for looking at how different types of boundary objects can bring different voices into the design process. Participatory design was, from its outset in the 1970's, originally focused on how to empower workers in the industry, but has since widened its scope to various forms of innovation in firms. The latter subject is also one of the focus areas in the emerging design management literature (Kim & Chung, 2007). This paper uses a systematic literature review method (Jesson et al., 2011) to give an overview over how boundary objects are currently described in the design management literature. The focus is on the parts of the literature where the business perspective from design management and the boundary object perspective from participatory design overlap. Therefore the paper looks at the following journals that cover both aspects: Design Management Journal, Design Management Review, The Design Journal, Design Issues, Design Studies and Co-Design.

The literature review process went through the following steps. First the databases Ingentaconnect, Wiley and EBSCO were searched for the keyword 'participatory design' within the journals mentioned above. This gave 99 results that were downloaded and skimmed to find duplicates and remove files that were not scientific papers, like book reviews or introductions. This narrowed the amount of papers to 81, and these were skimmed again with the purpose of identifying papers where there were a direct mentioning of a physical boundary object, or a synonym like a prototype or design tool, being used in relation to a firm. This meant a further reduction of the number of papers, and the remaining 17 were read with the purpose of identifying what types of boundary objects there are used for different stakeholders, processes, and focus areas.

LITERATURE REVIEW

Prototypes

The prototype is one of the most common used boundary objects in the design process. It can have various degrees of detail and finish, and it may allow actors to contribute with their

knowledge at different stages during the design process. In the literature the use of prototypes has often been described as a way to invite end-users into the design process, so a firm may use their expert knowledge to improve a product before it is introduced on the market. One examples of this is shown by McCallion & Richter (1997) that describe how ZIBA Design helped Kenwood conduct participatory design sessions involving various prototypes, to get end-users' input on the development of a new home theater product. Other examples include Logan (1997) and Alben (1997) that describe various cases of end-user involvement in the testing of the functionality of new products, and Friess (2010) that describes how prototypes can be used within graphic design. A broader perspective on the use of prototypes is presented by Baranauskas & Bonacin (2008) that report on a case where an entire management system for lean production went through five rounds of prototyping, involving participation of both floor workers and managers. Simonsen & Hertzum (2012) describe how designers at CSC worked with researchers and a hospital to design a new computer system, where prototypes of the physical touch points were used as a way to test the interaction with the entire system.

To sum up, prototypes are forms of boundary objects that are closely linked to the development of specific value propositions in the form of products or services. The interaction with prototypes is primarily focused on testing or commenting on the specifications of the product during the development stage, with the involved actors being members of the design team, other firm representatives, or selected members from the end-user segment.

Design tools

In the participatory design literature there is often a focus on toolkits, where a number of design artifacts are part of a collection that can be used together. Thereby, the designer can have a number of different boundary objects at his disposal. These are typically artifacts with now direct link to the topic being discussed that can be given meaning in the context where they are used. Sanders et al. (2008) describe such toolkits as 'things to think with', and emphasize that a designer that uses such tools changes his role from being a creator to being a facilitator. The authors mention different examples of this, where actors inside a firm or public organization can be invited into a innovation process by getting a way to articulate their knowledge. This broad view of how tangible artifacts can be used, is shared by Brereton & Buur (2008). They describe a project where field technicians as well as engineers from Danfoss take part in workshops to discuss the development of a new refrigeration system, by using different tangible boundary objects that are not directly linked to the new product's appearance. Postma et al. (2012) focus on how visualization and mapping of data can be used in a workshop setting. They describe a case where a project team within Philips Design are presented with user data in kits, and later use posters as boundary objects to map and discuss themes for new product concepts.

In the design management literature there is a growing focus on how design tools can play a role in more strategic processes, and not only be used within new product development. Buchanan (2001) presents 'four orders of design' where symbols from graphic design and things from product design can be used to understand interactions or systems. One of the examples he presents is how a product may function as a meditating middle between the designer's, the manufacturer's and the consumer's interests. Morelli (2007) takes a similar approach and describes how designers can add a modeling layer to more static analytical tools, when a group needs to make maps of complex interactions between actors, products, services and infrastructure. Celaschi et al. (2011) describe how different boundary objects, in the form of scenario building, creativity-aid toolkits, and generative tools, can play a role in the so-called 'fuzzy front-end' of a firm's innovation process. An example of this is shown by Chhatpar (2010) that describes how the design firm Frog Design work with enhanced business cases for their clients. Here they use a number of design tools internally and externally combined with more analytical approaches. Rockwell (2010) presents a case where different artifacts function as stimulus in participatory design interview, where a consultancy firm uses user data to improve the brands of the firms it works for. Steen (2013) presents a case where a number of strategic scenarios are visualized and discussed in meetings with the management team of an innovation project, as a way to align expectations and goals for the project. Finally, Buur et al. (2013) describe how business model innovation can be discussed through tangible artifacts in workshops involving a focal firm as well as suppliers and customers.

To sum up, the concept of design tools is used in the literature to describe a broad variety of design artifacts that may function as boundary objects and facilitate different processes. The artifacts are typically generative in their nature, and unlike a specific prototype for a new product they do not need to have any direct link to the subject being discussed, as different actors in different contexts can give them a specific meaning. They can be applied to traditional new product development processes, but also be used for discussing more strategic subjects as part of business development inside a firm or in a network. Thus, the involved actors may also vary from actors inside a focal firm, to various representatives from a network of actors involved in a common innovation activity.

	Stakeholders	Process	Type	Focus area
Alben (1997)	End-users	Product development	Prototypes	Portable electronic device
Baek & Lee (2008)		Product development	Design tools (visualizations) (tangibles)	Website
Friess (2010)		Product development	Prototypes	Publication
Logan (1997)		Product development	Prototypes	Electronic program guide
McCallion & Richter (1997)		Product development	Prototypes	Home Theater system
Rockwell (2010)		Business development	Design tools (tangibles)	Brand
Buur et al. (2013)	Firms	Business development	Design tools (visualizations) (tangibles)	Business models
Chhatpar (2010)		Business development	Prototypes	Business cases
Steen (2013)		Product development	Design tools (visualization)	Telecommunication applications
Baranauskas & Bonacin (2008)	Internal actors	Product development	Prototypes	Lean system
Postma et al. (2012)		Product development	Design tools (visualization)	Product concepts
Brereton & Buur (2008)	Multiple actors	Product development	Design tools (tangibles)	Refrigeration system
Buchanan (2001)		Business development	Design tools (tangibles) (visualization)	Systems
Celaschi et al. (2011)		Business development	Design tools (visualizations) (tangibles)	Extended value chain
Morelli (2007)		Business development	Design tools (visualization)	Systems
Sanders et al. (2008)		Business development	Design tools (tangibles)	Systems
Simonsen & Hertzum (2012)		Product development	Prototypes	Computer system

Table 1 - Results from the literature review in regards to types of boundary objects, stakeholders, processes, and focus areas.

KEY RESULTS

The review of boundary objects in the design management literature has revealed that the concept is an acknowledge way to describe how different design artifacts may function as an interface between different actors with different backgrounds. The concept was originally used to describe the interaction through prototypes in new product development processes, between the design team and end-users, but has since been applied to the discussion of a broader range of business issues between various actors. Common traits across different types of boundary objects are that they can be used to reveal disagreements as well as generate new ideas, that they have an unfinished appearance, and their ability to be pointed to, transformed and given meaning by the involved actors.

Table 1 presents the results of the review in regards to the four focus points: types of boundary objects, stakeholders, processes, and focus areas. The table shows that the majority of the reviewed literature within design management is focused on how boundary objects can be used for a firm's intra-organizational processes with a specific new product development project as focus. The involved stakeholders are typically representatives from the end-user segment or from different departments inside the firm. Among the papers that deal with issues in the firm besides product development (labeled business development in the table) a few look at interaction between firms and how boundary objects can play a role here. However, the majority of these papers talks about the involvement of multiple stakeholders, and are vague in their description of how representatives from different firms can take part in this interaction and discuss co-creation of value for the different parties. Instead, they tend to focus on how a focal firm can invite different stakeholders into its own business development and use their knowledge to enhance its own strategy. The review also shows that a number of the studies that deal with a BtB processes are actually BtC-focused. For example, the papers that involve design consultancies that use boundary objects to help their clients on innovation projects are not focus on the interaction between the firms on their value co-creation, but on how the consultancies can invite end-user into the process.

IMPLICATIONS

The literature review shows that there is a lack of research on the use of boundary objects in BtB marketing, and how they can contribute to firms' negotiation of their value co-creation and interaction between activities and resources. Further research should focus on making qualitative studies in the industry, with the aim of studying the effect of different types of boundary objects for specific types of stakeholders, processes and focus areas. In regards to the types of boundary objects, focus could be on studying how different forms of tangible elements and visualizations could be used for the BtB context. Are there focus areas within discussions on value co-creation between different firms that would demand new ways of using such boundary objects compared to more firm-centric discussions? Studies of the use of boundary objects in actual interaction and sales processes between firms could also provide

different types of knowledge compared to the 'lab-setting' that many studies have been conducted in so far.

Further, it would be relevant to look at how the focus on the interaction between human stakeholders (individuals and groups) in the design literature can be combined with the different levels of human and non-human stakeholders (individuals, groups, firms, dyads and networks) in the BtB marketing literature. The concept of co-creation itself has very different meanings in the two literature fields, so a comparison of different definitions across the fields could also be helpful for further cross-disciplinary dialogue. Finally, it could be of interest to look at how the marketing and sales literature currently describes the use of boundary objects. Is this at all seen as a research theme, and what kinds of synonyms are actually used in this literature to describe the phenomena compared to the view in design management?

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Characteristics of Smart PSSs: Design Considerations for Value Creation*

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Keywords: Product-service system, consumer experience, value creation, product design, service design

This article draws the attention of design academics and practitioners to a new type of market offering: Smart Product-Service Systems (Smart PSSs). Smart PSSs integrate smart products and e-services into single solutions, bringing the potential to create innovative interactions between consumers and providers. The article outlines six defining characteristics of Smart PSSs: *Consumer empowerment, individualization of services, community feeling, service involvement, product ownership and individual/shared experience*. Furthermore, the article discusses the implications for designers and design managers who are confronted with the creation of Smart PSSs. Our findings add to the discussion on what special design considerations must be taken when integrating products and services. Specially, knowledge is provided that can aid designers in the creation of Smart PSSs that bring the appropriate value and experience to consumers.

INTRODUCTION

Product-service systems (PSSs) are market offerings that combine products and services, and present them as single solutions to consumers (Goedkoop et al., 1999). In contrast to the traditional services attached to products (e.g., warranty), the service in a PSS significantly adds value to the experience of the consumer with the market offering. Launderettes are an example found in the existing literature (e.g., Mont and Plepys, 2007). This PSS is composed

* This research is part of the Creative Industry Scientific Program (CRISP), which focuses on the design of product-service systems as a means to stimulate the continuing growth of the Dutch Design Sector and Creative Industries. The CRISP program is partially sponsored by the Dutch Ministry of Education, Culture, and Science.

of washing machines (the products) that are made readily available to consumers for attended and unattended self-service purposes (the service). Consumers can access the launderette at any time of their convenience. Furthermore, many launderettes offer additional services, such as the folding of laundered clothing, which add value to the laundry experience.

In this paper, we focus on the so-called Smart PSS, an emerging type of PSS that is targeted to individual consumers. New technological advances have made it possible to combine products and services in innovative ways. Today, many traditional products can be equipped with information technology, which enables them to connect to the Internet. For instance, Laundry View has brought launderettes to a new level (http://www.laundryview.com). Laundry View is an Internet application that serves as a communication channel between the provider of the launderette and individual consumers. Laundry View allows consumers to check the availability of washing machines, view an estimated time of availability, and set notifications when a required machine becomes available. Because of this, consumers can save time by avoiding unnecessary visits to the launderette.

We refer to these PSSs as smart because they "contain information technology (IT) in the form of, for example, microchips, software and sensors and that are therefore able to collect, process and produce information" (Rijsdijk and Hultink, 2009, p. 25). In contrast to smart products, Smart PSSs integrate an e-service with the product to jointly address specific needs of consumers. For example, Philips' Direct Life (http://www.directlife.philips.com) is a Smart PSS designed to improve the health of consumers. The product in Direct Life is a small sensor that consumers can carry with them to measure their movements. This sensor is coupled with an e-service (i.e., web platform) that consumers can access to: 1) store the personal data that was measured during the day, 2) access descriptive graphs of their chronological progress, and 3) get in touch with health experts for professional advice.

From a design management perspective, the integration of product and services has different implications. First, designers are accustomed to creating products and services separately. However, the product and service in a Smart PSS are so deeply intertwined that a distinction between the two may not be possible. Similarly, consumers may no longer see the difference between product and service and evaluate the PSS as a whole. Designers may thus need to adopt new tools and methodologies that facilitate the effective integration of products and services (Morelli, 2002). Moreover, designers will require a better understanding of how the product and the service complement each other, to create and communicate value to consumers. Our research aims to address these growing needs by outlining the defining characteristics of Smart PSSs. Our findings can help designers to attain a better understanding of the features that consumers will expect in Smart PSSs, manage such expectations, and create solutions that bring the appropriate value and experience to consumers. Furthermore, our insight can be used in the creation of new tools and methodologies to equip designers in the creation of Smart PSSs.

From Smart Products to Smart Product-Service Systems

Smart products are market offerings characterized by the high content of IT technology, and their ability to process and produce information (Rijsdijk and Hultink, 2009). Smart PSSs are 'smart' because they carry some of the characteristics of smart products, such as the capacity to transform data into knowledge that can help consumers perform more effectively (Davis and Botkin, 1994). Several conceptualizations for the smartness of products have been proposed before (e.g., Maass et al., 2008, Rijsdijk and Hultink 2009). For example, according to Rijsdijk and Hultink (2009), the smartness of a product is determined by the extent to which it possesses, to a greater or lesser degree, one or more of the following dimensions: Autonomy, adaptability, reactivity, multifunctionality, the ability to cooperate with other devices, the human-like interaction of the product, and personality. For example, Direct Life is an autonomous Smart PSS because the sensor measures movement unobtrusively throughout the day while consumers continue with their daily routines. Direct Life is adaptable because it bases its measures on personal information, such as age or weight. Thus, the data and advice provided by the Smart PSS adapts to the personal conditions of individual consumers. Finally, Direct Life is able to cooperate with other devices because the data collected through the day must be transferred to a computer to access it.

An important difference between Smart PSSs and smart products is that the first integrates a service with the product to jointly address the needs of consumers. Many of these PSS have e-services that deliver value to consumers through electronic means (Stafford, 2003). For instance, an important characteristic of e-services is their capacity to support a two-way dialogue between consumer and service provider (Rust and Kannan, 2003). Through the course of this dialogue, providers can collect relevant and specific information about consumers, which facilitates the creation of customized services to satisfy their individual needs. Furthermore, self-service technologies have been reported to provide a sense of control to consumers who can handle their transactions any time they want (Meuter et al., 2000). In this respect, Rust and Kannan (2003) predicted an increase in technology-enabled innovations, capable of supporting the delivery of e-services to consumers, which allow consumers to experience a high level of control over their transaction. We argue that Smart PSSs are such technology-enabled innovations, which create new dynamics in the interactions between the service provider and the consumer, and can add value to the experience of consumers.

To conclude, we define Smart PSSs as the integration of smart products and e-services into single solutions delivered to the market to satisfy the needs of consumers. Our conceptualization focuses on the opportunities Smart PSSs offer to create new interaction between consumer and service provider. While the characteristics of PSSs have been previously discussed (e.g., Baines et al., 2007, Tukker, 2004), there is a gap in the literature concerning the characteristics of Smart PSSs in relation to the experience and/or benefits for consumers. Understanding these characteristics is pivotal for designers of Smart PSSs who want to manage the expectations of, and create value for consumers. We thus we set out to

gain a deeper understanding of Smart PSSs, and to provide designers with new knowledge that can help them create Smart PSSs more effectively.

METHOD

A classification task was created where participants grouped examples of Smart and non-Smart PSSs based on their perceived similarities. The goal of the classification task was to uncover the characteristics (i.e., criteria) used to group sets of Smart PSSs. To elucidate design characteristics, participants were encouraged to group stimuli on aspects related to the user interaction and/or experience. Establishing this mindset was important to avoid categorizations based on product features (e.g., shape, category). Furthermore, participants had the freedom to decide the number of groups and examples of PSS belonging to each group (Handelt and Imai, 1972).

Participants

Participants (n=16) were experts in industrial design engineering (with BSc degree), who are trained to understand how users experience and interact with products and services. Given the focus on Smart PSSs, it was particularly important to have participants capable to rationalize and explicate their grouping decisions in design-related terms.

Stimuli

Based on extensive Internet research and discussions with companies, a set of 29 existing PSSs was created. The selected PSSs differed considerably in the balance between product and service and the purpose of the offering or situations in which they are used. Moreover, examples of traditional PSSs that are often mentioned in the literature were included in the final list, with the purpose of obtaining insights in the differences between them that are important for the user experience.

The development of the final stimuli consisted of different phases. First, a storyboard for each PSS was created. In order to create the individual storyboards, the main researcher diagrammed the process followed by consumers in each PSS, from purchase to use, depicting the main product and service interactions with consumers. This resulted in 29 different product-service-user interaction diagrams. Then, the 29 individual storyboards were sketched by a graphic designer making use of professional software (Figure 1). The final storyboards were included in a booklet as sensitizing material for participants to learn about each PSS prior to the classification task. This booklet contained: An image of the PSS taken from the official website, an extensive description of the product and the service in the PSS and how they interrelate, the storyboard, and a notes-section for participants to write comments or questions to be addressed prior to the session. Finally, individual cards showing each PSS at a glance were made to facilitate the classification task. The individual cards contained the name and picture (as shown in the booklet) of the PSS, and the storyboard.

Procedure

Participants were contacted two weeks before the classification task. A booklet was provided to each participant, which they were encouraged to read at their own time and pace. Before the task started, remaining questions regarding each PSS were answered. Furthermore, participants were verbally instructed on the procedure; a classification example was provided as part of the instructions, thereby ensuring that participants understood the task.

Individual cards were randomized and placed on the table facing up; this gave participants an overview of the total set of PSSs. Participants were instructed to take two cards and to group them based on perceived similarities. Participants were asked to think aloud to reveal the rationale behind their classification choices. Once a first set of two cards was classified, participants were instructed to continue with the remaining. Participants took one card at the time, adding them to the already created group or creating new ones. This procedure was repeated until the set of 29 cards was discussed and classified. Following, participants were asked to label every distinctive group using a name describing their classification criteria. Participants took 55-145 min to complete the task. All stimuli were categorized and labelled.

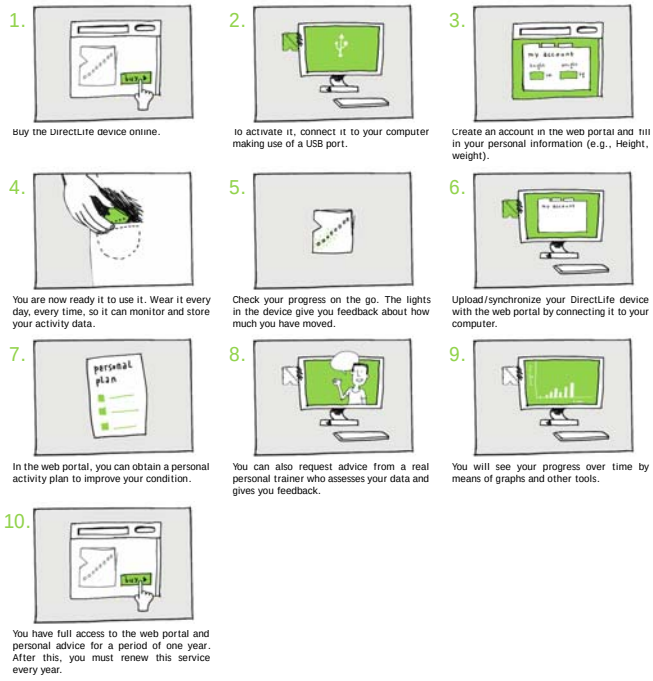

Figure 1. Example of a storyboard for Direct Life used in the final stimuli. The storyboard depicts product, service and user interactions in the PSS.

All interviews were recorded and fully transcribed. The data was analysed using the software program Atlas.it. Transcribed interviews were coded looking for patterns and interesting themes in the data. This process was followed interview by interview until no significant amount of codes was added to the list, resulting in an initial set of 100 codes. This set of

codes was discussed with the main and secondary researchers, identifying codes with similar meanings, and main subjects in the data. This process allowed reducing the list to a total of 55 codes. Once the list of codes was refined, the remaining interviews were coded.

FINDINGS AND DISCUSSION

We identified six highly interrelated characteristics of Smart PSSs, which can have an effect on how consumers perceive Smart PSS: Consumer empowerment, individualization of services, community feeling, service involvement, product ownership and individual/shared experience. In this chapter, we will present each of these characteristics and discuss the implications for designers.

Consumer Empowerment

Consumer empowerment is a characteristic of Smart PSSs that most participants recognized during the interviews. Smart PSSs empower consumers by giving them the necessary tools to make decisions or take action in their own terms. We identified two main sources of empowerment in Smart PSSs: delivering feedback to consumers, and enabling consumers to select their own content.

Feedback is relevant information that can be used by consumers to assess a specific situation, and take action accordingly. First, Smart PSSs enable consumers to measure their own data at a specific moment in time. Because this information is usually stored online, this grants service providers access to relevant input on consumers' states and activities. Service providers can create personalized overviews of the measured data, thereby enabling consumers to track their progress. Furthermore, data is transformed into graphs, diagrams and other pictorial representations. This type of feedback was often associated with Smart PSSs that facilitate the achievement of goals. For example, the WiFi Body Scale (http://www.withings.com) provides real-time feedback by displaying the weight and BMI of the consumer in the scale's screen when the Smart PSS is used. Furthermore, it provides long-term feedback by automatically sending these measurements to a web portal, which creates illustrative graphs of these over time. Together this information will empower consumers, because consumers can use such feedback to understand how their eating habits affect the achievement of their health goals.

Next to the capacity to track one's progress in a certain activity, Smart PSSs enable consumers to track the status of products, such as their availability and location. For example, Laundry View is a Smart PSS that enables consumers to check the availability of (specific) washing machines. Laundry View empowers consumers by helping them have control over the process, for example, by visiting the laundry room only when a laundry machine is available. Moreover, Smart PSSs provide feedback by delivering relevant information regarding product features or content prior to purchase. Such is the case with smart phones and app stores (e.g., iPhone and iTunes, http://www.apple.com), which provide descriptions, images and free trials of applications, but also enable consumers to give feedback to each

other about the quality of the apps. Thus, this type of feedback empowers consumers by providing relevant information to make a purchase decision.

Finally, Smart PSSs can empower consumers by enabling them to select their own content, and have an experience that fits closer to their individual needs. For example, Amazon's Kindle (https://kindle.amazon.com) is an e-book that consumers can use to read, buy and store e-books. Through the Kindle Store, consumers can browse and buy from a wide range of options, and select content that fits their individual taste or mood. Furthermore, enabling consumers to select their own content was associated with service availability; a service that can be accessed at any time and is always available to them.

Design for empowerment is clearly a topic of interest for designers. The role of design practices, such as do-it-yourself (DIY) solutions and co-design, for giving consumers a sense of authority in the design of traditional products, has been previously discussed (Mugge et al, 2009, Wolf and McQuitty, 2011). Furthermore, it has been suggested that e-services and technology-based self-service options provide consumers with a sense of control (e.g., Dabholkar, 1996, Rust and Lemon, 2001). However, Smart PSSs offer innovative opportunities to combine these. Thus, the challenge for designers lies in this specific combination of e-services with tangible products, and how these new combinations create new ways to empower consumers. Above, we presented different features in the integration of products and services that facilitate consumers' empowerment. However, these features are not exclusive and other ways of providing control and authority to consumers may be viable. Moreover, designers ought to be aware of the features enabling empowerment, and how they influence consumers' evaluations of the Smart PSSs' quality. This suggests a more wide-ranging role for designers, who should go far beyond the traditional product-design related manipulations, to account for consumers' evaluations towards a system.

Individualization of Services

The individualization of services refers to how Smart PSSs make consumers feel important by addressing them as unique individuals. Smart PSSs individualize their services for consumers in different ways. First, Smart PSSs make use of user accounts to identify consumers. E-services support the two-way communication between service providers and consumers (Lagrosen, 2005, Rust and Lemon, 2001). By identifying consumers, service providers can create more personalized solutions to satisfy their individual needs (Rust and Lemon, 2001). For example, Green Wheels (https://www.greenwheels.com) makes cars readily available to consumers, for specific periods of time, in a convenient way. Upon registration, consumers receive a personal e-card, which grants them access to the vehicles. Cars can be located and booked through a web platform or mobile phone. Because Green Wheels has personal information about the consumers, such as their locations and demand, they can adjust their offer.

Closely related to user accounts, Smart PSSs make use of virtual servicescapes to communicate with consumers. These virtual servicescapes are the main communication

channel between consumers and service providers, and thus an important touchpoint to implement tactics in the individualization of consumers. While some Smart PSSs make use of web portals accessed from computers, others allow consumers to access the virtual servicescapes directly through the product. Amazon's Kindle is a Smart PSS that provides both options. Consumers can access the Kindle Store to buy content directly through the e-reader, or access it through the Internet making use of a separate computer. Because consumers are identified with a (personal) user account, purchased content is linked to the individual consumers, stored, and synchronized through all virtual servicescapes.

Finally, Smart PSSs vary in the human-like interaction (Rijsdijk and Hultink, 2009) of the service provider. Some Smart PSS make use of real people to interact with consumers. For example, Philips Lifeline (http://www.lifelinesys.com) is a Smart PSS for the elderly, which consumers can use in case of emergency. When a consumer is in a life-threatening situation, he/she can press the button in the Lifeline collar he/she wears, and an emergency call is automatically placed to a Philips representative. The representative will then communicate via an intercom, assess the situation, and send medical help when needed. Other Smart PSSs make use of artificial means (or automated responses) to communicate with consumers. For example, Nike+ (http://www.nikeplus.com) enables consumers to track their progress during running workouts. The product in Nike+ measures data, such as burned calories, distance and trajectory. The service is a web platform that gives consumers access to graphs and overviews of the data. Nike+ encourages consumers to exercise by, for example, awarding them with trophies and other achievement-related prizes. When a consumer reaches a goal (e.g., 10 kilometers running), he/she receives pre-recorded cheering messages from celebrity athletes. Thus, Nike+ communication towards consumers is automated, human-like, and linked to the specific development of individual consumers.

The above-mentioned features are examples of how Smart PSSs address and individualize their services for consumers. These, however, may not be the only tactics designers can implement to create a more personal experience with Smart PSSs. Because the product in a Smart PSS is central to the experience of consumers, designers have the opportunity to strengthen the individual value of the service through the physical characteristics of the product. Past research has suggested that the integration of product and service could have an effect on the overall meaning associated with the PSS, and the attitudes of consumers towards the offering (Valencia et al., 2011). Thus, the challenge for designers lies in bringing the service closer to consumers while safeguarding the overall value of the Smart PSS. Consequently, creating individuality in the service through the product is a task for which other important stakeholders in the development of the Smart PSS should be involved; it is a task that requires the alignment from different functional areas to ensure that the correct value is communicated to consumers.

Community Feeling

Community feeling refers to Smart PSSs that facilitate the communication between their consumers. This communication typically takes place through social media. Consumers give feedback to each other, share and exchange information regarding the Smart PSS. For example, Wattcher (https://www.wattcher.nl) is developed to make consumers more aware of their energy consumption at home. The product in Wattcher is a sensor that measures and displays the consumed energy. The service is a web portal where consumers can store their measured data and track their development over time. An important feature of this web portal is an Internet forum that consumers can use to talk to each other, to compare measured data, and share advice on how to reach energy consumption goals. Other types of social media that are typically implemented in Smart PSSs include evaluative rating of content, connecting and sharing of information through social networks.

Internet facilitates the rapid dissemination of word-of-mouth. Companies experience reduced control over the opinions of consumers, which could imply diverse repercussions for the adoption of market offerings (Mangold and Faulds, 2009). However, by implementing social media as complement to their communication strategies, companies can engage consumers, communicate directly, provide targeted information, and shape and monitor their opinions (Mangold and Faulds, 2009). Thus, designers need to be aware of the important role that social media plays in the adoption of Smart PSSs, and their relevance in bringing such services closer to consumers. Moreover, the implementation of social media in Smart PSSs may be an important expectation of consumers. Thus, future research could set out to define the instances in which these communication channels are desired, and how they create value for consumers). In addition, because social media supports the two-way communication between consumers and service providers, creating a feeling of community may be an important way of individualizing and bringing the service closer to consumers. How the product in the Smart PSS can be used to support this communication, and for which touchpoints in the provider-consumer interaction, are interesting avenues for future research.

Service Involvement

Service involvement refers to the nature of the relationship between consumer and service provider. Smart PSSs promote the recurrent interaction between providers and consumers. This recurrent interaction facilitates the deeper understanding of consumers, and the provision of more targeted solutions to them. For example, consumers of Kindle may access the Smart PSS several times in one month, reading and participating in user reviews, or simply buying Kindle content. Every time consumers access Kindle, Amazon can learn from their preferences. In contrast, other non-Smart PSSs focus on particular stages of the consumer journey and involve fewer interactions between consumers and service providers. In tools sharing, for instance, consumers pay to make temporary use of professional tooling for gardening, construction, and other purposes (Mont, 2004). After being used, the tools are returned, so other consumers can make sequential use of them. Thus, different to Smart PSSs, the interaction between service provider and consumers is virtually non-existent during the

product use, and between rental periods. Furthermore, because the tools have no IT technology in them, they do not connect to the service, making the PSS more vulnerable to market replacements. Smart PSSs, on the contrary, have the unique potential to recurrently link product, service and consumers, which could translate into important benefits for consumers (e.g., personalized solutions, prompt reaction to consumers' needs).

For designers, it is important to understand the level of involvement that service providers aim to attain with their consumers, and vice versa. This understanding can be used as a framework in the development of Smart PSSs that support the correct level of interaction. Having Smart PSSs that involve consumers extensively, but without the correct infrastructure to support it, may be detrimental for their adoption. Establishing an accurate level of involvement could lead to more congruent Smart PSSs, where product and service features are in balance.

Product Ownership

Product ownership is related to the business model of the Smart PSS and is linked to prior classifications (i.e., types) of PSSs (e.g., Baines et al., 2007, Tuker, 2004). First, the tangible product in the Smart PSS can be sold to the consumer and its ownership transferred to him/her. Then, consumers are responsible for the maintenance of the product. Maintenance includes installing software updates, developed by the service provider, to guarantee the correct functionality of the Smart PSS. In Smart PSSs, consumers buy the product to gain access to and value from the service. Owning the product grants consumers unlimited access to the PSS, unless restricted by other business-model related aspects, such as the need of monthly fees to access the service. Examples of Smart PSSs where the ownership is transferred to consumers include Nike+, Wattcher and Kindle.

Second, the ownership of the product can be kept with the provider, who is responsible for the maintenance and correct functionality of the products. In this case, consumers have limited access to the PSS, typically for specific periods of time. Different to those Smart PSSs where the ownership is transferred, consumers interact with service providers to gain access to the tangible products. Examples of Smart PSSs where the ownership is kept with the provider include Green Wheels and Laundry View.

Individual/Shared Experience

Individual/shared experience relates to the extent to which consumers' experiences with the Smart PSS are shared with other users. This characteristic can vary among Smart PSS. For example, Direct Life is owned by consumers and used on an individual level. Although the system facilitates the communication between different consumers, the product as well as the service in Direct Life are used and experienced on an individual level. Differently, Nike+ encourages groups of friends, who all own Nike+, to compete with each other in reaching common goals. Their experiences are linked through the service, which connects consumers by depicting, for example, performance rates among competing friends. Because each

consumer makes use of Nike+, the individual experience with the Smart PSS is maintained. However, the idea of goal sharing, and the simultaneous use of the Smart PSS, creates a shared experience between of the Smart PSS.

Other Smart PSS are shared by different consumers, while the experience is devised as individual. For example, the cars of Green Wheels can be used by different consumers on a sequential manner. Although different consumers share the cars throughout the day, their experiences with the system remain individual. Differently, in Laundry View consumers share the laundry facilities with others, and their experiences (may be) greatly influenced by the interactions among them.

Designers ought to be aware of the desired level of shared experience because it may lead to important differences for the definition of Smart PSSs. For example, in designing shared experiences, designers may need to consider technical features that support the interconnection of the products (e.g., Nike+), or devise ways to control for environmental aspects likely to influence the individual, yet shared experience of consumers (e.g., the potential noise, messiness found at shared laundry facilities). Similarly, designers need to be aware of all the aspects surrounding the individual experience of products. A product that is owned and experienced at an individual basis may require a high focus on product aesthetics. Differently, designing experiences for shared Smart PSSs, may turn the focus of designers on creating durable Smart PSSs, and to create uniqueness and individuality for the consumer via the service.

IMPLICATIONS FOR DESIGN MANAGEMENT

In this article, we have discussed six characteristics of Smart PSS, and their potential in creating unique value for consumers. Our insights can help designers to attain a better understanding of how variations in Smart PSSs can be created, and which benefits these can bring for both companies and consumers. Furthermore, our findings take a first step in understanding the characteristics that consumers will expect in Smart PSSs. As such, our finding can help designers to manage said expectations, and to create experiences for consumers that bring value to them.

From a design management perspective, the design of Smart PSSs poses different challenges. First, the integration of smart products and e-services implies a new product development (NPD) process where many more stakeholders are often involved. Strategic partners, governments, consumers, outsourced design agencies, diverse experts, may all be part of the NPD process and bring different visions on what the Smart PSS should deliver (e.g., Dougherty, 1992). Thus, at a project definition level, the effective communication between multiple stakeholders may be fundamental to achieve the well-rounded design brief of the Smart PSS; one that integrates the needs of, and creates value for all stakeholders involved. In this respect, the characteristics outlined in this paper can serve as a tool to stimulate the communication and discussions around the Smart PSS. Furthermore, at a project execution

level, design may have to interact with experts from multiple disciplines, who may not only have different visions on the project, but also speak a different "language" than designers (e.g., Gorb, 1986, Persson, 2005). In this respect, the capacities of designers to facilitate the communication between professionals from different disciplines, and integrate the demands of diverse stakeholders (Valencia et al., *in press*), could be particularly relevant for the design of Smart PSSs.

Second, past research has questioned the effectiveness of traditional design tools for the integration of products and services (Morelli, 2002). Our research provides a first insight into what benefits design tools should bring to the design process of these complex systems. Because of the complexity that Smart PSS bring to the new product development process (e.g., multiple stakeholders, multiple contexts, multiple users), designers could benefit from tools to reduce this complexity. Tools for stakeholders' analysis, for example, can help identify the different important parties to be involved in the design of the Smart PSS, and the value they expect to find in the system. Second, tools that help safeguard the coherence in the Smart PSS, and the value it conveys, could benefit the design process. In this respect, informal interviews with experienced Smart PSS designers have suggested that traditional visualization tools, such as storyboards, which can help visualize the interactions between consumer, service and product, could be of significance.

Finally, there are different research opportunities that can strengthen our findings. In particular, it is important to obtain a better understanding of the value that the Smart PSS can bring to consumers. For example, it is important to understand how the goal and context for which the Smart PSS is developed, can influence the relevance of certain characteristics. Furthermore, participants in our research were industrial design experts, who could more easily elucidate aspects related to technology and interactions. Thus, future research should set out to explore the value of the Smart PSS characteristics with consumers, so that designers have a more accurate know-how on how to design these offerings.

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Chimps, Designers, Consultants and Empathy: A "Theory of Mind" for Service Design

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Keywords: Strategic Design, Service Design, Consulting, Design Thinking, Empathy

There are substantially divergent views on the differences and similarities between design-based and traditional, rationalist consulting-based approaches. We explore the extent to which these postulated differences might be related to different manifestations of empathy, and examine some of the consequences.

DESIGNERS AND CONSULTANTS: WHAT'S THE DIFFERENCE?

> *"So what is Design Thinking anyway? Sometimes the best way to understand something is to understand what it is not. So think of how McKinsey solves a problem. Now imagine the opposite. That's Design Thinking".*
>
> (Ostrower 2011).

> *"Consultancies such as IDEO, Continuum, and Ziba Design have positioned themselves as ready business partners, the more creative equivalents of McKinsey or Bain."*
>
> (Walters 2009).

> "*Empathy and collaboration are the hallmarks of McKinsey problem solving.*"
>
> (Beaujean et al 2006).

One of the features of the design discourse is that 'design' (or 'design thinking') is frequently positioned in contrast to alternative ways of tackling problems. In particular, it is repeatedly characterized in opposition to a caricature of rationalist, analytical 'orthodox' approaches characterised by traditional management consultancy. This paper arises from the authors' involvement in a research project on service design in technology-based organisations conducted at the Saïd Business School at the University of Oxford (http://www.sbs.ox.ac.uk/d4s/default.htm). A central thread of the project was a series of workshops which brought together design professionals, academics and representatives of high technology organisations. The discussion here owes much to these events. Those of us

involved in the "Designing for Services" workshops repeatedly found our putative arguments jamming up at the point where we try to deal with the distinction between traditional consulting and design-led interventions. This paper is an attempt to unclog this.

A few observations set the scene. Firstly, although the types of work embarked upon by consultants and designers do not overlap exactly, there is common ground. Indeed, we are aware that increasingly famous design-based firms such as IDEO are encroaching on work that might traditionally have gone the way of established firms of management consultants. Secondly, although the superficial apparatus or terminology might differ, we note there is sometimes much in common between the working practices of the two domains.

Part of the problem is that it is just too easy to slip into sketchy caricature, where the stereotype of the one-dimensional, shiny-suited consultant is compared with the unbounded, groovy designer. This polarity of contrasting idea types is clearly false, but perhaps useful as a structure around which some provisional observations can be woven, using a form of Weberian Ideal Type argument, conceding that they are "…heuristic aids which, by themselves, tell you nothing about the real world, but which throw into relief its deviations from themselves" (Watkins, 1952:25; Weber, 1947). So to enable the discussion to proceed, we will use the (flawed) notions of capitalised Designer and Consultant.

Some differences between conventional management consulting and design-led interventions are easy to enumerate: designers seem to make a bigger deal of imaginative visualisations of their ideas (Tversky et al 2003); they possibly have a higher tolerance of ambiguity (Owen 2006), being less keen to force a client's problem into a pre-determined solution; they may use a logic that is more allusive and metaphorical than their rationalist cousins (Martin 2009). And they generally get paid (much) less[1]. But one significant issue is the extent to which designers are pre-disposed – and make systematic efforts – to try to get under the skin of clients and users and see and feel the world as they see and feel it (Nussbaum 2005).

The field of management consulting covers a wide canvas, especially when considering the vast corpus of boutique firms; however, following our Ideal Type strategy, we here focus on the broad characteristics of the major consulting firms. The literature presents a picture which focuses on their role as creators of and traders in specific knowledge - which might be knowledge of markets and industries, or managerial practices (Kipping 2002; McKenna 2006; Kipping and Clark 2012). Significant research has explored the nature of this 'knowledge': some have emphasised the way in which consultants become the generators and purveyors of 'fads' (Abrahamson and Fairchild 1999; David and Strang 2006); others have focused on the dynamic creation and diffusion of knowledge with organisations (Grant 1996; Morris 2001; Sturdy 2002). Large consulting organisations are also often associated with

[1] http://salarybystate.org/ presents US salary data for 'user experience designer' in the range $45k-$119k for 2013; a Charles Aris Inc. 2013 report on salaries for recent entrants into strategy consulting presents a range $73k-$293k. (http://salarybystate.org/tag/how-much-do-user-experience-designers-make; http://consultantsmind.com/2012/12/11/consulting-salary/. Accessed 2nd July 2013.

strong, ideological positions - maintained by what Alvesson and Kärreman (2004) describe as 'cultural engineering' - that mean that the engagement with clients is driven not only by the transfer of information and expertise, but also by the communication of specific values and assumptions (eg O'Shea and Madison 1998; Salaman 2002; Toffler and Reingold 2003).

These features of management consulting practice can be seen to centre on the notion of expertise, and, in particular, the gradient of expertise between the advisor and the advised (Werr and Stjernberg 2003). Although some management consulting work, even by the big famous companies, is about providing 'merely' an alternative point of view, or an extra pair of hands, or some symbolic imprimatur to add weight to a course of action, the core element of (our Ideal Type) management consulting is that *they* know something *you* don't. They understand the problem better than you (they do a diagnosis) and they understand the prescription better than you (they provide the solution).

The designer, in contrast, has general expertise in a *process* - not necessarily any expertise in your particular problem; the process of working to a solution is different to that of drawing on prior experience or pulling the right solution from a pre-existing portfolio. In the famous ABC Nightline TV programme in which a team from IDEO redesign a shopping cart, co-founder David Kelley says 'The point is we're not actually experts at any given area. We're kind of experts on the process of how you design stuff.' (ABC 1999). Empirical studies of designers suggest that the design problem co-evolves with repeated attempts to solve it (Dorst and Cross 2001). This necessitates a form of deep engagement with the client and users of the system in question. In respect of product service systems (PSSs), De Lille et al (2012:3) say:

> *The design thinkers' ability to empathize with multiple kinds of people and the skill to co-create enables collaboration to develop PSS.* ***Empathic understanding*** *goes beyond knowledge: when* ***empathizing*** *you do not judge, you 'relate to (the user) and understand the situations and why certain experiences are meaningful to these people, a relation that involves an* ***emotional connection****... Using* ***empathy****, the design thinker can identify needs of the different stakeholders and react upon them. Through a complex and iterative process of synthesis and transformation of research data, design thinkers* ***empathize*** *with the stakeholders through revealing future design opportunities.*(Emphasis added).

Not all accounts of design emphasise the idea of empathy. The recent extensive review by Johansson-Sköldberg et al (2013) essentially ignores this issue. Those drawing on the extensive theoretical and practical engagements between ethnography and design (eg Suchman 2002) might see Designers' empathy as dumbed-down ethnography. But there are sufficient grounds elsewhere to justify an exploration of how the idea manifests itself, and how it operates. But we need also to bear in mind that empathy is frequently discussed as virtue in the world of the Consultant (Golightly 1987; Wang et al 2005): it is claimed that empathy is the 'most valuable thing' taught at the Harvard Business School (Beier 2012).

EMPATHY: ALTERNATIVE MANIFESTATIONS

Empathy's Journey

Empathy has become a topic of great interest in both academic and popular literatures: scholars from a range of disciplines have explored the idea from philosophical and physiological angles, notably Rifkin (2010); De Waal (2011), Baron-Cohen (2011), Keysers (2011) and Howe (2012).

The notion of 'empathy' has disputed origins but the word finds its way into English from the Greek εμπάθεια (roughly, physical affection) via the German *Einfühlung*, the latter sometimes attributed to the art historian Robert Vischer (1847-1933; Vischer 1844), although others associate the concept with the earlier philosopher Novalis (real name von Hardenberg, 1772-1801: Gunkle 1963). At this stage the concept is relatively imprecise and is something to do with the resonance or mutual interaction between subject and object. The English word (and its contemporary meaning) comes courtesy of the psychologist Edward Bradford Titchener (1867-1927; Titchener 1909), who appears to appropriate it from the aesthetic philosopher Theodor Lipps (1851-1914; Lipps 1903). The tangled origin is important because from the Titchener ends up using the word in a different way to Lipps: whilst the former is about putting oneself in the position of another, imagining what it is like for me to be you, the Lippsian version is more akin to the modern psychological concept of 'projection', or ascribing what I feel to you, or wondering what I would do if I were in your place. We will carry these contradictory definitions forward into the argument, but it is worth commenting that during the twentieth century psychologists and social psychologists have developed empathy into a more rigorous concept which relates to individuals' ability to imagine the opinions and feelings of others (Hastorf and Bender 1952; Hobart and Fahlberg 1965; Clark 1980; Gladstein 1981; Emery 1987; Duan and Hill 1996). In parallel, several other strands of inquiry draw on the idea including art theory (Ames 1943; Davies 1990), Method Acting (Stanislavski 1936), ethics (Deonna 2007) and cognitive science and neuroscience (Charman et al 1997; Decety and Jackson 2004; Langford et al 2006; Decety and Ickes 2011).

We now turn to two ways in which the nature of empathy in design and traditional consulting may vary. First, we characterise the essentially aesthetic mode of empathy with that of the rationalistic empathy of the consultant. We then contrast the ideas of cognitive and affectual empathy, before moving on to explore how these ideas are institutionalised in practice.

Rationalist and Aesthetic Empathy

It is unlikely that any management consultant would claim that empathy with a client was unimportant. Certainly, understanding and 'getting to know the client' is taken for granted in at least the rhetoric of the consulting industry (for example, Kubr 1976; Smith 2000). However, it is possible to suggest that the flavour of empathy is one based on a rationalist, technicist worldview, in which the 'seeing the problem from the client's viewpoint' is just

one more technique in the consultant's tool bag: no need for deep human-to-human connection, or a shared set of meanings.

Figure One crudely sets out the main dimensions in which we might compare the rationalist empathy of the traditional Consultant with the more aesthetic empathy of the Designer.

RATIONALIST EMPATHY	AESTHETIC EMPATHY
Based on demonstrable method	Based on intuitive response
I try to understand your problem by locating it within a universe of familiar problems	I try to understand what it would be like to be you
Reductive	Holistic
Nomothetic	Ideographic
Focus on diagnosis and prescription	Focus on interpretation of a representation/representations of the situation

Figure 1: ALTERNATIVE VIEWS OF EMPATHY

Examples of rationalist empathy can be drawn from parallel professions: medical doctors are frequently pilloried for seeing their patients as mere bundles of symptoms (Waitzkin 1991). But in their defence, perhaps what matters is the accuracy of their diagnoses. They must carefully investigate, teasing out details of the patient's experience with great skill. They need to know what the patient feels, but perhaps they do not need to imagine what it feels like to be that patient. There is a type of empathy, but one which is exercised by the deployment of some procedure or programme of inquiry. But for anti-technicist writers like Jacques Ellul (1964), technique remains technique, however dressed up.

In contrast, we might claim that the design mentality brings with it a profound, imaginative and affective immersion in the life and experience of the client. The bond between a designer and the client and their users is about a level of a creative leap into the experience of another. Whereas a Consultant can see that a business process fails to achieve some performance target, and may know what to reorganise to improve things, the Designer understands what this target means to the people involved, and is concerned with it relates to a wider group of stakeholders including users. For the Consultant the web of meanings that participants bring to a situation, and the rich texture of the detail of the context, provide merely the backdrop to the main action; for the Designer, they are essential data. For the Consultant, the problem is the (nomothetic) manipulation of variables; for the Designer, the issue is the (ideographic) story (Quesenbery and Brooks 2010). For the Consultant, the key issue is analysis and isolation of the problem; for the Designer, it is seeing problems and solutions holistically.

This type of dichotomy is not limited to the 'design versus consultancy' debate, but crops up in a range of settings, from the training of sociologists (Stevens and VanNatta 2002) to Checkland's 'Soft Systems Analysis' (Checkland 1999). Both of these solutions, like design thinking, entail the creative exercise of empathetic imagination. Although design is not 'art', it requires an aesthetic sensibility to make the intellectual and emotional leap which means

one can see the world like someone else does. In contrast, consulting's empathy has more in common with Lippsian empathy-as-projection; rather than imagining what the client's life is like, the Consultant imagines what it would be like if the client was more like the Consultant. It should be added, however, that even though there may be mileage in the projection/empathy distinction, the language used by Designers may blur the contrast. For example, IDEO's Jane Fulton Suri, in recounting a story of 'going and seeing' people who'd had toe-losing accidents with poorly designed lawnmowers:

> *"To get people to share the truth of what happened, I was using all of my psychology skills—perception, cognition, interrelating with people and getting them to open up and remember. And at the same time that I was asking people to show me how they cut the lawn, I would be* ***projecting myself*** *into that situation to think, Would I make the same mistake in this situation?"*
>
> (Berger 2010, emphasis added)[2].

Cognitive and Affective Empathy

Another important distinction made in the literature is the difference between cognitive and affective empathy. Cognitive empathy relates to an individual's ability to work out what is going on in the other's mind; affective empathy refers to a shared emotional response - for example, feeling fear or excitement. The boundary between the two concepts is not rigid, and in the literature of both human and animal (including Chimps) psychology the empirical challenges of differentiating the two are considerable. Nevertheless, the distinction has some face validity, and may read across to the comparison between Ideal Type Designers and Consultants. The idea of affective empathy is more than just using one's imagination to get a fuller picture of the other's experience. Affective empathy requires a kind of emotional labour: the understanding is not just descriptive, but embodied.

To illustrate these distinctions, it is helpful to consider the way in which (our idealised) Designers and Consultants might go about the task of how someone in a wheelchair might use an automated ticket machine at a railway station. Applying rationalist empathy, the Consultant might collect data - perhaps quantitative - on the process in question and calculate how long the queuing and ticket buying might take. They might explore whether the options available for travel meet the postulated needs of the disabled traveller. They might try to imagine what it would be like to be the person in the wheelchair and whether the person could reach the touch-screen and the ticket dispenser when seated. This is all - indisputably - a kind of empathy, but would fall short of the type of immersive, ethnographic design thinking normally associated with a Designer. In contrast, conventional design practice would perhaps involve the designer themselves using a wheelchair, or collecting data on the *overall* travel experience, and look for interactions with the wider process. Is, for example, the

[2] It is incidentally amusing to note that in Pugh's (1991) seminal work on engineering design, lawnmowers are the example given of a product for which the designer probably has no need of direct user engagement, as "market research and investigation of user needs is a task for others" (p.30).

lighting on the concourse such that a seated person cannot see the credit card instructions because of reflection? Is there room, once the wheelchair has approached the machine, for the chair to be turned around if there is a dense queue of people behind? These details require more than a superficial technical description of the problem, and require a deeper sense of 'what it is like to be someone else'. Elaborations of this approach are one of the key elements of design thinking as promoted by Brown (2009), Martin (2009) and many others.

This type of empathy, however, might still only be 'cognitive'. For 'affective' empathy to be involved the process of seeing through others' eyes requires a deeper engagement: this requires sharing the emotional response of the other. In the wheelchair example, it would require the designer to share, perhaps, the level of anxiety that a user might experience in the situation, or anger. This is not 'understanding that the person might get angry' - but actually to share the experience of anger (Postma et al 2012a; 2012b). It is not that one can rationally appreciate the fact of another's emotions, *but that one has the emotions oneself*.

These two framings of empathy suggest four permutations of which three seem to make sense in the context of the contrast between Consultant and Designer approaches (Figure Two). The top left quadrant appears problematic; the two right hand quadrants appear to map onto versions of the design thinking approach. This perspective leads to two further issues: the extent to which the empathic responses require some kind of machinery, and the potential obstacles to aesthetic/affective empathy.

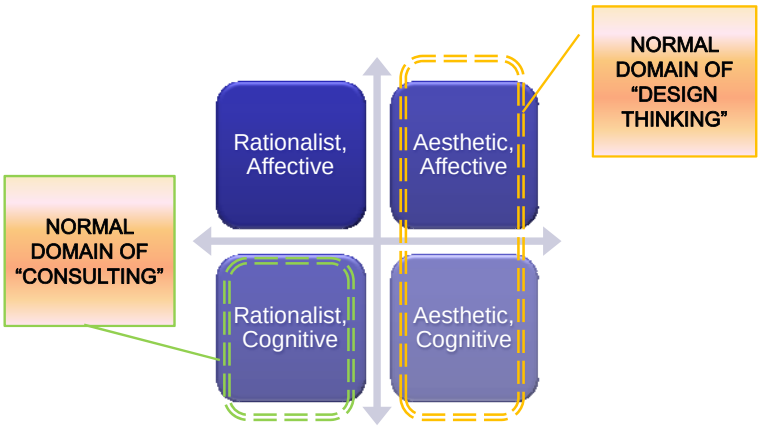

Figure 2: Versions of Empathy

MACHINERY AND OBSTACLES

Equipment for Empathy

One of the drivers for the growth in popular interest in empathy has been advances in human and animal neuroscience and psychology. In particular, techniques for analysing brain activity have led to insights into the ways in which empathy is operationalised as a physiological process. Part of the excitement in this field has been the discovery of so-called mirror neurons, leading to the idea that brains include some type of dedicated circuitry which

is responsible for - simplistically - running a kind of simulation programme that enables one actor to imagine what is going on inside the mind of another. Baron-Cohen (2011) is at pains to point out, however, that mirror neurons can only be conceived of as part of the machinery of empathy, and instead discusses the idea of the 'empathy circuits'. Regardless of the detail of the biology, however, the key issue is that, for living beings, there is 'equipment' for empathy, and, if it is absent or malfunctions, an organism's capacity for empathy is impaired.

For the debate about Consultants and Designers, it would be easy to slip at this point in the argument about individual personality types. However, there is no evidence to our knowledge that people who work in these sectors are a priori different in terms of their psychological make-up: indeed, our experiences in teaching MBA students suggest to us that many individuals can and do flip between the different approaches. What is more interesting is the extent to which the equipment idea can be applied at the organisational and institutional levels. In other words, can the capacity for (different sorts of) empathy be embodied in (different sorts of) organisational 'equipment', which might be reflected at the level of processes, techniques and capabilities?

This line of argument is risky because it entails a leap of analogy from human (or, indeed, chimp) to organisation; this is where our Ideal Type trope requires some qualification, because we are considering not just an idealised Designer or Consultant acting as an individual but in the context of collective professional apparatus. While it is easy to slip into this language ("IDEO really understand the users' needs…"), there is a need for caution as one does so. In construing some 'collective mind' (Weick and Roberts 1993) we need to avoid the idea of everyone thinking the same; however, we do have to consider what mechanisms are available for the (shared) cognitive processes of communication and memory (see also Boland and Tenkasi 1995; Tsoukas 1996, Tollefsen 2006).

To understand the possible *machinery* of empathy, there are several obvious approaches: the 'standard' design tool kit of visualisation, ethnographically-inspired research, role play, and immersive exploration are well-described in the literature and well-established in practice (Stickdorn and Schneider 2012; Curedale 2013). However, might there be more to aesthetic and affective empathy than this? If you do these things, do you naturally become empathetic? Are these tools necessary and sufficient for empathy? And is it the presence or absence of these methods that really explain the difference between Consultants and Designers?

We do not presume to know the answer to this question, but suggest three data points that might inform this debate. Firstly, we note that although there are some 'craft' elements to these traditional mechanisms of designerly interaction, they are not difficult to use: they can be taught relatively easily, and although sometimes time consuming and labour intensive, they are not especially expensive. Secondly, we note that variations of them - with different labels, or with different stylistic tics, or different levels of emphasis, are used in Management Consulting. But we also note that - when used by both Designers and Consultants - that these apparently empathy-oriented tools can be used in ways which are superficial, patronising and

inauthentic - or at the very least incomplete (Caplan 2009). In other words, if we wish to identify the machinery of empathy, it needs to be more than a toolkit.

Obstacles to Empathy

One possibility is that the institutionalised exercise of empathy requires mechanisms of internal communication and knowledge management. The discussion of empathetic (product) design processes in Nonaka and Takeuchi (1995) emphasise the need for the development of 'archetypes' - shared linguistic and conceptual models of relevant issues, redundancy in information sharing, and the role continuous translation of tacit to explicit knowledge (and vice versa). This implies that for some kind of institutional empathy to evolve, there needs to be some process of intensive, shared communication and interaction between the Designer and the client/user and, in a collective, institutional setting, between the Designers. Possibly, it is only this intensive level of detailed interaction that might give rise to sufficient insight to enable empathetic connection. This in turn has two implications for the comparison with the way empathy might operate for Consultants. Firstly, it may set a limit on the size of design firms: if you want to develop the kind of intensive internal discourses that enable aesthetic or affective empathy, you can't do it with an enormous, distributed, bureaucratic organisation.

A final set of points about the mechanisms of empathy relates to the reflexive character of the client-advisor relationship, and considers the obstacles to empathy. It could be that there are features of the traditional consulting relationship that work against empathic relationships. In traditional consulting, the 'real' client is typically the top management of the client firm, even if much of the actual interaction takes place with people lower down in the organisation. In some ways, this generates a power imbalance in the relationship between the consultant and the people with whom it might be necessary to empathise: the consultant may be seen, for example, as a kind of spy. The relationships formed therefore deviate significantly from a Habermasian "Ideal Speech" situation - communication is distorted by the asymmetry of power. In other words, the machinery of empathy may be disabled by the power imbalances: the Designer says "Tell me your pain…"; the Consultant tacitly appends "…so I can sneak on you to your boss."

Furthermore, the (relatively) high fees of traditional consulting mean that it becomes incongruent to maintain a position where the user or client's expertise is more important that that of the Consultant. The (relatively) low fees of the Designer mean that offering merely a process, rather than an 'answer', may be more palatable. If one pay's McKinsey's fees, one does not want the Consultant to turn up with *just* a flip chart and process for visualising what one already knows, or could find out oneself (Fincham 1999). In Korczynski's (2005) terms, the high fees require a high degree of 'enchantment'. The presumed expertise of Consultants perhaps eliminates the humility and acceptance of ignorance required for empathy.

Finally, although Consulting has not developed into a formal profession, it has evolved a set of common ethical practices (not, of course, always observed) based on the notion of telling the client the truth - regardless of what the client wants to hear. This idea is embedded in the

ethical guidelines of various consulting bodies, and - for the top firms - is an essential part of their marketing message (Harte and Dale 1995; Edersheim 2010; McKenna 2010). Gunz and Gunz (2008) write about the problem of 'client capture' - in 'professional services' it is important to maintain a degree of formality and distance, which in turn may limit the scope for (especially, affective) empathy.

CONCLUSIONS

In this paper we have reflected on the way in which consideration of the concept of empathy might shed some light on the distinctions between Ideal Type comparisons of Consulting and Designing. Our analysis has suggested that the understanding the processes and obstacles to empathy may go some way to explaining some features of the professional landscape: Consulting firms are bigger, trade on expertise, have distinctive client relationships and charge more. All of these features may have implications for the ways in which 'empathy' is exercised. This raises questions for research (in terms of efforts to delineate the essence of design and/or design thinking) and also for practice (especially the trajectory of design firms such as IDEO, and adoption of design-style practices by established consultants or MBAs).

The discussion also leads us to reflect on the enthusiasm (admittedly, possibly waning: Nussbaum 2011) for design thinking as a panacea for business. In Baron-Cohen's (2011) consideration of individual empathy, he argues persuasively for the merits of a *lack* of empathy: although empathy deficiency can lead to evil (in his view) it can also be associated with a propensity for systematization and quantification. In Baron-Cohen's view, we owe much by way of scientific progress and technology to individuals who operate with less than normal empathy: he argues for a connection between mathematics, engineering and Asperger's syndrome. Extending this idea to our contrast between Consultants and Designers may be a fruitful avenue for further research, and certainly cautions against presenting overly-simplistic manifestos for the superiority of the design approach.

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Co-creation patterns: Insights from a collaborative service design tool

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Keywords: Co-creation, patterns, service business, service design

The co-creation phenomenon is understood to be a powerful tool to tackle challenges in today's business world, but little empirical evidence supports these views. This study investigates co-creation activities in B2B service business practice using a visual collaborative service design research tool the CoCo Cosmos. The aim of this study is to contribute to the identification of co-creation patterns in service, design and innovation research. As a result five signposts of co-creation patterns are identified which establish the ground for future research activities in this area.

INTRODUCTION

The co-creation phenomenon is described to be "the next big thing" (e.g. Ind et al., 2012), and co-creation has been capturing a great deal of attention in many fields, especially in service research, management research, innovation research, and design research (e.g. Vargo & Lusch, 2004; Prahalad & Ramaswamy, 2004; Sangiorgi, 2012). Still, the co-creation phenomenon is by no means new (e.g. Normann & Ramirez, 1993), and related terms such as collaboration, interaction, customer engagement, participatory design, co-design, co-production, and co-innovation have been studied already for decades (e.g. Gersuny & Rosengren, 1973; Von Hippel, 1988; Ehn, 1992). The topical discussion on co-creation emphasizes the role of the customer in both the creation of value (e.g. Vargo & Lusch, 2004;

Grönroos & Voima, 2012) and in the development process of current or new service offerings (e.g. Wetter-Edmann, 2012).

Even though the co-creation phenomenon is understood to be a powerful tool to tackle challenges in today's business world (e.g. Fisher & Smith, 2011; Leavy, 2012), little empirical evidence supports these views. The current theoretical models seem to be mostly on an abstract level and present overly simplistic ideas and generalised heuristics.

Consequently, there seems to be a need to develop a better understanding of co-creation activities in business practice. Especially there is a need to better understand direct company-customer interactions that have the potential to increase the value creation i.e. how to engage and manage customers in collaborative environments in business-to-business (B2B) markets (Edvardsson et al., 2010; Grönroos, 2011; Ostrom et al., 2010).

In response to the gap highlighted above, this study investigates co-creation activities in service business practice. The aim is thereby to establish co-creation patterns leading to a better understanding of co-creation phenomenon through empirical qualitative evidence. The study focuses on the company-customer relationship and interactions in knowledge intensive B2B service businesses (KIBS), and investigates the co-creation phenomenon by using a collaborative card-based tool, the so-called 'CoCo Cosmos' (Keränen et al., 2013). This tool was developed as part of an on-going research project (the 'CoCo project') which aims to investigate the transition from conventional business approaches to the notion of co-creation.

The CoCo Cosmos is a visual collaborative service design research tool. The CoCo Cosmos tool covers the co-creation phenomenon from the three viewpoints that have been emphasized in the theoretical co-creation discussion: the value co-creation point of view, the co-production point of view and the collaborative new service development point of view. Based on the preliminary findings of this on-going research project signposts of co-creation patterns occur.

This paper is organized in four sections. First, the theoretical underpinning is presented. Second, the research method is described. Third, the findings of the study are shown. Then, the final conclusions are drawn.

CO-CREATION

This study sees co-creation through a CoCo framework (Keränen et al., 2013; Ojasalo & Keränen, 2011). The CoCo framework combines theoretically three different aspects of co-creation phenomenon in service business: (1) value co-creation, (2) co-production, and (3) co-design/co-innovation (see Figure 1).

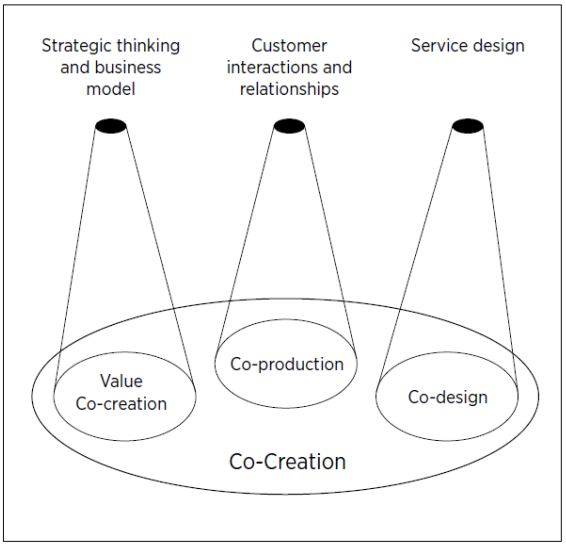

Figure 1: The CoCo framework (Keränen et al., 2013)

Lenses of co-creation

The CoCo framework combines three different aspects of co-creation (Keränen et al., 2013). These three different aspects are called lenses of co-creation. Each lens has five sub-lenses to capture main activities embedded in each main lens. Lenses define how a service company should act in order to co-create value. These aspects are introduced next.

A value co-creation view embedded in strategic thinking and business model

The first lens sees co-creation from the viewpoint of strategic thinking and business model and takes into account the topical research and general discussion on service-dominant logic (e.g. Lusch & Vargo, 2006) and service logic (e.g. Grönroos & Voima, 2012). These views focus on value co-creation, meaning that customers are seen as active creators of value rather than as passive recipients of goods and services. In value co-creation, the service company and its customers together create both value for the customer and the service company (Ramaswamy & Gouillart, 2010). The main activities embedded in this lens (see Figure 2) are related to business goals, strategy process, value creation process, resources and value network.

Strategic thinking and business model		
Sub-lenses	**Value co-creation**	**To adopt a co-creative business approach it is necessary to:**
Business goals	To jointly create comprehensive customer solutions/Value-in-use	Create service business solutions which emphasize the customer's value-in-use rather than simply focusing on producing and selling services and products (i.e. value-in-exchange)
Strategy process	Bottom-up/ Outside-in	Design processes which allow staff and customers to join in the development of new or modified strategies rather than restricting it to a small group of professionals inside your company
Value creation processes	Focus on customers' and their customers value creation processes	Focus on fully understanding and defining both your customers' and their customers' businesses and processes, and based on this understanding to design your own value propositions that support customers' businesses and processes
Resources	Focus on shared resources among the company, its customers and other stakeholders	Design processes that allow all your key stakeholders to share resources in an effective way
Position in value chain/value network	Focus on the entire value network	Understand and design your company's role as a part of value network rather than just one individual actor in a value chain

Figure 2: Value co-creation activities in strategic thinking and business model (Keränen et al., 2013.)

A co-production view in customer relationships and interactions

Secondly, the CoCo framework sees that co-creation involves co-production. This lens of co-creation involves the transformation of customers from passive audiences to 'active players'. Two typical customer roles in service settings are 'Customer as Resource' and 'Customer as Co-producer', i.e. customers bring input resources (e.g. information) to the service production and they usually produce parts of the service on their own and/or together with the service provider (see Ojasalo, 2003).

The main activities embedded in this lens (see Figure 3) are related to service company-customer relationship, how well service company knows its customers and customers' customers, how proactive and active the relationship is, and how accessible a service company is from the customer point. (Keränen et al., 2013.)

Customer interactions and relationships		
Sub-lenses	**Co-production**	**To adopt a co-creative business approach it is necessary to:**
Company-customer relationship	Oriented towards building long term customer relationships	Aim to establish long term customer relationships which allow building trust
Information on the customer	Deep customer insight – knowing in person	Aim at full knowledge of your customers' and their customers' businesses and challenges
Nature of interaction with the customer	Proactive/dialogue	Design communication processes to support proactive dialogue with your customers
Amount of interactions	Active/two-way Anywhere/anytime	Design communication processes with your customers which allow active two-way dialogue
Customer access to information and other resources	Transparent	Afford your customers transparent information regarding your business relationship

Figure 3: Co-production activities in customer interactions and relationships (Keränen et al., 2013.)

A co-design and co-innovation view embedded in service design

Thirdly, the CoCo framework sees co-creation as an activity within service innovation processes and co-design activities. In an innovation process, co-creation means involving different stakeholders and combining knowledge in order to create new service solutions. From the design perspective co-creation is often equated with co-design from the user perspective, or it can be seen as one of the design tools. Designing value propositions that can support a customer's value creation processes requires a deep, long term development partnership with the customer (Ojasalo, 2009).

The main activities embedded in this lens (see Figure 4) are related to service design process (e.g. Moritz, 2005) which includes steps how to gather customer information, how process customer information, how to develop a value proposition, how to test a value proposition, and how to launch a value proposition. (Keränen et al., 2013.)

Service design		
Sub-lenses	**Co-design/ Co-innovate**	**To adopt a co-creative business approach it is necessary to:**
Gathering information on the customer	Participatory methods, listening and learning together	Focus on activities which allow you to listen and learn together with your customers, instead of using only structured customer feedback methods
Processing information on the customer	Externally with the customers	Process all the customer information carefully, make it available to the customers and demonstrate their influence
Developing the value proposition	Bottom-up including the customers	Integrate staff and customers in every stage of the development of value propositions
Testing the value propostion	Externally with the customers	Test the value proposition externally with the customers during the development process
Launching the value proposition	Providing solutions	To launch the value proposition, use the powerful realtionship established during the development process, thus liberating your resources from a mere sales level

Figure 4: Co-creation activities in co-design and co-innovation (Keränen et al,. 2013.)

METHODOLOGY

This study is based on empirical qualitative evidence from three case companies and their customers. Case companies are representing knowledge intensive B2B services (KIBS). Their customers are representing variety of fields but having service business as a uniting factor (see Figure 5).

Case companies			
Suppliers		Customers	
A	Financial management services	C1	Business gift services
		C2	Sports betting services
		C3	Regional commerce and industry services
B	IT services	C4	Mobile software services
		C5	ICT infrastructure services
		C6	Education services
C	Construction, real estate development and area development consultation services	C7	Crane business
		C8	Elevator and escalator business
		C9	Real estate business

Figure 5: Case companies and their customers

In order to understand company-customer relationships and interactions, and to map the possible co-creation patterns this study developed a specific methodology that is based on a visual collaborative service design research tool, a CoCo Cosmos. The CoCo Cosmos is a fifth tool of the CoCo Tool Kit (Keränen et al., 2013) developed within the CoCo project. The CoCo project was to set up to investigate the transition of KIBS companies from conventional business approaches to the notion of co-creation.

The CoCo Cosmos is a proactive service design tool which primary purpose is to support the business partners i.e. suppliers and their customers to become more co-creative. As a service design tool it enables collaborative communication, better understanding and opens new possibilities among the partners (see Vaajakallio, 2012).

The tool involves six sets of cards (see Figure 6), three white board markers and a game board which sets the scene for capturing a service business setting. The six sets of cards include three sets of stakeholders, one set can be used as supplier actors, one set can be used as customer actors and a third set can be used as customers' customers' actors. The fourth set of cards indicates all the locations where the business can be made. The fifth set includes all business actions. The sixth set includes all the entities i.e. here understood as results of business actions. Each set of cards includes an empty card which gives a possibility to create new cards and leaving a space for creativeness (Vaajakallio, 2012, 221). All the cards and the game board are laminated so that the cards can be personalized and players can draw the game board with white board markers.

White board markers include black, green and red. Black is used to personalize the cards and to draw connectors between the cards. Connectors are advised to draw with arrows demonstrating a one-way or a two-way relationship. The dotted line shows lower activity level between the cards. Green is used to show the enablers of the service business setting i.e. things that are crucial to the relationship, work well and raise the quality of a service. Red is used to show the barriers of the service business setting i.e. things that slow down/prevent the service delivery and lower the quality of a service (see Figure 8).

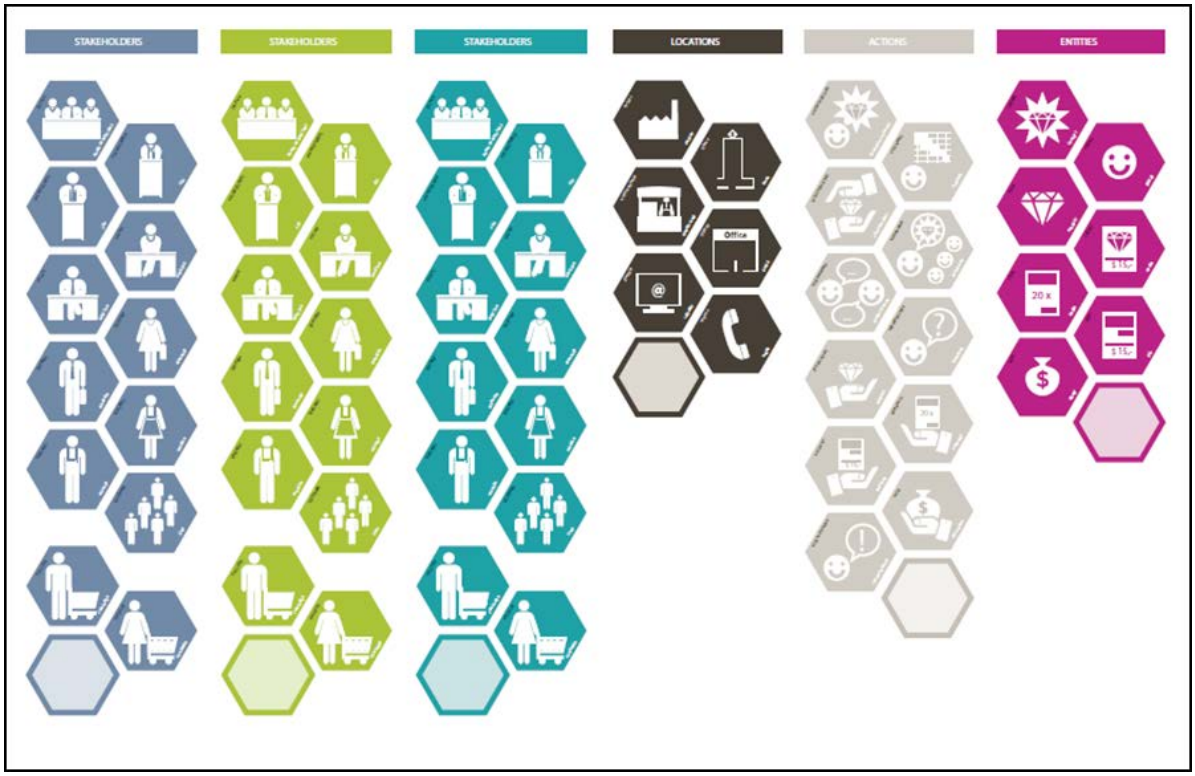

Figure 6: CoCo Cosmos cards (Keränen et al., 2013)

The core of the CoCo Cosmos is building a picture of a service business setting. Although it may seem at the beginning that the picture itself is salient, eventually it is also the process of building the picture that allows customers and suppliers to understand their joint service business setting. Furthermore, the CoCo Cosmos enables to better understand enablers, barriers and latent needs of the relationship. The CoCo Cosmos can be also used to depict the interdependencies or the lack of them. In this study we have used the CoCo Cosmos to identify signs of co-creation patterns.

The empirical data was collected in 18 workshops: 9 organized in the three case companies i.e. suppliers (three in each) and 9 in their customer companies (one in each). The assignment in these workshops was to build a picture of a service offered by the supplier using the CoCo Cosmos. First customers built their picture from their perspective. After that suppliers built their picture of the same service setting. Customers' pictures were shown to the suppliers only after they had built theirs (see Figure 7). A comparison between customer's and supplier's pictures was made combining the both pictures in the same file comparing similarities and differences in a systematic way.

Workshops (WS)/ 9 customers (C1-C9) & 9 suppliers (S1-S9)						
Case	WS	CoCo Cosmos	Time	WS	CoCo Cosmos	Time
1	C1		17.4.2013	S1		17.5.2013
2	C2		8.3.2013	S2		15.5.2013
3	C3		6.5.2013	S3		15.5.2013
4	C4		7.5.2013	S4		8.5.2013
5	C5		5.2.2013	S5		8.5.2013
6	C6		29.1.2013	S6		2.4.2013
7	C7		29.1.2013	S7		8.2.2013
8	C8		19.11.2012	S8		6.3.2013
9	C9		22.11.2012	S9		23.11.2012

Figure 7: Cases, workshops and timetable

The empirical data comprises the 18 pictures and tape recordings of the workshops i.e. also the process of building the pictures. The data was first processed by writing a story of the each case including the pictures and the list of all the stakeholders. Here one case includes two pictures: one customer picture and one supplier picture of a service provided by the supplier. After the cases were analysed case by case in terms of systematic categorization based on six sets of the CoCo Cosmos cards, listing the enablers and barriers of the service provided. Furthermore two tables including all the nine cases (i.e. nine supplier-customer cases) were drawn. The first table listed all the main actors, activities, places, drivers, barriers. The second table contained the signs of co-creation activities/ the lack of them based on the CoCo framework (Keränen et al., 2013). This cross-case analysis indicated some clear similarities and differences among the data. Next, these early findings are shortly presented.

FINDINGS

The evidence from data analysed pointed signs of co-creation activities or the lack of them. The most obvious signs of co-creation activities/ lack of them were the following:

- orientation to the long-term relationship,
- proactive dialogue,
- regular meetings with the customer,

- understanding customer's customer business
- involving customers to the both strategic and service design.

All the nine supplier-customer cases were focused on long-term business relationship. Meaning both the suppliers and the customers saw long-term business relationships valuable and in these cases all of the relationships have been lasting more than two years, the longest ones being nearly ten years.

Four out of the nine cases (cases 5,6,7,8) could be described as having a proactive dialogue aiming to have partnerships. The same four cases were also having regular face-to-face meetings. In these cases the whole service setting was seen more comprehensively.

Here case 7 one of these four cases is presented as an example (see Figure 8). In this case (C7 &S7) turquoise cards are placed for the customer's actors and green cards are placed as supplier's actors in both pictures. This business relationship started in 2008. During the workshops it became evident that the supplier and customer meet regularly and both of them indicated of having very proactive interaction. From a customer viewpoint it also became evident that during their relationship the supplier has developed its processes based on proactive interaction with the customer.

In customer's picture (C7) customer indicated two enablers of this relationship. First the whole service process including all the activities and actors and secondly customers were marked as a separate enabler. Enablers are marked with green ink in the pictures and pointed out as green arrows. The only barrier in the customer's picture is the money.

In supplier's picture (S7) supplier indicated many enablers between the different stakeholders (green arrows pointing the green spots) showing that interactions between different stakeholders are crucial in this service business setting. The supplier has marked two of its own stakeholder cards with question mark as barriers of this relationship showing that there is a deficiency of skilled staff as only two workers and the CEO are familiar with this service setting.

It is notable that in all other cases a strong aim of having more regular face-to-face meetings was evident. Moreover it was quite strongly indicated in many cases that at the beginning of the relationship the dialogue had been more proactive and there had been more face-to-face meetings.

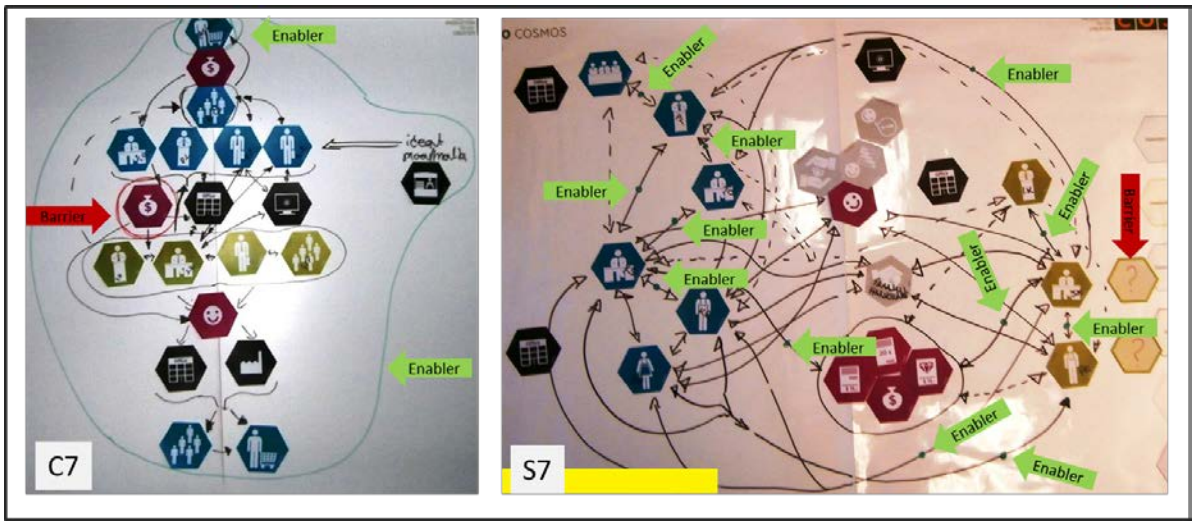

Figure 8: A CoCo Cosmos example 1

Furthermore, when customers´ pictures (C-pictures) were analysed separately from the suppliers´ pictures (S-pictures) it appeared that in eight customer´ pictures out of nine customers placed their customers in the picture. In the suppliers pictures only two pictures out of nine involved their customers' customers.

Case one is shown in Figure 9 as an example. In this case (C4 &S4), the turquoise cards are placed for the customer's actors and green cards are placed as supplier's actors in both pictures. Customer (C4) has placed several of its customers (turquoise cards with purchasing cart) cards around the service provided by the supplier – see turquoise arrow pointing this part of the picture C4. Related to this customer has also included its circulation of money to the picture (pink card with a money bag) and pointed out that the service provided by the supplier enables them to serve their customers – see green arrow pointing to the black factory card.

In supplier's (S4) picture the black factory card is shown next to the service cards (pink smiling face). Here the supplier sees the black factory card as an enabler but also as a possible barrier of this service setting. Barrier with the question mark means the possible lack of resources if customer's business grows rapidly. Customer's customers are not identified. This also applies to the case 7 (see Figure 8).

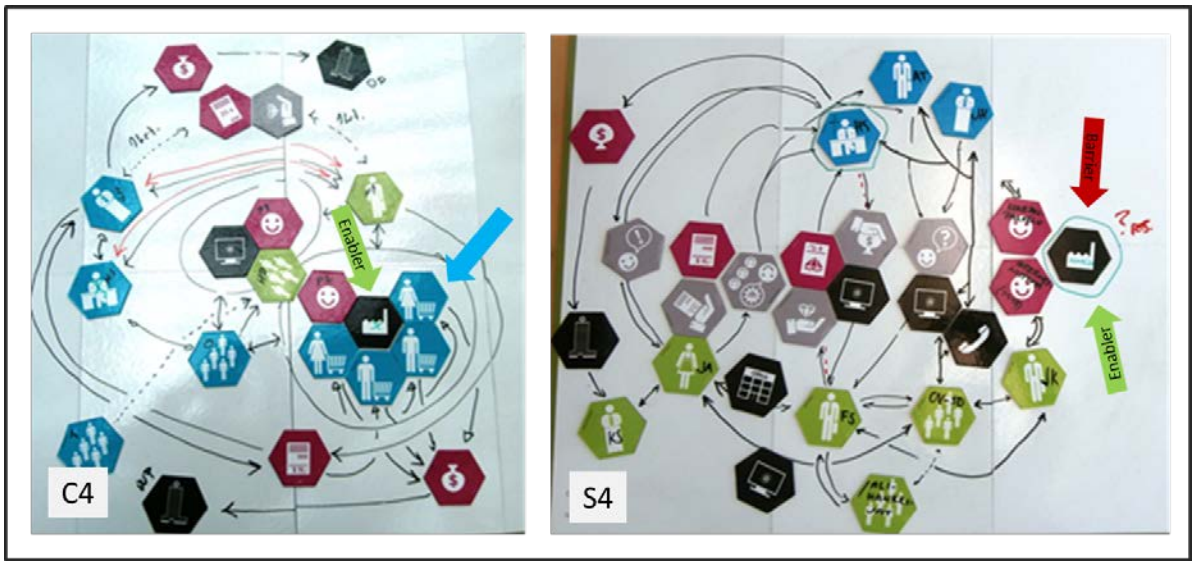

Figure 9: A CoCo Cosmos example 2

Finally, the data shows that suppliers very rarely involve customers to the strategic planning processes and service design. The customer involvement into these activities was seen only in two cases (cases 5, 7). This mainly occurred in the cases were customers were developing a new value proposition and involved their suppliers in the development process i.e. suppliers did not involve customers but the other way around. These findings were made during the workshops while participants were building the pictures so in these cases tape recordings are serving as evidence. It is acknowledged that this study is still in an early stage and that future research activities will further inform the findings introduced above. To synthesize the findings, next the detected signposts of co-creation patterns are presented.

ANALYSIS AND CONCLUSIONS

This study focused on the company-customer relationship and interactions in knowledge intensive B2B service businesses (KIBS), and investigated the co-creation phenomenon by using a CoCo Cosmos tool (Keränen et al., 2013). The main aim was to establish co-creation patterns leading to a better understanding of co-creation phenomenon through empirical qualitative evidence. As this research is working in process these are only preliminary conclusions towards co-creation patterns.

Based on CoCo framework, findings showed some signs of co-creation activities, and the lack of them. Five signposts of co-creation patterns could be identified: (1) Orientation to the long-term relationship, (2) Proactive dialogue, (3) Regular meetings with the customer, (4) Understanding customer's and customer's customer's business, and (5) Involving customers to the strategic and service design.

The orientation to the long-term relationship could be the first signpost since all of the cases were long-term relationships. Furthermore they all valued long term relationships rather than having regular tendering. This is interesting but we cannot still say that long-term relationships create co-creative relationships since quite many of the cases had been more proactive and have had more customer interaction at the beginning of the relationship than they were having at present. This would need a more research.

The second signpost/proactive dialogue and third signpost/regular meetings with the customer seem to be intertwined since these appeared in the same cases. It seems that in relationships where actors meet regularly face-to-face they also are more proactive and they seem to trust each other more. They see their business setting more comprehensively and they consider each other as partners rather than supplier-customer relationship.

The knowledge of customers and customers' customers' value creation could be the fourth signpost of a co-creation pattern leading to a co-creative business approach. These B2B service suppliers seem to lack the full knowledge of their customers' and their customers' customers' value creation or at least they don't seem to see this as an important point. Opposite of this customer's pictures highlighted the importance of understanding the customer's value creation and customers' customers value creation. In some cases the customers and customers' customers seemed to value different things that the suppliers think they value. Additionally customers indicated the importance of understanding their customers' value creation.

The fifth signpost of a co-creation pattern seems to be that only when customers are developing new value propositions they involve suppliers into strategic planning processes and service design processes. This also gives suppliers possibilities to involve customers into their own strategic planning processes and service design processes which will lead into higher level of co-creative business approach.

This study contributes to academic knowledge in service, design and innovation research. It aims to clarify the obscurity of co-creation phenomenon by documenting a better understanding of how co-creation embraces both its theoretical and practical side. Empirical qualitative data demonstrates five signposts of co-creation patterns. The identified signposts of co-creation patterns can lead to a framework which depicts co-creation activities in B2B service management. This will deepen and expand the knowledge of co-creation in B2B service business. On a practical level, the visual service design tool a CoCo Cosmos developed for this study might be also of independent value as a co-creation tool that supports companies in their management of co-creation activities, and contributes to a better integration of service logic in business practice.

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Consumer decision making in mobile-banking service selection

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Keywords: Mobile Service Value, Mobile Banking, Analytic Hierarchy Process (AHP)

This paper reports on the findings of a study of 267 consumers on the first order selection criteria within a decision making model that utilizes the Analytic Hierarchy Process (AHP) to evaluate mobile banking service selection. The AHP analysis of the first order selection criteria for the full data sample identified 'Time Saving' as the highest ranked factor followed by 'Control' then 'Any Place' and lastly 'Cost'. The survey also reports on consumer usage patterns for internet and mobile services as well as exploring their experiences with mobile banking services.

INTRODUCTION

M-business refers to the use of mobile telecommunications networks by firms in any part of their business whilst m-commerce refers to the buying/selling (the commerce) aspects and encompasses a variety of services accessed via a user's mobile phone handset including internet access to obtain information; making online transactions and utilising location based services which are based on knowledge of the consumer's geographic location. As mobile phone handsets become increasingly sophisticated then their versatility may make them more attractive for users such that they become their preferred means of accessing and using various services to support their lifestyles.

Mobile-banking is a service that involves payments and financial transactions via a consumer's mobile phone handset which they can access anytime and anyplace. Currently, there is great interest in consumer attitudes to accessing banking services through different channels and their decision making processes (Yousafzai and Yani-de-Soriano, 2012). The approach taken in this paper to examine consumer value perceptions is to utilise the hierarchical approach of analytical hierarchical process (AHP), as well as consumer mobile phone usage patterns in an integrative manner. Further, the use of 'Key Cards' is examined to see whether consumers view this as an enhancement of secure mobile payments (Kanniainen,

2010). 'Key cards' are an additional security measure often used by banks which are small handheld devices (like a calculator) that provide a unique PIN in real time. Users read the PIN from their device and use it when accessing their bank account and/or making a financial transaction.

The objective of this research is to examine the attitudes and concerns of consumers with regard to the use of their mobile phone handset to access their bank account and conduct mobile banking transactions. Consumer's perceptions of this mobile service will depend on their lifestyle and individual preferences (De Coster and Albesher, 2013) and thus questions were included to examine user's profiles (demographics and internet usage levels). The increasing trend of mobility in consumer's lifestyles justifies the need to study consumer's mobile service behaviours and service perceptions. Further, in many Developing Countries the mobile phone service dominates the telecommunications sector and is seen as an important communications method by many consumers.

LITERATURE REVIEW

The theoretical background to this study is derived from the literature areas of e-commerce and value provision as well as innovation theory concerning consumer adoption. Specifically, this research is focused on the m-banking sector as the extant literature on the adoption of e-technology focuses on the factors influencing behavioural intentions rather than consumer decision making based on an assessment of the perceived 'value' of a service.

Value creation involves designing and producing products/services with our customers in mind and what is of value to them. However, before we start designing the product (or service) we need a means of establishing what is of value to the customers and end users? In this study we will utilise a means for establishing what customers 'value' in terms of mobile-banking service selection. Value needs to be viewed from the customer perspective in terms of what is of value for the user (Anderson et al, 2009, p5 and Khalifa, 2004), rather than the organisational perspective of what can be produced.

The extant literature on marketing and value management examines value for customers which can be expressed as equations where each item is of monetary value. The fundamental value equation which recognizes that customer value typically involves a trade-off between what the customer receives (in terms of quality; benefits; worth etc…), and what he or she gives up to acquire and use a product or service (i.e. the price and the foregone alternative). The fundamental value equation is essentially the monetary difference in Value (which represents the monetary amount that would be paid for the firm's offering) to Price (the monetary amount being asked). However, it is not a straight forward matter to actually determine the monetary amounts involved since it is affected by the end users' perceptions of value.

The fundamental value equation shows that customer value is perceived by the customers rather than the vendor or supplier. This view has been extended by Heskett et al. (1997 cited

in Walters and Rainbird, 2007, p45) to include the value of the business processes where "the customer value equation = [Results produced for the customer + Process quality] less [Price to the customer + Costs of acquiring the product]". This identifies the benefit that a customer receives when acquiring a product from a firm that utilizes a high standard of business processes such as manufacturing processes or other core processes. Further, the customer value equation recognizes that the cost part of the value equation should also include the costs of acquiring the product (or solution) which in the case of enterprise products (or solutions) can be substantive. It also highlights that the cost to the customer comprises two elements of which the second element concerns the total cost of ownership.

Kothari and Lackner (2006) argue that there are a number of dimensions beyond the provision of the goods or product for customer value. They argue that "customer value = (Product + Access + Experience – Cost)" where the four categories of product; access; experience and cost must be considered from the customer perspective. More recent studies into value management and its delivery by organisations take this further by recognising the various internal organisational factors required for service delivery (Dumond, 2000 and Eng, 2008).

Measurement factors

The measures selected for the first level of the hierarchy are drawn from the literature concerning technology acceptance in general as well as the more focused literature on e-commerce and also that of m-banking. It should be recognised that consumer's perceptions of m-services are in part influenced by contextual factors which are likely to differ for various m-services (Rao and Troshani, 2007).

The first factor of 'Cost' was included as a measure as it has arisen in previous consumer research including comments being made during qualitative research (Luarn and Lin, 2005) where perceived financial cost was defined "as the extent to which a person believes that using mobile banking will cost money".

The factor 'Any Place' is the second measure in this study as Mobility is recognised as a factor in user's perceptions of the benefits of m-services. A survey into m-ticketing for users of local transportation by Mallat et al (2009) identified mobility as the second benefit (after 'usefulness' which refers to efficiency improvements for users) where mobility includes "time and place independent service access, reduced queuing, and substituting for other services".

The factor 'Control' is the third measure and according to Bhatti (2007) "is composed of elements of individual constraints that are related to the individual user's economy, experience, and skill in using a service". In the case of banking services this refers to the ability of consumers to access their financial details, to access their bank accounts and conduct payments and other financial transactions.

The factor ‘Time saving’ is the last measure which is well recognised in the e-commerce sector where large numbers of consumers use services such as that of Amazon for the time saving benefits of ordering books and other items online. This has also been the experience of many online grocery stores where busy consumers seek the convenience of home deliveries.

RESEARCH APPROACH

Various models are employed when studying customer perceptions of new services and technologies such as the Technology Acceptance Model (TAM) which was introduced by Davis in 1986 and has been widely used to assess user’s attitudes towards e-technologies (Wang et al, 2006; Cheng et al, 2006). This is based on the premise that two primary attributes have to be examined: perceived ‘usefulness’ and perceived ‘ease of use’ in respect of others variables, such as positive or negative attitude to using technologies which influence behavioural intention and actual use. However, although this approach is widely used this is not the approach used in this study as the focus here concerns consumers and their decision making.

Studies into adoption behaviours concerning high technology products and services that take a value based approach are likely to involve assessment of a number of factors that address the potential benefits (for the user) versus the costs as well as the likely risks (Faroughian et al, 2012). In contrast, traditional studies into consumer adoption focus on factors likely to affect their behaviour intentions such as perceived ‘ease of use’ as well as some personal factors which are often considered including attitudes to risk (Luarn and Lin, 2005).

For the purposes of this study into mobile banking a hierarchical approach was utilised to study consumer value perceptions utilising Woodruff’s (1997) Customer Value Hierarchy model which comprises three levels starting with ‘Customer’s Goals and Purposes’, secondly, ‘Desired Consequences in Use Situations’ and lastly, ‘Desired Product Attributes’ and ‘Attribute Preferences’. Each of these three levels is utilised in the consumer survey in this research. The approach taken for this study is that of Analytical Hierarchy Protocol (AHP) which is perhaps more usually associated with business decision making rather than consumer decision making (Cheng and Li, 2001).

Analytical Hierarchy Protocol (AHP)

The technique adopted here is that of Analytical Hierarchy Protocol (AHP) which can be used to understand how customers make decisions when deciding on which product to purchase (Saaty, 1990). Vaidya and Kumar (2006) reviewed 150 papers in which they examined the main application areas using AHP for which the majority were industrial and management situations with a limited number of social and personal areas. The finding of their review concerning AHP uses was the following: Selection; Evaluation; Decision Making and Resource Allocation. The justification for using AHP in this paper is that it is

examining consumer decision making concerning their evaluation (of mobile banking as a service); decision making (factors) and resource allocation (expenditure) which has also been the approach used in a recent study of mobile phone buying behaviour of consumers (Zameer et al, 2012). Further, this study examines the impact of previous e-banking and m-banking experiences on customers' perceptions of value when making decisions concerning mobile-banking service selection.

Population, sampling and data collection

Previous studies into the willingness of consumers to utilise m-services include a survey by Laukkanen and Pasanen (2005) that showed that age and gender are the main differentiating variables between users and non users of m-services. Thus, this survey aimed to collect responses across different age range ranges. The data sample comprises an international data set that was based on post graduate students taking a London based course including Managing Technology and Innovation (MTI). The majority of these students have engineering or technical undergraduate degrees and are studying for an MSc in the management area either on a Full-Time or Distance Learning basis. The sample was developed in a convenience and snow ball manner since the students undertaking coursework on the MTI option were asked to complete the survey themselves and also obtain responses from three (or more) other people. Guidance was given that the responses should be obtained from people who were not themselves studying on the course and that ideally a range of ages should be obtained.

The international nature of the cohort of students has led to a diverse data set being collected and analysed. Of the responses a few were rejected as they were either incomplete or not properly completed (for example, the pair wise comparisons were inappropriate such that weightings could not be sensibly obtained). Data gathering might be biased towards the technologically literate as the survey was administered by postgraduate students in the School of Engineering and Design who are likely to be inherently positive in attitude towards the adoption of new technologies and services.

A total of 267 responses were obtained (after discarding unsuitable responses) during this study with ages ranging from 18 to 21 (13.3%), from 22 to 29 (46.8%) which is the largest group, from 30 to 39 (23.2%), from 40 to 49 (10.6%) while the minority (6.8%) reported to be aged 50 or over. With regard to their internet usage, the majority indicated they have been using the internet for three to four hours per day with a small group using it for five or more hours per day. The minority of the sample have indicated they have been using internet services less with around a quarter using it for one to two hours per day and very few using it less than one hour per day.

RESEARCH RESULTS

The results from the study are presented which comprise firstly, services used by respondents, secondly, the Relative Weightings of the four factors and lastly views on the use of 'Key cards'. The results are followed by a discussion on the managerial implications which are based on the perspective of both product managers and operations managers within the banking community.

Usage results

The survey asked consumers to indicate the level of usage of various services in terms of 'Do Not Use' to 'Occasional Use' to 'Use Regularly' and 'Use Frequently'. The services ranged from accessing existing services (such as e-mail) to M-services which are defined as "enhanced information services accessed while mobile" (Mort and Drennan, 2007). The results for the top two usage categories are shown in Figure 1 and indicate that the majority of respondents were accessing E-mail (77.2%) and Social Networking (72.3%) via their mobile phone handset. Thirdly, (perhaps surprisingly) were Location Based Services (48.7%) with nearly half of respondents using these services. The remaining services were used less frequently with News including sports results (38.2%), Mobile Banking (37.8%), Wireless trading (34.1%) and lastly Price comparison sites (22.1%).

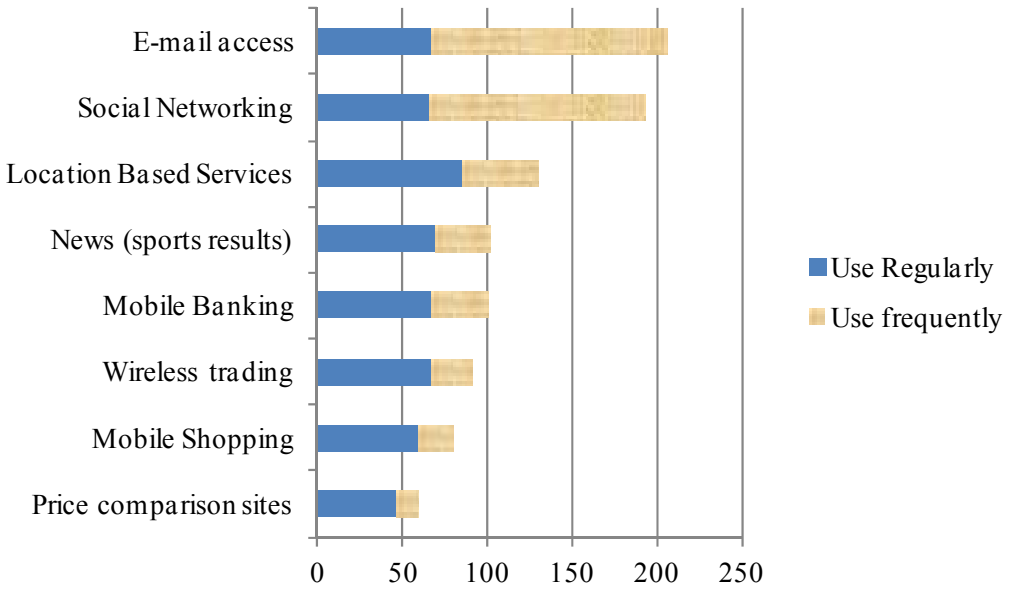

Figure 1. Results of mobile phone usage by survey respondents

Surveys by telecoms industry market research groups indicate that a broad range of mobile services are available and being used by consumers as highlighted by Anckar and D'Incau's conference paper (2002). Further, in terms of the age profile of the take-up of m-services from their survey they reported that "although the youngest users are likely to form the primary customer group for most m-services, especially entertainment-related applications, the observed m-willingness was, relatively speaking, surprisingly high even in the older age groups". This trend is perhaps unsurprising since e-business for consumers has been described as "ubiquitous" for over a decade (Parasuraman and Zinkhan, 2002).

Factor results

To obtain the Relative Weightings consumers were asked to give the relative importance of each the four factors (which are the first order selection criteria). The questionnaire utilised asked them to make a pair wise comparison against all the possible combinations (for 4 factors this is 6 pairs) as shown in Figure 2.

	More Important								**Equal**								**More Important**	
Factor A	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Factor B**
Factor A	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Factor C**
Factor A	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Factor D**
Factor B	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Factor C**
Factor B	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Factor D**
Factor C	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Factor D**

Figure 2. Questionnaire template for pair wise comparison of four factors

As shown the Respondent selects Factor A versus Factor B of 6: they regard Factor A as more important than Factor B. However, Factor A versus Factor D is an example of where the first factor is seen to be less important so we use the reciprocal of the answer (i.e. 1/5 or 0.2). Respondent selects Factor A versus Factor D of 0.2: they regard Factor A as less important than Factor D. The survey results are plotted in a matrix as shown in Figure 3 where, Factor BA is the reciprocal of Factor AB (i.e. 1/AB) and similarly for the other pairings. To calculate the Relative Weighting we first calculate the total for each column. To calculate the Relative Weighting for a factor we take each cell value for a Row and divide it by the Column Total. These are then averaged (Summed and divided by the number of them).

Factors	A	B	C	D	Relative Weighting
A	1	AB	AC	AD	W_A
B	BA	1	BC	BD	W_B
C	CA	CB	1	CD	W_C
D	DA	DB	DC	1	W_D
Column Total:	∑ Col A	∑ Col B	∑ Col C	∑ Col D	

Figure 3. Matrix template to calculate relative weightings of four factors

For the survey in this study the individual respondents results were combined by taking the average of the survey results (the Relative Weighting) for each factor and then ranking the results. The AHP analysis of the first order selection criteria for the full data sample identified 'Time Saving' as the highest ranked item followed by 'Control' then 'Any Place' and lastly 'Cost'. These results are the average weightings for the whole sample are shown in Figure 4. The results were examined for the different age ranges and had similar rankings with the main exception of the 50+ group that gave a lower weighting to 'Time Saving' (ranking it in third place). Further, the age group of 22 to 29 ranked 'Any Place' above 'Control' which may reflect the reduced needs of students to regularly handle their finances.

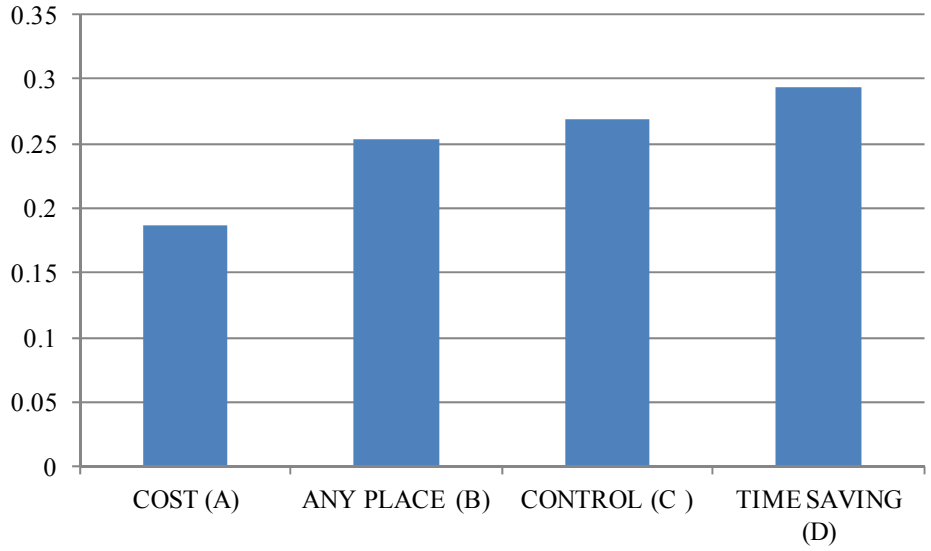

Figure 4. Results of relative weightings for whole data sample

A closer examination was made of the results where consumers had indicated that the 'Cost' factor was of highest importance. This showed that for this group of consumers more than

half of them (59%) weighted 'Cost' as over 0.5 which indicates that for these people it's a very significant factor. This is supported by the finding of Luarn and Lin (2005) in their survey who reported that "financial cost is also a significant barrier for users of mobile banking."

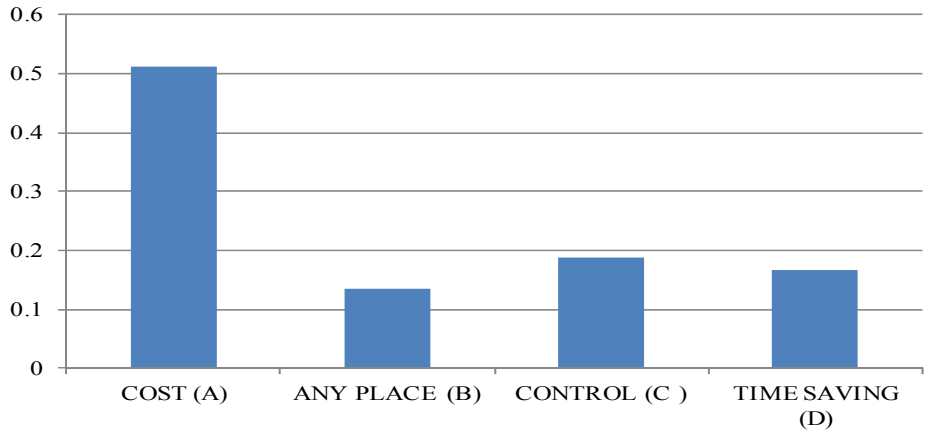

Figure 5. Results of relative weightings for cost conscious consumers

Key card results

Trust is a recognised concern for consumers who are considering mobile banking with the literature identifying that "both personal and institutional attributes are influential in determining clients' initial trust in an innovative service" (Kim et al, 2009). A paper by Gu et al (2009) argues that "to increase trust, mobile banks need to make users free from fearfulness when they transact with banks through mobile banking. In addition, to reduce fraud, uncertainties and potential risks and to facilitate transaction in mobile banking, mobile banks need to develop structural assurances". Hence, in this study we asked consumers about the use of 'Key cards' which are a highly visible approach by banks to reassure consumers that their mobile banking service is a secure one. The results are shown in Figures 6 and 7 which indicate that nearly half of the respondents are familiar with 'Key Cards' and the majority view m-banking as a safer service with the use of 'Key Cards'.

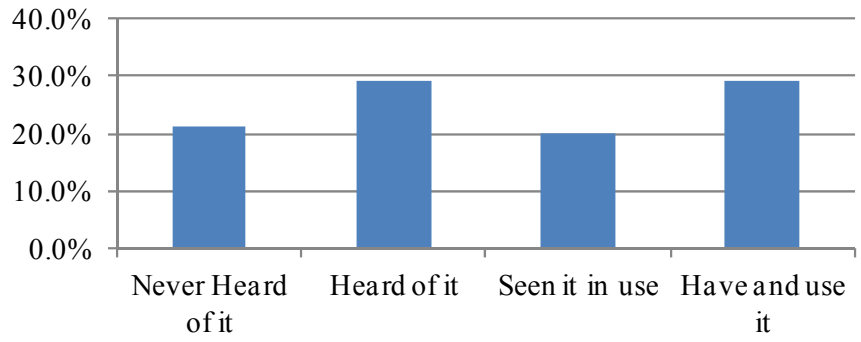

Figure 6. Results of familiarity of m-banking service usage of 'Key Cards'

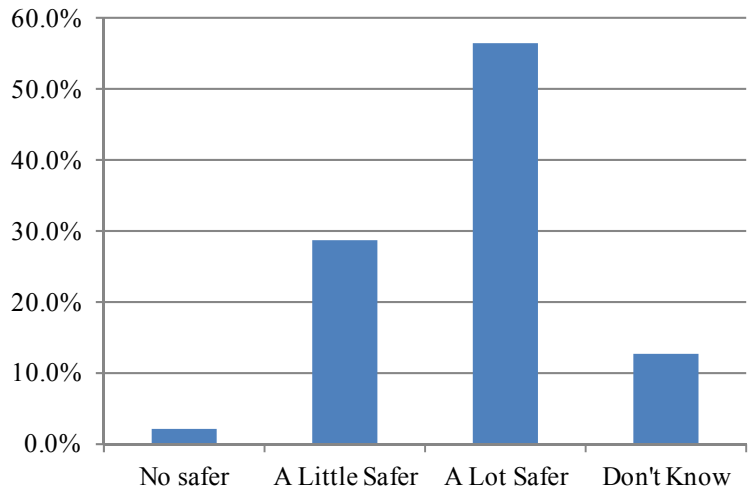

Figure 7. Results of views of improved m-banking service safety with 'Key Cards'

Managerial implications

Our findings can provide guidance to both product managers and operations managers within the banking community, noting that some aspects will be useful to more than one category of management. The implications for operations managers will include delivery aspects of the product portfolio topics discussed, together with a number of other items. These will include understanding mobile-specific technical issues and constraints, such as mobile-optimised pages and user interface. In addition the variable quality of mobile data transmission, including dropped calls, needs to be taken into account when designing the support systems. It is clearly important that the operational aspects of mobile banking products and services are thoroughly thought through (Pawar et al, 2009), otherwise the services will become hard to use or unreliable with consequent negative impact on customer value perception.

Many product managers will wish to know which features of their product portfolio are perceived as valuable by their target customers, and what are the relative values of the top two or three items. Our results show that 'Time saving' is perceived by customers as the most important benefit, where the time saving is achieved by elimination of visits to the bank branch. This suggests that product managers should review their product portfolio to identify all items which could be offered to a mobile banking customer and where 'Time saving' would be a key component of the offer. The review needs to be undertaken in partnership with Subject Matter Experts from their operations departments and from their mobile network partners in order to ensure that opportunities are recognised and that technical and operational constraints are recognised at the earliest opportunity.

As an illustration, the combination of Location information (from the mobile network) and knowledge of the customer profile might facilitate or expedite services which require a branch visit. For example, if a customer enquires about foreign currency exchange [ForEx]

then the service might use location information to determine whether the customer is close enough to a branch to offer immediate pick-up of the currency ordered. Organisationally this requires integration with the bank's systems to verify currency holdings at nearby branches and to transmit the order to the branch, and there will be operations implications associated with the service offer. The customer value delivered by such a service translates to a parallel set of values to the bank (not necessarily identical). Offering a location-based ForEx service translates to time saving for the branch - because the currency is pre-ordered and can thus be made up by back-office staff - and to customer retention for the bank as a whole. Similarly product offerings that address the 'Control' value perception can be created, providing that all potential operational issues are considered during the formulation of the offer.

The 'Any Place' value is inherently delivered by use of a mobile platform, provided that the underlying application and systems support can deliver the service across a sufficiently wide range of handset capabilities. Note that the successful M-PESA mobile banking system deployed by Safaricom in Kenya is delivered to entry-level handsets and does not require a smartphone. [http://www.safaricom.co.ke/index.php?id=323].

The 'Cost' value is in some ways more complex. The evidence suggests that cost had a low impact on adoption for the majority of customers, but this must be contrasted with the view of the minority that cost was a priority concern. This suggests the existence of a threshold effect, which in turn suggests that introduction of fees and charges for mobile-enabled services, is likely to be counter-productive unless the charges are very small.

LIMITATIONS AND FUTURE RESEARCH

This research has several limitations that need to be considered when interpreting the results. For this study we chose students with a technical background as participants along with their network of contacts which may limit the generalisability of our findings. However, it could be argued that these student's opinions are appropriate to the younger generation who are increasingly comfortable with computer based applications and e-technologies. Future research may examine whether the reported measurable (with 'Time Saving' as the highest ranked item followed by 'Control' then 'Any Place' and lastly 'Cost') as well as 'Key Cards' are significant factors for consumers when making service selection decisions concerning m-business and m-banking in particular.

Future studies may research the implications for companies in terms of the best way to promote these services (Talke and Snelders, 2013), given the results obtained from this study which gave insights into consumer decision making. Further, customer views and acceptance of m-services such as m-banking will depend on cultural and geographic customs (Cheng et al, 2006). Hence, a more detailed examination of differences from consumers across different countries may be beneficial given that the availability of m-services may be limited in Developing Countries.

CONCLUSIONS

The AHP analysis of the first order selection criteria for the full data sample identified 'Time Saving' as the highest ranked item followed by 'Control' then 'Any Place' and lastly 'Cost'. The factor of 'Time Saving' being ranked highest reflects the convenience of mobile banking as (in a similar manner to internet banking) it's faster for consumers than going to a bank branch in person saving in travel time and cost. The factor of 'Control' is also valued by consumers being ranked second as it makes it easy for them to manage their finances as they are able to find the status of their bank account and arrange for payments and transfers at a time of their convenience (and are not limited to getting to a home based PC or a bank branch).

The results from the AHP analysis in this study suggest that adoption behaviour of consumers is similar across the different age ranges with the exception of the 50+ group that gave a lower weighting to 'Time Saving' (ranking it in third place). 'Cost' has a low impact on adoption behaviour of the majority of the consumers surveyed, however for cost conscious consumers the weighting was above 0.5 for over half of this group indicating that for this group it is of primary concern.

The survey also reports on user usage patterns for internet and mobile services as well as exploring their experiences with mobile banking services. The overriding comment regarding their experiences is that consumers value the convenience of mobile banking as they can access their bank account balance in real time and make transactions anywhere and at anytime. Further, the use of 'Key Cards' is examined to see whether consumers view this as an enhancement of the secure mobile payments. The majority of respondents did perceive an improvement in m-banking security.

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Critical Routines for Higher Innovation Prosperity: A Dynamic Capabilities Perspective

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Keywords: Dynamic Capabilities, Absorptive Capacity, Innovation Performance

At the heart of the knowledge economy, innovation is critical for firms' long-term survival. Successful innovation is hatched from different stages and processes, with the right configuration of resources. With routines that enhance their assessment of opportunities and resources configuration, firms may better align their products/services with market demands. The data of 203 Saudi firms suggest that absorptive capacity benefits from market intelligence generation, higher breadth of knowledge sources and higher internationalisation orientation. Both explorative and exploitative innovation strategies, moreover, are important to increasing the overall innovative prosperity of firms.

INTRODUCTION

Innovation is a vital source for firms' competitive advantage (Dess & Picken, 2000; Tushman & O'Reilly, 1996). Hence, the firm with higher innovation prosperity compared with its rival has a crucial advantage (Barnett & Hansen 1996) that enables it to compete in local and global markets (Hitt et al., 2001). Baregheh et al. (2009, p. 1334) attempted to integrate various definitions of innovation in their description of it as "*the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace"*. Innovation is linked, to a significant extent, with change and exploration (March, 1991). It demands acquisition of new knowledge and the ability of knowledge integration and multiplication (Eisenhardt & Martin, 2000). Besides the resource capability of idea generation and execution and the different stages of the innovation funnel, it is perhaps important to

understand how firms may implement routines that keep new knowledge flowing into their innovation funnel and progressing into final products and services.

The resource-based view emphasizes resources and capabilities heterogeneously (Barnett et al., 1994; Mahoney & Pandian, 1992) and stresses that the competitive advantage of firms is linked to their valuable, rare, inimitable, and non-substitutable (VRIN) resources (Barney, 1991). In contrast, the dynamic capabilities view pays attention to the routines that use VRIN resources and implant an evolutionary nature into originations resources to be adaptive to market dynamism (Eisenhardt & Martin, 2000; Teece, 2007). Operational capabilities are critical for day-to-day activities (Wang & Ahmed, 2007); in *"how we earn a living now"* (Winter, 2003, p. 992), dynamic capabilities are linked with changes such as new product development, new process, or new markets (Winter, 2003).

Teece (2007) has proposed a model for dynamics capabilities that comprises three components: sensing, seizing and reconfiguring capabilities. 'Sensing opportunities' are related to searching and scanning for emerging opportunities and technologies. 'Seizing opportunity' focuses more on addressing opportunity associated with the retention and development of technological competence and complementary assets (Teece, 2007).

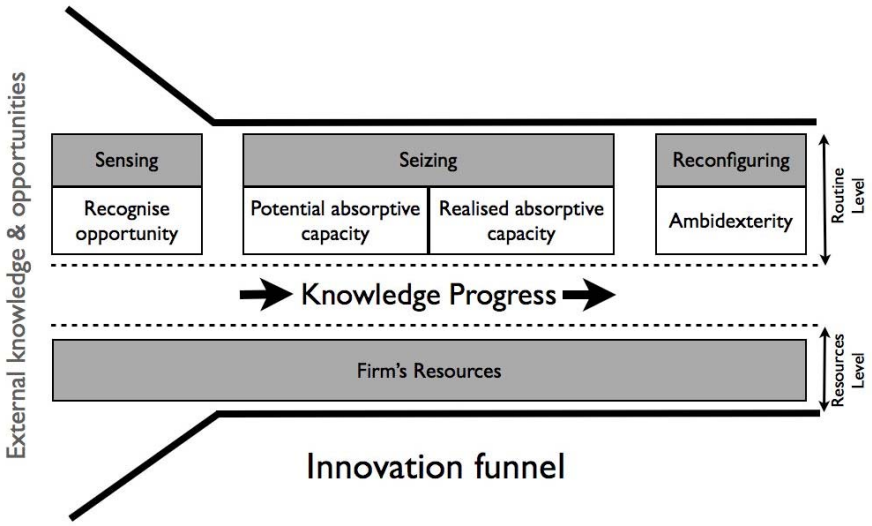

Figure 1: Different levels of theoretical analysis of the innovation funnel.

Reconfiguring capability is the continuous renewal, modification, and manipulation of resources, and the capabilities to achieve a sustainable competitive advantage in changing markets. Using state-of-the-art dynamic capabilities theories, this work highlights the practices of firms that increase their ability to acquire and multiply knowledge and technology according to the markets' status, which may lead to more successful innovative products/processes. The main goal of this paper is discuss the results of an innovation survey based in Saudi Arabia that aims to study the influence of the innovation dynamic capabilities routines on firms' innovation performance.

THEORETICAL FRAMEWORK

According to Teece (2007), 'sensing' is a dynamic capability that comprises activities such as scan, search, and exploration. Information about technologies, markets, current customers' demands, suppliers, and the structural evolution of industries is critical to a firm's short- and long-term survival (Teece, 2007). This capability of accessing knowledge (e.g. access to internal and external R&D activities, as well as knowledge of current customers' needs) is imperative for unlocking a wider range of commercialisation opportunities (Teece, 2007). The concept of open innovation embraces this capability by embedding linkages with external sources in the innovation strategy in order to benefit from the current high velocity of the market (Chesbrough, 2003, p. 24).

Many scholars have studied the influence of external knowledge sources, such as customers (Faems et al., 2005), competitors (Dussauge et al., 2000), research centres (Link et al., 2006), consultants (Tether & Tajar, 2008), and suppliers (Nieto & Santamaría, 2007). Increasing and maintaining the breadth of external knowledge privileges in inter-organisational relationships is a critical capability (Lichtenthaler & Lichtenthaler, 2009) for capturing an emerging opportunity (Grant & Baden-Fuller, 2004). Todorova and Durisin (2007) stress that exposure to knowledge sources is a crucial antecedent of new knowledge absorption.

H1A: The firm's breadth of knowledge sources enhances its potential absorptive capacity.

Nevertheless, in a knowledge-based economy, it is difficult to neglect the effect of the global supply chain and the global research network (Komninos, 2008, p. 17). This internationalisation of firms' activities signifies the importance of the global inter-organisational interaction. Scholars have shown that internationalisation (e.g. outward market seeking or inward foreign resource acquisition) is an imperative strategy even for small- and medium-scale enterprise SMEs, enabling them to sense and seize the massive global opportunities available (Knight & Cavusgil, 1996; Madsen & Servais, 1997). Internationalisation can be defined as *"a dynamic process through which internationally oriented firms are engaged in a diverse range of cross-border network relations and exchanges"* (Zhou, Wu, & Luo, 2007, p. 674).

H1B: The firm's internationalisation enhances its potential absorptive capacity.

Awareness, in the context of innovation, is a firm's recognition of new technological developments and the emergence of market trends that commonly result in new initiatives being undertaken by competitors and other organisations (Chen et al., 2007). Essentially, the firm needs to familiarise itself with appropriate and suitable technological forces and trends; the resulting familiarity helps establish whether there are any valuable opportunities available (Gnyawali & Srivastava, 2013; De Coster & Albesher, 2012). The generation of ideas may depend on environmental scanning, opportunity identification, and idea-seeding (Aloini &

Martini, 2013). When discontinuous occurs, firms must be able, by improving their search process, to recognise emerging signs at early stages (Day & Schoemaker, 2006).

Market intelligence generation is an essential part of a firm's market orientation. Information such as customers' preferences and demands, competitors' actions and activities, and market conditions are core business intelligence dimensions, linked to superior performance (Hult & Ketchen, 2001; Jaworski & Kohli, 1993). Market intelligence generation, however, requires strong coordination with other capabilities to exert an effective influence on radical and incremental innovation prosperity (Baker & Sinkula, 2005).

H1C: The firm's market intelligence generation enhances its potential absorptive capacity.

When an opportunity is identified, it must be 'seized' in a new product, process, or service (Teece, 2007). Wang and Ahmed (2007) recognise absorptive capacity (ACAP) as a key dimension of their dynamic capability framework. Cohen and Levinthal (1990, p. 128) define absorptive capacity as the *"firm's ability to recognize the value of new information, assimilate it, and apply it to commercial ends"*. Carrion et al. (2010) highlight how absorptive capacity is imperative for a firm's innovativeness. Knowledge acquisition and assimilation on the one hand represent the firm's potential absorptive capacity, and knowledge transformation and exploitation on the other hand represent the firm's realised absorptive capacity (Zahra and George, 2002).

Todorova and Durisin (2007, p. 776) have suggested that value recognition takes place as a predecessor of the classical dimensions of absorptive capacity (viz. potential and reliased). The ability of balancing explorative and exploitative innovation is called ambidexterity (O'Reilly III & Tushman, 2008). Realised absorptive capacity may help extend existing knowledge and skills and improve efficiency (Jansen, et al., 2005; Zahra & George, 2002). Hence, realised absorptive capacity may influence the firm's ability of innovation exploitation by improving existing processes (Zahra & George, 2002) and minimizing related costs (Jansen, et al., 2005; Zahra & George, 2002). Mutually, exploratory innovations rely on understanding, integration, and multiplication of existing and newly acquired knowledge (Datta, 2012). Realised absorptive capacity may target development and application of newly gained knowledge as part of exploratory innovations (Jansen, et al., 2005) in a novel way (Henderson & Clark, 1990; Kogut & Zander, 1992).

H2: The firm's potential absorptive capacity enhances its realised absorptive capacity.

H3: The firm's realised absorptive capacity enhances its ambidextrous capacity.

H4A: The firm's realised absorptive capacity enhances its innovation radicalness.

As Teece (2007) explained, 'reconfiguring' is the continuous renewal, modification, and manipulation of resources and capabilities to achieve a sustainable competitive advantage in a changing market. Underneath the dynamic capabilities model is a paradoxical set of capabilities, according to O'Reilly III and Tushman (2008). They explain that exploration and

exploitation are two distinctive activities that require distinctive routines, process, and skills. Mastering these two paradoxical capabilities is labelled 'ambidexterity', and it is probably the key dynamic capability that separates firms that survive as environments rapidly change from those that fail (Lubatkin et al., 2006; O'Reilly & Tushman, 2004). Incremental (exploitative) innovation enables firms to compete in mature markets (Christensen, 1992), and radical (explorative) innovation helps them compete in emerging markets (Burgelman, et al., 2006). Many scholars have found a positive link between ambidexterity and organisational continuous innovations (Hamel & Getz, 2004; Volberda & Lewin, 2003).

H4B: The firm's Ambidextrous Capacity enhances its innovation radicalness.

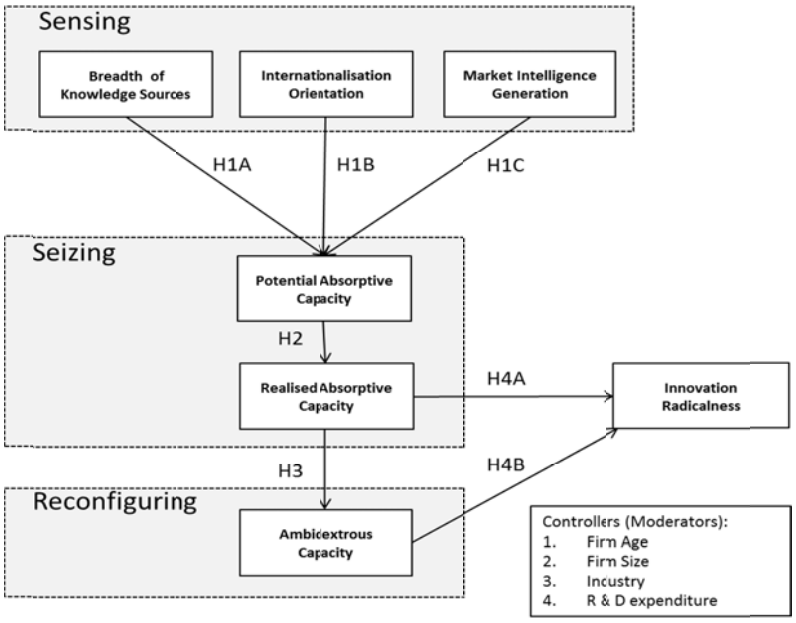

Figure 2: Conceptual Model with related hypothesis

METHOD

To test the hypothesis empirically, the researcher adopted a quantitative-method approach using the data from the Riyadh Chamber of Commerce and Industry in Saudi Arabia. Riyadh, the capital of Saudi Arabia, is one of the top cities in business activity in Saudi Arabia. The data provided by the Riyadh Chamber of Commerce and Industry covers all the active firms in Riyadh, with a total of 4,500 active firms.

A survey was sent to all 4,500 firms through the Riyadh Chamber of Commerce and Industry in September 2012. The age of the firms' surveyed ranges from 1-3 years, 3-5 years, 5-10 years and more than 10 years. The sample covers 21 different industries including traditional and high-tech industries. A week after the initial email, another reminder was sent; a third reminder was sent the week after. The final sample size, after eliminating non-usable responses, is 203 responses. Therefore, the response rate for this research is 4.53%, consistent with the adequate size suggested by Bartlett, Kotrlik, and Higgins (2001). Their work

provides a table for the size of a population and the corresponding adequate sample size for organisational research: a sample size between 198 and 209, they say, is adequate for a population between 4,000 and 6,000. These upper and lower bounds are set for a significant level of $P = .01$ and a marginal error of .03. Therefore, the sample size for this research (N = 203, from a population of 4,500 population) is very close to the sample size required for a population of 6,000 organisations.

MEASURES OF INNOVATION DYNAMIC CAPABILITIES

Each construct is measured with Likert scales from 1 to 7. Each measurement set represents routines that reflect the innovation dynamic capabilities discussed earlier. The innovation radicalness measure is derived from the work of Luarsen and Salter (2006). They used three proxies: the fraction of firms sales related to products new-to-the world, new-to-the-firm, and the improvement of existing products. This method captures the novelty of innovation as well as its ability to generate economic advantages (sales). In our research, we have adopted Luarsen and Salter's (2006) method and added new-to-country as an extra dimension to fit with the nature of developing countries. From these measures a dummy variable is derived as an ordinal variable (RAD) ranging from 0 to 4. Zero indicates that the firm did not generate any sales from any kind of innovation; 1 generates sales from improved products/service; 2 generates sales from product/services new to the firm; 3 generates sales from product/services new to the country; 4 generates sales product/services new to the world.

The other dummy variable is BREADTH, which captures the number of knowledge sources the firm uses heavily for innovation activities. The respondent is asked to rate on a how much these knowledge sources are used: customers, suppliers, competitors, consultants, and research institutes. The use level ranges from '1', at which the source is not used, to '7', at which the sources are highly used. If the respondent scores '5' or higher, a binary value of '1' is assigned for this source, indicating high usage. If the respondent scores '4' or below, a binary value of '0' is assigned to this source, indicating low usage. A similar approach was used by Leiponen and Helfat (2010), and earlier by Luarsen and Salter (2006). The last dummy variable is AMB, which reflects ambidexterity capacity. It is calculated by simple addition of the two variable explorative innovations EXR and EXP. The work of Jansen et al. (2009) shows that ambidexterity is best calculated by adding up the scores of explorative and exploitative innovation.

FINDINGS

To test the reliability of the scale items the Cronbach's Alpha procedure by Churchill (1979) is adopted (Wang, et al., 2013). The acceptable cut-off point, according to Nunnally (1978), is 0.7. The result of the reliability analysis is presented in table 1. Mutually, the table shows the loading of each item on the related construct as a result of the expletory factor analysis (EFA). The extraction method used for the EFA analysis was based on principle component

analysis with varimax rotation. All items loaded successfully (loading > 0.45) (Cua et al., 2001) on the related constructs with a maximum cross loading of 0.34.

Table 1: Cronbach's alpha and EFA loading (N=203).

Construct (α)	Routines (item code : EFA loading)
Internationalisation Orientation (0.78)	We utilize advanced and new knowledge from foreign countries (INT1:0.86); We develop alliances with foreign partners (INT2: 0.75); We utilize advanced management skills from foreign countries (INT: 0.68). (Zhou et al., 2007)
Market Intelligence Generation (0.79)	We do a lot of in-house market research (INTEL1: 0.84); The fundamental shifts in our industry (e.g., competition, technology, regulation) are periodically analyzed (INTEL2: 0.79); We frequently review changes in our customers' product/service preferences (INTEL3: 0.67); We periodically review the likely effect of changes in our business environment on customers (INTEL4: 0.6) (Kohli et al., 1993; Jimenez-Jimenez et al., 2008).
Potential Absorptive capacity (0.86)	The search for relevant information concerning our industry is everyday business in our organisation (PACAP1: 0.76); We have effective routines in identifying and acquiring information from sources within our industry (PACAP2: 0.71); We are able to deal with information beyond our industry (PACAP3: 0.70); We have effective routines to interchange new developments, problems, and achievements (PACAP4: 0.65); In our organisation, ideas and concepts are communicated cross-departmentally (PACAP5: 0.6); In our organisation, there is a quick information flow, e.g., if a business unit obtains important information, it communicates this information promptly to all other business units or departments (PACAP6: 0.57) (Flatten et al., 2011).
Realised Absorptive capacity (0.91)	We can successfully integrate our existing knowledge with new information and knowledge acquired (RACAP1: 0.84); Our employees have the ability to structure and use collected knowledge (RACAP2: 0.82); Our employees successfully link existing knowledge with new insights (RACAP3: 0.8); We are effective in exploiting internal and external information and knowledge into processes, products, or services (RACAP4: 0.80); Our organisation has the ability to work more effective by adopting new knowledge and information (RACAP5: 0.77); Our organisation supports the development of prototyping and testing new processes or services (RACAP6: 0.67) (Flatten et al., 2011).
Explorative Innovation (0.84)	Objectives for undertaking innovation projects in the last 3 years were to: Introduce new generation of products/services (EXR1: 0.79); Extend product/services range (EXR2: 0.78); Open up new markets (EXR3: 0.78); Enter new technology fields (EXR4: 0.65) (He & Wong, 2004).
Exploitative Innovation (0.86)	Objectives for undertaking innovation projects in the last 3 years were to: Improve existing product/service quality (EXP1: 0.80); Improve production/process flexibility (EXP2: 0.79); Reduce production/process cost (EXP3: 0.77); Improve yield or reduce material consumption (EXP4: 0.74) (He & Wong, 2004).

In order to test the hypotheses stated earlier, the analysis began by examining the correlation matrix as shown in table 2. No sign of multicollinearity between variables has been observed. Moving forward, the hierarchical regression analysis is applied. The firm's size, age, industry and research and development expenditure (R&D) as a fractions of sales have been controlled. Four models have been tested, as shown in table 3. In first model, breadth of knowledge sources, internationalisation and market intelligence generation are the independent variables, and potential absorptive capacity is the dependent variable. The model is significant with adjusted R^2 of 32.1%. This indicate that firms may better recognise

valuable external knowledge by increasing the number of stronger ties with external sources, generating market knowledge, and internationalising the search process for knowledge and skills. In consequence, firms keep feeding their innovation funnel knowledge and opportunities by increasing their potential absorptive capacity.

In the second model, potential absorptive capacity is the independent variable, and realised absorptive capacity is the dependent variable. The adjusted R^2 of 40.8% indicates that knowledge acquisition and assimilation throughout the firm increase the firm's ability to transform and exploit knowledge through knowledge integration, multiplication, and experimentation.

In the third model, the independent variable is realised absorptive capacity, and the dependent variable is ambidexterity. The model is significant with adjusted R^2 of 19.6%, indicating that continuous knowledge transformation and exploitation is important for being able to pursue both introducing both explorative (radical) and exploitative (incremental) innovation. What is more, realised absorptive capacity helps maximise the benefit of the knowledge acquired by embedding it to improve existing products/service and their production or by spinning off completely new products that may open new markets.

In the fourth and last model, ambidexterity and realised absorptive capacity are independent variables, and innovation radicalness is the dependent variable. The model is significant, with adjusted R2 of 35.7%. It indicates that the radicalness of successful products/services innovation depends on the ability of the firms to transform and exploit knowledge, as well as the ambidextrous innovation strategy. Realised appositive capacity keeps the firms in a continuous effort of knowledge exploitation, embodied in new products/services or utilising it to improve existing ones. Ambidexterity keeps the firms engaged in both modes of innovation, emphasising the economic advantage of the innovation that determines innovation success. Therefore, the hierarchical regression analysis suggests that all hypotheses are accepted, although the influence of market intelligence generation on potential absorptive capacity is less significant than other factors.

Table 2: Pearson Correlation (N=203)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1 AGE	1												
2 SIZE	.19**	1											
3 INDUSTRY	-0.01	.180*	1										
4 R&D	0.03	.36**	.148*	1									
5 BREADTH	0.001	0.031	0.06	0.086	1								
6 INT	0.021	.142*	0.053	.172*	.20**	1							
7 INTEL	0.027	0.021	-0.01	.22**	.35**	.39**	1						
8 PACAP	-0.04	0.053	-0.06	.18**	.36**	.48**	.38**	1					
9 RACAP	-0.02	0.052	0.024	.25**	.19**	.29**	.27**	.63**	1				

10 EXR	0.015	0.124	0.055	.22**	.37**	.36**	.44**	.48**	.36**	1			
11 EXL	0.033	-0.01	-0.08	0.128	.36**	.25**	.35**	.49**	.42**	.49**	1		
12 AMB	0.028	0.07	-0.02	.19**	.42**	.36**	.46**	.56**	.45**	.86**	.86**	1	
13 RAD	.165*	.47**	0.068	.38**	.162*	.25**	.23**	.29**	.33**	.35**	.19**	.32**	1

Note: **P is significant at the 0.01 level; *P is significant at the 0.05 level.

Table 3: Results of the hierarchical regression analysis (N=203)

Hierarchical Regression Analysis		Dependent Variable							
		PACAP (Model 1)		RACAP (Model 2)		AMB (Model 3)		RAD (Model 4)	
		$\beta^{Standardised}$	*t*-value	$\beta^{Standardised}$	*t*-value	$\beta^{Standardised}$	*t*-value	$\beta^{Standardised}$	*t*-value
Controllers	AGE	-0.049	-0.833	0.012	0.225	0.029	0.451	0.086	1.486
	SIZE	-0.018	-0.281	-0.044	-0.741	0.011	0.162	0.378***	6.054
	INDUSTRY	-0.107*	-1.797	0.05	0.904	-0.04	-0.624	-0.026	-0.454
	R & D	0.099	1.532	0.143**	2.399	0.092	1.311	0.165***	2.61
Independent variable	BREADTH	0.239***	3.831						
	INT	0.374***	5.828						
	INTEL	0.132*	1.936						
	PACAP			0.613***	11.055				
	RACAP					0.431***	6.609	0.205**	3.177
	AMB							0.164**	2.568
Model summary	Model Sig	0.000		0.000				0	
	R^2	0.345		0.423		0.216		0.376	
	Adjusted R^2	**0.321**		**0.408**		**0.196**		**0.357**	
	ΔR^2	0.299		0.358		0.17		.092	
	ΔR^2 Sig.	0.000		0.000		0.000		0	
	VIF Maximum	1.37		1.22		1.242		1.306	

Notes: *P is significant at the 0.1 level, **P is significant at the 0.05 level and ***P is significant at the 0.01 level; coefficients have been standardized.

IMPLICATIONS FOR THEORY/PRACTICE

In general, the model contributes to scholars' call for empirical research in dynamic capabilities. Wang and Ahmed (2007) have stressed that empirical research on dynamic capabilities lacks maturation and that additional studies are still considered critical. The results of this research contribute to the gap highlighted by Easterby-Smith, Lyles, and Peteraf (2009) that stresses that previous studies focused only on dynamic industries and further research is needed to include traditional industries and other countries with different conditions. The results suggest that dynamic capabilities are still important in traditional industries and clearly it is critical for a country like Saudi Arabia.

Furthermore, the fewer Saudi firms who indicate higher usage of the routines surveyed have stimulated external knowledge flow into their firms. The analysis shows that firms may better

recognise valuable external knowledge by increasing their breadth of knowledge resources. The larger the number of strong ties with knowledge sources the higher the firm's awareness of the current state of knowledge, technology and market demands, which stimulates firms to acquire valuable external knowledge. This points contributes directly to the gap highlighted by Volberda, Foss, and Lyles (2010), who suggest a study that explains the effect of firms' interaction as a macro-level antecedents for absorptive capacity. Moreover, firms should not limit their exploration for knowledge sources and resources to the local market. Internationalisation of the searching process of knowledge and resources is a critical break from local knowledge proximity, which may not be sufficient for developing breakthrough product/services, especially in less-developed countries. The Saudi firms who have linked up with international alliances and experts have a better chance at acquiring knowledge that surpasses the local state knowledge.

Volberda et al. (2010) stress further on the need to link realised absorptive capacity with outcomes such as innovation and a firm's performance. In this regard, this research model shows that realised absorptive capacity positively influence firms' innovation radicalness directly and indirectly through ambidextrous capacity. As the valuable external knowledge is recognised, the firm's absorptive capacity routines help to seize this potential knowledge by sharing it internally, by multiplying it with existing knowledge and by exploiting it into innovative products/services. However, the transformation of knowledge into a final product/service requires a proper innovation strategy, the model suggest that ambidextrous strategy is helping firm's fit the absorbed knowledge in successfully commercialised products/services. This confirms Datta's (2012) proposition that ambidexterity helps firms commercialise innovation.

CONCLUSION

The dynamic capabilities theory is a useful tool for understanding how firms may renew their knowledge base and utilise resources to introduce successful innovation products/services. The empirical results indicate that firms may better scan and recognise external valuable knowledge and opportunities by cultivating stronger ties with external sources, generating market information and internationalising their searching activities. These routines facilitate absorptive capacity, and firms may better maximise their innovation success by balancing better explorative and exploitative innovation. It is interesting, however, to see how these routines may be effectively applied and managed at the individual level, which may be recommended for future studies.

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Defining Marketing and Design management interaction: Cold war cohabitation fundamentals

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Keywords: Design management, Marketing, collaboration, conflict, new product development, tension.

In design and marketing interaction, literature expresses most of the time type of malaise without defining it. Through a qualitative methodology issued from narrative text performed by marketers and in-house designers, this research shows that marketing and design interaction is structured deeply by a strong and rooted tension and eliminating this tension remains an illusion as the tension is the norm rather than being the exception. Therefore, we conceptualize a definitional model: the cohabitation tension integrated positively as a structuring principle behind marketing and design interaction.

INTRODUCTION

From the past till the present, design management is gaining respectability in terms of organization performance. In this context, understanding design interaction with other business fields is essential, however a particular interaction related to marketing specifically, appear to be in a certain manner ambiguous and presents signs of malaise.

Even if a strong literature dealing with design field shows how design converges with marketing concepts (Hetzel 1993; Mozota 2003; Bruce & Daly 2007; Cooper & Press 1995) Close observation highlights the fact that literature argues the most for the time in one way for better collaboration and it seems in a certain way uncomfortable in dealing with this issue.

In this context, the research literature qualifies the interaction as “uneasy one” (Beverland 2005) asks if design & marketing are “Rivals or Partners?” (Holm & Johansson 2005), suggests in the same context that design & marketing interaction must be “convenience

marriage" rather than «love marriage » (Kneebone 2002) and represents the two fields as "brothers enemies" (Roehrich & al. 2006)

What it is observable here under a type of metaphorical thinking lies in the fact that design and marketing interaction presents malaise signs constructed under rivalry, tension, and conflicts. The main problematic then lies in a specific inquiries: this malaise suggested by the literature above is it something superficial that we can exceed by only setting models arguing for better collaboration? How marketers and designers interact when they are dedicated both to one identity company and are out of design studio in consultancy mode?

Methodology

To investigate the issue, qualitative approach was made focused on a sample of French ten companies that recognize design as a strategic function by implementing in house design as a human resource as it occurs for the marketing function. The principle of heterogeneity was respected by various sectors in SMEs and large groups. Interviews with both designers and marketers were conducted upon narrative and storytelling methodology investigation. (Barthes 1966) Related to this idea, to avoid bias, we choose to exclude outsourced design from our sample as this kind of interaction works under consultancy mode, which makes the interaction not fair especially when one marketer hires a designer.

Findings

For understanding the main question highlighted here, a focus on design and marketing institutional definition brought by I.C.S.I.D.(International council of societies of industrial design) and A.M.A. (American Marketing association) bring an interesting starting view:

« Marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large » A.M.A.

« Design is a creative activity whose aim is to establish the multi-faceted qualities of objects, processes, services and their systems in whole life cycles. Therefore, design is the central factor of innovative humanisation of technologies and the crucial factor of cultural and economic exchange. » I.C.S.I.D.

What is surprising at first glance in both definitions is the creative dimension claimed by both institutions. Thus, when marketing evokes creativity as source of the economic exchange offer, design evokes its activity as a creative. In a second point, when marketing is delimited by the processes and institutions that implements to create, communicate and deliver what is about the product and services offer, the design is determined in his relation to the process it uses under product and services lifecycle.

On a third point, reference to society is significant, when marketing evokes the benefit it brings to society at large, design evokes its crucial role in the cultural exchange and humanizing technology.

The creative dimension, society as a stakeholder, interest on products, services and processes structures the field of two entities that are design and marketing. It is even extremely difficult to make clear what differentiates marketing from design through the definitions put forward here. If ones try to advance the creative dimension of the design activity, we can quickly notes that marketing does not exclude the idea of creating.

The differentiation between design and marketing is it then behind what would separate the verb “creating” from the adjective “creative”? The question is fully seated but the institutions themselves establish a domain similarity starting then right there a first seed of rivalry.

DESIGN	MARKETING
Creative Activity	Activity
Processes	Processes for creating
Economic exchange	Exchanging offerings
Innovative humanization	Value to society at large
Qualities objects	Offerings value

Figure 1 I.C.S.I.D. and A.M.A. definition

Marketer versus designer: a close look to their job identities:

By spotting analysis on marketer and designer identity, it emanates that working as a designer is the result of a personal quest in constant search for consistency beyond the corporate company to whom designer work for. The designer is viewing himself driven by one life goal: to be designer, operating in this context a fusion between his self-identity and design identity as a job in a specific company.

Narrative progression is defined by the products the designer made instead of the corporate company name: “After my scientific diploma (…) I found a design school, I started to work for a company but for a while (…) I made urban furniture design, telecommunication towers, graphical design for advertising, I made the outdoor games for kids...”

Far from the designer view, working as a marketer shows that the marketer job is narrated on a career development basis, in terms of success and performance and appreciation of the company that the marketer works for: “ I am graduated from Nantes business school in 1994 in marketing major, I started my career in Paris in services in a market research institute: Samo for four years ... Later I hold marketing position in consultancy firm, then I moved to Packard Bell company and now I am for five years now at Elin company holding marketing position since 2004, so today I am in charge for 40% of the company revenue ”

Through the narrative discourse of marketer and designer self-identity, it appears that self-perception toward a designer job and marketer job is deeply different. In other words, the designer generates a unique connection to the artefacts he designed, the designer self-identity then tends to merge with his job identity. In the other hand, the marketer thinks his self-identity on successful career path basis in an idea of achievement and performance.

Therefore, to conceptualize comparatively the idea developed here, Hannah Arendt concept specific to "work" and "labour" distinction appears relevant to spot a distinctive interpretation.

Hannah Arendt (1958) distinguishes in his philosophy focused on the human condition in its relationship to human activity a difference between what can be considered as a "labor" and what can be considered as a "work" However, we do not use the concept in its basic state, but in his nuance to work experience as Benarrosh 2001 developed it.

In this conceptualization, designer work experience in his strong link to artefacts as he designs them, constructs designer activity within Arendt's "work" paradigm. Our observation shows that designer proximity to artefacts, leads to a specific perception embedded in products creation. This idea explains why designer past professional experiences are related through product design, rather than through the company to which the designer has belonged.

On the other hand, marketer past experience, is significant by the logic of performance that dominates marketer narration. The marketer rooted in business issues appear therefore embedded in action. Then, from the perspective offered by Arendt's prism, it fits more in comparative way with "labor" rather than "work" which fits more with the designer.

The marketer as he does not deal with products as the designer do, tend to adopt self-identity oriented to his job as a "labor", when the designer by dealing closely with the products under creativity thinking, tend to adopt self-identity focused on a "work". We define then the job self-identity of designer as a "work" and the marketer one as a "labor".

Market representation according to design and marketing:

In this point, empirical investigation highlights that market perception is not the same for both entities, as market definition is relevant to the "Market-ing" within organizations. Marketing by delimiting precise limits to the market tends then to perceive designer action as a frontal attack intended to crack the foundations of a market he strove to define: "Designer job is about creativity and as in advertising and communication, you must put the designer in a frame, otherwise, he will go everywhere, I believe that one marketer must put the designer inside a frame"

From design a point of view, the market, as marketing defines it, is perceived as a negative issue: "Marketing can be so limited just to stick to a market, if marketing drive, the company will just be concerned by how to fit market according to marketing instead of creating it ! "

The idea expressed by design lies in the need to explore the market boundaries established by Marketing. These boundaries constitute the place from where the designer wants to think his creative act. Designer namely then, appears as relevant to specific need: the broadening of market boundaries to shape the market: "If we respond in simplistic way to what marketing express, all designers will design the same kitchen or the same car (…)"

Market representation on the basis above draw the point from where tension seeds will be implemented.

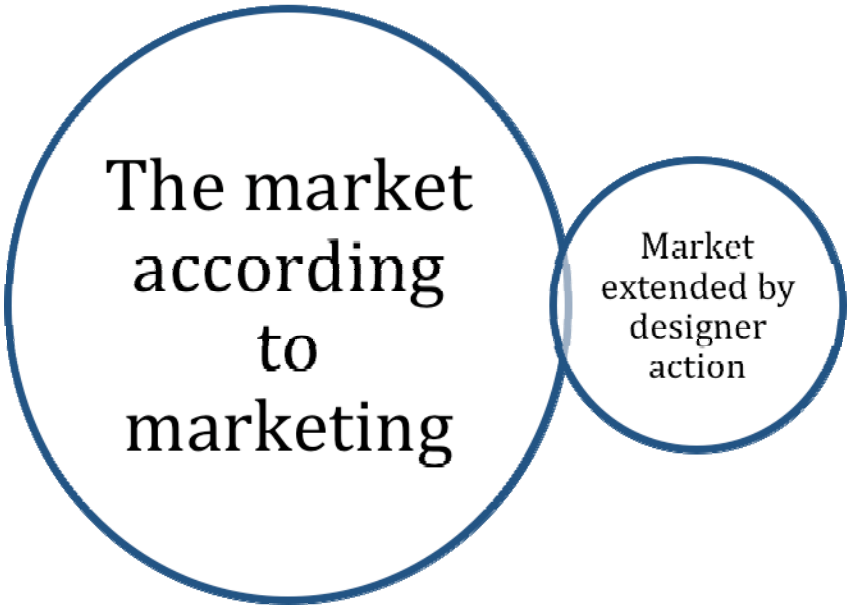

Figure 2 Designer action on the market as defined by marketing

Design and Marketing main paradigms comparative analysis:

To get a bigger picture thence by marketing and design vision on the market, two paradigms on the basis of our empirical investigation have emerged as being the theoretical fundamentals that drives the activities of marketers and designers. In other words, design and marketing interaction, operates on the basis of this theoretical background. It's crucial then to extend the analysis to these main paradigms that is user centred design and market oriented approach.

Market orientation as the main marketing paradigm:

Reviewing market orientation concept, Gotteland, Haon & Gauthier (2007) develops the central ideas shaping the paradigm on the strong foundation that correlation between market orientation and organizational performance is an evidence even marketing literature remains silent on market orientation paradigm implementation. (Kennedy, Goolsby & Arnould 2003). The Market orientation paradigm is then concerned by:

- The integration of the client as a central agent of the market (Gatignon & Xuereb 1997); (Voss & Voss 2000).

- Reactive market orientation based on the needs expressed by the client versus proactive orientation based on the expression of latent needs hidden to clients themselves. (Narver, Slater and MacLachlan 2004)
- Competitor's integration and the ability for one company to obtain technological know-how to use it in the development of new products (Zang & Markman 1998).
- The behavior of one company toward its social responsibility. (Narver & Slater 1990)

User centred design as the main design paradigm:

Popularized by Norman (1988) U.C.D. as philosophy based on the needs and interests of the user, with particular attention paid to the fact that the products are usable and understandable, U.C.D. was introduced in management science by Veryzer & Mozota (2005) as an alternative to other concepts in new product development and innovation. U.C.D. remains then as design main paradigm.

Now by confronting the two paradigms, we can easily identify the fact that what marketer names the "client" or the "consumer", the designer names it "the user". From this point what is theoretical finding for the marketing emanates "naturally" from U.C.D paradigm.

The user is then central agent and the needs expressed by the user in expressive way or in latent way are a starting point for the designer. Concerning the Technology as (Zhang & Markman 1998) advocates for it, research in design according to Krippendorf (2006) evokes the technology in its interaction with the " user centered design" and names it "technological cooperative" signifying by this idea that artefacts enlist in cooperative way technology guiding thereby designer work beyond other traditional practices. More than that, it is very difficult no to consider designer praxis legitimacy, as he needs to capture technology to develop products.

When Zhang and Markman (1998) evokes competitors integration, Krippendorf (2006) develops the idea of stakeholders and bring "Ecological meanings" idea. In this concept, the integration of the competition is theorized as a necessary ecology designer's work. In addition, the designer as part of its praxis cannot ignore the praxis of one designer about an artefact produced for the market.

Finally, the idea of social responsibility in its relationship with the behavior of the company according to Narver & Slater (1990) found echo within ethical considerations that matters to design as Findeli & Bousbaci (2005) evokes design as "poiesis" framed by legal and deontological obligations.

As we can observe it, marketing and design leading paradigms presents signs of similarity that turns to rivalry if we consider the epistemological difference shaping the framing of the "user" according to design and the "client"/ "consumer" according to marketing.

The paradigms applied: an empirical illustration: A minibus with two doors or three doors?

The following story wills highlights how the paradigms above constructs strong tension when marketing and design are in interaction. When market orientation, dictates a specific design

to fit market demand, user centred design paradigm advocates for an opposite design to fit the user need.

“This mini bus was designed with only two doors for the French market and when the company wanted to design it for an European country, marketing insisted absolutely on getting the same minibus with three doors rather than two. We told marketing that it doesn’t absolutely bring any value to get it with three doors, because adding a third door will cut off one meter valuable space at the back and in the middle, it is useless, the flow of people would be not good, there will be a bottleneck and we will lose seats. Marketing responded to us that historically, the country concerned, knows only buses with three doors and never heard about buses at two doors. It was an absurd request! All of us knew that this is absurd, we were then forced to do it, we tried to reformulate the problem, but without success, the marketing prevails as we were in front of people who are not listening, we were not able to talk to them, it did not work because of this specific argument, which says that in that country there is always a three door bus because of cultural factor and may be in design we do not know yet how to explain it somewhere. For me my perception as a designer is to improve the comfort of the user”

On this story basis, the reader can easily observe how the designer background paradigm in his interaction with marketing one, implements a tension between the two entities. When the marketer paradigm remains him to get an ad hoc response to market demand, the designer paradigm guides him to the user supposed to use the bus rather than the consumer, which is in this case government district. In a real situation two paradigms constructs the foundation of a tension between the two entities, resolved in some way by a “victory” of an entity against another.

The idea here is not to determine through a kind of case study who is right and who is wrong, however, even if we imagine that design goes over marketing, tension construction remains intact without minimizing the impact of such tension on future interactions in the context of new product development.

Design and marketing: tension is a norm not the exception

On the basis of this development, it’s conceivable to advance the idea that researching a kind of framework integration to erase this tension, in logic of harmony between the two entities is fundamentally wrong from the basis and even naïve, as the tension is rooted fundamentally on the main paradigms elaborating design and marketing as a discipline. In this idea, it is interesting to note that literature did not identify how deep and dense is the tension between design and marketing.

Within this development, we argue that supporting the idea of building total harmony between design and marketing is possible, but the price would be an identity renunciation to fit the other entity, which is obviously a no sense.

Thus, as the tension between the two entities appears structural, a framework for a better design and marketing interaction lies in the idea of tension cohabitation institutionnalisation. In this indication, rather than denying the existence of the tension and seeking continuously an interaction on the basis that harmony logic is necessary suitable, the two entities finally will take note of pervasive presence tension, in awareness sense.

This awareness could be considered as necessary at academic and managerial level because it becomes the prelude to a new approach, based on a completely new perspective. In contrast to the development of this idea, the lack of awareness concerning the institutionalization of tension generates a fundamental bias when design and marketing interaction are under study.

Once this awareness is established, a framework could be developed for expressing the tension as a normal part of the interaction between both entities in an idea of contribution to organization performance. The inclusion of this cohabitation tension logic, would highlight the fact that this tension is not necessarily negative in itself, but it carries the seeds of a better performance as soon as the awareness is established.

Habitation principle as a concept of dwelling (Wohnen) according to Heidegger (1958) before being "Co-Habitation" is interesting to highlight here. The principle drive the idea that "living" concerns design in the same manner that marketing and both of them needs a territorial space within their organization. This living, once constructed needs to determine its legitimacy to exist with an other living in an indication related to existence recognition of the of the otherness.

As this recognition is established under the sign of otherness, it becomes vain then to look for taking over other entity space living, but to consider the potential that give a cohabitation living advantageous for both parties in first level and to organization in a second one.

This advantage even reduced by its simplest form, such as the expression of a different point of view, is fundamentally generating a different perspective, which seeks to reach a different understanding, rather than destructing the otherness which is particularly risky as the two entities are belonging to the same organization. Expressing then the tension on cohabitation principle guarantees design and marketing living existence as tension and rivalry are the norm in marketing and design interaction rather than the exception.

Academic and managerial implications

However, on the basis of our empirical investigation, it appears that there is specific zones where expression of the tension will occur. Knowing that in conceptual issue, helps in academic and managerial way to identify in precise manner where and when tension is constructed:

1. Market definition: defining the market is sensitive to both entities. It's possible here for both entities to define the market under epistemological and specific background before starting the confrontation on cohabitation tension basis.
2. Branding definition: in this idea, our research investigation shows that tension is very low as both design and marketing develops sensitive understanding of the brand as they belong to the same organization.
3. The design brief as technical, strategic and operational document concentrates sensitive space where tension is erected at his intense level.

Concerning this third point, attention should be paid to the emergence of tension situations that oscillate between tonicity and atony throughout brief design specifications. The objective of the two entities therefore, is being aware that tension may lead to a deadlock, thus the idea

of thinking about setting upstream an arbitration committee seems to be significant. At this point, theoretical and managerial framework could be developed:

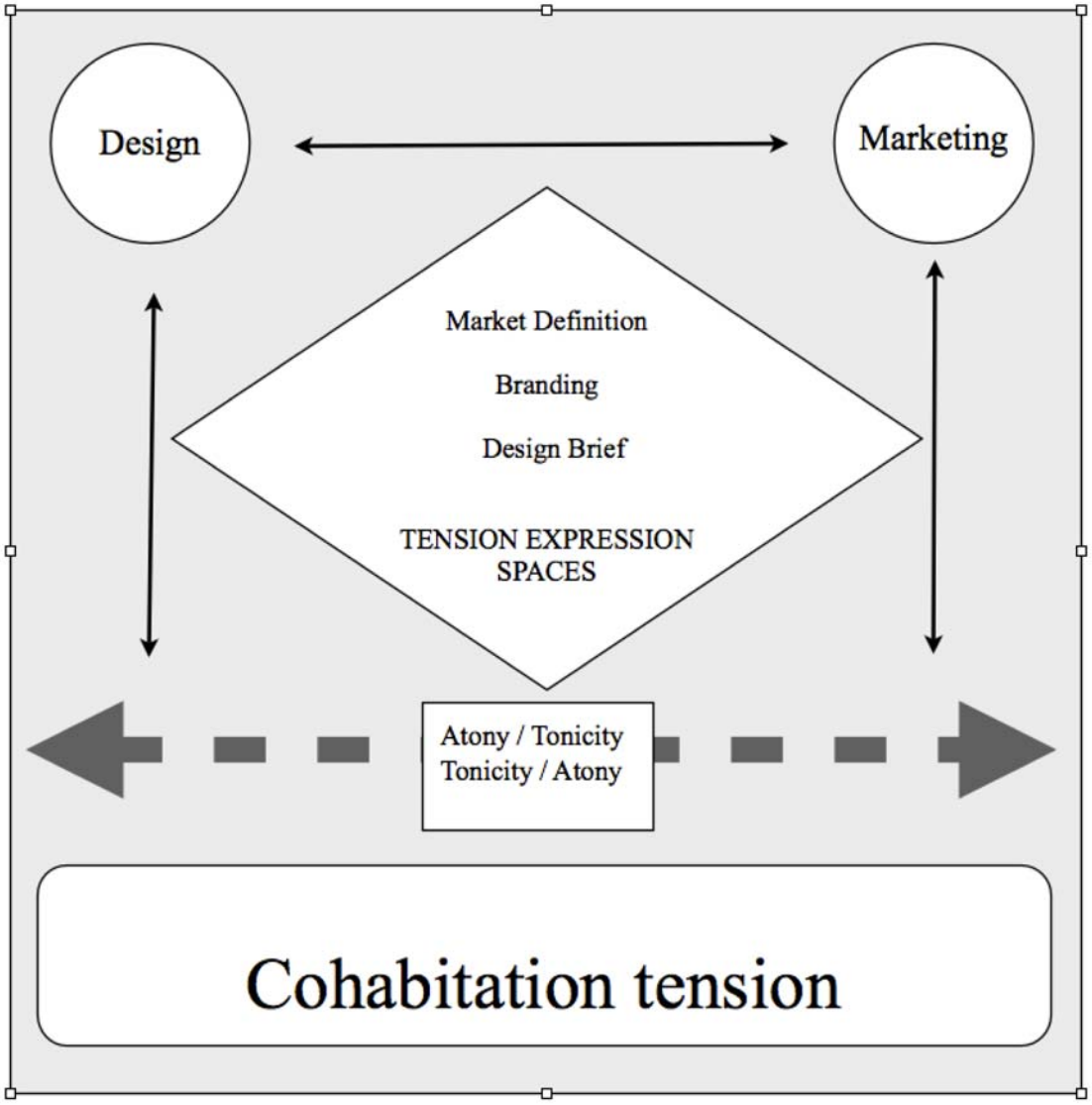

Figure 3 Cohabitation tension framework

Conclusion

Design and marketing plays key role within organizations, however this interaction appears biased when rivalry is not perceived at institutional and paradigms level. The interaction between marketing and design is structurally embedded in a cohabitation tension constantly regenerated. This idea can opens new research perspectives, rooted in the paradigms of the two entities within their respective development. Finally we argue in the interests of organizations and people making them for more interdisciplinary investigation within marketing and design.

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Design In Strategy: The Case of Cultural Organisations

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Keywords: Design Management, Strategy, Cultural Organisations, Museums

This paper builds upon our previous work in the area of strategic design. In an earlier paper on "The Strategic Role of Design in Cultural Products and Services", we undertook a critical review of the literature and developed a classification and analysis of the principal strategic applications of design in cultural sectors such as performing arts, fashion, museums, galleries, and publishing.

In this work, we a) suggest a distinction between design as a vehicle and set of methods that facilitate strategic decision making AND design as an integral part of strategy and its implementation ("design FOR strategy" as opposed to "design IN strategy", respectively); and b) create a core-list of "design IN strategy" applications in cultural organisations and address them through a case study of different museums' practices.

The case study focuses on how cultural projects are managed in relation to strategy and design thinking. It includes interviews with senior managers, a design manager, and the Marketing & Communications Officer of Tyne & Wear Archives & Museums – a UK based organisation of 12 museums, archaeological sites, and galleries.

INTRODUCTION

In our previous paper, "The Strategic Role of Design in Cultural Products and Services" (2011), we undertook a critical review of the literature pertaining to the strategic use of design within the cultural industries. Our main aim was to develop a better understanding of how design can aid the development and implementation of strategy, focusing specifically on products in which design is likely to be an especially important function – cultural products and services.

“Strategy is ‘the set of actions through which an organisation … develops resources and uses them to deliver services or products in a way which its users find valuable, while meeting the financial and other objectives and constraints imposed by key stakeholders’” (Haberberg & Rieple, 2007). Most successful strategies provide an organisation with some quality that is unique, or at least rare, that makes consumers want to buy its goods, as well as the means for renewing its competitive advantage as the environment changes. For example, a corporation that has made a strategic decision to invest in developing the ability to create innovative products, or to develop a strong brand identity, may be better able to survive a hostile economic environment, such as a recession, better than an organisation that has not.

Design can create both a new vision of what the organisation ‘is’ and reinforce and anchor its established essence through the creation of artefacts and symbols which individuals interpret and use to shape what they, in turn, do. It may also provide an important element in the implementation of strategy, through focusing on product or service functionality (encompassing quality and perceived value for money) or the creation of emotional or affective bonds, such as those epitomised by concepts like brand loyalty (Alexis, 2006; Roberts, 2006).

Following a discussion of how design may be used strategically in general, we have previously studied exemplars from a selection of cultural products and services in order to develop a model of the contingent role of design in our chosen cultural sectors: performing arts, fashion, museums, galleries, and publishing. Design is intrinsic to these sectors because it is an inherent aspect of the aesthetic or symbolic qualities of the product. Moreover, design has a number of strategic applications beyond the product itself, mainly because it informs emotional experiences linked to: the creation and physical nature of an ambience; the formation of an identity that people wish to share; the coordination of pre-established events and pathways that lead to particular experiences; the promotion of a “star” artist; and the engagement with brands, among other applications” (Rieple & Pitsaki, 2011).

These are some of the ideas and strategic uses of design that we explored in our initial work. In this paper, we develop an extended list of generic strategic applications of design in the cultural sectors, in an attempt to create a more systematic approach to design and strategy. There currently exists sufficient literature on the subject. However, experts hold various perspectives that often confuse and hinder rigorous developments in the field. Cooper & Evans (2011) tried to add clarity in this ideological panorama (see literature review); we take this a step further by suggesting a distinction between design as a vehicle and set of methods that facilitate strategic decision making AND design as an integral part of strategy and its implementation (“design FOR strategy” as opposed to “design IN strategy”, respectively). Furthermore, we created a core-list of “design IN strategy” applications and tested this approach through a museums case study with a strong practical focus.

METHODOLOGY

Our methodology combined an extensive literature review and analysis with a museums case study.

Literature review

The methodology we used for our research was as follows: in addition to books, we systematically and purposefully searched for papers that contained specific keywords, narrowing our search to academic papers or essays with references. For such search, we used EBSCO's Business Source Complete and Art Full Text databases as principal sources, supplemented by Google Scholar. These sources include all the major business journals as well as the majority of the design-focused journals. A small number of other relevant journals, for example Journal of Design Research and Design & Culture, which do not appear in these indices, were searched separately.

We used sequential Boolean search terms in "all fields" and we identified a number of relevant papers published between 1992 and 2013 (in total 182, which we then narrowed down to 93). Our search terms included various combinations: business strategy, strategic planning, strategic management, competitive advantage, product design, design, cultural industries, museums and culture. In addition to these we looked for papers that contained the term design in combination with the specific cultural sectors that we are interested in (eg. museums and art galleries). Searches like "design strategy and cultural industry" or "museums and competitive advantage" gave no results, hence we had to fall back on our own knowledge of the fields to bridge these distinct bodies of literature.

A distinction between "design FOR strategy" and "design IN strategy"

Cooper and Evans (2011) distinguish between a) "Design as strategy – focusing on it as a dominant paradigm, used to achieve competitive differentiation", b) "Design in strategy – one of many functions", c) "Design strategy – what you do with design", and d) "Design facilitating strategy – provocation, imagination, facilitation, organisational change, resource based". While clearly. design connects to strategy in various ways, we have summed them up into two approaches particularly relevant to cultural sectors:

1. Design FOR strategy (d - above) and 2. Design IN strategy (a, b - above). We purposefully left out "Design strategy", or "how we go about design" (the focus we adopt during the design process), as consider this to be very specific and closely tied to the realm of designers. Because the purpose of our research is to address the needs and perspectives of CEOs, general managers, and cultural stakeholders, we defined the following two approaches:

- (FOR) Design can play different roles in crafting and implementing strategy. It can be used to generate tools to facilitate strategic decision-making; for example, it can facilitate the creation of diagrams of value chains or organisation charts, mapping, or other visual representations of market

research, purchasing patterns, or consumer behaviour (such as charts, graphs and multimedia) or marketing communications (such as brand guidelines, author or book series guidelines or advertising storyboards). Design methods, such as brainstorming, prototyping, graphic representation, or scenarios can be used to facilitate discussion and promote the development of a business model or strategy (Osterwalder & Pingeur, 2010). Furthermore, sharing design methods with non-designers, decision-makes, and leaders fosters creative thinking. "Design offers a different approach and suggests processes that are more widely participative, more dialogue-based, issue-rather than calendar-driven, conflict-using rather than conflict-avoiding, all aimed at invention and learning, rather than control" (Liedtka, 2004). Thus it can be very beneficial in stimulating strategic thinking and allowing strategists to think outside the box, generate new ideas, and address strategic problems in an innovative way.

- (IN) Design helps to maintain a focus at different levels of strategic action (e.g. product or corporation levels) (Pitsaki, 2013). Also, "Design can make a strategic contribution in building an organisational or brand identity and creating and controlling a coherent competitive stance" (Rieple & Pitsaki, 2011). Therefore, design as an integral part of strategy can foster better interaction between the consumers and the corporation, enables the formation of long-term relationships (through customer satisfaction and the confluence of aesthetic tastes) and builds resilience in moments of failure (as people tend to react more positively to companies that they know and trust).

Hereafter, the focus of this paper will be strictly on "design IN strategy", because this is where our case study has led us to believe that progress needs to be made in terms of the way cultural organisations think about design, what it does, and how it can enhance strategic innovation and success.

Case Study

Based on the findings of our previous research and those yielded by extant literature, we drafted questionnaires and conducted interviews with senior managers, a design manager, and the Marketing & Communications Officer of a North-East English museum group (Tyne & Wear Archives & Museums, comprising 12 venues, and 1.5 million visitors per year). The interviews were focused on "design IN strategy" (e.g. branding) and on how projects were managed in terms of strategy and design thinking. Some of the questions included:

- What does 'design' mean to you?
- How is design linked to strategic aspects of your work within the organisation? (e.g. the brand concept, and the missions of the museum)
- How central is the value of design to the brand at both the project and corporate levels?

- How can design serve or influence the vision of the museum?
- What are the visitors' expectations and how can design be used to fulfil them?
- What is your approach to holistically developed experiences and their connection to strategy?

In answer to these and other questions, our participants shared with us the following observations:

Manager A: 'Design adds professionalism and makes everything more appealing. Web design has become crucial to what we do and how we engage people. There is a swift need in the way museums learn about people's interests and what museums stand for. Museum strategy is moving towards more inclusive approaches where the public shapes the exhibitions. Our office's role is to co-design the museums' offers with the community. Therefore, user-centred methods that are regularly applied in design fields can help us discover what local communities need. Museum visitors expect to acquire knowledge and have enjoyable experiences. Design can make these experiences more inspirational for people. A heavier focus on design would mean a greater focus on experiences that are developed more holistically'.

Manager B: 'Designers can explore a question and tell us what we might do differently. Innovation can happen "when the sky is the limit" and designers can help in that by suggesting innovative ways to access objects. Every organisation has a certain strategy and pre-established principles, but instead of telling every story an object could possibly have, we should actually try to tell the story that suits our particular organisational principles (i.e. the principles of the corporate brand). Museums should help people to understand their place in the world, and design is integral to how they access and experience the museum's cultural offerings'.

Design Manager: 'Design makes our strategy visible, and therefore it is crucial that it is managed in a consistent way across the various projects that we take on simultaneously. Consistency also has to do with the budgets allocated to different projects; in these times of austerity and diminishing returns, low budgets can have a significant impact on the quality and scope of design, often forcing designers to be ever more creative, in keeping with the age-old axiom "doing more with less". This attitude has a major impact on strategy implementation and normally results in less efficiency'.

Director of marketing. 'Design is about yielding aesthetically pleasing, easily accessible, and useful outputs for the audience. Design reflects the values of the brand and essentially materialises them for specifically targeted groups. Therefore, it is a strategic tool. It also helps to make the offer interesting, by encouraging people to be part of the brand, lending consistency, enhancing brand recognition, and allowing people to identify with it, and develop positive associations with it'.

The findings from our interviews added new and confirmed several of the pre-established functions of design and its link to strategy. In the following section, based on the insights of

the interviewees and their contrast with prevailing views from the literature, we offer a generic list of these, which we then narrow down to a few applications which seem to be more popular in the cultural sectors.

CONCLUSIONS

Generic applications of design to strategy within the cultural sectors

Design in association with strategy aims to create distinctive products, services, and experiences which deliver value to people. In addition, it serves to make this value difficult to substitute or imitate. In that sense, "design is a strategic resource, that can shape the offer and the organisational or product identity. Furthermore, it provides tacit guidelines that shape employee behaviour and ensure coherence in the organisation's offer" (Rieple & Pitsaki, 2011). These strategic approaches to design apply to most commercial and business sectors, and can be contrasted with applications that are likely to be central to the cultural industries. In light of this reality, the existing literature, and the findings from our case study, we have arrived at the following list of generic design applications linked to strategy:

- **Design enables better connections between individuals, products, and organisations and, therefore, facilitates the formation and implementation of strategy.** "Customer-driven design and marketing involves market-based practices that inform the strategy formation process, especially in the transition from planned to emergent strategy, and the creation and iteration of all customer interactions through the design of products, services, environments, and communications" (Gillespie, 2002). Design maximises consumer satisfaction and fosters long-lasting attachment to the organization (Pitsaki, 2010 a)".

- **Design is a vehicle for strategic innovation**. The role of design is to "bring about change, rather than simply maintaining the status quo" (Cooper & Evans, 2011) (Borja, 2003). Design contributes to innovation (Verganti, 2003). "The designer is an innovator who goes out, watches, inquires, and listens to the world around him, which means the first value of design is the development of ideas that can become concepts. Furthermore, the socio-cultural sources of design ideas are highly original and valued in terms of innovation, and enables cross-fertilization into a flow of ideas" (Roald, 2006).

- **Design is a means of developing identity and, therefore, represents a key strategic tool**. Through aesthetics, function, communication, and the capacity to keep an offer connected to the organisational principles or brand elements, design allows customers to share their values and to see their own identity

reflected through the brand. It therefore leads to stronger bonds and a steady exchange between individuals and organisations. “Design shapes an organisational or product-group identity or brand so that employees and consumers alike understand what the organisation is about (Kuksov, 2004)”. Design is a differentiation factor and delivers value through aesthetics and innovation (Cooper & Evans, 2011).

- **Design is a means of communication that makes the organisation’s values and strategy more visible and more easily communicated to consumers and employees alike.** Design allows for a physical, tangible manifestation of strategy, both externally and internally. Externally, through the creation of products that serve the communications, advertising, or websites that put the strategy into practice, and through the visual expression of the values of the brand. Internally, it allows the strategy to be more easily communicated to employees through its expression within internal communications, the use of spaces, and the way processes and briefs are explained (eg. in the management of design recourses and the brand).

- **The formulation of a design strategy can be an important “element of practice, acting as a glue of multi-disciplinary activities”** (Cooper & Evans, 2011) (Pitsaki, 2011). This function of design is particularly relevant in the case of cultural projects and products wherein various professionals are employed by the organisation. A design-driven approach to these cases can emphasise the interdisciplinary nature of any cultural product and can facilitate the implementation of strategy by reinforcing connections and adding focus to the collaborative process of the various professionals involved (e.g. curators, designers, historians, etc.) (Pitsaki, 2013).

- **Design promotes a holistic approach to the development of cultural products**. Customer satisfaction can be enhanced by the design of better cultural experiences and the more careful consideration of points of contact with individuals. This calls for a holistic approach to product development and the elements that surround it (e.g., how a particular exhibition will be combined with other museum events, how navigation in the museum space will influence perception, and how one exhibition relates to another, as well as to the museum as a whole) (Pitsaki, 2013). Design can facilitate this because it is essentially a way of looking at the problem holistically (Cooper & Evans, 2011).

- **Design helps to maintain coherence and consistency, allowing strategy to flow from the corporation to the product line and into a specific product**. This becomes particularly important to cultural strategies and the ways in which an organisation chooses to connect and sustain various brands within its

brand system (e.g. the museums group, in relation to an individual venue, exhibition or relevant exhibit). Ultimately, design strategy serves as a bridge between products and corporate cultural brands (Pitsaki, 2013).

The concepts described above show that design plays different roles and serves various strategic purposes. This is also reflected in the literature and in the ways our participants spoke of strategy. In order to better understand this within the case of the cultural sectors, we decided to focus on the principal strategic perspectives of "design IN strategy".

“Design IN strategy”: Applications from a Museums Case Study

In this paper we are particularly interested in underlining the importance of design as a contributor to strategic objectives, and in demonstrating that it can’t be treated as an external attribute of the cultural offer. Indeed, design is a core element of any kind of tangible or intangible value delivered in the cultural sectors. It is itself a significant strategic resource that delivers economic, symbolic, aesthetic and functional values and that therefore should be aligned with the stakeholders’ main objectives.

In the cultural sectors, the search for coherent competitive advantages becomes more and more imperative. Trying economic times and spending cuts call for a more strategic focus in the ways in which cultural organisations operate. Design can play an important role in that. The North-East of England museums group case study shows that design is often not managed in a way that acknowledges its importance as a strategic tool. It also shows that the way an exhibition or programme is designed and branded is not often in keeping with the corporate brand or with the museum’s overarching strategy.

However, stakeholders admit that design makes the offer of the museum attractive and likable; facilitates a long-lasting relationship and dialogue between the museum and its visitors; and enables more meaningful interactions between the brand and its audience. Furthermore, our interviews confirmed that design within cultural industries is often perceived as an element of quality and innovation. Therefore, it should be implemented as an integral part of the organisation’s strategy (Pitsaki, 2013). As one of our interviewees suggested, “Design is integral to how we tell stories and how we interpret things, and it becomes even more relevant when we use technology, because it allows people to more directly interact with exhibits or archives. Design is connected to the museum's essential function, in the sense that it engenders dialogue about identity, and allows people to reflect on and feel proud of an effective exhibition. Design shapes the exhibition by playing a role in people’s emotions and empathetic faculties”.

Building on this perspective, we have identified several main applications of “design In strategy” for cultural organisations:

- **Identity formation and communication**. Part of TWAM's strategic plan indicates a mission to "help people determine their place in the world and define their identities". Through their cultural offer, museums narrate true stories, educate people, and shape people's aesthetic taste values. This is clearly reflected in TWAM's vision as well as in its strategy. Moreover, this vision should be manifested first and foremost in the way the organisation establishes its own identity, its corporate brand (TWAM) and its individual brands (12 venues/museums). Through their choices, people share the museum's identity and can potentially become part of it. Design is a key component to both the processes of forming identity (e.g. the brand) and sharing it (e.g. aesthetic value, cultural content, meaning, etc.). Therefore, it should be managed within the context of an institution's strategic goals.

- **Brand consistency and coordination**. In the lifetime of a brand, constantly changing external factors and general management decisions can jeopardise the stability of identity and the projection of a clear image thereof. Consequently, it is necessary to carefully manage the brand in order to achieve consistency in all core elements and communications. Design contributes to the strategic management of the brand by ensuring parity across different brand levels. Furthermore, the coexistence of several brands in any cultural organisation makes their management and alignment with strategic aims somehow complex. For example, in the case of TWAM, there is an institutional brand, 12 venues / museums brands, and several exhibition brands. Design acts as a visual and content connector between these, facilitating coordination, and enhancing the fulfilment of the strategic aims across all brands.

- **Perception of innovation and quality**. The interviews demonstrated that design is perceived by visitors as an element of innovation which is introduced within the space of the museum (e.g. a well-designed exhibition or a modern space). It helps museum's offer to feel fresh and appealing to people. It also contributes to the perception of quality and professionalism. For these reasons, it is a catalyst for visitor satisfaction and, therefore for strategic success. In other words, design adds value to the museum offer and contributes to customer satisfaction and engagement.

- **Enhancement of experiential factors.** Museums aim to offer meaningful interactions and memorable experiences, in order to engage the public, build reputation, and achieve positive, long-lasting results. Generally speaking, design contributes to quality experiences; designers have the ability to identify user needs and think holistically about people's interaction with products. The use of design as a strategic element can be particularly relevant in culture, because of the experiential dimension of the kind of products and services that

cultural organisations develop; every cultural product is an experience that should be carefully crafted as such. A detailed consideration of the exhibition and everything that surrounds it, as well as of the various contact points between the museum's brand and its visitors, are elements to be considered for strategic success and here, as in all previous cases, design serves as a means to facilitate the management of such rich complexity.

We have shown that design plays an important role within strategic elements, actions, and the values that they hope to generate. We can conclude that "design In strategy" means design as an integral part of it. "Design In strategy" is strategy through design. It means that good design is an inseparable component of success and therefore of strategy itself. The strategic role of design in any organisation is one that must be performed top-down rather than bottom-top. It starts when the CEOs and strategists recognise, firstly, its importance and, secondly, its potential within the particular context at hand. This understanding may then inform the rest of the organisation at functional levels and, finally, in operations and product development. Ultimately, this top-down approach to the role of design in strategy has practical applications and can bring about important organisational change.

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Design management as the hub of meaning in organizations

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Keywords: Brand, Design, Management, Meaning, Sensegiving, Sensemaking

From the integration of different perspectives on the role of meaning in the design field we propose that design management can be regarded as the strategic development of sensemaking and sensegiving activities. In this way we explore how design management might be characterized as the hub of meaning in organizations, establishing a flow between their internal and external dimensions. Managing design implies understanding and influencing the processes of making and giving sense within a strategic business orientation.

1. INTRODUCTION

The evolution of competitive dynamics in an increasing number of industries has directed practitioners' attention to design processes and the strategic management of design seems to have become a source of business advantages. Also, there has been a rising interest in design among scholars, namely in management and organization studies (Ravasi & Stigliani 2005).

Krippendorff (1989, 2006) has proposed that design is an activity deeply embedded in meaning and argued that designers' sensitivity to what artifacts mean to others has always been an important but rarely explicitly acknowledged competence. Also, meaning has been suggested as central to the design activity by other authors, within different streams of research (e.g. Michlewski 2008; Karjalainen & Snelders 2009; Jahnke 2012; Stigliani & Ravasi, 2012).

Meaning is particularly central to brand management. Brands seem to be endowed with the ability to create meanings (Danesi 2006) and it has been widely researched how brands can become meaningful for consumers and act as sensegivers in the contemporary marketplaces (e.g. Kozinets 2001). Meaning creation seems to be at the core of the contemporary activities of design and brand management. Also, the increased integration of the design profession with management is greatly due to the rise of branding in the contemporary societies.

Starting from the assumption that design activity is related with the proposal of meanings, the general purpose of our research is to develop a theoretical frame from where it is possible to regard design management with an underlying focus on meaning. If design is related to meaning creation then managing design will necessarily imply addressing meaning. Meaning in management practices is a topic underresearched and undertheorized that continues to be addressed in a somehow simple way (Kärreman & Rylander 2008).

This paper doesn't aim to be normative, our contribution rather results from the integration of disperse perspectives in the literature and the expected promotion of further debate about the intersection of design management and meaning creation. Our contribution lies in the proposal of design management as being characterized by processes of sensemaking and sensegiving. Although it has been suggested that design processes are related with sensemaking (e.g. Stigliani & Ravasi 2012) to the extent of our knowledge there are no comprehensive theoretical proposals that clearly frame design management in the sensemaking theory. We believe that our conceptualization lays the foundations for future research that address meaning creation in a design management setting. The sensemaking theory is full of potential to be explored as background of a possible characterization of design management as the management of meaning.

In the next section we will address an analysis of related literature and establish the focus of our research. We will explain our approach and right after develop a discussion up on the existing literature, according to the purpose of our study. We will sustain our proposal of design management as being characterized by processes of sensemaking and sensegiving through the analysis of related literature and by addressing the results of different conceptual and empirical researches. Finally, we end up the article by presenting the conclusions of our proposal and the suggestions for future research.

2. BACKGROUND

Cooper et al. (2009) suggest that managing design is a permanent on going activity that might address different types of processes and outcomes, namely products, services, communications, environments and interactions. Branding has been rising as the focus and driver of much design practice. The launch of a brand is the first reason given by managers for design integration in a company (Borja De Mozota 2003). Design has a critical role in the brand management activities. Our perspective is that there is a design gestalt (an underlying "whole") that encompasses all the designed elements of brands. Thus, when referring to

design management our focus is in the management of the industrial, graphic and interior design processes (developed internally or outsourced) that lead to the overall design gestalt of brands. In this article we will frame design management in a brand management setting as a way to clearly define the scope of our proposal.

We regard meaning within a social constructionist paradigm, since design seems particularly well suited to the development of research within this paradigm (Roth 1999). The meaning of an artifact, for example, is the understanding that is constructed about that artifact. Meaning and understanding arise with individual cognition and are thus embedded in the self. Nevertheless, the processes of meaning creation are also influenced by the social, historical and cultural contexts. Since all human beings are unique and have different backgrounds and worldviews there are no universal and final meanings. In the same sense, the meaning of artifacts can't be transmitted to someone else or imposed, but rather is, in a first stance, individually created. Meaning is a continuous construction and can be infinitely revised.

Krippendorff (1989, 2006) argued that design activities imply proposing meanings and sense through design. Putting meanings into the center of design considerations give designers a unique focus that defines their expertize. Baudrillard (1998) proposes that consumption can be regarded like language as a system of communication and exchange, as a code of signs continually being sent, received and reinvented. Baudrillard (1998) considers that consumption is a general system of interpretation. Whereas consumption of a physical good generally produces satiation, the capacity for the consumption of meaning seems to be infinite.

Meaning, signification and communication are at the core of the semiotic theory. Semiotics has been used in the research design because as Vihma (2010, 12) argues this theory "offer opportunities for a designer researcher to gain knowledge and deeper insights about the interpretation of product characteristics and how material artefacts interact with humans." The acknowledged founders of modern semiotics are the linguist Ferdinand De Saussure and the philosopher Charles Peirce.

Krippendorff (2006) uses the term semantics as a way to differentiate his view on product meaning from what he calls semiotics and its mainstream objectivism. We don't regard semiotics as necessarily positivist, as Krippendorff (1992) claims. In the history of design research different approaches have been used to address how the semantic dimension of products communicates, just like language (Dell'Era et al. 2011); how brand values can be strategically embodied in products (Karjalainen & Snelders 2009), and how product meanings can be used to innovate (Verganti 2008).

3. APPROACH

Our research is exploratory and is developed within the social constructionist paradigm. This study is yet at a conceptual stage and we intend to start laying the foundations for future research on design management and meaning. The article is built upon interrelated literature

and from the integration of different perspectives we will develop a proposal of design management as being centred in meaning, processes of sensemaking and sensegiving.

4. DISCUSSION

In this section we will integrate and discuss several views on design as a way to develop our perspective about its management. First, and as stated, the central idea that underlies this paper is the view of design as being centred in meaning. Jahnke (2011, 21) observed that the designers "problem solving was completely integrated into the process of interpretation – that is, problems were solved as needed in order for the intended meaning of the artifact to be expressed".

Second, if one regards meaning as an unfolding construction, then designers cannot impose the meanings of artifacts to others. In this way, designers can only make proposals of intended meaning (Cross 2001; Krippendorff 2006; Jahnke 2012). Jahnke (2012) use's Gadamer's concept of "thrownness" to vividly illustrate how designers "throw" artifacts into the world. The designed artifacts are proposals to be interpreted with "the capacity to open up new worlds" (Jahnke 2012, 35).

Third, with a constructivist view it also becomes clear that designers must be actively immersed in the evolution of society and culture since it is critical that they can be aware of how meanings and understandings are being constructed. Designers are not masterminding these processes of construction of meaning but on the contrary they must be active participants in the wider networks of social relations (Krippendorff 2006). As Cross (2001) argues there are forms of knowledge special to the ability of a designer.

Fourth, and building on the previous arguments, continuity seems to be a necessary feature of the designers' work because if the meaning of artifacts results from unfolding constructions that can not be controlled, then understanding these meanings and proposing new ones can not be made in isolation but rather must result from a continuous immersion in social dynamics. Verganti (2008) has long been studying how Italian manufacturers developed a capability to understand and anticipate the emergence of new product meanings and he suggest that designers act as brokers and gatekeepers of knowledge that continuously involve themselves in culture and in networks of stakeholders. The knowledge about the dynamics of socio-cultural models must be continuously transposed to inside organizations (Bertola & Teixeira 2003). As Krippendorff (1992) argues, a constructivist view on design has to embrace change as a principle of its practice. These views fit exemplarily in the emergent process thinking theory in organizational studies where there is a focus on the dynamic constitution of organizational phenomena (Langley & Tsoukas 2010). Process organization studies is inspired in process metaphysics - "the world view that sees processes, rather than substances, as the basic forms of the universe" (Langley & Tsoukas 2010, 2).

Fifth, design practice can be regarded as a set of framing and re-framing activities that go beyond a linear view of problem solving. Schön's (1993) study of professionals in action and

his analysis of how architects developed a reflective conversation with a project has become a seminal work in the design field. Schön (1993) argues that practitioners deal with problematic situations through reflection-in-action. The architects in the case analysed by Schön (1993) continually "reframe" the situation they are addressing as a way to find a solution according to its characteristics.

These five perspectives on design – meaning; artifacts as proposals, immersion in socio-cultural dynamics; process thinking; framing – seem to fit exemplarily in the sensemaking theory in organizational studies (cf. Weick 1995). A focus on sensemaking is distinct from other related ones like interpretation, for example, because sensemaking induces a broad mindset on processes (Weick 1995).

Weick (1995, 13) characterizes sensemaking as processes of construction of meaning, through which "people generate what they interpret". Making sense is imposing frames on continuous flows of experience. Meaning arises from the relations established between cues and elements of a frame (Weick 1995). Sensegiving is a related concept and can be defined as the processes by which individuals attempt to influence the sensemaking of others (Gioia & Chittipeddi, 1991; Maitlis & Lawrence, 2007).

Krippendorff (1989, 2006) works build up on the idea of design as making sense of things, but the sensemaking theory was not addressed. Other design researchers have mentioned sensemaking (Kolko 2010; Dorst 2011) but their approach did not delve into the particularities of this theory. Stigliani and Ravasi (2012) recent study on a design consultancy firm clearly connects design practices with sensemaking and sensegiving. However, their analysis is basically focused on the material practices of designers and in the transition from individual to collective sensemaking. Our research follows a different path, addressing a macro-level perspective on design management in organizations and focusing on the purpose of the process of design. What the sensemaking theory can add to the design management field is an approach on meaning that purposively addresses organizations and management. Also, the sensemaking theory can be useful to integrate interrelated ideas on design and meaning and to frame design management as an activity embedded in meaning. Based on these assumptions we will develop in the next section an outline of the proposal of design management as the management of sensemaking and sensegiving activities.

5. DESIGN MANAGEMENT AS SENSEMAKING AND SENSEGIVING

Within the sensemaking theory one can regard the designers' immersion in the flow of socio-cultural changes that we've addressed earlier, as essentially an exercise of sensemaking. In fact, the overall activity of designers seems to fit exemplarily in the concept of sensemaking, if one regards meaning as being central to their professional expertize. Sensemaking is a critical aspect of how designers continuously understand and act up on the world. Also, when designers create artifacts they are proposing intended meanings and acting as sensegivers. This perspective on sensegiving is different from the one suggested by Stigliani and Ravasi

(2012), because their approach was based on the sensegiving activity implied in the persuasion of the design consultancy costumers. In our view and from a broader perspective designers act as sensegivers through the artifacts they create. So, through products, environments, catalogues, packages and many other designed artifacts, designers are proposing meaning and sense to others. There is a circular relation in the activities of sensemaking and sensigiving, within a design setting, because each activity is dependent on the other in a continuous recursive way.

What we propose is that design management, from a macro-level perspective, and regarded as embedded in meaning creation, is the tentative management of sensemaking and sensegiving. One can envisage design management as a boundary dimension of organizations, as a hub where sensemaking and sensegiving processes are developed and where meaning creation is an underlying element. Design management activities embrace this boundary area where organizations are inserted in the continuous flows of events that characterizes their environments. Regarding brands as aggregators of different design elements – and composing a design gestalt as we suggested earlier in this paper – it becomes evident that it is critical to manage the design processes in a way that potentiates an effective strategic alignment with the business activities. The continuous unfolding processes of construction of meaning of brands are of utterly importance for the business success in the contemporary marketplaces. Influencing these processes cannot be disregarded by organizations. Managing design with a strategic purpose implies an awareness of the sensemaking and sensegiving nature of the design activities and of how these activities are critical to the overall brand management processes.

6. CONCLUSIONS

A view on design management as the strategic development of sensemaking and sensegiving activities in a brand setting is valuable because it positions meaning at the core of the management practices. A sensemaking lenses provides insights on the unfolding nature of brand meaning and highlights the process nature of managing design and brands. Assuming that the contemporary markets are characterized by permanent dynamics, the unique capabilities of designers to continuously make sense of how meaning is created and can be proposed are increasingly becoming critical for organizations. In this way design management can be regarded as the hub of meaning in organizations, located on a dynamic boundary area that establishes a flow between the external and internal dimensions of organizations. Managing design implies the ability to understand and influence the processes of making and giving sense within a strategic business orientation.

7. FUTURE RESEARCH

Sensemaking and sensegiving seem to naturally fit in a general perspective that describes how designers develop their practices. The sensemaking theory is valuable not only to integrate different views on design and meaning but also to underlie the development of new

understandings about design management. Delving into the complexities of sensemaking theory presents many avenues of research full of potential to advance the understanding about design practices and design management in an organizational setting. The prospective dimension of sensemaking and sensegiving activities; their social and processual nature; the role of narratives and stories; and the concepts of enactment and mindfulness are just examples of paths of research that we deem as relevant to explore in the future in a design management research perspective.

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ACKNOWLEDGMENTS

This research results from the work developed in DESMA, a Training Network in the area of Design Management funded by the European Commission's Marie Curie Actions.

practice in the field. Many Indian consultancies have grown large by providing commodity outsourcing solutions in information technology and engineering; now some are set to enhance their role as consultancies offering high-value design and innovation.

The unfolding situation at HCL offers the opportunity to see the changes and impacts as the established design expertise in Xerox, with its acknowledged record of excellence in managing design and innovation, is amalgamated with the large, newly established design groups in India.

Aims and purpose

This paper explores changes within HCL Technologies' design groups during their transition from a purely supportive role towards establishing themselves as leading contributors to the group's growth and profitability. The business and economic context driving these changes are set out, followed by the background at the start of the transition. The mission, objectives and strategies that the design groups established are explained in the context of the business strategy of HCL Technologies as a whole.

The views of people on the specific role of design within the organisation were gained from interviews with those involved in the transition, and through a questionnaire targeted at HCL's engineering and design communities earlier this year.

The proposal for a global design organisation within HCL is explained and reflects the on-going journey to place design at the core of the group with an acknowledged leadership role.

It is hoped to develop this paper into a detailed case study. This should confirm insights into the challenges facing design leaders as well as best practices that might be adopted within offshore new product development consultancies as they move from offering cost-driven services towards offering value-driven, user-focused innovation. It should also highlight key areas for research.

The business and economic context

Xerox started as the Haloid Company early in the 20th century. The first commercial copier, the Xerox 914, was marketed in 1959 and, with a patent monopoly on the process, Xerox had 100% of the market in the USA during the 1970s.The corporation gained a reputation through its commitment to innovation during the1970s principally as a result of establishing the Palo Alto Research Centre (PARC). It was at PARC that the first personal computer was created in 1973, followed by the graphical user interface, point-and-click mouse, word processing and the ethernet. Xerox's lack of foresight into the potential of these inventions provides one the most powerful examples of marketing myopia[1]and the negative impacts of a short-term financial focus. In 1979, these innovations where demonstrated to a young Steve Jobs during a tour around PARC. Later he said:

"If Xerox had known what it had and had taken advantage of its real opportunities, it could have been as big as IBM plus Microsoft plus Xerox combined, and the largest high technology company in the world"[2]

In 1975, the patent monopoly was broken when the Federal Trade Commission forced Xerox to license its patents; Japanese manufacturers became direct competitors and its market share plummeted by 86% within four years. Xerox fought back in the 1980s with a focus on quality, product operability, and an emphasis on new product development through rigorous process improvements. Though still seen as technology-led in the 1990s, Xerox began to transform itself into a service company centred around document management. This shift to service provision drove Xerox to re-asses how it might continue to deliver the benefits of technological innovation in support of its new business direction. It acquired Affiliated Computer Services, a company offering data and document process management services, for US$6.4 billion in 2009.

Design emerged as a distinct function within Xerox in the 1980s. It evolved into a core support activity in maintaining brand reputation and leadership, with key functional expertise in industrial design, user interface design and, particularly, usability and design research. Until the venture with HCL, the design function maintained large studios in the USA and UK.

Founded in 1976, HCL Enterprises became HCL Technologies in 1991 as an information technology, business process outsourcing, and research and development services provider. It became one of the largest outsourcing firms in India with revenues of US$4.34 billion in the year ending April 2013 and around 90,000 employees world-wide. Its growth resulted from large multi-million dollar contracts and joint ventures to set up dedicated outsource facilities for key clients such as NEC, MTV networks, Intel, Boeing and Cisco.

HCL's key competitors are WIPRO, Tata Consulting Services, Infosys, Cognizant and Accenture. All are expanding their innovation consultancy businesses. As HCL moves into front-end value delivery, additional competition will come from some of the larger accountancy firms like Deloitte and PriceWaterhouseCoopers. Their consultancy services relating to innovation and development are expanding faster than their accounting services. The combined advisory service revenues for the 'big four' accounting firms jumped 12.2% to US$36.1billion in 2012[3].

The outsourcing context

The National Association of Software and Services Companies, the trade association for Indian business process outsourcing industry, predicts a slowdown of growth up to 2020. Using the offshoring value model[4] (see figure 1), the majority of HCL's success and growth has resulted from its position in the 'Commodity outsourcing' quadrant. This is becoming increasingly competitive, and growth will be considerably harder to maintain as a result of wage inflation in India. Innovation is no longer seen as a core activity in many organisations, and pressure on western companies to outsource even more of their operations is creating the

Design management implications as an Indian outsourcing consultancy shifts from commodity contracting to high-value design services

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Keywords: Design outsourcing, design management, India offshoring, design processes, design leadership, HCL Technologies, Xerox, experience design.

Abstract: This paper outlines the changing circumstances surrounding the design services offered by a large India-based engineering consultancy as it moves from providing a commodity service towards value enhanced, innovation services. HCL Technologies' transition – from using design purely as a support function towards repositioning it as a value leader – highlights key issues and potential best practices in design management. New structures, processes and business practices are identified as HCL sought to fast track it's shift to a value-driven proposition through the acquisition of engineering and design within Xerox Corporation's Office Product Development Unit.

Introduction

In 2011, Xerox Corporation transferred over 550 engineers and designers in its Design and Development group to HCL Technologies, an Indian information technology and engineering outsource development consultancy with a market capitalisation of $9.7 billion and employing 90,000 worldwide. With over 40% growth year-on-year and hundreds of designers in India, HCL has the ambition to provide high-value design services on a global scale. As such, it is creating new ways of managing design that will have major impacts on professional

opportunity for commodity outsourcing companies to grow their knowledge process outsourcing services operations and move into the strategic 'Value outsourcing' quadrant.

	Business issue	Impact on design management practices
Xerox Corporation	Shift from technology company to service provider. Minimal funds allocated to innovation, yet increased pressure to maintain innovation leadership position. R&D spend of over US$1050m in 2000 reduced 49% to US$550m in 2012. How to exploit labour/cost arbitrage without losing capability or control.	Greater emphasis on the full brand experience, including both hardware and virtual points of user interaction. Absolute priority given to the quality of the design brief. Increase level of information share. Explicitly stated roles and responsibilities clear RACI Increase level and types of communication with team members.
HCL Technologies	Shift from commodity service provider to value-adding innovation provider. Increased competition from other outsourcing firms. Need to grow revenue year on year. Late involvement in client new product development cycle. Attrition of high calibre personnel. Shift from an Indian enterprise with global clients to being a truly global group. Silo nature of organisational structure.	Grow capability in guiding the client in the preparation and creation of design briefs. Need to develop alternative revenue streams. Need to be more involved in sales and bid preparation. Need to develop tools and processes for remote team interactions. Need to create single cross organisational boundary design team.

Table 1: Key business issues

The labour market for technical staff in India is becoming increasingly volatile. People move between companies to raise their incomes rapidly; this fuels wage inflation of up to 30% per year for highly skilled staff. Until recently, firms such as IBM paid outsourced staff in India 80% less than in the US; that gap has narrowed to 30-40%for staff with expertise in high-value areas[5]. HCL is facing some key business issues that will impact design management (see table 1) and change the way design is perceived both internally and externally.

Designers in India have a higher level of education than their engineering counterparts: a good majority go on to master's degrees in design after completing first degrees in

engineering. This means designers start their careers with salaries twice that of engineering graduates. Consequently, their perceived value and status are rising, not least as the sales and marketing teams seek to reposition HCL Technologies.

HCL identified creative thinking and end-user experience design as key elements when repositioning itself as a strategic outsourcing partner. Therefore design managers are under significant pressure to deliver results. Design management is still a very young discipline: in India, the majority of design managers are designers, promoted into management, who now need to develop a broader range of skills and perspectives.

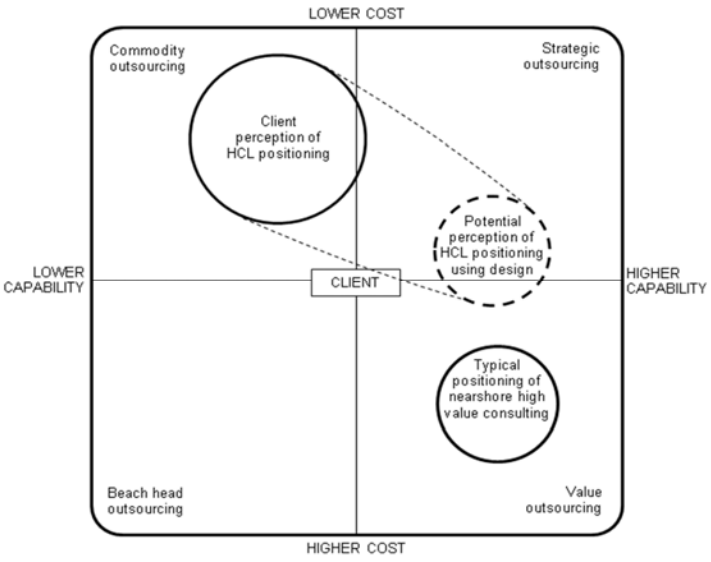


Figure 1: HCL within the offshore value model

Situation at the start of Xerox / HCL partnership

Over 550 engineers, designers and scientists were absorbed into HCL Technologies when it took over Xerox's design studios in Europe and Portland, USA plus a substantial part of the R&D organisation. Xerox retained its design studio in Rochester, New York to work closely with the 100-strong, multi-disciplinary Fuji Xerox design group in Japan.

'Partnership' with HCL Technologies was seen to benefit both parties: Xerox from the reduced costs of outsourcing many of it's development activities to India; HCL from acquiring considerable expertise that could be redeployed to other high-value accounts in Europe and the USA. Willem Appelo, President of the Xerox Global Business and Services Group, underlined the continued importance of innovation to Xerox; as follows:

"Innovation is core to Xerox. We expect HCL to increase that, to get more innovation out than we have so far".

Nevertheless, both organisations saw design essentially as a support activity – extremely important but not strategic to the future success or direction of either. There was substantial alignment between the design-focused skill sets of the Xerox and HCL design groups as both centred around industrial design and user interface design. However Xerox was considerably stronger in the core skills of operability and human factors.

Xerox R&D and design groups had been funded centrally as cost centres; their primary remit was to enhance usability and ensure that brand implementation was never compromised. Design groups in HCL operated as profit centres; engineering groups would call them in as an add-on revenue opportunity once contracts were underway.

HCL's designers are located within Engineering and R&D Services – figure 2 depicts the matrix structure with business segments and functional groups. Industrial design and user experience design (UxD) are positioned within the mechanical design and software delivery groups respectively. Both design groups grew organically as add-ons to the core business areas of information technology and engineering outsourcing services. The number of designers employed grew from 30 in 2005 to over 200 in 2013 – mainly industrial designers, user experience designers and digital animators.

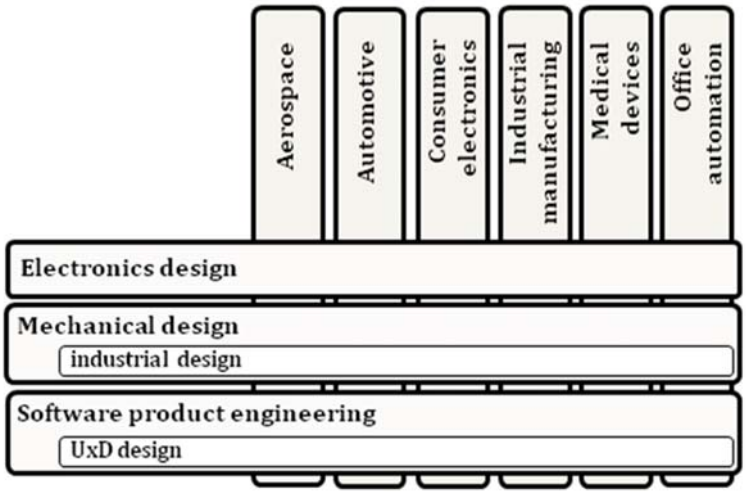


Figure 2: HCL Technologies group structure

In 2005, Vineet Nayar (CEO of HCL Technologies) recognised that the rigid hierarchies and reporting lines within his organisation rewarded conformity rather than innovation; therefore, they had to be changed if growth was to be maintained. He initiated a program called "Employee first, customers second", highlighting that the interface between customer and employee was where true value is created and set about inverting the hierarchical pyramid[6].

The marketing and brand departments then created two group-wide campaigns – *'Engineering Out of the Box'* and *'Engineering Experiences'* – to raise client perceptions of HCL from a provider of commodity support services to a partner delivering innovation focused on end users (see figure 3). This presented the opportunity to cast design in a central, leadership role rather than a support activity called in as an added extra and charged by the hour.

Prior to 2012, HCL's design groups operated exclusively as a sub-contract resource to the main HCL Global Delivery Centres without any direct client contacts. This resulted in an obsession with producing a high volume of work to justify the time spent – a classic case of "never mind the quality, feel the width". These new initiatives allowed design direct contacts with clients, thus enabling work to focus on the intangible value (not just on the number of artefacts produced) and raise credibility of the design function.

Designers in Xerox tend to be long service individuals with specialist experience in particular areas, while designers in HCL are much younger with short service and broader experience

across product domains. The design process and group structures within Xerox were well established as an integral part of the new product development cycle. By adopting the best practices from Xerox with the resources available within HCL, there was an ideal opportunity to accelerate delivery on the promises made in the marketing initiatives.

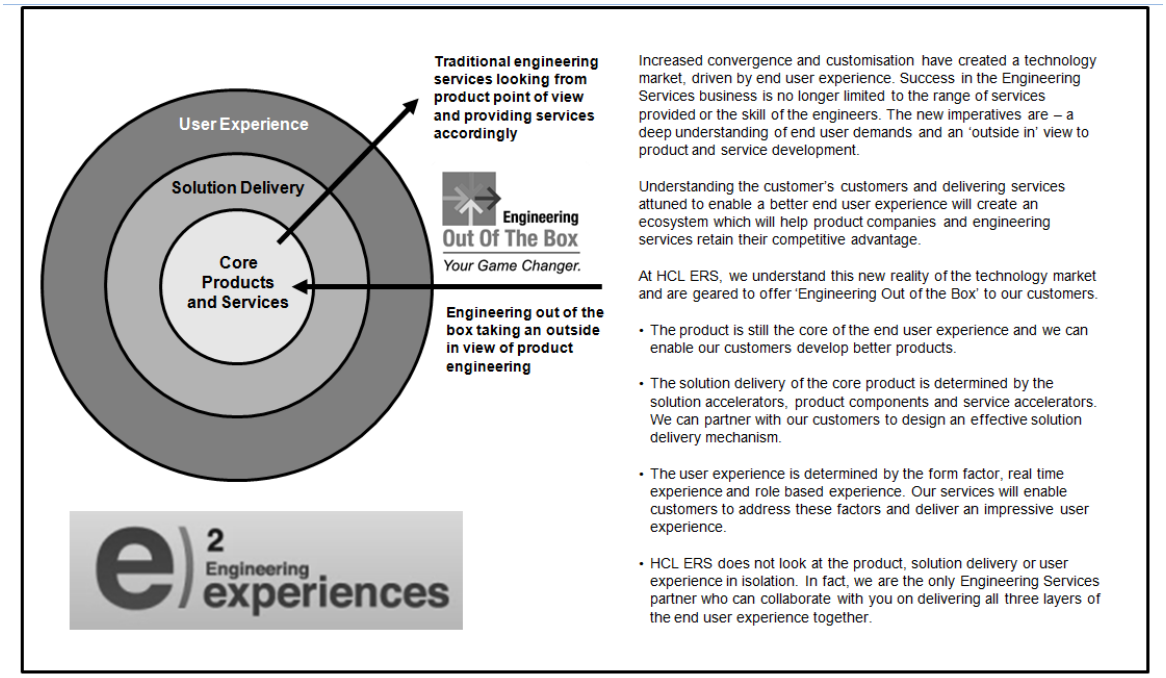


Figure 3: Recent marketing initiatives within HCL

Design group proposal

To remain relevant to HCL's overall business direction, the proposal for a new design group began with looking at the four elements of Mission-Objectives-Strategy-Tactics; the design function then sought to respond to these elements(see table 2).

The three most senior design managers in the newly-formed design group, when asked to identify the most important shifts in mindset necessary to progress from a commodity consultancy to a value-driven design organisation, listed the following:

– Engage early, pre-brief *not* post-brief
– Treat design as an investment *not* a cost
– Focus on user experiences *not* individual products
– Sell on value *not* cost.

A wider range of revenue streams needs to be explored to achieve a growth in revenue of over 30% year-on-year. Moreover, the design group needs to establish new structures and relationships so as to maximise returns from design investments (see figure 4). A network of studios – both nearshore to clients and partners, and offshore in India – would enable the

design group to negotiate and take advantage of all opportunities without the pressure to bill every hour to clients. The intention is for the studios to become valued investment opportunities as centres for innovation and research, rather than costly overheads.

	HCL corporate level	**HCL design function**
Mission (Purpose)	To be the technology partner of choice for forward-looking customers by collaboratively transforming technology into business advantage.	Reposition HCL design as a value proposition, moving HCL up the value chain. Create a front-end design organisation recognised for innovation and insight. Sell design as the focal point for creating user experiences. Educate clients and the HCL group that design is an investment, not a cost.
Objectives (Long-term goals)	To build HCL Engineering and R&D Services as an organisation led by innovation, stretching the engineering frontiers in a world that is becoming increasingly collaborative. Grow revenue by over 30% year-on-year.	Achieve a position within the top 10 design consultancies within five years. Grow design within HCL to be a US$50m business in five years. Increase size of India delivery organisation by 10 people for every one in the design groups.
Strategy (Achieving the goals)	Move up the value chain of new product development. Increase number of large contracts through partnerships and joint ventures. Globalisation of development centres – establish nearshore innovation labs. Align roles and organisational structures to client needs.	Create a stand-alone design group providing a single point user-focused service. Raise the profile of HCL as a design leader outside India, recognised for its leading edge design thinking. Operate as a conduit to India operations and provide front-end, pre-brief design expertise. Engage in more varied partnership structures.
Tactics (Deliver the short term)	Brand repositioning initiatives: • Engineering out of the box • Engineering experiences • Employee first program Focus on the user and identify unmet needs. Enhance high end capabilities.	Open high profile client-facing innovation studios in six regions. Each studio to co-locate all the skills necessary to deliver user-focused insights and innovation. Create world-class facilities and hire only the best talent in each region. Establish links with academia and leading design thinkers. Design must become contract owner rather than being subcontractor to other HCL development centres.

Table 2: Mission, Objectives, Strategies and Tactics

Creating and promoting many new revenue opportunities place HCL in the role of stake-holder and investor rather than service provider, forcing the adoption of a longer-term perspective and a greater concern for quality. Revenue becomes directly linked to the successful outcome of projects rather than the number of hours that can be billed. This shift to more complex inter-relationships is forcing design leaders to adopt a client's perspective

and mentality, in addition to a consultant's ideology, with emphases on leadership, origination of ideas, long-term perspective, and integration with business strategies[7].

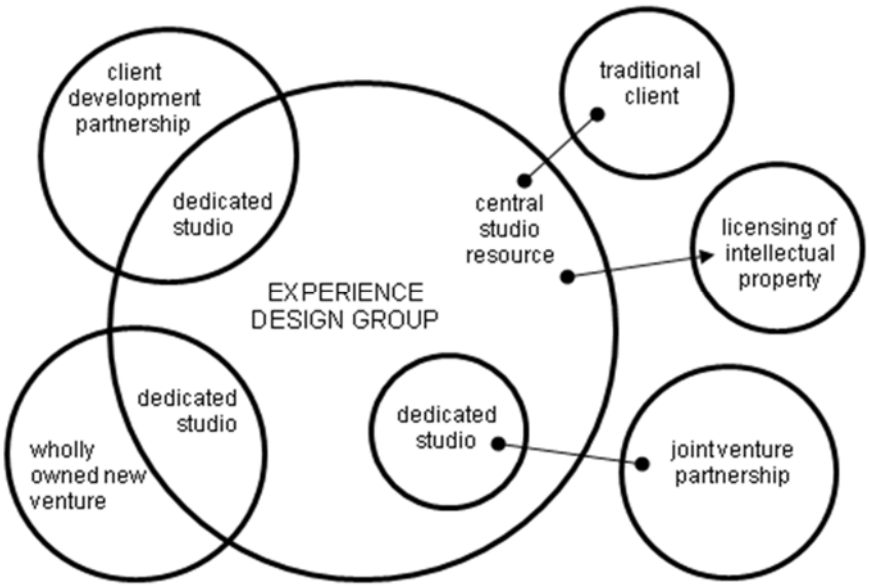
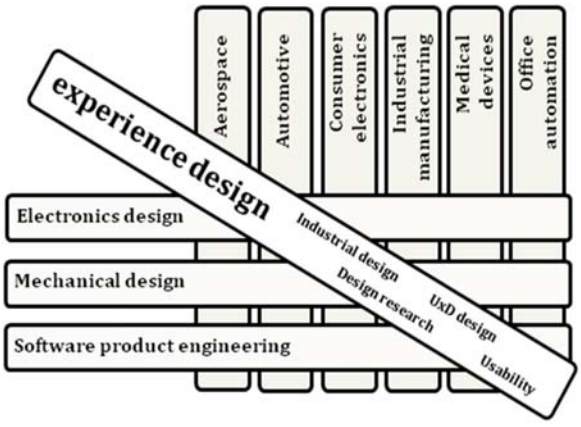


Figure 4: Different business models suggested by new relationship structures

A key part of the design group proposal was to create a new design organisation, focused on user-centred innovation, that crosses established functional groups and is accessible to the lines of business. The aim was to create an organisation that would provide a truly 'outside – in' view of product engineering as promoted by the marketing initiative *'Engineering Out of the Box'*(see figure 5).

A specific process, formulated to develop a creative stakeholder role during pre-brief groundwork, represents a conscious shift in how investments in design are viewed (see figure 6). HCL would fund such pre-project work, then use it to approach potential clients. Returns on that investment could be realised from direct payments for the concepts and down-stream development, joint venture development, or licensing.



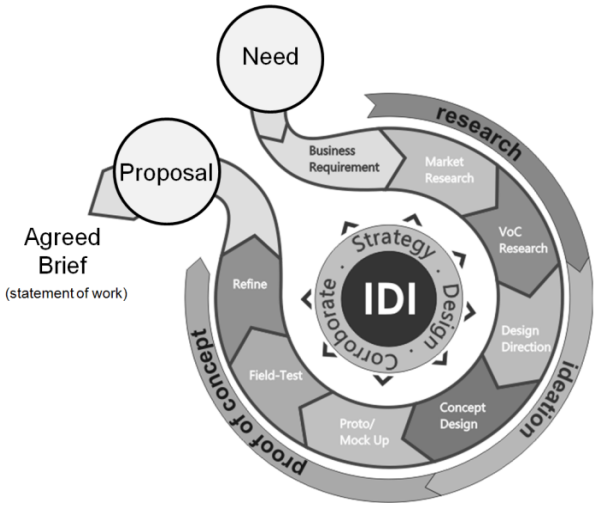


Figure 5: Cross boundary design organisation Figure 6: Pre-brief design groundwork

The relatively low cost of skilled design resources in India enables HCL to generate this work at low risk with the prospect of very large returns on investment. In this model, design managers need to understand business creation and development – especially product portfolio planning – in addition to delivering effective design, efficiently.

Initially, the strategy to engage clients at the high end had been to build relationships while providing commodity services at the low end, then to move up the value chain. While this had proved fairly successful, clients stubbornly retained their perceptions of HCL as a commodity outsourcing company. Paradoxically, a credibility gap is created when so successful as a commodity provider. Consequently, HCL is reversing its strategy by engaging new clients at the high-end with propositions centred on user-experience design and engineering innovation (see figure 7). Design is positioned to bridge the credibility gap by being directly linked with the sales organisation and, ultimately, creating nearshore design studio facilities in several geographic regions.

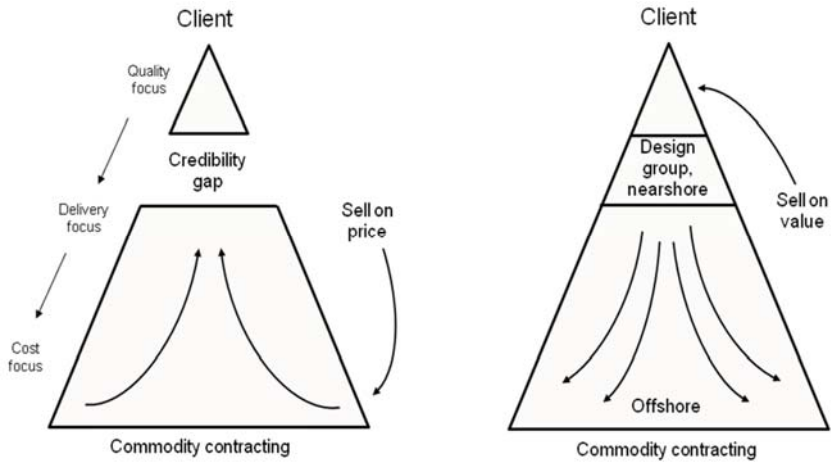
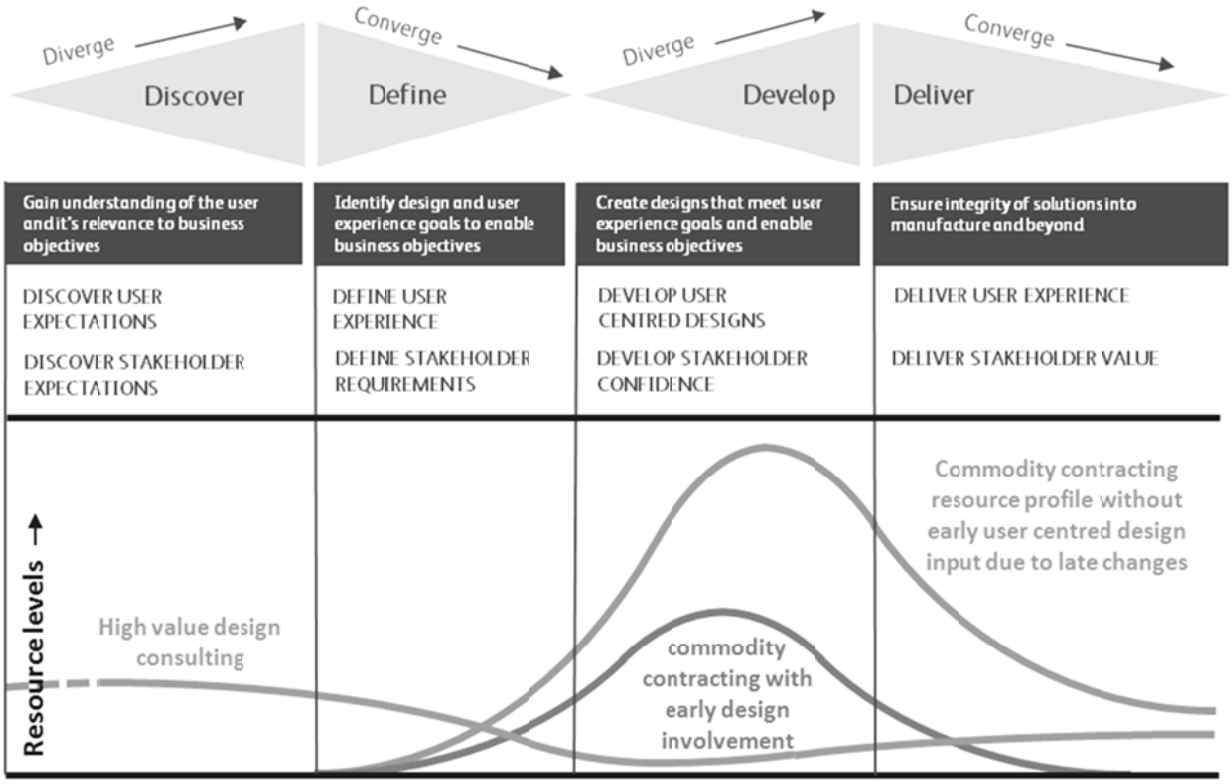


Figure 7: Positioning design to deliver value

In 2005, Xerox and 10 other companies collaborated with the UK Design Council to document case studies of design practices. A design process framework – Discover, Define, Develop and Deliver – was created out of this work which HCL adopted and aligned with its service proposition. Harnessing design at the start of the new product development process is an absolute requirement, with the formulation of the brief occurring at the end of the 'define' stage.

The fundamental proposition is predicated on adding value rather than simply reducing costs. Nevertheless, overall costs to the customer are reduced because downstream iterations are less frequent resulting in a lower commitment of resources. The overall risk to the return on investment of the project is also reduced by focusing on the user, which enables projects that are not viable to be identified and stopped at an early stage, while providing genuine insights

into those likely to succeed by addressing real user needs and desires. It is only by harnessing design right from the start that a product can be truly developed from the 'outside – in', as the



'Engineering Out of the Box' initiative indicates.

Figure 8: Design as a front-end discipline

Preliminary findings of survey into staff perceptions

Table 3 summarises the respondent profiles of a recent questionnaire survey drawn from HCL's Indian and European staff. Only two of the 63 respondents are women, reflecting the prevailing ratio within the engineering and design groups globally.

	Working level	Middle management	Senior management
Engineering	32	5	4
Design	18	2	2

Table 3: HCL internal survey respondents

A key feature of the questionnaire was to provide a differential scale to ascertain the perceptions of different groups within HCL regarding the role of industrial design.

Preliminary findings suggest that more respondents in India than in the UK accept that industrial design should provide direction for engineering and lead development. Unsurprisingly, engineers are less inclined than designers to agree that designers should have a lead role in development (see figure 9a and 9b).

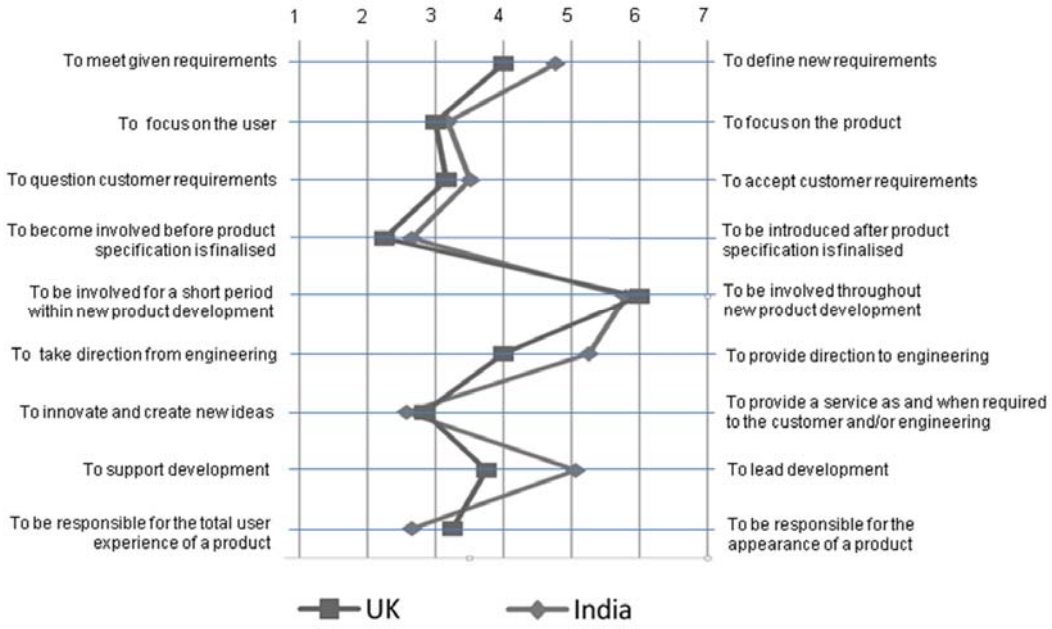


Figure 9a: HCL internal perceptions of the role of industrial design – UK v India

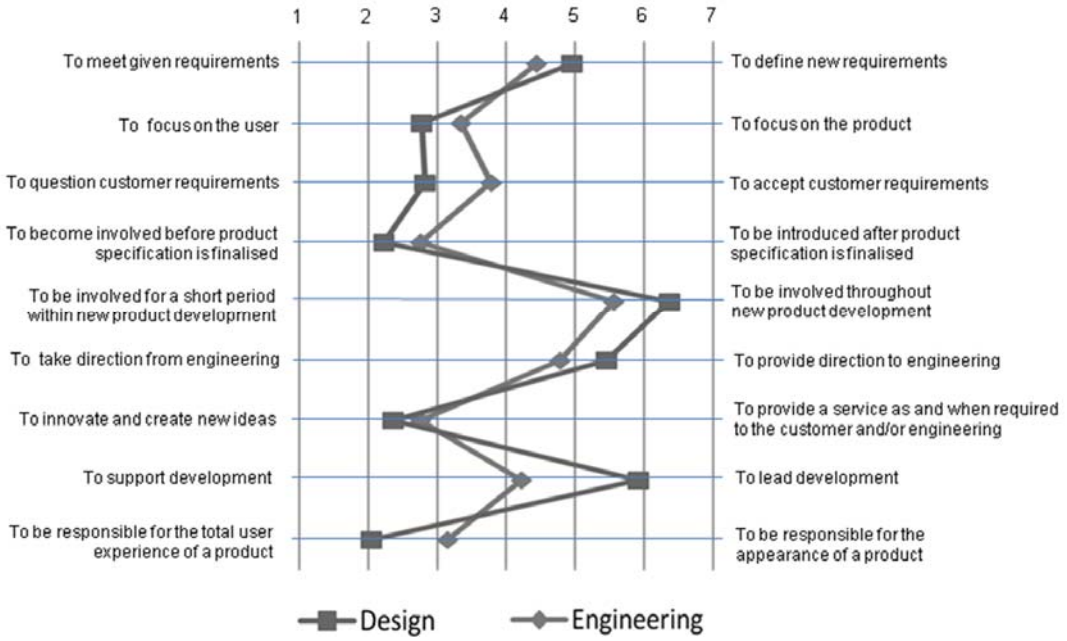


Figure 9b: HCL internal perceptions of the role of industrial design – Design v Engineering

Conclusions, best practices, challenges and opportunities

The aspirations of HCL's newly formed design group are very ambitious. How they build on the momentum generated by company-wide initiatives has still to be seen, yet they illustrate how large information technology and development consultancies in India are embracing design as a sales and value-adding resource. Design managers in advanced nations will need to embrace and accommodate these new 'stakeholder' design consultancies if they are to compete effectively.

From the way design is being repositioned within the HCL group, the following potential design management best practices can be suggested to those considering outsourcing design to India:

- Document and stick to clear roles and responsibilities in line with the relationship agreed between client and consultancy[8]. Where the consultancy takes on a stake-holder role, the boundaries of responsibility and decision making need to be agreed in detail. Ultimate accountability for design should always reside with a single individual at board level.
- Allow substantially greater time for interactions at a distance.
- Greater emphasis on pre-brief processes and design groundwork in order to establish a truly living brief[9] in collaboration with the outsource design team.
- Greater involvement in task definition, planning and metrics / evaluation for the implementation phase, both at corporate and project levels.
- Plan and manage for greater turnover of staff (attrition) during long projects.
- Introduce a 'no concessions' approach to demanding the highest standards from both the outsource team and clients.
- Heed culturally different expectations by preparing design managers to take many more lower-level decisions on behalf of their teams. They should also counter the reluctance of staff to volunteer bad news as shortcomings arise by establishing a 'no blame' culture.

Key challenges facing design managers when outsourcing design to India:

- Placing the right, appropriately qualified people into the new product development cycle, given the variability and unpredictability of design talent in different geographic regions.
- Exploring new ways to integrate on a global scale.
- Identifying what is truly unique about design in each geographical region.
- Rejecting the arrogant assumption that designers in developing nations are not as competent, creative or enthusiastic as those at home.
- Ensuring an appropriate design team remains involved throughout a project (and perhaps beyond).

- Ensuring the partnership between client and the consultancy design teams is built on credibility and trust, with a full free flow of information.
- Melding client and consultant teams into a more powerful new force that achieves beyond the norm .
- Drawing most benefit from diversity by aligning communication methods and practices.

Opportunities for design management with outsourcing of design to India:

- Early involvement by the design function during product portfolio planning phase.
- Freedom to explore unmet needs through greater resource availability to carry out lower cost design groundwork.
- Business proposition based on stakeholder role not just service provision.
- Embracing new global skill market to attract and retain the best each geographical region has to offer.

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AUTHOR BIOGRAPHIES

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Having graduated with a first class Bachelor's degree in industrial design engineering, and a Master's degree in product design, Les went on to hold senior positions in design consultancies and in-house design groups, working on both consumer and industrial products. He holds an MBA from the University of Westminster and was made a Fellow of the Royal Society of Arts in 2001.

Alan Topalian

Alan Topalian, Principal of Alto Design Management in London, has a first degree in mechanical engineering then graduated from Manchester Business School with an MBA. He entered the design field full time in 1971 and, on the basis of research since 1976, is an acknowledged pioneer in developing the management of design into a rigorous discipline in business.

Designing and managing the space for creativity. Artistic interventions for strategic development of an organization in resisting environment

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Keywords: Creativity, Artistic interventions, Aesthetics, Design management, Design thinking, Strategy, Organizational development

Creative interventions as a strategic tool in organizations have gained an increased interest with the hope to handle the complex, chaotic and interactional environments in the global competition. In this study we explore an organization which has involved an artist to facilitate a creative change in its working routines. The study is based on qualitative methods inspired by ethnography. Aesthetic perspective on organizations, design thinking and artistic intervention literature form the main theoretical frame. In the first phase of the two-year-long intervention project we have noticed a lot of problems depending on the differing business logics and the artistic logics, the artistic and designerly methods in practice have shown a lot of similarities.

1. INTRODUCTION

In our society new ways of finding strategic advantages in different kinds of business have largely focused on creativity (DeFillippi & al. 2007). Maybe the popularity of the concept creativity in contemporary discussion tells about a wish to find solutions to any kind of problems, but it is also evaluated critically, as a buzz word worth questioning (Ericsson 2001; Rehn 2009; Styhre & Sundgren 2005). Surely, a number of firms reach out to people working with creativity, like professional artists and designers. Companies ask for creative and

innovative solutions by exploiting “the creatives” skills and exotic mindsets in order to generate economic profit and stimulate idea generation amongst employees, or at least attract public attention and hence raise the value of the company. Norman (2010) claims that applying design thinking in companies is a powerful public relations term.

Design management has been one of the fields which has been associated with ideas of strategic management of the creative resources in companies (Borja de Mozota 2008; Kim and Chung 2007; Liedtka 2010, 2011). As Walton (2006) states, instead of asking if design makes a difference, the question nowadays is how design makes a difference. However, there are scholars who have criticized design management discourse in the sense that the view on creativity is too instrumental and is focused on the cognitive aspects in knowledge creation. Consequently, there exist opinions that aesthetics, art and cultural aspects, too, would be included in design management and design thinking (Digerfelt-Månsson 2009; Jahnke 2013; Johansson & Woodilla 2010; Verganti 2006; Venkatesh & al. 2012). Verganti (2006) emphasizes that design discourse is created in a network consisting of users, companies, products, designers, design schools, artists, cultural and communication actors which facilitates different kind of interactions allowing imagination to flourish. Parallel thoughts, concerning art being created in a network of several actors, have been presented by Guillet de Monthoux (2004). How inspiration from art and the cultural world, as well as aesthetics, can facilitate efforts to increase creativity in different kinds of organizations and companies has been of growing interest during the last decades (Austin & Devin 2003; Gagliardi 1996; Guillet de Monthoux 2004; Ladkin & Taylor 2010; Linstead & Höpfl 2000; Strati 1999; artist in residence, www. resartis.org, 20110620).

One of the organizations which has responded to the challenge of developing new, creative working methods is the Swedish trade union “GREEN” which is working in somewhat resisting environment in the society. According to Institute for Advanced Labour Studies, University of Amsterdam (Visser 2010), the membership numbers have fallen from a peak level of 86% in 1995 to 71 % at 2010. The same tendency can be identified in Sweden, too. In order to encounter the declining membership numbers a core group in “GREEN” consisting of eight persons, “Group8”, situated at “Holmen” in the city G, has been assembled. As a tool, with focus on the internal strategic development of Group8’s working routines, a company “LITTL” with artistic interventions in organizations as its business idea

has been involved. Besides *increasing creativity* in Group8 the goal for the cooperation between LITTL and Group8 is, eventually, to *find out new, innovative working methods*. As a part of improving the image of the union Group8 wants *to learn* about creativity and innovations in order to communicate the lessons in further contacts with old and potential new members.

Although there exists increased interest on design management, design thinking and artistic interventions in organizations with the aim of developing the business, it is tricky to analyse which are the consequences. Why this marriage between business and design world would work, if it works, Liedtka (2010) asks, stating that there is an asymmetry in the thinking systems between the creative and the business world. Business thinking expects rationality and clean economic logic with quantifiable measurements, and executives value stability and control. In contrast, design thinking assumes always more or less messy real life human experiences, and reality is socially constructed (ibid). It is problematic to measure and evaluate the impact of creative initiatives and the outcomes don't necessarily will be what is expected (Biehl-Missal and Berthoin Antal, 2011; Barry & Meisiek, 2010). There are also differences in design thinking and art belonging to two different traditions, and there has been little cross-disciplinary research, state Johansson and Woodilla (2012).

Consequently, in this study we explore what differences and similarities of artistic interventions and design thinking can be found in a business development process (on the example of the GREEN Group8 Holmen project)? What can be learned from such approaches and what is needed to support these efforts?

By focusing on artistic innovations and design thinking as conceptual and practical tools in strategic development of an organization our *purpose* is to raise appreciation for the creative approaches in business and organizational world. We also want to present some insights in the artistic intervention process in order to summarize experiences from the ArtRes project during the Spring 2013 as a base for the further intervention process. - In the long run the overall purpose of this two years long study is to create theoretical, empirical and methodological understanding for strategic development in organizations with help of the artistic and design methods in order to increase creativity and innovations.

However, the study is about the intervention process during the first months of the project, and our aim might be described like going to the location in order to conduct an ethnographic study, be open to what is happening and thereby setting the stage for the further research,

both empirical and theoretical. Consequently, the results, analysis and discussion should be viewed as the first reflections on the case of impacting artistic or designerly skills on business development.

2. THEORETICAL INSPIRATION

In this part we are presenting first the concepts of creativity and innovation. Second, perspectives and opinions on strategy, design management and design thinking are reviewed. After that follows a part on arts management and artistic interventions.

Creativity and innovations

Styhre and Sundgren (2005) present four different streams of research on **creativity**, e.g. creative processes, creative people, creative products and creative environments, stating that, at the inception of the field, it concentrated on the individual perspective; however, later on, interest focused on the contexts where creativity occurs. In organizational literature, creativity is often conceptualised as finding out something new, as new useful ideas, products, processes, procedures, and services (Amabile & al. 2004). In both public and private organizations, great efforts are made to find these new ways of managing the global problematic, states Koivunen and Rehn (2009). They continue by saying that, although creativity was previously greatly connected with the fields of art and culture, nowadays the basic premise of theoretical reasoning must be that creativity exists in all areas and every single person must be acknowledged as a source of creativity.

How creativity can be manifested interesting ideas can be found in process thinking (Hernes & Maitling, 2012). Chia & King (1998) argues that new situations, events and outcomes, incorporate the events into their past, providing opportunities for something new to emerge, but that also brings restrictions. According to process thinking, creativity and becoming are immanent in all living systems. Instead of viewing organizations as thing like social entities, they would be seen as processes of world-making. Mary Parker Follet is one of those raising the question of creativity as a collective action needed in a dynamic society (1919, 1924 www.folletfoundation.org/writings, 2011-05-31). She writes about social communities as creative processes and uses a relational, interactive perspective, arguing that if something new is to emerge, it will happen when different kinds of encounters and conflicts occur within a community.

Often, the creativity concept is followed by discussions about **innovations**. Koivunen & Rehn (2009) notes the gap in the understanding of the relationship between the two terms, being partly overlapping, but also distinctive in the sense that creativity would be defined as the *generation of new ideas*, and innovation is understood as the *implementation* of the creative ideas. According to Wennes (2009), economic results are central to the innovation perspective. Johansson and Woodilla (2009) states that innovation is a technological discourse aiming to be knowledgeable about bringing inventions to the market, which do not only need to be product specific – they can also be social (Mulgan, 2007). Styhre (2013) wants to expand the economic discussion concerning innovations to include also playfulness and squandering.

Strategy, design management, strategic management of the creative resources, design and design thinking

Surely, in traditional management thinking on **strategy** in organizations it has been viewed as a tool, largely understood as planning by top manager team, which leads the organization through changes and secures its future success. However, a static view on strategy has been questioned by process thinking (Mintzberg, 1994; Chia & MacKay, 2007)). Mintzberg (1994) states that the future is not given, strategic analysis can't be separated from implementing of it, and formal procedures don't necessarily to contribute to innovation. That means that planned inputs, but also acute everyday arrangements must be done, and we must rely on luck, too. During the recent years an approach called Strategy as practice has gained attention. Johnson & al. (2011) views the strategy as an important social practice. Wittington (2001) argues that *we must study what the people who do strategizing actually do.*

T**he strategic management of the creative resources** has been an important discussion in **the design management field** (Borja de Mozota, 2008; Cooper & al., 2011; Kim and Chung 2007; Liedtka 2010, 2011). According to Cooper & Press (1995) adding value by corporate planning process with help of design can be an individual activity or a management function. The disciplinary boundaries for design can range from engineering to fine art. Accordingly, design management would be viewed as management of design in companies, emphasizing its role in strategic and innovation work (Cooper & al. 2011). There are a lot of definitions and interpretations for the word design and the word can be understood in different ways. Design is making sense (of things) (Krippendorff, 1989), as well as creation and re-creation of meaning (Verganti, 2006). Simon (1996) talks about a framework of problem formulation

followed by finding a solution, and Schön (1983) writes about reflection in action –both during and after the designing process. Consequently, as soon as design management moves into more conceptual spheres of design and expands its scope to not only product development, production, distribution, sales or delivery, *design thinking* becomes relevant as a concept. According to DMI (2013) design thinking describes the use of design for management, therefore it can certainly be argued that design management can include the use of design thinking – or using design processes to solve general business problems. *Design management can be understood as the organizational strategy of design whereas design thinking is the used methodology, and design tools might be the concrete methods used in a design thinking process.*

Concerning the concept **design thinking** the term is generally referred to as applying a designer's sensibility and methods to problem solving (Lockwood 2010). At companies using design as a business strategy, design and designers have moved beyond roles as stylists to catalyze innovation as a core competency (Sato 2009). Hence, when talking about design thinking, it is crucial to make a clear differentiation between *design as practice* (traditional notion of design resulting in a product or service) and *design as method* (design thinking). Design thinking can be seen as the abstracted form of practice-based design. However, Tonkinswise (2011) is critical against design thinking meaning that it is *"design minus aesthetics*". Kimbell (2009) talks about design thinking reducing design to an immaterial, intellectual problem solving technique, design without the material practice. Brown (2008) states that design thinking helps in the transformation of design from form and style to that of function and structure.

One of the ground rules of design thinking is to apply **a design process** to a more strategic process. This means that iterative, non-linear practices – which are one of the fundamentals of a design process – are utilized for business, product or service development. Therefore, design thinking – with its process focus – is more related to the verb, the process of designing (Liedtka & Mintzberg 2006).

One of the basic ingredients of design process is *the re-definition of the initial problem* or *brief*– being a part of the professional skill of a designer (Norman 2010). The next step of is *the user of the intended product or service in the center* approach (Rylander 2009). Norman & Verganti (2012) says that human- or user-centered design is a philosophy, not a precise set of methods. In the *ideation phase* the design thinkers play with the gathered insights. This

often happens in multi-disciplinary teams, which might be the best way to unearth creative possibilities in innovation (Eriksson-Zetterquist& al. 2011). In the next phase to use the developed ideas, design thinkers make and test without a clear goal by *prototyping* new solutions that arise from their four strengths of empathy, intuition, imagination and idealism. Neumaier (2009) says, that instead of "solving" problems, designers "work through" them. *Failure* is also a significant feature of design thinking (Brown 2009).

Summing up. Design thinking occurs at the merger of business and design and strives to understand the character of designers' sense making (Johansson & Woodilla (2009), its practices aim to improve innovation capability (Jahnke, 2009). It is is argued to be more suitable to solve the vast and complex economic, social and ecological problems of today than traditional "scientific" approaches (Liedtka, 2010; Rylander, 2009). Aesthetics, art and cultural aspects, too, would be included in design thinking (Digerfelt-Månsson 2009; Johansson & Woodilla 2010; Verganti 2006; Venkatesh & al. 2012).

Arts management and Artistic interventions

During the last twenty years interest has been shown in arts management; that is, how ideas in business administration can influence practical organizing procedures in art and culture creating organizations in order to achieve better management (Evrard & Colbert 2000; Fitzgibbon & Kelly 1999; Stenström 2000; Taylor 2012), on the one hand. On the other hand, interest has also been growing concerning how art and the cultural world, as well as issues concerning aesthetics, can create an understanding of organizing and management/leadership in different kinds of organizations and companies (Austin & Devin 2003; Björkegren 1996; Gagliardi 1996; Guillet de Monthoux 2004; Koivunen & Rehn 2009; Linstead & Höpfl 2000; Ladkin & Taylor 2010; artist in residence, www. resartis.org, 20110620; Soila-Wadman & Köping 2009; Strati 1999). Biehl-Missal & Berthoin Antal (2012) claims that companies often are longing for co-operations with art-world thanks to their "otherness". Artists are also said to be more capable of being in uncertainties, mysteries and doubts, without any irritable reaching after fact and reason, which maybe explains why initial communication between managers and artists is prone to be difficult. Grzelec and Prata (2013) writes that the general idea behind artistic interventions is that when the two contrasting logics (the logic of the artist and the logic of the organisation) clash, energy is released in the form of new ideas and deeper understanding for what the organization is doing on an existential or meta-level.

The interventions can range from the use of theatrical presentation workshops to develop employees' confidence, poetry workshops to improve reading and writing skills, sculpture sessions to stimulate imagination, storytelling activities to encourage knowledge sharing and to improve communication, photography sessions to encourage teambuilding, filmmaking to visualize a group's development, and more. (Biehl-Missal & Berthoin Antal 2011).

Artistic methods can act as the "flavour of the month" or the "creative afternoon", adding something new and engaging to managerial development activities with little idea of what that something is (Biehl-Missal & Berthoin Antal 2011). Even rather low-expectancy projects can have a high impact in the long-run if they manage to keep everyone engaged. Yet the benefits are hard to predict and therefore sometimes difficult to appreciate from a management perspective. For such projects to be "successful" the participants need to be open and develop a high level of *trust* in the performing artist. Because first and foremost, artistic interventions – by the very nature of art – require freedom and trust (Biehl-Missal & Berthoin Antal 2011). Berthoin Antal (2012) declares that, art and artists stimulate us to see, hear and experience more of what is going on within us and around us. This is also when soft skills or tacit knowledge surface (Polanyi 1966). They are hard to evaluate and be taken into serious consideration in a world dominated by quantitative measurable results. Soft skills deal with emotions, feelings and intuition. For artists, these attributes are essential in their way of working, determining their decision-making processes.

Darsö (2004: 135-146) presents a model on how arts may influence the participants in an artistic intervention project to reflect on their everyday view of world and thereby develop a deeper understanding of themselves and how they relate to the circumstances surrounding them. Hopefully this deeper understanding will lead to action. The different phases are named as *downloading*, *seeing, sensing and presensing, crystallizing, prototyping and embodying*. Taylor & Ladkin (2009) identifies four different parts of artistic interventions regarding soft skills, they exist on their own or in combinations: (1) Skills transfer. Arts-based methods can facilitate the development of artistic skills in a group. (2) Projective technique. The output of artistic endeavours allows participants to reveal inner thoughts and feelings that may not be accessible through more conventional developmental modes. (3) Illustration of essence. Arts-based methods can enable participants to apprehend the "essence" of a concept or tacit knowledge in a specific situation in a particular way, revealing depths and connections. (4)

Making. The very making of art can foster a deeper experience of personal presence and connection.

Berthoin Antal and Strauß (2013) have examined 205 publications on arts and business and social impacts of the arts interventions in different kind of organizations. The majority of the cases report impacts of artistic interventions in *activation* (positive experience, emotion, stimulation, energy), *seeing more and differently* (reflection, widen perspectives, awareness of present conditions), *personal development* (discovery of self, personal growth, skills, tools) and *collaborative ways of working* (working together quality, communication quality, communication quantity). Only the fewest saw strategic and operational (profitability / turnover, marketing / PR, strategy, product development, product / service quality, efficiency / productivity, HR development / recruitment) impacts.

3. METHODOLOGICAL QUESTIONS

The text draws on relational constructionism (Gergen 1994; Dachler, Hosking & Gergen 1995), reflective ethnography (Kostera 2007; Law 2004) and narrative knowledge creation (Czarniawska 1998). Process ontology, sense-making and narrative thinking as already noticed in the previous chapter, are the inspirators when looking at creativity, viewed as an on-going process whereby we human beings structure and stabilize the moving social reality (Hernes & Maitlis, 2012; Chia & King 1998). We also want to emphasize the role of aesthetics in knowledge creation, meaning that knowledge creation is not only a chronological, linear, rational process, but also one that is based on our senses, emotions and imagination (Linstead & Höpfl 2000; Strati 1999; Taylor & Hansen 2005; Welsch 1997). Aesthetic reflexivity would be described as knowledge creation "through appropriation and transformation of the sensory and emotional characteristics of our experiences" (Sutherland 2012:1-19).

The empirical investigation part of this report focuses on a collaborative project between two quite different organizations – "GREEN" (a Swedish trade union) and "LITTL" (a creative agency working with artistic interventions). We have been able to monitor the early phases of LITTL's artistic intervention (called the ArtRes project), and conducted interviews with all participants in the project as well as with a lot of related stakeholders. Techniques have included participant observation of meetings and encounters, semi-structured interviews of the Goup8 members, the intervening artists and officials at Green, as well as a focus group conversation after the meeting of designing the action plan for Group8. The interviews are

recorded and transcribed. The interventions are in part documented by video and photo, which have been studied as well as other written documents.

4. EMPIRICAL FINDINGS AND ANALYSIS

The main goal and reason for the existence of this ArtRes project is set by GREEN'S board. The aim is to *"attract 8.000 new members within two years. In this context the development of new stadiums and functions of Group8 should be supported by the main organization GREEN. It is hoped that the fruits of this innovation work can be used within GREEN on a national level later on."* (Liinason, 2012).

Touch points for the intervention process

To represent the creative approaches in this project three touch points are selected, the kick-on workshop, the designer workshop and the action plan formulation.

Kick-on: In February 2013 LITTLs artist, who is steering the ArtRes process, started her first "getting-to-know" workshop with Group8. The team was asked to cut out six images from provided newspapers and magazines to represent their ***personalities*** and glue them on to a plastic cube. In the reflection phase, the participants were supposed to talk about their cubes. The team mostly chose images representing hobbies and interests rather than personalities. Would this task have had different outcomes if the team would have known each other better and been more confident to share personal things? A statement of a participant was: " *I liked that the artist presented her work. This touched me somehow and is certainly something I will remember."* This evidences a first clue for the important emotional aspect of artistic interventions. In the afternoon, everybody went to a nearby photo studio. The two teams were asked to come up with ideas of how to physically ***visualise*** "strength" and "togetherness" via the medium of photography for the other team respectively. The photoshooting – since very physical in its nature – led to a lot of engagement and cooperation amongst the participants. They seemed to have fun, and learned that ideas can also emerge *along the way* and *do not necessarily need to be determined at the beginning of a process only*.

Designer workshop: The designer workshop was organized by the designer because the team was stuck in the fuzzy phase of a creative process, and constantly asked for clarification, validation and documentation. The assignments were, first, an icebreaking game with sound and ball, second, everyone would tell a story of their lives, and third, brainstorming session to

generate different tools and tasks how to visualize their learning process. They also got homework to write down the tools and tasks, and deliver them next week in closed envelopes. The assignments were meant to be clear but open enough to trigger a free flow of ideas. But this proved to be a difficult part. As soon as it was explained that ideas could be quite random and playful, the team started to loosen up a bit and have fun.

The presentation of the homework results the following week brought fun stories and first good revelations. Although not everybody was able to show something, the learning from this task was beneficial for whole the group. *The participants started to realise that the outcome was actually not as important as the creative process itself.*

Action plan: The first workshop of the action plan formulation immediately raised the question what an action plan was, how it could be understood and what it should lead to. It proved to be a bit tricky to make a clear distinction between the ArtRes action plan and another action plan the project group received from the head office of GREEN in Stockholm, laying out the business related focal points for the company for the next quarter. Later, again a control question from the Group8 project leader about the meaning of the brainstorm came up; whether the ideas should be linked to concrete and practical applicable proposals of how to meet potential GREEN members (the core goal of this project) or focus around things that seem fun to do? This evidences an ongoing confusion about the ArtRes project compared to GREEN's business strategy. A statement underlines this notion: *"I do not understand the structure. I certainly have not rooted ArtRes properly. I need structure and an overall project plan."*

Analysis

The importance of increased creativity in the organization GREEN is well noticed and accepted in the organizational rhetoric in several hierarchical levels. However, in formal positions at GREEN there are also people who have a skeptical attitude towards the ArtRes project and Group8 feels they must continuously justify the ArtRes project. Also in the practical intervention processes once a week at Group8 some resistance has been noticed.

A few key topics or challenges became apparent during the ArtRes process:

Team: Since Group8 was a new team, people were rarely acquainted with each other, occupied with their practical work issues and felt the need to prove themselves. This made it hard for the artist to create trust in her work which is an important issue (Biehl Missal &

Berthoin Antal 2011) - Trust is needed in order to be able to reveal one's inner thoughts and feelings in workshops where a lot of work is accordingly done with '*projective techniques'* (Taylor & Ladkin, 2009).

Structure vs. openness: During our study, it became clear that engaging in an open creative process seemed challenging for the participants since they were new to this type of working and doing. Several of the researchers we have referred to talk about an open attitude in the beginning of a creative process. Norman (2010) writes about the *the re-definition of the initial problem* or *brief*. Darsö (2004) talks about '*downloading'*, meaning moving from one's ordinary view on world to *'seeing'* in the sense of being observational to one's surroundings and oneself, which probably is on the way, but cannot really be seen yet in the Group8. Everyone has been used to well-organized and structured working routines. From the very beginning, the participants – among others the project leader – have asked for rules, set goals, to-do lists, tasks and frameworks from the artists. This has been hard to provide due to the nature of an artistic intervention, which rests upon *co-creational approaches*, as also Mary Parker Follet (1919, 1924) emphasizes as a basic aspect for creativity to emerge, rather than set frames and guidelines. Even after four months of working with the artist, the participants still wanted these types of instructions. Interestingly, an instruction could also be that there were no instructions. This apparently already made it easier for the project team, since they had something they can hold on to. *"I need to mentally prioritise the customer visits – then comes creativity,"* said one team member.

Expectations: Group8 had different expectations of what an artistic intervention is, compared with the involved artist. Taylor & Ladkin (2009) name the phase in the beginning of an intervention process for '*skills transfer'* which describes the need for the acceptance that the artist's skills are useful for the organization. Contrasting interpretations of goals and deliverables have appeared all the time. Is the set goal according to traditional business logics to reach 8.000 new GREEN members really the goal that should be achieved through ArtRes? These and other discrepancies often dealt with mismatching notions about definition and understanding of the ArtRes process, time issues, questions about documentation, working effectively, credibility, measuring and visualizing creativity and the pressure of performing and justifying the financial investment for this project. Furthermore, artists are usually not keen on goals and outcomes. They live for the process and can hardly make promises of what the result of their work is going to be. Therefore, having clear, corporate,

measurable goals might be counter-productive for their processes. A phrase points out this struggle*: "We would achieve things much faster when they would trust me (the artist) and don't think about numbers and goals all the time."*

Acknowledgement: *'Crystallization'* is one of Darsö's (2004) terms for the phase in intervention after 'seeing'. The term is used to tell about a deeper understanding of the process, and which would lead to changed actions, named as *'prototyping'* and *'embodying'* (prototyping - in a slightly different meaning as it is used in design theory, but these words can be viewed having some parallel meaning referring to something which becomes materialized, or embodied as a changed behavior). -Positive affirmations have appeared to be important. Everyone at the Group8 seemed to need to feel that they achieved something, that they were *efficient* in one or another way at the end of the day. This helped them to feel good about their work and stay motivated.

Summing up, one might learn from our observations, that artists and designer can use rather similar tools and techniques when it comes to practice-based methods. Compared with Berthoin Antal & Strauss (2013) study about the artistic interventions, our case seems to focus on the same kind of issues, like positive experiences, emotion, stimulation, energy, widening perspectives, personal and collaborative ways of working. However, there is a difference in this case in the sense that strategic development, product / service quality, efficiency and HR development impacts have been raised as important questions at Group8. The question is nevertheless if the organizational development is a task for the artist, or is it the task for Group8 to come to work with these organizational issues, but with a widened and renewed perspective during the intervention process, and after.

5. FINAL WORDS

One of our purposes has been to raise appreciation for creative approaches through increased understanding for the use of artistic interventions and design thinking as strategic tools in organizational development process. We also have looked at the differences and similarities, on the one hand, in theoretical constructions concerning design management/design thinking and artistic interventions, and, on the other hand, working methods in the intervention practices.

Surely, design management and design thinking has been accused of lacking the aesthetic, material and embodied perspective in design, favouring the cognitive perspective (Kimbell 2009; Tonkinwise 2011). However, there are several texts which also emphasize the role of

aesthetics (Borja de Mozota, 2008; Svengren, 1995; Verganti, 2006) and art (Digerfelt – Månsson, 2009; Thornquist, 2005) and this trend already exists. The argument why we plead for the aesthetics would be reinforced with what Welsch (1997) writes. According to him there is no cognition without aesthetics because our thinking is depending on the knowledge we get through our senses.

What concerns *the artistic methods and design techniques* in the different workshops during the ArtRes project they look quite similar. In theoretical works concerning both design thinking and artistic intervention can be found the ideas of opening up for seeing the world differently (Darsö, 2004; Liedtka, 2010). But we also can see differences between art and design when looking at their application in such a process. Artistic interventions – from their very nature – are practice-based methods that might have long-term personal, cultural or organizational impacts. Whereas design thinking is an abstracted form of design-as-practice. Therefore, one can rather speak of design-as-practice in the context of our designer workshop. Design practice in that sense is different to design thinking as mentioned by several researchers (see the theoretical part). Design thinking describes how a designer's mindset can be used *strategically*, and therefore we wonder whether design thinking can really be used in a workshop alone.

However, what has made a strong impression on us is the clash between traditional business thinking and the creative approaches, which for instance Liedtka (2010), Grzelec & Prata (2013) and Barry & Meisiek (2010) notice. Although there is an acceptance in Group8 of the opportunity to change one's working methods, and willingness to do it, persons in a responsible managerial positions have at the same time expectations from higher hierarchical levels to deliver results in traditional, quantifiable forms.

Further research will focus on the continuing theoretical elaboration of the topics that have been raised in this text, on the one hand strategy and design management, on the other hand the organizational creativity and innovation development. In order to respond to the demands of more empirical research concerning the everyday practices and working routines (Sutherland 2012), in the further intervention process we will continue the field study in Group8, and focus on the situated learning processes of the group members concerning creativity, which, although some gravel on the road, is described as follows:

"We want that ArtRes is undemanding and leads to openness, creativity and joy. In order to subsequently implement new ideas and approaches in daily work. We want to create positive energy together and have time to try new things and dare to fail."

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DESIGNING FOR FLOW IN ONLINE APPAREL RETAIL

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Keywords: online retail, fashion, experience design, customer satisfaction, flow

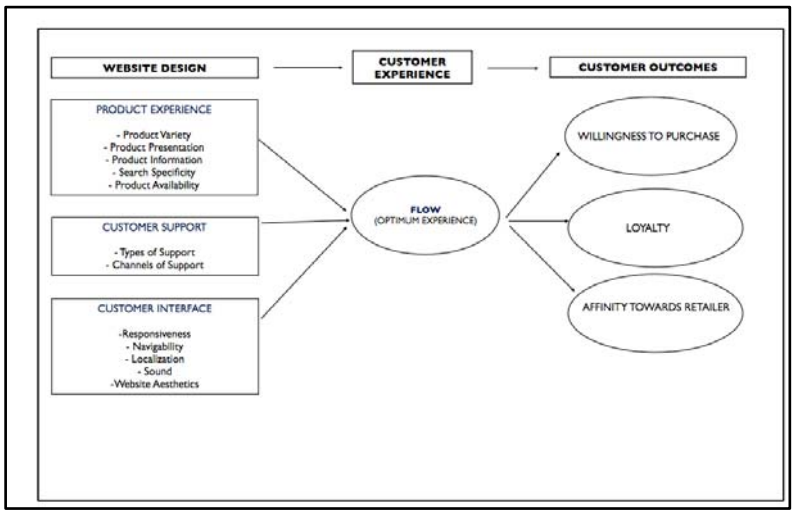
Online shopping is already well established in modern economies, traditional 'brick-a-mortar' stores have modified their business models to seize opportunities offered by online channels (To et al. 2007). In the United Kingdom, 11.7% of the total online retail sales consist of textile, clothing and footwear; a figure projected to grow to 60% by 2015 (Office for National Statistics, 2011). It is apparent from these statistics that the online apparel industry, composed of textile, clothing and footwear commodities, is an important retail channel for the economy.

However, the online fashion retail industry continues to face many challenges with the online format, one of the major drawbacks of online shopping as compared with brick a mortar stores is that customers cannot physically examine or try on the products before buying leading to a disinclination to buy online (Song et al. 2006)(Speck and Elliot, 2005). By focusing on offering an outstanding online experience, retailers can overcome some of these challenges (Grewal et al. 2009).

Given this significant projected increase in online retail and the challenges faced by online retailers it is essential to identify service design imperatives that may afford retailers a strong competitive position. One approach is to focus on providing an exceptional customer experience as a key characteristic of the service delivery system. As customers become experience oriented, retailers too are focusing on creating a successful experience for their customers. Flow provides a distinctive approach of looking at customers experience, flow has been described as a state of optimum experience (Csikszentmihalyi 1990). Customers who achieve flow are so acutely immersed in the navigation process that there is little room for thoughts not related to the activities and tasks performed whilst browsing a particular website (Hoffman and Novak 2000). Successful experiences are assumed to have a major impact on customer's purchase decisions, loyalty and affinity with a retailer (Pine and Gilmore, 1999) and should therefore be explored as a point of differentiation. Website Design is one the major factors that contributes to e-commerce success. Building intuitive and engaging websites is crucial for online retailers as it generates a positive experience which leads to more online buying and loyalty (Chaing and Nunez, 2007). Two-thirds of the customers will not shop on a poorly designed website (Genex 2003 cited in Speck and Elliot 2005). While 72% of the internet users search the internet for products (Shop.org 2001 cited by Seock and Norton 2006) the level of search activity does not translate into high purchase levels.

Against this background, the research explores how fashion retail websites can be designed for an optimal customer experience. While the design of the websites is owned and managed by the retailer, the customer experience of that website, however, cannot be fully controlled by the organization. Fundamentally, research has drawn attention to the role of processes and the firm's workforce on producing quality experiences for customers. Nevertheless, customers play an essential role in fabricating their experience and ultimately enhancing their satisfaction (Bitner et al. 1997). Service experiences are a consequence of interactions between the consumer and the retailer, its systems and processes, its personnel (Bitner et al., 1997). Experiences are construed and co-created by customers based on their interpretation of the interactions and clues provided by the service provider (Verhoef et al. 2009). Experiences are essentially emotional and personal; they are based on customer's subjective interpretations, personal characteristics and on the customer's prior mood to the interaction (Pullman and Gross, 2004). These factors go beyond the control of management. The overall objective of the research is to identify the website designs (illustrated in Figure 1) that facilitate the co-creation of optimal customer experiences to drive desired customer behaviours. This paper presents the derivation of a conceptual model and associated hypotheses suggesting a relationship between website design characteristics, elements of flow and behavioural outcome.

The research will examine whether customers who achieve flow during the shopping experience are more likely to make purchases on the website, to return to the website and to develop an affinity towards the retailer. The primary outcome of this research is an assessment of how the customer experience of a retail fashion website influences customer's shopping behaviour. Considering this assessment, the research will generate a set of preferred design characteristics for fashion websites that enable the co-creation of optimal customer experiences. This approach to website design will help fashion retailers to enhance the online shopping experience, focusing attention on the specific design elements that influence the customer's shopping behaviour and make a theoretical contribution to service design



literature.

A. LITERATURE REVIEW

(1) Customer Experience and Flow

Customers search beyond the product, service or brand. They seek a unique experience (Spreng, MacKenzie & Olshavsky, 1996; Vandenbosch & Dawar, 2002 cited by Ismail et al. 2011). Shopping is not only the act of purchasing goods; the experience of obtaining these goods also plays a major role (Pine and Gilmore, 1999). Considering the significant importance of experience, retailers are trying to position themselves as a source of memories as their consumers become increasingly experience oriented (Pine and Gilmore, 1999). The emerging 'experience economy' drives the demand for even more engaging customer experiences (Pine and Gilmore, 1999). Experiences are not just about entertainment but intend to engage customers in a personal way.

There are varying perspectives to defining customer experience. Flow offers one differentiating approach, Csikzentmihalyi (1990) introduced the concept of an optimum experience known as flow. Flow refers to a psychological state of acute concentration and enjoyment on a limited field (Csikzentmihalyi, 1990). Applying the flow concept to online environments, Hoffman and Novak (1996) defined flow as a cognitive state occurring during the navigation process which is denoted by high degrees of skill and control, high degrees of challenge and arousal, focused attention and is improved by interactivity (when the web responses rapidly to customer inputs) and telepresence (the user being acutely immersed in the virtual environment). The underlying principal is that customers interact with not only the retailer but the website as well (Nambisan, 2002). Importantly, flow is an outcome that can only be achieved when the customer performs tasks and activities and actively participates in co-creating the experience (Nambisan, 2002). In other words, effective customer co-production is required for the attainment of flow. Considering that customers play a crucial role in constructing their experience in online settings (Bitner et al. 1997), this suggests that flow is an appropriate concept to characterise successful online experiences.

There has been a wide variety of research on the flow construct and various definitions of flow have been proposed in the literature (Table1). Csikszentmihalyi (1990) was first to coin the term flow; describing it as a state of effortless concentration. Further, Csikzentmihalyi (1997) described flow as the state that arose in the presence of various task- and person-related characteristics such as clear goals, feedback, challenges, matching skills, concentration, focus, control, loss of self-consciousness, transformation of time and the autotelic nature of the activity. Flow is a concept that was initially developed to define powerful experiences in a variety of task environments. For instance, people report experiencing flow during a wide range of daily activities such as during playing sports, at work and while playing computer games (Hofman and Novak 2009). In recent years, scholars have turned their attention to transposing flow into commercial online environments. Ding et al. (2010) describe flow as a state that results from "significant cognitive involvement." Customers who achieve flow are so acutely immersed in the navigation

Figure 1: A PROPOSED MODEL FOR EXPERIENCE DESIGN AND IT'S IMPACT ON FLOW

process that there is little room for thoughts not relevant to the navigation process and the customer focuses wholly on the interaction with the web (Hoffman, Novak and Yung 2000). Similarly, Shang et al. (2005) defined flow as a psychological state in which an individual

feels cognitively efficient, motivated and delighted. The figure below has been adapted from Hoffman and Novak's model (2000) it presents the key components of flow and their relationships.

Flow is composed of seven distinct components namely skill, control, challenge, telepresence, focused attention, interactivity and exploratory behaviour as illustrated in Figure 2 (Hoffman and Novak, 1996). Skill is an individual's self-assessment of knowledge of the web; it refers to one's familiarity with the web (Bridges and Florsheim, 2006). Control is the perception that the task at hand is within the capability of an individual (Csikszentmihalyi, 1990). Challenge refers to the possibility of "action" or excitement during the navigation process (Hoffman and Novak, 2000). Telepresence occurs during the navigation process where virtual environment becomes more prominent than the actual physical environment (Hoffman, Novak and Yung, 2000). Focused attention is a state when

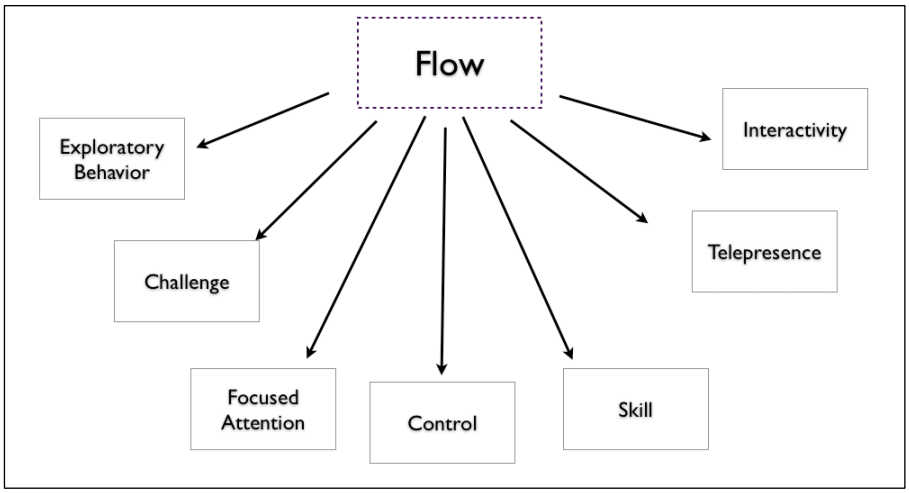


Figure 2: Components of Flow

the user focuses their complete attention on the activity of navigating the web (Webster et al., 1993). Exploratory behaviour refers to an individual's curiosity being aroused to further browse (Hoffman, Novak, Yung 2000).

(2) Experience Design

Customer experience is made up of every interaction the customer has with the company and the brand (LaSalle and Britton, 2003 cited by Ismail et al. 2011). An experience occurs when a company uses the services as a stage, the goods as props to engage customers in a manner that leads to a memorable experience (Pullman and Gross, 2004). Online customer experience is a "cognitive state experienced during navigation" (Novak, Hoffman, and Yung, 2000). While shopping online, the goods customer browse and interact with are system cues that affect the customer's cognitive involvement during the interaction (Berry, Wall, and Carbone 2006). Designing experiences is a cumulative of two key components (Stuart, 2006). First and foremost is the physical setting which is made up of system cues, in this case the online setting and the cues being website designs (Grove, Fisk, and Bitner 1992). Secondly, it is made of the level of involvement of customers in the service delivery process (Harris, Harris, and Baron, 2001).

(3) Flow and Satisfaction, Intention to Purchase, Loyalty and Repeat Purchases

Considerable research has investigated the role of positive experiences in driving customer satisfaction, both in marketing and management (Bitner et al., 1997). A pleasant experience is important as it has been shown to lead to desirable customer outcomes such as customer retention, loyalty and trust (Anderson and Srinivasan, 2003) (Fassnacht and Köse, 2007). Numerous marketing practitioners are convinced that customers will make more online purchases if they enter a state of flow (Florsheim and Bridges, 2007). The state of flow is known to have a positive influence on a customer's intention to make an online purchase (Korzaan, 2003). Not only does flow have a positive influence on intention to purchase but dimensions of flow also have a positive impact on attitude towards retailer (Korzaan, 2003). Furthermore, customers who achieve flow online are more likely to return to websites and be loyal customers (Cyr et al. 2005). By providing online features that are intended to facilitate the achievement of flow, retailers can encourage customers to make more online purchases, return to websites and loyal behavior (Florsheim and Bridges, 2007).

B. CONCEPTUAL MODEL AND HYPOTHESES

(1)Flow Experience and Customer Outcomes

(a) Control

Control is the perception that the activity of navigating a website is within the power of an individual (Hoffman and Novak 1996). Control is rooted in an individual's ability to successfully navigate a website and their understanding of how the website would react to their inputs (Hoffman, Novak and Yung 2000). Control in online fashion retail, refers to the extent to which a customer feels the activity of navigating a website and completing a transaction is within his or her control. Control refers to the extent to which a customer can determine how they will make an online transaction, the extent to which they can tailor their product and post-purchase experience. For example, when a customer is involved in buying a piece of clothing, they expect to have the power to choose what they buy (e.g. colour, sizes etc.), how they buy it (i.e. deciding how they pay for the products) and how they receive the end product (i.e. how the customer receives the delivery of products). The level of control a customer perceives while shopping online is likely to influence the attitude towards the retailer.

H1a: In Online Fashion Retail, a customer's perception of the level of control they feel while browsing an online fashion website is positively associated with their affinity and loyalty towards a retailer and the customer's inclination to make repeat purchases from the fashion retailer.

(b) Skill

Skill refers to an individual's competence to deal with a variety of tasks or challenges encountered during the navigation process (Shin 2006). Skill is an individual's self-assessment of knowledge of the web (Florsheim and Bridges 2006). Previous research has shown that the skill level of an individual tends to increase with an increase in use of the internet (Hoffman and Novak, 2009). In the context of online fashion retail, skill refers to the

previous experience one has in operating a fashion retail website and how well versed one is with the process of online shopping.

H1b: In online fashion retail, the customer's self-assessment of the level of skill they possess in online shopping is positively associated with their affinity and loyalty towards a retailer and the customer's inclination to make repeat purchases.

(c) Challenge

Challenge is the perception that an individual's abilities are being stretched while operating a website (Florsheim and Bridges, 2007). It refers to the opportunities for action on the website (Hoffman, Novak and Yung, 2000). A website that lacks adequate challenge is boring and monotonous to user (Anand and Strenthal, 1990). Flow is an outcome when there is adequate challenge so that users aren't bored but at the same time the level of challenge shouldn't make them anxious (Csikzentmihalyi, 2000). Web developers must provide adequate challenge to arouse users but not so much that they get disappointed and leave the website (Hoffman, Novak and Yung, 2000) In Online Fashion Retail, customers may find a challenge in trying to make the best possible product decision from all the choices available on a website. For e.g.: A customer may be looking for a pair of shoes, and may take up the challenge of looking at the entire selection of footwear available on a website to ensure they bought the best possible product.

H1c: In Online Fashion Retail, the level of challenge a customer perceives while browsing a fashion website is positively associated their affinity and loyalty towards a retailer and the customer's inclination to make repeat purchases.

(d) Telepresence

Telepresence is a cognitive state where the user is acutely immersed in the virtual environment (Turkle, 1984). Real world stimuli are blocked out and the virtual environment enthrals the senses (Song et al. 2006). Customers undergo a virtual product experience known as telepresence which stimulates an experience similar to that in a brick-a-mortar store while shopping for apparel online (Song et al. 2006). The virtual product experience entails mental imagery of the post purchase product use (Song et al. 2006). Telepresence is dependent on the quantity and quality of sensory information about the merchandise and the degree of interaction with the merchandise. While browsing a fashion product on a website, customers process a mental imagery of the post purchase product use.

H1d: In Online Fashion Retail, Telepresence while browsing a fashion website is positively associated with their affinity and loyalty towards a retailer and the customer's inclination to make repeat purchases.

(e) Focused Attention

Focused attention is when an individual focuses on a limited stimulus field; thoughts not relevant to the field are filtered out (Webster et al. 1993) (Ding et al. 2007). The focus on the website is so acute that the individual is mesmerised by the interaction with the web (Hoffman, Novak and Yung 2000). Focused attention is known to correlate to high levels of telepresence; therefore having an impact on flow (Hoffman, Novak and Yung 2000). In Online Fashion Retail customers focus their attention on the task of shopping and thoughts not relevant to the shopping process are completely filtered out.

H1e: In Online Fashion Retail, Focused attention on a fashion website is positively associated with their affinity and loyalty towards a retailer and the customer's inclination to make repeat purchases.

(f) Exploratory Behaviour

Exploratory behaviour refers to an individual's curiosity being aroused to further browse the website due to the compelling interaction with the web (Hoffman, Novak, Yung 2000). Exploratory behaviour is an independent outcome of telepresence (Hoffman, Novak and Yung, 2000). In Online Fashion Retail, Exploratory behaviour refers to the customer's desire to stay on the website and browse products.

H1f: In Online Fashion Retail, Exploratory Behaviour demonstrated by a customer on an online fashion retail website is positively associated with their affinity and loyalty towards a retailer and the customer's inclination to make repeat purchases.

(g) Interactivity

Interactivity occurs when the web pages load rapidly, when an individual enters responses to a website (Ding et al. 2007) (Shin 2006). Customers find an online experience extremely compelling when they achieve flow during the navigation process (Novak, Hoffman and Yung 2000). Interactivity of a website affects user's enjoyment and the level of satisfaction (Ding et al. 2009). Interactivity occurs on a fashion retail website when the web pages respond swiftly when a customer is browsing the web page.

H1g: In Online Fashion Retail, Interactivity of a web page in online fashion retail is positively associated with their affinity and loyalty towards a retailer and the customer's

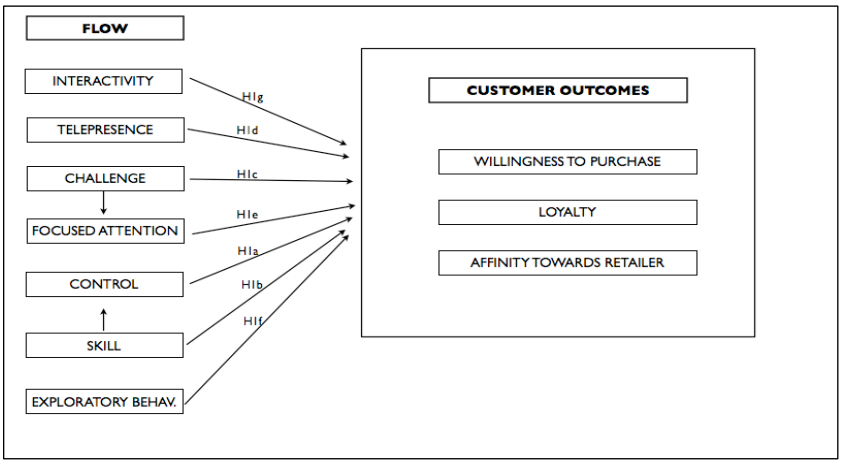


Figure 2: Hypothesized relationships between Flow and Customer Outcomes

inclination to make repeat purchases.

(2) Online Apparel Experience Design and Flow

In online apparel experience design, three main categories have been identified - Product Experience, Customer Support and Customer Interface Design. Referring to interaction between the customers and the products on a website, the product experience is often critical as customers cannot physically examine the products on a fashion website (Speck and Elliot, 2005) (Chaing and Nunez, 2007). Customers rely on the experience of the products on a website to make purchase decisions (Speck and Elliot, 2005). For example, the way in which products are presented can generate a feeling of fantasy around the apparel items the user is browsing as it generates mental imagery of post-purchase product use (Fiore et al. 2005). Customer support is a broad term used to describe the range of services offered by a retailer to provide customers with any type of assistance before and after purchase (Ding et al. 2010).

Customer interface provides a platform for customers to interact with the functional and esthetical elements of the website (Chang and Chen, 2008). Each category encompasses a number of individual design elements which are assumed to influence the attainment of flow constituents.

(a) Product Experience

There are a variety of design features and choices that can contribute to enabling a powerful product experience.

(a1) Product Variety

Previous research has shown that offering a variety of products significantly contributes to customer satisfaction (Bansal et al. 2004; Koo, 2006; Lim and Dubusty 2004). Firms can also attract the attention of customers by offering an assortment of products (Chen and Hilt, 2002 cited by Ding el al. 2007). Product variety refers to the depth and breadth of product selection; depth representing the number of variants in each product category and breath represents the total number of product categories (Simonson, 1999).

Product categories and product variety are overlapping themes. The number of product categories on a website can trigger a perception of high product variety (Chang 2011). In an online environment, products are displayed in a hierarchical order or a filtered order, which makes it difficult for customers to estimate product variety based on display space (Chang 2011). By looking at product categories on a website, a customer can judge the product variety on a website. Classifying products into categories on a website also generates a perception of greater product variety, ease of navigation for the customer and overall a joyful shopping experience (Chang 2011).

A website with an increased product range is perceived as challenging (Koufrais 2002). When a website has an increased range of products, customers will browse to find a product that is best suited for their needs, Product variety also has an impact on focused attention as a limited product selection does not attract the attention of customers (Ding et al. 2011).

H2a: In Online Fashion Retail, the number of product subcategories is positively associated with the customer's perception of product variety on a website.

H2b: In Online Fashion Retail, a high product variety is positively associated with customer's focused attention.

H2c: In Online Fashion Retail, a high product variety is positively associated with the customer's perception of level of challenge.

(a2) Presentation

As customers cannot physically examine or try on products in the online environment, product presentation is important for customer's to evaluate the quality of products. There are various ways of presenting products on a website using image interactivity technology, dynamic product imagery or using augmented reality.

Image Interactivity Technology facilities the alteration of product's design, background, viewing angle or distance which stimulate a pleasurable shopping experience (Fiore et al. 2005). Two emerging forms of image interactivity technology are mix and match technology and virtual try-on technology (Fiore et al. 2005). Mix and Match technology allows customers to pair different clothing items to stimulate an image of how products would look together. In virtual try on technology, the consumer selects from a variety of models, differing in gender and body proportion to try on items of clothing. H&M online stores use

virtual try on technology. Image interactivity technology is known to create a sense of telepresence as the images that are displayed on the website evoke mental imagery of a brick a mortar store (Fiore et al. 2005). Telepresence is dependent on the quantity and quality of sensory information about the merchandise and the interaction with the merchandise (Fiore and Song 2004). Image Interactivity Technology encourages users to stay in that environment and browse the online store which encourages exploratory behaviour, a constituent of flow(Fiore et al. 2005).

While, augmented reality simulates the appearance of apparel on the customer's body with the help of a webcam (Fiore et al. 2005). Retailers may also feature product videos on their websites. Dynamic product imagery allow online shopper to interact with a product and examine the product on screen, it provides shoppers with detailed information and induces shopper's enjoyment (Kim and Forsythe, 2010). Dynamic product imagery consists of videos and other rich media content (Kim and Forsythe, 2010), which enhance the shopping experience of users. It generates a feeling of fantasy around the apparel items the user is browsing (Fiore et al. 2005) High fidelity images and motion pictures which are used in dynamic product imagery have been shown to contribute to high user attention (Lee and Bensbat, 2009)

H2d: In Online Fashion Retail, Image Interactivity Technology, Dynamic Product Imagery and Augmented Reality are all positively associated with customer's telepresence sensation.

(a3) Product Information

Product Information refers to the accuracy and amount of information regarding the products and services offered on a website (Speck and Elliot, 2005). Product information contains product related information including prices, colours, packaging, brands, etc. While service related information refers to information regarding delivery, returns etc of goods purchased on the website (Dadzie and Winston 2007). This is especially important as the consumers cannot physically examine the product and therefore they depend upon the information provided to them (Speck and Elliot, 2005). Better information on a websites facilitates better decision making. Since product information is one of the main sources from which consumers gain knowledge of the products on a website, it may help customers in feeling more in control while navigating a website.

H2e: In Online Fashion Retail, the amount of information displayed on a fashion retail website is positively associated with customer the level of control.

(a4) Product Search-ability

Product Search-ability allows customers to easily search for the products they need as well as the retailer providing recommendations of products based on the products the customer has viewed or based on previous purchases (Chang and Nunez, 2007). Product Search-Ability allows customers to reach the product of their choice quickly (Chang and Nunez, 2007). Furthermore, product recommendations encourage browsing behaviour or further exploration. This is because the products recommendations are complementary or substitutes to the product the consumer are already viewing (Chang and Nunez, 2007). For example, .retailers recommend matching shoes to the dress the customer is browsing or a similar one to the dress a customer may be browsing.

H2f: In Online Fashion Retail, the provision to effortlessly search for products is positively associated with customer's exploratory behaviour.

(a5) Product Availability

Merchandise shortage is known to have a significant impact on customer dissatisfaction, consumers may leave the website or purchase a substitute at a time of stock out (Dadzie and Winston 2007). However, the substitute may be from another website. Consumers leave the website as they have high service expectations form e-retailers and stock outs leads to customer dissatisfaction (Dadzie and Winston 2007). Leaving a website due to a stock out may have a negative effect on exploratory behaviour as this discourages users from staying on the website and browsing more products.

H2g: In Online Fashion Retail, Product shortage in an online fashion retail website is negatively associated customer's exploratory behaviour.

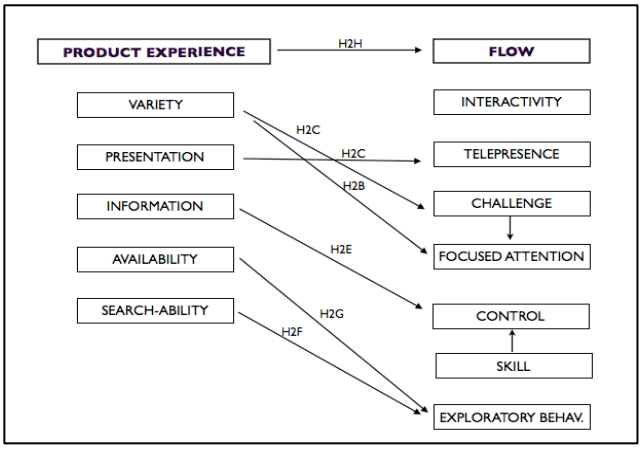


Figure 3: Hypothesised Relationships between Product Experience Variables and Flow

(b) Customer Service

Customer service is a key source for answers and solutions to customer queries (Ding et al. 2010). Customers expect prompt responses to queries and satisfactory solutions while interacting with customer service operators and expect them to be well informed, polite and easy to reach (Frohle 2006 cited by Ding et al. 2010). Such responses reduce customer's anxiety and help them feel more in control while shopping online (Ding, Verma and Iqbal 2007). Customer Service has two variables: Channels of Support and Types of Support. These two variables are explored from the design perspective rather than the quality of customer service.

(b1) Channels of Support

Customer service can be administered through various channels i.e. email, telephone, social networks, etc. The quality of customer service has a significant impact on customer intentions, behaviour and attitudes (Ding et al. 2010). Customers consult various blogs, social networks and reviews before making purchase decisions (Kietzmann et al. 2011). With the rise of online social networks, retailers are increasingly using social networks as a channel of customer support. In addition to social networks, customer support can be administered by way of email and telephone. Offering more than one channel of customer support gives customers more flexibility in contacting customer services. A new and upcoming is channel of customer support is online customer service. A recent study by L2 (2013) showed that 28% of US retailers had incorporated twenty hour live support on their websites. Giving customer a choice of how and when they can contact customer support increases the level of interactivity a customer perceives.

H3a: In Online Fashion Retail, the types of channels of customer support available to customers are positively associated with Interactivity.

(b2) Types of Support

There are various types of supports i.e. pre-purchase support and post-purchase support. Pre-Purchase support is offered before customers make purchases. Customers may wish to speak to someone and gain further information about the products. For e.g. customers on Asos.com can chat to a stylist before making purchase decisions. Post-purchase support is offered when customers have made purchases and wishes to return or exchange items. Increasingly retailers are offering the option to return items in store even when they were purchased online. This not only offers more choice to the customer but also creates opportunities for up sell opportunities (L2, 2013). Being able to contact customer services during their purchase process helps customers from feeling alienated and more in control of their shopping experience.

H3b: In Online Fashion Retail, the types of customer support help customers feel more in control of their shopping process.

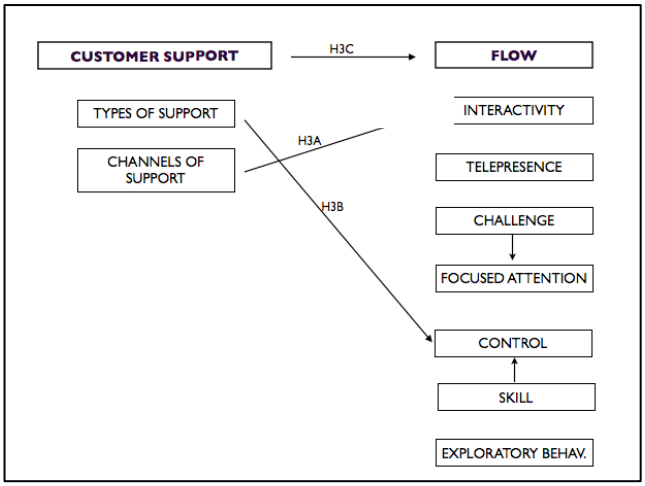


Figure 4: Hypothesised Relationships between Customer Support and Flow Variables

c) Customer Interface Design

Customer interface has been deemed crucial for the success of an online retailer (Chang and Chen 2008). Customer satisfaction and loyalty are antecedents of customer interface quality (Chang and Chen, 2008). Customer interface provides a direct and inexpensive way for customers to interact with the online store (Lee 2001 cited by Chang and Chen, 2008). There are a variety of factors that contribute to an intuitive and engaging customer interface, including interactivity, web aesthetics, localisation, navigability and entertainment.

(c1) Responsiveness

Responsiveness refers to the degree to which a website allows two way communications between customers and the website (Srinivasan et al. 2002) (Huang 2003). The level of interactivity is determined by the level of responsiveness of a website to customer inputs (Huang 2003).

H4a: In Online Fashion Retail, Responsiveness is positively associated to interactivity.

(c2) Navigability

Navigability refers to the extent to which a website is easy to use, intuitive and simple (Chang and Chen 2008). It refers to uncluttered screens, clear organisation, easy navigation

(Speck and Elliot, 2005). An easy to use website is effortless to navigate for customers (Speck and Elliot, 2005). It helps customers feel more in control with their shopping process. Thirty per cent of customer leaves a website because they find it difficult to navigate (Schaffer 2008 cited by Chang and Chen 2008). An easy to navigate website also has an impact on exploratory behaviour as it facilitates browsing behaviour (Chandra and Richard, 2005). Customers spend more time browsing the website as they are not discouraged by the usability of a website.

H4b: In Online Fashion Retail, Navigability is positively associated with exploratory behaviour.

H4c: In Online Fashion Retail, Navigability is positively associated with customer's perception of control.

(c3) Localisation

Localisation is the process of adapting a website to a particular language, the desired local look and feel of the local culture (Cyr and Smith 2004). This has a direct influence on the usability of a website, which is known to impact customer satisfaction. Layout, symbols, content, navigation all have to be designed differently in different cultures and these features must be adopted in social networks, on the website and on customer service portals (Cyr and Smith 2004). A website that has been adapted to local needs appeals to user's logic, emotions, and credibility (Cyr and Smith 2004). For e.g. In the middle east, Arabic is written for right to left, therefore the menus, search bars etc. have to be placed accordingly or it is difficult for customers to navigate.

H4d: In Online Fashion Retail, Localisation of web design is positively associated with customer's perception of control.

(c4) Sound

Importance has been laid on visual aspect of online shopping and very less attention has been paid to the use of sound. Fiore & Kelly (2009) consider it important as physical stores use sound as it adds to the online experience. The use of sound adds to the sensory appeal of the online stores and indirectly helps the decision making process. Sound is a delicate feature on online websites, as it may be annoying or maybe relaxing. Ambient music and sounds provide special effects to set the mood and grab the attention of the shopper. Most websites use sound to enhance the display of products, some use atmospheric sounds to enhance the product they are selling such as Louis Vuitton. It creates a mental imagery of being in a virtual world of shopping.

H4e: In Online Fashion Retail, Use of Sound on a website is positively associated with customer's perception of telepresence.

(c5) Website Aesthetics

Website aesthetics of a website i.e. visual appeal of a website play an important role in customer experiences given that the sensory experience of a website (Shun and Xu, 2011). Website aesthetics is made up of variety of components such as graphics, colour, layout etc which improve the interactivity of a website (Shun and Yunjie 2011). Interactivity is an important factor that affects customer satisfaction and purchase intent. An aesthetically pleasing interface increases user's attention. Furthermore, videos, virtual tours, celebrity outfits, etc. can be used to enhance the entertainment on a website which has an impact on telepresence sensation during the navigation process (Speck and Elliot, 2005).

H4f: In Online Fashion Retail, Website Aesthetics is positively associated with customer's perception of telepresence.

H4g: In Online Fashion Retail, Website Aesthetics is positively associated with customers focused attention

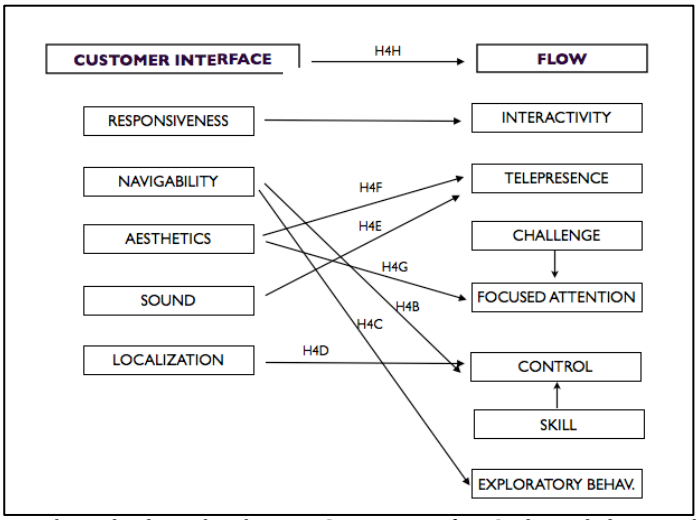


Figure 5: Hypothesised Relationships between Customer Interface Quality and Flow Variables

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Eco-design principles in a business network: A case study on the work of designers in developing a large-made-to-order product

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Keywords: Sustainability, business networks, design management

Product development in business networks presents new challenges for design management. In this paper, we present initial findings from a case study on a business network and the work of designers in an eco-design project for a large-made-to-order product. In describing the work of designers in the early stages of the project, we highlight challenges facing design managers as they set out to implement eco-design principles in a network setting. In particular, we exemplify why early and all-encompassing eco-design interventions are not readily realised in a business network.

INTRODUCTION

Product development in business networks has become the everyday reality for design. Through business networks, companies achieve improvements in flexibility and efficiency by combining vertical integration and outsourcing in product development (Ford et al., 2011; Jarillo, 1993; Möller et al., 2004). In networked development, companies focus on their core competences, collaborate with other companies and produce their offerings collectively. A prime question facing design management in such product development processes is how the network structure affects the work practices of designers and their managers.

In this paper, we present initial findings from an in-depth case study on a business network and the development process for a large-made-to-order (LMTO) product. The focus of our study is on eco-design and the work of designers in realising the sustainability targets for the product. As companies enter business networks, their individual decision power becomes less

defined due to the inherent interdependency that follows from the network setting (Ford et al., 2011; Jarillo, 1993). This interdependency sets new challenges for designers and managers in terms of how design activities are carried out in product development. In literature on design management, a basic premise of good management practice is that design managers should strive to achieve a strategic design fit between the product, services and operations of a company (see e.g., Cooper & Press, 1995; Ravasi & Lojacono, 2005; Stevens & Moultrie, 2011). The task for design managers is to organize activities so that design is used efficiently and consistently through the organization. The basic premise of a strategic design fit is also visible in the eco-design literature. Eco-design principles, such as lifecycle-design (Vezzoli & Manzini, 2008a), whole systems design (Blizzard & Klotz, 2012) and product-service system design (Mont, 2002) all stress the importance of disseminating a holistic perspective on sustainability and design throughout an organization to improve the sustainability of products. That said, as companies enter networked product development, how do the premises of a strategic fit and disseminating a holistic perspective on sustainability hold up when the decision power of individual actors (companies) becomes less defined?

The studied LMTO-product is a complex metal engineering product that functions as a business platform for the client company ordering the product. It possesses many of the typical characteristics of LMTO-products (such as offshore equipment, ships and power plants), having high energy use and requiring inputs from multiple specialist actors during the development process (Stoyell et al., 2001). From the outset of the project, achieving major improvements in terms of environmental sustainability was recognized as a key target by both the client and the manufacturing organization. The improvements were achieved by a number of energy saving measures and innovations that were introduced during the development process. In analyzing the development process from the perspective of eco-design management, the overarching questions we ask are (1) how these measures and innovations emerged and were realised in developing the product and (2) what role the work of designers potentially fulfilled in these processes.

Our study adds to on-going discussions in the intersection between design management and eco-design. As noted by Charter (2001), literature on eco-design has predominantly been written from the perspective of the individual company that independently designs, manufactures and sells its products. To this end, as companies enter new modes of operation through actions such as outsourcing, the relevance of past work may come into question. The findings we present outline challenges that design managers may encounter in managing eco-design activities within a business network. In particular, we describe how early and wide (all-encompassing) eco-design interventions as prescribed in the literature were challenged by the network structure of the product development project.

ECO-DESIGN AND BUSINESS NETWORKS: A GOOD COUPLE?

New products are often superior to earlier generations in terms of environmental sustainability (Robins & de Leeuw, 2001). Still, as noted by Mont (2002), the ever increasing

consumption of goods has made system-wide solutions a necessity for achieving a sustainable future. Accordingly, the focus of eco-design principles has shifted from products to services to systems, including product-service systems (Vezzoli & Manzini, 2008a). The scope of designers' work has also broadened from the sustainability of individual products to system-wide solutions (e.g. from designing washing machines to providing clean clothes). This transition to a more holistic view on design has been coupled with a number of recommendations for how eco-design activities should be pursued in product development.

A frequently occurring recommendation is that eco-design activities should be included as early as possible in the development process. Ideally, the environmental impact of products should be considered already during product planning and concept design (Brezet & Hemel, 1997; ISO, 2011; Lewis et al., 2001). Principles for whole-system design advocates to start design activities from "a clean sheet" in order to increase the possibilities to influence system-wide attributes during the early phases of development (Blizzard and Klotz, 2012). In the same vein, principles for product-service system design suggest that the early phases of design should be geared towards developing alternative business models in disconnecting the profits of companies from the sales of physical goods and, in doing so, cater for a shift towards intangible (more sustainable) services (Manzini & Vezzoli, 2003; Mont, 2002). In other words, the early phases of development are seen as the key points for eco-design interventions as the scope of development still needs to be defined and all possibilities still are open.

Another frequently occurring recommendation is that eco-design activities should be wide (all-encompassing) and extend over the product development process and cover the complete product lifecycle. Ideally, a focus on sustainability should be disseminated through the development process from concept generation to product launch (Brezet & Hemel, 1997; Mackenzie, 1997) All phases of the product (service) lifecycle should also be considered during development (Blizzard and Klotz, 2012; Vezzoli and Manzini, 2008a; Lewis et al., 2001). The work of designers should be targeted towards designing overarching satisfactory solutions instead of tangible products (Brezet & Hemel, 1997; Vezzoli & Manzini, 2008b).

From the perspective of design management, the recommendations above relate in many ways to basic principles for good design management practice. For example, the recommendation for early interventions strikes a chord with the ideal of pursuing design throughout organizations from business strategy to product (see e.g. Ravasi & Lojacono, 2005; Stevens & Moultrie, 2011). The recommendation for wide interventions resonates with the ideal of consistency or "concentration over time", as phrased by Cooper and Press (1995), as prerequisites for a coherent use of design during development.

However, the practical possibilities to implement recommendations for early and wide eco-design interventions seem increasingly challenges as companies increasingly pursue networked produce development. This is perhaps even more so for the development of LMTO products. First, as noted earlier, companies in business networks are not operating independently. Interaction and networking with other companies is essential in producing

valuable offerings to customers (Möller et al., 2004; Ford et al., 2009). Companies do not own the networks they operate in and cannot control them as they please (Ford et al., 2009). For eco-design, this implies that setting the tone for the complete product development process across different actors may be hard to achieve. For example, suppliers and partners do not necessarily need to subscribe to their clients' environmental agenda in case it conflicts with their own agenda (see e.g. Håkansson & Waluszewski, 2002). Second, LMTO products are highly complex entities. Their design and manufacturing requires the expertise of several specialists who do not necessarily operate as a static group in the same physical location at the same time (Stoyell et al., 2001). Studies on business networks also show that development of products may entail significant changes in the actors involved during the development process (Håkansson and Waluszewski, 2002; Ford et al., 2009). As a results, the actors to manage may not be clearly defined within development process which makes it hard for a design manager to determine the exact audience for eco-design interventions.

The discussion above calls for a closer examination of the design challenges that emerge when eco-design and product development is conducted in a network setting. In particular, from the perspective of eco-design management, what constitutes the decisive power in the early stages of development and what role(s) does designers fulfil in improving the sustainability of products merits more detailed investigation.

METHOD

We turn to an on-going case study on eco-design and business networks in providing an initial response to the questions above. With few empirical reports on the position and work practices of designers in business networks, our case study follows general recommendations for studies on business networks (Halinen & Törnroos, 2005). A case study approach allow us to account for the dynamics of the research (network) setting (Eisenhardt, 1989). It also makes it possible for us to pursue questions of *how* or *why* a certain phenomenon came to be (Yin, 2009).

The development context for our study is a LMTO product where improvements in terms of environmental sustainability were a key target during development and where the interactions between different actors (organizations and professionals) were critical in realising this target. The development process was characterized by intensive interactions between the client, manufacturer and a group of suppliers. The client is a regional company with extensive market presence. The manufacturer is a global producer with multiple business units across the globe. The client relied mainly on the use of eternal design expertise due to its small size and the lack of a product development organisation. As a result, the product development project in question provided us an opportunity to do an in-depth analysis how eco-design was realised in a network setting, and what the work constituted for designer in the development process. The studied case has good compatibility with the theoretical foundation of the study, i.e. the case is theoretically sampled (for theoretical sampling see Silverman, 2010).

The primary data for our analysis are interviews with designers (n=10), managers (n=5) and project coordinators (n=2) which is complemented with secondary data in terms of shared project documentation as well as internal and external reports about the project. Figure 1 illustrates the case boundaries for our study. Following Halinen and Törnroos (1998, p. 193), we study the position of designers from a dyad-network perspective which is "a natural starting-point for network research, as it represents a concrete level of business exchange". In our case, the dyad of study is composed of the client organization (CO) ordering the product and the manufacturing organization (MO) organizing the majority design and production. As the client organization relied heavily on external design consultancies during the project, we add a third network position to the case in terms of external client consultant designers (CCDs).

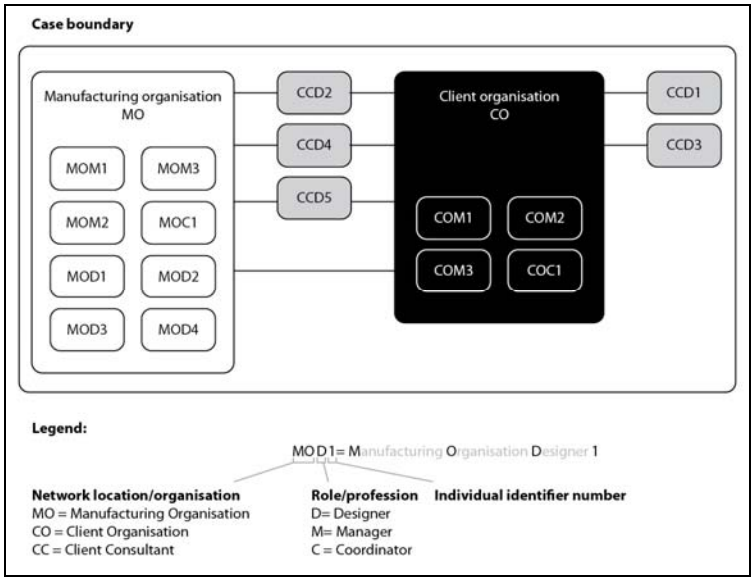

Figure 1. Case boundary and interviewees within the case.

The structure and functioning of a business network is seldom apparent from the outside. Therefore, we followed a snowball (chain-referral) strategy for forming our understanding about the work of the designers during their project and the impact of environmental sustainability on their work. We established initial contacts with designers working in the manufacturing organizations. The initial contacts had participated in a number of different phases of the project and provided recommendations based on their awareness of and encounters with other professionals in the project. Given the personal bias commonly occurring in snowball sampling (see Heckathorn, 1997), we also located additional professionals to interview by reviewing media reports on the project.

The interviews were carried out over a period of one year and covered the final phase of the project. The interviewees had participated in the project during a number of different phases. Some had worked already in the early concept phases of the product development process while others became involved later in the project. This enabled us to compare the work of designers participating in different times of the project. Since we collected the data from an ongoing development process, the interviewees were in different project situations during the

time of the interview; some of the interviewees had already finished working with the project while others were still active.

The interviews were semi-structured and organized around a discussion on the role and responsibilities of the interviewees in the project, who they worked with and how the focus on sustainability potentially had influenced their work. The interviewees were asked to present supportive material in the form of sketches, models internal documentation, etc. This way we were able to access process documents that otherwise would not have been accessible to us. After the interviews, some interviewees were asked via e-mail to elaborate on certain issues that we found not fully covered during the initial interview. We also used secondary data (such as press releases and news reports about the project) to verify key event times and to generate deeper understanding about the project.

Each interview took between 30 minutes to 2 hours. The interviews were recorded and transcribed for further analysis. In analyzing the interviews we began by mapping the position of the interviewees in terms of when they had participated in the project and who they had worked with. By comparing the responses with secondary data on the development project, we were able to sketch out how the interviewees related to the project time. Next, we investigated what kind of work the designers had done in the project and how it potentially had been influenced or affected by the set sustainability target. We focused not only on what roles the interviewees described as having but also what kind of tasks and deliverables they discussed in the interviews. Finally, we studied how different tasks and designers related to other tasks and designers in the network over time.

Case background

The LMTO product of study provided us rich material for investigating eco-design management and the role of designers in a business network. Figure 2 outlines the timeline of the project. It also shows during which time the interviewees participated in the project. The development process for the product can be divided into three main phases. In the first phase (P1), the manufacturing organisation engaged in active sales with the client organisation. At this stage, an engineer responsible for the overall feasibility of the project led a group of designers within the manufacturing organisation to sell in and set the overall specifications for the product. The client also hired external design consultants for concept design work at this phase. After about a period of concept design and tendering for about 1.5 year, the manufacturing organisation and the client organisation made a contract to manufacture the product. In the second phase (P2), the project entered the phase of basic design and detailing. During this phase, a number of outside suppliers entered project and a number of external professionals provided their input. In the third phase (P3), manufacturing began and finished 15 months later. Overall, the time of study from first concepts to finished product was slightly less than four years.

Throughout the process, a number of different internal and external designers came to work on the project. In P1, internal designers in the manufacturing organisation showcased product

alternatives to the client. External designers also provided inputs during in this phase. In P2 after the contract had been made, the client organization become more involved in the design work and contracted a number of external designers who made much of the detailing. At the manufacturing organization, the responsibility for the project shifted from sales to manufacturing. In P3, designers were involved in finalizing smaller subsection of the product.

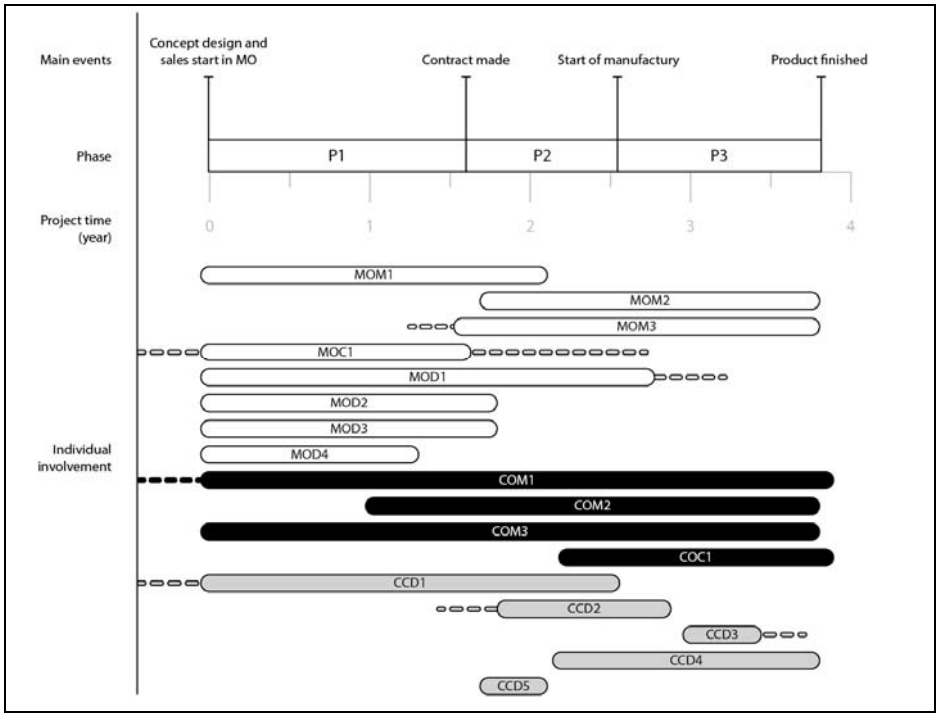

Figure 1. Project timeline showing main events, phases and individual involvement in the project.

RESULTS

The LMTO product under study featured multiple energy improvements and innovations that significantly reduced its environmental impact in comparison to other products of its class. From the perspective of the designers working in the project, we provide a first analysis of how these improvements and innovations came to be and what possibilities designers had in improving the environmental performance of the product. We focus our report in this paper on 1) how the early concept phase (P1) influenced development process and 2) how the designers perceived their work in realising the sustainability targets for the product.

From the perspective of eco-design management, as noted earlier, managers need to align design work with sustainability targets in order to be successful. In a company setting, managers are recommended to achieve this alignment by introducing sustainability targets early and disseminate a focus on sustainability during the development process. However, as the borders between different companies are diffused in a business network, the possibilities for a single manager to achieve this alignment are likely to be reduced.

In the interviews, the designers who had worked in the early phase of the project (P1) stressed the importance of having had good ideas for what the product could be like in order to secure the contract and push the development further. During this phase of the project, the focus of their work had been on what kinds of services, product features, user experience, new technologies and style the new product should have. A designer (MOD2) from the manufacturing organisation ironically described part of their work at this phase as *"we try to lure the client with good ideas and pictures right from the start"*. Sustainability targets were also present in this phase. All but one designer had incorporated sustainability features in pitching concepts. For example, one designer had suggested to fit solar panels on the product to generate sustainable energy. Another designer had suggested that the product should be divided into multiple smaller products to make it more adaptable and reduce the environmental impact. However, the breadth and detail of how to realise different sustainability ideas in the final product was often limited to statements – or *"suggestions"* as one designer (MOD4) described them – that the product would be more sustainable in one way or the other. To this end, although the early concepts often featured suggestions for sustainability improvements, their impact on the proceeding phases often became very limited.

When looking closer at the work of the interviewed designers and *when* and *what* they had done in the project, it is hard to distinguish a linear sequence in their work where the product concept moved from concept design to detail design to manufacturing (i.e. P1 to P2 to P3). Instead, the borders between different phases seem to have been blurred as different actors worked on the project and came to iterate the design accordingly. Concept and realisation did not follow upon each other but rather happened simultaneously. For example, detailing and early manufacturing activities often overlapped. Moreover, at a number of instances, earlier design work was almost completely redone as different designers stepped in and out of the project. The design process was discontinuous, holding multiple early phases of concept design and the division of labour between different actors was not always clear to the actors involved.

The distribution of labour in the network implied that information and ideas often was lost or never realised in the transition from one designer to another. For example, in the manufacturing organisation, a designer (MOD3) worked with multiple sections of the product. As the project progressed from P1 to P2 the client hired a number of new designers (CCD2, CCD4, CCD5) to continue the work. While the internal designers already had developed a concept, the new designers did not continue working from the concept that had been developed earlier. Instead, they came to initiate their own concept development phases when they entered the project. As one of the designers (CCD2) stated, his organisation entered the project by presenting new ideas of what the product could be like.

Designers also came to implicitly or explicitly disregard earlier work as they found ideas and concepts impossible to translate in practical solutions. For example, in reflecting upon the some parts of the design work done earlier in the project by the manufacturing organisation, a

designer (CCD5) stated that the designs were *"spectacular"* but not fitting the budget for the project. Therefore, he had to start his own concept design phase in order to meet cost and feasibility requirements. Similarly, in reflecting on the early work of a design consultant the main exterior designer (MOD1) stated the following: *"One consultant made this kind of a proposal and we started negotiating from that […] about what it should then* ***actually*** *be like, so that we can manufacture it. I mean we have been drawing things that look like this as well, and a lot of them, but they're more for expositions and so on…".*

The network structure and the division of labour resulted in that individual designers in a number of instances came to question their influence on the sustainability of the product. In fact, despite a strong focus on achieving the environmental target, a number of designers felt detached from the discussions on how to practically realise it. As example, the designers from the manufacturing organisation embedded sustainability features in their concepts but still stated that the strong focus on environmental performance did not really influence their work. As stated by the main exterior designer (MOD1): " *[the sustainability focus of the project] did not really, in terms of the environment, bring anything to the design, so that we would have somehow emphasized environmental friendliness in it".* In the same vein, another designer (MOD3) stated that in the early phase design where she works *"the design then [...] is more how it looks like".*

That said, the environmental targets came in many ways to have a direct effect on what kind of ideas the designers could pursue or were asked to realise in the project. For example, the use of energy-efficient LED-lighting was not a choice made by the designers but set in the targets for the overall energy-efficiency of the product. The work for designers was to utilize them and provide the necessary ventilation. The energy-efficiency targets also influenced the work on the exterior design of the product. In reflecting back on this influence, two designers from the manufacturing organisation (MOD1, MOD2) described how the technical solutions in many ways dictated the boundaries how the final design would look like. They also acknowledged that the largest environmental improvements had been made through energy-efficiency solutions and new technologies.

Designers working in the later phases of the process (P2 onwards) often stated that eco-design considerations in their work were limited due to safety and fire regulations as well as costs. Even though they might have had the power to influence material selection they were faced with strict regulation that reduced their options. For example, a designer working (CCD4) with parts of the interior stated that *"...I'd like to say yes, it's all environmentally friendly, but unfortunately given, given the, [...] certification and this sorts of, legal entitlements of those fabrics it's difficult to come up with nice entirely eco-friendly product".* Another designer working with the sections of the design raised similar points in terms of sustainability (MOD3): *"so the reality is quite, it's like there's so many safety issues before that [sustainability] you have to think about".* To this end, designers also partly came to question their own influence on the environmental improvements.

However, the designers did not deem environmental sustainability as unimportant. A number of them indicated that environmental sustainability was something they personally wished to pursue in their work. As one of the consultants (CCD3) stated, *"I have to say that it [environmental sustainability] has not played a big part. […] But of course, I personally prefer to choose that kind of materials [that are sustainable]"*.

Overall, the discussion above suggested that the early phase of product development in which environmental impacts should be defined does not necessarily occur in the beginning of the project in a network setting. Instead, lock-in of environmental impacts seem to have depended more on who did what and in what phase they enter and/or left the project. Furthermore, the translatability of ideas into practical solutions seem to have been a key factor in deciding whether sustainability ideas survived throughout the development process or remain only as inspiration.

CONCLUSIONS

Common wisdom as described in the literature suggests that eco-design principles need to be disseminated to every nook and cranny of a business network during product development to be effective. Moreover, the interests of different actors should be aligned to produce improvements that are both systematic and sustainable in nature (Vezzoli and Manzini, 2008a). However, as the initial results of our case study suggest, adhering to such principles is not always practically possible as companies pursue product development in a network setting. Yet, major sustainability improvements may still be implemented. To this end, our findings suggest a number of managerial challenges not sufficiently covered in previous work on eco-design and design management.

First, our study suggests that product development in business networks does not follow a linear path where concepts turn to basic design turn to detail design and so forth. The development of the LMTO product rather evolved as different actors interpreted the scope of the project and made their contributions. As such, it seems more accurate to describe the process of design in business networks as a stack of layers where actors move in and out of the project and leave their mark on the different layers. As shown in our study, the marks on layers do not always add to each other; some marks may even block the ones beneath it. What follow from this is that the environmental impact is not necessarily determined (locked in) in the early phases of product development as prescribed in the literature. Instead, with different activities disjointed in time and place, environmental impact is determined sporadically and unpredictably as different actors made their mark on the final product at different points in project. Managers need to account for this in utilizing designers effectively in eco-design by carefully consider the real possibilities for designers to do a mark on a project.

Second, the multiple concept phases and the discontinuity it brought about call for more managerial attention to the early stages of development. In particular, from the perspective of design, managers need to carefully consider (1) *when* a focus on eco-design should be

introduced during concept development and (2) *who* to manage in targeting environmental sustainability during development. As noted by Håkansson and Waluszewski (2002), a separation typically emerges between the basic concept (idea) and its technical implementation in product development. This implies that ideas often are put forward and realized by different professionals. Moreover, it also implies that costs and technical restrictions typically only emerge when an idea has to be translated into an actual product. Keinonen (2006) argues that concepts are used for a variety reasons ranging from setting a long-term vision to setting detailed specifications for further development. For the product of study, a design concept was essential in selling in the project to the client. However, from the perspective of the designers working in the project, the early concept phase (P1) was not decisive in an absolute sense in setting the sustainability target for the project; the final concept did not set strict requirements or a definitive direction for design. In potentially mitigating this problem, managers need to be aware of the role of different concepts, and when and for what purpose concepts are developed by different actors in order to manage design effectively in a network.

Third, questions raised in earlier research about what role designers play in eco-design are worth repeating in the light of our results. Similar to the findings of Lofthouse (2004) for product development in general, the work of the designers in our study seldom extended beyond traditional design tasks such as aesthetics, ergonomics and functionality (see e.g. Cagan & Vogel, 2002; Ulrich & Eppinger, 1999). Moreover, those designers who could have influenced a wider range of issues, such as material selection, had their hands tied by legislation, safety regulation and constraints of cost and time. This highlights a relevant further question about the role of legislation and regulation in eco-design. On the one hand, safety measures made certain environmental design strategies are very difficult to utilise (such as environmentally sound material selection). On the other hand, increased energy costs and coming legislation played a strong part in why the environmental targets were set in the first place. In other words, regulation had a strong role in determining what the end product would be like. For design managers this implies a need to take a wider perspective when defining who actually are involved in the design process and what is their professional background and profile. We suggest that in targeting consistency of eco-design in business networks, managers should pay attention to solutions that can go through the entire process from vision to reality. In other words, a key strategy for sustainable product development in business networks is to cater for the most promising threads of environmental improvements.

Finally, we point out that the studied LMTO product was very successful in terms of environmental improvements. Even so, the design process was very contradictory to what eco-design literature would suggest. Many of the ideas presented by the designers were not deemed practically feasible to produce. This detachment from the environmental targets is in stark contrast with what many of the managers involved in the engineering of the product stated. With the sustainability target primarily realised through technical solutions, they were often actively involved in discussions about the sustainability of the final product and how to

realise it. The sustainability targets also posed significant challenges for them as they embarked on other activities. As the client project manager (COM1) stated the developers *"are building a completely new standard"* in terms of how the product is designed and manufactured. One potential explanation for the success in this case was the close cooperation between the different actors. The manufacturing organisation made great efforts to realize environmental improvements that were mostly relevant to the client. In other words, the problems of the client became the problems of the manufacturing organisation through the collaboration. Thus, the situation for eco-design in business networks may not be as bleak as the contrast between eco-design and business network theory may have suggested.

Limitations and suggestions for future research

There are some limitations to consider when reviewing these early results of our study and which open up venues for future research. First, activities and relationships between people in new product development are inherently hard to capture. This is perhaps even more so for product development projects in business networks where professionals are distributed both in time and place. For our study, we purposefully sought professionals who had worked as designers in the project or had knowledge of the role designers had played in the development of the LMTO-product. While simultaneously uncovering the structure and organization of the business network, some of interviews came to take place when the professionals still were active in the project. Other interviews took place afterwards with the professionals reflecting back on different events. To this end, the foundation for our study is similar to those of many other interview-based studies in that the reports about different events do not give access to the actual events (Silverman, 2011). Future studies could address this short-coming by studying the role of designers in business network through a more participatory and/or ethnographic approach. This would also do away with the challenges related to retrospective accounts and their accuracy (Bernard et al., 1984; Golden, 1992). Second, the work of designers fulfil in the development of the product in question is not necessarily the same as designers may do in the development of other products. The product of study was developed over a period of several years, incorporating a number of different actors in the process. As a result, its development allowed us to study the role of eco-design and the role of designers in a complex distributed development process. In expanding on our results, future studies on business networks should be directed towards understanding the role of designers and eco-design in other industries. We hope that our study can provide starting points for those wishing to pursue such studies.

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Evaluating services
An exploratory approach beyond Service Design

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Keywords: service evaluation, radical efficiency, service design, decision-making, research approach

In the contemporary service society, where investments have been strongly reduced forcing firms and governments to restructure their role with the imperative of doing better with less (money, human resources) (Colligan, 2011), a new service innovation model is establishing, the so called “radical efficiency” one (Gillinson, Horne & Baeck, 2010). To achieve its purposes a possible solution should be the definition of an evaluation system to assess services, in order to optimise their outcomes and impacts at different level, i.e. social, economic, organizational, educational. The basic concept is that a service organization should be measured not only by its financial performance, but also by the ecological and social impacts (Elkington, 1997) of the services it produces. Nevertheless, service evaluation is still a fragmented and controversial issue that requires and in-depth research. On this topic, the authors will illustrate the first step of an on-going research by proposing a methodological approach to explore the field.

INTRODUCTION

The paper will frame the complex topic of service evaluation, starting by exploring the features of evaluating services, its reason why and its advantages in response to the contemporary societal challenges. Some considerations will therefore be done upon the role of design in this emerging field, accordingly to its potential as a driver of innovation and the evolution of the specific part of the discipline of service design. Considering the key role of evaluation in relation to decision-making processes, we will explore the field of service evaluation in order to collect existing methods and tools coming from different disciplines to build an evaluation overview. On these bases we will define a research framework considering the following questions: Who does evaluate services? Which are the object and

the purpose of service evaluation? How does the evaluation of a service can be done? Who is it addressed to? In the end, few examples of existing evaluation practices will be described in order to verify the efficacy of the set up framework.

FRAMING THE PROBLEM: EVALUATING SERVICES

In manufacturing, quality evaluation tends to be quantitative (Hollins, Blackman & Shinkins, 2003). Conversely in the service sector – because of the intangible nature of services and the connection of production and consumption (Shostack, 1982; Manzini, 1993; Kimbell, 2009; Meroni & Sangiorgi, 2012), – measures tend to be qualitative. Moreover, the quality of a service mostly depends on how an actor perceives it (i.e. final user, provider, designer) and for this reason it is more difficult to control (Hollins, Blackman & Shinkins, 2003).

As Polaine, Løvlie and Reason (2013) argue, considering service performance as a measure of value, the question leading service evaluation is: how well is the service performing? By performance they refer to the way in which the service is delivered, the immediate experiences that service users have. This entails that all the users interfaces as well as the back-office processes, have to be designed and managed holistically (Kimbell, 2009). Considering that – within the same performance – the quality can vary dramatically from one touchpoint to another (Polaine, Løvlie & Reason, 2013) in a way that can compromise the user experience and the organization efficiency. The incoherence within a service performance can derive from the common management approach of dividing organizations in departments that leads not to design services as a coherent whole (Polaine, Løvlie & Reason, 2013). From a provider perspective the purpose of service evaluation is to make visible variations in quality all along the different steps of the delivery process; while from a user perspective it aims to measure variation in quality perceived in relation to the service touchpoints, channels and tools. Hence, inward-facing value measurement should examine how well the service is performing for the organization; outward-facing value measurement should ask how well the service is achieving the results promised to the service users (*ibidem*).

Another complex issue to be considered when evaluating services is the difference between public and private sector. There are important differences between public and private sector innovation. Innovation in the latter is driven primarily by competitive advantage tending to restrict the sharing of good practices to strategic partners. By contrast, the drivers in the public sector are to achieve widespread improvements in governance and service performance in order to increase public value (Moore, 1995). Nevertheless, in the contemporary service-dominant logic (Vargo & Lusch, 2008) in both private and public sector, the customer is the main creator of value (Holmlid, 2010) and innovation requires a systemic approach, where the process of change and its enabling factors are understood, as well as the users' needs (OECD, 2011).

FACING RADICAL EFFICIENCY WITH SERVICE EVALUATION

We live in an historical moment in which the global system is facing extreme stress. Tight budgetary conditions are placing unprecedented constraints on governments' capacity to maintain current models of public service offer and delivery (OECD, 2011), affecting the welfare system of developed countries. Moreover, complex societal problems emerged before the recession (e.g. ageing populations, climate change, and spread of chronic illness) create new challenges and require public servants and firms to do more with less (Colligan, 2011).

To rapidly adapt to the contemporary welfare requirements, and to face the need of delivering better results with lower resources available (economic and human) public organizations and companies must continuously innovate. This quest for efficient, effective and sustainable ways to organise and deliver services requires to re-think public policies, programmes and traditional models of service innovation (OECD, 2011).

In response to these emerging issues, Innovation Unit and Nesta describe a new innovation model that - unlike the traditional ones - allows to make both more significant savings and more significant improvements to public services. This brand new model is called "Radical Efficiency" (Gillinson, Horne & Baeck, 2010) is not only proposed as an abstract theory: it is based on hundreds of well-evidenced cases from around the world, from different service sectors and on very different scales. As follows some examples from "Radical Efficiency Report" (2010).

Patient Hotel

A service of the University Hospital in Lund (Sweden) that operates since 1988 providing spaces for rehabilitation in hotels. It was born to meet a period of a higher request for hospital beds with no funds availability. It proposes an alternative solution for those patients who did not need hospital-based care from doctors and nurses. Through a partnership with Scandinavian hotel chain SAS they rethought service processes and the physical environment creating a special dedicated hotel where patients can manage their own care – from bandaging to meals. The doctor remains responsible for the patient's treatment – from afar – throughout their stay. The service generates a cost reduction per night patient of 60%, and resources savings for the healthcare system.

M-PESA

A service born in 2003 that use mobile technology to move money in Kenya, where limited banking facilities outside the main towns often make moving funds slow, unsafe and expensive. It responds to the need of urban workers to send money home to their families in rural villages, quickly and easily. The service provider is a mobile phone company so that users can transfer money to any mobile phone number in the country using simple SMS technology and avoiding appreciation of funds. Before M-PESA, 58 per cent of Kenyans sent money by hand (in person) and 24 per cent via the post office. After only one year, 47 per cent of Kenyans used M-PESA and the use of post offices to transfer money had stopped almost completely. This is mainly due to the fact that it is 27 per cent cheaper than using the

postal network and 68 per cent cheaper than sending money by bus. 77 per cent of rural users of M-PESA saw an increase in income and in their welfare.

Even if the radical efficiency model developed by Innovation Unit and Nesta focuses on public services, we argue it should be effective even if applied to private firms. Firstly – as it emerges from the case studies described – public organizations often require support from private firms and institutions in developing public services. Secondly private sector is inevitably affected by reforms and new policies introduced by governments. Finally - as previously stated - in both private and public sector, innovation requires a common, systemic process, even if their different purposes (competitive advantages in the first case and welfare enhancement in the second) must be obviously taken into account.

To reach radical efficiency objectives both sectors need to reduce risks and waste in developing or improving their service offer. According to radical efficiency principles, evaluation may represent an instrument of value creation and cost reduction for service providers and service customers, as well as a driver of innovation for consumer experience and service delivery. Even if measuring service innovation and quality can be problematic, from a service provider perspective service evaluation can be useful to clarify where the organization needs to focus to maximize success, tailor programs to address areas of weakness and identify areas of strength to capitalize on (Gamal, 2011).

THE RELATIONSHIP BETWEEN SERVICE DESIGN AND SERVICE EVALUATION

What about design? Which is the relationship between design and service evaluation?

Nowadays, even if during the last decades there has been the realisation that services are also artefacts that have to be designed and managed (Hollins, Blackman & Shinkins, 2003) and it has been recognised that design has a relevant role in the innovation process (Freeman 1982; Roy & Bruce, 1984), a great deal of service design happens without any professional design input (Brown, 2009), and its role is still controversial. This attitude has efficaciously been defined as “silent design” (Gorb & Dumas 1987).

Who is designing services now? A research on managers operating in the service sector in London, led by the University of Westminster (2003), has shown that more than half of those questioned did not know what design was and slightly more than half knew what innovation was. As a source of new ideas different people affirmed that they copy from their competitors or from market leaders. This means that most managers are are not able to identify the costs of the various stages of the service process; therefore, they are not in control of the future of their organizations. Only in the last decade managers in organisations involved in the service sector have realised that a conscious effort in applying design competencies to services can result in greater customer satisfaction, greater control over their offerings and greater profits. (Design Council, 2002). This attitude is clearly opposite to the radical efficiency purpose they should reach to survive contemporary challenges. And, despite many of the necessary improvements can be brought into the service through the application of good design

(Hollins, Blackman & Shinkins, 2003), to involve it in the service development process may not be enough. From a design point of view, what we know is that

> "When we build services based on genuine insight into the people who will use them, we can be confident that we will deliver real value. When we make smart use of networks of technology and people, we can simplify complex services and make them more powerful for the customer. […] When we apply design consistency to all elements of a service, the human experience will be fulfilling and satisfying. When we measure service performance in the right way, we can prove that service design results in more effective employment of resources - human, capital, and natural" (Polaine, Løvlie & Reason, 2013:18-19).

Contemporary economic, environmental, and social trends are pulling design disciplines toward new challenges: designers are no longer expected to confine their skills to the creative process but can apply their knowledge across a wider range of strategic and management activities (Kimbell, 2009). Creating successful organizations by paying attention both to the needs of providers and users experience as well as addressing the social and economical challenges of our society is the foundation that service designers need to build over the next decade (*ibidem*).

What we want to suggest as a new challenge for service design discipline (exploiting its multidisciplinary nature and its value as strategic tool), is to contribute in designing and defining a service evaluation approach to be applied to the entire service lifecycle, across several service sectors. Before dealing with the role of service design in service evaluation, we need to explore the state of the art in this field. Our first attempt to set up a service evaluation research framework will consider service evaluation as connected to the decision making process. The connection between evaluation process and decision-making process is outlined in the next paragraph.

EVALUATION AS A KEY FACTOR OF DECISION MAKING PROCESSES

To solve a problem, people spontaneously (and sometimes unconsciously) undertake a decision making process to individuate the best solution. This process is usually organized in (i) identifying information and options available as well as possible constraints, (ii) establishing criteria to evaluate them, (iii) understanding what they want to obtain and (iv) taking the final decision (Saaty, 2008). This is a simplified version of a decision-making process that works when applied to ideal problems. In real life, problems are far from being ideal and when a decision is made the problem is not necessarily resolved. Moreover the decision-maker perspective can vary according to the context and his personal background and purposes (Tversky & Kahneman, 1981). Referring to the bounded rationality model (Simon, 1982) rationality of individuals is limited by the information they have, the cognitive limitations of their minds, and the finite amount of time they have to make a decision.

Anyway, the key point we are going to discuss in this paragraph is that evaluation is a matter of decision and evaluate options. Hence, to reach our purpose of defining a first approach to explore the field of service evaluation, we are going to consider only some aspects of decision making that in our opinion may affect evaluation processes, mainly relating to a perfect rationality model. The discourse is divided into three main areas: the purpose of evaluating different options, the criteria of evaluation and the role of decision-makers in evaluation processes.

The first point examined is the idea that lies behind evaluating different options: what does the decision-maker want to obtain through evaluation? To simplify we will consider three basic typologies of evaluation systems.

1. “Rating systems” allow summarizing alternatives putting them on a scale, in order to individuate the best alternative. For instance, investors make decisions by consulting ratings of financial products, online shoppers compare products by examining product ratings and students refer to university rankings to decide which school to attend (Bargagliotti and Li, 2009).
2. “Ranking systems” allow classifying alternatives to decide that something is 'ranked higher than', 'ranked lower than' or 'ranked equal to' in order to define a priority (Saaty, 2008).
3. “Clustering systems” allow simplifying the evaluation by organizing alternatives in group according to their similarities. They can be considered as ranking decision tools useful for distinguishing groups of best alternatives (Saaty, 1994).

The second point considered refers to the evaluation criteria and the fundamental distinction between qualitative and quantitative measurements: which aspects of the alternatives available does the decision-maker want to compare? After having defined the purpose of evaluation it is necessary to set a synthesis framework to confront the chosen evaluation criteria. These must be both qualitative and quantitative, because a decision-maker has to decide on a number of issues that not necessarily requires to be represented by numbers, such as how to simulate the user choice or how to act according to the competitors moves (Tsafarakis, Delias & Matsatsinis, 2013). Quantitative methods are good for creating knowledge about the problem to solve, but they are not always useful for translating knowledge into action and helping organizations do something with it. This is particularly true referring to services, as we said in the first paragraph, since it is impossible to evaluate them without considering qualitative aspects that are the core of the service performance (inward or outward-facing). For example, discovering through quantitative research that 70% of people do not ride a bicycle does not give us any hints about why they do not ride bicycles (Gamal, 2011). To obtain effective results, the synthesis is the key moment for both evaluation and decision-making process.

The third point is linked to the considerations on qualitative aspects. It refers to the human and social component of decision-making: who is (which are) the decision-maker(s)? Whose needs the evaluation must respond? As stated by the bounded rationally model, preferences - and consequently choices - depend on analysis and evaluation of the alternatives as well as on individual perceptions of risks and values. The frame that a decision-maker adopts is

controlled partly by the formulation of the problem and partly by the norms, habits and personal characteristics of the decision-maker (Tversky & Kahneman, 1981).
Even if the influence of character and social aspects are very relevant in decision-making, in order to simplify, in this paper we will only focus on the so called "expected utility model" based on the idea that a rational decision maker will prefer the prospect offering the highest expected utility (Von Neumann & Morgenstern, 1947; Raiffa, 1968; Fishburn, 1970; Savage, 1954).
According to the idea that using rationality decision making may be a starting point in evaluation processes, we are going to propose a research approach for mapping the service evaluation field with the intention to build, in the future, a sort of decision aiding methodology (Tsoukias, 2007), a unique blend of techniques and resources required by problem solving in the service sector.

A RESEARCH FRAMEWORK FOR SERVICE EVALUATION

The idea of building a research approach is to understand which part of service evaluation is already covered by existing methods and tools and which one needs to be deepened and developed. Furthermore, as said before, thanks to an overview on dominant evaluation approaches coming from different service disciplines it may be possible to define a starting set of methods which could be used by decision-makers working in the service sector.
To set up the research framework we firstly need to determine the beneficiaries of evaluation: whose needs the evaluation is addressing? There are several actors involved in the service lifecycle who could need an evaluation system for aiding them in decision making: among others managers and entrepreneurs in service organizations, especially those involved in service management, operations, marketing and innovation; institution, such as design department in education, government bodies and policymakers; academics studying services; service users (Moritz, 2005; Kimbell, 2009). According to us, they can be clusterized in three main categories:

1. service providers, including those actors (decision-makers or other stakeholders) dealing with service management, operations, marketing and innovation coming both from private and public sector;
2. service designers, including both service design professionals (or service design agencies) and other actors (unconsciously) dealing with the design of the service;
3. service users, including the service customers and other end users.

Once identified the beneficiaries of evaluation, the second action consists in the definition of the service lifecycle phases, since – as stated before – the value of a service lies on adopting a systemic vision, where all the actions are coherently designed and managed. We will define the service lifecycle phases adopting two diffused service design model, which approach service development in a systemic way.
The first one, called "Four Segments Model", represents the design equivalent of the 4 P's of marketing and is commonly used in a large number of designs and innovation processes today (Moritz, 2005). These four segments are: discover, define, develop and deliver.

Fig. 1 - Service Design Process (Moritz, 2005)

Starting from this generic segmentation Moritz (2005) has developed a more detailed and explicit model (Fig. 1) that fits to the framework we are going to illustrate. As shown and described in figure it is made by six phases. Merging the "Four Segments Model" with "Moritz model" a comprehensive service lifecycle process definition emerges. In Fig. 2, we represent it from our point of view, by adding a further phase that is usually not considered in design process models: the adoption phase consisting in the consolidation in the medium-long term. This probably lies on the fact that, unlike many products or interfaces, services usually involve large infrastructures and depend on intangible people interactions with different touchpoints/channels (Polaine, Løvlie & Reason, 2013), which generate unpredictable situations that cannot be easily controlled or measured. As a consequence, the evaluation of services mainly stops at project prototypes or beta-version.

Fig. 2 - Service Lifecycle Phases

The idea is indeed to shift the service evaluation focus from functional characteristics, technical components, flow of processes and relationships, to the potential impact (social, economic, organizational, educational) that services can have on individuals, communities and organizations, offering new patterns of behaviour and interaction (Anderson in Ostrom et al., 2010) and as a consequence consolidate its success.

The third and final action to set up the research framework for service evaluation consists in defining some questions, based on those aspects of decision making that in our opinion have a role in the evaluation process:

- Who does evaluate? (*Evaluator*)
- Which is the object and the purpose of service evaluation? (*Purpose*)
- Which are the criteria compared? (*Criteria*)

As a result, the matrix shown in Fig. 3 is built to collect and compare existing evaluation tools and methods from different service disciplines. Referring to what argued before, even in

this case to be efficient the comparison should be both quantitative (i.e. number of existing methods in a selected quarter of the matrix) and qualitative (i.e. compliance to the needs of the service actors of the methods in a selected quarter of the matrix).

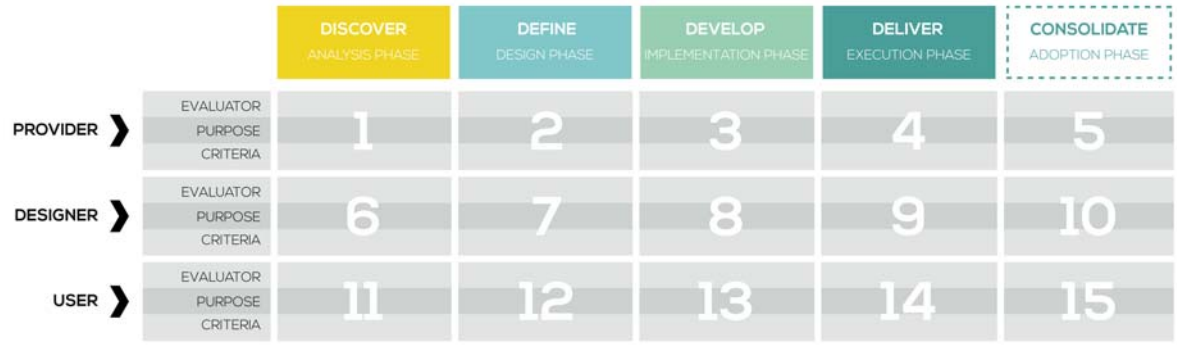

Fig. 3 - Service Evaluation Research Matrix

SOME EXAMPLES OF APPLICATION OF THE EVALUATION RESEARCH MATRIX

In this paragraph some of the most common evaluation techniques will be described and analysed according the defined matrix elements. The selected examples want to represent a small variety of the existing including methods based both on quantitative and qualitative measures, considered successful or controversial.

Cost-Benefit Analysis

Cost-benefit analysis (CBA) is a systematic process for calculating and comparing benefits and costs of a project, decision or government policy. The basic notion is very simple: if we have to decide whether to do A or not, the rule is understanding of the benefits of doing A exceed those of the next best alternative. Applying this rational rule to all possible choices should generate the largest possible benefits (Layard & Glaister, 1994). Being clearly a quantitative method, the only basic principle is that numerical values must be assigned to costs and benefits, in order to arrive at decisions by adding them up and accepting those alternatives whose benefits exceed their costs (ibidem). Benefits and costs are usually expressed in monetary terms (benefits minus costs), but it can be undertaken even in nonmonetary terms.

According to the proposed framework CBA will be positioned in quarters 2, 3 and 4 because:

• it is a technique that mainly address to service providers since it is usually applied to determine a program's efficiency (it is often related to cost-effectiveness analysis) and as a consequence decide on investments (Cellini & Kee, 2010). This task is commonly held by policy-makers or firms managers.

• Referring to the phases of application, it can be applied anytime before, after, or during a program implementation (*ibidem*), hence in the phases of definition, development and delivery.

Referring to the proposed matrix, the related elements to describe an evaluation method are illustrated as follows.

• EVALUATOR: even if it's a quick and simple technique that everybody could apply, in case of critical decisions it requires the involvement of an expert in the field of economics.

• PURPOSE: the main purpose consists in providing a basis for comparing alternatives (establishing a ranking system) and determine/justify their feasibility.

• CRITERIA: criteria compared are of course costs and benefits. The result of the comparison is called net benefit.

Customer Satisfaction Survey

Customer satisfaction is the commonest tool adopted by private and public organizations for measuring users perception of quality according to their expectations (Zeithaml, 1988). In other words it evaluates how satisfied or dissatisfied customers are with a product or service. It is a questionnaire-based research approach whose outputs can be collected and analysed in many different ways: they can provide the organisation with (quantitative) measures or can be used to understand the (qualitative) reasons for the level of satisfaction that has been recorded (HM Government, 2007). Furthermore, for quantitative measurement to be effective, it will generally need to be preceded by qualitative research to explore the key features of a service from the perspective of the customer (*ibidem*).

According to the evaluation framework, Customer Satisfaction Survey will be positioned in quarter 4 and 14 because:

• its relevance to the success of the organization is evident since it allows the service provider to better address the service offer according to the user perceptions. Moreover, studies have demonstrated that involving and satisfying customer triggers the loyalty mechanism (Anderson & Sullivan, 1993). But - even if indirectly - we can also consider the user as a beneficiary, because his feedback will generate improvements that will enhance his satisfaction and will be more responsive to his needs.

• It is generally construed to be a post-consumption evaluation (Anderson, 1994).

Then, referring to the specific questions about how it works we can state as follows.

• EVALUATOR: the most important stakeholders in customer satisfaction measurement are the service customers themselves involved in the survey, but the questionnaire may be designed and executed by the research community within an organisation (HM Government, 2007).

• PURPOSE: the purpose consists in gathering customer answers in order to to start formulating a targeted plan of action (establishing a clustering system). Some organisations use pre-defined customer segments within which through the survey they can identify sub-groups of diversities.

• CRITERIA: Customer Satisfaction Surveys can be built and conducted in several ways (e.g. face to face, telephone, online and through focus group, client advisory groups and so on) according to the needs of the organization. In the same way, questions may ask for overall

rating measures, service-specific features, customer priorities and customer characteristics. Nevertheless, we can identify some common criteria evaluated in most customer satisfaction questionnaires: quality of the service, speed of the service, pricing, complaints or problems, trust in the employees, types of other services needed, positioning in clients' minds.

Service Blueprint

The blueprint is a technique - introduced by Lynn Shostack in 1984 - to describe the nature and the characteristics of the service interaction in detail. It is based on a graphical tool that displays the service process distinguishing by front office and back-office activities, in order to ensure that service management, staff and design team are synergic.
Since its main purpose is to identify and eliminate barriers to efficiency and satisfaction (Hollins & Hollins, 1991), it is mainly used by service designers to plan and design a service, but it can also represent an operational tool allowing to analyze where cost and revenue occur and how they affect the service experience as a whole (Polaine, Løvlie & Reason, 2013).

According to the proposed matrix Service Blueprint will be positioned in quarters 7 and 8 because:
• it supports those people who are consciously or unconsciously designing the service interactions and touchpoints. Actually, it can be considered the main service-native way to model and measure the value of design (Polaine, Løvlie & Reason, 2013).
• It may be applied to the design and implementation phases, when the service has not been launched yet and revisions can still be done.

Answering the questions about how it works, we can argue as follows.
• EVALUATOR: according to the technique description, the evaluator in this case coincides with the beneficiary, hence the service designer (not necessarily a professional one). This is also due to the fact that it requires visualization skills, which are mainly held by design professionals.
• PURPOSE: from an evaluation point of view, the purpose consists in identifying gaps and inefficiencies in the overall service experience and organization. As for the Customer Satisfaction Survey it links the hard business metrics to the qualitative aspects of the customer journey, therefore it aims at clusterizing problems in order to plan responsive design actions.
• CRITERIA: quantitative criteria may consist in comparing costs and revenues related to each service process phase (i.e. access, purchase, post-consumption); qualitative criteria may include the quality and efficiency of service interactions according to the service provider needs and the service user perceptions related to the overall service experience.

SERVQUAL or RATER

SERVQUAL is a service quality framework based on quantitative measures developed in 1988 by marketing researchers Parasuraman, Zeithaml and Berry. The basic assumption of the measurement is that customers can evaluate a firm's service quality by comparing their

perceptions with their expectations. The instrument consists in a 22 items scale, representing various facets of 5 selected service quality dimensions. Each item is evaluated with a score from 1 (strongly disagree) to 7 (strongly agree) and to each dimension is assigned a coefficient of reliability (Parasuraman, Zeithaml & Berry, 1988).
Since it was considered too complex, by the early 1990s, the authors had refined the model creating a simplified version called RATER.

According to the proposed matrix SERVQUAL (or RATER) will be positioned in quarters 4, 14, 5 and 15 because:
• as the Customer Satisfaction Survey it may be relevant for providers to address possible improvements in the experience offered to the service users, according to the gaps recorded between their perceptions and expectations. Therefore it indirectly addresses even service users.
• As its creators suggest organizations must periodically (3/4 times per year) apply SERVQUAL in order to monitor the user perceptions related to the service offers.
Even in this case, we can describe how it works.
• EVALUATOR: this technique is structured to be applied autonomously by service managers (Parasuraman, Zeithaml & Berry, 1988).
• PURPOSE: SERVQUAL purpose is clearly that of establishing a rating system by giving a numerical values to items and dimensions.
• CRITERIA: while the items can vary according to the characteristics and the needs of the organization, dimensions are fixed and consists of reliability, assurance, tangible, empathy, and responsiveness.

CONCLUSION

According to the assumption that evaluation in the field of services is still a fragmented and controversial topic, the authors have proposed - as a first attempt – a research exploratory framework in order to outline a service evaluation overview, mapping existing evaluation methods and approaches coming from different disciplines. The framework proposed for the exploration is based on elements of the rational decision-making process, where evaluation has a key role, and on service design literature, defining a comprehensive service lifecycle process. As a matter of fact, the idea of this ongoing research - considered as an open issue - is to better understand which can be the role of evaluation in service design practices and define – in future stages – a unique blend of service evaluation techniques supporting service design, development, delivery and consolidation phases, even in an adoption perspective.
Future development of the research will also aim at focussing on the role of designers in service evaluation and how service design can represent a tool not only to design services, but also to measure their efficacy.

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Evaluating the levels of design management in user experience-oriented companies – experiences from Finnish metals and engineering industry

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Keywords: Design management, user experience, metals and engineering industry

The aim of this paper is to explore the potentials of a design management approach in contributing to solving the contradictions we claim to reflect Finnish metals and engineering industry culture and which might prevent them fully benefiting from user experience orientation as their new competitive advantage. To this end, we empirically study three case companies' selected user experience -related efforts from design management perspective by applying a framework proposed by Borja De Mozota. We discuss the results from the potentials perspective and suggest some future avenues of research.

INTRODUCTION

The potential of design for user experience (UX) has been widely recognised. The concept of UX originates from human-centred design research that already has a long tradition in ensuring that the users' needs and demands are taken into account in all phases of design (ISO 1998 & 2009, Nielsen 1993, Beyer & Holtzblatt 1998). Creating better UX means that products, systems and services need to support users' hedonic needs in addition to the pragmatic ones (Hassenzahl 2004). Designing for UX aims at broader views of users' emotional, contextual and dynamically evolving needs, and the impact of users' previous experiences on new experiences.

Finnish Metals and Engineering Competence Cluster's (FIMECC) UXUS programme aims at enhancing the competitiveness of the industry through better UX. The programme includes various metals and engineering industry (MEI) companies operating in a business-to-business (B2B) environment pursuing to add competitiveness through UX-based differentiation in a field where all competitors have similar basic products with similar functions. In the B2B

context, we see that *UX is the way a person feels about using a product, service or system in a work context, and how this shapes the image of oneself as a professional* (Roto et al 2012).

In our previous study (Nuutinen et al. 2011), we recognised three levels of demands and related contradictions between present 'MEI thinking' and 'design thinking' to be solved when the MEI companies aim to surpass their present level of performance in UX-based differentiation. At the level of UX as a strategic factor, measurable performance criteria, highly controlled productivity of the systems and cost efficiency in manufacturing contrasted with a more holistic, subjective and less easily measurable way of human driven design. Whereas, at the level of UX as a renewal driver of R&D, the contradiction laid in strict R&D processes and design methods and UX ideas that develop through iteration. At the third level, UX as a human-technology interaction concept, innovations realised in products and services, "technology push" often overrides "UX pull". We claim that these contradictions reflect the state of organisational culture rooted deep in the MEI companies and the whole industry and might prevent them benefitting from UX orientation fully as their new competitive advantage.

In the following, we will describe the lines of reasoning behind this claim and then turn to design management and empirically study three FIMECC UXUS companies' selected UX - related efforts. The aim of this paper is to explore the potentials of design management approach contributing to solving the contradictions and enhancing UX related competitiveness.

Organisational culture and design management

Emphasising measurable criteria, the strict R&D processes and "the technology push" in product development can be seen as an organisation's cultural solutions of surviving and succeeding in competition, learned in the history of the particular company. These cultural solutions have worked in coping with demands of competition in the past, but might limit the organisation's ability to challenge them when needed, to sense changes in their environment and utilise opportunities rising in different industries. The idea of organisational culture as 'a solution created by an organisation for the demands set by the core task' originates from Reiman's and Oedewald's (2002 p. 27, 2004; Oedewald and Reiman 2003) approach (based on e.g. Schein, 2004/1985) which is further developed for understanding radical organisational change, transformation from an organisational culture point of view (Nuutinen and Lappalainen 2012). The core task refers to the demands an organisation should fulfil in order to succeed in its environment (Nuutinen and Lappalainen 2012 c.f. Norros 2004). As the core task perceptions also have a central role in work motivation and work performance (Nuutinen 2006), changes to them play an important role in both the emergence and realisation of more radical strategies and innovations (Nuutinen and Lappalainen 2012). In practice, the changes in the organisational culture mean that those deep and partly subconscious perceptions of the organisation's core task should change within the personnel together with the more visible organisational and management structures and processes.

(Nuutinen and Lappalainen, 2012). Thus, the contradictions are rooted into a deep core in the present culture.

There is a risk that the above contradictions will be solved in a clear favour of 'the MEI thinking' and lot of the potential of UX and 'the design thinking' remains unused. The great potential that emphasising experiences carriers is based on attracting a common focus to turn deeper into users' and customers' world. Integrating this knowledge with technical competence (see Grönroos 2007) and reflecting present conceptions of core task gradually promote more agile culture to emerge (Nuutinen and Lappalainen 2012)

When searching ways to overcome these contradictions and building UX based competitiveness together with utilising its wider potential for renewal, we turned our attention to design research. It has been argued that good design does not appear by accident, but is a result of a managed process. Those organizational activities, practices and skills required to accomplish the product development process are considered in the literature as design management (Bruce & Bessant 2002; Chiva & Alegre 2009). The concept of design management is understood in different ways, but generally it can be defined as the on-going management of design organizations, design processes and designed outcomes. Design management is thus management of an organization where the assumptions of design thinking has been adopted and it consequently includes management of the design of innovations and services as well as design of tangible products (Cooper 2010).

Borja de Mozota (2003, 2010) emphasises design management's power to create value in companies and identifies three levels or design management: design action, design function and design vision. By *design action* Borja de Mozota (2003, 2010) refers to the operational level of design management, where the differentiating value of design and its impact on the company's offering through in the market are crucial. Borja de Mozota (2003) argues that design has a major role in marketing as design provides visual differentiation and influences customer behaviour. Besides, differentiation through brand development and positioning is important (see also Ward et al. 2009) as it supports both the company's efforts in the markets and enhances the design integration in the company. The overall goal of this design management level is to increase value in the production and marketing functions of the company.

By *design function*, Borja de Mozota (2003, 2010) means the functional level of design management, namely the impact of design on the company and its coordination methods. On this level she discusses new product development (NPD) and innovation management quality which she argues are improved through design management efforts. She argues that design is a value both in the improvement of products and organisational processes as it may help in creating a better product and improving the innovation process (see also Verganti 2011 & Leavy 2010). Furthermore, design is suggested to help in overcoming barriers between different organisational functions by increasing communications and mutual learning as well as by fostering a common culture. Especially the constraints between R&D and marketing are claimed to be removed through design management as it increases their integration and

interdependence. The overall target of this level of design management is, according to Borja de Mozota (2003), to create value through design in particular in the company's innovation and technology management.

Design vision focuses on the strategic level of design management. At this level design's strategic positioning is considered and it is argued that design can be either the core competence of a company from the beginning or learned by experience over time. Borja de Mozota (2003) also points out competitive advantage in relation to design. At the level of design vision, also design as is considered. Competitive advantage attained from design can be external, in which a company develops a unique offering and position in the markets, or internal where the company develops a strong core competence. This discussion implies that design can be seen as a resource, as a learning process and as a core competency and that these views should be considered when planning the strategic direction of the company in relation to design and design management. The ultimate goal of this third level of design management is to improve the understanding of the operational environment and change the representation in relation to competition (see also Martin 2009, Fraser 2010).

METHODOLOGY

Research strategy

In the study presented in this paper we adopt a case-study based research approach (see e.g. Yin 2009, Eisenhardt 1989). In general, case studies are the preferred strategy when "how" and "why" questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context. The research is conducted as a multiple-cases study, which is regarded more robust than a single-case study as evidence is gathered from multiple cases (Yin 2009). For the purposes of this study, we chose three differing case organisations from FIMECC's UXUS programme.

Case descriptions

Three companies were chosen for this study as cases. The first one is a factory automation integrator supplier, referred here to as COMPANY B; the second one is a lifting service provider, referred here to as COMPANY A; and the third one operates as an elevator and escalator service provider referred her to as COMPANY C. The three companies aim to make UX a significant competitive advantage for them. This mutual vision is supported by various UX efforts within the companies, and in our paper we concentrate on three specific ones; at COMPANY B and COMPANY A we concentrate on a UX-led product development processes that were initiated both to develop a product with improved UX and to increase understanding about the meaning of UX in the organisation. At COMPANY C our focus is on a training concept aiming to change the organisation's mind-set towards UX orientation.

Data collection and analysis

In this qualitative study, we held semi-structured interviews lasting from one hour to hour and a half with the research participants. The interviews conducted are summarised in table 1. The interview topics at COMPANY B and COMPANY A regarded the development processes of the new products aiming to better UX as well as their sales and marketing, delivery process and experiences from the use of the new products. At COMPANY C, our interview focused on the background and development of the training concept, the organising and success of the event and the experiences from the last training. The overall goals and the current state regarding the position of UX in their business were also discussed in each company. In addition to interviews, the researchers participated the researched employee training event at COMPANY C in autumn 2012. Also memos from the discussions with all the three companies' representatives in the UXUS programme were used as a supplement in this study. With the amount of the interviews and other research material, we achieved saturation of data and the material can thus be considered representative (Corbin & Strauss, 2008).

	Employee interviews	Customer interviews	Total
COMPANY A	15	8	23
COMPANY B	10	5	15
COMPANY C	6		6
Total	31	13	44

Table 1. The amount of interviews

After the interviews were conducted, they were transcribed and thoroughly examined. We were looking for the elements of design management from each of these cases to be able to describe the current state of design management efforts in each company (see e.g. Yin 2009). The companies and their design management efforts are not intended to compare to one another as the companies are currently in different situations and the efforts we have been investigating in this paper are very different in nature. Instead, the aim is to describe companies' efforts in each level and evaluate them in relation to the literature.

THE LEVELS OF DESIGN MANAGEMENT IN FINNISH MEI-ORGANISATIONS

In this section, we explore the levels of design management in the specific UX efforts of the case companies. We first shortly describe the background and role of design and UX in general in the companies, after which we focus on COMPANY A's and COMPANY B's NPD projects and COMPANY C's training concept more precisely.

Design and UX related background of case companies

Company A

In COMPANY A the UX development efforts have a strong strategic support and they are connected to corporate brand renewal implemented in 2006, which emphasised the move from technology orientation towards overall customer value. UX- and design-orientation is also tied into company -wide design identity project started in 2008, which aimed at modernisation of company image. The future challenge in the organisation is to make sure that users and users' experiences are understood to be a major competitive advantage for COMPANY A and that this understanding is shared through the organisation.

As a part of the efforts described above, COMPANY A started a product development project aiming to improve the UX of an old product to better represent the company image. A project group including people from both R & D department and various business units was formed to plan and implement the project. Besides improving user and customer orientation through the new product, the goals of the product development project was seen to support the brand renewal of COMPANY A and enhance the competitiveness of the company.

Company B

COMPANY B has turned to UX as a way to challenge its R&D practises thus enhancing product innovations as well as to support the overall company brand as a forerunner in factory automation and to surpass its competitors. In the beginning of the research programme they searched new sources for innovation by testing existing technologies outside their field in enabling positive UX (see e.g. Heimonen et al. 2013). Recently, the aim of supporting UX-orientation throughout the organisation, has become even stronger. The efforts are also supporting to build a modern and inviting image for young professionals in the trade that still suffers from prejudices based on its past poor work conditions.

As a part of their aims to enhance UX in their business and in products in particular, COMPANY B started a product development project aiming to ease the use of certain control unit that is used to control automation systems in factories and assembly lines. This was the first project in COMPANY B concentrating on usability and UX. The aim was both to improve usability and to minimize the need for user training so that basically anyone could be able to use the control unit without long training periods. The project thus aimed to create something totally new in the field of robotics, where the control units are typically very complex and difficult to use. The project also aimed to gain competitive advantage through the new product as the experiences from a previous project have made it clear that customers would especially appreciate the ease of use. The development project at COMPANY B was seen as an important starting point for wider UX orientation, though the project itself was consider to be quite small and it has thus minor visibility for the rest of the organisation.

Company C

COMPANY C has strongly been investing in design and UX during the recent years. From the year 2006, the management has actively led the renewal of the company's brand image from a manufacturing company towards experience-centred company, as focusing on design and experience is seen as an important competitive advantage of the future. In the year 2008, COMPANY C launched a new UX-based vision and strategy, to change the direction of the company more towards business from experience.

Although COMPANY C has put a lot of effort in changing its business towards bringing customer value through experience, there have been some difficulties in concretizing the UX-based vision and strategy for the entire organisation. The product-centred way of thinking is still strongly seen in the company's DNA, and there is a need to change the entire organisation's mind-set. An example of COMPANY C's efforts in incorporating UX to its operations is a global training concept developed for enhancing employee understanding of the company's UX-based vision organised every year. Its purpose is to engage employees to the vision and strategy by bringing employees closer to the customers and users. It is also a tool for bridging the gaps in the organisation by forming teams comprised of representatives from various units.

Elements of design management in the UX efforts of case companies

Following Borja de Mozota (2003) we analysed the levels of design management in the specific UX-efforts of our case companies. Many elements from the levels were adopted in each company, but in various styles and depths. The results are summarized in table 2.

Level of design management	COMPANY A New product development	COMPANY B New product development	COMPANY C Training concept
Design action • **Design's impact on customer behavior** • **Design differentiation through branding**	• Direct impact on customer behaviour. • Brand renewal as a basis of design management.	• Direct impact on customer behaviour. • Brand does not yet support design management efforts	• Indirect but clear impact on customer behaviour. • Brand renewal as a basis of design management.
Design function • **Design's impact on new product development (NPD) process quality** • **Design in increasing cooperation between R&D and marketing**	• NPD process was improved through the cooperation in a large project group • Cooperation between R&D and marketing is not systemised	• NPD process was improved through intensive working of small group of R&D employees • Cooperation between R&D and marketing is not systemised	• NPD process may be improved through improved customer and user understanding gained in the event. • The conditions for cooperation between R&D and marketing may be improved.
Design vision • **Design's strategic positioning** • **Design as an internal and external competitive**	• Design is learned by experience, aim to build a core competence • Internal: Design as a	• Design is learned by experience, aim to build a competence • Internal: design is on the responsibility of R&D, some	• Design is learned by experience, aim to build a core competence • Internal: a large design unit

advantage	resource (design team) • External: a unique new product in the market	elements outsourced. • External: new and innovative user interface in the market	established • External: indirect influence on the customer experiences

Table 2. The elements of design management in UX -efforts in case companies

Design Action

In all the case companies design seems to have some effect on customer behavior. At COMPANY A and COMPANY B this is most evident as the new products emphasising improved UX were launched. At COMPANY A the new product concentrating on better UX and design was received very positively by the customer and users (operators) interviewed. It has even led to a change in their existing order. The users felt their voice had been heard and considered as they could also participate the delivery process. The new product clearly had an effect on the users' perceptions and future behaviour, as one of the operators put it *"One thing is for sure, we will not go back to the old products. That time has passed"*. The users' satisfaction was also important for the persons who actually bought the product, since the satisfaction of the users in the production sites is seen to be essential in terms of getting the work done. The differentiating effects were also recognized inside COMPANY A. As one of the members of the project group stated about the end result: *"The products are starting to look like COMPANY A now*".

At COMPANY B the customer were also satisfied with the new control unit that had features borrowed from consumer electronics. The product was seen to have reached its goal; the ease of use. There were, however, some attributes in the product the users were not totally happy about, which affected on their overall experience. The product is, however, used quite a short time daily and the drawbacks in it are thus not as critical as they would be for instance in COMPANY A's product. On the whole, the users describe the product as a "*Major step forward compared to the old one*". In small and medium size customer organisations the ease of use was also important for the managers as they wanted to be able to use the machines themselves for instance during the weekends when operators were not at work.

COMPANY C, on the other hand, has been able to influence on customer behavior in an indirect manner through its successful training concept. As some selected customers participate the event, it has been noted to have an obvious positive effect on sales. Even though the training concept is above all aiming to enhance company's internal understanding of the UX- oriented vision, the possible differentiation in the eyes of the customers that may result from the event is recognized.

At COMPANY A and COMPANY C the design and UX -orientation has a strong connection to company brand. Actually, all the UX efforts are grounded on the brand renewals in both companies. At COMPANY A the new product development process ended up to a product that is seen to be in line with company's vision, brand and slogan. Both COMPANY A employees and customers see that its' design mirrors the company's brand supports

COMPANY A's company identity. At COMPANY C the training concept has been supporting a major brand renewal and increased the awareness of employees and customers about the meaning of UX. At COMPANY B, on the other hand, the company brand has not yet as strong UX or design emphasis as the other companies. COMPANY B is in its early phases of UX-orientation and the possible brand renewal still ahead.

Design Function

At COMPANY A the new product development process investigated ended up to a design innovation, where ideas are transformed into unique UX. Also the innovation process was seen to be improved as internal cooperation was increased and the collaboration with a new manufacturing partner worked well. There was, however, also some discomfort concerning the fact, that not all the units of the company were participating the process. Even though the project members came from several business units, few members thought that including people from service, maintenance, procurement and manufacturing in the project group could have improved the outcome.

The cooperation and communication between R&D and marketing did not improve remarkably at COMPANY A as a consequence of this UX-driven product development project. Integration of these two functions through design management is therefore currently only moderate at COMPANY A. Marketing people share the same understanding about the importance of UX and design, but the fluency and frequency of communication between the units could be improved. The communication is informal and mostly dependent on employees' own activity.

At COMPANY B the product development process was conducted by solely five R&D employees and no people from the other departments of the company were participating. This was actually the reason the members of the project group saw the innovation process to be successful; it was conducted within a small group of people and there was time to concentrate on one thing. No increased coordination inside the organisation through design management was thus obtained in this project. The project aimed at improved UX through ease of use, but planning the user-interface and designing the product was outsourced. The meaning of design was consequently not widely considered among the project members.

The cooperation of R&D function and marketing & sales is also moderate at COMPANY B. Marketing and sales are not completely satisfied with the new product and they are somewhat disappointed due to their minimal participation in the development project and their chance to express their opinions. However, the sales people at COMPANY B considered the product and its better UX to be a good supplement to company's offering even though the sales volume has so far been only moderate. R&D and marketing & sales departments are seen to be separate and their working styles are different. At COMPANY B there is thus a need to enhance design management to increase the understanding that those functions are depending on each other rather than them being separate entities.

At COMPANY C the training concept has had some influence on new product development. As the concept enhances learning and increases understanding about users, customers and their needs, it has also generated ideas on how design and UX can be captured in actual products in R&D. The R&D employees interviewed are planning to utilize their learning and participate customers and users when starting to plan new concepts and products.

The cooperation between R&D and marketing functions was seen to be improved due to the training at COMPANY C. The event created better conditions for internal collaboration and thus might have lowered the barriers between various departments. In this study no sales people were interviewed, but employees from other departments had identified some difficulties in making the sales people understand the value of UX and design as they are quite abstract concepts. They, however, saw that the training has helped in concretising their meaning also for sales and marketing and thus made it easier to discuss these issues both internally and externally.

Design vision

The strategic positioning of design in the investigated companies can be said to be experience based. As all of the companies have a long history in the B2B –sector as a manufactures, design has not been the defining core competence from the beginning of their story, but rather acquired and learned by experience, from which the user-centred new product development projects at COMPANY A and COMPANY B and the training events of COMPANY C are good examples. The use of design and UX has been progressive, as in all of the companies the value of design and UX has been noticed through a learning process, by observing the current trends and conceptualising future directions and possibilities for differentiation. Though the positioning of design is experience based, the overall goal in all companies is to develop the organisational culture in making design and UX a core competence and a competitive advantage in the B2B-markets.

At COMPANY A the competitive advantage from design and UX is both internal and external. The strategic value of focusing on customer and user needs has been noticed, and as a result, the company begun the product development project and strengthened its resources with design competence by establishing a design team within its R&D. The external value of design for the company is manifested in the new and unique product, which differentiates the company's offering from the competitors. The product has become a "flagship" of UX, and the company has actively promoted it in various industry and design fairs. This has been noticed by the customers, and design can be said to have strengthened the company's position in the market in a new way. At COMPANY B, the aim is to gain internal and external competitive advantage from design and UX. Building the UX and design competence in the product development project was on the responsibility of the small project group within the R&D, which noticed the differentiation value of design and UX. The company did not recruit design experts, however, they did utilise external design resources to support the concept phase of the project. Design and UX competence is therefore expanding through an internal learning process of R&D from bottom-up. The result of the product development project was

an innovative product, however, the external competitive advantage of it remains to be seen. After its launch in the market, the new user interface has evoked possibilities to expand to other product lines as well. At COMPANY C, the competitive advantage from design is strongly internal; the company has established a larger design unit to make sure design is a part of their operations, and developed the training concept, so all employees would be able to experience the design driven vision, regardless of how closely they work with the customers or users. The external value of design in the training concept is the indirect influence it has to the customers; by visiting the customer sites and gathering information from their experiences, the personnel strengthens the company image.

DISCUSSION AND CONCLUSIONS

The aim of this paper was to explore the potentials of a design management approach in contributing to solving the cultural contradictions recognised between "the MEI thinking" and "the new design thinking" and thus enhancing UX related competitiveness. We studied empirically three case companies' selected UX -related efforts from design management perspective by applying Borja De Mozota's framework. In the following we will discuss the results from the potentials perspective and suggest some future avenues of research.

As an overall conclusion, we argue that investigating companies' UX efforts from design management viewpoint gives new insights into understanding the direction of these efforts. The companies in the FIMECC UXUS programme seem to utilize all levels of design management and are heading towards the direction of increased competitiveness through better UX and ultimately they can drive renewal of the whole industry by their example. We suggest that all the levels of design management are needed and that the overall UX related goals of the company define the useful design management level and the suitable efforts.

The more deep impact of the efforts studied on the contradictions recognised in the previous study depends if they turn into daily practises of the companies as well as their relationship with other "design management activities" (brand building, marketing etc.). The acceptance of the training events of COMPANY C as yearly occasion increases its meaning in solving the cultural contradictions in favour of design thinking. If new product development is increasingly done through collaboration between different organisational functions (as in COMPANY A), then it reduces the contradiction related to the R&D processes away and strengthens the design function. The strong product orientation and emphasis on technological superiority as a competitive advantage in the past have been strong driving forces for the industry. Thus, UX, as easily associated with new products development can be the way to introduce design management more profoundly into the organisations in this industry and enhance its impact also on operational and strategic level. UX can also be an important driver for service and solutions development and thus, through these levels, the impact of design management might also boost overall change of organisational culture. From organisational culture perspective the gradual progress gives time needed to adopt the

best of the new approach - too much too soon might counteract and force the new initiatives to align with the old culture. This is preferred also because direct change programmes of culture can have unexpected negative effects because the culture has a tendency to restrict change from outside, and at best, the part that has changed may only be the visible part of the culture (Schein 2004/1985; Reiman 2007). Thus, the potential of UX in enhancing MEI's competitiveness lies not only in differentiating by products, services and solutions but also in renewing organisational culture towards a more aware and agile culture.

As a theoretical contribution we suggest that when aiming to apply approaches originating from different (business or industry) contexts organisational culture approaches can give insight needed in understanding difficulties and perhaps failures of such adaptation. Although in the development of design management and UX approaches have been led by research on business to consumer type of companies, they seem to have great potential also in MEI business- to business companies and even supporting the cultural transformation there. The novelty value of this paper is related to linking design management to organisational culture discussion and exploring empirically design management's applicability in B2B and MEI.

In the future, there is an obvious need to understand the design management efforts and their progress in more detail. We suggest that longitudinal studies on how design management efforts have been changing the business logic of organisations, their networks and the whole industry should be conducted later on.

ACKNOWLEDGEMENTS

This research was carried out as part of the Finnish Metals and Engineering Competence Cluster (FIMECC)’s UXUS program funded by participating organisations and Tekes - The Finnish Funding Agency for Technology and Innovation.

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Exploring the Application of Methods for Involving Customers in New Product Development Practices from the Manager's Perspective

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Keywords: Customer Involvement, Methods, New product development

This research seeks to understand the ways in which customers are involved in the new product development practice and the extent to which approaches adopted are effective from the manager's perspective. The research has adopted semi-structured interviews for R&D managers in six leading companies. This initial study of firms especially aims to understand the extent to which firms are using traditional or new web-based methods for involving customers. Preferences of methods have been identified and manager's views on those methods have been collected. The findings indicate the limited use of new web-based methods for customer involvement in these companies.

INTRODUCTION

Working closely with customers to obtain deep insights and potential needs for their products is one of successful factors for developing new product (Cooper and Kleinschmidt, 1994; Gruner and Homburg, 2000). Although customer involvement may not always have an active influence on the success of new products (Brockhoff, 1997, 1998), the positive effect of customer involvement has been supported by several empirical studies in recent decades and identified as critical success factors (Nishikawa *et al*., 2012; Hanna *et al*., 1995; Johne and Snelson, 1988; Maidique and Zirger, 1984; and Cooper, 1979). Successful NPD relies on a deep understanding of customer needs (Hauser *et al*., 2006). Consequently, a shift from the 'Manufacturer Active Paradigm' to the 'Customer Active Paradigm' (Von Hippel, 1978) in new product development has been seen in many companies and has generated the discussion in recent years (Peled and Dvir, 2012). Accordingly, the role of customer has been changed from serving as resource (e.g. worker, buyer and user) (Gersuny and Rosengren, 1973) and information provider (Fang, 2008) to serving as 'co-designers' and 'co-creators' (Prahalad

and Ramaswamy, 2004) of products. In many companies, such as MUJI (Nishikawa *et al*., 2012), Apple ITunes, Swarovski, Starbucks, P&G and Staples, customers play a new role as 'co-developers' in the new product development (Piller and Ihl, 2009). Thomke and Von Hippel (2002) introduced the concept of 'Customer as Innovator', who actively performs as primary developer in product design.

With the emergence of the Internet, the means by which customers might be involved has changed significantly. Before 2000, 'traditional methods such as interviews and focus groups were dominant. The Internet has however enabled customers to be involved in new ways. This study is seeking to understand the extent to which firms are adopting these new web-based methods. The paper is structured as follows: first the range of methods for involving customers will be briefly summarised; next a description of the research methods; this is followed by a summary of results and finally a discussion of the implications.

TRADITIONAL METHODS OF INVOLVING CUSTOMERS

To design a successful product, customer involvement is critical (Kaulio, 1998). Companies must give meticulous attention to the 'voice of customers' (Roman, 2010) and there are many established methods for customer research, which are used for generating insights into user needs and wants and some are summarised in table 1.

Traditional methods for involving users	Sources
Interview	Lazarsfeld, 1937; Kvale and Brinkmann, 2008
Focus Group	Merton and Kendall, 1946; Ciccantelli and Magidson, 1993
Questionnaire Survey	Lazarsfeld, 1935; Mellenbergh, 2008
Ethnographic Research	Conklin, 1967; Cooper and Edgett, 2008
Customer Idealised Design	Cincianntelli and Magdison, 1993
Idea Competitions	Kaulio, 1998; Piller and Walcher, 2006
Customer Brainstorming	Osborn, 1963; Cooper and Edgett, 2008
Concept Testing	Moore, 1982; Kaulio, 1998
Conjoint Analysis	Green and Srinivasan, 1978; Orme, 2006
Customer or User Designs	Cooper and Edgett, 2008
Co-Design/Developing	Neale and Corkindale, 1998
Prototype Testing	Dolan and Matthews, 1993
Market Testing	Prandelli *et al*., 2006

Table 1: An overview of selected 'traditional' methods for customer research

Basic customer research methods, such as interviews, focus groups and questionnaires, are often used across product development process for multiple purposes (Creusen *et al*., 2013), while methods as customer idealised design are developed for specific purposes. Whilst there are various approaches for customer research, these methods are often used to gather product

ideas from customers at the early and stage of new product development and then gain feedback on possible designs at a later stage for validation (Ozer 1999, Creusen *et al*., 2013).

In addition to the timing of customer involvement, absorbing and acting on customer insights can be difficult (Prandelli *et al*., 2006). Therefore, companies need not only to conduct customer research energetically, but also to involve customers actively. Hence, more proactive approaches have been developed recently for involving customers in different stages of NPD.

NEW WEB-BASED METHODS FOR CUSTOMER INTERACTION

The Internet has presented a revolutionary change in the way that customers can be involved in NPD. The Internet specifically enhances the absorptive capacity of company to obtain market knowledge without using external agencies (Prandelli *et al*., 2006), providing easier access to the knowledge of customers (Füller et al. 2007). More importantly, it can be used at a lower cost than some non-web based approaches (Nambisan, 2002; Sawhney *et al*., 2005). Companies are making increasing use of Web-based tools in the development of new products. Web-based methods such as crowdsourcing, design toolkits and virtual communities have become quite popular, by which customers play an active role against the previously companies-dominated world of product development (Füller, 2010). A range of new methods is summarised in table 2. For instance, Swarovski, as Fujitsu, Adidas, etc., have launched on-line design contests to invite designers and creative consumers from all over the world to participate (Füller, 2010); BMW established a virtual innovation agency (Piller and Ihl, 2009); and video game designers encourage customers to be co-developers of new gaming ideas and participate in development and testing process (Jeppesen and Molin 2003). These new methods enable customers to be more actively engaged in the generation, design, refinement, and testing of ideas and new product concepts Consequently, it is argued that aborption of customer knowledge can be simplified and enhanced (Nambisan, 2002; Sawhney *et al.*, 2005).

Web based methods for involving users	Sources
Crowd-sourcing	Howe, 2006; Brabham and Daren, 2008; Ryzhkova, 2012
Design Toolkits/Templates	Janssen and Dankbaar, 2008; Ramaswamy, 2008
Virtual Community/Forum (including Social-Media)	Füller *et al.,* 2007; Prandelli *et al*., 2008
Virtual Development Team	Lipnack 1997; Ebrahim *et al*., 2009
Open Source Mechanisms	Raymond, 1999; Lakhani and Von Hippel, 2003

Table 2: An overview of selected new Web-based methods for involving customer

METHODOLOGY

As the aim of this study is to understand the methods used in involving customers in new product development and specifically to explore the extent to which new web based methods are becoming adopted.

An interview-based approach was adopted, as this study was inherently exploratory, seeking to generate qualitative insights from managers in firms (Bernard, 1988). Companies were deliberately selected to represent a range of sectors, from business-to-business technology to consumer retail. In all cases, companies chosen are ranked in the top 3 in their respective markets and can thus be considered 'leaders' in their sector. This selection strategy was viewed as appropriate in order to gain insights that represent a wide range of firms, but where these firms were independently successful. A summary of the firms interviewed and the specific interviewees is provided in table 3.

The interviews followed a semi-structured format, in that there was a predetermined interview protocol, but interviewees were allowed to pursue areas of interest where relevant. This enabled the exploration of the perceptions of interviewees regarding a range of complex issues with scope for probing for further information and clarification (Barriball and While, 1994). The following questions were used as the backbone structure of the interviews:

- How do your company involve customers in new product development?
- What specific methods do your company use? (unprompted)
- What specific methods do your company use? (using graphical prompts)
- How do you use the methods?
- What are the effective methods and how to conduct them? (Maximum three methods)
- How do you think about new web-based methods and traditional methods?

The first two questions were asked with no prompts or suggestions. Respondents were asked to note whether the methods were 'traditional' or 'web-based'. For the third question, a list of methods was presented in order to stimulate additional insights. Participants were asked to add any further methods missed in their initial response. Just naming the methods was viewed as in sufficient (Nijssen and Lieshout, 1995), and so interviewees were also asked to select three methods to describe in more detail exactly how they were used. These three methods were selected as the 'primary' methods used in the firms.

All respondents were R&D managers (or equivalents), who were chosen because of their ability to provide insights regarding new product development and customer integration. Interviews lasted between 50 to 65 minutes. All interviews were recorded and transcribed. They were subsequently analysed to identify key issues and patterns using a grounded theory approach (Glaser and Strauss, 1967).

Next, key observations and findings from these interviews are summarised, leading to the development of a conceptual framework.

Company	Sector/Product	Market Position	Informant	Department
A	Juice Drinks	Top 1 UK	Innovation Manager	R&D Department
B	Beauty, Healthcare	Top 1 UK	Senior Design Manager (Decoration)	R&D Department
C	Turbo Engine, Power system	Top 2 Global	Chief Engineer/ Manager (Civil Aero Engine)	R&D Department
D	Grocery and general merchandise	Top 3 Global	Head of Design (Home Products)	R&D Department
E	Office Products	Top 1 Japan	Director of Product Development (Furniture)	R&D Department
F	Computer hardware and electronics	Top 2 Global (PC Vendors)	Project Manager	Innovation Design Center

Table 3: Companies and interviewees in this study

RESULTS

Company A

Since 1999, company A has become the No.1 smoothy brand in the UK and occupied an extremely large share of Europe drinking market. Almost all the staff can tell the story of how the founders decided to launch a Smoothies brand. The original idea of establishing a smoothy brand was evaluated by potential customers. Since then, the company has always taken customer's views as being at the heart of the company.

The company has used different a range of methods to involve customers in new product development. Voice of the customer and QFD (Quality Function Deployment) are mentioned as principles of the product development process. Testing products and validating concepts are the main ways of involving customers. No methods are used for involving customers in co-development process. Several web-based methods have been used, such as social-media questionnaires and virtual community, although these methods are mainly used for collecting feedback and enabling Internet generation of ideas.

The most effective method was identified as "Paid Interview" for certain group. The company believes that this method can encourage customers to provide more accurate and reliable information.

Company B

Company B is an international pharmacy-led health and beauty group and owns over 2000 stores in local community. It sells both own brands and third party brands. Top-managers in this company are very concerned with feedback from customers. One interesting example is: "We held a customers focus group to make a judgment on two distinctly different designs of a specific product. Business managers favor Design A; Customers favor design B. In the end, we went with design B. When you come to our company, you will find everyone here said customers' wants. If customers said yes, it cannot be wrong."

The company has special 'Customer Insight Team', which analyses customer behavior, trends in market and collects feedbacks from customers for special category or product. It provides more specific comments and understanding of their designed products.

There are many lines integrated with the final design, including the uniforms of staff, product development, display design and store design. Everything integrates together to create 'Experience' to customers. Customers are invited to give comments on final concept or products and sometimes also on prototypes in company's laboratory. In addition, stores are the important place to help collect feedbacks. However, the methods are still mainly used for the beginning and end stage of new product development process. Three methods are selected to be the most effective methods: Interviews in Stores, Prototype Test Interview and Concept Testing.

Company C

Company C has won an extremely high reputation for quality, delivery, responsiveness and reliability of products. Aircraft engines products make the company to be the world's second-largest maker.

The company has two specific kinds of customers: one is aircraft manufacturer; the other is airline company. Understanding the two groups of customers with close observation and communication is fundamentally important strategy. Company B provides almost all of its customers each with a "Customer Executive", who is directly based in the customer' area with an office and takes in charge of involving customers locally. In addition, the customer support organisation in the company builds interrelationship with airline companies and helps to make customers' survey in products generally. Understanding what customers' fleet plan maybe, what their buying plans maybe and making out what kinds of things they are looking for in new airplane are of great importance for new product development. Due to airline companies from different locations, company B pays more attention to customer specific requirements and defines distinguished design statements.

In order to obtain more valuable information from customers and respond appropriately to them, company B uses different kinds of methods to involve customers widely and effectively. Except the methods for generating ideas and validating products, several methods are used for co-developing with their business partners or even competitors, such as joint

studies and co-development team. However, methods for the beginning and end stage of developing products are still the main streamlines. Three methods are selected to be the most effective methods: Joint Studies, Product Strategic Meeting and Airline Forums.

Company D

Company D is a British multinational grocery and general merchandise retailer. Till 2012, the company has stores across 14 countries. From a company perspective, involving customers in developing products is supportive to capture customers' needs and thinks accurately and trust relationship between customer and company can probably improved by integrating customers. Besides, the company has a special team for gathering and analyse customer insights, which partly takes in charge of selecting specific customers for involvement and research.

Company D has several common points with Company B, such as launching club cards, building stores and on-line shopping with customer review. Similarly, there is a lack of involvement methods in the co-development stage. All the methods used focus on generating new ideas or validating products, such as panels, customer visiting group and user trials. Two methods are selected to be the most effective methods: Loyally Card and Panels (Focus group).

Company E

Company E is a leading company in office stationary and furniture area and owns business across Asia. In furniture department, attention is given to how user works in an appropriate environment. Company needs detailed investigation with customers and cooperate with design agencies to understand environment, work modes and user requirements. The main customers of company include IT and electronic companies, law office and design office under two categories: one is business to business; the other is end-user. These industries have different requirements, which are achieved through product design. As the company mentioned, 'Voice of Customer' is the core of new product development.

The details of products reflect the concerns on customers. Methods for involving customers are mainly used to listen to the customers carefully. Voice of customers and User-oriented design are mentioned as principles of product development process. Several methods are developed to collect customers' voice, such as customer call center, customer visiting group and voice clip. In addition, Experts are considered to be a kind of 'lead users'. The methods used for involving customers are focus on generating ideas and validating products. Two methods are selected to be the most effective methods: Voice clip and Annual exhibitions.

Company F

Company F is a Chinese multinational technology company. Its product categories include a large range of electronic products. The market has expanded to around 160 countries. In this company, new products can be divided in two streamlines: one is new product for current market; the other is new product for 5 years-later market. The roles of customer are vital and

different: for the former, customers are asked about more specific questions of product, such as design and functions; for the latter, customers are asked about life experience, such as living and consumption habits. In company F, investigation in user experience is a key to success, by which company can better plan product strategy and ensure good market performance.

Methods used for involving customers are allocated in the beginning and end stages of new product development process, and the main purposes of these methods are to generate ideas and to validate products. Voice of customers and QFD are mentioned as the principles of developing products. Moreover, expert interview is mentioned to understand design trend and future market, and therefore the company encourage staffs to communicate with experts around the world every year. However, there is no specific method used for in the middle stage of development process in this company. The most effective method is Early Adopter.

DISCUSSION

All the companies can be described as being 'customer focused' in their collation and management of customer information. Retailing firms company B and company D both made extensive use of customer data, generated through the use of their loyally cards. These databases enable the selection of appropriate customer samples for further research. Company E also has large database of customers' information, while the approach to obtain the information is different. In company E, the customer call center takes charge of processing customer data, including customer information, feedback, inquiries and comments. Similarly, company F also has specific team for customer database, but prefers to hire third parties to analyse data and conduct specific research. Although there is no specific team for customer insight, company A has developed a virtual community, which enables people to be actively involved, through receipt of newsletter and interactive activities. As a business-to-business company, company C has very specific and small range of customers, which enable intensive study and care on each customer effective. Through its 'Customer Executive Program' almost every customer has a named 'customer executive' with an office nearby. These executives take charge of involving customers locally and are the 'interpreters' and 'translators' of any customer feedback.

Methods for involving Customers

The use of formal tools for involving customers is found in these six leading companies. Each method is used for a specific purpose and some methods can be used for multiple purposes. The majority of the methods described are what might be described as 'traditional'. Interviews, focus groups, questionnaire, concept testing and prototype testing have been mentioned as key approaches across this set of firms. In the majority of firms, customer involvement is mainly based around providing evidence or insights as a precursor to idea generation and subsequently for validating concept ideas generated as a result. Thus, the methods are used at the very beginning and also towards the end of new product

development. Company C mentioned its virtual teams for co-developing in limited scale and for special tasks, while there is a shortage of co-developing task with customers among the other five companies. Overall, few of the firms either mentioned or actively used web-based methods for involving customers. Where these methods were used, they were mainly for providing feedback (e.g. reviews) on existing products. A summary of the main methods used in each of the firms is provided in table 4. A distinction is made between the methods that the firms chose as being the most effective ways of involving customers. It is interesting to note that with the exception of company D, all of the methods are 'traditional', and even in this firm, involvement is based on feedback and review of products and does not provide any original insights for the development of new products.

Company		Traditioanl Methods	New web-based Methods
A	Most effective	Paid Interview	
	Other	Focus Group; Taste Test; Feedback Survey; Concept Testing; Conjoint Analysis; Market Test	Facebook Questionnaire; Twitter Questionnaire; On-line virtual community
B	Most effective	Interviews in Stores; Prototype Test Interview; Concept Testing	
	Other	Loyally Card; Ad hoc Conversation; Focus Group; On-site Questionnaires/Feedback Survey	On-line Forum (Social-Media); On-line Questionnaire
C	Most effective	Joint Studies; Product Strategic Meeting; Airline Forums	
	Other	Interview/Discussion; Survey/Questionnaire; Informal Discussion; Email Exchange; Workshop; Operator Conference; Tele-conference; Conjoint Analysis; Customer Idealised Design; Co-Development Teams	WebEX-Internet meeting; Virtual Teams
D	Most effective	Loyally Card; Panels (Focus group);	On-line Customer Review
	Other	Workshops; User Experience Interviews; Questionnaire; Customer Visiting Group; Concept Testing; Feedback Survey; Minimum Make Standard; User (Staff) Trial (Market Test)	Facebook Blogs
E	Most effective	Voice clip (voice of customer); Annual exhibitions	
	Other	Show Room Activities; RFP (Request for Proposal); Questionnaire/Feedback Survey; Interview; Concept Testing; Prototype/Market Test; Customer Call Center; Customer Visiting Group	On-line Design Contest; Social-Media Feedback
F	Most effective	Early Adopter	
	Other	Interview; Focus Group; Workshop; Modular Customisation; Customer Idealised Design; Concept Testing; Idea Competition (inactive now); Participatory Ergonomics; Market Test; Beta Test (Software); Feedback Survey	On-line Questionnaire; Social-Media Feedback

Table 4: Overview of Methods used for involving Customers in six Companies

Analysing these methods overall, interviews are dominant, with several other methods being used consistently across several firms: Interviews (6); Social-media Feedback (5); Concept Testing (5); Prototype (e.g. Early Adopter, Taste, Panels) Testing (5); Feedback Survey/ On-line Feedbacks (Questionnaires) (5); Focus Group (4); Workshop (3); Loyally Card (2); Customer Visiting Group (2).

Channels to market influences the methods used

The route to market appears to play an important role in the choice of methods used. Companies with their own channels (e.g. stores or exhibition halls), such as company B, D and E, seem to interact with customers through these channels. For example, retailing companies, such as company B and D, use 'loyally Card' schemes to gather a wide variety of customer data for quick market analysis. Company E prefers to invite customers to visit its show rooms and exhibition halls locally and involve them directly in experiencing its products. Company F has its own stores and distributors, which are mainly for gathering feedback through customer complaints. Company A, which does not own retail-outlets, has to put more effort into developing virtual communities or web-based activities for loyalty fans. Company C, unlike any other five companies, interacts directly with customers through local offices.

Rewards for customer involvement

The majority of the companies viewed methods with either monetary or physical (e.g. goody bags) rewards as the most effective ways to involve customers (e.g. company A, B, D, E and F). Payment seems to be the 'golden rule' to gathering effective and reliable information, whether the research is conducted by the company itself or by third parties. Their view is that paid research is necessary for good feedback. In contrast, company C sees customer involvement as a means of improving the company-customer relationship.

Absence of co-development

It is surprising how little involvement there is of customers during the 'middle stages' of new product development. With the exception of company C, all firms used methods at the beginning (for ideas) and end (for validation) of NPD. In some cases (e.g. company D and F), customers might be involved during the development phase, but the majority of involvement is based around validation and generation. As a result, there is little participation of customers as co-designers or co-developers, again with the exception of company C, where co-development is strongly encouraged. However, although company C mentioned several methods for involving customers, cooperation remains limited due to the technically complex nature of the products. Overall, there appears to be a perceived difficulty in involving customers as co-developers due to an apparent lack of skills or knowledge and concerns over confidentiality.

Little application of new web-based methods

Although computers and the Internet are used as the main tools for everyday work in these companies, use of web-based methods for involving customers in developing products is still marginal. Social-media provides ready-made platforms and thus seem to be the most commonly used of these new approaches. On-line focus groups, and questionnaires are sometimes used. The majority of web-based methods used seek to provide evidence for idea generation and to provide feedback on existing products. For example, company B and D have both established on-line customer review systems. However, screening and processing this feedback can become challenging work. Company A has built an virtual community to interact with customers and company E holds an annual on-line design contest, although many of the ideas proposed are crude. Whilst understanding of these web-based methods is different among these companies, it remains low overall.

Trust in Traditional Methods

Traditional methods remain dominant as the firms have developed both expertise and trust in the evidence that will be returned. The results generated are perceived to be more convincing and believable. This was mentioned by almost every interviewee, and there was overall agreement around the confidence generated by physical interactions. Consequently, web-based methods received less praise and greater suspicion. The respondents expressed concern over the reliability of the information obtained through web-based approaches due to the potential diversity of respondents and that these people were ‘unknown’. Thus, such on-line methods may not be controlled for both quality and security. These observations agree with Ryzhkova’s (2012) argument that companies may be unwilling and reluctant to implement new web-based tools due to the lack of understanding of the benefits and risks. However, although the companies still focus on using traditional methods to involve customers, they also think that it is necessary to understand more about the prerequisites of using web-based methods and how to achieve them. All are seeking to enlarge the use of web-based methods in future.

CONCLUSIONS AND FURTHER WORK

All interviewees confirmed that customer involvement is a successful factor of new product development. However, use of methods is generally geared towards three goals: providing evidence to support idea generation; validating new product concepts; and collecting feedback on existing products. Traditional methods dominate, and little use is made of new web-based methods. In addition to confidentiality and cost issues, there appears to be a mistrust of web-based methods as tools for providing reliable data.

These concerns restrict the potential for broader and deeper customer participation. Nonetheless, the companies are all beginning to recognise that web-based methods provide opportunities for increasing customisation and greater participation. The managers appeared

interested to better understand how to achieve the capacities of exemplars, such as NikeID and Lego, which have successfully developed new ways to engage their customers in NPD.

Future work is needed to explore these capabilities and support firms to transition from relying upon tried and tested approaches and to exploit the potential offered by web-based methods.

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Facilitating Innovation through Design in a Danish context

- a framework for design capacity

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Keywords: Innovation, design capacity, design management, visual management tool

ABSTRACT

Design is seen as a powerful tool to improve business performance. Danish as well as international studies have indicated that companies and organisations using design in their innovation process or as part of their business development more often achieve better economic results and become more innovative than companies that have less or no focus on design (The Danish Business Authority, 2003, 2008; Design Management Europe, 2009; The Danish Business Authority and FORA, 2011; Tether, 2005). However, these studies also indicate that the competitive potential of design depend on how design is included and managed as a strategic competitive driver in the organisation. According to The Danish Business Authority and FORA (2011), there is an untapped competitive potential for Danish companies to work strategically with design in their businesses innovation to create growth.

In this paper we look at how to develop a framework to visualize and discuss the nature of companies' design capacity. The paper will discuss this through nine case studies selected with maximum variation with respect to the companies' size and their degree of internationalization. It is discussed how this framework can be used by management to gain an overview of current status of the design capacity in the organization and to sustain

awareness of how to change their design capacity. In this respect the model presented is seen as a visual conversation tool for management and employees. In addition, the purpose of the model is also to enable comparative evaluations of companies' design capacity. The present contribution reflects on conceptual work in progress. The results contribute to further develop a model of design capacity for SME's as a visual strategic management tool that can hopefully facilitate conversations in the companies on their potential for innovation through design. The contribution is concluded with a few reflections on limitations of the model and prospects for further work to validate and develop model applications.

1. INTRODUCTION

Design is increasingly seen as a strategic key factor in the development processes of innovation and business. Value creation for the company comes through design thinking, which contributes to the core creative processes in the company that creates value for the company (de Mozota, 2006; Martin, 2009). In 2003, 2007 and 2010 nearly 2000 private companies in Denmark responded in a telephone survey on how they use design in their business. In the resulting report from The Danish Business Authority and FORA (2011) the companies are categorised according to the level at which they use design. To categorise this, the "Design Ladder" model from The Danish Design Centre was used. The report indicates that almost all companies using design as a key factor also implemented innovation activities (The Danish Business Authority and FORA, op. Cit.). In addition the report concludes that the Danish companies with a high level of integration of design are more productive than the most productive companies with a low integration of design (The Danish Business Authority and FORA, op. Cit.). Furthermore, the report shows that half of the addressed Danish companies use design strategically in their business development or as part of their innovation process. This is in line with Verganti (2008) who suggests that design plays a crucial role in the innovation strategy of design intensive firms. However, the circumstances facilitating design driven innovation still remain largely unexplored. Therefore there is a need for more knowledge on the organizational and managerial factors sustaining and impeding companies' implementation and use of design.

In this paper we will discuss and develop a framework for companies' design management capacity. The framework is inspired by a similar model developed by Heskett & Liu (2012). Their model describes the design management capacity in Chinese companies. We build on, change and expand their model in order to match a Danish context. For example, we find a need to reflect how closely users and other stakeholders are involved in the companies' innovation process. We also find it important to articulate the basic drivers of innovation in the companies as well as the role of design in the internal processes of the organization. The overall question in our work has therefore been: What are the appropriate dimensions to include considering the different purposes we aim to facilitate with the model, including status description of current design management capacity, facilitation of conversations on design management capacity in the organization, and future options for capacity building.

The paper therefore seeks to explore:

> *How can a dynamic framework for design management be developed to highlight and discuss the complexity of design capacity in companies?*

The remaining part of the paper is divided into five sections. First section includes a discussion of companies' design capacity. Next, a methodology section reveals the reason for the selection of the nine cases included to illustrate the model. A section presenting the cases: Three cases from the manufacturing industry, three cases from consumer and entertainment industry and three cases from the design and consultant industry. This is followed by a section discussing the cases and finally, conclusions and implications for the use of the model are presented.

2. DESIGN CAPACITY

One way to look at how companies use design is through the lenses of the Design Ladder model (The Danish Business Authority, 2008). The Design Ladder indicates that at each step there is an increasing degree of integration of design in the companies' business. On the first step of the ladder, design is not used in any systematic way, but can occasionally find ground through considerations of aesthetics and functionality, for example as how the companies present themselves on their website. On step 2 design is seen as a final finish, functional design or styling when developing new products or services. On this step design becomes an aesthetic, symbolic and sometimes a functional 'add-on' and designers are often involved late in the innovation process. On step 3 design is seen as an integrated, but not controlling, element in the companies' innovation processes, while design on step 4 is a central and controlling element in the companies' strategy. Although the Design Ladder does provide a comparative static image of the companies' use of design, it also has a number of limitations. Basically, the model provides a snapshot of the company's use of design, but the model does not show the resources and the awareness in the organization, which give the basis for the design efforts. Neither does it describe the dynamics that lead a company from one step to the next. Implicitly, it is also assumed that the company is better off at the higher levels of the ladder.

In a further development Design Management Europe (DME) has added the model a clear design management dimension. In this model each step shows the interaction of design and design management in five key areas: awareness of design's importance, planning of the use of design, resources allocated for design, availability of design expertise, either internally or externally, and integration of design processes. Although the DME model involves a management capacity dimension, the aspects indicated are not unfolded and does not lead to concrete suggestions on how companies can move from one step to another. This extended Design Ladder is still deployed as a static model that does not indicate how the individual

companies can move up and down the steps and what dimensions it is possible for management to alter in order to achieve the desired results.

The managerial perspective also plays an important role in Heskett & Liu's (2012) model for measuring the design capacity. They see design capacity as an expression of the company's ability to implement design practice on a strategic, a functional and an operative level. Heskett & Liu visualizes their work with a spiders web diagram and measure capacity using six dimensions, namely: 1) design awareness - in the company, 2) design as a competitive factor in the company's business, 3) internal design - whether there is established an internal design team or a designer is employed, 4) design work assigned to - formalization degree: who makes the design work? 5) design process – whether it is flexible or standardized and 6) company size. Based on the six dimensions they identify six types of companies that control the use of design in different ways, which means that they all have different design practices. The dimensions of Heskett & Liu's model are developed in a Chinese context and are therefore not directly comparable with Danish conditions. For example, the model does not take into consideration how closely users or other stakeholders are involved in the company's innovation processes. The size of companies included in the category of SMEs differs vastly. Finally, the model does not include the fundamental drivers of innovation that we find important to reflect on and it does not specify the internal processes in which design is used in the company. Since the contribution by Heskett and Liu is an explorative paper, the reasons for the selected dimensions in the diagram are not explicated yet.

In light of these contextual and purpose oriented reflections we developed the model into another version. In this process we are in total agreement with Heskett and Liu (Op.cit.) that the qualitative approach adapted, with its' strong focus on the individuality of capacity building, has to be complemented by quantitative analyses, if the aim is to gain insights into the population based patterns. Nelson and Winter (1982) label this type of triangulation 'formal' and 'appreciative' styles of theorizing and underline the complementarities of the two. In the same way further in-depth field studies are in need to guide management regarding their future options on capacity building. In this respect the capacity model is a gateway to focus on these studies. Based on the above, we will argue for five overall typical themes that relate to the companies' use of design. The five themes are also the lenses used in the design of the Design Management Capacity Model. In summary they are:

- Who are the design thinkers in the company? Is awareness and motivation for design limited to top management or is it widespread among employees of the organization?
- How and where is design active in the processes? Is it related to strategy processes or embedded with a specific function or project or is it taking no role at all?
- How are users engaged in the process? Are user communities and lead users engaged in co-creation processes or are insights from end users not considered at all?

- What is driving the company's innovation? On one extreme innovation in the company may be fundamentally technology driven, on the other extreme it may be, design driven in a combination of several factors?
- From where does the design capability originate? On one hand internal staff with design capabilities but no formal education, on the other hand a combination of external and internal designers?

In combination these themes, in a unique way, contribute to a comprehensive image of the practice of design management embedded with the company in focus. Based on the discussed, a framework for how design capacity can be unfolded in the following.

A framework for design capacity

Inspired by Heskett & Liu (2012) we have developed a framework model for design capacity designed as a spider's web. The Design Capacity Model is based on five criteria founded on empirical evidence and literature studies of what has direct impact on the company's ability to build a design capacity. The five dimensions measures how equipped the company is to bring design into play to support the company's innovation. (See Figure 1)

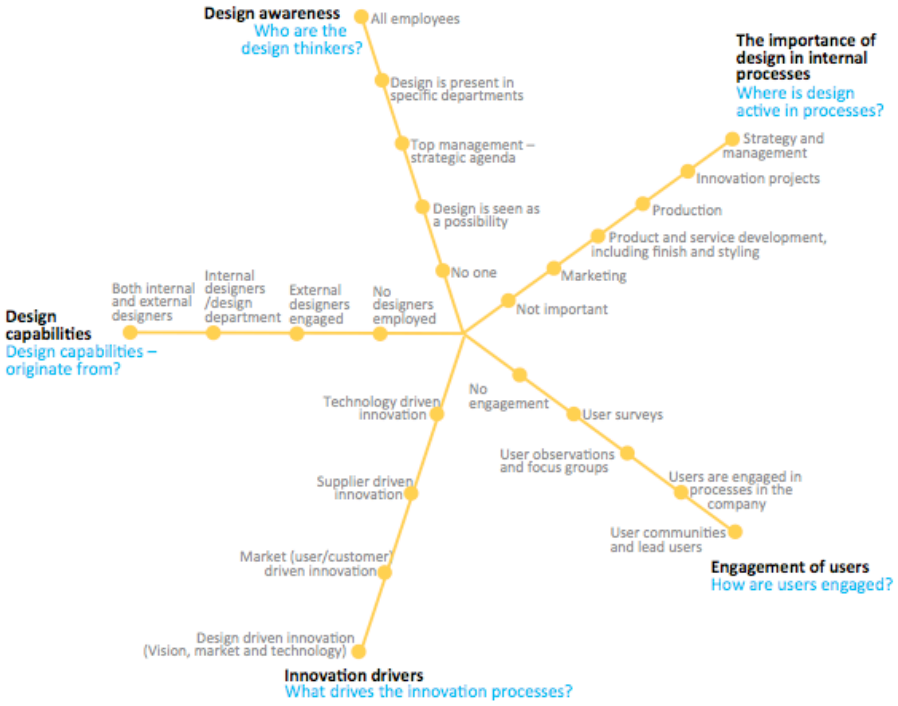


Figure 1. Framework for design capacity

The overall framework consists of the five dimensions and information about the context: 1) Design awareness, 2) Design's importance in internal processes, 3) User engagement, 4) Innovation drivers and 5) Design capabilities**.** The order of the different criteria is an ideal type and the same applies to the categories. There may be many categories in between and more companies will find themselves in more than one category. Similarly, various

departments could be located in different categories depending on the department and whether there will be designers employed or management in the department has a strategic focus on design in that department. In some of the dimensions the model contains a certain progression. This could for instance be in the dimensions relation to design capabilities. We have also seen that the company can have both internal and external designers and that it can have both at the same time. This may indicate that for some companies it may be necessary to have internal designers employed to translate external designers' proposals while the external designers ensure flexibility and focus on new trends. In the dimension of who are the design thinkers, design is more and more integrated in the company's awareness both among managers, departments and employees. And in relation to how design is involved in the company's processes the measurement is on how widespread design is integrated in the organization. Although the spider models immediately envision that there is a certain progression in the dimensions, it is not so, that the companies with indications far from the centre are in a better capacity position than those near the centre. Rather, it will depend on the company's target for these areas.

The next section concentrates on the methodology used to select nine companies in order to investigate and evaluate the design capacity in a Danish context and secondly, the nine cases are presented in order to evaluate the different roles that design can play in the companies.

3. METHODOLOGY

The choice of using case study methodology is related to the notion that *'the interaction between a phenomenon and its context is best understood through in-depth case studies'* (Dubois and Gadde 2002:554). Case studies are a unique method to build and utilize understandings of an empirical phenomenon with a view to developing theory (Harrison and Easton 2004). The cases attempt to illustrate how design capacity facilitates innovation in a Danish context and how different companies varies. The nine cases have been selected to demonstrate in which ways companies use design in their innovation, how this is facilitated and how this will inflict on the design capacity and vice versa. The nine cases have been selected based on variation (Miles & Hubermann, 1994) in terms of whether the company focuses on Danish or international customers and the size of the company[1] (see table 1). These dimensions are chosen because large companies are often more innovative due to their access to resources; on the other hand, innovation may be more radical in the small companies because they are not bound by existing systems, routines and invested interests (Nelson and Winter, 1982; Audretsch & Thurik, 2001; Mairesse & Mohnen, 2001). The degree of internationalization is about exporting companies, which traditionally are more innovative due to the fact that they are more exposed to competition (Mairesse & Mohnen,

[1] In an international context companies in Denmark are very small so most of the biggest companies in Denmark will in an international context be regarded as a medium-sized company.

2001). In-depth interviews including conversations on the prototype of the Design Management Capacity Model have been conducted.

	Where do customers come from?		
Company size	**Focus on costumers in Denmark**	**Focus mainly on Danish costumers but are also considering more activities with international customers**	**Focus on both Danish and international customers**
Micro: **Under 5**	**Design and consultant company 1** Interior design for companies and event design	**Design and consultant company 2** Customised interior design of vans	**Design and consultant company 3** Worldwide shopper & user insights. Helps clients to innovate products, packaging, marketing, sales, and channels
Medium small: **Between 5 - 50**	**Retail company 1** Retailer of caravans, outdoor equipment and tents including reparation workshop	**Retail company 2** Company that manufactures and sells quality sausages both in their own shop and to other stores for resale	**Manufacturing company 1** Manufacture of air-laid technology for non-woven fibre production.
Medium size: Between 50 – 250 or with an annual turnover under 50m EUR	**Retail company 3**[2] Musical and Music Theatre	**Manufacturing company 2** Manufacturer of quality woven textiles for home use	**Manufacturing company 3** Development and manufacture of products primarily for bathroom designs

Table 1. Nine companies selected from a Danish context

The cases represent are from: 1) Manufacturing companies, 2) Consumer and entertainment business and 3) Design and consultant companies. All together data have been collected from 12 qualitative interviews with senior company staff or company owners, 2 workshops with senior professionals, owners, consultants and customers, 2 network meetings with owner, senior staff and consultants and 1 focus group/workshop meeting with design consultants and researchers and various group meetings between the design consultants and researchers. But the data also includes secondary data from company web pages together with conversations about the cases in the team of researchers and consultants.

4. CASES

In the following the nine cases are used to illustrate the different roles that design may play in the innovation processes as well as differences in the way the processes are managed (See Table 2). This is illustrated through various themes that relate to the companies use of design.

Cases	**Themes that relate to the companies use of design**				
	Who are the design thinkers?	**Where is design active in the**	**How are users engaged?**	**What is the basic driver for**	**Where is design capabilities**

[2] The company has around 20 permanent staff but as soon as production runs staff can be up to several hundred people.

		processes?		innovation?	embedded?
Manufacturing companies					
Manufacturing company 1 Manufacture of air-laid technology for non-woven fibre production	Top management strategic agenda	In the production process	Lead users, experts and specialists, network (Costumers are highly specialist B2B companies)	Technology driven	Internal engineering designer
Manufacturing company 2 Manufacturer of quality woven textiles for home use	All employees	In the innovation process and to some extend in the management strategy	Focus groups	Design driven	External designers + an internal design department facilitating the processes with external designers
Manufacturing company 3 Development and manufacture of products primarily for bathroom designs	Design is present in specific departments	In the innovation process and to some extend in the management strategy	Lead users, experts and specialists, network	Market and design driven	Internal designers
Retailer and entertainment company					
Retail company 1 Retailer of caravans, outdoor equipment and tents including reparation workshop	Design is seen as a possibility	Marketing	No engagement but some unstructured observations	Market and supplier driven	External marketing agency
Retail company 2 Company that manufactures and sells quality sausages both for their own shop and to other stores for resale	Design is seen as a possibility	In the development of the products	The use of focus groups	Design and market driven innovation	External marketing agency
Retail company 3 Musical and Music Theatre	Design is present in specific departments	Production process	No engagement but some user engagement through the social media	Design driven	Internal and external designers
Design and consultant companies - customised products					
Design and consultant company 1 Interior design for companies and event design	Top management strategic agenda	Innovation projects	Closely development and co-creation with the customer	Design driven	Internal designer
Design and consultant company 2 Customised interior design of vans	All employees	Product development, including finish and styling	Closely development and co-creation with the customer	Design driven	A not trained internal designer
Design and consultant company 3 Worldwide shopper & user insights. Helps clients to innovate	Top management strategic agenda	Strategy management	User surveys	Market driven	External designer

Table 2. Themes within the companies that relates to the companies' use of design

5. DISCUSSION OF FINDINGS

In the following we will discuss some of our findings. We find it important to expand and to alter some of the dimensions of the positioning diagram that Heskett & Liu (2012), in order to discuss design capacity in a Danish context with the purpose we have in mind.

Who are the design thinkers in the company? Heskett & Liu (2012) have suggested using awareness as a parameter to discuss design capacity. Awareness is not just about being passive aware of design, but about being motivated which is more action-oriented. Awareness is also addressed in DME (2009) in relation to discussing the management of design processes and how widespread the awareness is embedded in the enterprise. Who is motivated to bring professional design methods into play? Is it the top management alone or is it isolated in specific teams/departments (e.g. R &D; project teams or marketing) or are all employees motivated? Heskett & Liu distinguish between whether the awareness is in the top management or in the whole company. We have refined the distinctions, realizing that there might be more levels of awareness. Our studies reveal, that awareness may be isolated in a department because of their dedicated task of working with design issues. But we have also experienced a company that has employed a designer, implying that the department gains more focus on design.

How and where is design active in the processes? This relates to the management of the design process. Heskett & Liu (2012) focus on whether design processes are lead in a flexible (intuitive) way or in a standardised (systematic) way. Some of our cases demonstrate that the process can be managed in an open and flexible way in the initial phases and then later on, in the later phases, the management of the processes gets more structured and standardised. At the same time we have also experienced that design does not show in any processes while design in other companies involves a wide range of processes such as branding, product development, process development, innovation or management strategy. Design can therefore be active at many levels of the internal processes. At the same time design can appear on several levels. In this light we find it important to subdivide the different processes in line with some of the thinking from the Design Ladder.

How are users engaged in the process? A key issue is how users are engaged in the design process (Sanders, et.al. 2008; Buur & Matthews, 2008). Here we define users in the broadest sense, in line with Buur & Matthews (2008), as various stakeholders that have different interests in the company. There is a huge difference between retrieving information from users (e.g. by questionnaires), or involving them in co-design processes and validation of design solution. Leonard-Barton (1995) stresses the need for different levels of user engagement depending on how much knowledge the company has about its technology and how well its product is adapted to customers' existing knowledge. This is in line with Buur & Matthews (2008) that points out the need to work with a variety of approaches for user engagement and sometimes several at a time. In our studies we have also seen, that users sometimes are either actively or passively involved in the company processes. This dimension is not included in Heskett & Liu's (2012) model. Our guess is that the reason is differences in the culture, design processes and differences in the business context framing. It seems that the Heskett and Liu study (op. Cit.) is embedded in a B2B context.

What is driving the company's innovation? An important factor in the model of Heskett & Liu (2012) is the size of the company, which they state is relevant in relation to the

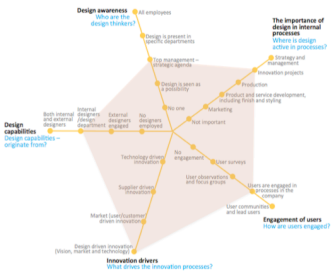
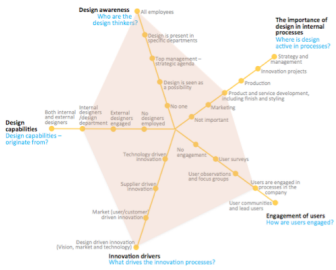
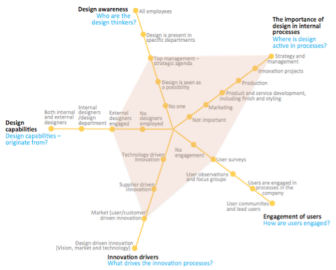
company's design capacity. We tend to agree on that. In the Danish survey made by The Danish Business Authority (2003, 2007) they found that more of the larger companies were using design strategically in their business development or as part of their innovation process. However, we also find that design is aligned with some basic push or pull factors driving innovation. Our cases indicate that design may be a key factor releasing pull and push factors, especially in small entrepreneurial firms. Verganti (2008) points out that design can be a driver of innovation. As far as our small population indicates, the medium sized companies tend to be technology and market driven in their innovation, with an add-on of design. The micro companies on the other hand are to a higher extent driven by design.

From where does the design capacity originate? Heskett & Liu (2012) point out that an important element in measuring the design capacity is where the design capability comes from and what design skills are available? This applies to the design skills that are currently available internally in the company in terms of own staff. Capacity may also build on external designers associated with the company. As in Heskett & Liu (2012) we have also seen that the design capacity can either come from internal, external or a mixture of internal and external designers. Therefore, we also find that where the design capabilities originate from is relevant to address in relation to design capacity.

Based on the discussions above, we will apply the capacity model developed on the nine cases in order to illustrate the images generated by help of the model.

Application of the framework

In table 3 we have applied the nine cases in the framework to analyse how design capacity are used in the companies.

	Design capacity spin in nine cases		
Company size	**Focus on costumers in Denmark**	**Focus on Danish costumers but are also considering international customers**	**Focus on both national and international customers**
Micro **Under 5**	 Design and consultant company 1	 Design and consultant company 2	 Design and consultant company 3

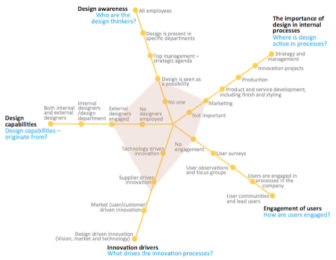
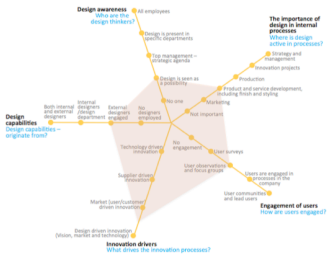
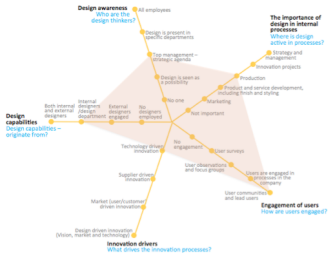
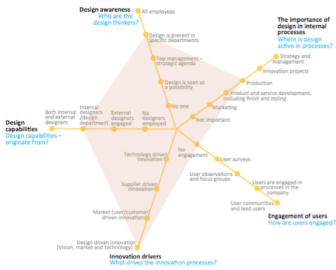
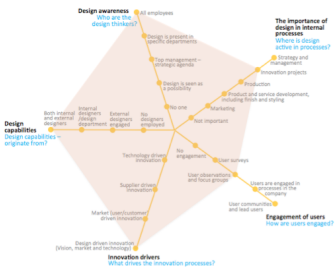
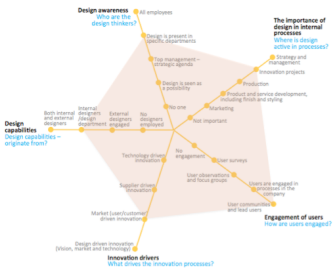
Medium small **Between 5 - 50**	 Retail company 1	 Retail company 2	 Manufacturing company 1
Medium size **Between 50 – 250 or an annual turnover under 50m EUR**	 Retail company 3	 Manufacturing company 2	 Manufacturing company 3

Table 3. Application of the model in nine cases

In the figure above the visualisation represents unique images of the design practice and capacity currently embedded in the companies. It is in other words a snapshot of the companies' design capacity. The visualization can therefore be seen as a conversation tool helping to focus discussion internally as well as with possible design and management consultants. In this way, the model can be seen as a dynamic framework for the company to decide how to move back and forth in the design capacity model, depending on the company's current position and their wishes for the future. In relation to the analysis of the companies' design potential and their wishes to change the design capacity it may be important to clarify the innovative point of departure, to decide to move in a different direction compared to their present position.

Therefore, the effort in the Design Capacity Model also has to relate to the companies' current position and the strategic intentions for the future of the management. Basically, this implies that the individual company's success only can be described by its own standards and expectations. Where is the company in relation to where they aim to be with regard to the use of design? If they are where they want to be, it can be considered a success, while if there is a large disproportion, the company will face a number of challenges. This is seen with the eyes of the company. Seen through the eyes of society, a company that is satisfied with the state of things may very well be an issue that should be addressed or taken care of for example through incitement or regulations. If all companies want to maintain status quo, it is not a problem for the company, but for society. The same applies for design, if it has an unexploited competition, innovation and growth potential. The design capacity model may also be used as an internal dialogue tool, if staff members fill in the spider diagram individually. That will, no doubt, result in diverse images of the current position and may also direct conversations to focus points of agreement and disagreement. It may equally become visible internally where there is a gap. At the same time the gap analysis ties the Design Capacity Model with the company's strategic considerations.

6. CONCLUSION

The model developed in this paper gives a framework for analysing and describing the way companies organize and manage design. The model was developed using an explorative research design combining previous research on design management with empirical investigations. The model together with an understanding of the company's context gives a framework for analysing the company's design practice from different perspectives. The paper demonstrates that the design practice is very different in the nine cases. Although design to some extent was used in all companies, they were not all aware of the role of design. It has been interesting to discuss the position of the company with its managers and for them to get a visualization of the company's situation as a tool to describe the direction they wanted the company to develop. In five of the cases including all the retail companies they wanted to develop their design capacity further. In two of the cases the companies wanted the situation to stay status quo. And in the last two, both manufacturing companies, the wanted to tighten the design activities. In one of these companies the discussions were about making reduction in operations to cut down activities. And in the other case the company needed to find ways to reduce customer influence and their impact on product performance, as its customers are some of the major lead users in the field. The company wants to involve the lead users as experts, but at the same time they also wants to be released from contractual constraints and from user requirements and strict specification.

Managerial implications. Mapping of the company's design practice in design management gives an opportunity to compare it with other companies. This may be interesting for the company as bench marking or, when looking across several companies, for assessing the impacts of an initiative. The framwork can be used as an instrument for facilitating dialogue on the company's design practice. The need for the discussion may come from strategic considerations of the current design situation in order to make a visualisation of the gabs compared to where the company is today and where the company will develop its design practice in the future. The mapping may be carried out by an internal department or by using external consultants. The resulting analysis of the gap may clarify where the company should concentrate its efforts to obtain the desired design practice. The framework may be used both internal and external.

Theoretical implications. The framework may also be interesting for applied research on design management both as an audit, an analysis of the design potential in the company and for the implications of design management. At the same time the model includes some of the dimensions used in design, such as user engagement and a clarification of what drives the innovation. The framework can also be seen as a theoretical supplement to the Design Ladder because it describes some of the layers in the model. The various dimensions in the model help to give substance to the steps in the ladder model and it provides more managerial dimensions. The framework has the same qualities as the model of Heskett & Liu which provides an image of the companies' design capacity and the complexity of design management. This is in line with the intention of the model by Design Management Europe

(DME). But the complexity of the DME model can be hard to grasp since it has 20 dimensions and at the same time some of the dimensions seems more relevant than others.

Imperial limitations. Although the framework is based on a limited sample of cases, this first application of the Design Capacity Model gave some promising results. The model needs further tests with a larger population of companies to confirm the usefulness of the framework and to test if the companies that had a high score on design in the Design Ladder investigation also will have a high use of design in the Design Capacity Model? It could also be interesting to look at the Design Ladder on the basis of new research and further research on more dimensions on the framework could be interesting. Finally, it could perhaps as Heskett & Liu suggest, be of interest to define some typologies on the basis of the Design Capacity Model.

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Facilitating the Transition from Product to Product Service System

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Keywords: Product Service system, PSS, Transition, Strategy, Management

Product Service Systems based competitive strategy uses deep product, process and customer knowledge to reduce the total cost of a product. However, due to the inherent differences between products and services, many product-orientated companies fail to integrate the two effectively and do not successfully exploit the financial potential of an extended service business model. This paper discusses the cultural barriers to implementing PSS in product-orientated medical device companies. It proposes a new model, the TIPSS Process model, with which to achieve the transitional cultural change required of product-orientated companies to fully exploit a PSS offering.

INTRODUCTION

The defining lines between product and service are becoming increasingly blurred (Correa *et al*., 2007; Graves and Ward, 2007). The importance of services is increasing within manufacturing companies and trends are moving towards a more product service system (PSS) approach to business, where both are combined together to provide high customer value. Compared to products, services are generally under-designed and inefficiently developed (Cavalieri and Pezzotta, 2012). This is particularly true for product-orientated companies as, due to the fundamental differences between the production of goods and services, many struggle to integrate the two effectively (Friedli *et al*., 2005). In comparison to product development, a broader range of knowledge is required for PSS design as both products and services are included in its design space (Akasaka *et al,* 2012). This can prevent or limit the level of PSS application as the company does not have the necessary service knowledge and skill resources.

A significant factor in any change of business strategy is the existing corporate culture (Nadkarni and Narayanan, 2007; Kwantes and Boglarsky, 2007; MacIntosh and Doherty, 2010; Obloj *et al*., 2010). Drawing from Primary and Secondary research, this paper proposes a new model, the **T**ransition to and **I**mplementation of **P**roduct **S**ervice **S**ystems' or 'TIPSS' Process model, which will prescribe the transition process of Goods-dominant culture to an integrated culture within medical device companies. It includes the development and implementation of a workshop prototype which initiates the transition process as prescribed by the TIPSS Process model. The TIPSS Process model proposes to show a relationship between the culture within a company, and the type and extent of adoption of PSS strategy. This author strongly contends that existing culture is one of the main barriers to the implementation of PSS. As the culture within a company changes from a Goods-dominant Logic to Integrated Logic, which takes into account product and service requirements, the range and extent of PSS application will be positively affected.

It is important to note that, it is not the objective of the research to transition companies to service-orientated company. Rather, the aim is to facilitate the cultural transition which will allow for the combination of product and service offerings, optimally balanced to best suit the company's strategy. It is also important to note that the proposed model is not a PSS model which defines the stages required to implement a PSS offering. The TIPSS Process model is a prelude to the full implementation of a PSS strategy, intended to create a culture in which a PSS could effectively be applied.

PRODUCT SERVICE SYSTEMS AND DOMINANT LOGICS

Corporate culture plays a significant role in adoption of PSS methodologies as it determines what knowledge is available within the company, its willingness to learn and how it makes strategic decisions. For example, when transitioning from product-orientated to PSS, the corporate culture must adapt to account for 'soft factors' associated with services such as customer relationships and customer co-creation. Although of high importance in service provision, 'soft factors' are typically of lower importance in product production and are often overlooked. In order to initiate PSS, companies must redirect and adapt their product-orientated business strategies to facilitate the distinguishing characteristics of services. The primary approach to this transition is through the conversion of a company's culture from Goods-dominant logic to an Integrated logic.

Dominant logic is the manner in which companies conceptualise and make critical resource allocation decisions. Over time these develop into mental maps, business models and processes which become company norms (Obloj *et al*., 2010). There are three primary dominant logics, Goods-dominant, Service-dominant and Integrated Logic. Goods-dominant logic developed from a combination of works concerning the creation of national wealth through production and export of surplus tangible commodities (Smith, 1776 as cited by Lusch *et al.* 2007). It views value as embedded in an organisation's offerings of product, which is then distributed in the marketplace in exchange for goods and/ or money. In contrast to Goods-dominant logic, Service-dominant logic is based on the theory that the customer is a co-producer of value, not the target of the value. Rather than value being embedded in the offering of a product or service, value is realised in use and is co-created through collaboration among the contributors of the 'value network'.

Therefore, due to the service components in PSS, in order for the companies to successfully implement a service component, they must alter their dominant logic. It must be emphasised that transition is not a one-dimensional effort to transform manufacturing organisations into service-orientated organisations but a delicate balancing act in which multiple business logics must co-exist (Windahl & Lakemond, 2010; Day *et al*., 2004), namely an Integrated Logic. The intention is not to substitute Goods-dominant logic with Service-dominant logic. Rather, companies must increase the breath of their PSS offering, which they must manage and coordinate (Kowalkowski, 2010). The following section will describe the methodology used to gather and analyse the information used in this body of research to address this cultural transition.

METHODOLOGY

An initial literature review was undertaken to identify common difficulties in applying service activities and methodologies in product orientated companies. To identify barriers to transitioning from a Goods-dominant to an Integrated Logic, qualitative research was undertaken with eight medical device companies. These companies were selected for interview through the use of an online questionnaire based on the PIM Framework (Cormican and O'Sullivan, 2005) which analyses innovation management practices in relation to best practice. The interview goals were to establish the company's current culture, an understanding of their current offering, their perception and experience of service, their

current development processes and their willingness/ openness to change. As the product-orientated companies considered themselves product manufacturers with little or no service components, their level of input in relation to service focused areas was limited. Therefore, two service practitioners were also interviewed. These were well established in the field and had worked across a broad spectrum of industries. Information gathered at these interviews was used to determine the primary barriers to cultural change. An additional literature research was used to further support this information in a broader context e.g. common findings in previous studies, similar studies across a range of industries and case studies. Gaining an understanding of these areas on both a focused and broad level was essential as it provided the context in which changes must be implemented in order to transition from Goods-dominant to an Integrated Logic. Once these had been established, a system capable of overcoming the cultural barriers to the transition to PSS while delivering the defined content required by a PSS could be developed and validated.

THE TIPSS PROCESS MODEL

The **T**ransition to and **I**mplementation of **P**roduct **S**ervice **S**ystems' Process model or 'TIPSS' Process model, prescribes the transition process of Goods-dominant logic to an Integrated Logic. It establishes a basis for prescribing the PSS process from a transition perspective and serves as a base from which functional specifications can be derived for developing and implementing processes and tools to support transition activities. The TIPSS workshop is used to initiate the transition process as prescribed by the TIPSS Process model. There are three key specifications within the TIPSS Process model: PSS process and activities; Cultural influencing factors; and Information and knowledge transition.

PSS Process and Activities

As PSS is a combination of both product and service components, this Author proposes that the TIPSS Process model proposes to adopt activities from a well referenced prescriptive model which draws for both products and services sources. The NSD Process Cycle (Chase *et al*., 2000) was developed based on knowledge of both product and service development processes. It illustrates a clear series of development phases, while representing the cyclical and variable nature of PSS within its central activities. The NSD Process Cycle model identifies four primary phases in PSS development: *Design, Analysis, Development and Full*

launch. Development activities in product, service and product/ service development processes can be categorised under these headings and follow the same progression format. Therefore, as representing every development activity would be unrealistic, the development phases of *Design, Analysis, Development* and *Full Launch* is adopted within the TIPSS Process model to indicate the progression path (see Figure 1). It is important to note that the development process is not linear but cyclical, a continuous loop of concept generation, development, feedback and improvement.

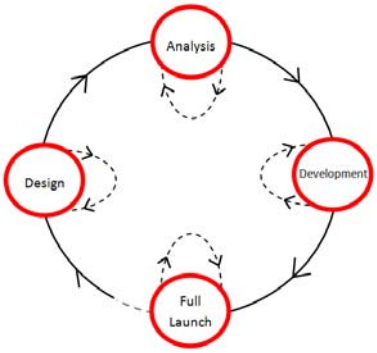

Figure 1: Development Phases for the TIPSS Process model

Cultural Influencing factors

The TIPSS Process model proposes to represent the cultural barriers within the transition model, collectively known as *Cultural Influencing Factors* (*CIF*). Thirteen CIFs were identified through primary interviews, as discussed previously in the methodology section of this paper. The CIFs within the TIPSS Process model can be summarised into three headings: *Awareness of the current dominant logic, Knowledge management* and C*ommunication* (see Table 1 for summary groups). CIFs are significant in relation to the TIPSS Process model as they directly influence the knowledge available, information absorbed and knowledge applied. Therefore they directly affect the inputs and outputs of the knowledge transition process. For example, lack of communication within the company adversely affects staff's acceptance of change, willingness to learn and their ability to interpret, process and absorb new information. When transitioning from a Goods-Dominant logic to an Integrated logic, the CIFs must be considered and catered for to allow the progression from one stage of the process to the next as they directly affect the inputs and outputs of each phase.

CIF Headings	
Awareness of the current dominant logic	Lack of awareness of dominant culture Product-orientated approach to measuring success 'Mistake' avoidance mindset
Knowledge management	Product orientated concept of Value Proposition Product-orientated customer relationship management Product-orientated knowledge management Lack of Value Network management
Communication	Undefined PSS strategy Product-orientated communication management Lack of Value Network management No knowledge/ understanding of change rationale

Table 1: Summary of CIF headings

The CIFs will be represented within the TIPSS Process model between each of the development phases (as illustrated in Figure 2). Each CIF is intrinsically linked to each other and therefore must be approached collectively. For example, simply providing the information required for the transition is not sufficient to change the mindset of staff and management. Instead, information which is justified, clearly communicated, tailored to suit the predominant learning styles and presented in a familiar context would have a greater impact on changing the dominant regime.

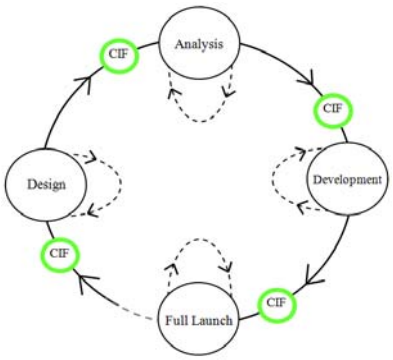

Figure 2: Influencing Factors (IF) for TIPSS model

Information and Knowledge Transition

Knowledge and culture are heavily interlinked as individuals acquire information to facilitate problem solving and decision making. Individual knowledge is central in how and what information is acquired, how it is organised, assimilated and used within an organisation (Lemon and Sahota, 2004). As PSS information is acquired, assimilated and applied, companies gain a deeper understanding of PSS, and broaden their concept of value. Therefore, this author contends that information/ knowledge of the PSS processes, and

understanding of the integrations of them with existing processes is a significant factor in the transition from a Goods-dominant to an Integrated logic. Therefore, the TIPSS Process model represents the relationship between information, knowledge and understanding of PSS in the context of cultural transition. Using the author's own understanding of Škerlavaj *et al*.s learning process (2010), the TIPSS Process model represents the transformation of information into knowledge in the context of the PSS design and development process. This conversion of information to knowledge can be broken into four points: I1: New information; I2: Understood information; K1: Understood knowledge; and K2: Actionable knowledge. Within the TIPSS Process model, these points of information/ knowledge sit between the PSS development phases (see Figure 3). As companies progress through the development phases, information is converted to knowledge by being collected, understood and applied.

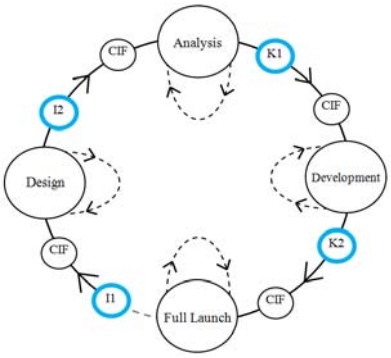

Figure 3: Information and Knowledge transition for TIPSS model

Information is the key input within the process and knowledge the key output. The PSS process and activity phases both drive and require this information/ knowledge. As companies progress through each phase, existing information/ knowledge is used as a base on which to build and expand learning. Additional information in relation to PSS can then be gathered, absorbed and applied in the context of existing knowledge and processes.

TIPSS Workshop

In order to implement the TIPSS Process, an initiation tool was required. The TIPSS workshop is a delivery method explicitly designed for the specifications as identified by the TIPSS Process model. It is used to benchmark the company for validation purposes, discussed later, and initiate the transition process. The workshop is broken into three main activities, corresponding with the phases defined in the model (see Figure 4).

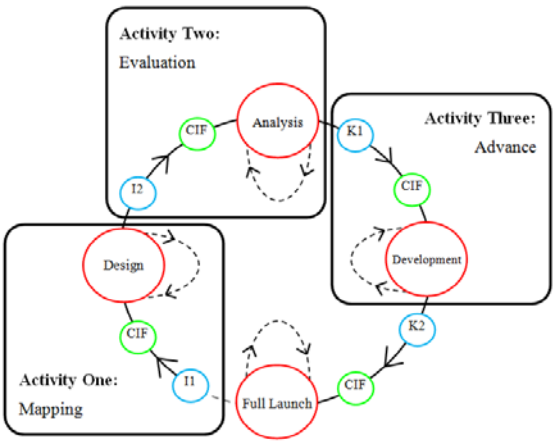

Figure 4: TIPSS Process Model Specification summary

The Mapping activity establishes the structure of the current business and value proposition through a mapping tool. The Evaluation activity contains a series of questions for each section of the map which highlights areas of weakness, strength, opportunities and threats within the current offering. The Advance activity develops and exploits customer knowledge to advance the offering through the provision of PSS. Proposed concepts are then projected and evaluated within the context of the company by reiterating the Mapping stage. Cultural Influencing Factors are highlighted during the duration of the Workshop. To facilitate the transition from a Goods-dominant logic to an Integrated logic, documents generated form the basis of a 'live' process which are regularly updated. This maintains a level of cultural awareness, captures the knowledge generated and provides a reference document to facilitate discussion and communication.

VALIDATION

In the scope of this research, the chosen validation method must account for the variable nature of services, people and organisational culture. Therefore qualitative methods were best suited to validate the TIPSS Process Model as they facilitate an understanding of social phenomena in the natural setting, often from the perspectives of the participants (Thomson *et al.*, 2011). In the context of this research, qualitative methods can take into account both tacit and explicit information e.g. documentation, opinion or intuitive approaches. This provides insight into the overt human component of the process from staff and customer perspectives which can be overlooked by quantitative methods. More specifically, the qualitative method of action research was used to validate the TIPSS Process Model. Action research refers to a

class of research methods where interventions are part of the research process. It stems from the basic contention that complex social processes can be best studied by introducing changes into these processes and observing the effects of the changes (Porter *et al*., 2012).

To initiate the transition process two companies undertook the TIPSS workshop over a single day, facilitated by the author. This initiated the transition process which was monitored over a seven month time period. Both companies fit the basic criteria as developers of Class I Medical Device and were highly product-orientated. When asked, neither company considered themselves to provide any service components. Eight fundamental differences can be found between a Goods-dominant logic and a Service-dominant logic (Lusch *et al*., 2006). These eight fundamental differences provide a list of cultural indicators. These binary oppositions are indicative characteristics of pure Goods- and Service-dominant logics. Based on these indicators, a rating table was created as shown in Table 3.

Goods-dominant vs. Service-dominant	**Rating 1**	**Rating 2**	**Rating 3**	**Rating 4**
Goods vs. Services	Provision of goods only.	Limited services, heavily dependent on goods (e.g. repair, distribution).	Some value added services.	Predominately service based. Products may be tools of service delivery.
Tangible vs. Intangible	Emphasis is placed on the functionality of the product.	Functionality is the predominant focus. Solutions are secondary.	Functionality & solutions are both considered.	Emphasis is placed on the solution provided by the service.
Oper*and* Resources vs. Oper*ant* Resources	Value is placed in static resources e.g. machinery, premises, raw materials.	Dynamic resources are considered but value is predominantly static.	Static resources are considered but value is predominantly dynamic.	Value is placed in dynamic resources e.g. customer relationships, staff knowledge.
Asymmetric Info vs. Symmetric Info	Company has strict restrictions on the flow of information.	Flow of information is unrestricted within the company.	Flow of information is unrestricted within the company & select partners.	Information is readily shared/ exchanged amongst trading partners.
Propaganda vs. Conversation	Communication is predominantly done through a third party medium e.g. website, printed media.	Communication is predominantly done through third party media with supporting direct contact.	Communication is done through a combination of third party media & direct communication.	Communication is predominantly done through direct conversation between staff, customers and relevant stakeholders.
Value Added vs. Value Proposition	Value is added to the product through the manufacturing process.	Value is predominantly created through product/ process refinement &supported by customer co-creation.	Value is predominantly created through a co-creation, & supported by product/ process refinement.	Value is created through customer co-creation.
Transactional vs. Relational	Customer interaction is predominantly transactional based. Contact after transaction is minimal/ non-existent.	Customer interaction is predominantly transactional, within moderate contact.	Customer interaction is a combination of transactional and relational.	Customer contact is high. Relational or social contracts are used to created and maintained.
Profit Maximisation vs. Financial Feedback	Profit is maximised through altering of product & processes e.g. improved functionality, process optimisation.	Profit is maximised through altering of product & processes. Feedback is gathered on an ad hoc basis.	Feedback is actively sought but application is limited.	Companies learn from financial outcomes as it attempts to better serve customers & obtain cash flows for the company.

Table 3: Criteria rating summary based on Lusch *et al*., 2006.

By linking these cultural indicators to the company orientation, the transition from Good-dominant to PSS and Service-dominant logic can be mapped. A rating for each criteria was determined at three points over the course of the action research, benchmarking (at the close of the TIPSS Workshop), at the end of the seven month study and at the closing interview (for future plans and feedback).

FINDINGS

The following sections detail the observations made as both company progressed through the TIPSS Process in relation to PSS related developments at the benchmarking stage, over the duration of the study and the PSS related future plans of the company.

Company A

As can be seen in table 4, Company A has implemented significant changes in relation to transitioning from a Goods- to a Service-dominant culture. At Benchmarking, ratings (validated by staff themselves) clearly indicate that Company A was product focused. Although management was eager to implement service components into the offering, they were unsure how to progress. On initiation of the TIPSS Process, changes were quickly implemented as it provided the direction and knowledge for the provision of service components. The most significant change was the recognition of service as being a significant component of the value offering. Service was taken into consideration in the costings of the units and service provision tailored for high/ low priority customers. This is still a new strategy for Company A. This approach had not previously been applied and the company lacks experience to quickly gain an understanding of the success/ failure of the new service strategy. Therefore, intended future plans were modest in relation to earlier changes. Instead of considering further changes, the company focused on quantifying the success of the current product/ service offering. This is reflected in the increased rating of the 'Profit Maximisation vs. Financial Feedback' criteria.

	Benchmarking	PSS Transition	Future
Goods-dominant vs. Service-dominant	**Rating 1-4**	**Rating 1-4**	**Rating 1-4**
Goods vs. Services	2	3	4
Tangible vs. Intangible	1	3	3
Oper*and* Resources vs. Oper*ant* Resources	2	3	3
Asymmetric Info vs. Symmetric Info	1	3	3
Propaganda vs. Conversation	3	2	2
Value Added vs. Value Proposition	1	3	3
Transactional vs. Relational	2	2	2
Profit Maximisation vs. Financial Feedback	2	2	4

Table 4: Company A Validation Criteria summary

Company B

As shown in table 5, Company B has implemented moderate changes in relation to transitioning from a Goods- to a Service-dominant culture. At Benchmarking, Company B did not consider itself as a provider of any services. At initiation of the process, it recognised that staff knowledge and strong customer relations were factors of their value offering. Several efforts were made to expand these service factors (i.e. mentoring classes, webinars, workshops, professional/ technical advice). Services were still viewed as sale/ marketing channels for the tangible products. As the study progressed, the additional requirements on staff time to provide these services became unmanageable. Company B began a new approach, prioritising customers, refining and streamlining processes to maximise the efficiency of service components. The primary drive was to reduce the overall financial outgoings while providing the same level of service/ products to the customer. As financial pressure accumulated, this became an increasing focus which carried through into future plans. Unlike Company A, Company B did not implement any radical changes to their value offering. Instead, changes were incremental over several areas. Although, this provided small improvements over a broad range of areas, it did not offer any extensive changes. This is reflected in the decreasing or unchanging rating across four of the validation criteria.

	Benchmarking	PSS Transition	Future
Goods-dominant vs. Service-dominant	**Rating 1-4**	**Rating 1-4**	**Rating 1-4**
Goods vs. Services	2	2	2
Tangible vs. Intangible	1	2	3
Oper*and* Resources vs. Oper*ant* Resources	2	3	3
Asymmetric Info vs. Symmetric Info	2	3	4
Propaganda vs. Conversation	3	3	3
Value Added vs. Value Proposition	3	3	2
Transactional vs. Relational	2	3	3
Profit Maximisation vs. Financial Feedback	2	2	2

Table 5: Company B Validation Criteria summary

CONCLUSIONS

The TIPSS Process model is grounded on specifications derived from existing PSS and cultural theory. Drawing from these sources it provides an important contribution in prescribing the transition of a company from a product-orientated culture to a PSS orientated culture. Central to the models theory are cultural influencing factors which directly affect this transition process. Culture determines what information is available, sought, utilised and applied. By taking these cultural influencers into account, the TIPSS Process model adapts to overcome and accommodate cultural barriers to cultural change.

The results from the validation process indicate that the transition of PSS information to knowledge was successful, thus overcoming the cultural barriers present in the participating companies. Company process and methodologies were adapted to include service components based on the initiation of the process and incrementally implemented over the duration of the study. This indicates that the transition from a Goods-dominant logic to an Integrated-logic was successful.

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Factors for Utilizing the Design Organization's Agility

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Keywords: Organizational agility, Design organization, competencies of organizational agility

Sensing the market changes properly and responding to the changed market trends or user's needs are important to current business. Here, the notion of organizational agility could come into play because the ability to sense and respond is an essential part of organizational agility. In addition, the design discipline is very sensitive to market changes. Therefore, this study firstly aims to elucidate the notion of organizational ability matched to design organization.

To find the characteristics of design organization agility, three dimensions of design organization agility were identified from literature and experts' interviews. They were: Sense, Respond (including customer respond, partnering respond and operational respond), and Execution. A survey was conducted using these dimensions, with Korean design consultancies. Additionally two British design consultancies were included in the survey in comparison with the Korean design consultancies.

Implications of the characteristics of design organization agility were drawn from the survey. Firstly, the employees of the consultancies did not know much about organizational agility, while they recognized the necessity for an agile organization. Secondly, a pattern was found in the respond and execution dimensions within design consultancies. The findings from the research will be used to conduct further study to determine sufficient factors for design organization.

INTRODUCTION

Market trends are going through increasingly rapid changes in recent years. Globally, the timely responses to the turbulent market represent an essential competence of a company. In these situations, organizational agility is required. After Haeckel suggested the possibility of a "sense and respond organization" in 1995, global organizations' interests are moving from

“make and sell” strategies to “sense and respond” strategies. Generally, organizational agility is an organization’s ability to cognize changes in increasingly unpredictable markets and to respond flexibly in an appropriate timeframe (Goldman et al., 1999; Ramasesh et al., 2001). James argued that the design discipline is concerned with tomorrow. Whether designing a package or a city centre, designing behaviours always think about changing the future (James, 2011).

Researchers have attempted multiple approaches to organizational agility including definition, enablers, competitors, and measuring agility. However, unlike the marketing and business fields, there have been few studies on the agility of design organizations.

In this study, we have investigated the organizational agility of design organizations in Korea. Additionally, the results of Korean consultancies compared with those from design organizations in Britain. This study defines organizational agility in the design discipline, identifies the necessary and sufficient conditions for an agile design organization, measures the design organization’s agility, and investigates the attitude of employees to organizational agility in design. This study is a pilot study of a larger research project and functions as the pilot study that matches the notion of organizational agility to the design discipline.

THE RELEVANCE OF ORGANIZATIONAL AGILITY IN THE DESIGN FIELD

The importance of organizational agility has increasingly stressed in recent years in order to cope with the ever-changing environment. There have been a variety of complementary definitions that collaborate to create a broad concept for application in various fields. Goldman et al. (1995) defined organizational agility as a survival capacity for unpredictable environments; Sharifi and Zhang (2001) defined it as an ability to resist unpredictable environments and to seize opportunities from changes. Furthermore, Ramasesh et al. (2001) defined organizational agility as agility that achieves speed, flexibility, innovation, quality, and profitability through the reconstitution resources and the study of best practice in order to provide customers with base products and services in rapidly changing markets. From these definitions, it can be established that organizational agility is the ability to cognize unpredictable market changes and overcome them.

Broadly, organizational agility can be divided into the 'ability to sense' and the 'ability to respond' to market trends and changes. The ability to sense involves perceiving the customer’s needs including unrealized needs, the market changes, and the technology developments. The ability to respond refers to fulfilling the perceived needs with customized products and services that are delivered quickly (Bradley and Nolan, 1998). Bradley and Nolan (1998) and Weil et al. (2002) identified these abilities as core competencies in organizational agility. Furthermore, Sambamurthy et al. (2003) further divided the ability to respond into customer agility, partner agility, and operational agility. The abilities to sense

and respond, which include customer agility, partner agility, and operational agility, provide the basis of the conceptual framework for organizational agility used in this research.

In addition the ability to execute was added because of considering design organization's characteristics. Design organizations are not only required to recognize changes in the market but also to carry out the changes within the organization. In light of these characteristics of design organizations, 'execution' was added to the five competencies listed above.

Dimensions of organizational agility

Table 2. Operationalization of the dimensions of organizational agility.

Dimension		Operational definition	Measurement method
Sense		Ability to perceive customer's needs including unrealized needs, market changes, and technology developments	Extended from Natanski's (2004) scale, and Bradley and Nolan's (1998) study
Respond	Customer agility	Ability to understand the customer as a significant business point	Adapted from Atuahene-Gima *et al.*'s (2005) scale
	Partner agility	Ability to cooperate with vendor and/or colleagues	Adapted from Jackson and Johansson's (2003) scale
	Operational agility	Ability to accomplish speed, accuracy, and cost economy in the operation of the organization	Adapted from Sambamurthy *et al.*'s (2003) scale
Execution		Actions to overcome market changes and trends within the organization including developing the ability of the staff	Newly developed scale

Three dimensions of organizational agility were explored in this study including ability to sense, ability to respond, and execution; the ability to respond dimension was further divided into three areas: customer, partner, and operational agility. These five dimensions measured using multiple item scales drawn from prevalidated measures in other studies and reworded to be appropriate for the context of the design discipline. Each item was based on seven-point Likert scales anchored between "Not at all" and "Extremely". Table 2 provides the operational definitions and sources of these dimensions.

A total of 11 items were used to measure the dimension of ability to sense including 8 items adapted from Natanski's (2004) active scanning scale and 3 items from Bradley and Nolan's (1998) notion related to quickly fulfilling and adopting technology. From Natanski's 8 items, 4 measured the organization members' actions in relation to observing trends and society, 2 measured the interaction between the organization members and customers or between the organization members and 2 measured the existing processes for sensing. The remaining items measured the interpretation of observing changes.

The dimension of ability to respond was divided in the three abovementioned areas of agility: customer agility, partner agility, and operational agility. In these items, customer agility was measured using 3 items adapted from Atuahene-Gima et al.'s (2005) responsive scale. These 3 items focused on the organization's response to their customers. Partner agility was measured using 5 items adapted from Jackson and Johansson's (2003) scale. These 5 items

focused on the organization's response to their cooperation partner. Lastly, operational agility was measured using 3 items adapted from Sambamurthy et al.'s (2003) scale. These items focused on the organization's response to their operational agility.

The dimension of execution was newly developed in this study in order to consider the design consultancies' conditions. Design consultancies must develop their staff's ability to overcome market changes and trends within the organization. Furthermore, design consultancy staff must digest new trends and new technologies immediately in order to follow the market changes. Therefore, execution dimension is the ability to digest new trends and technologies to chase of changing of market within organization. Each item for the dimension of execution was verified through interviews with experts who have worked in major design consultancies for more than 6 years and at a start-up company for more than 4 years.

RESEARCH METHODOLOGY

The research methodology used in this study includes a literature review to define the concept of design organization agility and a survey to determine some implications of the characteristics of design organizations. In this study, the surveys were conducted using a cross-sectional field of design that was limited to Korean design consultancies and two additional British design consultancies in order to obtain some implications for further research.

In order to measure the agility competencies that were identified through the literature review, twenty-seven survey questions were developed. There were eleven items for measuring the ability to sense and eleven items for the ability to respond agility, which included three items for customer agility, five items for partner agility, and three items for operational agility. Furthermore, five items were used to measure execution agility. These twenty-seven items were used to measure the overall organizational agility for design organizations. The survey data were collected using Likert scale responses to questions and the responses were converted to mean data for each design consultancy.

As part of the process to develop the evaluation survey items for design organization agility, expert interviews were conducted to verify the evaluation form. In order to investigate how Korean design consultancies respond rapidly to market turbulence, a survey of the employees working in Korean design consultancies was conducted. The sample consisted of 123 participants in 8 Korean design consultancies and 17 participants in 2 British design consultancies. The selected Korean consultancies were listed as top consultancies in the 2012 Best Design Company in Korea list developed by the Korea Institute of Design Promotion (KIDP) or they were consultancies that were actively collaborating with major companies.

The selected design consultancies included product design consultancies, user-interface/user-experience (UI/UX) design consultancies, and identity design consultancies. A total of 37 responses were collected from the 4 product design consultancies, 65 responses were from the 3 UI/UX design consultancies, and 26 responses from one identity design consultancy

(Table 1). Here, the different number of responses collected from each firm resulted from the low demand for product design consultancies in the current Korean design market. This reason was discovered from a post-survey interview. Within the responses, 5 were deleted resulting from the data was considered invalid due to the Likert scales being marked identically with the same points for all questions.

The additional two British design consultancies that were selected were Kinneir Dufort and seymourpowell Product Design Consultancy. There were 9 responses from Kinneir Dufort and 8 responses from seymourpowell (Table 1). Both British design consultancies have product design as their basic competency. These data from these consultancies were compared with the characteristics of the Korean design consultancies, in order to find any implications for further research in terms of international comparison.

Table 1. The number of valid responses

The number of responses		
Discipline	Design firm	The number of valid responses
Product/Visual design	Fusion design	6
	Design Mu	5
	Seol Design	12
	Design Mall	13
Identity design	Meta Branding	26
UI/UX design	Pulip Communications	21
	Team interface	3
	Design Fever	37
British Product design	Kinneir dufort	9
	Seymour Powell	8

Reliability test within items

Table3. Cronbach's alpha for internal consistency.

Dimension		Cronbach's α
Sense		0.895
Respond	Total	0.809
	Customer	0.625
	Partner	0.725
	Operational	0.734
Execution		0.855

Before the data analysis, Cronbach's alpha for internal consistency and reliability was calculated in order to verify the validity of each dimension's consistency. The ability to respond dimension consisted of three subordinate concepts (customer agility, partner agility, operational agility), so the Cronbach's alpha value for each agility was calculated as well as the overall Cronbach's alpha for the overall dimension of ability to respond. In the 'ability to respond' dimension, the Cronbach's alpha coefficient for two of the three comprising agilities exceeded 0.7, but that for customer agility was relatively low and below 0.7; it was 0.625 (Table 3). However, the total Cronbach's alpha coefficient for the ability to respond dimension was sufficiently high, so customer agility dimension could not be eliminated.

CHARACTERISTICS OF KOREAN DESIGN CONSULTANCIES' AGILITY

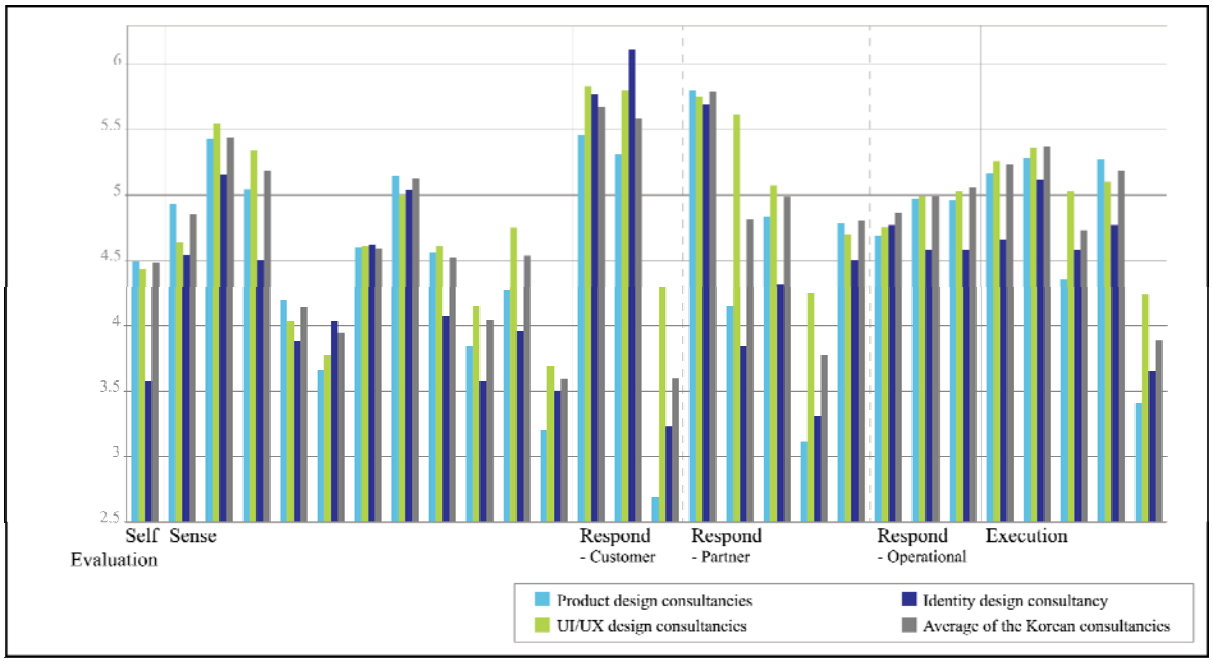

Figure 1. Agility mean value for the Korean design consultancies.

Table 4. ANOVA analysis results (Korean design consultancies).

	Dimension	F	Significance
Korean design consultancies	Sense	0.28	0.7589
	Respond	2.24	0.1108
	Execution	0.41	0.6636

The eight Korean design consultancies were classified according to their domain: product design consultancies (4), UI/UX design consultancies (3), and identity design consultancy (1). In Figure 1, it can be seen that there are differences in the responses according to the design domain, but a consistent pattern among the Korean design consultancies was found. In order to verify that this pattern is statically significance, an ANOVA test was conducted (Table 4). In the analysis, it was confirmed that the Korean design consultancies were not significantly different in any organizational agility dimension item.

Based on the ANOVA test results in Table 4, it was identified that the Korean design consultancies' organizational agility had a consistent pattern. The potential factors that could be affected in the differentiation of organizational agility existed including the domain and size of company, but these factors scored highly for the same items and lowly for the same items. While the number of consultancies that were selected for survey was small, their service level was above average in Korea. Therefore, assumptions could be made about the tendencies of the Korean design from the data collected in this study.

Findings from the Korean design consultancies

Although the surveyed consultancies have above average size or do above average performances in the Korean design market, the participants' knowledge of organizational agility was very low. Only 18% of the respondents understood the concept of organizational agility prior to the study. However, from those participants that understood, the majority stated that they had learned about it in mass communication or design magazines. The next group stated that they learned about the concept from education, but no respondents learned about it from training at their consultancy. This result did not have statistical significance because the number of the total sample was low. However, some implications were discovered from this data because the participants were from the highest quality design consultancies in Korea. Meanwhile, more than half of the respondents who marked 'yes' to knowledge of the organizational agility notion had worked for more than 5 years in the industry and they often held managerial positions within the consultancy. Thus, it can be inferred that there is an interesting point about managing and organizational links to knowledge. In more detail, a majority of those who responded said that they had never heard of organizational agility; but after the survey, nearly all of these respondents said it would be helpful to the organization for the staff to understand more about the notion. This result suggests that the organization staffs are fully aware of the need to act quickly because it is a characteristic of design consultancies, which are sensitive to market changes and trends.

To the question, asking the organization's main business challenges in the preceding 3 years, 52% of the respondents said "Entering new design market". At the 2009 Economist intelligence unit's report said that 50% of the respondents marked to "pressure to drive down operating costs" but only 20% of the respondents marked to "pressure to be first to market/innovate" at the same item. Considering that 2009 reports were conducted via a cross sectional industries including financial service, professional service, IT & technology industry, it could be suggested that design consultancy industries were more pressure than other industries to entering new market.

According to the organizational agility self-evaluation, the 2009 outcome showed that "Moderately agile" was the largest answer, 61%, followed by the "Not at all agile" and "Extremely agile". In this research, "Moderately agile" was the largest answer, 70%, equally. However "extremely agile" was more than "Not at all agile". This result could be showed at the British survey result.

According to the result of Korean design consultancies analysis, five items out of 27 items scored lower than 4, as seen in Figure 1. Four items were asked to figure out whether the consultancies have a regular evaluation process or not. All of them were found to be scored below 4. Therefore, Korean consultancies do not only seem to have regular processes to interact with customers (Sense 5) but also to measure customer satisfaction regularly (Respond Customer 3). Additionally, Korean consultancies seem to have regular processes to evaluate after practicing new design market. Finally, Korean design consultancies are

interested in trend watches but they do not have sufficient time and effort to study each individual trend.

The average of this research was 4.76. Among them, three items exceeded 5.5 and two of them were about customer responding agility. Specifically, how much the business objectives of consultancies are driven by customer satisfaction; how much the strategies are based upon the understanding of customers' needs. Therefore, the members of Korean design consultancies are fully aware that customers' needs and satisfaction are the core of the design businesses even though they lack the regular evaluation process regarding customer satisfaction. The other exceeding 5.5 item was about partner agility. The cooperation with other functions or clients was found to be highly scored.

COMPARISON BETWEEN BRITISH DESIGN CONSULTANCIES AND KOREAN DESIGN CONSULTANCIES

Table 5. ANOVA results for the organizational agility dimensions of Korean and British design consultancies.

	Dimension	F	Sig.
Korean consultancies, Kinneir Dufort, Seymourpowell	Sense	8.42	0.0003
	Respond	1.39	0.2522
	Execution	1.63	0.2000

Table 6. Post-hoc test results: multiple comparisons (Tukey).

		Mean difference	95% confidence level	
Sense	seymourpowell - Korean	14.598	5.431	3.766
	Kinneir Dufort - seymourpowell	-19.694	-31.929	-7.46
	Kinneir Dufort - Korean	-5.096	-13.77	3.578

Two large British product design consultancies were surveyed in order to obtain some implications and comparisons between Korean design consultancies and British design consultancies. Because they actively cooperate with major global companies, these two British design consultancies were selected. As a result of the significant differences between the two British consultancies in the independent t-test result analyses (Table 7), the results were analyzed using three groups: the average of the Korean consultancies, seymourpowell, and Kinneir Dufort (Table 5).

From the results, there were no significant differences between the Korean consultancies and British consultancies for the ability to respond and execution dimensions: However, the ability to sense dimension was significantly different. Thus, the next step investigated which pairs of design consultancies exhibited significant differences; post-hoc tests (Tukey) were

conducted in order to achieve this. Table 6 presents the post-hoc test results: the 'seymourpowell and Korean consultancies' and 'Kinneir Dufort and seymourpowell' pairs exhibited significant differences.

Understanding the organizational agility of the Korean design consultancies and British design consultancies

Overall, 29% of the British respondents stated that they had heard about the notion of organizational agility before the survey. This rate was very high in comparison with the Korean participants' responses, which was only 18%. Perhaps a reason for this difference in response rates is that the Korean participants' positions were lower than those of their British counterparts: approximately 30% of the Korean participants had managerial positions, but the majority of the British participants were managers. However, when the positions were at the same level, i.e. when the Korean managers were compared with the British managers, the difference decreased significantly. In the Korean participants who responded that they knew about the notion of organizational agility, none had learned about it from their consultancy. However, for the British participants, some responses indicated that they had learned about it from their consultancy.

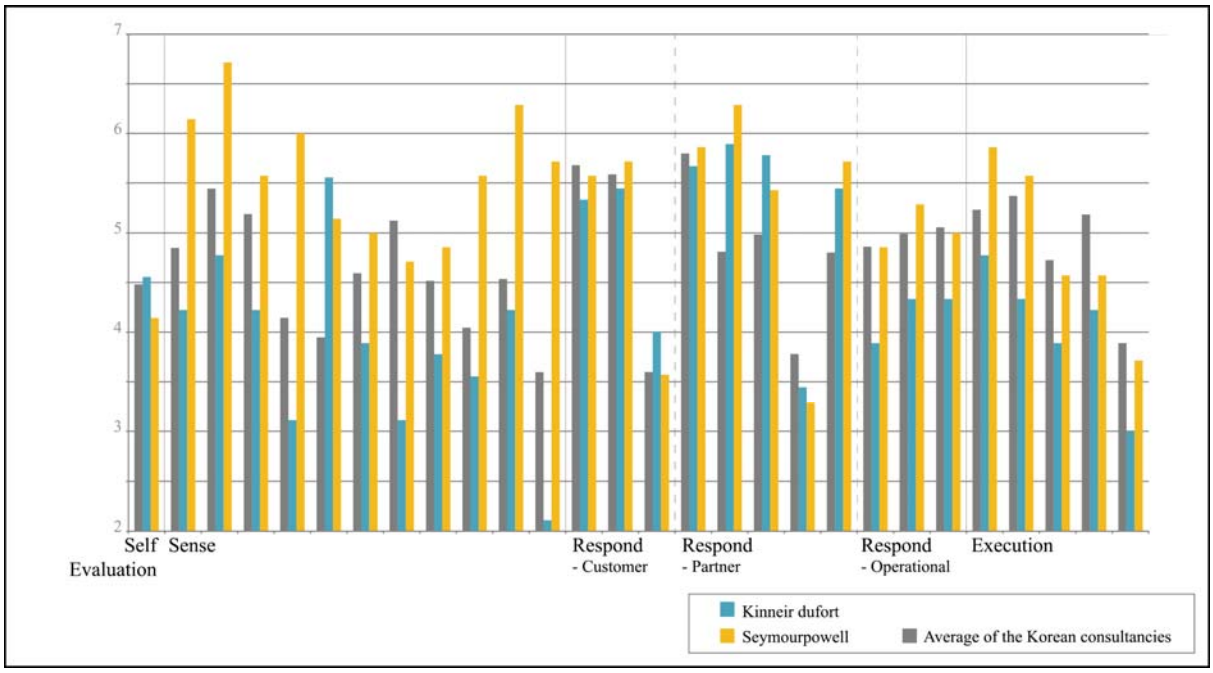

Figure 2. Agility survey mean values of the average Korean design consultancy and two British design consultancies.

To the question, asking the organization's main business challenges in the preceding 3 years, a difference was found between Korean respondents and British respondents. "Rising customer demands" was the largest selected answer. This answer was selected second-largest answer from Korean respondents. It is contrasting result that third-largest answer was "Rising customer demands", 29% and "Pressure to be first to market/innovate" was second-smallest answer, 20% at the 2009 report.

According to table 5, both Korean consultancies and British consultancies show similar patterns in the dimensions of respond and execution. Thus, it could be assumed to be characteristics of organizational agility of design consultancies. The prominent characteristic for both Korean design consultancies and British design consultancies is the lack of regular evaluation processes. In other words, the feedback from customers and the measurement of customer satisfaction and cooperation with partners are not being regularly evaluated.

From the results of the comparison between the two British consultancies and the comparison between the Korean and two British consultancies verified the significant differences in each group's ability to sense dimension. Many studies have demonstrated that organizational agility is affected by the organization's size and that generally smaller organizations have higher organizational agility. However, the ability to sense dimension's comparison results between the two British consultancies demonstrated the same results, which aligned with other studies, but the comparison results between the Korean consultancies and British consultancies demonstrated that the Korean consultancies did not differ even though their organizational size differed.

According to this finding, we proposed three hypotheses. First, the common characteristics of the surveyed organizations being consulting companies that provide design services affect the results. Second, the consulting company organization size scale does not make a significant difference. Although these design consultancies could be large in their field, we are talking about scale. This difference could affect the results. Third, in the post-hoc test for the Korean consultancies and two British consultancies, the differences are that the one British consultancy had significantly higher scores than others.

In the sense dimension, the British consultancy which presented yellow line is highest at the figure 2. Yellow graph British consultancy created a strategy department in the company early compared with the other design consultancies. Currently, they focus on their competitive factors of strategy, trends, and forecasting. Additionally, it could be suggested that a strategic mind-set in the consultancy could affect the design organization agility.

Detailed findings between the two British design consultancies

From these results, it is clear that there is a difference between these two British design consultancies. According to the detailed test, the difference is significant in the ability to sense dimension. Here, Sense 11 (Do you have sufficient time to detect changes of design trends?) had a significant difference. Furthermore one consultancy scored highly on most items, but its score for Sense 5 (Is your firm interacting much with customers, i.e. gathering feedback from customers regularly?) was low. It can be assumed that some factors that will affect the items in the ability to sense dimension might provide different responses to the interaction with customer items. Finally, it was verified that the ability to sense dimension had a significant difference between the two groups, but there was not a difference between the two groups' participants' cognized agility. Therefore, it is suggested that there is a

difference between the organization's real agility rate and its cognition agility that is cognized to all organization staff.

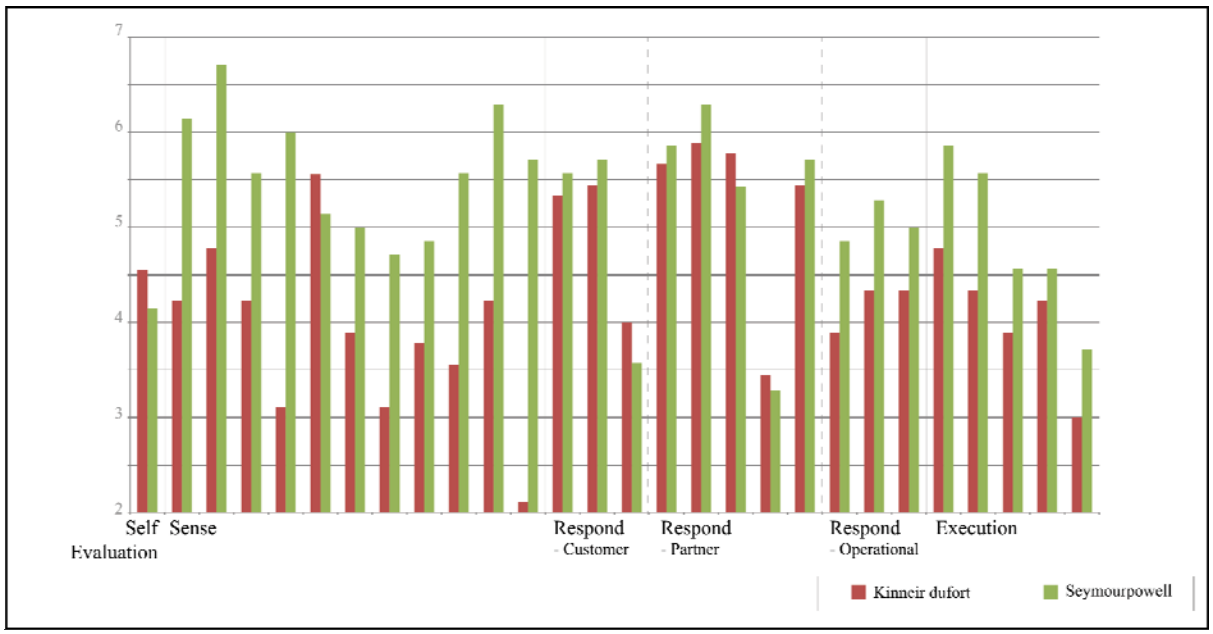

Figure 3. Agility survey average rate of British design consultancies.

Table 7. Independent T-test results.

	Item	F	Significance
British design consultancies	Design organizational agility	8.00	0.0127

Table 8. T-test results for the organizational agility dimensions of British design consultancies.

	Dimension	F	Significance
British design consultancies	Sense	23.70	0.0002
	Respond	1.08	0.3157
	Execution	1.83	0.1963

CONCLUSION

This research is a pilot study to determine the agility of design organization. Eight Korean design consultancies and two British design consultancies were investigated in order to adjust the notion of the organizational agility to the design organization. According to the study, respond and execution dimensions show similar patterns both for Korean and British design consultancies while sense dimension show differences.

There are three major findings. First, design organizations recognize the necessity for being agile. In addition, respondents in managerial level show more acquaintance about the notion

of organizational agility than respondents in operational level. Second, the regular evaluation processes for organizational agility are not deployed yet within design consultancies. Third, Korean design consultancies show more homogeneous patterns throughout the three dimensions of organizational agility while British consultancies show different patterns particularly in sense dimension. This pattern is the most significant finding of this research.

Furthermore, more detailed implications will be verified in further studies including more empirical studies. Finally, different characteristics between the typically studied organizations, such as marketing and manufacturing organizations, and design organizations will be investigated further.

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Appendix

Measurement item	
Sense - Natanski's (2004) and Bradly and Nolan's (1998)	**Respond (Partnering agility)** - Jackson and Johansson's (2003)
1. Do you monitor the political, social and economic environment? 2. Do you monitor design trends? 3. Do you monitor emerging markets? * Emerging market - In contrast to product design and visual design, UX design and service design are emerging markets to design firms 4. Does your firm have a process for detecting changes in design trend and market condition? 5. Is your firm interacting much with customers? (Gathering feedback from customers regularly?) 6. Do you exchange meaningful interpretation of change with colleagues? 7. Do you watch out for triggering events? 8. Do you communicate implications of change with other co-workers? 9. Does your firm have a process for detecting usable new-technology available for design? 10. Do you incorporate analyzed design trends immediately into design? 11. Do you have enough time for detecting changes of design trends?	4. Is project development run with representatives from several functions? 5. Does your firm use cross-functional teams? 6. Do you co-operate with vendors? 7. Do you have a measuring process for co-operation? 8. Is there co-operation among different departments?
Respond (Customer agility) - Atuahene-Gima et al.'s (2005)	**Respond (Operational agility)** - Sambamurthy et al.'s (2003)
1. Are your firm's business objectives driven primarily by customer satisfaction? 2. Is your firm's strategy for competitive advantage based on your understanding of customers' needs? 3. Does your firm measure customer satisfaction of designed products systematically and frequently?	9. Ability to accomplish cost economy in the exploitation of innovation opportunities 10. Ability to quickly accomplish the exploitation of innovation opportunities 11. Ability to accomplish accuracy in the exploitation of innovation opportunities
	Execution
	1. Do you make an effort to explore new design field according to market and trend changes 2. Do you make an effort to increase your expertise of the field for practicing new design market? 3. Does your firm make an effort to recruit and retain Human resources having expertise for practicing new design market? 4. Do you make an effort to increase your expertise of usable tools for practicing new design market? 5. Does your firm have evaluation process after practicing new design market?

From Strategic Design to Design Integration

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Keywords: Business Model Design, Strategic Design, Design Led Innovation.

Within a growing awareness of design as central to the strategic success and the sustained competitive advantage of firms, this paper examines how companies pursue design driven innovation (Verganti, 2008, 2009) and respond to design led innovation initiatives (Matthews & Bucolo 2013). Specifically, this paper reports the findings of a collaborative research project where CEO sponsored senior managers from five multi-national organisations, met regularly over a twelve-month period, to discuss their progress on applying a design led approach in their firms. This longitudinal research project traced the process and progress of change instigated by the senior management representatives, as well as the deeper investigation of the barriers and challenges to re-frame design more strategically in their organisation. Data were collected through workshops and interviews throughout the twelve-month period, regarding the firms' journeys and also the barriers and challenges firms faced in order to become design led. The findings present a novel set of implications for both designers and management scholars. This paper seeks to contribute to research and practice by investigating the processes and outcomes of a design led innovation program and to propose implications for practice for designers and management.

BACKGROUND

There is a clear recognition that companies that use design in their business perform better economically in the marketplace (Cox Review, 2005; Borja de Mozota, 2003; Dell'Era, Marchesi & Verganti, 2010: Moultrie & Livesey, 2009; Nussbaum, 2006). Furthermore, the impact of design on firms' performance and the benefits of the effective use of design over a ten year period of analysis include an improved share price performance and therefore greater shareholder returns on the performance of firms (UK Design Council, 2004) and it is well

established that design contributes to a firm's ability to generate exemplary products (Bruce & Bessant, 2002; Roy & Riedel, 1997). In addition, design enhances the outcomes of numerous innovation activities, bringing benefits such as increased quality of goods and services, improved production flexibility and reduced material costs (Cox Review, 2005). The value of design is not just in new products or services, but through employing, skilfully managing and soundly implementing design throughout a company's business strategy (UK Design Council, 2004). Indeed, design is increasingly being viewed as a vital and important strategic business resource (Dell'Era, Marchesi & Verganti, 2010; Gemser & Leeders, 2000).

The notion of design as a direct contributor to strategy has grown over the last decade with approaches such as design management (Borja de Mozota 2003, 2006) and strategy as design (Liedtka, 2000; Liedtka & Ogilvie 2011). Design management arose from research on design-oriented European SMEs and led to the formulation of models for design as differentiator, integrator, transformer and good business (Borja de Mozota, 2006, p 21), illustrated by notions of a 'Design Scorecard' (Borja de Mozata, 2006). In addition, the contributions of strategic design have been discussed in the product service system, in strategic management and in the supply chain. For example Johansson & Svengren (2004) describe processes within a firm that shape the possibilities of design contributing to strategy. They use an example of one company's journey from a single designer with a clear strategic vision, to a team of designers engaged in diverse internal design initiatives, in a context where senior executives showed increased understanding and openness to design.

Furthermore, management has become more open and receptive to the offerings of design to strategic development and implementation as shown in the work of Roger Martin (2007, 2009), the Special Issue of the Journal of Business Strategy (Martin, 2007), the work of Liedtka & Ogilvie (2011) and inspiring additional examples in various business literature.

DESIGN LED INNOVATION

The term *'design led innovation'* is emerging as a fundamental business process, that is rapidly being adopted by both large and medium sized firms (Bucolo, Wrigley & Matthews, 2012). The value that design in this context brings to an organisation is a different way of thinking, of framing situations and possibilities, doing things and tackling problems: essentially a cultural transformation of the way it undertakes its business. Being design led is increasingly being seen by business as a driver of company growth, allowing firms to provide a strong point of difference to its stakeholders (Matthews & Bucolo, 2013). However strong leadership is required for the organisation to develop a clear vision for top line growth, which is based on deep customer insights and expanded through customer and stakeholder engagements, with the outcomes being mapped to all aspects of the business. To achieve this goal, several tools and process are available, which need to be linked to new organisational capabilities within a business transformation context.

At the basis of this approach is *design thinking* - essentially, using creative methods to tackle business problems and reframe business structures. The notion of design thinking used here is closely based on human centred interaction and closely parallels the methods commonly used by designers and others to develop creative and innovative solutions. Design thinking comes in several varieties, stages and definitions (Cooper, Junginger, Lockwood, 2009; Johansson-Skoldberg, Woodilla & Cetinkaya, 2013; Leavy, 2010). Design led innovation as described above, uses the premise of design thinking to build upon this thinking through a set of tools and processes in order for a firm to become design led or design integrated as illustrated in Figure 1.

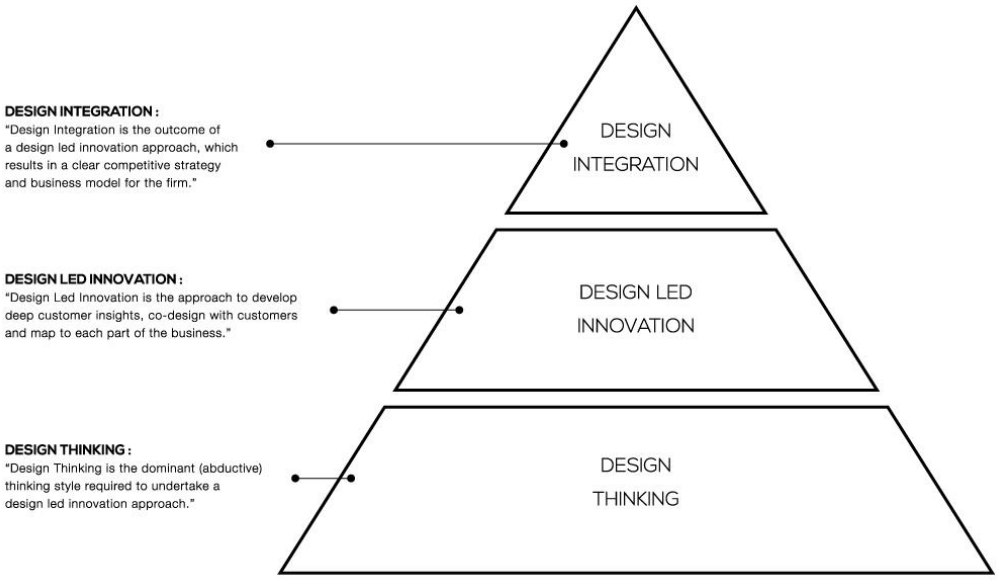

Figure 1: Design Pyramid

APPROACH

Five companies from different industry sectors participated in a twelve-month design led innovation education program, facilitated by two design academics in the field. The criterion for company involvement in this program was a commitment to pilot a design led approach within the firm. This approach included the company having a vision for growth, a commitment to seek deep customer insights and to gain these customer insights on a regular basis, to investigate the emotional responses of customers to existing situation, and potential solutions and to explore ways of using these insights for the company's benefit, and to map these deep customer insights to all aspects of their business. Each company self-identified as meeting these criteria and a small team of participants of 3 to 5 members from these companies engaged in this program.

The program focused on exploring and embedding tools and processes within an organisation and matching these processes with the design leadership qualities to enable companies to create breakthrough innovation and achieve sustained growth. The design led innovation education program was developed to provide a mechanism for participants to apply and gain knowledge of this approach, sharing their challenges and successes through a yearlong collaborative journey with their peers.

The key objectives of the program were:

- to explore the value of design led innovation inside their business.
- to pilot the adoption of a design led innovation within their business.
- to contribute to the development of a learning community to share common challenges and strategies to overcome the barriers to adoption of design led innovation within Australian businesses collectively.

The program began with a two-day intensive workshop (master class) in order to first introduce design led innovation as a process for change. Topics included why companies in today's economic climate needed to remain competitive and how design led innovation could provide some direction. Building on this foundation knowledge, one day intensive sessions

were held throughout the year, extending knowledge of design led innovation and sharing their learning and updating their progress on individual company projects hosted at each of the firms. These sessions in total consisted of five full-day meetings, multiple conference calls, emails and sharing of online resources on request.

Design Led Innovation Master Class

The initial two-day intensive hands-on workshop (master class) focused on the application of the principles of design integration to create breakthrough innovations and transform existing businesses. The workshop began with an overview of the main theories of innovation and change followed by an explanation and discussion of design thinking, design led innovation and design integration (Figure 1). Participants were introduced to the design led innovation processes as signposts (Figure 2) and to some practical tools to allow them to challenge their firm's future strategies and create a sustainable competitive advantage. These processes were explored initially in a hypothetical project, where participants proposed incremental and breakthrough innovations, and examined how the business would also need to transform to implement such solutions. Case studies illustrating how other companies have used design to develop their business were presented. Activities that illustrated directions for the future were utilised through the two-day workshop. Through the master class, participants gained a better understanding of the opportunities and challenges to adopt design led innovation.

Developing a Common Challenge

Following the Master Class, participants were tasked with investigating a project within their organisation where design led innovation could be applied, and each organisation was asked to share and engage in regular conversations in order to build common understanding. The initial goal was to identify one common theme (a grand challenge) that participants from all organisations would work on in the coming month, utilising the principles and tools of a design led approach, to enable the participants to share common experiences, while building profile within their own organizations.

Sharing Experiences of Exploration and Implementation

In the following session **t**he processes and outcomes from engaging in the common challenge were shared and discussed. The aim was to explore the design led framework inside their own organisation to review potential barriers. This session focused on presenting how each team has explored the topic, added value and revealed any blockades. The goal was that these barriers formed the structure of the future content for the program discussion in the coming months. It was not expected that the participants would complete the challenge in this timeframe, however some firms were able to complete the task.

Each organisation was then asked to commit to undertaking a pilot project with a cross functional team inside their own organisation, to explore the design led innovation framework on a problem unique to their organisation. Over the next six months each organisation was asked to share their progress and to also host a session in their organisation to explore and share learnings in greater detail.

Design Led Innovation Detailed Content

The following sessions were structured on discussions and responding to the feedback the companies provided regarding the barriers to this approach that participants were facing in their organisations. These sessions were constructed with more detailed specific theory on design led innovation individual signposts in the framework. This was done in order to provide detailed knowledge in regards the most valuable signposts. One example was the

deep customer insights identified by firms to be of great benefit. The process of *'deep dives'* with customers and stakeholders was also an area of interest that was explored further. Additionally Project updates were discussed regularly at each of the sessions. Deep customer insights and the emotional connection underpinnings were presented and tools introduced for the firms to use in their pilot projects.

Final Program Workshop

The program concluded with a final presentation of the projects undertaken by teams of five companies. This workshop discussed the projects undertaken, the processes, challenges and pitfalls, the successes, learnings and takeaways from each company. Sharing reflections with members of the learning cohort was a powerful way to summarise individual learnings and reflect on other possible approaches as well as learn from other companies and their reflections on what they could have done differently. Reflections on the collective shared outcomes from the program were also discussed.

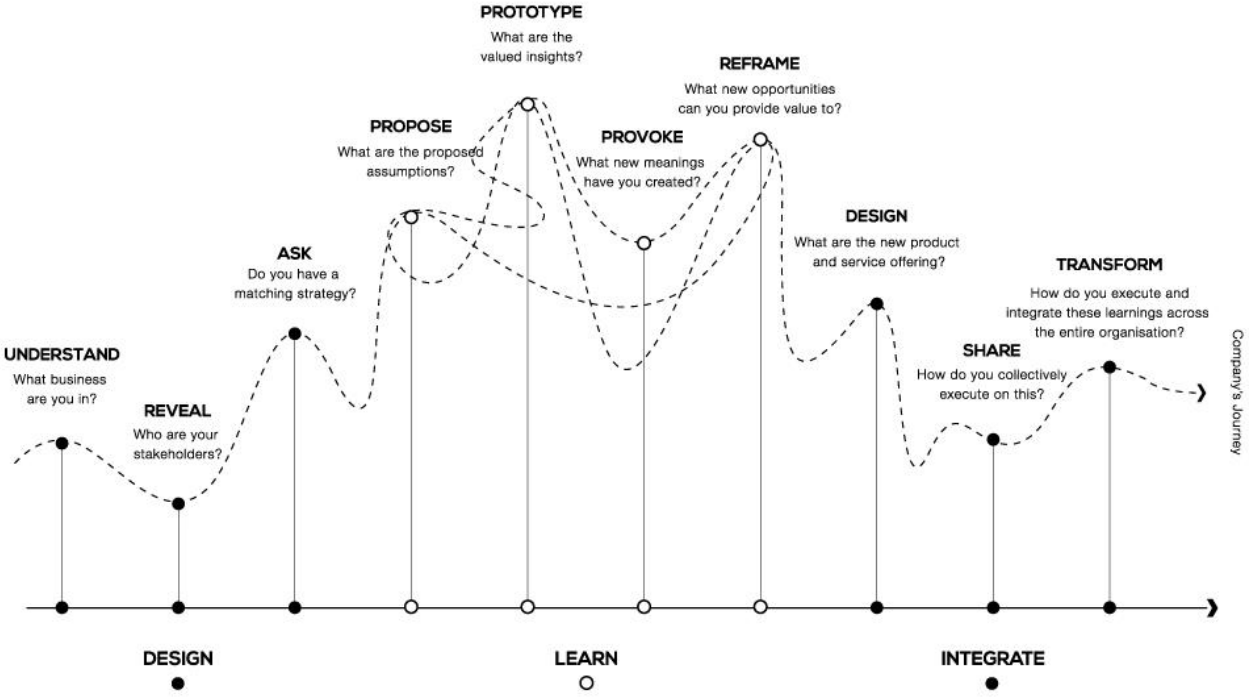

Figure 2: Design Led Innovation Framework

Method

The design led innovation program was based on an action research approach of engaging with practitioners around interests of concern, facilitating increased awareness of tools and processes, nurturing and challenging their understanding and applying the principles and tools as the firms moved toward design led innovation.

Action Research is a method of establishing a clear vision for the program and encouraging participants to explore ways of achieving their goals through action and reflection (Susman & Evered, 2002; Zuber-Skerritt, 2002). In this design led innovation program, participants were introduced to tools and processes to assist their exploration with distinct design methods. Encouraging participants to set their own goals and select meaningful projects from their own

business around issues of concern, or the development of new possibilities ensured that teams were focused on achieving their desired ends.

Analysis

Data from the final workshop where participants reported the progress of their projects, their challenges, pitfalls, successes and failures, reflections and learning from their engagement in the twelve month design led innovation action research program were examined using thematic analysis.

Specifically analysis of the visual record and textual data from final presentations and discussion of five companies was carried out independently by two researchers: one researcher actively involved in the development and delivery of this program and one researcher familiar with a design led innovation program but external to this program. This triangulation of analysis validated the thematic analysis (Patton, 2002) and provided richer understanding of processes and benefits gained by the participants.

RESULTS

The results of this program are presented through the participants' views of the processes and outcomes design led innovation methods and tools provided. The extent of their progress toward design integration was also included in the results. All of the companies reported gaining new insights from their customers and expressed an on-going commitment to use design led innovation tools in future investigations of their customers and in capturing such insights to apply in their business. Participants specifically nominated tools such as narratives, co-design with customers, an experimental approach, and prototyping as contributing to new ways of valuing customers.

One firm focused on transforming their findings into narratives to frame such insights for the benefit of their company. "*Narrative ability to tap into intangibles and the emotional side of product experience is new for us*". Other firms reported that "*Consumer insight philosophy is important for our program*"; staff in our company "*are looking forward to taking elements of this program and using in our new product development process and getting much more thinking into our pipeline"*. Example comments from the five firms are shown in Table 1.

Table 1: Results Summary

Company	DLI Foci	Challenges and Barriers	Leanings and Takeaways
Company 1 *Legal Services Firm*	Narratives	*"these new ways of working require an investment of time and resources to learn and engage with the tools and new thinking to turn those insights into valuable outcomes"* *"the challenge is going to be turning these insights into solutions, new products/services and business models"*	*"we now perceive things differently and try to keep an open mind"* *"we always ask ourselves - are we asking the right questions?"* *"the tools are great for finding out what you don't know and how to turn customer insights into new products and services"*

Company 2 *Publishing company*	Co-Design	*"we needed to go deeper into the reasons about why, not just react to the yes/no as we had done in the past"* *"we made assumptions as to why our customers wanted to engage with us in the first place"* *"all of the pain points and touch-points of customers' and how they intersect with the their workday allowed for opportunities we can capitalize on"*	*"the insights we received through co-design have driven an awful amount of new product development in our business and it has been incredibly successful"* *"design led innovation has given us a new way of engaging with our customers, a series of tools and approaches but most importantly a new attitude"* *"helped us learn to expand our business and change with our customers…"*
Company 3 *Adhesive Products Manufacturing Firm*	Comparison of New Product Development and Design Led Innovation	*"design led innovation allowed us to model our product interaction with the customer the entire way through, and we discovered we had severe gaps in our knowledge"* *"it was not just a matter of failing fast but gaining understanding along the way…"*	*"we developed much deeper insights into the emotional side of the task, which is an area that we probably had not gained through our historical traditional market research techniques"*
Company 4 *Finance and Insurance Firm*	Lessons Learnt	*"there was some disagreement internal to our company about what constitutes incremental and radical innovation in order to see what design led innovation could offer"* *"what does success look like in an outcome driven organization?"*	*"design led innovation allowed us to network within our own organization and we found that there are many people with some great ideas, now joining together to make things happen"* *"the organizations appears to have the right culture where many people are wanting to improve, but they need processes to ensure it aligns to organizational strategy"*
Company 5 *Insurance Firm*	Take Aways	*"really listening to stakeholders was a great challenge for us"* *"moving past our previous assumptions was also a challenge"* *"take risk to start a project and not know where you are going and not know the return on investment…this is a major challenge and very hard in financial institutions"*	*"design teaches you techniques, like the skill of listening to your customer, by asking deeper questions"* *"design Led innovation teaches you a different way of thinking and behaving"* *"learn from your mistakes and keep trialling different approaches…don't give up"*

Key Findings

All participants reflected on their personal and professional learning. Their personal learning included thinking differently, from a customer's perspective, while they expressed understanding in regards to their personal strengths and gaps in better listening and provoking skills while in discussion with customers and other employees. The cohort approach of learning from others engaged in parallel experiments was described as helpful and powerful to reinforce the adaptable design process.

Above all the participants described their excitement about the amount and type of new knowledge they had gained. From learning how to explore their customers' thoughts and feelings, aspirations, expectations, motivations, preferences, to the powerful new perspectives these insights generated in relation to their current business, providing new business possibilities for the future. Their increased understanding of customers also enriched the new product development process, with new benefits and outcomes, where, *"small changes can be big changes"*.

The benefits of the program include learning how to turn customer insights into new products and services; where *"tools are great for finding out what you don't know; design led innovation helped us learn to expand our business and change with our customers"*; and more informed practice *"we now have access to a level of customer insight that we never had before"*. One company stated, *"our aim in joining this program was to find out what other ways we could deliver products/services to our market segment?"* As a result, "*we developed much deeper insights into the emotional side of the task, which is an area that we probably had not gained through our historical traditional market research techniques"*.

Another company learned to consider the end user, not just the stakeholders (middlemen) in the value chain. *"Design led innovation teaches you a different way of thinking and behaving"* and to learn from your mistakes. The design led innovation program developed new knowledge, new skills and new capacities in the firms resulting in better exploration of new possibilities as well as better exploitation of current capabilities. Specific outcomes included new business opportunities, improved business, co-designing with customers, extending their range of products and services and the diffusion of notions of design led innovation within in their organisations. Figure 3 illustrates such findings detailed above.

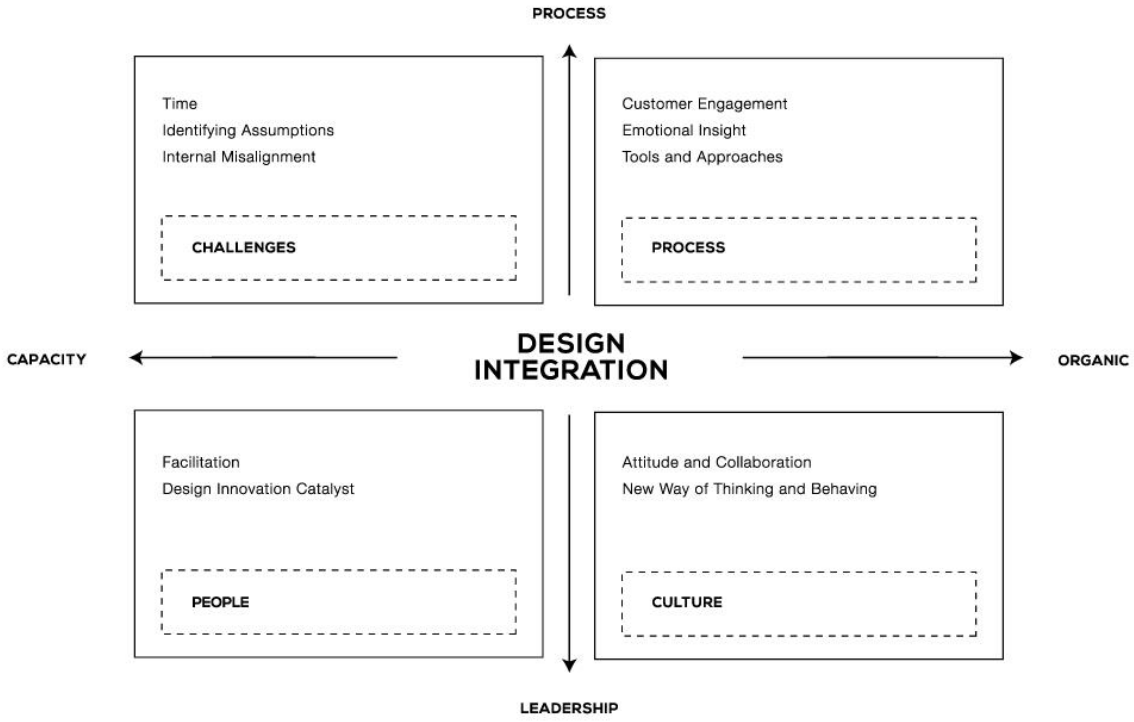

Figure 3: Design Integration Findings

Limitations

Due to the sensitivity of some business issues and the company concerns of 'commercial in confidence' issues, the companies carefully selected the successes and concerns in a context where such processes were video recorded for later analysis by the researchers. However sufficient relevant information was shared for a rich and rigorous data collection, analysis and discussion.

IMPLICATIONS FOR THEORY AND PRACTICE

Each of the companies that participated in this program aspired to having a vision for growth for their firm. Additionally, they expressed a commitment to seek deep customer insights and to gather them on a regular basis, to investigate the emotional responses of customers by exploring the *'why'* instead of responding to the *'what'*, and then expanding these insights by turning them into potential solutions that could be mapped to all aspects of the organisation.

Each of the companies self-identified to meeting these criteria and selected a small team of participants (3 to 5 members from each company), committing financial and human resources to participate in the program. The program was perceived by the participants as adding value to their organisations by exploring, prototyping, testing and in some cases gaining new attitudes, new customer insights and developing new ways of working and/or new products and services.

The enhanced human capability development processes in these companies are evident. New ways of exploring customers and their insights were celebrated by all companies and better working practices were established. It was also clear that the road to becoming design led was long. All firms reported that they had come a great distance from where they started twelve months ago, and that their companies were still some distance from full design integration

In all five cases presented, the journey towards design led innovation has begun, with the achievement of distinct milestones. For example, small customer insight breakthroughs and new internal alliances were formed within firms, encouraging innovation attitudes and activities that did not previously exist. In most cases firms reported new ways of understanding and provoking their customers. New ways of working and familiarity with beneficial tools and approaches to overall innovation, and receptiveness to innovation by their company culture had been developed;

The results are similar to a previous study of the implementation of design led innovation in small and medium enterprises (Bucolo et al., 2012) where a strong focus on operational factors at the project level rather than company wide strategic processes were found. Moving from design led innovation to design integration will require more active engagement and investment by senior management to build on the new insights and incorporate them into strategic formulation and implementation around new business models.

Practice implications arising from this research include the importance of introducing and shaping the adoption and implementation of new ideas in companies with a history of successful business operations.

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Gaining Clarity on Ambiguity: An Initial Study on How Business Students Navigate Ambiguity Utilizing Strategic Design Principles

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Keywords: Ambiguity, design thinking, strategic design, business pedagogy

Introduction

We are interested in how business students navigate ambiguity. The competitive environment in which businesses compete is increasingly complex and organizational actors must be adept in these ambiguous environments (Rosen, 2000; Martin, 2009). In these contexts, the emphasis is less on problem-solving, a commodity activity, and more on problem-framing, where most of the opportunity to gain insight exists. In this paper, we share findings from our preliminary qualitative research about how graduate business students navigate ambiguity by exploring the following questions:

- In what ways does business curriculum taught in a strategic design context help students to navigate ambiguity?
- How are we preparing business students to manage ambiguity?
- How do business students assess their own comfort level with ambiguity?
- Ultimately, might these students transition into embracing ambiguity as a means to think strategically?

We examine initial findings from how a business school curriculum—The Strategic Design MBA at Philadelphia University—framed by strategic design principles might equip students to become more adept at responding to ambiguous situations. We explore these findings from two directions: 1) the development of curricular projects and assignments that are interpreted as ambiguous and 2) the students' self-assessment on how adaptive, flexible and comfortable they are with ambiguous assignments, measured at different points in the curriculum. We examine both the students' perspective as well as the construction of assignments that are purposefully

ambiguous. This is an important framework to understand because practitioners in today's global business environment largely emphasize that uncertainty and complexity are a significant reality in doing business.

LITERATURE REVIEW

Strategic design and business pedagogy

Currently, there is minimal focused research on the value of strategic design frameworks in business pedagogy (Bohemia, de Mozota & Collina, 2011). While the lines between design and business have become blurred in mainstream media, the integration of design and business in the academy, especially in the United States, is nascent. Dividing design and business into silos is not practical for preparing students to become innovative contributors to this complex world. The key principles that design brings to an MBA degree include empathic listening and inquiry, the ability to bridge different thought-worlds, rapid prototyping, and the design thinking process. More traditionally trained designers acknowledge that the methodologies associated with the design research method can be helpful to a range of industries. Concurrently, non-design sectors are examining the ways in which designers approach problem solving as a means to differentiate and innovate (Design Council, 2002).

This broader scope of design requires higher-level systems thinking and orchestrating a range of different inputs. In a VUCA (volatile, uncertain, complex and ambiguous) competitive environment, firms require practitioners from a range of fields equipped with an adaptive method for problem solving for reinvention in this creative economy (Florida, 2002) utilizing incrementally evolutionary or disruptive paths. The results of applying an integrative design methodology to opportunity finding in an MBA program are solutions that are functional, elegant, creative and efficient. More often, MBA programs are structured in silos. Jump Associates, a design strategy firm, has observed that:

> "The future of strategy is hybrid. …in a world overblown with ambiguity, how do you know where to start? What questions to ask? And what tasks to perform? The solution is clear: the antidote to ambiguity is hybridity. Difficult problems get solved when people act as one-part humanist, one-part technologist and one-part capitalist. A hybrid approach can help you see across silos, make startling new connections and uncover promising opportunities."

Programs that integrate design thinking and business are underrepresented as an area of study in American colleges and universities. While there are full-fledged design management academic

programs that have been developed in the past twenty years in Europe, the United Kingdom, and Asia – such academic degree programs at the undergraduate, master's and doctoral levels in the United States are nascent in the United States. Traditionally framed American graduate business education are just beginning to incorporate strategic design, design thinking and systems thinking as the means to arrive at innovative solutions in marketing, management, operations and finance (Korn and Silverman, 2012; Quinn, 2012). There now exist multiple examples of thought leaders who have written at length on the value of such integrative thinking stemming from linking design thinking and business (Borja de Mozota, 2003; Pink, 2005; Martin, 2009; Nussbaum, 2009; Lockwood, 2009; Best, 2010; and Pacione, 2010). There is an opportunity to develop curricula that operationalizes design as agency in a business (Nelson and Stolterman, 2012).

The perspective of framing MBA pedagogy to advance innovation, to develop novel solutions and ideas, to be a change agent and to work within a post-bureaucratic workplace and organizations, inherently involves bringing together experts from multiple disciplines, working towards emergent ideas. To this end, a design approach becomes increasingly relevant.

Ambiguity

Recent research on leadership of collective creative projects and innovative ventures suggests that managing ambiguity is a key aspect of the innovative leadership role, especially when leaders need to elicit and synthesize expertise from across multiple disciplines, organizations and networks (Long Lingo & O'Mahony, 2010). Ambiguity is different from uncertainty because it cannot be resolved with further information as in the case of uncertainty; ambiguity also requires sensemaking and interpretation. Despite the importance to business leaders of being able to successfully navigate ambiguous environments, business schools have yet to systematically incorporate ambiguity in teaching practice. The strategic design tools of prototyping, improvisation, and ethnography make strategic design a useful paradigm for an innovative graduate business curriculum that can operationalize ambiguity. Budner's (1962) tolerance for ambiguity scale is a well-known instrument used to measure ambiguity tolerance framed within the psychological personality construct. There is opportunity to extend the work of Budner's ambiguity tolerance scale beyond dispositions and thinking, to taking action and leadership.

More specifically, Long Lingo and O'Mahony (2010) found that leaders need to be able to deploy different approaches to respond to ambiguity arising in collective creative ventures, including (1) ambiguous quality metrics (What constitutes quality or success?); (2) ambiguous occupational jurisdictions (Whose claim of expertise entitles them to control the process?); and

(3) ambiguous transformation processes (How should the work be done?). Failure to respond to and manage ambiguity successfully can lead to unproductive conflict, missed opportunities for new insights and idea generation, and lack of commitment and support for projects. Thus, the ability to deftly respond to and manage ambiguity is a key leadership capacity to be developed.

Sensemaking is a resource for generating recombinations and interpreting possibilities in the absence of predictable and rational outcomes (Barrett, 1995). When business students find themselves needing to solve problems in situ, they create new interpretations, ultimately developing coherent, composite stories. The sensemaking concept reveals how students have the raw materials to become bricoleurs, making creative use of whatever is at hand. In the absence of a rational plan, the bricoleur makes connections between the old and the new and retrospective sensemaking makes spontaneous action appear purposeful and coherent. Thus, in the midst of chaos, students can piece together their own skills with others', drawing on past experience and interweaving strategic design concepts to create innovative insights.

METHODS

We utilize a mixed-method qualitative research method constructed of surveys, extended observations, and interviews. Our sample is a cohort of graduate students enrolled in Philadelphia University's Strategic Design MBA (SDMBA) program which utilizes design thinking and systems thinking—both of which require systematically presenting students with ambiguous situations. Our data includes 1) qualitative responses to open-ended survey questions administered at the end of each of the first three courses of the new SDMBA program and 2) more in-depth interviews with four students representing different backgrounds in the program. More specifically, our four case studies include 1) a typical MBA student with extensive business and management experience, 2) a design student with extensive design consulting experience, 3) an entrepreneur with a design background and 4) a financial analyst who has dabbled in design ventures. All of our data is disguised to preserve the anonymity of our respondents.

Our sample is limited in two ways. First, we have only collected data from the first cohort of the SDMBA, and only after they have completed the first 3 of the 10 courses in the program. Thus, we view this initial foray as piloted research. Future analyses will be augmented with post-course data from subsequent courses as students move through the full program arc, and data from the program's second cohort, who will begin in Fall 2013. This initial pilot is also limited in that we did not explicitly analyze differences and similarities between students who have a

design background and those without. We acknowledge that this is an area of improvement for future study.

Building from the work of Long Lingo and O'Mahony (2010), we focus on the three different types of ambiguity that arise in the leadership of innovation and collective creative projects and how these might be pedagogically introduced and simulated in the classroom. Further, building from the work of Karl Weick (1984; 1995; 1998), we explore how ambiguity presents an opportunity for expansive and divergent thinking, as well as sensemaking and sensegiving as graduate business students respond to ambiguity. This can enable organizational actors to better integrate the reductive and convergent thinking necessary to optimize problem framing and decision making. In today's global environment it is necessary to not only generate ideas but to also edit and distill without losing the commitment of all stakeholders.

FINDINGS

In the first section, we draw on post-course survey data to examine early-stage Strategic Design MBA (SDMBA) students' perception of ambiguity arising in the course of their program and their work. In the second section, we illustrate how students utilized strategic design principles and tools to manage ambiguity in their assignments and real world practice, and the impact of their experience on a personal and organizational outcomes.

Post-Course Survey Data

At the culmination of each class, students were asked to respond to a 6-question, open-ended questionnaire. The intention is to gather insight from the students around their comfort with ambiguity and ways in which they are applying what they have learned from the program to their jobs and careers. Because all students are working full-time, their work environments are potential testing grounds and feedback loops for the principles they are learning. At the publication of this paper, students in the first cohort had completed only 3 of the 10 courses offered in the Strategic Design MBA. We focus on 3 of the 6 questions in this paper.

Comfort with Open-ended Assignments

Students are split in their comfort level with ambiguity and around what professors expect on open-ended assignments. The issue around what is expected is a tricky one because while in a traditional art or design studio class, the open-ended question is the norm, this is still an MBA program and so students are expecting clarity from the professor around assignments. Professors must calibrate a balance between giving assignments that allow for the complexity of ambiguity,

while not being murky in their instructions. Consistent feedback to students becomes very important here, because as one student wrote "I want to know how I am doing." Group projects also present different types of ambiguity. In courses 2 and 3, students are assigned team projects. As they get to know one another, their comfort level in working in teams dissipates. Several students also mentioned that team work forces them to practice articulating to each other their particular subject matter expertise- by clarifying first in their own minds what they know, and then translating that to their peers, new ways of seeing emerge.

Looking at Work in New Ways

While responses show that many students will need more time beyond the first 3 classes to synthesize and apply their learning to their work environment, their answers reveal how students will look at their work in new ways. Responses ranged from applying the business model canvas to a client they were serving, to being more user-centered ("I've made an internal shift to consciously choose people over topics when considering opportunities"), to learning to ask "the *right"* questions: "By the end, I became more comfortable with hands-on research tools, recognizing dysfunction and adaptive behaviors in myself and others, recognizing blocks to collaboration, and dealing with atypically high ambiguity." As one student recalled, "A lot of things are black and white, and these assignments made you think about the grey area. Thinking about the grey area, and thinking about how someone else may be thinking about the grey area, can be very challenging."

Empathic Inquiry and Listening

Overall, students have been surprised by how much they value the diversity of the cohort, and how that compels more dynamic learning and intentional curiosity about each other. This diversity and curiosity helps to reinforce the design thinking principle of empathy and being user-centered. One student also wrote that she was surprised to learn how much creativity is required to maintain a business's profitability. That student's statement underpins this general ethos: "I was surprised at how much I was delighted to be there. There was never that feeling of 'having something else, better to do.' I truly valued my time in the classroom and working on the material. I wished I could do it every day of the week."

Responding to ambiguity using strategic design principles and tools

In this second section, we offer four case studies of how students engaged different strategic design principles and tools to respond to three types of ambiguity arising in collective creative ventures (Long Lingo and O'Mahony, 2010), including (1) ambiguous outcomes (What constitutes quality or success?); (2) ambiguous occupational jurisdictions (Whose claim of

expertise entitles them to control the process?); and (3) ambiguous transformation processes (How should the work be done?).

The first type of ambiguity, ambiguity over outcomes or perceived quality, pertains to what the creative process will produce, given competing or ambiguous definitions of the quality of creative output or what will constitute a successful outcome. Three strategic design principles and tools were introduced to students as resources for responding and managing ambiguity over outcomes: 1) rapid prototyping, 2) visual thinking & mindmapping and 3) benchmarking. The design thinking principle of prototyping involves the ability to test and mitigate differences in perspective regarding what will constitute success in an unfinished product or service. Visual thinking and mindmapping are ways to use graphics, symbols and visual metaphors to foster a shared understanding among participants. Benchmarking is useful for establishing legitimacy for a concept by demonstrating success in other industries or companies.

The second type of ambiguity pertained to who has claims to control over the creative process, stemming from unclear or overlapping occupational jurisdictions (Abbott, 1988; Bechky, 2003a). At the heart of leading innovation is being able to recognize and elicit the multi-disciplinary expertise of participants to the venture or organization. However, working across disciplinary or organizational boundaries may often lead to participants having a sense of superiority vis-à-vis others, which can undermine the collective creative design process. Three strategic design principles and tools were introduced to students as resources for responding and managing ambiguity over expertise: 1) empathic listening, 2) related worlds thinking, and 3) integrative negotiation. Empathic listening and inquiry involves a stance of asking, “Why?” and probing for deeper meaning and thought processes behind other’s statements. Related worlds thinking involves an orientation toward connecting the dots between seemingly disparate ideas and can be a critical resource in moving beyond a stalemate in a problem solving process. Integrative negotiation involves facility in moving beyond positional statements to eliciting and understanding the underlying interests of participants to the process, and engaging in problem solving that jointly recognizes differing needs and interests of the participants.

The third type of ambiguity pertains to how the creative work is to be achieved, given that creative production cannot be routinized (e.g., Amabile, 1996). Three strategic design principles and tools were introduced to students as resources for responding and managing ambiguity over how the work should proceed: 1) the design thinking process, 2) systems thinking and 3) scenario planning. The design thinking process provides a robust approach for bringing diverse participants through the creative process of gathering data, generating ideas, prototyping,

piloting, and revising as needed. Both systems thinking and design thinking enable participants to consider problems and solutions holistically and in detail, and provides a process for illuminating unexpected and underlying connections and unintended consequences of decisions for a multiplex of parties. Scenario planning enables participants to see the multiplex of ways in which a path of action could unfold. Both take an expansive view of the entire innovation process and its unintended consequences and requires bringing in parties that may have insight into the entire process arc.

Figure 1 provides a summary of the respective strategic design tools students engaged to manage and respond to ambiguity arising in the innovation process. In each case, we also share students' perceived individual and organizational outcomes from their exposure to strategic design principles.

Figure 1: Engaging Strategic Design Principles and Tools to Manage Ambiguity

Case #1: Mary, a prototypical MBA student

Mary entered the program with considerable business and management experience. Nevertheless, the design principles of rapid prototyping, empathic listening, and systems thinking proved to be invaluable to her work and organization.

Using prototyping to manage ambiguous perceptions of what will create success

Mary's introduction of rapid prototyping and sharing her ideas early and often has become an invaluable strategy. As she explains,

> I am a big believer in not wasting people's time. But the concept of "fail early and fail often" really resonated with me. Instead of trying to prove to people that this is something that we should do, I have begun including people in the process earlier than I even thought was beneficial. I've begun to do a little less "due diligence" on an idea and start peppering/testing the idea as a concept before I do the research to see if it is viable. I've begun mentioning ideas to people—in passing, or in official meetings scheduled for bringing in ideas. And even though I don't need their approval to try to innovate, getting people brought in earlier has proved to help with acceptance of the idea going forward. This approach has also triggered them to start thinking in more depth and detail why they think it will not work. They need to think deeper and all the aspects, and in turn they're helping me to work through all the details."

Using empathic inquiry to manage ambiguous perceptions of expertise

For Mary, using empathic inquiry as a way to understand an individual's point of view and challenges to her business ideas has been invaluable. "Now I am asking the question of why—empathically—why is this not possible? Instead of defending, I am helping to work through the problems to see how we can make it happen. It also really has made me think about different aspects of the business that I have not been thoroughly involved in." Yet Mary's greatest insights into the power of empathic listening and inquiry have come through interaction with the diverse constellation of students in her cohort.

> I've learned so much from the nature of the other [students] in the group. For example—very few students have the background that I have in the class. It has allowed me to better understand the different thought processes that people use to get to certain points and this is an incredible benefit of the program. Because our program is design focused, you have non-typical MBA students. So there is incredible heterogeneity regarding the diversity of perspectives and opinions and points that people are making. When I started I originally dismissed some people's ideas because I didn't agree with them. Now I've realized that it's more about me understanding their deduction process and how they get to their point of view, rather than me defending my ideas.

Using systems thinking to manage ambiguous perceptions of how work should proceed

As part of her coursework, Mary introduced an innovation product life-cycle approach to evaluating new products at her company. This process has been invaluable not only for eliciting ideas from individuals across her organization (many of whom she did not typically engage), but it also provided a process through which evaluation of a project could advance and build organizational buy-in in advance. As Mary describes, this systems-thinking approach,

> Enabled us to map out the entire process from idea to launch and support—this was incredibly important. Our organization needed a way to consider things in advance and evaluate at each phase of the product cycle. This life cycle approach helps us think in depth and critically along the way, and bring people in from all these areas into the process. Now sales is able to participate in the development of the product. Before we go live, we have people who are engaged.

Impact: Personal and organizational outcomes

Mary found a systems thinking approach to be an invaluable resource for her company,

> I really believe that I have developed a process template that triggers people to think in different ways. Our company had historically not been able to monetize things that impact the business because they couldn't see it. Non-revenue generating things could be worth millions of dollars.

Mary notes, however, that the real impact has been in her personal life, "…to listen more and to be honest, to think a little more before I speak. Now I see the value in listening and understanding peoples' different perspectives."

Case #2: Benton, graphic designer

Benton entered the program with a design background and considerable expertise in consulting and managing clients. Nevertheless, the design tools of rapid prototyping, empathic listening, and mind-mapping have proved invaluable to his work in brand management.

Using rapid prototyping and mindmapping to manage ambiguous definitions of quality

For Benton, exposure to prototyping and sharing early stage ideas struck at the very heart of his design training. As he details,

> Prototyping blew me away. I had never tried to share something that wasn't fully realized. The [object we created for our partner] didn't have to be the perfect thing but the ideas still came through…This is not surprising. Design training is the complete antithesis of this. If I share it early I won't have ownership of it. I position myself. If I bring them in when it's rough they feel like they are not getting their money's worth.

Benton also found that the visual tool of mindmapping enabled him to depart from his traditional design training, while at the same time developing a shared understanding among participants to his collective creative design process. While fluent in visual thinking as a designer, Benton discovery of mind mapping in his first course was a huge breakthrough, "Mind maps are the new modus operandi. I use them all the time… A big part of it for me is that I am more of a visual person. But now I am using words visually as well." In his consulting work, Benton uses mindmapping as a tool to discover and resolve differing perceptions of quality and success, "I used mindmapping with the client and it provided a whole new way to look at her business and used it as a launching point to revamp what she needs to do, how she represents her company. It gave me an amazing insight into what she does." Benton also uses mindmapping with groups, "I use it as a way to elicit everyone's ideas and make the leap between perspectives."

Using empathic listening to manage ambiguous claims to expertise

Benton noted the importance of empathic listening to ensure that there was buy-in among all the parties to the evolving design concept,

> I need to figure out how to bring [my clients] into the process. Now I use the words they use to get their buy in and to help them get a better insight into their world. I tape myself during this process and when I do, I often hear myself not waiting it out long enough to let people talk and say what they need to say. I realize that I need to sit an extra couple of seconds. I don't think I noticed it as much until I was in this program. Am I really hearing what people are saying? Am I rushing them? I want to slow down.

Impact: Relating worlds to advance one's professional career

Benton notes the importance of having his newly learned design principles and tools in bridging the gap between design and business.

> People think design is just about making things look pretty. After years of trying to change the paradigm, I now have a new language that is helping me bridge the gap to take my role as designer to new business realms. I am totally changing the way in which I am talking about what I do. Even changed my business card. When I think about why I wanted to sign up, it's already happened after just three classes!

Case #3: Gareth, project manager and design entrepreneur

Gareth, trained in design, is an entrepreneur and project manager. For him, navigating ambiguity has always been an integral, enjoyable part of his work:

> I thrive on ambiguity. It is kind of like part of the process—that thinking of the answer is thinking of what the question is. The fact that something is not defined, I enjoy that portion. There is a bit of a gamble and a bit of a risk in that—but there is more chance to be wrong! I am a project manager and the fact that I enjoy the ambiguity allows me to stay in the concept mode.

Using prototyping to manage ambiguous expectations of success

Gareth was invited by a small company to open up an office for a major metropolitan market. His challenge—how to manage expectations of success. Gareth notes,

> I can stand up and say this is what I have done and this is where I am going. I need to get everyone singing from the same hymnal. I have used prototyping… in terms of setting up a business structure. The prototype is in flux, so if it needs to change midstream, or from month to month based on where we are, we will change it.

Using empathy and relating across markets to manage competing claims to control

Gareth takes an empathic approach to his co-owners, even engaging the project as his own entrepreneurial venture, as a way to honor the mutual control over the office and elicit deeper

trust in his launching of the new office. He notes, "So I treat my job as if it was my business. I try to be empathetic and understand what the co-owner is trying to do and be mindful about that." Beyond his engagement with the owners of the venture, Gareth also sees engaging in empathic listening as a key practice in his work. He elaborates:

> A traditional business developer comes into a meeting telling his client and team what he will do. But I say, "*You* know your business, you have contacts, and I will help you manage your contacts so that you can get work, to help you define what and who you know so that you build work." I act like a 3rd party consultant to all the project managers for our group... I connect the dots into different markets and segments into people they know but don't think they know... A lot of my work is training project managers how to be business developers—rather than me trying to tap into their contacts. I try to create bridges to empower the project managers.

Case #4 – Maggie, risk management consultant

Maggie, one of the younger members of the cohort, works in the financial industry and has dabbled in design ventures. She sees herself as more of a planner than someone facile with managing ambiguity. Maggie notes, "Historically I have been uncomfortable with ambiguity, but I am definitely more comfortable with it now than when I entered the SDMBA. My way of becoming comfortable with it is trying to understand it. Now I am more prone to ask a lot of questions. For some reason when I was uncomfortable with it in the past, I wasn't inquisitive, now I ask a lot more questions."

Using benchmarking to manage differing expectations of success

Maggie recognizes the value of benchmarking across other financial firms as a way to establish credibility and competing perspectives over whether a new program will be a success. She notes, "We are developing this new program and it is called integrating testing. But I think we need to reach out to other financial firms; we can also learn from other sectors. That may be something I can present as an exercise."

Using empathy to manage competing claims to control and expertise

Maggie details the impact the program has had on her practice of taking an empathic approach with team members and internal clients, and the challenges of doing so in a way that does not undermine her emergent reputation:

> Empathy- that has been the biggest area when I say my world has opened up! I am naturally empathetic but I didn't think there was a place for empathy in a corporate environment. But I see that internally with my team, and our customers, who are internal, if I have a better understanding of who they are, then we can better work as a team. Empathy also connects to how you are

> communicating to others. I try to use it everyday, although I sometimes forget. It does need to come across in a way that is not viewed as weak—especially if you discuss the way you feel about something. To me, now, empathy is a business term—to understand your end user, and to understand your team.

Using scenario planning to manage ambiguity over how to proceed

Much of Maggie's experience in the strategic design program to date has enabled her to reframe her risk management work as strategic design work and managing ambiguity. She notes:

> What I do at [my company] is all ambiguous, it involves scenario planning. We don't know what future incidences will happen so I have to have that mindset. Coming up with scenarios, is [a way to manage] an ambiguous process. We make the client talk amongst their own people to figure out what they need to do. They need to get into a character so to speak. That is the part that excites me in testing—these are some of the links to design thinking.

Impact: Management Recognition and New Leadership Opportunities

Maggie has also noticed that her involvement in the SDMBA program has enabled her to see the value in developing teams of differing expertise—a skill set that has not gone unnoticed by her management. She details:

> I have noticed that since beginning the SDMBA program, I am much more likely to take the lead on roles and in some cases those that others may not necessarily want to do (i.e. presenting new topics to our end-users and taking on responsibilities previously reserved for those with more experience). This speaks to my growth in being more comfortable with ambiguity. I realize that I do not have to be the expert to lead a project, I just need to know who to involve. So I am willing to jump in to situations prior to knowing everything about them. This behavior gets the attention of our leadership and affords me additional opportunities to develop as a leader on my team and in the organization.

IMPLICATIONS FOR THEORY AND PRACTICE

This research has four implications. First, it provides a robust framework for understanding the importance of certain strategic design principles and tools and how they relate to the challenge of leading innovation, change and collective creative projects. Rather than offering a laundry list of strategic design principles and tools, we provide a framework for understanding how these tools help students manage three types of ambiguity arising in collective creative ventures. We have set out a preliminary framework (one yet to be tested) as to how each of the design principles can be engaged as a resource to respond to ambiguity arising in the leadership of innovation and complex organizations in the 21st century. We unpack ambiguity not as a barrier, but as a gateway to innovation—both in practice and pedagogy.

We recognize that our framework is presented as if there are direct and clean relationships between the types of ambiguity present and the principles and tools engaged to respond to them. In practice we recognize that many tools and techniques address multiple types of ambiguity. This is especially the case with the process tools, such as systems thinking and scenario planning, that require leaders to engage a diverse array of participants—often all aspects of the business—in the testing of new projects. Further, we suggest that further research and pedagogy extend beyond a focus on a single technique or principle, toward students' capacity to engage a portfolio of tools and principles as warranted by the situation.

Second, our paper provides a useful model for universities to experiment with new ways to deliver business education in order to prepare students for complex work environments. Ultimately, we should not simply focus on providing students *exposure* to these tools and principles. Rather we should design curriculum to build repeated experience in engaging these principles and tools—moving from what Long Lingo (2013) describes as an "exposure" to a "fluency model" of developing capacity to respond to ambiguity arising in the leadership of collective creative ventures.

Third, in this paper we offer a preliminary framework for curriculum design and assessment—both at the course and program level. Developing students' capacity to engage multiple strategic design techniques and having fluency in those techniques requires intentional design and assessment at both the course level and across the entire curriculum over time. We propose this model as a way to spur conversation and assessment of the value of certain assignments and design of programs in reaching these goals.

Fourth, our research extends the role of sensemaking – the ability to generate re-combinations and interpret possibilities in the absence of predictable and rational outcomes— in MBA pedagogy. By explaining the integrative thinking that Strategic Design MBA students must utilize, we situate sensemaking as the potential modus operandi of MBA students in the 21st century. We operationalize these MBA students as bricoleurs, creative and resourceful agents capable of navigating ambiguity.

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Guidelines for the proposal of a system of design management indicators in product development companies

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Keywords: design management, performance indicators.

The contribution of design to businesses is known, but measuring this result has been a complex task. This paper proposes ways of selecting design management indicators by product development companies. As a method, case studies of companies based in southern Brazil were used. Results show that indicators can be chosen by means of three criteria of selection. In addition, this study presents guidelines to build a system of indicators based on criteria of selection.

1. INTRODUCTION

Regarding design evaluation, Best (2010) has stated that it is a complex task. According to this author, in qualitative terms, design can be measured through aesthetic elements, improved brand image and increased organizational learning. However, when considering quantitative aspects such as profits and units sold, among others, isolating the design contribution is a hard task. Design managers need ways of measuring performance that aligned with both the design success measures and the company's success strategy measures (Best, 2010).

In Brazil, design management has been scarcely discussed in academic and professional environments. This research aims to contribute to studies in the area of design management by addressing a gap related to performance measurement. It is in this scenario that this research has been developed as a way to contribute to discussions about design management, product development process and performance indicators, by establishing guidelines to propose a system of design management indicators in product development companies.

2. RESEARCH METHOD

In order to establish the guidelines for proposing a system of design indicators, the investigation were conducted in a three companies study cases. In each company, it started with interviews with the designers and people connected with them and also with the product development process, in a way of understanding the routines and environment in which the company are inserted.

The researchers have also developed, based on literature (Kaplan & Norton, 1997; Nixon, 2002; Oliver, 2002; Lockwood, 2008; Andrew et al., 2009; Viladàs, 2009; Borja de Mozota, 2003), a research protocol. The protocol was used to develop three case studies. According to Yin (2008), this method is suitable when the investigators have little control over the events and their focus is on a contemporary phenomenon from real life. Three criteria for the selection of the companies were considered: the main activity of the companies should be product development, thus service firms were excluded from the study; the companies should be located in the state of Rio Grande do Sul - Brazil, so as to facilitate visits and personal interviews by the researcher; the companies should have an internal department in charge of product development, with at least one professional working as a designer. The case studies were carried out from November 2011 to May 2012.

The research protocol was applied by means of an interview with either the designers or the people in charge of the design department in the companies studied. The respondents were free to select the indicators they regarded as the most suitable to their reality. They were also required to justify the selection of each indicator, thus characterizing the selection criterion used.

The respondents were asked to select the three most relevant indicators to their contexts from the set of 46 indicators. The interviews with the design team members were followed by a meeting to present and discuss the data. After the interviews with collaborators from the three companies, their answers were analyzed and compared, thus generating the criteria for selection of indicators.

To finish our research, based on the criteria for selecting indicators, it was possible to establish the guidelines for companies to select indicators, based on the literature review and also in the answers from the respondents from companies.

3. CASE STUDIES

3.1 COMPANY A

Founded in 1966, Company A belongs to a conglomerate of six companies that produce different kinds of products (house utensils, cleaning supplies, office supplies, and home organizing products). Company A produces hand tools. It is located in Esteio/RS and has approximately 600 employees. The research protocol was applied to collaborators that participate directly in the design management process. Four people were interviewed: (1) director of products, (2) Design coordinator, (3) Product designer, and (4) Design trainee.

In the survey process, before starting the process of indicator selection, the respondents were asked about the objectives defined at the launching of a new product. The respondents stated that the main objective is always related to the company's financial return, but this objective is only reached through the attainment of other objectives, such as increased sales, reduced production costs, and increased consumer satisfaction, among others. Some products are launched in order to create a new market. This may initially cause financial losses, but the product may generate profits later.

Regarding the objectives of the product development process, the indicators selected may point whether the company is following the right path to attain its objective. The justifications given by the respondents for the selection of indicators may be listed as follows:

- Feedback: The indicators must give some feedback to the team about the acceptance of the product by the market. Such feedback may be related to sales, and even consumer satisfaction.

- Productivity: The indicators selected provide an overview of the industry productivity, the number of projects being executed at the same time, and the number of cancelled projects, among other things.

- Development time: One of the ways to evaluate the development process is to check how long it takes to convert an idea into a product to be marketed. The respondents stated that the market is dynamic; therefore, it is necessary to accelerate the process to launch the products ahead of the company's business competitors.

• Competitors: Monitoring the market is important to the product development process, since it positions the company in the market in relation to its competitors and also follows the launching of new products.

The justifications mentioned above have been interpreted as criteria for the selection of indicators of design management in Company A. At the end of each interview, three indicators from the list were selected as the most important ones.

Based on the answers given by the Company A team, it is possible to notice a certain diversity among the indicators selected. No indicator from the "HR" category was selected as one of the most relevant. The team evidenced a constant concern with the evaluation of the financial return derived from their projects, but there is a clear idea that, in the end, the other indicators selected would result in a higher financial return. As already seen in the Balanced Scorecard model (Kaplan and Norton, 1992), the indicators show a cause-and-effect relationship, i.e. a variation in one indicator causes variation in the others.

3.2 COMPANY B

Company B was founded in 1958. It is situated in Porto Alegre, and develops thermal conservation products. It has approximately 700 collaborators. Presently, the product development department has three collaborators: (1) design coordinator, (2) engineer, and (3) product designer. The department reports directly to the company's board of directors. The two designers of Company B answered the research protocol.

With regard to the result indicators, the design coordinator of Company B stated that two indicators are taken into consideration by the department: (1) number of projects launched per month and (2) attainment of sales expectations, which is also known as payback in the company.

Based on the interviews, the criteria for selection of indicators identified were the following:

• Financial return: The main objective of product development in Company B is to achieve financial return. The indicators selected must show whether the product meets the sales expectations estimated by the commercial department at the stage of Investment Analysis.

• Production cost reduction: Indicators that evidence reduced costs of the production process are important, especially in projects of existing products.

• Product performance: The portfolio of products in Company B is monthly evaluated in order to identify the products that must be kept and those that must be taken out of the production line. For this purpose, the consumer acceptance of a particular product should be measured and assessed through financial indicators in the first place, according to the development team, but issues related to consumer satisfaction are also analyzed.

• Productivity: The board of directors of Company B requires good productivity of the product development department; for this reason, indicators showing the productivity of the design team should be taken into account along the analysis of the design process. According to the design coordinator, the main indicators that meet this criterion are the number of products launched and the number of patent applications per year.

Half of the indicators selected as the most relevant ones by the Company B team are in the 'Financial' category. It was noticed that the designers interviewed focused on financial issues as well as on the return provided by their products. The evaluation of product success in Company B is grounded on both the confirmation of sales and the financial return estimated before the product is produced. These indicators guide the work of the product development team.

3.3 COMPANY C

Company C was founded in 1958 in the city of Canoas/RS and its head office is currently located in the city of Nova Santa Rita/RS. It has approximately 600 collaborators and focuses on the development of audio speakers for professional – nightclubs, stadiums, etc. - and domestic users – speakers for computers, cars, houses, etc. The area of product development is within the engineering department. It is represented by one product designer with master's degree in strategic design who has worked at Company C for 10 years.

The only designer working in Company C answered the research protocol. On being questioned about the existence of indicators to evaluate design in the company, the respondent said that, in accordance with the company strategic planning, his goal is to develop three low-cost innovations. Therefore, his productivity is measured in conformity with the creation and implantation of innovations, which can be either improvement of existing products or development of new products. The second indicator is related to the company sales revenue, but this indicator is shared with the area of product engineering.

Concerning the way the design results are evaluated in Company C, the designer stated that this evaluation is performed through the use of indicators related to sales and financial return. After the application of the protocol, the criteria for selection of indicators were:

• Financial return: From the interviews with the designer and the portfolio manager, the concern with the financial return that the product development must generate has become evident. For this purpose, it is important to use indicators that show the sales performance and product profits.

• Feedback: Indicators that point out improvement opportunities are regarded as sources of information for the development of future products. Most of the time, such return appears in the form of complaints through customer service and internet.

• Competitors: The assessment of both the market in which the company participates and its relationship with competitors is relevant to the product development process.

For this reason, indicators that show the company position in its competitive setting are important.

• Productivity: The company designer's goal is to develop three low cost innovations per year. Therefore, the use of indicators showing the industry productivity is important.

The results of the application of the research protocol in Company C were similar to those found in Company A and Company B, i.e. the financial goal is the main reason for the selection of indicators. The cause-and-effect relationship presented by Kaplan e Norton (1992) in their Balanced Scorecard model has been noticed in the selection of indicators by the designer: ideas converted into products generate a larger number of patents, which eventually generate increased sales.

4. DISCUSSION

Based on the study of companies A, B and C, it was possible to group the selection criteria used and identify the similarities and patterns in their choices. Chart 1 is a summary of the selection criteria of indicators used by the respondents of the surveyed companies.

	Company A	**Company B**	**Company C**
Criteria	Feedback	Financial return	Financial return
	Productivity	Reduction of production costs	Feedback
	Development time	Product performance	Competitors
	Competitors	Productivity	Productivity

Chart 1: Summary of criteria for the indicators selection

When analyzing the criteria for the selection of the indicators by the three companies studied, it can be observed a similarity in the responses, despite the different nature of the products developed by the companies: (1) Hand tools, (2) Thermal products, (3) Audio speakers. The researcher's initial idea was that the companies producing products in different segments would indicate different criteria for the selection of indicators, but in practice this has not occurred because the companies' way of choosing the indicators showed converging points.

Each company used four criteria for the selection of indicators, totaling twelve criteria. Some criteria were mentioned by more than one company, so the list was cut down to seven criteria: (1) Feedback, (2) Productivity, (3) Development time, (4) Competitors, (5) Financial Return, (6) Reduction of production costs, and (7) Product performance. By analyzing the seven criteria, similarities were found among some of them, so it was decided to join the Feedback, Financial Return and Product Performance criteria, assuming that they are information that the indicators will provide to the product development team. It was also

decided to combine Productivity, Development Time and Reduction of Process Costs, assuming that these criteria cover issues associated with the product development process itself.

The three criteria for the selection of indicators resulting from the case studies of companies A, B and C convey different companies' visions and their relationships with the market. Criterion 01 (feedback) chooses result-related indicators, which provides information from the product's users to the company when the product is already in the market. Criterion 02 (productivity) refers to performance indicators, whereby measurements are made in the company's internal processes responsible for the production and launch of the product in the market. On the other hand, criterion 03 (market) presents market indicators, monitoring the competitors' activities and providing such information to the development team. Figure 1 illustrates the relationship between the criteria, indicators and parties involved.

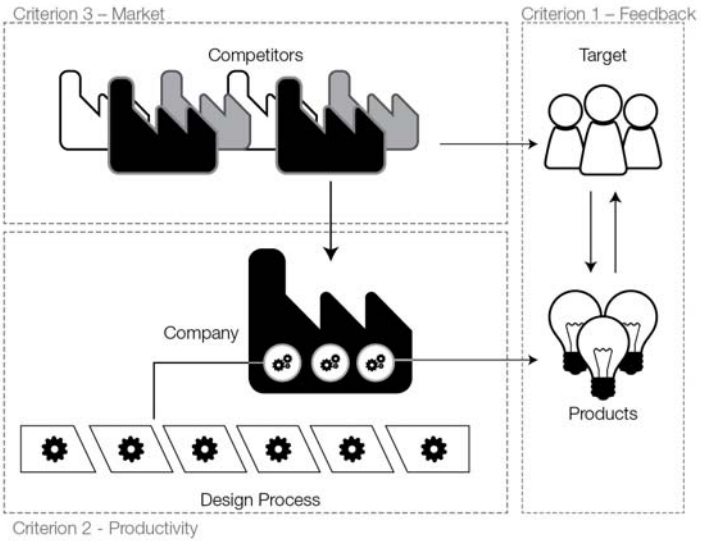

Figure 1: Criteria for the selection of indicators

The indicators related to criterion 01 (feedback) are those that come from the interaction of the product developed by the company and its public. The traditional financial measurements are part of this criterion. The indicators of criterion 02 (productivity) will evaluate the product development process as a whole, i.e., the design management process, idea management, and others that the company may adopt. The indicators of criterion 03 (market) are related to the interplay of the competing companies with both their public and the companies themselves.

4.1 GUIDELINES FOR THE SELECTION OF INDICATORS

The guidelines for the selection of indicators are the company's instructions to select indicators to evaluate its design management. As a result of this research, seven guidelines were built to perform the selection of indicators, as a result of the research methods adopted

in this study: literature review and case study. The guidelines are described in the items below.

a) Alignment between indicators and the business strategy

When defining the objectives and goals for the development of a product, the company should have tools to evaluate whether it is achieving their goals or should review its actions. According to Müller (2003), indicators have the function of evaluating whether the company's actions will meet its strategic goals. The indicators chosen must be able to correct or confirm the decisions made, so as to promote competitive strategies. A company, for example, consider to launch a product aiming to financial returns by selling the product at a price lower than the price of competitors, thus ensuring profits through sales volume. In this context, an increase in the indicators related to sales may suggest that the company strategy is being met. In another example, the company may seek a reduction of product development costs and in this case the indicators related to productivity and operating costs may indicate whether the goal will be attained.

b) Balance between the results, performance and market indicators

In the case studies of companies A, B and C of this research, an imbalance was observed in the indicators chosen: emphasis has always been on indicators of results, especially on financial indicators showing the product sales. It is suggested that the companies, when adopting a system of indicators, ensure a balance among the categories, with the purpose of obtaining information from all those involved in the product development process, both internal and external to the company, as shown in Figure 1. As seen in theory, especially as a justification for the creation of the Balanced Scorecard model (Kaplan & Norton, 1992), financial indicators are important to management, but they are not the only ones that should be considered, because financial gains are always the result of other actions, such as sales increase, costs reduction, among others.

c) Establishing relationships between indicators

As already defined by the Balanced Scorecard (Kaplan & Norton, 1992), the indicators have a cause-and-effect relationship. When the indices resulting from the calculation of an indicator are changed, others that are interconnected may also present variation. It is important to have it clear in the system how the variation of an indicator will affect the others. In company A this concern is clear when they selected indicators of different categories rather than just financial indicators.

d) Easy indicators collection

Companies should select indicators to evaluate their processes, but it is important that the company's team can easily obtain data and measurements. There is no point in choosing an indicator that requires resources not available for its measurement such as, for example, measuring the number of products launched by the competitors without having in the company a person or a firm contracted to perform this kind of monitoring. When structuring a

system of indicators and start the measurement process, skilled people are necessary and, in some cases, investments have to be made by the company in order to operationalize the measurements.

e) Selection of indicators and the action plan

After administering the research protocol and selecting the indicators that effectively can be collected, it is recommended that the implementation of a system of indicators be planned by an action plan. The plan should include the indicators to be used, the person(s) who will be responsible to collect them, the resulting information and who will receive it, among other issues considered important by the company when implementing a system of indicators.

f) Shared vision by the users of the indicators system

Along with the goals and competitive strategy, the shared vision of the system of indicators should be disseminated across the company's levels (Kaplan & Norton, 1997). The selected indicators must also be disclosed and made clear to all those involved in the system. A shared vision contributes to building an ambience and culture of measurement (Schiemann; Lingle, 1999). According to Harrington (1993), the use of indicators promotes the required motivation for process changes and improvements. Some of the indicators may be disclosed to the company's areas. For example, an increase in the sales volume can be the result of the work of several areas of the company, so many sectors of the company can share it.

g) Preparation for the selection and implementation of the indicators system

Companies must train employees on how to collect and make decisions based on the information provided by the indicators system. In the case studies, it was clear that the company's internal design teams neither had the knowledge nor the habit of working with result indicators. In this case, training would be necessary to explain the function and purpose of the indicators, in an attempt to create a culture of results measurement. It is advisable that such training be conducted before the selection of indicators so that the persons involved in the selection already have the required knowledge on the subject, thus qualifying the decisions made.

Figure 2 summarizes how the indicators system can be built in a company, based on the guidelines of indicators selection detailed in the previous sections of this work. The process begins with some kind of training to the users of the indicators system, including the basics, once some professionals, e.g., the designers, may have difficulties in understanding the terms and concepts (Lockwood, 2008). After this initial stage, it will be possible to choose indicators (a) aligned with the company strategy, and (b) easy collectable, i.e., if the company decides to increase profits, indicators to measure sales and costs reduction are indicated to be selected. It is also suggested that such indicators be chosen based on the three criteria of selection presented in this study, not privileging one of the three criteria in detriment of others.

With the indicators selected according to the criteria, it is possible to establish the existing relationships among them; in other words, how the change of an indicator will directly impact the other indicators of the system. After this mapping, it is suggested that a meeting be held to approve the start of the system implementation, thus contributing to building a culture of results measurement and evaluation inside the company.

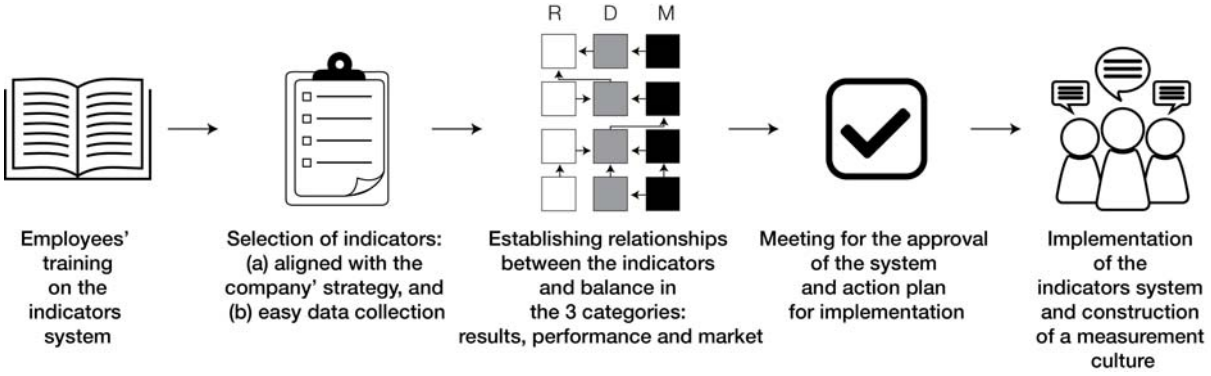

Figure 2: Strategy for building a system of indicators

FINAL REMARKS

Some previous studies (Cooper &Press, 1995; Hertenstein et al., 2001; Ramlau, Melander, 2004; Design Council, 2005; Best et al., 2010;) provide evidence that design can contribute to successful companies. The survey conducted by Bruce, Cooper and Vazquez (1999) in small UK companies also shows that management design contributes positively to the companies' success.

Measuring the contribution of design to successful companies is a hard task, but necessary, so that a better recognition of designers by the companies is ensured (Best, 2010; Borja de Mozota, 2003; Phillips, 2004; Lockwood, 2008). For this reason, this research seeks to contribute to the discussions relating to the methods and techniques that can be used to measure results from design. It is believed that the definition of criteria and guidelines for the selection of indicators make easy the process of selecting and implementing a system of indicators, no matter the size or other characteristics of a company.

Further researches are suggested to apply the criteria and guidelines to a larger number of companies in order to seek validation and possible improvement suggestions.

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APPENDIX

Research Protocol

1 – Schedule interviews with designers and/or design coordinators of the companies and ask them to select the indicators from the chart below that they regard as important in their company context.

2 – After the selection of each indicator, the respondent should justify his or her choice. This reason will characterize the criterion for selection.

3 – After the selection of the indicators, each respondent should select the three indicators that he or she finds more relevant than all the others selected.

Category	Indicators	
Financial	□ Increased sales through new products (%) □ Project costX Product cost (%) □ Savings generated by project changes □ Investment in research and development (R$) □ Profitability of new products in comparison to existing products (%) □ Profitability per customer (R$) □ Profitability per product (R$) □ Profit obtained from new products (R$)	□ Relationship between investment in research andsales (%) □ Relationship between sales of new products and sales of existing products (%) □ Relationship between sales in the home market andsales in the foreign market (exports) (%) □ Value of company stock at the stock exchange (R$) □ Actual sales X Forecasted sales(%)
Customer	□ Number of positive comments (#) □Number of new customers (#) □Number of complaints (#) □Market share (%) □ Consumer satisfaction with products (%)	□ Reputation among customers(quali) □ Customer retention (%) □ Positive and negative comments in social networks (#) □ Number of messages received through the website and social networks (#) □ Website traffic (# of visits)
Design and innovation	□ Ideas generated at the beginning of the product project (#) □ Number of new projects per year □Number of new products launched in comparison to the competition's (%) □ Number of products cancelled during development (#)	□ Number of patents (#) □ Number of awards X Number of contest applications □ Number of new technologies employed per year (#) □ Products X Level of (radical/incremental) innovation (#)
PDP	□ Mean time of product development – from inception through production (days) □ Number of people per project (#) □ Number of projects cancelled (#) □ Number of projects completed on time X Number of projects delayed (#) □ Quality Program – 5S, ISO – (y/n)	□ Failure rate/1,000 products (#) □ Rework (hours) □ Total hours worked by all the professionals involved in the project (#) □ Machine idle time (hours)
HR	□ % of employees per job duration (% – 1 year – 2 years – 3 years – 4 years, + 5 years) □ Absenteeism □ Training hours (#)	□ Number of accidents (#) □ Internal customer satisfaction (quali) □ Turnover rate (#)

R$ = reals # = number % = percentage y/n = Yes or No Quali = qualitative, requiring value scale

Identifying Core Knowledge: Towards a Shared Understanding of Design Management through Comparing Different Stakeholders' Perspectives

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Keywords: design, design management, core knowledge in design, statistical analysis

This paper aims to explore what constitutes a body of core knowledge – e.g. concepts, skills, and methods – in design management and to what extent such a core is recognised and shared by the design community. An online questionnaire survey was conducted with appropriate stakeholders in design – designers, design managers, design researchers, and design educators. Through analyses of the survey results a potential body of core knowledge in design management was proposed and different stakeholders' perspectives were compared in terms of their similarities and differences. This led to the development of a conceptual framework for building a shared understanding of the fields of design, design management and other relevant fields. Rather than including specific concepts in core knowledge, the features that are identified to describe the core of design management are discussed.

DESIGN AS A GROWING FIELD OF STUDY

Contemporary design research and practice has become more interdisciplinary, with greater collaboration and integration with other related disciplines, including science, social sciences, and the humanities (Cooper, 2009; Frascara, 2002; Laurel, 2003). This has led to creating new areas of study, such as: design management – design in the context of management, organisation, and business (e.g. Boland and Collopy, 2004; de Mozota, 2003); design thinking – design in the context of innovation and change (e.g. Brown, 2009; Lockwood, 2009); and service design – design in the context of public services and societal transformation (e.g. Sangiorgi, 2011). Within a multidisciplinary context, designers are

required to be equipped with not only their own subject-specific knowledge but also a broader understanding of the system of organisations and society in which they operate.

Although the diversity of research topics in the design community continues to increase and expand, a corresponding effort has yet to be made in the development of a shared understanding of both design research and design practice. This often create confusion within the design industry, particularly in the context where the design is continually striving to assert the value it can bring to such diverse fields as management, business, society, politics, health, and the service sector. This can be applied to the design field itself, i.e. being neglected in terms of its values and thus preventing areas outside of design from benefiting fully from the capabilities of design.

This paper integrates perspectives from four main areas of design: design practice, design management, design research, and design education. Design practice concerns creating and making something by designing, design management examines how the design process can be managed, design research embraces the skills and methods to conduct research in design, and design education deals with how to teach designers. The design community that is investigated in this paper refers to designers who practise any type of designing, design managers who manage the process in which design is practised, design researchers who investigate issues and phenomena relating to design with the goal of building knowledge in design, and design educators who teach how to design.

Design management discourse

There has been a rise in the need for designers to engage with management and business in line with industrial production, in which design needs to be effectively managed. With the rising number of design consultants and design consultancies the term design management emerged in the 1960s. In the intervening time, design management has attempted to establish itself as a field of research and practice. It has been identified that there are three paradigms in the discourse of design management (Cooper et al, 2011): first is the design practice paradigm, which concerns design within the process of production and manufacturing; the design management paradigm is the second whereby design operates on a strategic level within the organisation; and thirdly, the design capacity paradigm concerns design in the context of society and the environment.

According to the perspective presented by Kuhn (1996), recognizable and cumulative conceptual underpinnings within a common paradigm of discipline allow the production of a new body of knowledge. Considering the substantial growth in knowledge of design management as a field of practice and research, identifying a common body of knowledge in the field is needed in order to move on to the next paradigm and produce a new body of knowledge. However, research into such a shared body of knowledge has been limited in the field of design and design management, while it has been widely conducted within many other disciplines, such as sociology, management, science, and the humanities (Keith & Ender, 2004; Smith-Lovin, 1999; Benbasat & Zmud, 2003; Carey, 1996; Vick, 2004).

What constitutes the core knowledge?

The term ‘core’ has been used to refer to a body of knowledge that is central to study a subject in the field. Many scholars have researched their disciplinary core, not only for teaching and learning purposes, but also to understand the practices and emerging research agenda within the discipline (Young, 2010; Haghighi et al, 2011). Specifically, to define a core, its fundamental elements that are distinctive to the discipline are discussed, such as concepts, topics, programmes, frameworks, phenomena, recognised culture, theories, methods, skills, abilities, and so on (Keith & Ender, 2004; Smith-Lovin, 1999; D'Antonio, 1983). Since these elements define the characteristics of the discipline, the core is also discussed in the context of the politics of the discipline; a well-defined disciplinary core is critical to retaining the existence of the discipline, while a weak core can make the department unstable, allowing the intrusion of other disciplines (Huber, 1995). More importantly, it is stressed that a core should be relevant to different stakeholders within the field based on a consensus between them (Keith & Ender, 2004; Smith-Lovin, 1999). In this sense, the core knowledge in a field provides common ground for the members in the field as well as those in other relevant fields. However, only limited research has been conducted to search for the core in art and design in general (Corner, 2005; Burnham, 1988; Cross, 2007; Allison, 1982).

In the related literature, the core is often discussed relative to the diversity of the topics studied in the discipline. It seems that there are conflicts between them in terms of their purposes. The core serves to establish the discipline as an individual facet of academia and does not necessarily work for integration and collaboration between different areas of fields, which require diversity in the perspectives and methods used in the area. However, the authors argue that the core and interdisciplinarity need not be thought of as completely separate; rather, they can be understood as constantly interacting and cooperating, enhancing each other’s capacity to achieve their own goals. In other words, the core can be reinforced through reassessment in the light of the findings of relevant fields; and in turn, a well-established core in the field forms common ground within interdisciplinary settings. Thus, the core acts as a basic element based on which complexity and diversity can be built, and via which subsequent phenomena can be described and understood. We also contend that without a core, such diversity have no underpinning to grow towards productive fruit-bearing achievements. Here, the contribution to investigating the field’s core stems from the current interdisciplinary and collaborative culture in both design management research and practice.

This paper raises a number of questions, including: What constitutes the core knowledge in design and design management? To what extent is it recognised and shared by the design community? What are the similarities and differences between different stakeholders in design in terms of their core knowledge?

RESEARCH DESIGN

A rigorous literature review across design and related fields provided an appropriate structure to categorize the core elements of design and design management: skills and methods, attributes and capabilities, and knowledge and understanding. This structure was populated with design-specific content drawn from a range of key literature where the focus of the texts was design as a general subject of research and practice, rather than sub-domain specific. Secondly, the content was refined by eliminating less frequent items, thus representing cumulative disciplinary knowledge. Thirdly, a refined selection of design-specific content was used to inform the development of an online survey with appropriate stakeholders in the design community to determine which concepts, skills, and methods they deemed most important. Recognized bodies of core knowledge from the respondents were revealed and compared by using different statistical analysis methods. Table 1 shows a selection of design-specific content and its descriptions which were presented in the survey questionnaire.

	Skills and methods	
	Content	Description
1	Brainstorming	Using brainstorming in the design process
2	Market research	Using market research to gain consumer insights
3	Focus group	Using focus groups to understand consumer perceptions
4	Ethnography	Using ethnography to do design research
5	Games	Using games and being playful in design activity
6	Computer skills	The use of computer-aided design (CAD)
7	Drawing skills	Employing drawing skills
8	Craft skills	Employing craft skills and working directly with materials
9	Communication	Employing communication skills (including visual, verbal, and written)
10	Interpretation	Employing interpretation skills to understand a design situation
11	Evaluation	Employing evaluation skills to make judgement between alternatives
12	Representation	Employing representation skills through either visual (image or model) or verbal (language) medium
13	Measurement	Employing measurement skills to assess design in the decision-making process
14	Design thinking	Employing different modes of thinking skills – e.g. divergent and convergent
15	Design research	Conducting research in a variety of modes
	Attributes and capabilities	
	Content	Description
16	Imagination	Being imaginative (imaginative drive)
17	Creativity	Being creative (creative thinking)
18	Innovation	Being innovative (innovative activity)
19	Aesthetic sensibility	Developing an aesthetic sensibility
20	Design expertise	Developing design expertise through professional practice
21	Complexity	Ability to deal with complexity
22	Visualisation	Ability to visualise in two- or three- dimensions
23	Identity	Ability to identify and solve problems
24	Goal-setting	Ability to set goals in design process
25	Information	Ability to source, assimilate, and analyse information
26	Reflection	Ability to reflect on what you are doing (reflective practitioner)
27	Design teams	Ability to work within teams
28	Design process	Managing the design process
29	Stakeholders	Integrating different stakeholders' perspectives

30	Identity	Designing identity - individual, institution, brand, and corporation
31	Design experience	Creating design experience in the actual use of a product or service
32	User-centeredness	Considering needs and interests of the user (user-centeredness)
33	Tacit knowledge	Drawing on the past experience when designing (tacit knowledge)
34	Form vs. function	Giving forms in relation to functions
35	Usability	Increasing usability for users
36	Meaning	Creating meanings of products and services for users
37	Quality	Improving the quality of products and services through design
38	Originality	Bringing originality by offering something really new and different
39	Change	Generating change - environmental, social, economic, and cultural - as a consequence of design intention
	Attributes and capabilities	
	Content	Description
40	Design discipline	Defining design as a discipline (vs. art, science, social science, etc.)
41	Discipline-specific knowledge	Developing discipline-specific knowledge and skills – e.g. architecture, graphic design, fashion design, etc.
42	Design history	Understanding design history
43	Design knowledge	Understanding how design knowledge is gained
44	Design practice	Understanding practices and processes in design
45	Design education	Obtaining design knowledge through design education
46	Learning by doing	Obtaining design knowledge through Learning by doing
47	Materials	Knowledge of materials
48	Bauhaus	Understanding Bauhaus as modernist principles of design education
49	Semiotics	Understanding semiotics - study of signs and symbols
50	Product semantics	Understanding product semantics - study of symbolic qualities of man-made things
51	Modernism	Understanding modernism
52	Postmodernism	Understanding postmodernism
53	Aesthetics	Understanding aesthetics
54	Structuralism	Understanding structuralism
55	Functionalism	Understanding functionalism
56	Consumerism	Understanding consumerism (production and consumption)
57	Client-designer relationship	Understanding the client-designer relationship
58	Constraints	Understanding the function of constraints to inform design strategy
59	Context	Understanding the context in which design practice operates – e.g. development of technology, globalisation, etc.
60	System	Understanding how design operates in a wider social, cultural, and economic systems

Table 1. Selection of design-specific content

Respondent information

A total of 625 individuals participated in this survey from December 2011 to January 2012, and 373 completed responses were used for the analysis. The frequencies of different respondents' descriptions are presented below in Table 2; the respondents' own descriptions of their current job titles are included in the survey results. For example, 71 respondents who described themselves as design managers, project managers, founders, (creative) directors, or CEOs were regarded as a group of design managers, which makes up 19.0% of the total respondents. Their areas of expertise embrace diverse sub-domains in design, including

industrial design, graphic design, architecture, design thinking, design management, sustainable design, service design, and so on.

	Frequency	Percentage
Designer/ Design consultant	118	31.6
Design manager	71	19.0
Design researcher	65	17.4
Design educator	73	19.6
Other	46	12.3
Total	373	100.0

Table 2. Frequencies: descriptions of respondents

RESEARCH FINDINGS

The key findings from the survey analysis are twofold. First, quantitative survey results outline a potential body of core knowledge – e.g. concepts, skills, and methods – in design management. A set of variables that were deemed very important by design managers were identified through comparing the statistics of frequencies and means, whilst factor analysis displays the structure underlying the identified set of variables by clustering each element into meaningful categories. Second, statistical one-way ANOVA analysis facilitated a comparison of the different stakeholders' perspectives presented in the survey results. Here, respondents to the survey were categorised into groups of designers/ design consultants, design managers, design researchers, and design educators. A series of statistical analyses helped to develop a conceptual framework for building a shared understanding of design and design management.

Potential set of cores of design management

Sixty content items (Table 1) presented as variables in the questionnaire were rated, selected, and ranked by the respondents in terms of their importance. Table 3 presents a summary of the analysis results, i.e. the top-10 variables that were highly rated, frequently selected, and highly ranked by the group of design managers. For each type of question, different statistics were used to measure the importance of variables; statistical means for the rating scales, percentages for multiple responses, and scores for rank order. In response to all types of questions, communication appeared as something that design managers deemed the most important. It can also be seen that design problems, creativity, complexity, design thinking, design process, client-designer relationship, etc. were considered more important than other variables.

	Rating scale		Multiple response		Rank order	
	Variable	Mean	Variable	Percent	Variable	Score
1	**Communication**	**4.76**	**Communication**	**42.30%**	**Communication**	**87**
2	Design problems	4.70	Design thinking	29.60%	Design thinking	78
3	Creativity	4.55	Design process	26.80%	Creativity	62
4	Complexity	4.53	Creativity	23.90%	Client-designer relationship	61
5	Evaluation	4.50	Client-designer	23.90%	Design process	59

			relationship				
6	Interpretation	4.48	Design research	21.10%		Brainstorming	52
7	User-centeredness	4.48	Brainstorming	19.70%		Design research	50
8	Representation	4.42	Market research	19.70%		User-centeredness	50
9	Learning by doing	4.42	User-centeredness	19.70%		Market research	46
10	Design teams	4.40	Imagination	18.30%		Imagination	46

Table 3. Top-10 important variables for design managers

Statistical factor analysis allowed unveiling of the structure of and relationship between 32 variables that were deemed very important (m>4.0). As a result, six underlying factors within the set of variables were revealed and are presented below in Table 4. Each factor has a group of concepts affiliated to it, a core and other related concepts. Six core concepts are proposed, including communication, creativity, design problems, complexity, design teams, and usability. As the statistical results suggest, these core concepts and other related concepts can be regarded as a fundamental structure, representing a potential body of core knowledge in design management. Within the structure, the underlying factors that involves the concepts of communication, evaluation, interpretation, representation, and learning by doing are indicated as the most significant ones (m=4.52) by comparing the average means of the concepts attached to each factor.

Factor	Core concept	Other related concepts	Average mean
Factor 1	Communication	Interpretation Representation Evaluation Learning by doing	4.52
Factor 2	Creativity	Imagination Innovation Brainstorming	4.36
Factor 3	Design problems	Context Constraints Client-designer relationship Stakeholders Design thinking	4.33
Factor 4	Complexity	Tacit knowledge User-centeredness Aesthetic sensibility Information Visualisation Design practice	4.32
Factor 5	Design teams	Design process Goal-setting Design expertise Reflection	4.32
Factor 6	Usability	Meaning Quality Design experience Originality	4.17

Table 4. Underlying factors and their affiliated concepts

Frequencies and factor analyses inform a basis that can be used to investigate core knowledge in design management. After revealing this proposed structure, further analyses were conducted to compare different stakeholders' perspectives in design and to explore to what extent they share their core knowledge.

Different stakeholders' views compared

As mentioned earlier in this paper, the field of design is considered as comprising four sectors: design practice, design management, design research, and design education. Practitioners in each sector are represented by groups of designers/ design consultants (D), design managers (DM), design researchers (DR), and design educators (DE) in the survey. Their views are compared in terms of the top-10 variables indicated as important by each group of respondents. Table 5 shows the results of the groups D, DR, and DE (the ones for DM were presented earlier, in Table 3). For DM and DR, communication was considered the most important, and design problems for D and DE. It can be inferred that design managers and design researchers work in situations where skills to communicate their designs and ideas to others are highly appreciated, while being equipped with the ability to identify and solve design problems is a more critical factor than others in the context of practising and teaching design. In general, an emphasis by all groups is put on the content of communication, design problems, creativity, complexity, and evaluation, all being recognised as highly important. There are also areas of contradiction or differences of opinion: imagination and learning are more essential for designers, user-centeredness and design teams for design managers, design thinking and systems for design researchers, and interpretation, representation, and reflection for design educators.

	Designer (D)		Design researcher (DR)		Design educators (DE)	
	Variable	Mean	Variable	Mean	Variable	Mean
1	**Design problems**	**4.72**	**Communication**	**4.61**	**Design problems**	**4.74**
2	Creativity	4.66	Evaluation	4.55	Communication	4.68
3	Communication	4.65	Design problems	4.55	Interpretation	4.68
4	Imagination	4.54	Complexity	4.54	Representation	4.63
5	Complexity	4.52	Creativity	4.52	Evaluation	4.61
6	Evaluation	4.51	Interpretation	4.48	Design thinking	4.60
7	Learning by doing	4.51	Design thinking	4.48	Creativity	4.60
8	Interpretation	4.50	Representation	4.47	Complexity	4.58
9	User-centeredness	4.49	Information	4.47	Reflection	4.58
10	Information	4.48	Systems	4.44	Information	4.54

Table 5. Top-10 highly rated variables: different stakeholders' views compared

So far, the group differences have been discussed by focusing on the relatively different levels of importance between the variables in each group. When the absolute values of means are considered, a comparison between the groups of D, DM, DR, and DE can be illustrated as shown in Figure 1. The diagram compares the mean figures of five variables that were previously discussed as seemingly showing a general consensus between the groups. Firstly,

communication received the highest mean by design managers, and the lowest by design researchers. Also, its mean value is the highest amongst those of other variables, which indicates that communication is a key element in the practice of design management. Secondly, the importance of identifying and solving design problems is less recognised in the field of design research, while its importance is shared by the fields of design practice, design management, and design education, albeit with slightly different levels. Thirdly, designers are clearly concerned creativity, which is less attended by design managers and design researchers. Lastly, the topics of complexity and evaluation skills are acknowledged more in design education.

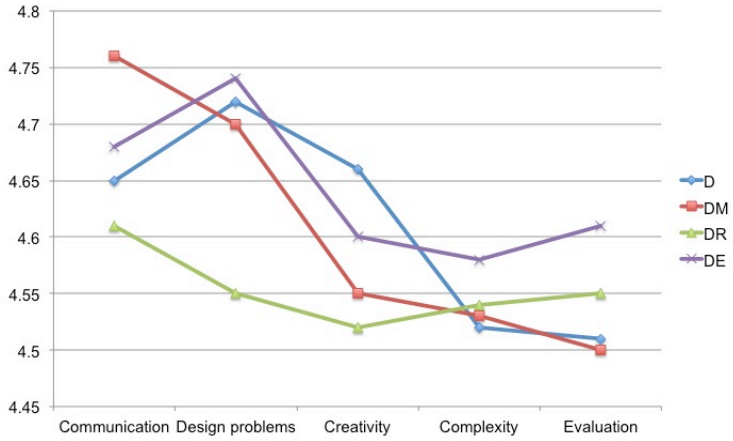

Figure 1. Comparing variable means for different groups

Whilst comparing means revealed subtle differences between the groups (Table 5 and Figure 1) ANOVA revealed whether there were significant group differences within the survey results. As summarised in Table 6, there are 19 variables for which different respondent groups showed conflicting views. No significant differences exist between design managers and designers. However, there are several significant group differences between design managers and other groups: design researchers and design educators. For example, design managers put more emphasis on concepts that are closely related to the market, such as market research, consumerism, and the client-designer relationship. Instead, they rated as significantly less important content relating to craft skills, design research, reflection, design history, and systems.

In general, significant group differences exist between design practitioners, i.e. designers and design managers, and design academics, i.e. design researchers and design educators. Thus, to bridge the gap there are a number of issues that needs to be addressed by design academics to understand the practices being exercised in the design industry. It seems that design researchers should address issues of design practice relating to aesthetic sensibility, learning by doing, knowledge of materials, and some of the theories and movements in design, such as aesthetics, structuralism, functionalism, and consumerism. For design educators, things that should be attended to in more depth include market research, aesthetic sensibility, design expertise, identity, consumerism, and the client-designer relationship.

	Variable	Group difference		Variable	Group difference
1	Market research	**DM** > DE	11	Design history	**DM** < DE, DR < DE
2	Ethnography	D < DR	12	Learning by doing	D > DR
3	Games (being playful)	D < DE	13	Materials	D > DR
4	Craft skills	D < DE, **DM** < DE	14	Aesthetics	D > DR
5	Design thinking	D < DE	15	Structuralism	D > DR
6	Design research	D < DR, **DM** < DR	16	Functionalism	D > DR
7	Aesthetic sensibility	D > DR, D > DE	17	Consumerism	**DM** > DR, **DM** > DE
8	Design expertise	D > DE	18	Client-designer relationship	D > DE, **DM** > DE
9	Reflection	**DM** < DE	19	Systems	D < DR & DE, **DM** < DR
10	Identity	D > DE			

Table 6. Variables showing significant group differences

The findings discussed so far form a base on which to develop a framework for a shared understanding between different design stakeholders, specifically between design managers and others.

A framework for a shared understanding of design management

This study first identified a set of common concepts that represent cumulative knowledge in design. Then, this was tested by conducting an online survey with appropriate stakeholders in design, including design managers. A series of statistical analyses indicated several features in terms of core knowledge in design management.

Firstly and most importantly, communication is revealed as the key element in design management. In different questionnaire types – rating-scale, multiple-response, and rank-order – it was agreed that communication is essential for design managers (Table 3). Its importance is also recognised by different stakeholders in the design community – designers, design researchers, and design educators – but to a slightly less degree. In the survey, the concept of communication was described as employing various communication skills, including visual, verbal, and written. This means that the ability to use different mediums for effective communication is also an important factor in managing design. There are several skills and abilities that are closely related to the way in which communication operates in the context of design management, as revealed by factor analysis. Employing communication skills is associated with interpretation skills to understand the design situation, evaluation skills to make judgements, skills to represent ideas and concepts, and obtaining design knowledge through learning by doing. This set of skills combined together form one of the most important factors in the field of design management.

Secondly, other fundamental elements in design management embrace topics around the identified core concepts of creativity, design problems, complexity, design teams, and usability, according to the results of the factor analysis (Table 4). Each of them forms important factors with other relevant concepts. For example, one is the combination of being creative, being imaginative, being innovative, and using brainstorming. Although the

statistical analyses do not show how these things operate in relation to each other, it does suggest that they are practised and understood in a manner that is closely linked for design managers. Another important factor comprises design problems, design thinking, context, constraints, stakeholders, and the client-designer relationship. Thus, when it comes to identifying and solving problems for design managers, those relevant things should be considered. In addition, managing teams and processes, the ability to set goals and reflect, and developing design expertise should be considered in relation to each other. These findings help understand the structure underlying the theories and practices of design management, providing what concepts, skills, and methods are working in line with each other as influencing factors.

Lastly, significant emphasis is put on content relating to the markets, such as market research, consumerism, and the client-designer relationship, by design managers, as indicated by ANOVA (Table 6). What are significantly undermined in the field of design management include craft skills, design research, the ability to reflect, and understanding design history and systems – social, cultural, and economic. The views of design managers do not differ significantly from those of designers, but do differ from those of design researchers and design educators in general.

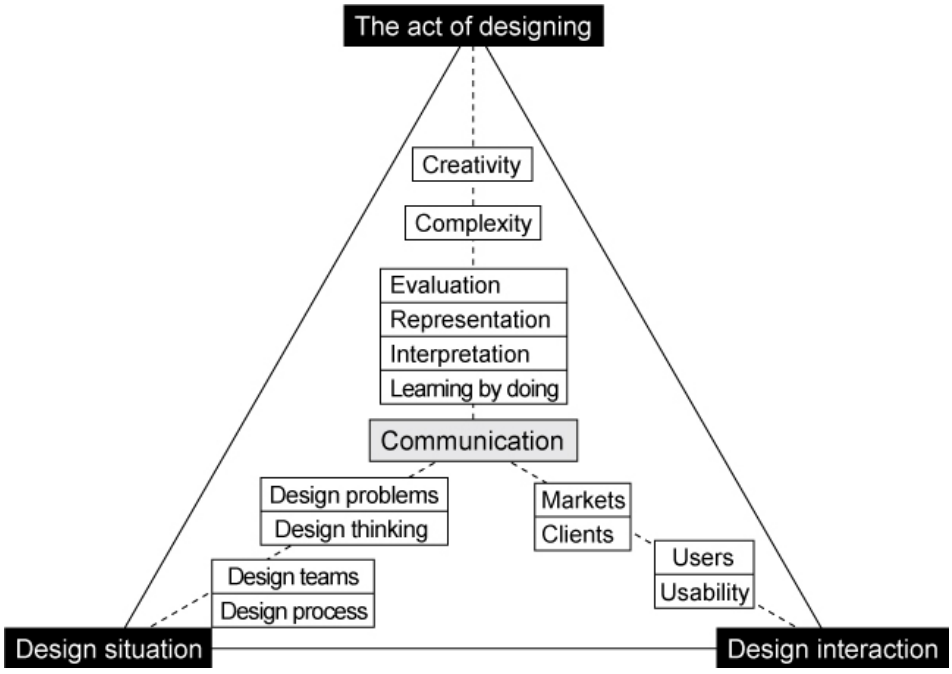

Figure 2. Core components of design management

A conceptual framework has been developed based on features identified in design management. It frames some of the core concepts within three domains: the act of designing, the design situation, and design interaction. While these domains operate in relation to each other, communication as a key component integrates them all. In the act of designing, designers' skills and abilities are acknowledged, such as being creative, having the ability to deal with complexity, and skills to evaluate, represent, interpret, and learn by doing. The design situation concerns critical conditions where designers' skills and abilities are

evaluated, such as managing design teams and processes, identifying and solving design problems, and employing design thinking. Other components relating to markets, clients, and users fall within the realm of design interaction whereby designers act in a way to identify and meet different stakeholders' needs. It should be noted that this framework was developed based on statistics, though a quantitative approach is one way to discover the presence of core knowledge and its components. However, what is lacking here are the reasons and explanations behind the statistics and how these can be addressed. Hence, it can be used as a basic structure for further investigation, but needs triangulation of the findings.

CONCLUSIONS

In design management, activities often involve dynamics of people, organisations, and societies, and the interactions between them. This aspect has brought a diverse range of issues that require the exploration of the peripheral realm of the field where inter-, multi-, and trans-disciplinarity are greatly valued. The expansion of diversity in the subjects under scrutiny results in a need to employ broader approaches and methods, sometimes adapted from other related disciplines. It aims to contribute to productive interaction between designers and people from other disciplines in a cross-working environment. However, without a concrete core as a basis for exploration, expansion and collaboration with other disciplines can lead to misunderstanding and confusions for both sides – both inside and outside the discipline.

This paper has examined the core knowledge of design management in terms of a shared consensus within its community as well as within the design community as a whole. The study findings have implications for the theory and practice of design management. Concerning the theory of design management, an identifiable body of core knowledge that is relevant to practitioners, researchers, and educators will form a theoretical basis for the discipline based on which a new body of knowledge can be built. For the practice of design management, a proposed framework developed from a series of survey analyses will help to build a shared understanding of current interdisciplinary phenomena and activities in design management research and practice. The authors assert that this study will act as a foundation, not only for understanding current phenomena in design management, but also for shaping the future direction of design management practice, research, and education.

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“I’m not a plastic bag!” A study on eco-designed packaging and consumers’ responses to its signals

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Keywords: Packaging Design, Ecological cues, Consumers’ responses.

This paper examines the influence of eco-designed packaging on consumers' responses. Two studies enable us to determine the different features of packaging ecological cues. Study 1 defines the concept of eco-designed packaging, and a taxonomy of its cues is suggested. Attitudinal and behavioural, positive and negative responses triggered by the perception of these signals are analyzed. Study 2 focuses on how consumers process ecological cues embedded in the packaging.

INTRODUCTION

Consumers often make their first judgments about brands and products based solely on their packages (Orth & Malkewitz, 2008). In contexts of information overload and hyperchoice environments, this initial evaluation often influences both attitude towards the brand and selection of this brand. Also, brands that take into consideration environmental and ethical principles are usually better valued by consumers. Therefore, manufacturers are increasingly designing more sustainable goods (ie., goods having a less negative environmental impact) in order to create a competitive advantage. Literature has extensively shown that individuals evaluate quality through extrinsic attributes, especially when intrinsic cues are not directly provided. Thus, this paper addresses the question of sustainable product design management and examines the influence of an eco-designed extrinsic cue of the brand – packaging. It considers packaging as a communicating object *per se* and intends to answer the subsequent research questions: Via which cues / signals, is package design susceptible to infer a global perception of the ethicality/ecological focus of the brand? How do consumers process these signals and what are their responses to them?

In order to deal with these issues, the theoretical background of this research is first presented. It draws on literature on consumers' responses to, respectively, packaging and ecological signalling. Two qualitative studies that aim at answering the research questions are then presented. Study 1 consists of 18 interviews with consumers; its purpose is to identify and sort packaging ecological cues and to obtain an understanding of their influence on consumers' responses. Study 2 consists of a visual study that aims at understanding how individuals process packaging ecological cues. Then further discussion is provided on findings and their managerial implications. Finally, limitations and directions for future research are outlined.

I. THEORETICAL BACKGROUND

1. Consumers' responses to packaging

Literature on packaging is usually divided into two main streams; the holistic or gestaltist approach and the analytical approach. The subsequent paragraphs highlight the main features of both approaches and position this research within that corpus of literature.

1.1. Holistic approach

The holistic approach examines packaging as a whole and doesn't consider its characteristics independently. Most of these studies are following a semiotics approach. Dano (1998), argues that packaging is a meaningful object and that its success depends on the adaptation of its discourse to consumers' expectations and personal values. Cavassillas (2006) tackles the semiotics of packaging visual language and establishes a relationship between different signifiers and signified (de Saussure, 1913) in order to reveal the different forms of visual discourse. In the same vein, Orth and Malkewitz (2008), have created a guide aiming to help marketers to develop packaging that would directly tie together packaging design and the personality of the brand. Thus, for example, robust brands should have a massive and contrasted packaging design, whereas competent brands should exhibit a delicate design.

1.2. Analytical approach

The analytical approach regards packaging characteristics independently, and the elements taken into account that appear in the literature are verbal, graphic or structural (colour, shape, size, imagery, proportions, unity, prototypicality...). Thus, it appears that colour influences perceptions and judgments of taste (Dichter, 1964), product evaluation and purchase intention (Gordon, Finlay and Watts, 1994), or beliefs and consumers' attitude. Likewise, packaging shape has an effect on product preferences (Raghubir & Greenleaf, 2006), volume perceptions and product use (Folkes & Matta, 2004) and even on brand personality (Pantin-Sohier, 2009). Size influences product purchase and also the quantity used during product consumption (Wansink, 1996). Only a few studies tackle the influence of environmental cues. Among them Rokka & Uusitalo (2008) have tested if green packaging would have an influence on product choice. The results of their conjoint analysis show that packaging is an

important product attribute in consumer choice, contributing to 34% of the overall utility of attributes. The respondents clearly preferred the environment-friendly package alternative (recyclable-labelled carton package), whereas both non recyclable plastic packages produced negative utility estimates for the respondents.

The studies presented above attest of the determining influence that packaging exerts on consumer's attitudes and behaviours towards a product. Nevertheless, strong theoretical contributions on ecological signalling displayed on packaging seem to be missing. This study is situated at the intersection of these two research bodies, because we first analyze specific ecological cues, which falls into the analytical category and then we assess the general effect of the gestalt of these combined cues which falls into the holistic category.

2. Consumers' responses to ecological signalling

2.1. Ecological concern

Amongst individual antecedents that are susceptible to have a positive influence on responses to ecological signalling, numerous studies have been undertaken on ecological concern. Its influence on pro-environmental behaviours always proved to be positive, even though the relationship is very often weak. Antecedents of individual ecological concern are various; their nature can be socio-demographic or psycho-sociological. Among socio-demographic variables, results are sometimes contradicting, but globally, the literature outlines that gender (F, +) and income (+) might affect the ecological concern of an individual (Giannelloni, 1998). Among psycho-sociological variables, it has been shown that perceived consumer effectiveness (Ellen, Wiener & Cobb-Walgren, 1991) (+), expertise (+), values such as tradition (-), self direction (+), benevolence (+) and universalism (+) (Grunert & Kristensen, 1992), alienation (Webster, 1975) (+), and locus of control (internal, +) (Pettus & Giles, 1987), might exert an influence on the presence of this pattern.

2.2. Literature on eco-seals

Most of the research on ecological signalling has been realized on eco-seals. Results show that in order to be efficient they have to be credible and therefore satisfy certain criteria. In general, it appears that credibility is enhanced when the labels are issued by independent regulatory agencies. The proliferation of eco-seals provokes confusion in consumers' mind who consider many of them as misleading (Polonsky *et alii*, 1998) and participating in the greenwashing, that is to say the ecological laundering, of a company's image.

2.3. Positive effects of ecological signalling perception

The perception of ecological signalling has many effects on consumers' attitudes and behaviours towards a product or a brand. Amongst them, it has been proved that the perception of ecological signalling has a positive effect on trust, brand evaluation, product evaluation, purchase intention, long term brand loyalty and promoting behaviours (Giannelloni, 1998).

III. STUDY 1

This section describes study 1, which aims at gaining a better understanding of how individuals perceive ecological cues and how these signals influence their response towards the product.

1. Research methodology

The objective of this study was to apprehend consumers' attitudes and behaviours towards ecological packaging; and by doing so, to define the concept and to determine how ecological cues are valued by consumers. A phenomenological approach has been chosen. Indeed, the description by the individual of his own experience, here his perception of ecological cues and his attitudes and behaviours inherent to their processing, enables to gather more fruitful data. Thus, the interpretative epistemological positioning of this part of the research aims at suggesting a conceptual basis for the concept of eco-designed packaging, as well as completing the literature, taking into account the subjective appreciation, influenced by individual perception of what is an ecological cue.

In the first stage of data collection, in-depth interviews have been realized on a limited convenience sample composed of eight consumers. Two-third of the sample were women and the mean age was 35.4 years. The overrepresentation of women in the sample can be explained by the fact that individuals were recruited on the criteria 'being in charge of grocery shopping in the household'. Each interview lasted between forty-five minutes and one hour and fifteen minutes. They all have been recorded and fully transcribed. The interview guide used in order to foster respondents' expression tackled a few topics such as packaging evocations, consumers' attitudes towards packaging across different categories of fast moving consumer goods, environmental concern, evaluation criteria of an ecological packaging, and perceived benefits and sacrifices for the purchase of an eco-designed product (emotions, social influence, inferences on product quality). After the completion of these eight interviews, saturation was almost reached, and it appeared relevant to slightly vary the method in order to go more in-depth into consumers' perceptions. Therefore, the second phase of the study consists of a series of ten ZMET interviews. Participants were asked to bring a dozen of images that represented ecological packaging in their eyes. In the first place, they were asked to express their opinion on the main research topic, and then were invited to realize the 12 steps of the ZMET process. This method enables participants to think about the research topic beforehand and to come at the interview with already a few elements to discuss. Considering that most of the sense is shared in a non-verbal way, the use of images also enables to reveal new constructs, underlying motivations or thoughts and feelings that would not have appeared *a priori* (Khoo-Lattimore, Thyne & Robertson, 2009). For this phase of the study, the sample was composed of ten individuals, 70% of them were women and the mean age was 37 years. All interviews have been carried out in the laboratory, recorded and fully transcribed. Their length varies from fifty minutes to one hour and fifteen minutes.

The analysis has two main objectives: (1) clarify the definition of a packaging ecological cue and produce a relevant taxonomy of the different signals and (2) determine the influence of the perception of these signals on perceived value, consumers' attitudes and behaviours. The general process of open coding analysis approximates Spiggle's method (1994). Complementarities of the results of the two studies led us to present them indistinctively. The subsequent section is divided into two parts. The first part introduces what makes a packaging eco-friendly, which entails a definition of eco-designed packaging and a taxonomy of these cues. The second part of the results presents perceived value interpreted through the lens of a cost-benefit procedure.

2. Results

2.1. Nature of packaging ecological cues

Results reveal that ecological cues concern different elements of the couple product-packaging, but consumers tend to consider that there is an interweaving between these signals. It appears that these cues are related to four different elements: although packaging is usually considered as an extrinsic attribute of the product (Teas & Agarwal, 2000), it can display environmental signals which are intrinsic or extrinsic to the product and other environmental signals which are intrinsic or extrinsic to the packaging.

		Nature of the environmental cues	
		Intrinsic	Extrinsic
Element of the offer on which the ecological attribute bears on	Product	E.g.: without chemicals, organic ingredients...	E.g.: logo AB, images representing the nature...
	Packaging	E.g.: reduction of the packaging/overpackaging, use of recycled materials.	E.g.: logo FSC, bio-compostable, recyclable.

Table 1: Nature of the product/packaging ecological cues

2.2. Taxonomy of the different cues

Results also reveal that the types of signals displayed fall into two different categories which are processed in different ways by consumers: implicit or explicit. Explicit cues refer to signals that are expressed, written or stated directly whereas implicit cues refer to signals that are not expressed in clear and express terms, but which involve natural deductions by consumers. Their importance is crucial in the understanding of decision-making because it might imply different styles of processing.

Type of cue	**Definition**
Assertion/ general	Any statement on the packaging aiming at informing the consumer on the actions realized towards the environment (packaging reduced) or a claim that attempt to portray a general

environmental claim	environmental benefit that the product exhibits (e.g..: eco-safe)
Scientific / environmental attribute	Any environmental scientific term which meaning is not clearly known or understood by the general consumer (e.g.: biodegradable, recycled).
Eco-seal	Seal appended on the packaging requiring the satisfaction of certain environmental criteria which can be decided by associations, governments or regulatory agencies (e.g.: recyclable logo)
Licensing agreement	A private aid designed to give the consumer some dependable third-party assurance as a verification of the environmental claims made on the packaging such as "tested by", "guaranteed by", "approved by... or an agreement with a third-party (e.g. WWF), used in order to portray information in regards to their environmental policies or contributions to that cause.
Carbon footprint	Amount of carbon dioxide emitted by an entity and discharged in the atmosphere.
Material	Materials used in the packaging (e.g.: board paper, plastic, glass...)
Colour	Colours of the packaging that represent eco-friendliness in the eye of the consumer
Picture	Any graphical representation of the environment other than a logo
Image	Term or symbol displayed on the packaging in order to carry a certain image of the company's environmental concern
Pedagogical attribute	Any attribute aiming at giving information or educating the consumer about environmental best practices.
Logo	Visual representation of the brand name
Brand name /product name	Name of the product or of the brand that alludes to ecology
Reusability	Nature of the package that can be reused for other purposes in the future
Reduction	Nature of the package that has been reduced, or which over-packaging has been removed.

Table 2: Taxonomy of packaging ecological cues.

These results enable us to define eco-designed packaging as a packaging, which, by its nature, infers explicitly or implicitly on the ecological character of the offer, the product or the brand, whether it is because of its materials, its reduction, its reusability or the range of signals it displays.

2.3. Perception of eco-signals by consumers – a cost-benefit approach

2.3.1. Perceived benefits

Research on benefits tied to pro-environmental consumption behaviours underlines that they fall into two categories (Thøgersen, 2011) that will be taken into account in our classification: private benefits and public benefits. Private benefits refer to self-oriented benefits, and are

inherent to values of status, safety or pleasure. On the other hand, public benefits refer to other-oriented or altruistic benefits, they are related to values such as universalism.

Private benefits

Health-related benefits: Packaging ecological cues can, in a few cases, bring health-related value. First, when the innocuousness is doubted (e.g.: when phthalates are involved in the production of the package), the environmental signal can make consumers feel better. Then, as a matter of fact the production of packaging generates pollution (raw materials, transformation, transports...) and it appeared in our respondents discourse that they positively value these packages, because they infer that it must be right for their health on the long run.

Convenience: The decrease of volume as well as the easiness to eliminate or transform packages after their use (ex.: compost) evokes a feeling of convenience and implies positive associations.

Price decrease: Decrease in volume of materials used in the process of packaging creation can, in certain cases, lead to a decrease in price. Ecological cues and notably the absence or reduction of packaging can then be, in a few specific cases, valued for its economical benefits.

Social value: It corresponds to the perceived utility linked to a product and one or several specific social groups (Sheth *et alii*, 1991). Pro-environmental attitudes and behaviours have become social norms across time (Félonneau & Becker, 2008). Conspicuous consumption of sustainable products is then susceptible to reinforce self-concept.

Emotional value: It refers to the ability of a product to arouse feelings and emotional state of an individual. Our results show that an anticipated positive emotion is a predictor of the intention to engage in pro-environmental actions or purchases.

Public benefit

Protection of the environment: The perception of ecological cues on packaging can refer to altruistic benefits and bring value to the consumer (for the common good). Their remarks bear upon the protection of the environment for the sake of their children and future generations.

2.3.2. Perceived costs

It also appears in respondents' discourse that certain elements contrast the benefits related to the perception of packaging ecological cues and exert a negative effect on consumers' perceived value.

Loss of pleasure during consumption experience: Packages offering certain environmental guarantees don't always meet consumers' needs. It has been proved that consumers are not always ready to give up the pleasure they find through their purchases. This pleasure can come from the inferences that a complex and sophisticated package may involve, in terms of social value or aesthetics for example.

Aesthetic cost: Environmental packaging is also often perceived as less appealing by consumers, particularly because of its simplicity, minimalism and lack of colours.

Cleanliness sacrifice: The inconvenience related to cleanliness is evoked in respondents' discourse in the context of degradation or elimination of packaging. This refers to contamination theory introduced by Argo, Dahl and Morales (2006). According to this theory, consumers evaluate products that have been touched by other customers less favourably. Thus, this can provoke a feeling of lack of hygiene and product contamination.

Protection / efficiency: Some of the respondents have evoked the idea that ecological packaging might not protect the product as well as a conventional one and therefore degrade products' properties. Luchs *et alii* (2010) sustain the idea that in certain cases ecological arguments can have a negative impact on product perceived value. They demonstrate that the positive effect of product sustainability is reduced when attributes relative to strength are evaluated, which results in preferences for less sustainable alternatives.

Higher price for the product: Products and packaging presenting environmental cues have the reputation to be more expensive. Although some consumers are willing to pay more for an ecological offer, others find it unacceptable to pay more for an ecological packaging.

Lack of credibility: The fact that environmental cues are of multiple kinds and sometimes misleading can generate problems in terms of trust for consumers that don't consider holding the necessary expertise to judge if a packaging is ecological.

3. Discussion

This first study enabled us to complete the literature and to identify packaging ecological cues. First of all, it seems important to point out that there is an interweaving between ecological signals related to the packaging and ecological signals related to the product itself. Even if it seems quite obvious, this issue is not, to the best of our knowledge, tackled in the literature. It seems interesting to understand more thoroughly how ecological inferences operate during consumers' processing. Would an over-packaged ecological product be more valued on the ecological level than a conventional product which is not eco-friendly but would have an ecological packaging? The taxonomy provides marketers and designers a useful tool in order to signify the ecological nature of their product.

The second significant output of this study consisted in shedding light on how consumers value ecological cues. Indeed, most of the studies show that the perception of ecological signals doesn't only lead to positive inferences (Francois-Lecompte, 2009) and many costs are also associated to this kind of consumption. In this context, a cost-benefit analysis proved to be relevant. Even if respondents' statements seem to reveal that they value products more which packaging displays environmental signals, there are also elements that could prove to have a negative effect on their decision making. Bringing out these elements thus enables us to generate a better understanding of the existing hiatus between pro-environmental attitudes and ecological behaviours and to understand what can sometimes hamper the adoption of

ecological packaging. Establishing the benefits that emanate from the perception of these signals enables us to complete the literature on the antecedents of ecological behaviours. The study also confirms that, when it comes to environmental consumption, motivations can be either private or altruistic and that the benefits associated to this kind of consumption are numerous (experiential, social, emotional, economical...).

IV. STUDY 2

1. Research methodology

Study 2 is a visual study which consists in showing respondents packaging displaying different kind of ecological cues, related intrinsically and extrinsically to the product or to the packaging itself. Three offers (combination of product/service and packaging) were then developed using graphical and structural elements mentioned by respondents in study 1, and presented randomly, in triad, to 40 individuals. The products and services have been selected in different categories (food, household and service) with little to strong connections to ecology. First, a laundry detergent has been selected because it is part of a product category that is usually subject to specific environmental efforts. Then, sugar cane has been chosen because it is a food product that is quite neutral in the environmental debate. Finally, an antivirus software has been chosen because it is a service for which the ecological aspect is not obvious at all. Four versions of package were developed for both the detergent and the sugar cane (*ethicality of the brand*: conventional vs eco-friendly/organic x *package design*: conventional vs eco-designed). Since the antivirus software itself could not really present eco-friendly attributes, only two versions were developed (*package design*: conventional vs eco-designed). Eco-designed offers displayed, at the packaging level, intrinsic ecological cues (general design, material...), and extrinsic ecological cues (compostable or recyclable logos). At the product level, the packages displayed intrinsic ecological cues (description and composition of the product) and extrinsic ecological cues (recyclable bio-compostable label). For non-green offers, environmental signals were either transformed into standard signals when possible or completely removed when the transformation was not relevant. After they had examined the three images they were presented with, respondents were asked, for each one of them, to circle and number by order of importance, the three elements that were the most salient. Once this task was realized, they had to grade each image on its ecological characteristics and to express themselves on its aesthetic appearance. Each series ended with individual questions about environmental concern (Gierl & Stumpp, 1999), gender and age.

2. Results

The purpose of this study was to obtain a better understanding on how different ecological signals are processed by individuals. The analysis has been conducted according to a coding of the elements elicited by order of appearance and for each stimulus. Also, grades concerning the ecological nature of the package, as well as perceptions of aesthetics were coded for each stimulus presented. Analysis enabled us to detect a replication in the way

packaging signals were perceived and processed by individuals. Results were analyzed and anchored in the theory of cue utilization (Olson & Jacoby, 1972). Nevertheless, a few particularities appeared.

2.1. The cue utilization theory

It has been established that consumers use two different kinds of signals when they evaluate the quality of a product: intrinsic and extrinsic cues. In their conceptualization of quality perception, Olson & Jacoby (1972) considered that there are usually two steps. The importance of the signals depends on its value (predictive value and value of trustworthiness), and on the type of signal: intrinsic or extrinsic. The predictive value is defined as the extent to which the consumer considers the signal as a good indicator of the quality of a product. The value of trustworthiness represents the degree to which a consumer is confident in his ability to perceive accurately and to judge a signal. Intrinsic cues consist in attributes that cannot be modified without touching to the physical features of the product such as ingredients, size, volume, material, design... Extrinsic cues designate attributes inherent to the product but external to its physical features, such as brand name, price, seals of approval, guarantee...

This theory can be adapted in the packaging framework, more precisely in the case of perception of ecological quality. Packaging can be considered as a communicating object *per se*, that displays several environmental signals, intrinsic to the product itself or to its packaging, and extrinsic to the product or to the packaging. These signals are used, more or less consciously, by consumers in order to evaluate the ecological nature of an offer. Literature shows that consumers usually grant more legitimacy to intrinsic cues. Although, when intrinsic signals don't prove to be predictive enough (ie, when credibility is low) or consumers don't trust their ability to judge them (ie, in situation of asymetric information), their credit tend to decrease. When the level of knowledge towards the product category is low, consumers grant more credit to the extrinsic cues, and intrinsic cues are sometimes ignored because they are disconcerting or not intelligible. In contrast, an expert in a product category will have the ability to interpret correctly and evaluate them (Maheswaran, 1994). The importance granted to extrinsic attributes can also be contextual, e.g. when intrinsic cues are not available, or during the process of purchasing goods that are related to self-image or status. It has also been highlighted that consumers are different in their need for cognition when evaluating a product. Consumers with a low need for cognition will use cognitive shortcuts because they are not motivated to understand the intrinsic cues and they want to take a fast decision. The elements of the cue utilization theory presented above involve several consequences in the different style of processing that consumers will adopt when evaluating environmental signals. Indeed, it seems so that ecological concern, perceived expertise in terms of ecological matters, familiarity with the brand and with the signals displayed, credibility of the signals, the contexts of consumption as well as several individual variables such as the need for cognition will greatly affect the processing of the different cues.

2.2. General features of processing

By and large, individuals tend to process attributes that are related to the product in the first place and secondly attributes that are related to the packaging. These results seem relevant since respondents were confronted with products and brands they were not familiar with. Processing enabled them to determine first the product category and then other attributes displayed in order to globally assess the offer. Packaging extrinsic cues were mostly processed before intrinsic cues, and these results confirm the cue utilization theory in situation of low familiarity. Eco-designed packaging brings respondents, in a large proportion to perceive the ecological cues as more salient and notably the extrinsic cues. On the contrary, when packaging design is not particularly eco-friendly, packaging cues are not specifically perceived as salient, whether they are intrinsic or extrinsic. Individuals tend to focus on product attributes. These results show the importance of packaging design in the global evaluation of a product, and how ecological cues of an extrinsic attribute of the product - packaging are susceptible to infer global eco-friendliness. When they are analyzed by pairs (eco-designed packaging vs conventional), it seems that packages displaying environmental cues tend to improve the global perception of the eco-friendliness of an offer, whether the product displays intrinsic ecological characteristics or not, thus proving that only package design is able to influence in a positive way ecological grades that respondents were giving. Moreover, ecological concern seems to reinforce the perception of eco-friendliness of offers presenting packaging ecological signals (extrinsic or intrinsic), meaning that individuals that are more aware of ecological issues do find more salient and value more ecological cues. Finally, this concern seems to positively affect the aesthetical perception of stimuli displaying environmental cues.

2.3. Specific results by product category

Laundry detergent: Laundry detergents have been subjects to numerous ecological debates. In this category, many ecological products and strong ecological brands are present. Beyond the intrinsic qualities of the product, brands are also very careful with the packaging design, trying to decrease its ecological impact (e.g.: by developing refills, concentrated products...). These elements induce the fact that consumers are more susceptible to think about ecology when processing a product of this category. The analysis of the paths of lecture shows that when the package is eco-designed, individuals tend to grant their attention first on the extrinsic characteristics of the product, then on the extrinsic characteristics of the packaging and finally to focus on the intrinsic characteristics of the product. Therefore, it shows that in this case of a low-involvement product, they evaluate the package as a whole, its ecological nature and then the intrinsic characteristics. On the contrary, when the design of the package is conventional, their tendency to analyze the attributes of the packaging is lower. In this case, the attention is first granted on the extrinsic attributes of the product and then on the intrinsic attributes.

Sugar cane: Sugar cane is a basic product for which consumers don't really have strong expectations in terms of quality or performance. This might even explain the fact that their

attention is almost not caught by the intrinsic attributes of the product. It also appeared that the attention granted to packaging extrinsic cues is much more important when it is eco-designed. This might imply that the mere presence of ecological signals makes the ecological character of the offer becoming more important in consumers' mind.

Antivirus software: This service, materialized by a CD, has an ecological aspect which is not important and ecological signals concerning the ecological characteristics of the product are quasi-nonexistent. On the contrary, ecological signals related to its packaging are plausible. Thus, when the package is eco-designed, the attention is caught by the different signals attesting the ecological characteristics of the package (and notably the ones related to its extrinsic characteristics). When the design is not particularly ecological, then consumers' attention is not directed to packaging cues, but exclusively to the attributes related to the service. Moreover, antivirus software are, unlike sugarcane, subject to specific expectations in terms of performance, therefore explaining the importance granted to signals related to the product itself, firstly extrinsic (brand name, logo...) and then intrinsic (description of performance characteristics).

2.4. Discussion of results

This study enables to understand better how ecological cues are processed when a consumer is facing an offer. The results enabled us to bring further elements to the theory of cue utilization, especially for packaging and environmental cues processing. Nevertheless, this methodology presents a few limitations; unlike an eye-tracking study, responses were self-declared and therefore subject to several biases. Respondents might have not declared signals processed unconsciously. Moreover, even if size of typography has been controlled, it is difficult to demonstrate what the importance of the size is and place of the signal in the processing. Finally, sample size and diversity do not enable us to generalize results.

CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

The importance of packaging ecological cues in the decision making process has clearly been demonstrated. Nevertheless, a finer understanding seems to be necessary. Future research should include a measure of the salience of these different environmental cues and their effects on several dimensions of perceived value and on willingness to pay. A few experimentations are already under development in order to reach these objectives. These experimental studies should measure the influence of ecological cues on consumers' responses taking into account several individual variables such as their environmental concern, their implication towards the product category or their expertise in terms of environmental issues. The role of the aesthetic appeal will also be measured.

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Incremental vs. Radical Innovation as a Determinant of Design Position

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Keywords: design companies, design positions, innovation types.

This paper analyzes the determinants behind the choice of contracting external designers when the companies have internal design teams. The methodology follows a multi-case study analysis of seven industrial firms (four plus three as a control group) that use design actively in their activity. The detailed analysis of these cases is done first by analyzing the companies and some of their projects, and second by identifying the determinants behind the decision of using external design. The results reveal that companies that contract external designers have one of two goals: a) have a 'design breakthrough' perspective – radical innovation; or b) benefit from the association with a recognized designer. In those cases the internal design team is used to do incremental innovations in the product platforms initially developed by the external designers.

INTRODUCTION

SPAL, a Portuguese brand and manufacturer of ceramics invited a German external designer to create a new shape for a new collection. That seems like a surprising decision as SPAL has a team of seven internal designers. This kind of strategic decisions become common between design companies in several industries, but the question is why are those companies contracting external designers if they have internal design teams?

In the literature the distinction between internal and the external design is clear. While internal design is the usage of the firms' own resources (internal designers) to develop the projects, the external design is the outsourcing of individuals or design agencies. While internal design is the best design position to reduce lead times, to increase efficiency and to reduce development costs; external is the best approach to bring fresh and original ideas that can bring a true competitive advantage to the company (Abecassis-Moedas and Ben Mahmoud-Jouini, 2008; Abecassis-Moedas and Benghozi, 2012). Although the literature in

this area is scarce, the shortage is even greater when we talk about the determinants beyond the choice of the design position. This paper aims to fill this gap, answering the research question: Why do companies with internal design teams contract external designers? This research is based on an exploratory multiple case study methodology, with a sample of seven cases (four plus three as a control group), which combine the two design positions: internal and internal and external.

The results reveal that companies that contract external designers have one of two goals: a) have a 'design breakthrough' perspective – radical innovation; or b) benefit from the association with a recognized designer. While the internal design team is used to do incremental innovations in the product platforms initially developed by the external designers.

The paper start with a literature review on design positions and innovation types; followed by the methodology, findings, and finally a discussion of the results in light of the literature.

LITERATURE REVIEW

The success of design-centered firms, such as Nokia, Apple, and Alessi, has positioned design as a way to differentiate and position products (Chiva and Alegre, 2009; Verganti, 2006). In that way, design emerges as a part of the value chain, rather than a stand-alone activity (Borja de Mozota, 2003) that, when used systematically, can bring a sustainable competitive advantage to companies in the marketplace (Lorenz, 1986; Walsh, 1993). Design is also a way of thinking (Brown, 2008) that creates symbolic value (Kreuzbauer and Malter, 2005; Ravasi and Rindova, 2008) and offers an alternative or a complement to technological changes (Rindova and Petkova, 2007; Walsh, Roy, and Bruce, 1988). Verganti (2008) argues that breakthrough design-driven innovations reflect radical innovations of meanings. To achieve design-driven innovation, firms require a network of interpreters that consists of external designers, publishers, users, artists, suppliers, design services, education, and research (Verganti, 2008).

Design position

Benefits of internal design

When the manufacturing or retail firm possesses its own design departments, it gains many advantages: designers get a strong knowledge of the firm and the product, which provides shorter lead times, and reduced development costs (Abeccasis-Moedas and Ben Mahmoud-Jouini, 2008). In this context, design becomes less a creative activity that demands liberty and independence and more a productive activity that sits at the junction of manufacturing and marketing. Design synthetizes technology and human needs into manufacturing products (Crawford and Di Benedetto, 2003) that integrates interconnected activities such as aesthetics, ergonomics, and ease of manufacture to offer more value when integrated within

the firm. When internalized, design also achieves a specific status, because the designers must move across functional and organizational boundaries (Beverland, 2005; Veryzer, 2005).

Research exploring the role of design in the new product development process across multiple industries also shows that incremental product development is more likely by in-house designers (Perks, Cooper and Jones, 2005). Furthermore, Cote-Colisson, Le Louche, and Cygler (1998) suggest that the relative benefits of internal versus external design derive from reactivity, image, and cost.

Benefits of external design

The design activity is a complex intertwining of individual competences and organizational capabilities. Design skills are located in both individual designers (free lancers) and design agencies or consultancies (Walsh, 1996). Hargadon and Sutton (1997) argue that the design consultancy IDEO derives its effectiveness in design from its position as a knowledge broker, working with clients from diverse industries. Their conclusion supports the view that design capabilities are based on rare competencies that are best developed by specialist organizations.

It remains unclear how these skills may interrelate and if the organization drives or restrains individual creativity. Designers, with their creative skills and often egocentric personalities, may not respond well to “normal” modes of management (Florida, 2002), in which case outsourcing creative work may provide an effective solution (Munsh, 2004).

External designers offer fresh and original ideas, free from the constraints of internal institutional barriers. An external designer also is relatively autonomous and can more easily ignore market research and feasibility studies that “may restrain the creative process or alter the original concept” (Ravasi and Lojacono, 2005, p. 59). When outsourced though, such design requires specific inter-organizational contracts that protect the creative freedom of the designers and delineate the expectations of the manufacturers (Bruce and Moger, 1999).

The relative benefits of external versus internal design appear mainly in terms of creativity, innovation, and renewal (Cote-Colisson et al., 1998). Perks et al. (2005) similarly observe that among companies that develop radical new products, some make extensive use of external designers, whereas others rely on combined design teams.

Chiva and Alegre (2007) study the link between companies’ design resources (basic skills, specialized skills, skills in involving others, skills in organizational change and innovation skills) and their design positions, concluding that companies that use their internal teams show the greatest emphasis on all skills, while companies that contract external designers shows the least emphasis in all skills.

Radical and incremental innovation

Radical Innovation

Radical innovation is the development and implementation of a substantially different product, technology and process (Hill and Rothaermel 2003; Ettlie, Bridges and O'Keefe, 1984) that fulfill a new emerging need (Atuahene-Gima 2005). This kind of innovation is difficult to copy, since it includes a large amount of new knowledge (Dewar and Dutton, 1986), creating in that way value to the company (Hurley and Hult, 1998).

Radical innovations are associated on the one hand with the emergence of new markets and, on the other hand, with the extinction of old ones (Tellis, Prabhu and Chandy, 2009; Sinha and Noble, 2008), being sometimes a risky move. It often requires huge investments in production, distribution and communication (Garica and Calantone, 2002), being the development cycles long and the success rates low (Leifer, McDermott, Colarelli-O'Connor, Peters, Rice and Veryzer, 2000). It also breaks the established structures and requires a strategic repositioning of the business (Ettlie et al.,1984), which leads to some opposition inside the companies (Hauschildt, 2004).

To be successful, radical innovations require a high proneness to uncertainty (Hill and Rothaermel, 2003; McDermott and O'Connor, 2002), but when they succeed, they are hard to imitate, creating a distinct competitive advantage. The harder to imitate, the more distinctive and durable is the competitive advantage (Koellinger, 2008). "Radical innovations advance the price/performance frontier by much more than the existing rate of progress" (Gatignon et al., 2002, p. 1107).

Incremental Innovation.

This type of innovation evolves minor technology changes in existing products (Atuahene-Gima, 2005; Dewar and Dutton, 1986; Gatignon, Tushman, Smith and Anderson, 2002) builds on the firm's current technical capabilities (Benner and Tushman, 2003).

Its main goal is to keep products competitive in existing markets through adaptations and improvements (Sorescu and Spanjol, 2008; Garcia and Calantone, 2002). Incremental innovations are important to remain competitive, but they have less competitive impact than radical innovations (Christensen, 1997), since they are easier to imitate by competitors (Ettlie et al., 1984; Leifer et al., 2000). Incremental innovations are less risky and less expensive than radical innovations (Dewar and Dutton, 1986), being perceived as less successful than radical ones (Gatignon, Tushman, Smith, and Anderson, 2002). "Incremental innovations are those that improve price/performance at a rate consistent with the existing technical trajectory" (Gatignon et al., 2002, p. 1107).

METHODOLOGY

To answer the research question why do firms with internal design teams contract external designers, we adopt an exploratory multi-case study approach in an attempt to "provide freshness in perspective to an already researched topic" (Eisenhardt, 1989, p. 548). Case study research is particularly suitable for bringing to the surface emerging phenomena whose dimensions remain poorly understood (Yin, 1984). With a multiple case study approach, it is possible to compare the findings across a range of situations, which strengthens the validity of findings and reveals contextual differences. In contrast to grounded theory building (Glaser and Strauss, 1967), the goal of this methodology is not to construct a new theory, but to incorporate streams of literature that are relevant to a problem area and to use the empirical data of in-depth case studies to fill the gaps, reveal and unclear connections in existing theories (Durisin and Todorova, 2012).

Research Setting and Data Sampling

Given our interest in identifying the design positions, we rely on theoretical sampling (Strauss and Corbin, 1998). Theoretical sampling is "data gathering driven by concepts derived from the evolving theory and based on concepts of 'making comparisons', whose purpose is to go to places, people, or events that will maximize opportunities to discover variations among concepts and to densify categories in terms of their properties and dimensions" (Strauss and Corbin, 1998; p. 201). This approach increases the probability that we can collect different and varied data on design positions (Strauss and Corbin, 1998; Miles and Huberman, 1994).

In order to get the sample, the researchers contacted CPD (Centro Portugues de Design) a non-profit institution that works on putting into contact designers and companies. One of their initiative is the Design + that aims at sponsoring young designers for an internship in successful design-intensive companies, in which they would work, develop a product and present it in an international fair, and therefore gain visibility. Fourteen companies participated to this initiative and seven agreed to participate in the study and to be interviewed. All the companies in our sample are industrial firms that use design actively in their activity. They are all international companies, operating in different industries such as clothing, ceramics, silverware, china tableware, street furniture, and glass. The selection of different specific industries allows to control environmental variation (Eisenhardt, 1989).

These firms were selected for their exemplarity in design activity, internal team of designers, willingness to invest in design, and national and international reputation. As control variables we used size (number of designers, number of employees, revenues, international activity,

and design prizes). In Table I the cases are characterized regarding the control variables described above.

Cases	Industry	Number of designers	Number of employees	Revenues (M €)	International activity	Design prizes
Case 1	Street furniture	3	25	3	50%	Yes (DME 07, Red Dot, ICSID 08…)
Case 2	Ceramics tiles	3	318	39	50%	Yes (CPD)
Case 3	China tableware	7	520	15.3	90%	No
Case 4	China, home linen, glass, clothing	12	36	48	100%	No
Case 5	China tableware	5	73	3	60%	N
Case 6	Clothing	5	26	9	84%	Yes (DME)
Case 7	Silverware	1	215	10	25%	No

Table I: List and characteristics of the cases

Data Collection

We exploited several data sources to facilitate validation and triangulation of the data (Denzin, 1978). The first source of data was interviews with the intern-designer and the head of the design unit (who is often the CEO). We conducted a total of 16 face-to-face interviews. The interviews followed a semi-structured interview protocol (see Appendix A) with open-ended questions and follow-up questions to provide a better understanding and clarification of responses (Spradley, 1979).

The questions were about the following topics: company and respondent characteristics; products and services description; design activity description; design team structure; design position; the reasons behind this choice; and the perceived competitive advantage of the firm.

At the end of each interview, we asked interviewees for comments on any other issues. We guaranteed anonymity to encourage candour. Interviews lasted on average 60 minutes. For each case, the data collected through the interviews were triangulated with archival data such as firm documents (reports), press articles, firm websites, industry reports and company visit.

With this rich and complex qualitative data, first it was possible to explore several hypotheses, ensuring that no rival explanations arise (saturation principle); second, external

validity was ensured by including a wide variety of informants and pursuing an extended research project.

Data Analysis

The aim of the data analysis was to analyze the cases to identify the similarities and differences among them. The first four cases were analyzed and the last three work as a control group (see Table II). The researchers performed the data analysis separately and iteratively following two steps: 1) describe the companies and one or two specific projects; 2) identify the determinants behind the external design decision.

In the second step, the researchers went through the data doing a descriptive coding (Miles and Huberman, 1994, p. 57) of the design positions determinants and of key elements, balancing the literature and new emerging determinants. At each step of the data analysis, the results were presented by the authors to industry experts, which validated the results as an accurate interpretation of the reality.

Cases	**Design position**
Case 1	Internal & external
Case 2	Internal & external
Case 3	Internal & external
Case 4	Internal & external
Case 5 (control group)	Internal
Case 6 (control group)	Internal
Case 7 (control group)	Internal

Table II: List of the cases and their design position

FINDINGS

In order to answer the question why would companies with internal design teams also have external designers, we first briefly describe the companies and some of their projects; and secondly we analyzed the determinants behind the decision of contracting external designers (see details in Table II).

Companies' and project descriptions

Case 1 is a street furniture company that sells mainly to public institutions. Clients look for Case 1 in order to get a product or a full line of products that already exist and is part of their portfolio, or to ask for a unique product or line of products to fit in the client's specific needs. In Case 1 we focused in two exemplary lines of product. The first one: 'Axis' is bench in wood and is a bestseller product. Its specificity is to use rare and expensive wood, and was developed by the internal design team.The second product: 'Matea' is a more radical project. It is a very innovative chair that runs on a street track, and has been developed in cooperation with an external architect, that signed the project.

Case 2 manufactures ceramic tiles, and develops numerous 'collections' per year. New products are defined as either new material or new tiles, and then each product (material or tile) is declined in a large number of final products (with new design). The number of new products on the total varies between 36 to 53% over the years. There is even an 'author collection' in which six artists are invited every year to develop a new design (drawing). External designers are therefore brought to reinforce the artistic image of the firm and to add 'names'.

Case 3 designs and manufactures china tableware. The company has a design team of seven designers. Case 3 uses external designers in two situations, when acting as a subcontractor for a brand or a retailer, like Ikea, or, when inviting an external designer to design a new collection (a new shape). This later case is quite rare, as a new collection, then has many years of life and can be updated through new designs (drawings) performed by internal designers. Overall around 65% of products are designed internally and 35% externally. For instance, line 303, a new collection was designed by a German designer. She was met at a professional show and she had worked for top firms like Bernardaud and Rosenthal. She made three proposals and the company chose one, and asked for a few alterations. This new line was developed without the involvement of any internal designer. This line is now declined in 30 different decorations (but with the same shape). The name of the external design does not appear, but she is remunerated through royalties, based on sales volume.

Case 4 is a special case, as it is a Hong-Kong based trader. Their clients (Amazon for kitchen accessories or Ralph Lauren for home linen) ask them to take everything in charge, from design, to manufacturing or the subcontracting of manufacturing. As such, Case 4 acts as an external designer for its clients. The main reason why clients contract them is because they are able to interface better with manufacturing.

Determinants behind the decision of contracting external designers

The companies that contract outside designer aims to: a) have a 'design breakthrough' perspective; or b) benefit from the association with a recognized designer.

a) The analysis of the four internal & external design position cases allows us to conclude that companies contract outside designers to launch new collection meaning to create a new

product platform. In these cases, they can subcontract an individual designer or a recognized agency, being both typically anonymous to the market.

b) In other cases, external designers are used as brand name where the external designer sign the project, bringing reputation to the product line and to the contractor. In these cases the companies use to contract individual designers that usually are superstars, instead of design agencies.

It is also interesting to note that the question of naming or branding is not straightforward. Not all external designers are allowed to brand the product. In the case of Case 1, the famous architect signs the product and his name is associated with it. In the case of Case 3, the external design gets royalties but no name recognition.

Regarding the first determinant: *have a "design breakthrough" perspective* the firm aims to change the product platform, what can be compared to a radical innovation. In those cases the inside design team is used to slightly change the platform designed by the outside designer, what correspond to incremental innovation. For example, Case 3 hired an external design to design a new collection (shape of the products) but uses internal design on a regular basis to create new collections with the same shape (what is changed is the drawings, the color or just some details). In this case, we can clearly identify the radical innovation introduced by the external designer and the incremental innovation done by the internal design team.

Concerning the second determinant, the main goal of the company is to have a product line associated with the designer reputation, but in those situations the outside designers almost always present radical innovation, since their reputations are associated with the product.

Regarding the control group we can conclude that variables like number of employees, number of designers, revenues, design prizes and international activity, doesn't influence the results.

DISCUSSION

Some studies have been developed in the innovation field studying the links of the design positions and the innovation types . For example, Chiva and Alegre (2007) study the link between companies' design resources (e.g. basic skills and specialized skills) and their design positions, concluding that the design position depends on the company's resources focus; Arnold, Fang and Palmatier (2011) analyze the relationship between innovation type (incremental or radical) with customer strategy (retention or acquisition); and Abecassis-Moedas and Benghozi (2012) study the companies' architectures based on their design positions, arriving to five types of architectures. However, few research focus on the relationship between the design position and the innovation type, being this link the main contribution of this paper.

The results of this paper reveals that companies use external designers to achieve radical innovations and internal designers to achieve incremental innovations. The outsource of

designers as a way to access fresh and original ideas that bring innovation and renewal to the contractor company is well established in the literature (Munsh, 2004; Ravasi and Lojacono, 2005; Cote-Colisson et al., 1998). The same happens with the conclusion that internal design teams allow shortened lead times and reduced development costs in the NPD process (Abeccasis-Moedas and Ben Mahmoud-Jouini, 2008; Perks, Cooper and Jones, 2005). However, the link between design positions and innovation types research streams is a contribution of this paper. The result that companies also contract external designers to have publicity and gain market recognition is other contribution of this paper that must be explored by further research. Other topics that must be further explored are the conditions behind the decision of associating the product with the external designer that design it, and whether these conditions are related with the outsource of a famous designer or a design agency.

From a theoretical perspective, this research links existing research streams, clarifying the relationship between them, contributing not only to the design management research field, but also to knowledge about design positions and innovations types. From a managerial perspective, this research provides guidelines for design focused companies regarding when to use internal and external design, and the appropriateness of combining the two.

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Innovating Services in Networks: Interplay between Openness and Closeness

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Keywords: Innovation, service, network, living lab, openness, closeness, open innovation,

This paper examines service innovation in networks. Our empirical analysis suggests that there are different degrees of openness and closeness in innovation networks. These 'grey areas' are evident when pursuing the co-development of services. We focus on four key characteristics of openness in networks: governance, motivation, interaction, and innovation practices. This categorization is based on a theory review and an empirical analysis of three networks. Understanding the interplay between openness and closeness aids managers to set up an efficient innovation management.

INTRODUCTION

Innovation is a central topic in organizational research. Currently, innovation is perceived as collaboration beyond company boundaries rather than intra-organizational action (Berchicci, 2013). The idea of involving customers and users as co-developers of innovation has become a trend in many industries, but it has challenges. Research shows that ideas from customers often come up as being more radical, original and valuable, but in-house developers' ideas are more realizable (Edvardsson et al., 2010). Moreover, innovation that makes use of external sources calls for open structures, processes, products and services.

The development of products and services needs to be fast due to intense competition and shorter life-cycles (Duhamel et al., 1995). Many innovators find it difficult and costly to gain enough understanding of customers. Thus, companies no longer attempt to grasp the details of user needs alone, but operate through innovation networks characterized by openness and collaboration as well as heterogeneous actors (Leek and Canning, 2011; Edvardsson et al.,

2012). In particular, they reassign the design aspect of service development to users who can help with the innovation and create new ideas (de Vries, 2006; Edvardsson et al., 2010).

The literature is ample with diverse approaches to open innovation. They include the open source model (von Hippel, 2001; Feller and Fitzgerald, 2002), the crowdsourcing model (Brabham, 2008; Sloane, 2011), and the living labs model (Almirall and Wareham, 2011; Leminen and Westerlund, 2012). Living labs are particularly interesting, as they are innovation networks suited for the development of services (Luo et al., 2012; Leminen et al., 2012). Despite the growing popularity of living labs, there is scant research on interaction in service development and on the interplay between openness and closeness in living labs.

Research is also sparse on the alternatives between open and closed innovation. The former discusses innovation activities that take into account customers, users and other stakeholders, whereas the latter refers to innovation activities that come about within single organization. We respond to Kviselius et al.'s (2009) call for more research on the characteristics of these two modes, and aim to describe the various modes of openness and closeness in networks. We aim to understand the challenges of involving users and stakeholders as co-developers in service innovation. To achieve these objectives, we depict the following research questions:

- What are the characteristics of open and closed service innovation networks?
- How does the interplay between openness and closeness occur in networks?

The paper is divided as follows. First, we review the theoretical foundations of open and closed innovation, present living labs as a form of open innovation networks, and elaborate service innovation. Then, we describe our research methodology and provide empirical findings on the interplay between openness and closeness in innovation networks. Finally, we discuss our findings and conclude on the managerial challenges and recommendations.

THEORETICAL BACKGROUND

People today live in a world of networks redefining their lifestyles. It is becoming a challenge to develop offerings that meet hyper-differentiated consumer demands (Arakji and Lang, 2007). Many firms no longer attempt to grasp the details of consumer needs alone, but reassign product development to external sources of ideas, such as customers and users, who can help with idea generation and create new innovations and value (Edvardsson et al., 2010). Although the idea about 'prosumers' (producer-customer) is not new, only recent research has underlined the role of users as innovators (Dahlander et al., 2008).

Customer insight speeds up the development processes and lowers the costs, as understanding of users' needs is expensive. Zaltmann (2003) argues that at least 80 per cent of new products and services fail when launching them into market. Thus, integrating customers and users to innovation development as co-developers is increasingly accepted. Co-development is about co-opting customers' competence and bringing users into the innovation process and design

(Edvardsson et al., 2010). It enables a firm to understand users' actual behavior, needs and future trends, but requires openness in processes and structures.

While firms draw on their own expertise to accessing the market, openness refers to the pooling of knowledge for innovative purposes where the contributors have access to the inputs of others and cannot exert exclusive rights over the innovation (Chesbrough and Appleyard, 2007). Value created through an open process approaches that of a public good and causes immaterial rights problems. According to Cassiman and Valentino (2009), firms should simultaneously consider the type of R&D to be performed and the organization of R&D that includes the exposure of the project to knowledge from outside the firm.

Dahlander and Gann (2010) discuss the 'forms of openness' via pecuniary, non-pecuniary, inbound and outbound innovation. Pecuniary refers to direct and non-pecuniary to indirect benefits to firm. Inbound innovation means internal use of external knowledge and outbound innovation means external exploitation of internal knowledge (Huizingh, 2011). 'Open innovation' assumes that openness is a strategic choice of a firm to use external and internal ideas and their paths to market (Chesbrough 2003). Laursen and Salter (2006) introduced 'external search breadth' and 'external search depth' to characterize a firm´s strategy to acquire external knowledge to exploit innovative opportunities. Almirall and Casadeus-Masanell (2010) found 'discovery' and 'divergence' effects related to open innovation.

Openness is evident in networks. Bergvall-Kåreborn and Ståhlbröst (2009) consider openness as an 'iterative process cycle' in a network. Pisano and Verganti (2008) discuss networks through the choice of 'governance' (hierarchical or flat) and 'participation' (open or closed). Westerlund and Leminen (2011) suggest the 'degree of openness' and networking increase when a firm advances towards user-driven innovation. Schweisfurth et al. (2011) put forward five characteristics of openness and Huizingh (2011) describes innovation types with the help of innovation process and innovation outcome. Finally, Drechsler and Natter (2012) argue that openness is managers' key strategic decision.

FRAMEWORK

We focus on the characteristics of openness (cf. Schweisfurth et al. 2011; Pisano & Verganti, 2008; Westerlund & Leminen 2011) to comprehend openness and closeness in networks. We deem that innovation networks comprise different types of actors (utilizers, enablers, providers, users) and that the four key characteristics of openness are governance, motivation, interaction, and innovation practices.

Governance

Pisano and Verganti (2008) propose a two by two matrix to distinct between diverse innovation networks. They demonstrate governance to be one of the key elements of networks. Mulder et al. (2008) identify governance as one of six perspectives to influencing open innovation networks and Chiaroni et al. (2010) address networks crucial for firms to

move from a closed innovation mode to open innovation. Schweisfurth et al. (2011) propose that allocation of decision making rights, such as task definition, task allocation, and selection of result, differ across open innovation procedures. Leminen et al. (2012) argue that the actor making decisions on goal setting varies between different open innovation networks.

Prior literature assumes that networks differ by their management structure, density and connectivity. Lay and Moore (2009) argue that 'collaborative networks' are complex, focus on innovation, and are coordinated by hub, whereas 'coordinated networks' aim at high volumes and efficiency, and are coordinated by concentrator. Centralized networks are good for simple problems coordination and decentralized networks suit for complex problems (Lazer & Friedman, 2007). Chesbrough (2003) puts forward the management of internal and external ideas when targeting new markets and Von Hippel (2007) shows that open innovation networks are self-coordinated and target to solve problems of interest.

Interaction

Interaction is essential in innovation networks (Pisano and Verganti 2008). The literature views open innovation as a process with predefined phases that address collective innovation, user innovation networks, common-based peer production, crowdsourcing and open source innovation (Schweisfurth et al., 2011) and living labs (Gong et al., 2012; Kang, 2012; Lin et al., 2012). In living labs, phases are understood as an adaptor´s perspective to innovation (Bendavid and Cassivi, 2012), detailed descriptions of execution in living activities (Gong et al., 2012), a part of new product development and commercialization processes (Katzy et al., 2012; Katzy, 2012), and evidence of systemic thinking (van der Waltand and Buitendag, 2009). Predefined phases may not exist, as innovation activities are continually redirected based on interaction with users in innovation networks (Westerlund and Leminen, 2011).

The level of interaction is important. Sjödin et al. (2011) found that although the level of interaction in terms of collaboration intensity varies across stages from closed to open mode of innovation, early collaboration paves the way for collaboration in later stages. Open innovation literature (von Hippel, 2007; Bogers et al., 2010) describes different innovation approaches; e.g. user-driven is based on tight interaction with users, while user-centric assumes looser interaction. The users' roles in networks, such as co-creator, co-developer, tester or informant, describe the depth of interaction (Leminen et al., forthcoming).

Innovation practices

Innovation practices in networks address foundational aspects, such as the transparency of innovation development, accessibility to innovation processes, and intellectual property (IP) issues. Transparency refers to an actor's right to inspect a design and to observe its development in the networks, and accessibility refers to a network member's right to participate in the development process by making modifications to previous solutions or contributing new solutions. IP management needs to attend to public commons or the retention of IP rights by a single actor in the form of patents (Schweisfurth et al., 2011).

IP portfolio constitutes an important driver of open innovation (Lichtenthaler, 2010). According to Drechsler and Natter (2012), the degree of openness can range from closed to multiple levels of openness, and firms pursuing open innovation may be concerned about ineffective IP protection. IP commons in open innovation draw on copyleft thinking, which concerns the extent of the IP that can be released while enabling initiators to benefit from the innovation (Rajala et al., 2012). By actively acquiring, commercializing and out-licensing IP in the markets, open innovation contrasts closed innovation processes (Lichtenthaler, 2010).

Motivation

Motivations to participate are elemental, because being motivated means being compelled or encouraged to act (Battistella & Nonino, 2012). Actors' motivations can be differentiated by the degree of motivation and their reasons to participate. Schweisfurth et al. (2011) argue that motivation in innovation networks comprises both individual and organizational motives, and categorize motivations by financial, technological and socio-political dimensions.

The distinction between different types of motivations builds on attitudes, intentions and goals that lead a participant to act, think, and behave in a certain way (Battistella & Nonino, 2012). We draw on the classification of intrinsic and extrinsic motivations (Ryan & Deci, 2000, Battistella & Nonino, 2013). Network actors are motivated by intrinsic factors, e.g., the perceptions of being part of the community and having a social identity. Extrinsic motivations concern all actions that lead, directly or indirectly, to economic advantages for the contributor. The reward incentives include monetary rewards (Antikainen et al., 2010), free products (Bergvall-Kåreborn, 2011) and IPR sharing (Battistella & Nonino, 2012).

METHODOLOGY

Research setting and design

We apply a multiple case study design (cf. Yin, 2009) to analyze the interplay of openness and closeness in three innovation networks. We chose two cases to represent openness and one that builds on closed approach. The empirical research was based on inductive methods and compound sources of evidence: interviews with key actors and other actors when necessary, internal documentation, and workshop participation. We used secondary data such as annual reports and marketing material for data triangulation (Diefenbach, 2009).

The cases were chosen because innovation development in them enabled us to explore the interplay between openness and closeness of innovation. We used the following criteria for case selection: 1) they represented innovation networks, 2) multiple actors were engaged in the development of innovation, and/or 3) innovation took place in real or simulated every-day life with users. We also utilized researcher participation for observation, but were unable to interview every actor in each innovation network due to that covering large networks would take a substantial amount of time and resources. Thus, we focused on the core actors.

We conducted 53 semi-structured interviews with managers from 10 organizations as well as 9 users in 2008-2011. The informants included CEOs, CTOs, sales directors, researchers, project managers, project coordinators, and users. Interviews were carried out through face-to-face meetings and by phone, and they were audio-recorded for transcription and analysis. We cannot reveal the identities and organizations of the informants, or the networks, due to confidentiality reasons, but describe the goals, activities and outcomes of each network.

Data analysis

The unit of analysis was an actor's perception of openness. We mapped the actors in each case to determine their roles in the network and classified them into formerly identified groups of actors (cf. Leminen et al., 2012). We analyzed interaction to understand how innovation activities are organized in networks and investigated the cases from the innovation practice (Schweisfurth et al., 2011) and motivation (Ryan and Deci, 2000) perspectives.

We coded the transcribed interviews using a theme based coding, in which relevant quotes were placed under each theme in our framework (i.e. governance, motivation, interaction, and innovation practices). By doing so, we followed the notions by Roberts (1997) and Neuendorf (2002) to make meaning out of the cases with the use of content analysis and coding. Finally, we summarized the results and concluded on the characteristics of openness and closeness. The outcomes were compared, discussed, and agreed between all authors.

FINDINGS

Innovation networks

This study reveals the characteristics of openness and closeness in three distinct innovation networks. Two of them are perceived as open innovation networks, while one is perceived as a closed innovation network. Table 1 summarizes the innovation mechanisms in our cases.

Both networks #1 and #2 are living labs dominated by open idea generation. Case #1 focuses on prototyping of ideas for the retail industry. It is driven by a regional development organization and includes firms providing technological and methodological solutions, universities, users (students, employees, residents) and a firm utilizing the results. Case #2 develops augmented mobile reality services with occupants from a geographic area and other users (e.g. students). It is driven by a firm utilizing the results, which provides tangible and intangible expertise for other stakeholders (e.g. universities) in the network.

Case #3 is characterized by closed innovation. The network is formed around a building infrastructure where players have own agendas and goals regarding innovation. The dominant player is closest to the customer and can this way acquire customer information and take over the market. It has access to customer knowledge (e.g. user preferences) and can involve customers in innovation processes for designing the usability of a building. The suppliers are used to bring incremental innovations to the completion of a project.

Next, we will analyze the cases in relation to the framework to illustrate how these networks are governed, how the decisions are made, which way the interaction occurs, what kind of innovation practices these networks employ, and what the essential motivations are.

Innovation network	**Objective**	**Dominator of innovation network**	**Actors**	**User roles**	**Innovation outcome**
Case 1: Dominated by open idea generation and prototyping	Develop and test services as a pilot in the retail industry; develop prototypes and concepts within the electronic and mobile business together with users	Enabler, regional developer organization	Enabler (regional development organization), provider (universities, ICT companies), users, and utilizer (retailer)	Co-creator, co-developer	Incremental innovation; prototypes and concepts co-developed with users from a geographical area, students and researchers
Case 2: Dominated by open idea generation	Develop augmented reality services for a new mobile gadget in cooperation with users	Utilizer, company	Enabler, provider (universities, ICT companies), user, and utilizer (mobile company)	Co-creator, co-developer	Radical innovation; augmented mobile reality services; utilizer co-developed innovation with occupants from a geographical area, researchers and students
Case 3: Individual innovations	Build new housing infrastructure (project based business)	Organization closest to the customer interface having the investment capacity (utilizer)	Provider (investor), utilizer (builder), user	Co-creator, informant	Incremental innovation for usability of buildings (interior design solutions, lighting solutions, air ventilation systems)

Table 1. Summary of the three innovation network cases

Governance

The openness of innovation is related to the type and degree of governance (i.e. structure) in the network. There were flat hierarchical structures driven by an enabler in case #1 (regional

development organization) and a utilizer in case #2 (mobile device manufacturer). They set the overall goals. The targeted outcomes kept forming based on on-going actions. In addition to the mutual goal, each actor had their own objectives, e.g., seeking business references, developing a prototype, or validating existing concepts. The flat hierarchical structures enabled collaborative processes, the transition of knowledge between the actors, and common learning process. They were major outcomes besides the prototypes, concepts and services.

In case #3, the network structure was hierarchical, and each player had their predefined roles. Each network actor had defined the desired outcome before the kick-off. The party that set the ground for the hierarchy was the dominant player; e.g., the utilizer that was the closest to the customer yet did not always involve a customer for the target setting. The decision rights were held by the actor that had the investment capacity (utilizer). It was responsible of steering the network by setting the targets and timescale for the project, but the hierarchical structure flattened in time as each member was allowed to reach their target by any means.

Interaction and Innovation practices

Cases #1 and #2 were characterized by flexible interaction between the actors. They relied on technology when agreeing on innovation sessions, preparing material for the sessions, or sharing results from the previous sessions. Sessions encompassed face-to-face interaction. Actors participated actively in innovation and were encouraged to contribute new solutions. Sessions stressed solving upcoming challenges in the network, as well as sharing knowledge. In case #1, network actors provided project-related knowledge to new entrants when an initial player exited, thus ensuring the continuation of the project. IPR were discussed before the start, but they did not become an issue as all participants had the right to use the outcomes.

An example of challenges was the design of carbon prototypes of gadgets when the actual prototypes were still on a product line. The flexible interaction in case #2 enabled the project to proceed in a different way as originally planned. Users' roles cannot be underestimated, as users were equal co-creators of innovation rather than objects of research and observation. In case #1, they kept shopping diaries and analyzed their shopping behavior. In case #2, users participated in the planning of focus group sessions, technology demonstrations and user experience field studies, attended relevant events, and co-analyzed the results.

Case #3 was dominated by a hierarchical setting in the beginning of the project. This changed after the kick-off, when interaction increased dramatically as actors started to collectively search for innovative means to complete the project. Whereas the initial phases were done in offices, the project completion took place at the construction site where actors could share ideas and discuss on project's realization. Surprises were unavoidable and the plans could change because of the conditions at the site (e.g., humidity, temperature, light). Actors had to solve problems that were unknown in the early phase.

Motivation

Cases #1 and #2 leant on intrinsic and extrinsic motivation. External rewards (e.g. token gift, course marks, or formal recognition) were not key motivators, but the users' desire to develop their competences, living areas, or products and services were more prominent. The actors shared the overall motivation and enthusiasm to develop new prototypes, products, and services in both cases, which resulted in incremental innovation in case #1 and radical innovation in case #2. In addition, each participant had their individual motives.

Case #3 highlighted extrinsic rewards as motivators. The task had predefined goals that needed to be fulfilled. However, when the process went on, the actors started to get transfer ideas and practical tips on the site that resulted incremental innovations throughout the project. This reflects the motivational factors related to the community; i.e. perceptions on being a part of a group and being capable of transferring ideas seem to foster innovation.

Innovation activity had also negative effects. Some innovations were in conflict with the initial design, which resulted in unpredicted challenges (e.g. problems in air ventilation systems as the lighting was installed in a different way from the initial plan). The innovation process should probably have followed either the closed or the open model throughout the process. The combination of these two resulted in conflicts between the initial design (target) and the process (deployment). Table 2 summarizes the findings from our cases.

Innovation mechanism	Case 1	Case 2	Case 3
GOVERNANCE			
Structure	Flat hierarchical	Flat hierarchical	Hierarchical
Project objective definition	Centralized, enabler driven	Centralized, utilizer driven	Decentralized
Activity definition	Decentralized	Decentralized	Centralized, provider driven
Activity allocation	Decentralized	Decentralized	Centralized, provider driven
Result settlement	Decentralized	Decentralized	Decentralized
INTERACTION			
Type of interaction	Flexible innovation interaction	Flexible innovation interaction	Interaction via technological solutions
Level of interaction	Deep	Moderate	Low
INNOVATION PRACTICES			
Transparency	Yes	Yes	To some extend
Accessibility	Yes	Yes	No

IP commons	Yes	Yes	No
MOTIVATION			
Intrinsic	Yes	Yes	No
Extrinsic	Yes	Yes	Yes

Table 2. Findings from the three cases

Summary of cross-case analysis

Our cases represented opposite innovation models, as cases #1 and #2 characterized open idea generation and #3 represented conventional project based business. Cases #1 and #2 showed there should not be predefined outcomes, but the project is a vehicle for discovering and validating unexplored areas. Case #3 had predefined goals, but interaction generated fresh ideas and inventions whose value were not fully understood nor deployed.

Openness increases the degree of freedom. Governance and decision making in cases #1 and #2 were decentralized as compared to centralized decision making in #3. The modes of governance were selected based on intended outcome and the way of working. We argue that this may reflect the underlying assumptions or development stage of the industries when working with the users and customers (cf. Westerlund and Leminen, 2011).

Hierarchies, processes or methods do not limit possibilities. Rather, they helped actors to find unconventional solutions to problems in cases #1 and #2. In case #3, all the deviations were dealt with the agreed procedures. The representatives of utilizer informed the firm's steering group of the changes but it did not affect the project level. Cases #1 and #2 reflected flexible interaction, while case #3 showed more structured interaction. Interaction ranged from co-development and co-creation to more formalized activities such as observation and surveys.

Transparency, accessibility and IP commons were open in cases #1 and #2, but closed in case #3. Transparency and accessibility are by definition open when applying open innovation and controlled in conventional projects with closed innovation thinking, according to which only some of the participants have full rights to participate in activities. Cases #1 and #2 evidenced both intrinsic and extrinsic motivations, and case #3 relied merely on extrinsic motivation.

CONCLUSIONS

Our analysis suggests there are different degrees of openness in innovation networks. These ‘grey areas’ are evident when pursuing the co-development of services. We identified four key characteristics of openness: i) governance (structure and decision making rights), ii) motivation (intrinsic and extrinsic), iii) interaction (type of interaction and level of interaction with users), and iv) innovation practices (transparency, accessibility, and IP commons).

Our findings bring new knowledge on the interplay between open and closed innovation. The key characteristics of openness can be applied to innovation networks to better understand

their operation and management. Our findings also address the importance of interaction, which supports the view of Dutilleul et al. (2010) who suggest that the focus in open processes should be on the analysis of obstructions rather than on processes. We found that interaction varies by the degree of openness and depends on the driving party in the network.

This study contributes to the open innovation literature by showing that the interplay between openness and closeness is affected by various elements: (i) driving party in the network (who leads the innovation activity?), (ii) decision (when should the innovation be open or closed?), (iii) interaction (how does the interaction take place within the network actors?), and (iv) role (what are the different roles of users and stakeholders in innovation networks?).

Managers contemplating service development need to reframe their innovation practices based on the characteristics of open networks, especially considering the interaction, not the process. Understanding the interplay between openness and closeness aids managers to set up an efficient innovation management. Although service innovation in networks is increasingly popular, the extant literature lacks knowledge of 'grey areas' between the ideal open and closed modes. This gap provides lots of opportunities for further research.

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Integrated design process to enhance usability and accessibility of websites for small- and medium-sized enterprises: An empirical validation

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Keywords: website traffic, online advertising strategies, advertising effectiveness, search engine optimization, paid placement, news release

Increasing website presence has become a prerequisite for companies' success in online markets. This study provides a five-step process that enables small- and medium-sized enterprises to enhance website accessibility and usability and compares the effects of popular advertising strategies (news release, paid placement advertising, and search engine optimization) on website traffic (direct-type, paid-type, and search-type) in terms of page visit counts and duration, an important behavioural characteristic indicating a visitor's attention to a website. The findings show that search engine optimization causes modest but long-term effects while the paid placement effect is strong but ephemeral. Based on the findings, we conclude that SEO is the first and a necessary step for success in online markets.

1. Introduction

Online retailers emphasize attracting more online visitors and capturing longer attention on their websites because frequent visits and longer duration are known to be correlated with higher revenues (Cotlier, 2001; Cotriss, 2002; Ledford, 2009). Larger companies spend a significant amount of marketing funds to enhance their website experiences, in terms of both usability and accessibility, by in-house hiring or outside consultancy. Such investment, however, is often unavailable for small- and medium-sized enterprises (SMEs). This research identifies strategies that can benefit SMEs in the design of their online experiences in order to

attract more visitors and capture longer attention on their websites. Website traffic is a necessary condition for online retailers' success, although not a sufficient one (Nikolaeva, 2005; Rajgopal, Kotha, & Venkatachalam, 2000). Search engine marketing (SEM) aims to increase a website's visibility in the search engine results pages (SERPs) of popular search engines. As to achieve longer duration, informative content and its presentation or "website usability" is crucial (Nikolaeva, 2005; Winer & Ilfeld, 2002).

Practitioners, as well as researchers, found various factors that positively or negatively influence the website visibility on SERPs to increase the number of visitors (Chambers, 2005; Google, 2010; Visser, 2006). Such studies were often considered separately in the domain of user interface design and digital marketing. In reality, however, the two must be considered concurrently to procure synergy, especially for SMEs with limited resources to maximize online presence. If design is confined to the narrow sense of only improving the visual aspects, adaptation may increase only the usability but not accessibility of the website. In this vein, the term "design" has been used widely in this research in order to include all the activities for developing a website in conjunction with the Herbert Simon's connotation of design for devising a course of action aimed at changing existing situation into preferred one (Simon, 1996). We developed a five-step website design process called Definition-Analysis-Substantialization-Execution-Maintenance (hereafter *DASEM process*). To measure the effectiveness of each advertising strategy, we have classified site traffic into three types: an online user may visit a retailer's website by typing the website address in the URL window (hereafter *direct*), visits by clicking paid advertising (hereafter *paid*) or by clicking an organic search result provided by search engines (hereafter *search*). Since how long the impact lasts is just as important as the degree of initial impact, this study compares the effects of each advertising strategy on site traffic and traces how long the effects last.

The rest of our study is structured as follows. In Section 2, we examine the general procedure of the renewal project and briefly explain the DASEM process. Section 3 analyzes the results generated from the DASEM process, based on the research hypotheses. Finally, we discuss the implications of our findings as well as the limitations of our research and provide several suggestions for advertising professionals of online retailers in Section 4.

2. Research Procedure and DASEM Process

Research Procedure

This study relies on the site traffic of a private start-up company based in South Korea. Established in 2009, the company sells data leakage prevention solutions, including data encryption, copy protection, and PC peripheral device control hardware and software to individuals and corporate customers. In the summer of 2011, the company decided to adopt aggressive advertising strategies in the hope not only of increasing global sales but also attracting potential distribution partners. To maximize the effects of advertising strategies on website traffic, the company published conventional online news releases, started conducting

online advertising with DoubleClick, and launched a renovated website with Search Engine Optimization (SEO) based on white hat techniques (Google, 2010) on September 7th, 2011.

Online news releases (NRs), distributed in ten countries[1], dealt with the newest release of five hardware products and gave a brief introduction of the company and a hyperlink to the company's website. The article was uploaded to an online public relation agency's website and then distributed to 207 journalists, bloggers, and others within the targeted industry and country at a cost of 1,500 USD. Paid Placement (PP) advertisements offer pay-per-click, i.e. cost-per-click (CPC), advertising in local, national, and international markets. The total budget spent from September to December 15th, 2011, totaled 10,500 USD (the advertising budget was depleted). SEO-based website modification, which modifies a company's website to obtain a higher rank on the SERPs when specific keywords are searched, required a basic understanding of HTML as well as a designer skilled in the use of Adobe Photoshop and Illustrator. The total cost of the website reconstruction, including hiring two interns for this project was 5,000 USD over ten weeks.

With the combination of user-friendly design, SEO, and online advertisements, a three-month project dramatically increased the monthly visitor traffic (52.8 times, from 238 to 12,577), visitors from search engines (14.9 times, from 59 to 878[2]), and direct traffic (7.24 times, from 152 to 1,101) from May to October 2011. Based the data from the project, we propose a five-step website renewal process for SMEs to enhance the user's website experience.

DASEM Process

The DASEM process includes the necessary course of action for designing a website with improved accessibility and usability. The major objectives of the newly-developed process are as follows: 1) to appropriately reflect most design-oriented website renewal processes, 2) to integrate SEO according to the web formation process, and 3) to reduce the risk of neglecting important factors in enhancing the website experience. The involvement of SEO in each step clearly distinguishes DASEM process from other design processes.

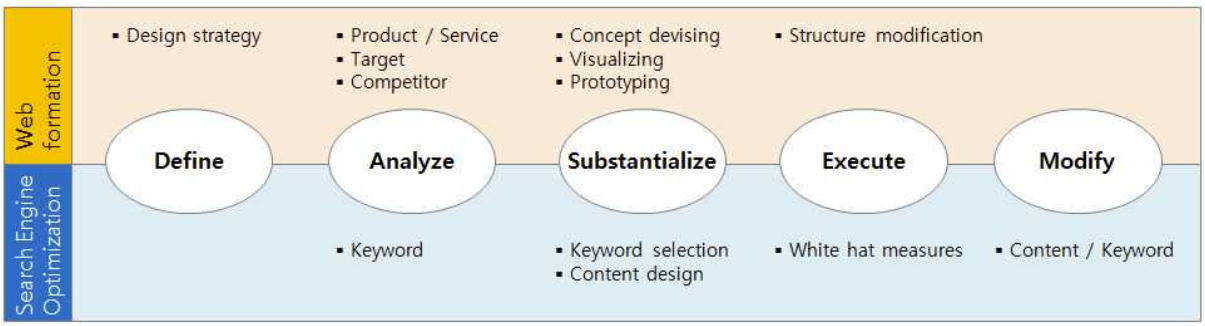

Figure 1. DASEM Process

[1] NRs were distributed in Canada, the Czech Republic, Denmark, Germany, India, Spain, Singapore, Ukraine, the United Kingdom, and the United States.

[2] Traffic from search engine optimization increased to 2,167 in November, 2011 (36.7 times).

The major activities of each step in the process are as follows.

Definition

A design strategy that comprises the major boundary conditions of the project, including the company's expectations, capabilities, and requirements, is defined in the very beginning of this step. Other strategic issues such as scope, term, and budget are also decided. Based on such information, the primary goals and objectives of the project as well as the overall look and feel of the website are described. Moreover, a “Don't List” can be coincided, if necessary. Such a distinct picture of the project in mind ensures a clear strategic focus among the team and contributes to high morale. With the amount of budget given, the project manager picks team members with appropriate skills and schedules the project according to the objectives.

Analysis

All the necessary information and data has to be thoroughly analysed to provide a strong backbone for the website. The analysis is generally composed of three parts: product/service, target, and competitor analysis. Product/service analysis identifies the features, benefits, and value of product and provides insight on defining the target and how to gain a competitive advantage against others. Target analysis involves not only finding out the users' desires from the website, but also learning how users are currently utilizing the website and comparing that information with the company's expectations. Competitor analysis examines and benchmarks competitors' websites as well as other excellent websites with distinguishing features that can be implemented for a better user experience; while analysis on the structure and design is important in providing greater usability, research on the content and codes of the website is helpful in enhancing accessibility.

Google Analytics and Google Adwords, which provide detailed information on the technical profile, can be useful tools for understanding what kind of keywords draw most visitors to the website and to gain insight in terms of geographical, cultural, and linguistic differences. While the target analysis for usability focuses not only on the new visitors but also returning visitors, and even internal users who frequently use the website, analysis for SEO need to concentrate mostly on the newly-visiting users.

Substantialization

A concept cannot be delivered unless it is expressed effectively in visualized content. The content has to be designed, according to SEO rules, in such a way that enhances visibility on search engines and improve accessibility while providing useful information to the visitors.

In this step, a design concept has to be devised as a result of group activities, such as brainstorming. Then, the concept is transformed into a prototype through various visualizing techniques and skills including sketching, rendering, and modeling. Design consistency in page layouts, product banners, and feature are also kept in order to achieve convenience and efficiency of the website. Keywords used to increase accessibility will be selected based on relevancy, search volume and competitiveness of the search. The main focus is on how to

make the website easy for the visitors to browse through different information and easily understand the content. To access whether this goal is being met, an affinity diagram is used in website structure diagnosis and card sorting to confirm the information architecture of the website. Upon such information, a mock-up is generated, which includes functional factors benchmarked from competitor websites or devised from brainstorming within the team.

Execution

Once substantialization is completed, the generated outcome is implemented on the website. In the traditional website design process, most designers only care about the design of individual banner and icons, the overall look and feel of the page, and perhaps, the user interface of the website once the visitors arrive at the website, but not on which route the visitors take in accessing the website. In the DASEM process, the execution takes place in two different domains: the substantialized work is adapted to the website in an SEO-suitable manner and structure modification takes place to enhance the user experience. To apply the design outcome in an SEO manner, the "white hat techniques" in HTML coding are crucial (Ledford, 2009; Loveday & Niehaus, 2007; Unger & Chandler, 2009). Since the text embedded in an image cannot be searched by a search engine, a title must be set for each image using relevant keywords. The files must be in a widely supported format (JPEG, GIF, PNG, BMP, etc.), and the type should be included in the file name and alt tag.

The designer should consider the purpose of the website before modifying its structure and determine essential features to achieve the proposed purpose in the targeted market. For example, if the primary purpose of a website is to increase sales, it is crucial to allow the potential customers to easily access a "purchase" menu from any page of the website. The simple directory structure with relevant keywords in the URL allows users to foretell the content on that URL. Links to similar or relevant products should be included in the sidebar to reduce the effort to locate the product that the visitors are interested in. Designers must also confirm whether all links are properly operating and make sure each page has a proper title that accurately describes its content. An additional consideration is whether to implement an executive summary, or positioning statement, for each product. This increases the chances of achieving higher SERPs and also allows the visitors to quickly determine whether the product delivers the features, benefits, and values they require. Once website construction is completed, designers should conduct a "compatibility test" on different browsers to make sure that the design works are as planned. To provide better user experience, do not require visitors to install any additional plug-ins to access the website or acquire information.

Maintenance

In a traditional sense of website maintenance, the website is left untouched unless a significant change takes place (launch of a new product, sales promotion, etc); from an SEO point of view, however, the content on the web must be up to date because the user experience would decrease greatly if the information they found on the web is not accurate. More importantly, from an SEO point of view, websites need to be continuously updated with

the keywords that appropriately represent the expected search patterns of the potential customers. If the traffic from searches is not satisfactory, the chosen keywords should be selected again upon reevaluation. It is also important to keep an eye on the keyword choices of the competitors, since they may adequately express the newly emerging market trends.

3. Hypotheses and Method

To evaluate the impact of SEO on accessibility to the website, data was statistically analysed.

Hypotheses Development

Website traffic, unless distinctions are made between different types, may water down a small but meaningful change by aggregating different impacts of website traffic. Our study classifies website traffic into three types that have distinctive behavioural meanings. The first type of traffic is *direct*, which means that an online user visits the website directly with no referral and has been informed about the website from other sources. The second type is *paid*, which means that a user visits the website by clicking an advertisement text or banner that the company bought from a search engine entrepreneur. PP-type traffic occurs when the user sees an advertisement and clicks it. The third type is *search*, which indicates that an online user visits the website by searching for certain keywords using search engines. It implies that a user purposely selected the website from SERP based on the description of the web (Ledford, 2009; Miller, Washington, Richard, & Associates, 2011; Rubel, K., M., & R., 2009).

Advertising efforts in real marketing practices launch multiple marketing or advertising strategies to achieve a synergistic effect (Clow, 2007). When multiple strategies are exploited, it is natural to question which strategy will be more effective to trigger website traffic and its duration. In this sense, our study aims to address untested research questions by comparing the effects of three different strategies (i.e., NR, PP, and SEO) on three types of site traffic (e.g., direct, paid, or search) and examining the duration of the effects. The duration of a visitor's stay on a website is considered to be an important behavioural characteristic of the visitor's interest in the website and can be used to measure the quality of website traffic.

Online news releases are a major traffic determinant (Bellizzi, 2000; Pfeiffer & Zinnbauer, 2010; Winer & Ilfeld, 2002). The effect of online news releases on website traffic is likely to appear in two forms: direct and search. After being exposed to the released news, an online user may remember a company's website and visit the website by directly typing the address in the URL window or may visit the website later by searching for specific keywords associated with the company or its products. Although online news websites might be reached and accessed from around the world, the effect of news releases on site traffic could be space-constrained because online news agencies mainly target local readers. The above arguments, thus, led to the development of H1a and b as follows: "After publishing an online news release, [H1a] direct-type website traffic within news-released media markets will be higher than that outside the released market areas; [H1b] search-type website traffic within news-released media markets will be higher than that outside the released market areas."

The second type of website traffic determinants is PP advertising, which is keyword-related banner advertising via online advertising companies. Although its effectiveness is a point of debate (Sen, 2005; Sherman & Deighton, 2001), PP is known to be an effective and inexpensive way to increase website traffic and actual sales (Manchanda, Dubé, Goh, & Chintagunta, 2006; Robinson, Wysocka, & Hand, 2007). Due to its strong presence, paid-type traffic from PP advertising may absorb what may have been potential traffic from direct-type or search-type traffic. Even if PP advertising is effective enough to increase website traffic, the traffic is generated by clicking online banners or texts, which are available only for the timeframe purchased (e.g. as long as the budget for cost-per-click advertising lasts). Thus, we developed H2 as follows: "After employing online banner advertising, [H2] paid-type website traffic will substantially increase against its baseline for a short period but return to the baseline after the contracted amount of clicks has been consumed."

Finally, SEO, a recently emerging technique in search engine marketing, can be utilized to increase website traffic. SEO, in terms of online users' credibility as well as effect duration, is a more promising strategy than paid placement and/or news releases. An empirical analysis of people's online search patterns clarifies that over 95 percent of online users visit websites found on the first page of SEPRs and that most of them (about 70 percent) state that an organic search is more reliable than paid advertising, indicating that organic results elicit higher trust from users than advertised results (Miller et al., 2011). Furthermore, SEO, if conducted correctly and successfully, will enhance the visibility of a website for a long time unless the algorithmic logics of search engines dramatically change (Curan, 2004; Google, 2010; Ledford, 2009). The above arguments, thus, led to the development of H3 as follows: "After enacting a search engine optimization strategy, [H3] search-type website traffic will substantially increase against its baseline and its positive effect will last for a long time."

Variable Description

Since each type is measured as the number of page visits and duration,[3] there are six dependent variables. The two independent variables are the time period and whether a country received a news release or not. Regarding the time period, we examined the descriptive statistics for the six dependent variables across the full time span (i.e., January to December 2011) and appropriately divided the span into three time periods: (1) *baseline*,[4] before the advertising; (2) the *short-term* period, when the advertising strategies started but before the contracted PP advertising was finished; and (3) the *long-term* period, the period after the contracted PP advertising was finished. Regarding NR areas, the variable comprises two levels: (1) ten countries receiving news releases and (2) the other countries that do not. Thus, adopting either page visits or duration time, we ran repeated measures ANOVA.

[3] All measures of site traffic are based on unique IP addresses on a daily basis in order to measure the number of unique visitors and the time they spend on the company's website in seconds. All website traffic that originated from South Korea was excluded from the analysis.

[4] Website traffic before September 7th, 2011, when the advertising strategies took place.

Descriptive Statistics

Figures 2 and 3 illustrate the daily fluctuations of website traffic across the full time span. Figure 2 clearly shows that the three types of page visits before the advertising were very low or non-existent. After the advertising strategies were enacted on September 7th (ongoing modification of advertising keywords took place until October 11th), paid-type page visits exploded, but direct-type and search-type page visits increased only moderately. However, when the contracted PP advertising was consumed on Nov. 16th, the paid-type page visits disappeared (because the paid-type website traffic exists only when purchased clicks remain), but search-type visits increased substantially. Direct-type page visits seemed to increase slightly once the advertising strategies were enacted but to decline when PP stopped.

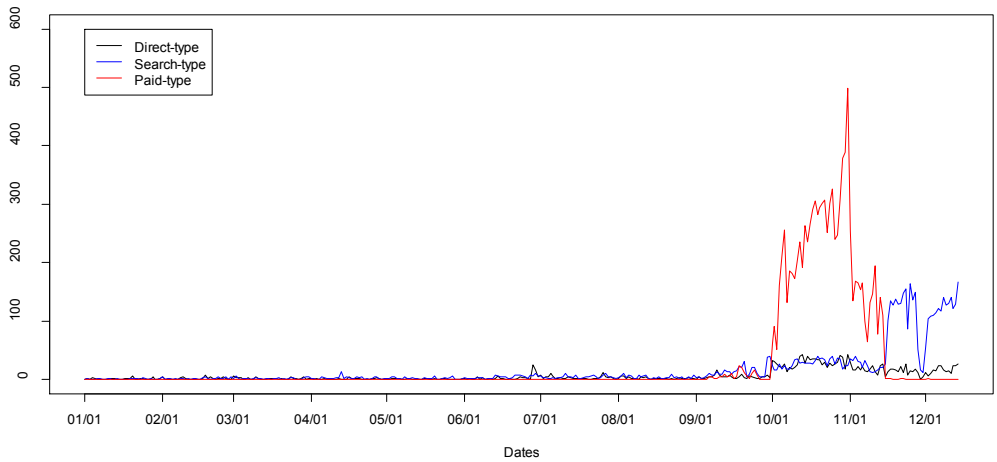

Figure 2. Daily fluctuation of the three types of page visits

Figure 3, which demonstrates the duration of the three website traffic types, tells a different story. As in Figure 2, the duration of the three traffic types was quite low before the advertising. After the deployment of ads, the duration of the search-type visits seemed to be longer than that of the paid-type and direct-type visits. More importantly, the search-type duration was maintained even after the contracted PP advertising was consumed.

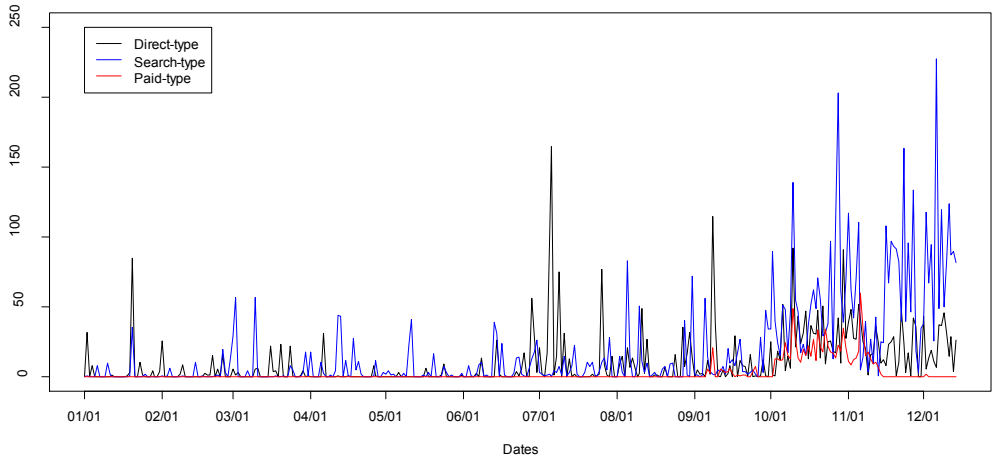

Figure 3. Daily fluctuation of duration of stay by the three types

The findings for the descriptive statistics in Figures 2 and 3 can be summarized in three points. First, the effect of PP on page visits is quite strong, but only in the short term because it stops when the purchased amount is depleted. In addition, visitors from PP spend shorter amount of time on the website and demonstrate less interest on the content than visitors from other sources. Second, the effect of an NR on page visits is quite weak but has a long-term effect. Also, visitors who type a URL directly spend more time on the site than those guided by PP. Finally, the effect of SEO on page visits is quite moderate with a long-term effect, and visitors from search engines spend more time than traffic from other sources do.

Testing the Research Hypotheses

While the descriptive statistics provided in Figures 2 and 3 seem quite informative, statistical significance testing should be conducted to obtain more confirmatory results. As mentioned above, we chose two between-subject factors: (1) whether a country received an online news release and (2) the time period, i.e., the baseline, short-term, and long-term period. Also, both page visits and duration per visit were used as dependent variables, and each dependent measure's traffic type was defined as a within-subject factor.

The results in Table 1 provide the results of repeated measures ANOVA (rANOVA), testing page visits, which is one of the traffic measures. First, page visits substantially fluctuated across three time points. However, regardless of the type of page visits, online news releases had no effect. Also, there was no interaction effect between the time period and online news release. Second, each type of page visit changed differently across three point points. However, the type of page visits (i.e., within-subject factor) had no interaction effect with the news release or interaction term of the two between-subject effects.

Effect	MS	df	F	Partial η^2	p	Greenhouse-Geisser	Huyhn-Feldf
Between-subject factors							
Time period	6179.34	2	42.93	0.04	<.001		
News release	44.62	1	0.62	<.001	0.43		
Time period * News release	61.89	2	0.43	<.001	0.65		
Residual (between)	71.97	3889					
Within-subject factors							
Type of page-visits	58.84	2	0.53	<.001	0.59	0.47	0.47
Type of page-visits * Time period	10342.6	4	46.58	0.10	<.001	<.001	<.001
Type of page-visits * News release	54.40	2	0.49	<.001	0.61	0.49	0.49
Type of page-visits * Time period * News release	226.48	4	1.02	.002	.40	0.36	0.36
Residual (within)	55.51	7778					

Table 1. Testing the effect of time period and online news release on page visits (rANOVA)

Figure 4 shows the results of the effect of the three time periods and areas of online news releases on three types of *page visits*. The most important finding here is that search-type traffic actually increased after the effect of PP advertising ended. Given that search-type site traffic is mainly related with the SEO strategy, this finding clearly shows that SEO's effect on site traffic is long-term (i.e., it lasts at least three months), and its effect seems to be magnified within countries where news releases were additionally executed. Next, direct-type page visits increased right after the online news was released, especially within countries where the news was released, but the increase returned to its baseline about two months later. Considering the fact that direct-type website traffic is associated with online users' cognition of a company or its related keywords, this finding implies that online news releases are effective, but only within the areas of the news coverage.

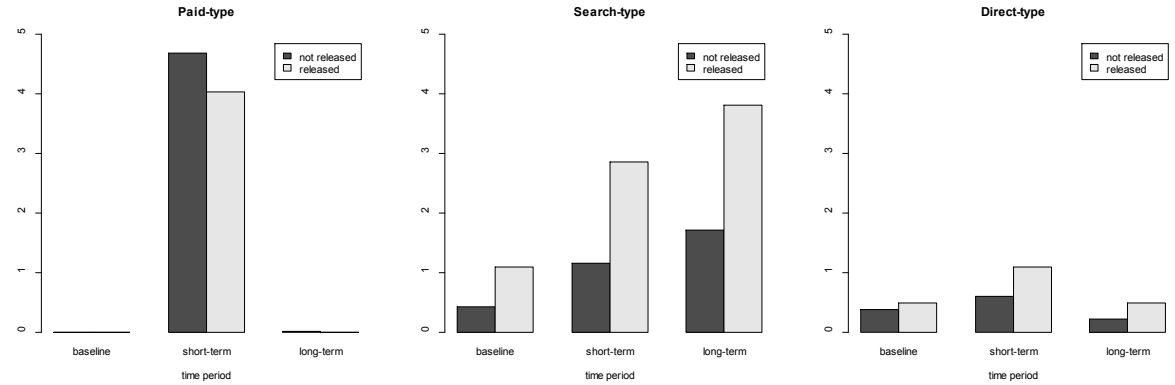

Figure 4. Means of the page visits stratified by online news release and time periods

The findings in Table 1 and Figure 4 show that online news releases failed to increase paid-type page visits but modestly promoted direct-type visits for the short-term period and search-type visits for the long-term. The effect of PP on page visits resembles the steroid effect, in which the short-term effect is strong but quickly disappears when the purchased clicks are gone. On the contrary, the effect of SEO on page visits was only modest for the short-term period but endured for quite a long time. When website traffic is measured as the number of page visits, all the hypotheses have supportive evidence.

Table 2 and Figure 5 show the testing effect of the time period and areas of online news release on the *duration* across three types of online traffic. Contrasted with the results in Table 1, two main effects and an interaction effect between between-subject factors were statistically significantly. As shown in Table 2, duration time substantially fluctuates across three time points, regardless of the type of traffic. Moreover, the duration time in news-released areas is substantially higher than that of non-released areas. While the effect of news releases was not huge, duration time across three time points changed differently between news-released and non-released areas.

Effect	MS	Df	F	Partial η^2	P	Greenhouse-Geisser	Huyhn-Feldf
Between-subject factors							
Time period	387.08	2	73.31	0.08	<.001		
News release	110.43	1	41.83	0.01	<.001		
Time period * News release	16.68	2	3.16	0.003	<.05		
Residual (between)	2.64	3889					
Within-subject factors							
Type of page-duration	174.21	2	46.58	0.02	<.001	<.001	<.001
Type of page-duration * Time period	601.69	4	80.44	0.17	<.001	<.001	<.001
Type of page-duration * News release	133.93	2	35.81	0.02	<.001	<.001	<.001
Type of page-duration * Time period * News release	25.66	4	3.43	0.01	<.01	<.05	<.05
Residual (within)	1.87	7778					

Table 2. Testing the effects of time period and online news release on duration (rANOVA)

However, more interesting findings can be found in the interaction effects between time periods and news release areas. Unlike the findings in page visits, the results of Table 2 show that types of online traffic are important and also show the interaction between time periods and news-released areas. First, one of the noticeable features of the paid-type duration is that users spend substantially less time (i.e., less than 30 seconds) when they visit a website by clicking an advertisement banner or text, as shown in Figure 4. The fact that the paid-type duration is quite short while its page visits are quite frequent clearly shows that users drawn by PP advertising are less loyal or attentive than other visitors who visit via direct URL or organic searches.

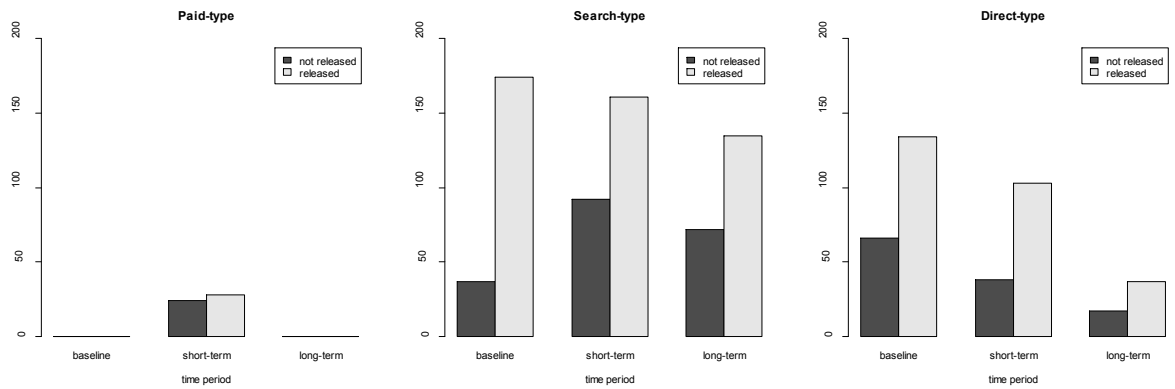

Figure 5. Means of duration stratified by online news release and time periods

The findings in Table 2 and Figure 5 show that the duration tells quite a different story from that of page visits. First, once the advertising was launched, the visitors' duration of stay declined while page visits increased, indicating that advertising drew more visitors but not

their attention. Second, visitors within countries which had online news releases spent more time than those in other countries. Third, visitors in both the short-term and the long-term periods spent less time than those before the advertising was launched. When website traffic is measured as the duration per page visit, only H3 is supported and the others hypotheses are not.

4. Conclusion

It has been widely observed that while the effects of NR coverage and PP advertising do not last for a long-term period (Eagly & Chaiken, 1993; Nikolaeva, 2005; Xing & Lin, 2006), SEO, if conducted successfully, may last longer (Rubel et al., 2009; Xing & Lin, 2006). From this analysis, we found that the results from DASEM process coincide with previous studies.

Traffic from SEO shows a steady and more prolonged effect on page visits with stable duration, which indicates that the usability is enhanced. Although duration decreased slightly, the drop was not statistically significant. Setting the increased number of visitors aside, users who actively search for the most appropriate website by themselves pay a sufficient level of attention to the company's website. With the investment of 5,000 USD, the renewal team was able to emulate the expected results of SEO (Curan, 2004; Google, 2010; Ledford, 2009).

PP-mobilized visitors, with significantly increased page visits, but of shorter duration, indicate that users attracted by advertisements are less loyal and attentive than visitors from other sources; this corresponds with previous studies on advertisements, which state that the effects of advertising are marginal, decay rapidly, and are unlikely to have lasting cumulative effects that lead to loyalty (Clarke, 1976; Tellis, 1988; Vakratsas & Ambler, 1999).

Traffic from news releases (NRs) shows a weak short-term effect on direct-type page visits, but not a long-term effect. The effect of online news releases on page visits, however, should be interpreted with care because five countries (Canada, India, Spain, the United Kingdom, and the United States) where news was released already had an existing relationship with the company. In other words, some may already have had greater interest in the released subject than other countries, and it is less clear whether the impact resulted from the innate characteristics of the local markets or the effect of the online news release. Although the observed gap in website traffic between countries with news releases and those without was maintained, a new partnership with a Singaporean company was established in November 2011. It might be safer to conclude that the effect of the online news release on website traffic was undetermined, but may have had a qualitative impact on business.

In practice, it is very difficult to find data regarding the number of visitors increased by adopting search engine optimization. Even when such data were available, the improvements were not as impressive as the results from the project. In addition, the results were only provided in descriptive data and without statistical analysis. This paper makes a unique contribution in providing practical guidelines that integrate search engine optimization to the ordinary web formation process, which has been validated empirically with repeated

measures ANOVA. From these findings, we conclude that the remodeled experience design of the website guided by the DASEM process – in terms of accessibility and usability – of this SME is successful. Although this result is based on only one case study, because the process of searching for information on the web is a generalized process, the results are expected to be replicable. While the effect of PP in increasing website traffic, especially with respect to page visits, is evident (Manchanda et al., 2006; Sherman & Deighton, 2001), the results and findings from previous studies strongly suggest that users have greater confidence in organically-searched results. In order for SMEs to enhance accessibility, websites must be compatible with the logics of search engines.

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Integrating association mining with quality function deployment

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Keywords: Quality function deployment, Data mining, Fuzzy logic, Design Research

Modern Product design requires high level of customer focus and customer satisfaction. The satisfaction of customer needs is critical for any designer. Modern customers are more difficult to satisfy; they have more requirements, continues change of minds. The extraction of knowledge from large customer database has been successfully applied in a number of advanced fields by data mining. This paper integrates data mining and quality function deployment, in order to improve design management. This paper also discussed the usefulness of fuzzy logic in such a scenario. For dealing with the fuzzy nature in the product design processes, fuzzy approaches are applied to enhance the relationship identification

1. INTRODUCTION

New product development or improvement on existing one in today's technology–driven markets carries significant risks. Studies indicate that new product failure rates can be as low as one out of every three products. (Yelkur, 1996) It is one to actually discover and measure the customer's needs and wants but to achieve desired outcomes these findings need to be translated into company language. Therefore company should focus on what is wrong with the existing product or services and try to understand what the customer really wants (Bouchereau, 2000).

Meeting customer requirements has also direct relationship with design quality. There are numerous studies on qualitative approaches in industrial design and production issues. Our study mainly focuses on the quality function deployment method to be used in industrial design applications. The main idea of quality function deployment approach is building a design strategy over the voice of customer.

The gradual convergence of user-centered practices and design practice has initiated by the contribution of practices from 'biological' and 'social' sciences to the practice of design and augmented the understanding of user experience (Sanders, 2001). Buur (2002) argues that the user-centered approach has emerged as a reaction to the requirement for meeting user needs in the design of computer interfaces, and later evolved as a design field comprising of a variety of approaches. In the following chapter we give a short overview on the body of research regarding the important aspects of Quality function deployment and Fuzzy association mining.

2. QUALITY FUNCTION DEPLOYMENT

Quality Function Deployment (QFD) is a quality improvement technique that deals with quality problems from the outset of the product design and development stage and assures that customers' requirements are accurately translated into appropriate technical requirements and actions (Low,1998). The emphasis on ''voice of the customer'' is the key to QFD (Kamara et al. 1999)

Some main benefits of using QFD may include better communication of cross-functional teamwork, lower project and product cost, better product design, and increased customer satisfaction (Hauser and Clausing, 1988; Chan and Wu, 2002; Xie et al., 2003). As with any other tools, QFD also has some limitations apart from its benefits. It is limited in the sense that it is more effective for developing *incremental* products as opposed to *really* new products (Griffin and Hauser, 1992).

According to Chaplin and Terninko (2000) a fundamental difference between the traditional manufacturing design process and the design process using QFD is the allocation of time, money, and staff. Traditionally, the allocation of resources begins modestly and increases to a peak as problems and breakdowns requiring corrective action. In contrast, QFD allocating more time and resources up front as shown in Figure 1 by (Sullivan,1996).

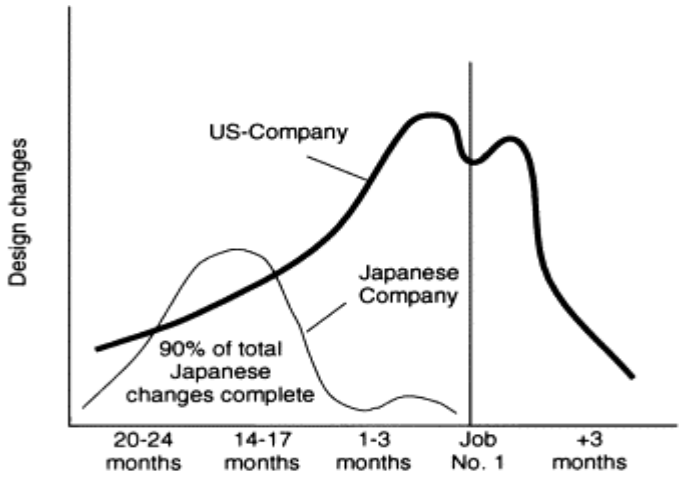

Figure1. Number of engineering or product changes where Japanese company applied QFD and US doesn't (Sullivan,1996)

QFD organizes the collected data into a matrix format. Each of the different areas of the matrix are referred to as "rooms" and the first matrix of the QFD process itself is referred to as the "house" and is often referred to as the "House of Quality". The term ''House'' is used because the original QFD tool used looks similar to a house with several rooms and a roof. The matrix in the QFD House of Quality relates a list of things that the customer wants to the design ''Hows'' (i.e., services that satisfy customer wants). The various elements that made up a basic House of Quality are shown in Fig. 2.

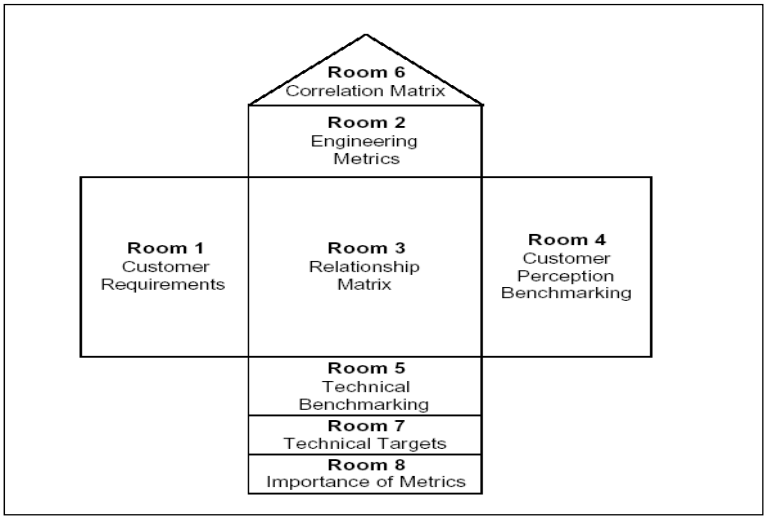

Figure 2 House of quality

Room 1 Customer Requirements ; requirements for the product as stated by the customers, including a weighting of the importance of that requirement to the customer.

Room 2 Engineering Metrics ; technical metrics that measure one or more of the customer requirements .

Room 3 Relationship Matrix ; indicates which engineering metrics affect which customer requirements.

Room 4 Customer Perception Benchmarking ; involves collecting information from consumers to determine how your product compares with the competition.
Room 5 Technical Benchmarking ; use the engineering metrics to objectively measure how well your product compares with the competition.
Room 6 Correlation matrix ; this roof matrix shows conflicts or synergies between the different engineering metrics
Room 7 Technical Targets – the quantitative targets for the engineering metrics.
Room 8 Importance of Metrics (Relative Weights) – a calculation determining the relative importance of the engineering metrics. For each engineering metric, a SumProduct of the customer weights and relationship matrix column is calculated .

3. ASSOCITION MINING IN QFD

Data mining for HoQ is to find useful knowledge from the accumulated cases for aiding the designers on the following HoQ analysis. Specifically, the purpose is to extract the reasonable association rules which express the strong relationships between Customer Requirements and Product Specifications. All these rules will be used in new product development by the designers.

An association data mining approach is used to find out all useful association rules between between Customer Requirements and Product Specifications. Through the analysis of rule conflict, redundancy and clustering, the useful rules are stored in a rule base.

Association rule extraction is to elicit the potential relationships between two item-sets for benefiting product design (Shahbaz et al. 2006). Apriori developed by Agrawal and Srikant (1994) is an effective method for association rule extraction from a predefined dataset. The approach is to extract the strong association rules by finding the frequent items, which was widely used in for newproduct development (Liao et al. 2008) and product portfolio identification (Jiao and Zhang 2005). Shao et al. (2006) and Xia and Wang (2010) proposed a simple Apriori-based algorithm was used to mine the association rules between Customer Requirements and product specifications.

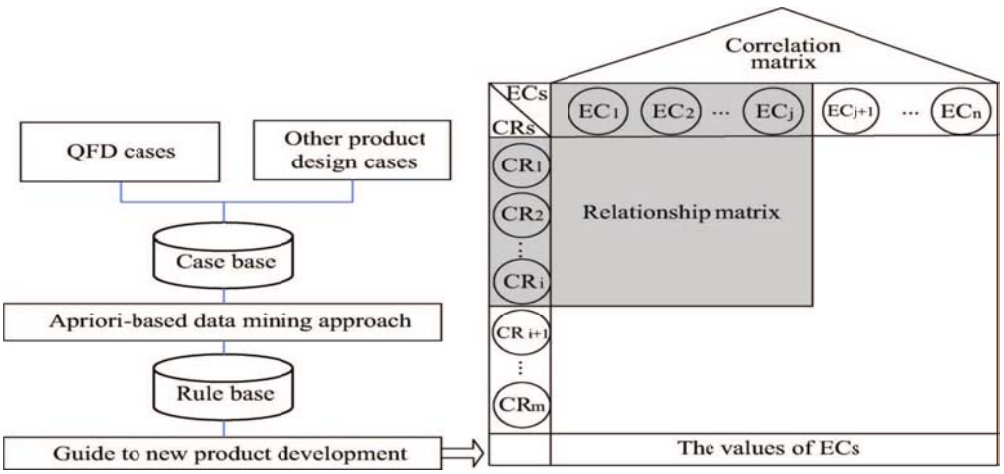

Figure 3 geeral problem formulation where CR = Custmer requirement and EC= product specification (Zhang, et al., 2010, pp 676)

Association mining was discovered by Agrawal (Agrawal *et al*., (1993). It was further improved in various ways, such as in speed (Agrawal *et al*.,1993 and Cheung *et al*., 1996) and with parallelism (Zaki *et al*., 2001) to find interesting associations and/or correlation relationships among large sets of data items. Measures are need to eliminate useless rules. Suppose T ~ {(Customer Requirements, Product specification) } is a case dataset, where C is the number of the cases. A general association rules is expressed as: IF X THEN Y, where X = Customer Requirements and Y= Product specification). Two measures can be used

(1) **Support**

Support is a general index in rule extraction. The index is a measure of the importance of association rules for expressing the universal degrees of association isting.

$$Sup\ (X \rightarrow Y) = \frac{X \cup Y}{T}$$

where XUY is the number of instances in the database T satisfying all the conditions in both frontitems X and back-items Y, and T is the total number
of instances in the database T.

(2) **Confidence**

The index is a measure of the veracity of association rules for expressing the characteristics of association intensity.

$$Conf\ (X \rightarrow Y) = \frac{X \cup Y}{X}$$

where T is the number of items in the database T satisfying all the conditions in the front-items X. The process of mining association rules consists of two main parts. First identify all the combinations of contained in the data that are adequate for mining association rules. These combinations have to show at least a certain frequency to be worth mining and are thus called frequent itemsets. The second step will generate rules out of the discovered frequent itemsets.

1. **Mining frequent patterns:** All sets of items that occured at least as frequently as a user-specified minimum support has to be identified

2. **Rule generation:**. The task is to generate all possible rules in the frequent itemsets and then compare their confidence value with the minimum confidence.

4. Fuzzy logic and fuzziness

Considering the inevitable vagueness and uncertainty in the decision-making process, fuzzy numbers, linguistic data and even incomplete data were used to express the judgments for the weights and the relationships (Shen et al. 2001, Kwong and Bai 2002, Han et al. 2004). Fuzzy

set theory was integrated with the existing methods, e.g. fuzzy pairwise comparison ranking method (Li et al. 2006), fuzzy arithmetic and entropy method (Chan et al. ,1999), and fuzzy mathematical programming (Lai et al. 2008).

Crisp sets do not always satisfy the needs of real world applications, because they only allow a membership of 1 or 0, i.e. member or non-member. In the real world, it is not at all times possible to assign an object clearly to a certain group of objects. Rather, it might lie in between two different sets (Borgelt, 2005).

Fuzzy sets can help overcome crisp problem by allowing different degrees of membership, not only 1 and 0. Objects can thereby be members of more than one set and therefore give a more realistic view on such data. Fuzzy sets can generally be viewed as an extension of the classical crisp sets. They have been first introduced by Lofti A. Zadeh (1965).

Crisp sets are discriminating between members and nonmembers of a set by assigning 0 or 1 to each object of the universal set (Gottwald, 2006). Fuzzy sets generalize this function by assigning values that fall in a specified range, typically 0 to 1, to the elements. This evolved out of the attempt to build a mathematical model which can display the vague colloquial language. Fuzzy sets have proofed to be useful in many areas where the colloquial language is of influence.

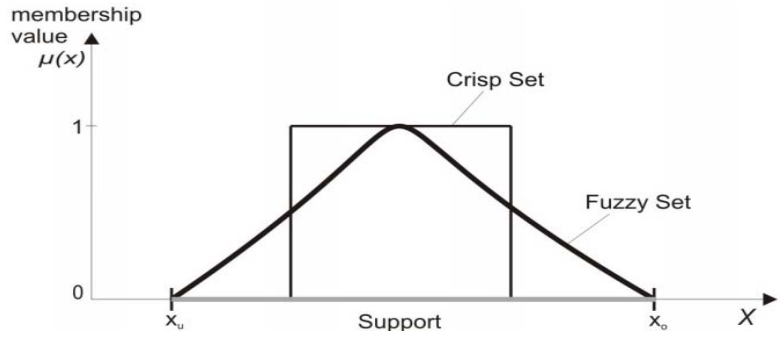

Figure 4 Crisp and Fuzzy set

Figure 4 illustrates a graph of a crisp set and a fuzzy set. Using the fuzzy function, it is possible to assign a membership degree to each of the elements in X (Klir, 1988).

A fuzzy set is then defined by a function $\mu_A(x): X \to [0,1]$ and denoted by $A = \{(x, \mu(x))\, x \in X\}$. μ_A is a generalised characteristic function (the membership function of the fuzzy set A), x is one particular element that belongs to A, X is the universe of discourse. The conditions are $\mu_A(x) = 1$ if x is totally in A, $\mu_A(x) = 0$, if x is totally out of A and $0 < \mu_A(x) < 1$ if x is partly in A.

A set whose membership function is piecewise continuous is called fuzzy number. A fuzzy number according to the concept of fuzzy set can be represented in a triangular form as in Figure 5. A triangular fuzzy number with a centre a may be seen as a fuzzy quantity "x is

approximately equal to *a*". 'A linguistic variable can be defined as a variable whose values are not numbers, but words or sentences in natural or artificial language' (Karsak, 2001). Linguistic variable such as 'large' or 'small' is taken as a representation of phenomenon too complex to be described using the conventional quantitative terms.

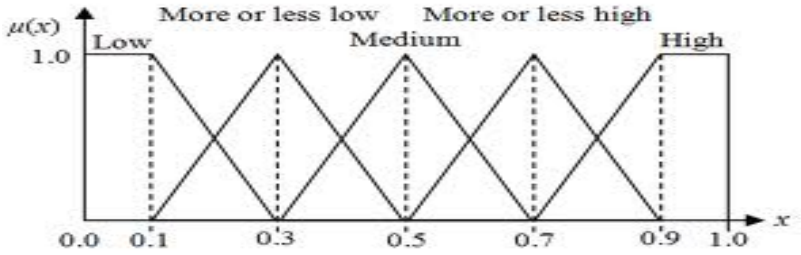

Figure 5 Fuzzy membership function

Within a universe of discourse a linguistic variable represents a range of values that make up a fuzzy set. The universe of discourse can be partitioned into as many linguistic variables as deemed necessary and partitions can overlap as shown in Figure 5. The linguistic variables are usually defined as fuzzy sets with appropriate membership functions (Hong and Lee, 1996). H is a linguistic variable representing a partition that describes a certain phenomenon with a characteristic 'high' in the universe of discourse. In fuzzy set theory membership is a matter of degree. In the above expression $\mu(A)$ is defining the degree of relevant of x to the set A. Membership of x to A is imprecise or vague and $\mu(A)$ is its measure of uncertainty. The fuzzy proposition is true to the degree to which x belongs to the fuzzy set.

A symmetric triangular fuzzy number with centre a and width $\alpha > 0$ has a membership function of the following form:

$$A(x) = \begin{cases} 1 - \dfrac{|a-x|}{\alpha} & \text{if } |a-x| \le \alpha \\ 0 & \text{otherwise} \end{cases}.$$

The notation use is A=(a, α). The process of assigning membership functions to fuzzy variables is either intuitive or based on some algorithmic or logical operations. Intuition is simply derived from the capacity of the experts to develop membership functions through their own intelligence, experience and judgement. Triangular membership functions are chosen for application considering their intuitive representation and ease of computation.

5. FUZZY ASSOCIATION MINING

The proposed algorithm uses a fuzzy association technique to determine the optimum sensor to track targets in areas of overlapping radar coverage. The fuzzy association approach is preferred over traditional Boolean logic processes because it considers partial relationships or degrees of truth to the observed data, rather than the stringent relationship of "true" or "false" (Hirota, 1999). In a multisensor environment, a fuzzy association approach is suitable for

determining the relationship between multiple track pairs. Instead of resolving track pairs as simply being correlated or non-correlated, they can be categorized into degrees of membership by quantifying the level of their correlation.

From these degrees of correlation, a more informed assessment can be made whether or not to fuse the track pairs. Data are sent from to the fusion center, where the degree of membership is assigned to the similarity measures of the data(Ishibuchi, 2001). The membership values are then applied to fuzzy association rules in which a decision is made about the data. This decision is then defuzzified to indicate fusion for the data received (Mirta, 2002).

Fuzzy association is ideal for multisensor tracking systems in that several associations can be made from the data received. Fuzzy association uses IF-THEN-ELSE rules to establish association based on the membership values assigned to the similarity measure of the data and predetermined thresholds, such as support and confidence. IF-THEN rules are established so that if a membership value is greater than the threshold, the result is association, or else association is avoided:

$$\text{IF } \mu(A) \geq \text{Support, Then Association ELSE No Association}$$

After associating the input membership values, the membership function is defuzzified to obtain a crisp output. In control systems, this output provides feedback to the system. In multisensor tracking systems, the output is a decision whether or not the track pairs represent the same vessel. If the output indicates that the tracks belong to the same vessel, the fusion process then estimates the optimum sensor track. If the output indicates that the tracks belong to separate vessels, then the fusion algorithm repeats itself for the next set of data.

Attribute data in the form of latitude, longitude, and course from one sensor are comparedagainst the attribute data from another sensor to form a similarity measure. Once all of the assessed attributes for the track pairs have been assigned membership values, they are then checked against a designated threshold for that attribute. The threshold is selected by the operator or determined by the known resolutions of the sensor. If a threshold is not exceeded, the association for the track pairs fails, and further checks are stopped. If all values exceed the assigned threshold, an association is made, indicated by a binary output of "1" from the defuzzifier, and the two target tracks are then fused to become one unique track displayed at the operator's console.

Again 2 steps are used to mining

1. finding all possible frequent fuzzy itemset <X, A> from the input database, i.e. $fs(<X, A>) \geq$ support.
2. 2 generating all possible confident fuzzy association rules from the discovered frequent fuzzy itemsets above. This subproblem is relatively straightforward and less time-consuming comparing to the previous step.

Fuzzy association rule mining assumed that the linguistic terms are provided by the user or the domain expert. However, there are some cases in which even domain experts are not able to define the fuzzy set. Besides, a different application context may require different assessment of the definitions. Some approaches were proposed to dealing with this issue. The fuzzy clustering technique was used to find fuzzy sets to represent linguistic terms on the attribute domain (Fu 1998). Studies to learn the fuzzy linguistic terms from the data can be also found in (Nauck 1998). However, the main problem of these approaches is that it is hard to automatically generate fuzzy sets consistent with the user's intuition. Therefore, the rules are difficult to interpret because of the gap between the obtained membership functions and the users' understanding of each linguistic term.

Association rule mining can generate a large number of rules. The number of rules explodes dramatically as the number of attributes of the database increases. It is often difficult for the user to understand and handle such a large number of rules. Some of these rules are redundant among themselves, while some of them refer to uninteresting attributes, prior knowledge or expectation. Research efforts on rule pruning have been made in two directions. One is to propose new appropriate measures for rule interestingness. The other is to prune and group the rules, use templates and dynamically set both the minimum support and the minimum confidence value to get rules. For instance, the user can define an inclusive template to match the rules, or define a restrictive template to prune the rules (Klemettinen 1994). Distance measures, such as the amount of records that separate two rules, can be used to group the association rules (Toivonen 1995).

6. ILLUSTRATIVE EXAMPLE

Following example shows the difference between out pot of a standard house of quality, as shown in Table 1 and and fuzzified house of quality As show in Table 2. This is just room 1, 2 and 3 illustrated in Figure 2 Relation are expressed as following: Very Low (VL)= 1, Low (L) =3 Midium (M)= 5 Hight (H)) = 7 Very High (VH) = 9

	Performance	Reliability	Durability	Aesthetics
Softens hair	VL	VH	L	VL
Prevents dandruff	VL	VH	VL	VL
Appropriate for hair	L	VH	VL	L
Easy to foam	VH	VH	L	0

Table 2 showes the fuzzified out come of house of quality, it is clear that the result are clearer and slightly affected by the fuzzy syste,

	Performance	Reliability	Durability	Aesthetics
Softens hair	0.35 VL	VH	0.25L	VL
Prevents dandruff	VL	0.4VH	0.6 VL	0.3VL

Appropriate for hair	0.85 L	0.75VH	0.45VL	L
Easy to foam	VH	0.23 VH	0.50L	0

7. CONCLUSIONS

As a customer-driven quality management system, QFD involves numerous input data from both customers and QFD team members. This paper attempted to treat the main inputs of QFD as linguistic data on the basis of a proposed process model. This paper addresses the problem of redesign by applying fuzzy association mining to quality function deployment. The approach is aimed to identify the useful Fuzzy association rules that reflect the relationships between customer requirement and product specification. The proposed approach is more suitable for these applications with mass of data. As illustrated with the example, extreme case does not need fuzzy association mining to deal with.

This paper employs data mining methodology to association customer needs and requirements into the quality characteristics to improve quality for an existing product to develop a new consumer product. The results of this study can provide an effective procedure of identifying the significant trends to satisfy customer needs for company and enhance their competitiveness in the marketplace.

The utility of the rules can be improved if a previous categorization of the documents is available, and items meaning that the document is in a given category are employed in the document representation. Rules containing category labels can give us new information about the category itself. For instance, if a rule of the form term vs category appears with enough accuracy, we can assert that documents where that term appears can be classified in that category.

As future work, we will implement the application of the model to this query reformulation procedure and compare the results with other approaches to query reffinement coming from Information Retrieval.

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Knowledge exchange between practice, education and research in Design Management

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Keywords: Education, Knowledge, Practice, Metamorphosis

INTRODUCTION

This paper will review an innovative approach to knowledge exchange between practice, education and research in design management drawing upon the review activity completed by the UK-based Metamorphosis of Design Management Network (Metamorphosis of Design Management Network) between 2007 and 2012. This Network supported a series of nine workshops during this five-year period, exploring the changing nature of design management practice, education and research. The paper has three overarching aims, firstly to describe the methods used by the Management Network to exchange knowledge, secondly to reflect on the past, present and future drivers of change within design management suggested by the Metamorphosis of Design Management Network participants and thirdly to explore the relationships and nature of knowledge exchange between practice, education and research in Design Management.

The Metamorphosis of Design Management Network was founded on the principle that in a complex rapidly changing field such as design management there are critical knowledge relationships between practice, education and research, as suggested in Figure 1 (Inns 2009). Knowledge can be understood from a number of perspectives per se. It is discussed in the context of individuals and wider social and organisational groups, in whom knowledge resides and is acquired. It relates to and is distinguished from learning, information and data. Realist positions hold that it involves transmitting of an objective, agreed reality or truth as a correspondence of reality mirrored in the mind. Knowledge can be objective but also in

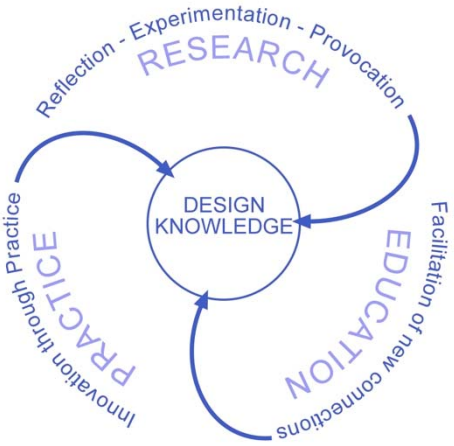


Figure 1: Knowledge relationships between research, practice and education

varying degrees, relative. (Evans 1997). A constructionist perspective holds that knowledge is created or constructed by the learner, or socially constructed (Gosain 2003) knowledge determines what you see and what you choose to see as relevant. Further, knowledge is self-referencing, in that future knowledge requires an understanding of the concepts and learning from the past (Von Krogh et al. 1994)

Tsoukas and Vladimiros (2001) argue that knowledge is both personal (Polyanyi 1967, 1969) and drawing on Wittgenstein who treated cognition as essentially social, collective (Bloor 1983) and that these positions complement and extend each other. In an organisational context, Nonaka and Takeuchi (1995) further explain knowledge as a "dynamic human process justifying personal human belief toward the "truth" (p.58) in contrast to accounts of knowledge as absolute and non-human. In addition to these views, Blackler (1993,1995) demonstrates knowledge in organisations through the nature of expertise and changing systems; and that knowledge or more specifically, knowing, is mediated, situated, provisional, pragmatic and contested. It can also be understood within a socio-cultural evolutionary framework as sense making (Weick, 1979) engaging with the material, as well as the mental and social (Latour, 1987) and as a source of power (Alvesson and Kärreman (2001).

The concepts of Knowledge Management, Transfer and Exchange account for the uses of knowledge in organisations. The knowledge creation model (Nonaka 1994; Nonaka and Takeuchi 1995) emphasises knowledge management in organisations as a continuous process through the exchange of tacit knowledge between individuals. The process is characterised by four dimensions of socialization (share experiences by observation and imitation), externalization (articulate tacit knowledge), combination (connect explicit knowledge) and internalization (internalize explicit knowledge). Thus, the permanent exchange of knowledge between individuals, groups, and artefacts in an organization is an essential precondition for successful knowledge work and workplace learning (Eraut, 2000; Eraut and Hirsh, 2007).

A second significant contribution to knowledge management in organisations is provided by Davenport and Prusak (1998) who explain that "…knowledge is a flux mix of framed experiences, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information… in organisations it often becomes embedded not only in documents or repositories but also in organisational routines, process, practices and norms (p.5). Although criticising it for its breadth, Greenhalgh (2010) further argues that this definition of knowledge, a capacity to exercise judgement, requires both an ability to draw distinctions, and to be located within a collectively generated and sustained domain of action.

Research on knowledge transfer in organisations emerged in the 1990s. However social scientists' primary focus on tangible resources such as new technologies, greatly simplified the complexities of co-operative exchange and formal and informal person-to-person collaboration (Gupta & Govindarajan 2000). Subsequently knowledge exchange extended the one-way transfer process to interactions between researchers other stakeholders (Mitton et al. 2007). In this context Ward et al. (2012) found that interactions, shared experiences and networks produced shared spaces (and informal constraints) for knowledge exchange and creation. Moreover they demonstrated a growing understanding about the multifaceted, variable use of knowledge across settings with a clearer description of the fluid, dynamic nature of knowledge exchange, and explain its similarity to an innovation process. Lockwood (2011) uses this perspective - the social context of organisational knowledge - to define an integrated, flexible and collaborative approach in Design Management

In parallel with these collective approaches to knowledge exchange, there has been a re-assessment of the users of knowledge. Early studies distinguished knowledge workers by job roles, demonstrating a binary divide between thinking and doing (Drucker 1999). Kelloway and Barling (2010) argued that organisations should seek to open up knowledge exchange by developing employees with high levels of ability motivated to use their knowledge towards organisational ends and given the opportunity to use their knowledge in the workplace.

Van de Ven and Johnson (2006) extend the creation of knowledge beyond the organisation, seeing it emerge dialectically when academics and practitioners converge to address a problem in engaged scholarship and that conflicts are inevitable, providing opportunities for reflection as well as data. Knowledge exchange recognises a two-way exchange between organisations and academics and provides for a more balanced dialogue and recognizes that knowledge is also transferred from organisations to the academic. Knowledge of practice then informs teaching, research and further knowledge exchange activities (Davies 2009).

However there is relatively little research on the relationship between education, practice and research in the Design Management from the perspective of knowledge exchange. Oakley's Handbook of Design Management (1990) discusses methodologies, common language, interdisciplinarity and a variety of principles, strategies and processes. Separately Oakley and Walker's chapters, discuss the distinctions between design and management education. Cooper and Junginger in their more recent handbook (2011), more explicitly observe that

Design Management constitutes a field of practice and research. Their focus on management and business schools education as design schools tend to develop programmes with existing management schools, and management educators are making “earnest efforts” to study the possibilities that design offers in improving business practices and in achieving desirable results. If design is being integrated into management education, design researchers need to understand how, when and why design comes into play. Further if there is a convergence of design and management its manifestations need to be understood.

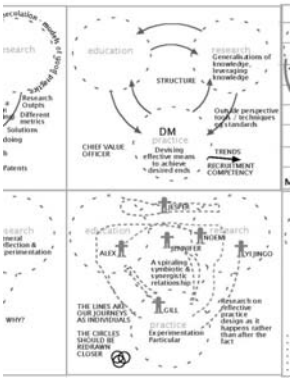
FINDINGS

Methods used by the Management Network to exchange knowledge

The format of the activities supported network discussions, enabled workshop participants to spend time reflecting on their individual design management experiences, and then pooled perspectives to develop group positions on a variety of issues. These includws the future knowledge needs of design management and the sources of future information to fuel this activity; the past, present and future drivers of change within design management; the knowledge relationships between practice, research and education

Each event was organised around a series of short presentations from practitioners, researchers and educators; small group activities and summaries facilitated by the second author, Tom Inns, and plenary discussions. These participative and collaborative learning methods stimulated individual and group thinking about key issues and priorities, their relationship to each other and their significance, for further information on interdisciplinary workshop approaches (see Inns 2013). The groups used a range of visual techniques to record their results, which captured both creative and non-linear definitions and potential solutions to the tasks and the questions they raised. The discourse maps created after each event explored current concepts of Design Management, and the value of discourses between practitioners, researchers and educationalists. These approaches are supported by Edenser et al. (2006) who propose in a health care context that “knowledge mapping examines the dynamics at play in ….. an area of work; where knowledge resources and assets are located; how these elements move around the organization or an area of work; where the elements are created; and where they are needed and should be used.” Figure 2 provides a summary of the nine workshops in the metamorphosis series. A short introduction is provided for each event and a summary of the key findings from the interactive discussions that took place.

Figure 2. Summary of the nine Metamorphosis workshops.

Metamorphosis 1. May 2007, London The first Metamorphosis symposium explored the concept, future direction and opportunities for Design Management in the 2000s. It was a participative one day event that reflected on the origins and development of Design Management and the ways in which education and practice engage with design and management. More than 50 people attended, with a good representation of design educators and consultants, researchers and industry representatives. Bill Sermon (Nokia) started with the industry view, saying: *"Every single day I confront the issues and topics we are talking about today. I'm keen to explore new research methodologies and very interested in measuring their success. Design Management is nothing if it is not really about providing business success."* **Key Finding:** Short presentations were made by a number of speakers who all focused on their journey into design management practice, each speaker explained the way they had had to adapt their practice to deal with changes within the business landscape in which they worked, developing this level of adaptability within future design managers was identified as a key challenge for design educators.	
Metamorphosis 2. Sept 2007, London The second Metamorphosis event was attended by over 30 researchers, practitioners and educators, presentations were given from the perspective of practice and research. Definitions of design management were then shared. Through interactive mapping exercises, participants then explored their own individual journeys between practice, education and research. **Key Finding:** The journey maps revealed interesting patterns in how members of the design management community move from education to practice and through research at different points in their careers, highlighting how knowledge exchange might work within individuals and between individuals as they work in different domains.	
Metamorphosis 3. April 2008, London The third Metamorphosis workshop was attended by over 40 researchers, practitioners and educators, again scene setting presentations were given from the perspective of practice and research. At this event interactive sessions focused on exploring the past, present and future drivers of design management knowledge and the value exchange associated with knowledge flows between education, practice and research. **Key Finding:** Strong links were clear between the past, present and future drivers of design management knowledge and the generic drivers of business, (the interactive activities highlighted the current significance of issues like globalization, digital innovation, sustainability on design management practice). It was also clear that cutting edge knowledge in design management was probably located in cutting edge practice, sending a clear message as to where research might focus its efforts (for the benefit of education)	

European Forum for Design Management Research (Metamorphosis 5.) Dec 2009, Gothenberg

In December 2009, workshop activities used in previous metamorphosis events were adopted at the European Forum for Design Management Research workshop organized by University of Gothenberg. This two-day event was attended by 75 delegates from across Europe

Key Finding: Delegates looked at past, present and future drivers of design management knowledge and future knowledge needs. There was a very interesting tension between the need for hands-on knowledge (tools, methods and innovative approaches) and the need for new platforms of design management theory that would build an equivalent position for design management as in other fields of management research such as organizational theory and strategic planning.

Metamorphosis 4. Jan 2009, London

The fourth Metamorphosis symposium explored the knowledge needs of design management in more detail. Again key practitioners gave an overview of current design management challenges in business. Interactive sessions then focused on identifying what research projects should be developed to develop new knowledge for the design management community.

Key Finding: Areas for future design management research were identified as:

- Measurement of the value of strategic design investment
- Using design to influence human behaviours in complex social/business areas such as food supply chains
- Research into how design can support organizational change
- How design could influence understanding of sustainability within business decision makers … by looking at the financial benefits of sustainability
- Research into design's contribution to multidisciplinary facilitation
- Exploring design's role in National economic policy (particularly for states in crisis – Iceland!)

Metamorphosis 6 April 2010, London

40 participants at this one-day London event again heard perspectives from industry. Interactive workshop activities then explored the taxonomy of knowledge associated with design management. Groups produced maps describing the relationships between different areas of knowledge associated with design contemporary management practice.

Key Finding: The maps produced by the 6 groups were all visually very different but shared common characteristics. The knowledge fields associated with design management were very broad and encompassed many associated areas of management, organisational behaviour, consumer behavior, economics, complexity as well as areas associated with design both at a project level as well as policy.

Metamorphosis Nov 2010, Manchester

60 participants at this workshop again heard from business case studies. The focus at this event was exploration of the big questions for the contemporary practitioner. Debate and discussion focused on one of the key skill sets of the contemporary design management practitioner the skill of advocacy.

Key Finding: The knowledge needs of advocacy are clearly broad; the soft interpersonal skills associated with negotiation and persuasion; the network and political understanding needed to navigate complex organizational landscapes and finally the knowledge base of facts, examples and case studies needed to influence thinking. Being an effective advocate sets key challenges for educationalists, researchers and practitioners in the design management field.

Metamorphosis 8: Jan 2012, London

This penultimate workshop reflected on the experiences of educationalists running design management programmes within UK HEIs, examples included: Lancaster, Northumbria, Staffordshire, Brunel, Ravensbourne, University of the Arts London and Birmingham City University. Each of the programmes of study clearly has a distinctive focus and particular course philosophy. Interactive workshop sessions explored what sources of knowledge educationalists were using within their programmes and how these sources might be changing.

Key Finding:

The literatures and platforms of knowledge that inform contemporary design management courses are varied. Whilst there is clearly a core literature on branding, product development, strategy and the key texts written on design management, other readings, for example service design, sustainability and organizational change were particular to specific courses. Typically courses and their students were using online sources, blogs, online interest groups etc., to inform thinking, particularly when looking for information on design management practice, case studies, information on methods and tools etc.

Metamorphosis 9: May 2012, Dundee

The final metamorphosis event in Dundee reflected on the design management knowledge base that seemed to be core and changed little over time and the knowledge that was emergent and linked to changes in the context within which design management operates. Interactive sessions helped participants explore the future research projects that might develop both knowledge platforms.

Key Finding:

An ongoing challenge for design management is clearly one of communicating the value of design approaches and design investment. Whilst design literacy and organisational cultures in some sectors have clearly evolved there is still much to be learnt to promote design management in new settings. Further research benchmarking design management practices in different sectors, regions and forms of organization, were identified as priorities, but all linked to appropriate forms of dissemination that would bring this information in the right format to those that needed it, whether students or practitioners: many lessons here could be learnt from the January 2012 workshop. In parallel further research is clearly needed to support design management as it works in new contexts, in a globalized economy, navigating complex networks, dealing with global challenges such as sustainability, shifting demographics etc.

Rapidly shifting generic contexts affected all aspects of design management and provide drivers of change in the discipline. The timespan of the MDMN over six years provided a significant opportunity to record the evolution of change; some drivers remained consistent,

for example globalisation, others came into focus as the series of events continued. The impact of the economic recession was evident in new approaches to research, notably the expansion of design and differences between the concept and implementation of design in the UK and China, and the place of 'design' within a 'knowledge' supply chain. In Europe, the economic recession in Sweden had broadened the design industry's client base in different fields, such as services and packaging, and stimulated international expansion. The employment of sales and marketing specialists had enabled it to become more business oriented, harnessing education to build professional competence and capabilities but also to develop new ways of thinking in business education.

The development of, and possibilities for, emergent models of Design Management demonstrated both the interdisciplinary complexity of the discipline and new roles for design and the input of designers within organisations and their networks. The first MDMN event concluded that "there was a need to recognise cultural and contextual differences, the heritage between large and small organisations and the impact [occurring] between organisational and national cultures". Consumer demand for greater meaning within products and services and increasing consumer co-creating activities, added further dimensions of complexity. These were highlighted in practice, through the creation of customer and consumer experiences. This could be achieved through a cyclical understanding of both customer and consumer needs and the fundamental role of intelligent design to balance the products and experiences required by consumers.

The relationships and nature of knowledge exchange between practice, education and research in Design Management

Through the MDMN events it was clear that the experience and skill sets of those working with design management is constantly evolving and that as contexts change over time, the background and experience of designers entering these programmes is rapidly developing. A useful starting point for understanding these relationships is the question considered by participants in Metamorphosis 1, "What is the future of Design Management in practice and education?" They identified six themes: language and communication; multidisciplinary collaboration; performance and measures; projects versus systemic logic; Design Management in the context of different organisational cultures; and the development of a body of Design Management knowledge and methodology. In subsequent events, changing contexts provided a further significant theme. In examining the educational in Design Management, the symposia generally took a design school perspective, in contrast to Cooper and Junginger's (2011) focus on design in business schools. Evidence of knowledge exchange through these themes was undertaken from an analysis of transcripts and event activities.

Firstly, the exposure of students to organisations and different design contexts formed a consistent theme. In part the emphasis on Design Management in organisations, and the range of interactions with practitioners, had a pragmatic purpose to highlight the diversity of roles related to Design Management - and potential job opportunities - and their organisational significance. Knowing what's happening in the 'real world' takes place through teaching and learning strategies, within and outside the university with a highly permeable boundary between the two. The contexts were typified by their variety, reflecting the institutional vision, resources, access to external activities through the Course team's contacts, and the specific aim of the course and its ethos defined and mediated by the Course Director. Thus they included large and SME organisations in both the public and private sectors.

Teaching staff were seen to be important facilitators in Knowledge Exchange both as practicing designers outside the university but also in their ability to access other design sub-disciplines. Dialogues with professionals and practitioners, from experienced names such as Terence Conran to new alumni demonstrated to students recent achievements and success stories. These related not only to design, but also entrepreneurship, and specific examples, such as Oliver King's work were cited. Educational spaces can be important too. The spatial design of Ravensbourne's new site enabled students to look at how the new technology of prototyping works. Following the collective view of Knowledge Exchange, the learning environment enables collaborations "with people from other courses to talk in each other's languages."

Outside the university industrial engagement was important. It was noted on one course that there was a significant emphasis on internship and involvement in "doing" workshops and surveys, one case specifically cited knowledge transfer in a project in the workplace. Knowledge exchange took place through different types of interaction, through co-designing, for example prototyping projects, and more broadly exchanging, testing and evaluating ideas. Examples included a formal case study in South Africa, but also projects ranging from a university library to a farm shop. One presenter specifically noted that workplace activities should integrate learning from the course modules, and that students should demonstrate an ability to reciprocally apply theory to practice and practice to theory.

Closely related to this theme was the importance of environmental and organisational change and the currency of Design Management education. Some courses specifically looked to external environmental changes, the global scale of contexts and rate of change. The aim was to cover advanced Design Management theory and relate it to current Design Management practice within a global context. One presenter explained, "everybody is asking about live projects ……when they apply", and so the link with industry is crucial. What was 'delivered' on the course was relevant to the students, and relevant to businesses as well. In this respect, online resources have taken on an important role in accessing and maintaining topicality but also in the development of learning materials in new and emerging areas of Design Management.

The mix of students on courses provided a further opportunity for collective exchange of knowledge. Collaborations could be organised with other courses with complementary skills and knowledge, for example, two-day innovation camps with MBA students to acquire fresh perspectives on their discipline. In addition the diversity of the international student body, in one case with 35 students from 20 countries, was a valuable source of knowledge exchange. More broadly a responsibility of the course team, could be to address the knowledge that overseas students gained from the course to take back home.

Interdisciplinarity continued to provide a series of challenges, in part because the symposia contained little explicit discussion of either inter or multi disciplinarity. Design Management cohorts in Design Schools attract students from a range of design backgrounds and to a lesser but still significant extent, business and management. In one case, the course design and its delivery had to enable non-designers to be "brought in". A key challenge with designers and non-designers is to develop a common ground of knowledge as well as skills: a common understanding of individual approaches to design and management. A speaker explained to their students that they will be "working with people from different disciplines who won't necessarily understand what your particular knowledge and skillset is about". It was important for students to acquire the language of business "…..words and ways that business people understand the strategic value of design". On the other hand there are series of challenges to teach non-design students about what goes on in designing which is "….experiential, problem-based" and to consider "… how do you organise for design?", and how might designers be structured into organisations. Business students could learn to understand 'better' design, how designers think and develop products. Elsewhere courses were concerned with complex problem solving and experimentation facilitated by access to other course pathways' practices. These could include electives or units in creative innovation and interactive digital media, combined in project and practice based learning approaches.

The first symposium had posed a question about the development of Design Management knowledge and methodology. In part the challenge was seen to be moving students from narrow thinking about 'design' specialisms to a broader perspective of design. In one case students had a notably strong product design focus, but learnt to understand the possibilities for design: where design is, where design can be, and to open up conversations which had previously been missing. In other cases students were interested in the strategic level of design, how they can set the direction for design in an organisation. Student motivation and intention could determine the direction and implementation of the course. A significant group of design students aimed to set up their own companies and were motivated to develop their entrepreneurial skills. In one account, skills development rather than learning, described the purpose of the course, and this focus on skills was generally replicated in other presentations and discussions.

It was evident that knowledge was exchanged through 'collisions' between students from different disciplines, for example in systems design between technologists and interaction

designers, user-facing designers, anthropologists and sociologists. It can be important too, to introduce critical perspectives from social science and humanities educators and researchers, with new ways of talking about knowledge, concepts, and processes with designers, and to create new methodologies through these collaborations. More broadly one speaker exposed a need to be more challenging, using an example of the consultancy model for design and design thinking and its role in the world. This requires students to develop critical - and challenging - abilities through their Design Management course. By implication these interactions point to innovative approaches to the discipline and the development of theory.

The balance between theory and practice formed an important consideration in the ethos of the course and its design. Experiential and problem-based learning approaches were favoured in curricula design and learning strategies. The role of theory was explained as a way to see connections between practice and more conceptually, reflect on existing categories of design and the ways in which design activities could be re-categorised. There was also a sense that management and organisational theory in particular, needs to be confronted to provide a framework for further development. More conventionally for designers, the use of models and ways of visualising areas of practice and contextualising them were explicitly highlighted. One course team "…..can pick them [the students] up from where they are, using models and visualising and exemplifying these different ways [and] areas of practices, and contextualising them in different economies, in different industries, [so] that the students ….. can do some real intellectual work ….. grasp their discipline and understand their choices so they're prepared to engage in different areas and different cultures." Different cultures could also include the disciplinary culture of design and design thinking for management students. While there was little evidence of tension between practice and theory - and an emphasis on theory and in contrast, practice, were specifically highlighted at two universities- it was clear that a spectrum of courses exist from research and theory-led, to practical conversion courses.

Returning the question posed in the first event, relationships between education, practice and research were most evident, as well as most developed in the theme of Design Management in the context of different organisational cultures and also, although this was not explicitly discussed, multidisciplinary collaboration. A potential problem here is to define 'multidisciplinarity' through the expanding range of sub-disciplines and media that Design Management embraces and this is reflected in the development of language and communication. The symposia demonstrated an established core of Design Management knowledge and methodologies, around which new areas of research and education engaged with emerging practices. In these, dynamic projects formed a significant element; development of systemic logic in the field was less evident. Overall there was little evidence for the development of the theme concerning performance measures.

CONCLUSION

The series of symposia from 2007-2012, enabled participants from research, education and practice to explore and evaluate the changing relationship between each element in Design Management. Their findings demonstrated the opportunities to exchange knowledge through workshop activities and discussions, and supported Ward et al.'s (2012) work on the importance of creating shared spaces through interactions and shared experiences. The symposia highlighted the importance of the stages of understanding, accessing and utilising both tacit and collective knowledge from all three types of participant. The dynamic nature of knowledge in organisations has been frequently acknowledged, and the symposia confirmed the highly fluid and contextualised state of knowledge exchange in practice, reflecting generic drivers of change primarily globalisation, sustainability and digital innovation. Specific drivers of change were identified in organisational complexity and diversity, and Design Management's engagement with increasingly diverse fields of management extended to behaviour, both organisational and consumer. The final symposium in particular pointed to an increasingly interdisciplinary future. A willingness to work across disciplinary boundaries was evident in course design and learning strategies, but also students' interest and motivation to develop their skills: entrepreneurial skills development may be a particularly significant motivator. It was clearly evident in cutting edge practice which needs to more directly inform research agenda. Devising spaces for exchanges will lead to new methodologies and methods to firstly build theory, and secondly communicate the value of design and investment in design in new organisational environments.

Eraut (1994) proposed that researchers and practitioners engage in more joint research projects, mid-career seminars and continuing career development opportunities for practitioners to reflect and acquire new perspectives. The MDMN events clearly demonstrate how collaborations between research, education and practice can take place.

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Measuring and Improving the Performance of Product Development in Small and Medium Sized Enterprises

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Keywords: Product Development, SME, Performance Assessment

Small and middle-sized enterprises (SME) tend to solve problems from a short term perspective generating sources of inefficiency in their processes and products. Methodologies to identify those sources of inefficiency exist, as well as descriptions of manager's role in a project. However, no specific concept for each inefficiency source or determined activity to be performed by the manager is given.

The research results presented in this paper start by creating an understanding of the main activities in Product Development by building a system model. This is followed by an individual analysis of each entity within the system and its interfaces. The research concludes by integrating the measurements of single performance parameters at an entity level to allow for an overall analysis.

This paper provides two perspectives on the performance of product development activities. The first level is local and regards issues related to each entity and its interfaces. The second summarizes the behaviour of single entities to form a unit, spanning the overall system of the activities to be completed. Suggestions to improve the performance rate at entity level and the overall project's performance are presented for task responsible persons at single entity level.

Measurable parameters are necessary to establish the performance of single entities. This eases decision making processes and enables SME to reformulate their strategy when it is necessary. The relationship between manager and employee is transparent. The improvement measures of the activities performed in Product Development are compatible.

INTRODUCTION

Small and Medium sized Enterprises (SME) are facing continuous challenges. These are the ongoing acceleration of customer expectation on products and the competition of other companies offering very similar products (Foster, 1986). The goal for any SME is to achieve higher product performance while reducing the cost of the product. Moreover, the market environment benefits those companies achieving this goal.

In order to fulfil the increasing demand on the technical capabilities of the products, SME adapt their processes to market needs. This motivates a short-term planning conducted by the company. Thereby, sources of inefficiency are introduced (Eben, et al., 2011). (Syamil et al., 2004) contribute to this opinion by sharing that monitoring of the processes' problems could be corrected before manufacturing, pointing out the need for a planned business/product strategy.

(McManus, 2005) studied the cost of changing the design of the product at each of the different design stages. The study adds that changing the design in late stages is more expensive and invites designers and companies to plan carefully and perform trade-offs based on requirements.

Strategy, planning and rapid decision processes need data tracking and visualization of all processes involved. Any process' update has an impact on the capabilities of this process, on the overall product's cost and requirements fulfilled as well as on the company's performance.

Lean techniques have been widely implemented in manufacturing . Toyota has been the example to follow in the car industry first and from there it has evolved to other markets. Applying lean techniques to product development activities have a bigger margin of leeway to improve as they represent a bigger percentage of the total product cost (McManus, et al., 2005). Lean techniques are not only compatible with the tools introduced in this paper, but also can be used to identify the sources of inefficiency, such as the Product Development Value Stream Mapping (PDVSM) (McManus, 2005).

However, (Karlsson & Ahlstrom, 1996) state: "Not by implementing one or a few lean techniques is sufficient for achieving lean product development". Karlsson and Ahlstrom consider the following techniques as necessary: supplier involvement, simultaneous engineering, cross-functional teams, integration of activities, heavy-weight team structure and strategic management of projects.

Different tools to improve the performance of product development are presented in cited papers. However, an overview of tools applicable in the different product development activities lacks in literature. In this paper, tools are presented for each entity in product development and application examples are given.

In literature many methodologies are introduced to improve certain parts of product development. However, these do not present the impact of the methodologies on or links with

the other parts of product development. The effects of implementing these methodologies in the rest of the product development activities are not explained.

Current literature is based on the manager's perspective. This hides the relevance and capability of the workforce to push a project forward (especially in a SME).

This article aims to develop a tool for SME to assess the performance of its products and processes. Visualization tools are introduced so that employees and managers are supported to discuss and share ideas of possible methodologies to follow in order to improve their process results.

The detailed overview of the processes related to product development presented in this paper establishes a pattern for the relationship between objectives, employees and managers in product development.

METHOD

The presented results have been deduced from the results of a literature review on descriptions of different models for performance. This paper makes use of the performance definition given by O'Donnel and Duffy in their book Design Performance (O'Donnell & Duffy, 2005): Performance is a combination of efficiency and effectiveness. The search phrases used in the literature research are "SME performance", "Performance assessment" and "Lean SME".

First of all, a system model of Product Development activities is designed, covering the roles of and the interaction between the different entities from the literature (Clifford, 2008), (O'Donnell & Duffy, 2005) and (Hoppmann, et al., 2010). An entity, i.e. an element in the system model, represents important sub-processes in the development process such as requirements definition. For each of the entities methods are introduced, which can be applied to improve the performance of the activities carried out by the entity.

Once the entities are defined, efficiency and effectiveness – i.e. the performance – are described individually. Finally, the improvement tools for each entity are explained.

Subsequently, the overall performance of a SME is defined as a compound of effectiveness, efficiency and improvement rate.

Improvement rate (Ø) is defined as the amount of resources a SME needs at the moment compared to the resources it needed in the previous project. The resources can be translated into a monetary value or any equivalence. Resources can be time, raw material, and workforce. The improvement rate can be calculated according to the following formula:

$$\emptyset = \frac{\text{Resources consumed now}}{\textit{Resources consumed}}$$

The system model and performance definitions of system and entities form an overall assessment framework.

Finally, a conceptual simulation tool, based on the developed system model and assessment framework, is presented. The tool aims at simulating effects of improvement actions on performance and thereby supporting decision making for action taking.

RESULTS

The results are presented separately for the different entities of the SME system model of product development and for the overall analysis of an SME. A model of a small or medium sized enterprise is developed to define the activities of each entity of the company. From left to right the product evolves (fig. 1). As input for the model defined there is the feedback from customers, while as output there is the product delivered to the market.

Figure 1 depicts the structure of the SME system model, its entities and the interfaces between them. The structure has been developed based on the understanding the authors gained from the results of the literature review. From (Clifford, 2008), (Easterbook & Nuseibeh, 1995) and (Hoppmann, et al., 2010) the structure of product development activities in different entities is deduced. Moreover, the interaction between all the entities is understood and established.

Management and Suppliers are entities that partly belong to the product development scope. However, these entities are also responsible for activities outside of the system of study.

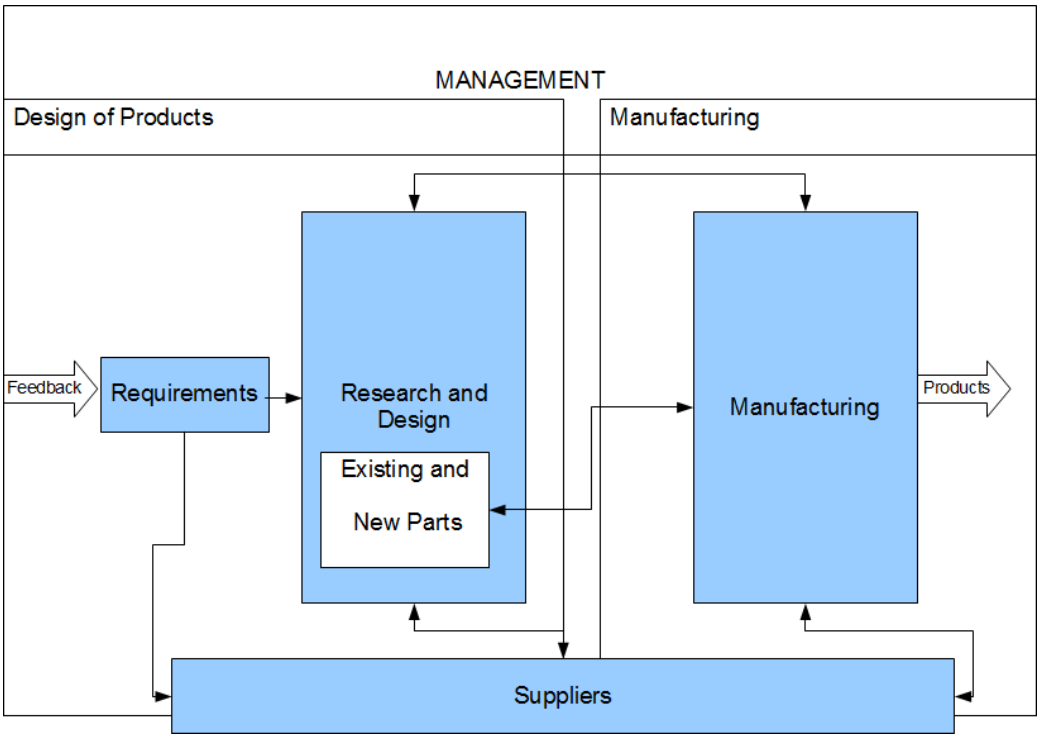

Figure 1: Structural description of the product development activities.

Requirements

At the early stage of the product definition stakeholders must be weighted properly in order to balance comments and needs from different perspectives. Stakeholders define the characteristics of the product and the trade-off designs to do in order to decide in favour of the product. This entity gathers the feedback received from the customers and important players of the project and turns these comments into technical specifications.

For this entity efficiency is determined as the division between the sums of the stakeholder's needs that are satisfied by the sum of stakeholders' needs. On the other side, effectiveness is the coefficient of Output and Goal.

Stakeholders can be characterized as a viewpoint (Gopkinar, et al., 2010). For each stakeholder viewpoint data form previous experiences and discussions should be gathered and stored. Stakeholders should be known by the tolerance to accept modifications of the previous products, the variability of their requirements during the entire project and other aspects of interest (examples: other companies with which the stakeholder works, focal point of the company for this stakeholder). These data would enable project leaders to know the stakeholders better before-hand and assess more accurately the weights of the stakeholders in the project.

Discussions with stakeholders require technical knowledge, experience and social skills. Negotiations require reliability and a high level of understanding. Therefore, setting viewpoints enables project leaders and the employees to understand the requirements better and translate these to technical specifications with a higher accuracy.

Experience shows reliability of the SME as well as of the stakeholders. These are weighted by their importance and the strength of their compromise with the project. Stakeholders with great demands should be respected as long as they had a positive impact on previous projects or their comments are shared with the SME.

Suppliers

A new company-supplier relationship should be achieved, while both sides are open-minded to collaborate and seek for mutual benefit. Data and technology capabilities should be shared to improve the know-how of the two enterprises. However, second-tier supplier management is also required. As shown by (Follis & Enrietti, 2001), second tier suppliers contribute to the success of a project. First tier supplier depends partly on their suppliers´ performance.

Regarding the entity suppliers, performance is defined as a combination of efficiency and effectiveness. The definition of effectiveness depends on the characterization of the supplier. From the concept introduced by (Dain, et al., 2007) two kinds of suppliers are considered: “parts” and “technological”. While the first type of suppliers produces parts for the SME to manufacture, the second type generates know-how for the products to be developed by the SME.

For the first kind of supplier, effectiveness is defined as the ratio between parts delivered and parts ordered. Parts delivered meaning those parts that are given and fulfil quality requirements. For the “technological” supplier type effectiveness is defined as the coefficient between the technical specifications fulfilled and the technical specifications ordered.

Efficiency is defined for the two types of suppliers as the division between expected value and delivered value. Value of the parts or the know-how delivered is to be considered by the ordering enterprise. Each of the deliverables may have a different value depending on its strategic importance for the project.

An open relationship between company and supplier should enable agreements such as the following: company and supplier should plot the number of times a product is outsourced versus the cost per unit. The new company-supplier relationship should enable the discussion of the cost reduction of the product. The supplier and the company establish the investment needed to reduce the manufacturing cost.

These discussions would lead to a benefit for the company as it is outsourced at a lower price and / or it receives parts better suited for its products, while the supplier company receives financial aid by the company to improve their processes and see the needs of its clients.

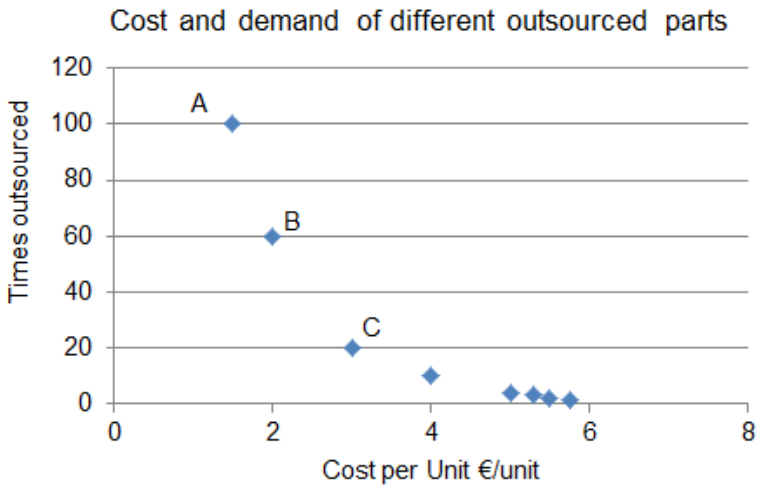

Figure 2: Relationship times outsourced versus cost per unit plotted in a graph.

Figure 2 shows an example. Regarding a reduction the manufacturing cost, parts A, B and C would be the parts that would benefit most the outsourced company.

Moreover, the suppliers must be evaluated also by their capacity to change their products and introduce variations in order to adapt to market needs. SME need to work with partners willing to meet customer's needs continuously, giving and taking feedback from the SME for the benefit of the project.

Research and Design

The Research and Design entity receives the technical requirements from the Requirements entity and transforms them into new products or subparts. In order to fulfil these tasks the collaboration of all the entities is required.

This entity decides whether it is necessary to develop a new technology or the evolution of a current technology satisfies the needs. It also selects the designs and how to meet the technical requirements. This selection has to be approved by the manufacturing and management entity, because the selection has to be feasible from the production and business perspective.

Regarding the entity Research and Design, efficiency is defined as the coefficient between Knowledge Gained and Resources Used, while effectiveness is the coefficient between Output and Goal. It is important to consider that maximum efficiency and effectiveness can be achieved by proving that a hypothesis is wrong. A goal could be: "proof technology A can perform B". The efficiency coefficient depends on the economic value the enterprise gives to the research performed.

Know-how of the technology performance and capabilities enables the company to decide between studying new technologies and focusing on current capabilities. Experienced employees take these decisions based on a graph such as:

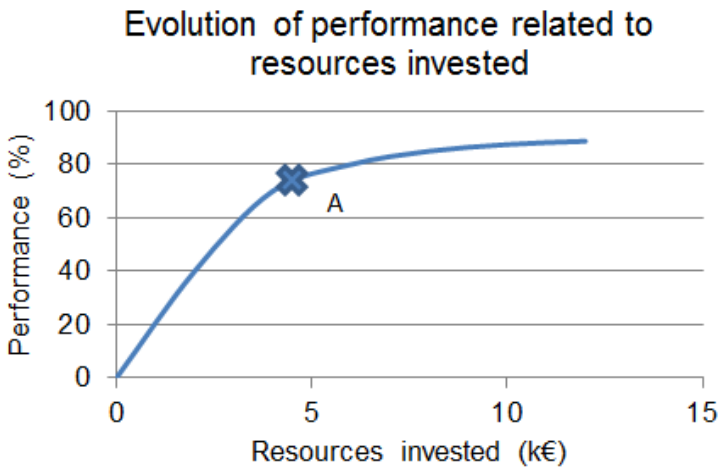

Figure 3: Example of the evolution of technology's performance versus the resources invested.

The graph has also been presented by (Foster, 1986). However, the curve should not mandatorily have an S shape. It is intended to be used by specialists to decide if it is time to switch to a new technology. Moreover, it can be used by technicians to present their ideas and potential benefit for the company and its products.

Overall Performance Analysis

The performance of the product development activities of the SME is based on the performance of each entity. However, the performance of each entity has a different impact on the overall performance.

Effectiveness is defined as the coefficient between the sum of goals planned to achieve by the different entities and the goals really achieved. Each goal can be weighted differently respecting the relevance of each technological specification for the product. Efficiency is defined as the coefficient between the sum of resources planned and the resources used. For calculating this ratio all kinds of resources may be selected selected, but only those considered important by all employees of the SME.

Different teams / departments have a dissimilar capability to adapt to changes. The skill to adapt to changes in processes is a skill that requires practice. As SME are facing continuous modifications on their processes, those SME with a higher proactivity to lead the change have a higher probability to succeed.

From the team and process perspective, the evolution of the coefficient "efficiency" x "effectiveness" needs to be analysed over time.

In the beginning, team leaders give the first priority to the objective. Therefore, it is assumed that in the early stages the effectiveness coefficient will increase while the efficiency will decrease. Once the goal is achieved, efficiency will gain value within the coefficient "efficiency" x "effectiveness". This assumption draws the curve in **Figure 4**:

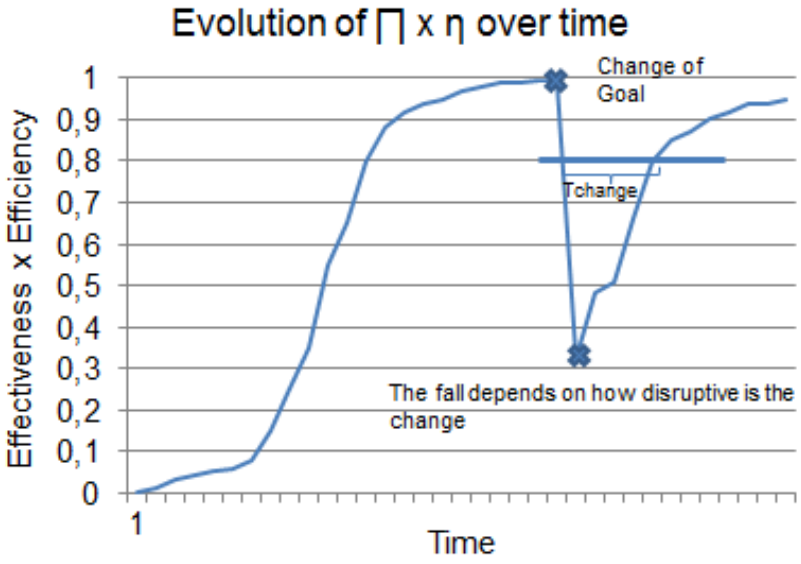

Figure 4: Evolution of the process' performance.

It is also assumed that if the process changes for any reason, the coefficient will change. The drop of the coefficient value depends on how disruptive the new objective is compared to the previous objective.

The time span Tchange represents the time needed by the team to adapt to these changes and achieve a reasonable "efficiency" x "effectiveness" coefficient. The smaller Tchange is, the higher is the team capability to adapt to any change in the process. This graph visualizes the skill of a team to follow track of the current technologies and market needs.

It is of strategic value to have teams with a short Tchange, so the SME will be able to provide solutions faster while being accurate to the requirements at the same time.

DISCUSSION

Improving the performance of the SME is a matter of compromise, e.g. a trade-off between the SME and its suppliers. SME must be aware of and support the benefits of the visibility of tasks fulfilled by the employees in order to apply improvement tools successfully.

The implementation of these tools must come with a sense of criticism. The indicators of efficiency and effectiveness must be correctly formulated, so that 100% efficient and effective means perfect performance of the SME. During the process of objective definition, it is essential to look for an optimum situation of the SME, while the results are interesting for the company and at the same time are feasible to be obtained by the employees.

Visualization of processes and results may find controversy among the departments. Employees at all levels must understand changes in their processes. Those changes do not mean that they are being inefficient at work, but e.g. new product requirements or changed circumstances could result in a need to change the employees' procedures to meet current

market's demand. This is aligned with the conclusion by (Longenecker & Fink, 2001), that improving performance is not expensive; it only needs the commitment of the enterprises, its managers and its employees.

In order to achieve a high performance rate, attaining compromise is essential. The relationship between managers and employees as well as the determination of the right objectives are necessary.

Multidimensional measures (financial and non-financial measures). Performance Measurement System (PMS) are seen as a responsibility of top management (Muhammad Jamil & Rapiah, 2011). The activities inside product development are not related to sales or marketing. From the product development perspective: "clients buy the product fulfilling their needs". It is considered that better products represent higher benefits.

(Longenecker & Fink, 2001) conclude that, in a period of rapid change, management development needs are large. In this article this idea is extended, the commitment of all employees is necessary to adapt to rapid changes successfully.

(Syamil et al., 2004) state that there is a time dependency of a value method's impact on waste sources. This concept is to be considered in the application of the tools presented in this framework to increase efficiency of the effort applied and the feedback. Experts in the processes are required to foresee which tools would eliminate at first the most of the inefficiencies in the processes. Experience helps to focus on the principal issues.

There is a linkage between manufacturing competitive priorities with business performance. High competent manufacturing should yield better business performance. "Firms manufacturing function is competent if it has a strong capability on a variable that is also considered important. If a firm is strong on what is considered not very important, one could argue that this particular strength does not add too much to the firm's manufacturing competence "(Kim & Arnold, 1993).

The framework assesses SME to increase their performance in the product development activities. It must be analysed under the perspective of the firm. Each firm has a unique market situation, technology capabilities and workforce (Clifford, 2008). Therefore, not all tools or ideas are applicable to a specific SME. Success is not guaranteed just by applying the tools presented in this framework. It is mandatory to select and adapt the tools to the environment.

The framework has a number of advantages that make it attractive for anyone who considers implementing the tools. First of all, tools are explicit and direct. Expected benefits are explained so the SME knows the result to expect. Second, the framework is not addressed to a specific market or technology field, i.e., it can be applied to any kind of firm for any product. Third, the resources required to implement these tools are low. As it is stated by (Longenecker & Fink, 2001) SME needs commitment and clear goals to improve their processes. However, the framework has not been tested in any SME so far. For this reason,

SME future work needs to focus on examining applicability and acceptance of the concepts presented in this paper.

CONCLUSIONS

The research presented in this paper was initialised with the aim to analyse the environment of the product development activities, while assessing the performance of these activities by technical variables. It started with a structural study of the product development activities. Once structural units were defined the research focused on the definition of performance of these structural units, while adding tools to improve the performance. At the latest stage the performance of the overall system is defined.

On the one hand the analysis of each entity leads to tools that improve the performance of the entity as well as the overall SME. These individual tools require experience in the activities done at the entity and the motivation by the employees to look for improvement. On the other hand, the overall analysis enables employees and managers to evaluate the performance of the project with the entities' performance as variables. The overall analysis gives a higher visibility of the needs of each entity and where more resources are needed.

So far it has been possible to introduce a tool based on a Microsoft Excel sheet assessing the performance of the overall product development activities. This tool needs input from the employees, but it shows the performance depending on the weights of the processes and its characteristics.

This framework sets a method to improve the performance of the SME by motivating the workforce of the SME and the suppliers. It is necessary to involve the SME and the suppliers in the projects in order to achieve the improvement. For this reason only a motivating and constructive environment make the tools implementation possible.

The management applied by implementing these tools is essential. The management should not convey the notion to their employees that workforce should be cut down or resources necessary in order to reduce workforce and resources consumtion. A SME has the chance to start new projects around their core activities, know-how and technologies. Workforce must rely on the management of their company. Management must not perceive new methodologies and resources consumption as a threat. This would make the tools introduced in the framework not feasible.

By implementing these tools in SME main benefits are expected. However, side effects and new inefficiencies sources may also be found. The relationship employee – manager and SME – supplier will change, but it cannot be guaranteed that it will turn well. The level inefficiencies arise to will decrease by implementing these tools and other tools. It is not expected to reach a point where no more improvements are necessary. This is about to be the beginning of a path of continuous improvement and continuous research for meeting better stakeholders' needs in the products developed.

This paper presents first results of on-going research. Currently, a Simulation tool and the introduction to an app developed for Android Operating System needs further studies. From this point concepts are given for researchers to discuss and analyse the benefits of mobile tools to make the control of the processes easier.

The implementation of the tool in mobile technology aims to ease the access of employees and managers to know the performance of their processes. This way enables the workforce to follow track of their processes 24/7 if needed. Moreover, this tool enables employees to reschedule their objectives, set meetings with co-workers or suppliers and find inefficiencies in their processes.

Future work will focus on testing these tools and any combination of them, in order to examine its applicability and the benefits it provides in the long term. Although these tools are meant to increase the performance, second side effects are not studied so far.

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New Personas for Design Management: Public Management roles redefined for design

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Keywords: Design Management, Design thinking, Public Management, Designers

The main argument of this paper is new roles in design management are emerging in the public management domain. This paper draws from empirical based research on a case study of the Australian Taxation Office and its application of design in its management work. The research findings discuss three new roles: the Design Champion, Design Manager, and the Designer as situated in complex networks drawing attention away from intrinsic qualities of designers to a more networked view. A new model "Integrated Leadership Model in Design" shows collective agency of these roles.

AIMS

The idea of a pubic manager being a designer is both provocative and challenging concept to grasp. In the context of public organisations striving to be more innovative this proposition can be found in a growing discourse that public management which is more participatory, human centred or designerly, brings the necessary set of attitudes, methods and modes of working to stimulate innovation (Brown 2008, Buchanan 2008, Martin 2009, SunningdaleInstitute 2009, Bason 2010, Briggs and Lenihan 2011). This trend in public management is indicative of the overall shift in the design management discourse that sees a new application of design thinking to design problems that are inherently complex and strive for multi-level outcomes and results. The aim of the PhD research, which this paper draws, was to shift attention from what is design, design methods, design process or design thinking to *how* public organisations embed design in their management practices.

This paper explores the new design management roles emerging in public organisations. It is proposed in this paper to understand these new roles, we can empirically understand their

contingent positions in relations within complex networks of human and material entities rather than the intrinsic capabilities, potentialities or personal characteristics. As such this paper discusses three types of designing managers and designers: senior leader as Design Champion, the public manager as Design Manager, and the public employee as Designer. For each of the roles two questions addressed: First, what does one look like? Drawing from the analysis of participants in this study personas have been developed. Secondly, what is their network and how do their relations in the network situate them as agents to promulgate design activities? To answer this, a description of the managing by design network in which they are situated will be discussed. This paper will conclude by discussing the agency of the three designated design roles resulting in a unique contribution to management theory and practice with the "Integrated Design leadership model".

LITERATURE REVIEW

Design Management is a growing field and it has turned attention from manufacturing and product design management to service design and services of complex organisations. The application of design in organisational setting has been around for some time. One of the endeavours over the years has been to understand ‘design’. The journey of design thinking can be traced back to design studies in the 1970s and early 1980s which primarily looked at the cognitive abilities of the designer, the design process and design artefacts (Archer 1979, Jones 1979, Thomas and Carroll 1979, Schon 1983, Jones 1992, Galle 2008, Visser 2009). The movement of design into the domain and interests of management and organisations has been a growing trend. Scholars and practitioners from management and design have collaborated over the years to discuss possibilities of design and management coming together. A seminal book, published in 2004 and based on a conference in the United States in 2002, called Managing As Designing (Boland and Collopy 2004) applied design philosophy, methods, and practices to management.

The attention to the manager, has since then been expanded and attends to the executive and how they can adopt and change to incorporate design thinking in their work: According to Martin “Executives should look to the concept of “design thinking” and learn how to apply it more widely to processes like strategy development and business model innovation” (Martin 2011). Much of the literature about the manager as a designer focuses on the individual and how they can become a different kind of manager in their organisation. One strand of this literature focuses on how to use design thinking as a way to understand and tackle the complexities of problems faced by contemporary business operating in fast changing global contexts (Hippel 2007, Castellion 2010). While this discourse pays attention to these intrinsic qualities there is an opportunity to pay attention to the situatedness of the design managers, and in doing so identify new situations, and provide new definitions to design management. This is where this paper attends – to new applications of design management.

APPROACH

The research design, a single case study, explored the adoption and embedding of design as a management practice in the Australian Taxation Office (ATO). The ATO is a pioneer in applying design methods to its administrative work (Junginger 2006, Body 2007, Terrey 2010, Terrey 2010). This study used Actor Network Theory (ANT) to both shape the inquiry and the analysis of the study. By using ANT this drew attention to the “human” and the “non-human” elements and the importance of the networked view of these elements in seeing design as a management practice. ANT brought attention to the materiality, the semiotic relations between the elements such as designers, the artefacts they made, the interactions they had with other people in and outside the ATO, enabling a deeper more practiced appreciation of design in the day to day everyday life of management work. ANT is not a casual theory but rather looks at the empirical level by illuminating all elements at play, in ways that "flatten" the social by including all things human and non-human.

The analysis using ANT drew from a wide range of qualitative data sets, which provided a rich picture of what it means to design in the case organisation. Over 3-year period, extensive exploratory interviews with designers and management in the ATO were conducted; review of organisational documents and auto-ethnographic accounts from the researcher’s own experiences as designer in the ATO made up the dataset.

The diagram illustrates these methods and data sets.

Actor Network Maps: Illustrate design roles

The research gathered and analysed multiple accounts of designing practices in the ATO and drew these accounts into Actor Network Maps to see the actors and networks in action. It was possible to see different levels of designers in action, because the study explored design from perspectives from senior managers, middle management and team members. In each of these tiers it was clear that people either had assigned formal roles as designers, or were at least active in the action of designing. ANT maps were created from the data provided in the interviews and accounts. The ANT maps show the network of relations across these three organisational roles and discussed in the next section: "Key Findings".

The study of these networks provides the landscape to ask such questions: what actors are present in their network? How do their relations with these other actors in the network situate

them as agents? As actors in their network, what do they do to enact design in the organisation? This analysis shows how different design roles' agency is a distributed outcome of the network and the emphasis is on the relations in the network and how this makes it possible to carry out design in their management work.

KEY FINDINGS

The main finding is the *situatedness* of the designing managers and employees. The emphasis is on the actions that these actors take to build networks that make managing by design possible. This contributes to a silent space in the literature on how design is enacted in organisational settings. The findings presented here argue that what is required is a network of human and non-human actors in an organisation for design to stick or become a practice. This argument adds to the existing research and knowledge on the individual as designer, design thinking or to intrinsic abilities of people to do design (Cross 1995, Cross 2006, Michlewski 2007, Lawson and Dorst 2009, Cross 2011) by showing the relations they have with other actors. The findings will discuss each of the design roles.

Senior Leader as Design Champion

Persona

Max[1] is a senior leader and is a Design Champion. Max has worked in the public sector for over twenty years and has held a senior level role for the last ten years. He is focussed on the outcomes of the organisation and results. He invests time in relationships and empowers people to do their job. In the capacity as a Design Champion, Max understands design in terms of how it creates value for the organisation. He invests resources and support employees in design roles because he sees results. Max can be 'counted on' in conversations to stand for design. He spends time supporting and guiding others in design. He creates space in the organisation to experiment and learn. As a Design Champion Max also enjoys being active in the work of design:

"So I am interested in design personally because I like the creativity that I believe goes with design and I love the intellectual jousting that can go on with it - ideas where you are - in order to achieve a good design, you are about exposing, considering, accepting and rejecting different ideas. I love that. I find it energising" [Quote: Senior leader]

Networked relations

The senior leader as Design Champion is an actor in the managing by design network who employs strategies to enrol others and translate other's interests into their interests. The senior

[1] Max is a fictitious character. The description is not attributable to anyone. The text is based on a thematic analysis of all participants who acted in this role in the ATO.

leader has a few advantages by nature of their position and influence in the organisation which means they create obligatory passages (Callon 1986) or places of influence affecting a range of actors, both human and non-human. In the analysis of their network, there were multiple characteristics, which exemplified their role as design champion. One of these characteristics was their role in delivering communications and speeches to other actors. It was evident that Design Champions created scripts to deliver consistent messages about how design works to achieve organisational outcomes. This is illustrated in a speech from a previous Commissioner of Taxation, Michael D'Acenszo: *"By listening to and co-designing with taxpayers and others, we can build community trust in our administration and reduce compliance costs"*[2]. Another characteristic of the senior leader as Design Champion is the investment in design resources. For example Design Champions around the organisation all employed design managers and designers in their teams. They sponsored projects and encourage design methods. They actively played in a role in select projects demonstrating their intent for the projects and maintaining a human-centred approach.

Actor Network Map - Senior leader

[2] D'Ascenzo, M. (2007). Keynote address: The Business of Adding Public Value Commonwealth Director of Public Prosecutions Luncheon. Tasmanian Club, Hobart, Australia.

Public Manager as Design Manager

Persona

Mary[3] is a Design Manager. Mary works at the executive level of the ATO and has operated at that level for five years. She is organisationally aware of the strategic goals and outcomes. Mary is located in one of the business areas in the ATO. Mary is responsible for leading design projects and building and managing a design team within her business area. She has a strong interest and ability to communicate design in the organisational context. She builds relationships well with others, including peers, senior leaders, her own design team and with a variety of stakeholders across the Tax System. She actively engages across the organisation and within her business areas to ensure design is supported and understood:

"I make sure that we've got projects that need to have design thinking in there, have them in there. It's about growing people, the practitioners themselves" [Quote: Design Manager]

Networked relations

The many relations that make up their network define the public manager as Design Manager. The Design Manager is dedicated to apply design to every day project work. The work of the Design Manager is characterised by constant processes of negotiation and persuasion between many actors. Their network is characterised by many features, and one important feature is encouraging other actors at every opportunity in projects to engage with the end users and the community, that is to take a human centred approach. This is driven by the need to break down the barriers between the tax manager and the community. The Design Manager does this through creating interventions, which create environments, which enable the taxpayer and/or tax professionals and the organisation to collaborate on specific design projects. A simple illustration was the story of one Design Manager who was able to broker relations with the indigenous community to participate in a project exploring indigenous micro businesses. *"I knew people in our indigenous advisory groups, and others in networks of my own, then contacts led to other contacts and we were able to engage with end users" [Quote: Design Manager]* The Design Manager acts as an agent of persuasion in the day to day with new business leaders and new project leaders. They actively invite these people into design activities to immerse them in design. The relations between the Design Manager and their team of designers involves coaching, mentoring, developing design skills are critical characteristics of their network.

[3] Mary is a fictitious character. The description is not attributable to anyone. The text is based on a thematic analysis of all participants who acted this role in the case organisation.

Actor Network Map - Public Manager

Public Employee as Designer

Persona

Sean[4] is a designer and has worked in the ATO for about four years. He has been in his design role as a design facilitator for the last fourteen months. He works for a design team in the small business area. He reports to a Design Manager. He works with five other designers. The other designers in his team include another design facilitator, two user researchers and two information designers. Sean is a highly energetic design facilitator and has a credible reputation across the business line for his facilitation and design skills. He has good working relationships across a number of areas in the organisation. He is deeply interested in design and has done a number of short courses and been mentored by some external consultants. He is willing to immerse himself in new contexts and work with new people on projects. Sean enjoys the challenges of complex tax projects. He relies on his peers in the organisation who also have design roles and he participates in the communities of practice to maintain design skills. He also engages in the broader design community across the public sector.

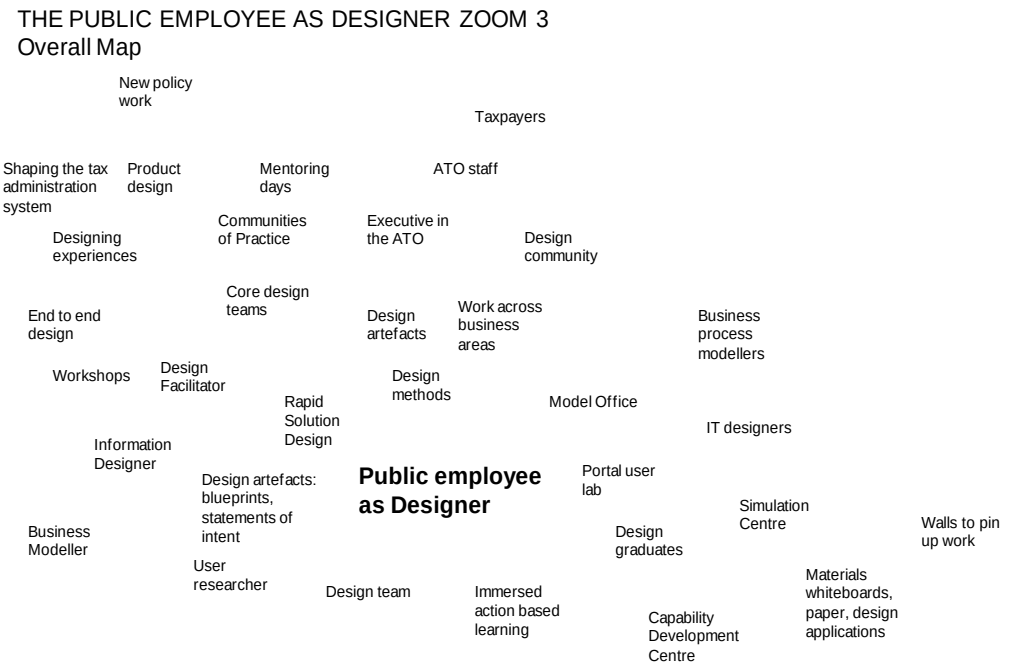
"I enjoy the variety of work I do. I get to explore challenging projects using design, and I am able to facilitate creative conversations across many parts of the organisation" [Quote: Designer]

[4] Sean is a fictitious character. The description is not attributable to anyone. The text is based on a thematic analysis of all participants who acted this role in the case organisation.

Networked relations

The network of the Designer is similar to that of the Design Manager. The critical differences are in the areas of the design artefact, the execution of the design work and the depth of engagement with design projects. The designer in the ATO is not a lone genius - they are interactive and engaged with other designers. The designer is part of a larger group of designers and whilst they are allocated to specific areas in the organisation they interact with other designers regularly. They are busy doing design and spend more time on a few projects and run the design process. One of the important characteristics of the designer's network is teamwork. The designer situates between two types of teams in their work. The first type of team is a multi-disciplinary project team, known as a core design team. The core design team brings together several, usually separate, branches of expertise from across the organisation e.g. law, operations, marketing, IT, HR to solve organisational design problems. The other team is an intra-disciplinary team, and this is between other designers in the ATO who are active in the disciplines of design, such as facilitation, information design, and user research to build skills and share expertise. This team-based view is important for the designers because this is how they create value in the organisation. The value of team based approach is illustrated by one designers reflection

"They [business areas] get involved in the core design team workshops … being able to get involved right from the beginning, they have the history from the beginning so they understand why decisions were made" [Interview, Designer manager #9, 2008]. The Designer is also the creator and producer of design artefacts or non-human actors such as maps, models, taxpayer pathway maps, which play a critical role in building a shared understanding of design. The Designers direct and shape design activities within projects. They grapple with interactions of all actors in their network in enacting design practices. They persuade and adapt to allow design to flourish as a practice.



Actor Network Map - Public employee

The collective agency of these roles

What is the collective agency of the Design Champion, the Design Manager and the Designer? These human actors work together as a set of integrated designers in the organisation. As a network of human actors they collectively act as obligatory passage points for design to be practiced. They set up the conditions, they draw together the necessary actors, and they ensure there are common scripts for others to follow. They each bring unique characteristics to their design networks as well as shared characteristics. In the analysis of the shared characteristics across all three roles, there are three main characteristics are:

1. ‘Building shared understanding of design’;
2. ‘Investing and building design teams’; and
3. ‘Participating in design projects’.

These characteristics point to the collective agency of the three roles. This is modelled below:

Shared role	DESIGN CHAMPIONS	DESIGN MANAGERS	DESIGNERS
"Building a shared understanding of design"	Define and reference design scripts to focus on understanding outcomes	Engage and educate other actors in design practice	Create the design artefacts that travel to communicate design
"Investing and building design teams"	Recruit designers and design managers in their business teams	Manage a design team and build skills and confidence	Take a multi-disciplinary team approach and maintain intra-design disciplinary teams
"Participating in design projects"	Participate as a leader of intent in design projects	Lead design projects and ensure human-centred practices are enacted	Develop and enact design methods and processes for each project

Illustration: Integrated Design Leadership Model (IDLM)

This table concludes that the design roles operate within their networks reinforcing three main points of agency, which contributes to everyday practices of design. These three roles are vitally important to the sustainability of the design networks across the organisation. This means that these actors play a critical role in establishing design as relevant and useful management approach and are instrumental in the on-going embeddedness of design in in the case organisation.

IMPLICATIONS FOR THEORY AND PRACTICE

The three roles of design management identified in this case study of the ATO demonstrate a powerful collective network of actors; actions and interactions which when combined present a compelling **Integrated Design Leadership Model (IDLM)**. The importance of the IDLM is that it demonstrates the importance of a multiplicity of actors to ensure design is enacted in organisations. The IDLM elevates the importance of collective action, rather than focussing on individuals, or design method or process as a critical ingredient for new forms of design management to take hold in complex organisations. The viability and sustainability of design management is contingent on all these roles being present in the organisation. These roles are observable, and found in many locations, not just one central team. The IDLM provides practical guidance to organisations attempting to institutionalise design by identifying the types of roles to appoint in organisational structures. In addition, once these roles are in place providing the space to allow these roles to build their networks and enacting their roles in their respective networks is an important implementation strategy. The IDLM also levels the "status" of design management - edifying all three roles and highlights the importance of all

roles not just the champion, or the designer. The emphasis on three tiers acknowledges the complex and dynamic nature of organisations and that design management can have an instrumental role in organisations if organisation leaders are willing to let the Design personas come to life.

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On Managing Innovative Design Projects Methodologically: The Case of Framing

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Keywords: Management of Innovative Design, Design Methods, Framing

In this contribution I present a challenge that innovation by design thinking poses to its management, and describe an approach to take it up. The challenge is that advocates of design thinking are critical to managing design projects by upfront defined targets, claiming that it blocks innovation. The approach to take it up is to manage design projects by means of the steps that are discerned in methods of design thinking. For this alternative management the methodological steps of design thinking should be described in a SMART manner, which is explored for the design technique of framing.

INTRODUCTION

Design thinking is currently embraced as a new and general means for innovation in industry and society. The methods of design thinking developed at, e.g., the Design School at Stanford and Potsdam (e.g., Plattner et al. 2009; D.School 2011), IDEO (Brown 2009) and Philips Design (Gardien 2006) are presented as successful in innovative product development and as having the potential to also innovate policies in business (Verganti 2009) and for addressing societal issues (Brown and Wyatt 2010). These promises of design thinking come however with a managerial catch. The advocates of design thinking are critical to existing management practices: designers require a rather free hand for arriving at innovation, and the pre-set targets of project management and the fixed time-windows part of return-of-investment criteria are taken to be limiting that free hand. This criticism challenges the usage of design thinking in industry and society, and the challenge is for both parties: when design thinking is to amount to projects without clear targets and without clear endings, designers need other means to convince their new clients of the feasibility of the projects they present, and these clients in turn need alternative means to managing the design projects they commission.

In this contribution the managerial challenge of design thinking is taken up. I argue that if the methods of design thinking are made more explicit by specifying their methodological steps

in a SMART manner, then design thinking projects can be presented and managed by their methods without blocking innovation with pre-set targets or fixed time-windows.

This contribution is primarily a theoretical one and may be taken as a position paper. The proposed approach toward the managerial challenge of design thinking is made plausibility by argument; empirical evidence is not provided, but the potential of the solution is illustrated by detailing what it implies for the design technique of framing, which is a methodological step part of many design methods for design thinking. An earlier version of the argument has been given in (Vermaas 2012); this contribution gives content by its application to framing.

I start by briefly describing the methods of design thinking and the criticism of existing management tools. Then the argument is given to manage design thinking project by means of their methods. Finally I consider what the proposed approach means for framing.

METHODS FOR INNOVATIVE DESIGN THINKING

There are various methods for innovation by design thinking, similar to that there are various methods for engineering design. A more well-known design thinking method is the one associated with the Stanford and Potsdam Design School and with IDEO, as described with different nuances in the literature (e.g., Brown 2009; Plattner et al. 2009; D.School 2011). In the version of (Plattner et al. 2009) it is a linear sequence of six steps, as depicted in Figure 1. The linearity allows for iterations, and in design projects there may be many. For instance, in the first 'understand' step in which the initial problem as formulated by a client is analysed, and in the subsequent 'observe' step that includes ethnographic studies and interviews with prospective users, the designers concerned may decide that the problem is still not well understood, leading one step back to the ‘understand’ step.

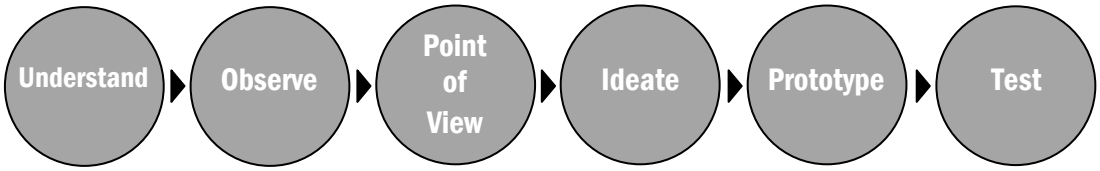

Figure 1: the Design School method in the version of (Plattner et al. 2009)

Another example of a design thinking method is one aimed at modelling how innovative design projects take place at Philips Design (Gardien 2006). It divides these projects in nine steps ordered in a matrix (see Figure 2), where the columns indicate the length of the time perspective - its horizon - considered in a project, and the rows the target to be achieved. Horizon 3 brings together steps with the longer-term perspective of firms to define new options for their business, horizon 2 collect steps with the mid-term perspective of building emerging business, and horizon 1 contains the firms' immediate tasks to maintain their

current core business. The target of steps on row 3 are to identify a value for users, steps on row 2 are about developing a value, and steps on row 1 involve communicating the value to users. A design project can take different trajectories through the methodological matrix. It can, for instance, start by identifying new values through analysing cultural trends (row 3, column 1), then test a value by design probes (row 2, column 1) and design products in collaboration with partners (row 2, column 2), and end in incremental improvements of these products (row 2, column 3). Or a design project can start by identifying values by ethnographic studies of social avant-garde communities (row 3, column 2), move to designing innovative products (row 2, column 2), and present a value through concept products (row 1, column 2).

	horizon 3 (create viable options)	horizon 2 (build emerging business)	horizon 1 (extend & defend core business)
Communicate value	Aspirational promise	concept car	specific campaigns
develop value	innovative debate (probes)	collaborative innovation	Incremental Innovation
identify value	social cultural trends & narratives	future focussed persona research	people & market research

Figure 2: The Philips Design method by (Gardien 2006, fig. 12)

By both these methods for design thinking designers take their distance from the problems of clients. By the Design School method designers are to understand the problem a client formulates, and then to adjust this formulation, or the problem itself, by ethnographic observation. In the third 'point-of-view' step of that method designers moreover take a perspective on the client's problem by deciding how to frame the prospective users and how to frame the problem. Taking a personal music player as jewellery rather than as practical equipment, is an example of a point of view by which designer may stop to see the client's problem as one of merely finding suitable speakers, and frame it instead as one of finding items users enjoy to wear (D.School 2011, p. 22). And if this point of view is not working, designers may revisit this step and reframe the design problem in yet another way. The design method of Philips Design illustrate this distance to clients even more, since on this method design projects may define new business for firms, breaking away from the scheme that (the management of) these firms decide about their future business and then, as clients, hire designers to develop the products that come with this business.

Designers are by contemporary design methods more generally taking distance from the three main stakeholders in design. First, and rather schematically characterised, clients that order design projects are seen as stakeholders who may confront designers with problems that are ill-structured (Simon 1984), wicked (Rittel and Webber 1984) or paradoxical (Dorst 2006). Second, users are taken as stakeholders who formulate their needs in a conservative manner, leading designers toward incremental improvements of existing products rather than to innovation (e.g., Brown 2009; Verganti 2009), as illustrated by quotes as Henry Ford's that "if [he] had asked people what they wanted, they would have said faster horses", and Steve Jobs' "[a] lot of times, people don't know what they want until you show it to them." And, third, managers are seen as stakeholders who jeopardise innovation by requiring upfront fixed outcomes for design projects. Yet, in design projects that are aimed at defining concepts of future families of innovative products rather than at developing single products (e.g., Gardien 2006; Verganti 2009), even the designers involved may initially not know what the outcomes will be. For instance, a project at Philips Design aimed at exploring whether projection of images on bedroom ceilings could define innovative wake-up devices, evolved into innovation of medical CT and MR scanning: the projection of images was eventually used in examination rooms to calm patients, and to let them lay still in the scanning devices to produce scans with higher resolutions (Gardien 2006; 2011). Project management by predefined goals is rejected for such design projects aimed at innovative concepts. "[O]ften the real application of a technology is not in the area in which it was initially envisaged" (Gardien 2006, p. 5), hence, so the argument goes, predefined goals block a search for concepts for new families of products before it can reach innovative results. And managerial tools that define fixed time-windows for design projects by business models or return of investment criteria are rejected too, because also they deny how innovation by design actually evolves (Verganti 2009). Designers should get a free hand, and firms should engage into innovation by design without pigeonholing projects too early (Gardien 2006).

Contemporary design methodology gives the tools by which designers indeed can take their distance from specifically the clients and users. As illustrated by the Design School method, designers can frame the assignments that clients set to arrive at formulations that allow proper design projects (Schön 1983; Cross 2006). And designers can themselves determine the needs of users and do so in more innovative ways that the users, for instance, by empathy and ethnographic studies (e.g., Brown 2009; D.School 2011), or by analysing and collaborating with 'future-focused persona' and 'cultural innovators' who hold the values and beliefs of the next area (Gardien 2006). Yet, when it concerns taking distance for the managers of design projects, design methodology seems not to have generic tools readily available. Designers want freedom to explore innovative ideas, and for acquiring this freedom, methodologists still only negatively argue that managers should neither invoke project management nor impose return-on-investment criteria.

MANAGING INNOVATIVE DESIGN PROJECTS

The position that managers of design projects jeopardise innovation when fixing upfront targets may make sense when it is assumed that these targets specify the *content* design projects are to realise, say, the specific products that are to be designed. When this assumption is dropped, an alternative becomes available, namely to manage innovative design projects by targets that specify the *processes* that make up these projects. Design methodologists already structure these processes - design thinking - by methodological steps, as was illustrated by the methods of the Design School and Philips Design. Hence, design projects could be presented in terms of the different methodological steps they aim to take and be managed by determining if these methodological steps are carried out successfully or not. Such methodological management of design projects would be a generic tool for giving designers also their distance to managers: managers would stop to pigeonhole design projects in terms of their content, yet still be able to supervise and guide these projects.

It may seem that this alternative management of innovative design projects by their methods is already possible since its ingredients are currently available: design methodologists indeed divide design thinking in different methodological steps and have defined the goals of these steps. Yet, these goals are typically formulated in ways that are not yet suitable to determine if the methodological steps were carried out successfully. The 'observe' step in the Design School method (Figure 1) is defined as doing ethnographic studies and interviews with prospective users to decide if the design problem is well understood. But criteria to determine what a good understanding of a client's problem is, are left opaque. The 'concept car' step in the Philips Design method (row 1, column 2; Figure 2) is for arriving at a product that communicates value to users of emerging business of firms, yet what a good 'concept car'-product is, is not spelled out. Hence, what seems needed to make this alternative management of design projects feasible is that the goals of the steps in these methods are specified in more detail. An option to do so is to describe these goals in a SMART manner, that is, Specific, Measurable, Assignable, Realistic and Time-related (Doran 1981). For each methodological step in a design project it would then be defined what its specific goal is, how it is determined whether this goal is realised, who is responsible for doing so, what the probabilities are that the goal is indeed realised, and what resources – time, money, and so on – it may take. For instance, the 'concept car' design step in the Philips Design method may be spelled out SMART as having the goal to communicate a predefined value to users, which makes it a specific and measurable step. The task is assigned to the designers involved, and standards can be set what resources the development of a 'concept car'-product may take, making it a time-bound step. Realism would imply that also a rate of success is given for this step.

Formulating the goals of the steps in design methods in a SMART manner would require considerable work. It would require that design methodologists improve on their descriptions of design methods. It would imply accepting a more realistic perspective on what these methods can do in product development and in resolving problems of industry and society; currently design methods may be advertised as methods that almost always lead to useful

results (e.g., Plattner et al. 2009, p. 103), whereas Realism would mean that for each step fair probabilities are given that designers conclude them successfully. Formulating the steps In design methods in a SMART manner would also imply empirical work to determine these probabilities, say by collecting data about how often a 'concept car' step does lead with the allocated resources to a product that successfully communicates the intended value to customers. Starting points for this work can be found in current design research. For instance, Kumar (2013) spells out for many design tools and methodological steps what the required input is, and what the expected output. And Blessing and Chakrabarti (2009) aim at empirically validating tools and methods in engineering design. In the remainder of this contribution, I focus on the methodological step of framing, part of many design methods, and consider what a SMART formulation of the goal of this step may mean.

The prospect of this possibility of managing design projects by their methods should be clear. SMART descriptions of design methods enable both designers and their managers to acquire a shared understanding of design projects, which allow designers to have their distance and free hand. Designers can then present their projects to their managers (and clients) as structured in well-defined steps, and explain how they are to result into innovation, and with what probabilities. These steps become time-bound, but designers can also explain that this does not mean that design projects always result in marketable projects within a fixed time window; design projects may end merely in 'concept car'-products, or in the identification of new business opportunities for firms, as can be made clear with the Philips Design matrix (Figure 2). Reversely, managers obtain means to monitor the progress made within design projects without defining upfront the products these projects have to result in. By understanding the methodological steps of such projects, managers can evaluate if the goals of these steps are realised, and in this way still be able to determine if design projects are carried out successfully or not.

THE CASE OF FRAMING

Framing may be seen as one of the methodological steps that set apart contemporary design methods from more traditional engineering design methods. By engineering design methods (e.g., Pahl et al. 2007) a design project is aimed at producing a solution to a problem as set by a client. This problem may be somewhat adjusted by the designer and be translated in more technical terms, yet remains throughout the design project by and large fixed, thus providing a stable and clear basis to evaluate the successfulness of the outcome of the project with. Adding the methodological step of framing implies that this evaluative basis is removed from design projects. A designer may then reformulate the problem as set by the client by taking a specific point of view on the client's problem, as is required in the Design School method. Or a designer may reorient a project by dropping the problem s/he is working on, and taking up another more attractive problem, as was done in the Philips Design project on projecting images on ceilings. With framing the designer can even define himself or herself the (initial) problem; the (D.School 2011, p. 1) version of the Design School method, for instance, has as

its first step 'empathize' in which designers may uncover needs of people these people may not be aware of, thus allowing that the designer formulates the problem to be designed for. And in all these cases the initial problem as formulated by the client is not suitable anymore to assess if the design project has a successful outcome, leading to the question of what alternative basis there is to evaluate the outcomes of design projects with. Focussing on framing, this question becomes how to evaluate the reformulation, or introduction, of design problems by designers.

When looking at the current literature in design methodology the methodological step of framing is hardly formulated in a Specific, Measurable, Assignable, Realistic and Time-related manner. The task is Assignable since it are the designers who are responsible for framing the design problem. Yet, how Realistic framing is and how much time and other resources it may take, are open issues. In the literature many design projects have been described in which design problems were successfully framed, as, for instance, the project on projecting images on ceilings. But estimates of the probability of success of framing are hard to find. Hence, in order to formulate the step of framing in a SMART manner empirical research is needed to determine these probabilities, in relation to the resources allocated to it for describe framing in a Time-related manner as well. Presenting such empirical research is not the goal of this contribution; instead I look in this final section at possibilities of formulating framing in a Specific and Measurable manner: what is the specific goal of framing, and what are the criteria to measure if this goal is realised?

The goals of framing

Again looking at the literature, one goal of framing is to find a formulation of the design problem such that a solution can be found. In (Dorst and Cross 2001) framing is modelled semi-formally as part of an analysis of the creativity in design projects, and by this modelling it becomes clear how framing assists in finding design solutions. The modelling of framing is based on an analysis of creative design by (Maher et al. 1996) in terms of the co-evolution of the problem space and the solution space. The problem space consists of requirements set by the problem considered, and the solution space is the search space for design solutions (these are admittedly vague notions of a space). In the model of (Dorst and Cross 2001) an initial design problem defines first, at t=0, a problem space P(t=0) and a solution space S(t=0). Second, the designer starts by exploring the problem space by clustering some of the information about the design problem, and arrives in this way at t=1 at a partial structured problem space P(t=1). Third, the designer uses this partial structuring of the problem space to find a partial structuring of the solution space leading to a solution space S(t=2). Fourth, the designer considers the implications of the partial structuring of the solution space, and uses it to arrive at first concepts for a design solution, leading to a further structured solution space S(t=3). Fifth, the designer transfers the partial structure of the solution space back into the problem space, for deriving further requirements on and implication for the concept design solutions, thus adding again structure to the problem space P(t=4). The problem space and solution space are in this way co-evolving (Figure 3), and framing is taking as identifying a

problem-solution pair. The goal is finding a matching problem-solution pair, which in the model probably means that at some moment t=n a specific design solution is identified in the solution space S(t=n) that solves the problem as structured in the problem space P(t=n) that is considered at that moment. One cycle of structuring the problem and solution spaces is moreover probably not always sufficient for finding a matching pair (i.e., the moment t=n need not be the moment t=4); two or more structuring or restructuring cycles of the problem and solution spaces may be needed.

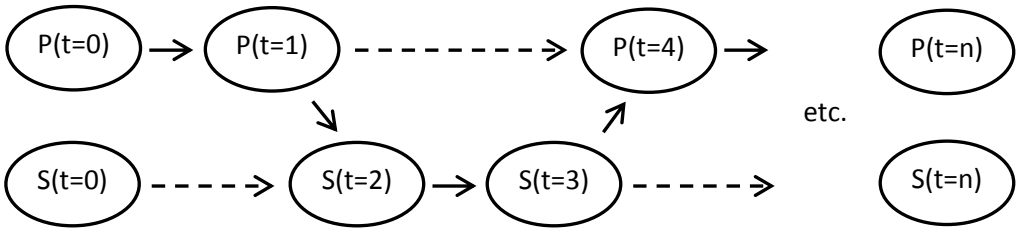

Figure 3: Structuring of problem space and solution space in framing (solid arrows) through time (dashed arrows), after (Dorst and Cross 2001, fig. 5)

This modelling of framing captures the goal of framing to find a design solution: it describes how designers reformulate the design problem such that a solution to it can be found. Giving a SMART formulation of framing with only this goal will however not do because it can be argued that producing a matching problem-solution pair is a necessary but not a sufficient condition for successful framing: the solution in this matching pair may be one the client is not interested in. Consider again the examples of framing discussed before to see that finding a design solution does not yet demarcate successful framing. A client ordering a personal music player, may be pleased when the designer presents a solution to the reformulated problem of finding a jewellery-style item users enjoy to wear, say when the client wants to create a new market for expensive personal music players. Yet, when the client's intention is to offer a service to patients in hospitals, this solution most probably is not a successful one. And a firm selling light-systems may welcome that designers reformulate a search for light-operated alarm clocks into one for light-operated systems to calm persons in CT and MR scans. But a firm that sells alarm clocks most probably rejects this outcome. When capturing these examples in terms of the model of (Dorst and Cross 2001), it may be observed that the final problem space P(t=n) a designer creates by framing need not be similar to the client's original problem space P(t=0). For instance, if the initial client problem is paradoxical (Dorst 2006), then P(t=0) is "empty" and P(t=n) necessary different to it. And if these spaces are not similar, the solutions found by framing need not be of interest to the client. This last possibility seems inherent to this model of framing, since in the modelling there is no constraint that relates the final problem space P(t=n) with the initial one P(t=0). Successful framing should therefore meet a second goal, for which I again turn to the literature.

In Dorst (2011) designing in its barest form is modelled logically as a reasoning process in which a designer determine on the one hand an object, service or system, referred to by a 'what', and on the other hand a working principle, referred to by a 'how', that together realise an aspired 'value' (Figure 4). In more simple design projects only the 'what' is unknown, and the 'how' and 'value' are given, which means that the design task is a conventional one of finding an object, service or system that realises with a given working principle a set aspired 'value'. In more challenging design projects, however, both the 'what' and the 'how' are unknown, and is only the 'value' given, leading to the design task to both determine an object, service or system and a working principle. According to Dorst (2011) experienced designers carry out this more complex task by breaking it up in two subtasks. First, these designers determine a 'how' - the working principle - for creating the 'value', after which the design task again becomes a conventional one. Second, experienced designers solve this conventional task of finding an unknown 'what' that realises with the determined 'how' the aspired 'value'. The first subtask is now taken as framing: framing is choosing a working principle as a (potential) means to realise a given value (Figure 4). Dorst (2011) further spells out how experienced designers arrive at specific framings: they analyse the situation in which a 'value' has to be realised, and recognise on the basis of their experience that a known working principle will do the job; or they search for the "central paradox" why in this situation the aspired 'value' is hard to realise, and then explore the broader context of the situation to find clues for new frames. Yet, important for finding a SMART description of framing is that in the model the aspired value is not changed: different working principles may be tried, and different objects, services or systems may be determined; yet the value remains what it was at the beginning of the design project.

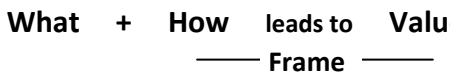

Figure 4 Framing according to (Dorst 2011, pp. 523-524)

From this second model a second goal of framing can be derived, namely that it should determine means - working principles or matching problem-solution pairs - that realise a set value. When adding this second goal to a SMART description of framing, one arrives at a sufficient condition for framing to be successful. The working principles or matching problem-solution produced by framing may still not be ones the client originally had in mind, yet with this second goal, successful framing has to realises a value the client has. Return again to the examples, for now demarcating successful framing properly. A client ordering a personal music player and aiming at creating a new market for expensive personal music players, may indeed be pleased when the designer after framing presents a jewellery-style music player, because this outcome realises the commercial value of the client. For a client

who wants to offer a service to patients in hospitals, this framing of music players may however not be successful, say, because it does not realise the client's value of efficiency. For a firm selling light-systems the reformulation of a search for light-operated alarm clocks into one for light-systems to calm persons in CT and MR scans, may again be successful because the outcome realises the firm's value, but for a firm that sells alarm clocks it is not.

A SMART description of framing

So, a SMART description of framing should include that its goals are a reformulation of the design problem that, first, enables finding solutions to the problem that, second, realise a value of the client. These goals are Specific and Measurable, and thus providing a clear basis to evaluate the successfulness of framing with.

The value to be realised by the solution found by framing may be a value that the client can present explicitly at the beginning of the design project. Yet, it may also be the case that the designer articulates this value during the design project and in that way makes it explicit for the client. When a designer starts a design project by empathising with a client to uncover needs this client may not be aware of, as is done in the (D.School 2011) method, then it is assumed that the designer determines values the client could not explicitly present himself or herself. Specifically in the last case is important for successful framing that the designer checks if the value articulated for a client is indeed a value the client may accept. In actual design projects this importance is reflected by the communication designers typically have with their clients about the progress of design projects, and by the testing of design solutions through mock-ups and prototypes. This communication and testing may be interpreted as aimed at exploring what values the clients actually have and at checking whether the framed design problems realise these values. By the SMART description of framing I propose, this importance is incorporated by making it an explicit goal of framing.

CONCLUSION

In this contribution a challenge was presented that innovation by design thinking poses to its management: the advocates of design thinking are critical to existing management practices since these introduce pre-set targets and time-windows that limit the free hand designers are said to need for arriving at innovation. This challenge is for both parties: when design thinking leads to projects without clear targets and endings, designers need other means to convince their clients and managers of the feasibility of their projects, and these clients in turn need alternative means to managing the design projects they commission.

In this contribution I took up this challenge and argued for managing innovative design projects not through pre-set targets on their outcomes but through the design thinking methods that designers are following. For this alternative management the methodological steps of design thinking methods should be formulated in a SMART manner, which was illustrated by developing a SMART description of the design technique of framing.

By SMART descriptions of design methods, designers and their managers acquire a common understanding of design projects, which allow designers to have their free hand. Designers can present their projects to their managers as structured in well-defined steps, and explain how they are to result into innovation, and with what probabilities. These steps become time-bound, but designers can also explain that this does not mean that design projects need to result in marketable projects within a fixed time window. Reversely, managers obtain an understanding of the methodological steps in such projects, and can without pigeonholing design projects in terms of their outcomes, determine if they are carried out successfully by evaluating if designers are realising the goals of these steps.

The methodological steps in methods for design thinking are currently not described in a SMART manner. In this contribution I developed a Specific and Measurable description of the methodological step of framing, but for extending this to a Realistic and Time-related description empirical work has to be done about the success rates of framing. For enabling management of innovative design projects by their methods, also the other methodological steps in design thinking should be described in a SMART manner, and this requires additional work. Steps such as explorative research by design probes and prototyping design solutions all have their goals that are to be articulated in Specific and Measurable ways by conceptual analysis, as was done in this contribution for framing. For describing these steps also Realistic and Time-related again further empirical research is to be done. The result of these efforts will be a precise understanding of the methodological steps of innovative design projects that can be shared between designers and their managers to help realising the potential of design thinking to bring innovation to industry and society.

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Organizational Factors in the Design Development Activity

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Keywords: Interdepartmental coordination, Organizational Structure

The purpose of this study is to clarify organizational factors that impact product design outcomes. This study analyzes surveys of corporate recipients of good design awards within Japan`s manufacturing industry in order to clarify what type of organizational factors and management policies have an impact on final design outputs.

INTRODUCTION

The purpose of this study is to clarify critical organizational factors that impact product design outcomes (hereafter "design output"). What type of organizational structures must be formulated in order to effectively generate superior designs that contribute to such competitive advantages and corporate profitability and how should these structures be managed? These types of questions have yet to be sufficiently answered within the field of management research. This study analyzes surveys of corporate recipients of good design awards within Japan`s manufacturing industry in order to clarify what type of organizational factors and management policies have an impact on final design outputs.

The term "Design" used in this paper is mainly for the design of products and refers to a series of activities where ideas and concepts are created and realized into forms as well as its output.

EXAMINATION OF EXISTING RESEARCH

The Relationship between Design and Company-wide Strategy

There are a number of examples of existing research that discuss design related to company-wide strategy. For instance, Dumas and Mintzberg (1989) hold that capturing the interest of all members of the organization involved in design by making design part of the company-

wide strategy, and instilling design strategy throughout the organization is critical to generate superior designs as an organization. Borja de Mozota (1998) holds that it is possible to generate superior designs that contribute to the formulation of the corporate brand by using the framework of Porter`s (1985) value chains to embed design strategy into management strategy and consistently instill design strategy into every element of a company`s internal value chain. Joziasse (2000) contends that it is necessary to transform the design department from a traditional operational position to a strategic position in order to achieve favorable outcomes attributable to design. He also holds that in addition to implementing design as a part of company-wide strategy, design should also be implemented into strategy at every level of the company.

A common theme in these arguments is that design is not implemented separately for each product, but rather design strategy should be clearly positioned within the company-wide strategy to be applied to the entire organization.

The Mutual Relationship between the Design Department and Other Departments in the Product Development Process

Existing research has focused on interactions between design departments and other departments. For instance, Walsh, Roy and Bruce (1988), Roy and Potter (1988), Bailetti, Callahan and McCluskey (1998), and Olson, Slater and Cooper (2000) point out that the state of coordination between departments interdependent with the design department (sales, marketing, research and development, manufacturing, production, etc.) and closeness of the collaboration between different stages of the design and development process impact the efficiency and performance of design and development. Kotler and Rath (1984), Veryzer (2005), Bruce and Daly (2007) hold that close collaboration between the design department and marketing department is especially important among interdepartmental collaborative relationships. Gorb and Dumas (1987) contend that design-related information and value sharing have an important role in design output, and that not only designers but staff from different departments should mutually collaborate and actively be involved in the design process. Dumas (1995), Dickson et al. (1995), and Gregory and Sohal (2002) focus on the importance of intradepartmental organization management in relation to design, and hold that organizations with effective intradepartmental structure enable the discovery of new design ideas, the exchange and integration of knowledge, and innovation. Chiva-Gomez (2004) points out the necessity of structures that effectively transmit knowledge and information related to the purpose of the organization, priorities, and design strategy, and structures that generate effective communication and the importance of strengthening mutual relationships between the design department and other departments.

There is also research that points out the importance of the design department maintaining its autonomy while contributing to interdepartmental collaboration in the process of product development. The common themes in these arguments are that the design department is not perceived simply as comprising design engineers and technicians but “gatekeepers” who

receive and deliver knowledge and information that flow within and outside of the organization (Walsh and Roy, 1985), "catalysts" who mediate the interaction of each department involved in the product development process (Lorenz, 1990), or the "integrators" who consolidate knowledge and information related to the product development process (Blaich, 1988; Bahnsen, 1988). This is because they are the ones that are in a position to connect technical design factors with customer needs (Walsh, 1996), the ability to come up with ideas based on a variety of knowledge and backgrounds (Walsh and Roy, 1985), and the ability to develop concrete outputs (sketches, prototypes, etc.) based on customer information (Borja de Mozota, 2003; Utterback et al., 2006).

These researches suggest that the relationship between the design department and other departments, the state of mutual cooperation and the way that design department is involved in the product development process have an important impact on final design outputs.

Organizational Design and Design Development

There have also been discussions about the impact that organizational structure and institutional frameworks related to design development have on design output and the relationship between the design department and other departments. Oakley (1984) points out that when the design department belongs to a department such as production or marketing, design becomes isolated from top management decision making process, limiting designing activities. Furthermore, he states that differentiating and separating the design department into an independent functional department engenders a direct relationship between the design department and top management and improves design output.

Blaich and Blaich (1992) argue that while an organizational structure that integrates the design department with all other departments provides benefits of more efficient product development due to an increased sense of self-sufficiency as well as closing the gap between the design department and the market, it also carries the risk of causing the following two problems. The first is the problem that the utilization of the design department is limited to functions such as styling because of the department's relatively weak position compared to other business departments. The second is the problem of multiple designs for each business department and difficulty in achieving uniformity in company-wide designs as communication becomes fragmented between business departments and the head office. Hence, an organizational framework is needed that enables consistent control of the design activities of each department while the umbrella design unit at headquarters routinely maintains close communication with business departments.

Utilizing case analysis of Japanese automakers, Morinaga (2010) clarifies the impact on the level of design personality and identity exerted by organization factors such as the level of centralized authority held by project leaders in product development activities, the distance between the design department and top management, and the level of authority held by the head of design. He indicates that due to the relative strength of technical departments in organizations with a high degree of integration, such as divisional organizations, there are

cases where the ability of the design department is limited to a specific area. Under such circumstances, the authority of the design department will be strengthened by promoting its decentralization to facilitate the implementation of company-wide design strategy under the leadership of the design department. It is necessary to prepare an organizational framework for cutting and/or absorbing the cost incurred by information processing and coordination that comes with the decentralization. Dumas and Mintzberg (1991) indicate that as the decentralization of the design department progresses within the organization, a framework for guaranteeing integration is necessary due to increased difficulty of interdepartmental cooperation and integration.

Utilizing case analysis of Japan`s general home electronics manufacturers, Kanno (2011) points out that although it is effective to differentiate the design department from business departments in order to strengthen design capability of a company, this alone is insufficient for promoting the autonomy and independence of the design department to change communication patterns with other departments, and that an institutional framework with authority for budgeting and human resources is needed that guarantees the autonomy and independence of the design department.

There have also been studies about decision making in the area of design. Owen (2000) points out that the difference in status between members involved in design development within an organization has a decisively important impact on design output. Chiva-Gomez (2004) hold that the participation of many types of members is needed for design-related decision-making, and that planning the power balance between participating members is important. In his study on the relationship between the type of design strategy and the style of decision making in the design development process, Morinaga (2008) shows how the number of decisions made, diversity of participating members, the number of members, and the standards of decision making impact design output,. These researches show that who performs the design related decision making through what type of processes has an important impact on final design output.

ANALYTICAL FRAMEWORK

The existing research reviewed in the previous section identifies a variety of organizational factors and management requirements for achieving superior design output. However the current research, which is not backed up by sufficient number of studies in the first place (Walsh, 1996; Borja de Mozota, 2003) is limited to conceptual discussions (Morinaga, 2010) and has a problem of insufficient evidence specifically explaining what type of organizational factors exert an impact on design outputs and how. Therefore, there is a need to accumulate empirical research that focuses on organizational factors that impact design output while keeping in mind the various factors discussed in the existing body of research.

This study proposes an analytical framework focusing on organizational factors that define design outputs based on the existing research results as well as the issues left behind them.

The first point suggested by existing research is that the state of interdepartmental coordination and the relationship between the design department and other departments in the design development process impacts the nature of final design output. The existing body of research indicates the importance of close mutual cooperation between the design department and other departments (Kotler and Rath, 1984; Gorb and Dumas, 1987; Walsh, Roy and Bruce, 1988; Roy and Potter, 1988; Bailetti, Callahan and McCluskey, 1998; Olson, Slater and Cooper, 2000; Chiva-Gomez, 2004; Veryzer, 2005; Bruce and Daly, 2007), effective management of cross-functional organizations (Dumas, 1995; Dickson et al., 1995; Gregory and Sohal, 2002), and the proactive involvement of the design department (Walsh and Roy, 1985; Bahnsen, 1988; Blaich, 1988; Lorenz, 1990). Hence, this study analyses the impact that communication patterns and mutual cooperation between the design department and other departments has on design output.

Furthermore, such a relationship between the design department and other departments is affected by various other organization factors. The existing body of research suggests that the relationship between the design department and other departments is influenced by factors such as the relationship between the company-wide strategy and the design strategy (Dumas and Mintzberg, 1989; Borja de Mozota, 1998; Joziasse, 2000), the design of organizational structure related to design development (Oakley, 1984; Blaich and Blaich, 1992; Morinaga, 2010; Kanno, 2011), institutional frameworks such as budget and human resources related to design development (Dumas and Mintzberg, 1991; Kanno, 2011), and the state of decision making (Owen, 2000; Chiva-Gomez, 2004; Morinaga, 2008). Therefore, this study performs analyses primarily focusing on the following three factors that impact relationship between the design department and other departments: company-wide design strategy, organizational structure, and the authority of the design department.

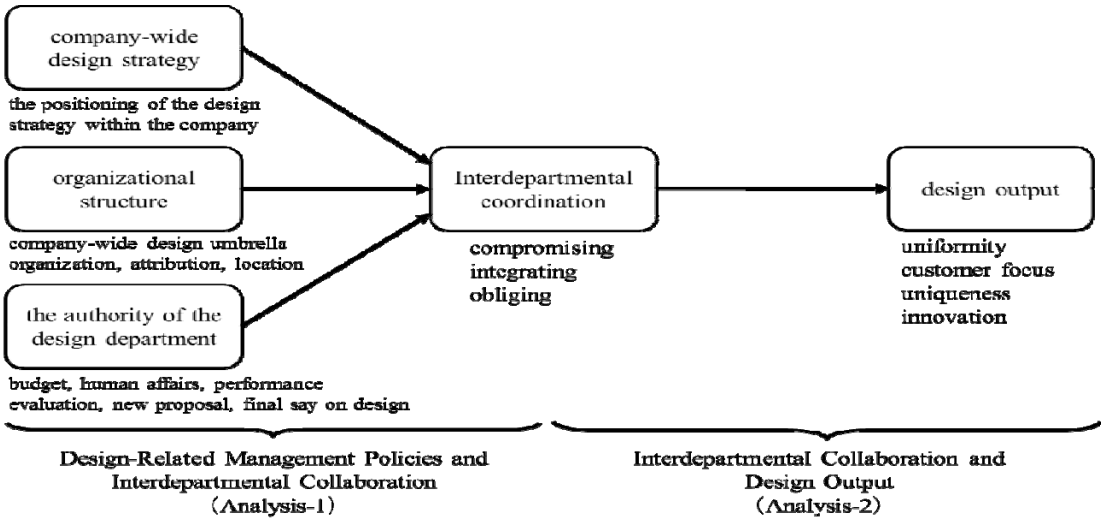

Figure 1. Analytical framework

Based on the foregoing, the analytic framework of this paper is structured to show that the positioning of the design strategy within the company, the organizational structure related to design, and the presence or absence of authority related to design impact the relationship

between the design department and other departments as well as formal and informal communication patterns, which define the final design outputs (Figure 1).

SURVEY OVERVIEW

Survey Subjects and Description of the Date and Variables

A questionnaire survey entitled "A Survey of Design Management" was conducted in order to investigate the impact of various organizational factors on the nature of design outputs. The questionnaire survey was conducted in March of 2012 and targeted 141 recipient companies of excellence in design awards in 2010 and 2011 with established internal design department, of which 41 responded. In accordance with the analytical framework, the survey data consists of questions regarding management policy related to design, questions related to interdepartmental cooperation and communication, and designer evaluations on design outputs.

In order to determine the company-wide positioning of design, the survey also included questions about the presence or absence of a company-wide design strategy. In addition, the following questions were posed to determine factors that demonstrate a formal organizational structure, such as the existence of a design center or design headquarters: "Do you have an organization that oversees design for the entire company?" "Is the design department established independently from other organizations?" "Is the design department physically separated from other business departments?" These questions represent the variables to determine the level of differentiation of the design department and its positioning in the formal organizational structure. The data were collected as dummy variables with two values indicating applicability. Next, the following questions were asked to evaluate the authority of the design department and dummy variables with two values were collected: "Does the design department have authority to decide budgets?" "Does the design department have authority to decide on human resources?" "Does the design department conduct performance evaluations?" "Is the design department able to suggest new projects?" and "Does the design department have the final say on designs?"

The bootstrap method (Efron and Tibshirani, 1993) was used in the analysis as a simulation approach based on actual data to compensate for the small sample count, and analysis was conducted through generation of analytical data by resampling the samples.

Measurement Scale

Interdepartmental coordination can be viewed as a strategy for resolving conflicts. Rahim (1983) presents a ROCI scale comprising the following five dimensions as a general strategy for interdepartmental conflict resolution: "Integrating" (sublation based on mutual differences), "Obliging" (Both parties sacrifice self-interests in consideration of the intent of the other party), "Compromising" (Compromising mutual self-interests), "Dominating" (Achieving one's goal through the use of one`s own power) and "Avoiding" (Avoiding a

relationship with the other party and putting off the problem). It is known in prior research dealing with product development that taking the "Integrating" strategy interdepartmentally improves profitability and product innovation (Xie, Song and Stringfellow, 1998). It is also believed that innovation is negatively impacted when both parties compromise due to the smoothing of self-interest of both parties . Moreover, when power is unevenly distributed, there is the problem of a decrease in knowledge resources due to the promotion of only one party`s self-interest.

Based on the above, this study utilized the three factors of Compromising, Integrating, and Obliging with regard to interdepartmental collaboration and modified the ROCI scale to fit the context of design management. The "Compromising" factor relates to independence of the design department and the degree of its compromises with other departments. The "Integrating" factor relates to the degree the design department is respected by other departments and the closeness of their relationship. The "Obliging" factor relates to the influence and the degree of interference other departments have on the design department. Based on these scales, seven-point Likert scale questions were formulated for this study and measurements were conducted. As the scale was modified, exploratory factor analysis was implemented using the principal factor method. Moreover, factor rotation using the promax method was performed in order to facilitate interpretation of the results of the factor analysis.

item	compromising	integrating	obliging	Cronbach's α	Proportion (%)
Do designers sometimes make compromises by following the direction of other departments or business divisions?	**.991**	.082	-.123	0.736	41.300
Do designers sometimes compromise on designs?	**.875**	-.142	-.236		
Does the design division make decisions regarding design?	**-.795**	.030	.104		
Does the design division take the lead in making decisions on product design?	**-.670**	.031	-.118		
Do you feel that people in other divisions try to understand the intent of designers?	**.639**	.506	.028		
Do you get undue interference from other divisions in decision-making regarding designs?	**-.500**	.169	-.154		
Do other divisions change product specifications according to the direction of the design division?	.117	**.773**	.344	0.712	16.200
Are the opinions of designers respected in decision-making regarding designs?	-.185	**.732**	-.226		
Do you refer to a formal, company-wide plan when designing?	-.154	**.595**	.076		
Are you sometimes influenced by other divisions regarding design?	.110	.076	**.709**	0.623	10.300
Do you think about the direction of other divisions when considering design?	-.264	.230	**.497**		
Do you get undue interference from other divisions in decision-making regarding design?	.406	-.091	**.462**		

Table 1. Factor Analysis(1)

In design management, differentiation from other products (Lorenz, 1990) and corporate brand formulation (Borja de Mozota, 2003; Morinaga, 2010) are generally achieved by generating superior designs. The originality and innovative design output is necessary in order to achieve product differentiation (Yamamoto and Lambert, 1994; Morinaga, 2010; Talke et al., 2009). On the other hand, unity (Blaich and Blaich, 1992) and consistency (Morinaga, 2010) of company-wide product design are required in order to utilize design in formulating a corporate brand. Moreover, in order for these designs to contribute to corporate performance, they must be accepted by the market and meet the needs of customers (Kotler and Rath, 1984).

Using the existing research results as a reference, outcome variables were set for design output in this study. The first factor is the "Unity" factor comprised of items such as the

uniformity and consistency of the company-wide design image. The second factor is the "Customer Focus" factor which relates to whether the design appeals to the customer and if it is in line with what customers want. The third factor is the "Uniqueness" factor which relates to the degree of distinguishability of the design from other companies and whether or not it is immediately recognizable as the company`s own design. The fourth factor is the "Innovation" factor which relates to novelty or something unprecedented. Confirmatory factor analysis was then performed by means of the major factors method.

item	unity	customer focus	uniqueness	innovation	Cronbach's α	Proportion (%)
Do you feel that there is a consistent policy of design from viewpoint of a company-wide?	.904				0.877	80.359
Do you feel that there is a common feature of design even between different products?	.883					
Do you think that there is a consistent image for all products?	.902					
Do you feel that your company's product design is attractive to consumers?		.914			0.867	80.810
Is your company's products designed in consideration of the customers targeted?		.901				
Do you fool that your company's product design captures the needs of the market?		.881				
Do you feel that your company's product design is unique and defferenciated compared with other companies?			.882		0.855	77.139
Do you feel that it is easy for consumer to understand your company's product design?			.810			
Do you feel that your company has an design identity that is different from the other companies?			.938			
Do you feel that your company has a newness of design without ever?				.933	0.924	87.748
Do you feel that your comapy's product design is innovative.				.953		
Do you feel that your company's product design surprise consumer?				.923		

Table 2. Factor Analysis(2)

ANALYSIS

		compromising model		integrating model		obliging model	
		β	*t-value*	*β*	*t-value*	*β*	*t-value*
	intercept	.765	5.782	.374	2.802	.591	3.737
strategic factor	strategy	.378	6.468	.009	.151	.207	2.964
organizational facotr	design center	-.794	-13.791	-.248	-4.269	-.120	-1.752
	attribution	-.029	-2.667	-.071	-6.551	-.025	-1.979
	location	.099	4.323	-.180	-7.837	-.065	-2.378
authority	authority for budjets	-.161	-2.401	.886	13.090	-.283	-3.531
	authority for personnel affairs	.204	3.212	.193	3.025	.185	2.446
	performance evaluation	.306	4.990	-.317	-5.133	.099	1.347
	new proposal,	-.047	-.708	-.138	-2.079	.274	3.467
	final say on design	-1.441	-24.231	.406	6.768	-.930	-13.084
	adjusted R square		.476		.411		.174
	F		101.976		78.538		24.371

Table 3. Design-Related Management Policies and Interdepartmental Collaboration

Regression Analysis(1): Design-Related Management Policies and Interdepartmental Collaboration

With regard to design-related organization structure and interdepartmental collaboration, the results showed that functional differentiation of the design department and the existence of a company-wide design umbrella organization decrease “Compromising” and “Obliging” within the design department. These results seem to suggest that separating and differentiating the design department from business and manufacturing departments decreases its passive involvement and excess interference from other departments while promoting the autonomy of the design department. These conclusions are consistent with existing research by Oakley (1984), Blaich and Blaich (1992), and Morinaga (2010).

On the other hand, the results showed that the existence of a company-wide design umbrella organization differentiation, and physical autonomy of the design department decreases integration under interdepartmental collaboration. It is inferred that self-containment exerted by belonging to business and other departments decreases due to the differentiation and separation of the design department. Thus, it is believed that the cost of processing knowledge and information between departments increases while the degree of integration in interdepartmental collaboration decreases.

With regard to the authority of the design department and interdepartmental collaboration, the results showed that the design department having authority for budgets and the final say on designs positively impacts all three dimensions of “Compromising,” “Integrating,” and “Obliging.” The design department’s proactive involvement and avoidance of excessive interference and intervention by other departments are to be expected when it possesses the proper authority for design development. Furthermore, giving the design department the necessary authority conceivably promotes understanding and cooperation from other departments about designs, which leads to consistent design development.

On the other hand, results demonstrated decreased integration in interdepartmental collaboration when the design department conducts its own performance evaluations related to design outcomes. Although this conflicts with existing research (Walsh and Roy, 1985; Bahnsen, 1988; Blaich, 1988; Lorenz, 1990) claiming that independence and autonomy should be given to design departments in order to integrate product development activities、it is consistent with the aforementioned results that showed that differentiation of the design department decreases integration in interdepartmental collaboration. These results seem to suggest that cognizance of outputs within the design department do not necessarily coincide with overall awareness of product development. Although there are risks that the innovation and uniqueness of designs will be impeded if design outputs are evaluated from the comprehensive perspective of overall product development, over-prioritizing the interests of the design department alone is problematic as this would hamper integration and lower the overall efficiency of design development.

Lastly, results demonstrated that company-wide design strategies increase design department's "Compromising" and "Obliging." This conflicts with claims of existing research (Dumas and Mintzberg, 1989; Borja de Mozota, 1998; Joziasse, 2000) that design strategy should be clearly positioned within the company-wide strategy in order to generate superior designs. Although this can be interpreted that intervention in the design department by other departments may conversely increase as design strategy penetrates the entire company and other departments become more interested in design, there is certainly a need to carefully consider the relationship between design strategy and interdepartmental collaboration by examining other case studies.

Regression Analysis(2): Interdepartmental Collaboration and Design Output

	unity		customer focus		uniqueness		innovation	
	β	*t-value*	*β*	*t-value*	*β*	*t-value*	*β*	*t-value*
constant	-.053	-19.868	-.083	-37.639	-.088	-33.506	-.101	-39.522
compromising factor	-.437	-11.756	-.222	-7.165	-.369	-10.062	-.079	-2.209
integrating factor	.084	2.606	.511	18.948	.127	3.980	.250	8.027
obliging factor	-.165	-4.260	-.110	-3.407	-.047	-1.220	-.241	-6.471
adjusted R square		.305		.450		.216		.208
F		147.204		273.404		92.753		88.454

Table 4. Interdepartmental Collaboration and Design Output

With regard to "Compromising," "Integrating," and "Obliging" factors, results showed a positive impact on uniformity of design outputs, customer focus, autonomy, and innovation when the design department exerts its independence on other departments. Particularly evident was the characteristic that uniformity of design and independence increase as design department's "Compromising" decreases. Overall uniformity and consistency would be impeded when priority is given to the manufacturing department`s focus on productivity or the sales department`s hot selling items at the store front, for example. Also evident was the characteristic that customer focus in design increases when there is a high degree of integration in interdepartmental collaboration between the design department and other departments. It is inferred that as the design department achieves close collaboration with sales, manufacturing and other departments toward an overall market focus, sharing of information related to customers and the market is facilitated, which has a positive effect on design outputs.

Observation

The first knowledge obtained from the aforementioned results is that design department independence in the product development process and a high level of integration in interdepartmental collaboration positively impact design output. Traditionally, designs were formulated through customer-focused initiatives which combined customer needs with technology to provide a function that fulfilled those needs (Walsh, 1996; Borja de Mozota, 2003; Utterback et al., 2006). A focus on users can be more effectively implemented in

product development and customer focus can be expected to increase if the design department is able to demonstrate this primary function in product development. Furthermore there is danger risk that uniformity and design personality may be sacrificed when the design department is in a passive position in relation to other departments, as indicated by Blaich and Blaich (1992) and Morinaga (2010). Conversely, this suggests the risk of a negative impact on the elements of design output when integration of design departments with other departments has yet to be achieved. In other words, this suggests the importance of simultaneously satisfying the two elements of design department autonomy and interdepartmental integration.

Furthermore, the results of the analysis suggest that functional differentiation of the design department and existence of an effective company-wide design umbrella organization for the promotion of design department independence present the dilemma of impeding interdepartmental integration.

In general, organizations with high self-sufficiency (such as divisional organizations) tend to have a strong tendency to focus on the short term goals of the individual departments by functioning as a single company (Chandler, 1962; Galbraith, 1973）. These short term goals sometimes conflict with design goals such as uniformity, uniqueness, and innovation. Because of this, there is a possibility that a design department that has integrated with business and other departments may become passive in its involvement with product development activities by compromising in deference to the overriding interests of the departments as a whole. On the other hand, highly self-sufficient organizations excel in speedily reflecting into design development relevant new information on markets and customers as it becomes available to sales and marketing departments. When the design department is differentiated, there is a risk that product development efficiency will be lost as processing of knowledge and information between departments increases due to the increasing difficulty of transmitting such information to the design department. In this manner, a dilemma exists with regard to differentiation and integration (Lawrence and Lorsch, 1967) in organizational design related to design development, and it is believed that this has a strong influence on final design outputs. While the independence and autonomy of the design department are indispensable for generating superior design outputs, comprehensive organizational ingenuity is required in order to balance differentiation and a high level of integration so that the benefits of a high level of self-sufficiency within the organization are not lost.

The second finding is that soft factors such as the authority given to the design department have a greater impact on interdepartmental collaboration and communication patterns than concrete factors such as organizational structure and physical location. It suggests that organizational structure and the physical environment of the design department alone are not sufficient conditions to guarantee the independence and autonomy of the design department, and that it is important how much meaningful authority is actually given to the design department. From the results of the analysis, it is evident that interdepartmental integration

increases when the design department has authority for budgets and the final say on designs. Although it was found out that the soft factor of design department authority is more important among the organizational factors related to design, this type of soft organizational factor has not received much attention from previous research.

CONCLUSION

One contribution of this study is the identification of critical organizational factors that impact design output. Most previous research on organizational factors that impact design has been limited to conceptual discussions and has focused on European and American companies, while this study has been able to comprehensively examine the relationship between various organizational factors and design outputs through surveys and analysis of Japanese companies that have received excellence in design awards.

In addition to clarifying the critical impact on design output exerted by the degree of integration and design department autonomy in interdepartmental collaboration in product development processes, this analysis also suggests the presence of a dilemma between differentiation and integration of the design department in organizational design to achieve the goal of the autonomy and integration of the design department. . Furthermore, this study clarifies that the organizational factors that have a particularly critical impact on the autonomy and integration of the design department are not concrete factors such as organizational structure, but that the soft factor of authority associated with design development is extremely important. The existing body of research regarding organizational design points out that the options for organizational structure depend on the type of technology (Burns and Stalker, 1961), the uncertainty of market environments (Lawrence and Lorsch, 1967; Thompson, 1967), and the uncertainty of tasks (Galbraith, 1973) and that there is no ultimately superior form or method. Although it is conceivable that the type of organizational structure chosen may depend on the aforementioned factors in organizational design for the purpose of generating superior design outputs, the results of this study suggest that the prerequisite of the design department holding the necessary authority for budgets and the final say on design is extremely important in any organizational structure. This issue of organizational structure differentiation, integration, and design department authority has been a problem specific to Japanese companies where design departments traditionally have relatively low status.

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Prototypes for Innovation – Facing the Complexity of Prototyping

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Keywords: Design Thinking, Prototype, Innovation Process, Prototyping Canvas, Design Research

In our paper we describe the development and evaluation of a promising prototyping tool, which is intended to facilitate the use of design prototypes for inexperienced practitioners in educational and corporate settings. We hypothesize, that different prototypes may be more or less suitable within innovation processes, depending on the intended purposes. We furthermore assumed that inexperienced practitioners rather unintentionally prototype solutions that may not be necessarily suitable with regard to their situation-specific needs. The goal was to develop a concrete tool that may inspire those practitioners to develop prototypes more efficiently, by creating a better understanding of different application scenarios and an overview of prototypes that may be more suitable within these different scenarios that occur along innovation processes. We thus aimed at combining insights from our own empirical research on prototyping and previous insights from academy research. We designed a set of cards representing different prototypes and furthermore arranged these cards differently in order to develop a framework that provides a meaningful guidance for our target users. After several iterations, we developed a so-called prototyping canvas, which will be introduced in this paper.

1. INTRODUCTION

Design Thinking has become a popular innovation technique and managerial method of choice in many organizations (Boland, 2004; Martin, 2009). Prototyping is told to be an essential part of Design Thinking. And indeed, design prototypes are described to be a successful tool in the innovation process (Schrage, 1996). The aim is to enable creative solutions that are being developed through the creative manpower of a team rather than through the output of an individual genius. Design Thinking starts with the user and his or her

specific needs, no concept or initial idea is given but only a rather fuzzy understand of a problem space to be explored (see Chapter 3). During the exploration, prototypes oftentimes are built as a tool to quickly learn about user behaviours or a context in which a problem occurs (Schrage, 1996).

Along the Design Thinking process, prototypes not necessarily act as representations of solutions but also as a tool for teams to interact and learn about a specific aspect of an idea or a problem. They rather support moments of reflection within the development process. They facilitate a knowledge exchange between Design Thinking teams and internal stakeholders as well as with external partners, such as users, customers and managers (Lim, Stolterman & Tenenberg, 2008). Furthermore some prototypes reflect the desirability of a functioning or an aesthetics of a product (Houde & Hill, 1997).

Considering the fact that many Design Thinking teams are staffed with non-designers and relatively unexperienced team members with regard to prototyping, the initial question for our research was: How could non-designers possibly prototype in successful and efficient ways with regard to the different opportunities mentioned above?

We decided to conduct our research in three phases: First, we wanted to gain a deep understanding about the academic research on prototyping. Therefore we reviewed the state of literature regarding prototyping of the past 30 years. Second, we conducted qualitative interviews with different stakeholders in a globally acting company that integrates Design Thinking at present and combined our results with statements from Design Thinking experts and teachers. Third, we followed a research by design approach by using results from academic research on prototyping and identifying user needs based on our empirical research. We developed a set of cards and a prototyping canvas that shall help practitioners to intentionally develop different prototypes according to their different purposes along innovation processes.

In the following chapter we give a short overview on the body of research regarding prototyping and highlight the important aspects.

2. ACADEMIC RESEARCH ON PROTOTYPING

Previous scientific research describes prototyping as means to an end in order to fulfil different roles along innovation processes in organizations. Prototypes can be defined as “any representation of a design idea, regardless of medium” (Houde & Hill, 1997, p. 2). A prototype can be characterized not only as a medium or by its form, but also by its impact on team-internal and organization-wide communications (Rhinow, Lindberg, Köppen & Meinel, 2011). Any prototype is always a limited representation (Brandt, 2007). It is restricted in form and medium and thereby represents only limited aspects of a greater idea. Lim, Stolterman, and Tenenberg conclude that there are prototypes of different qualities and that “the best prototype is one that, in the simplest and most efficient way, makes the possibilities and limitations of a design idea visible and measurable” (Lim et al., 2008, p. 3).

Also, prototypes are often described as boundary objects (Brandt 2007; Doll 2009; Neyer, Doll & Möslein, 2008; Star & Griesemer, 1989). Boundary objects couple different social worlds (Doll, 2009) in order to converge perspectives and give them meanings. As boundary objects, prototypes are at the heart of the exchange of design ideas in organizations and are therefore crucial for the success of social interactions within the design team. Boundary objects in general are of explicit relevance in organizational innovation processes, as Star and Griesemer (1989, p. 393) describe them as “objects which are both plastic enough to adapt to local needs (…), yet robust enough to maintain a common identity across sites.”

In order to bring the existing body of research literature in a systematic order, we were focusing on the prototype as communication agent and medium of knowledge (Rhinow et al., 2011). We structured the scientific findings into three different application areas, which will be presented briefly below.

The prototype as an agent to interact and to learn within design teams

Design Thinking teams are usually working together on prototypes in order to clarify a problem space or visualize associations and ideas with regard to their problem space. Prototypes as manifestations can be seen as interactions on a more concrete level than other interactions such as discussions. They thereby reduce uncertainties and improve the confidence and the bonding of the team (Doll, 2008). Dow, Heddleston, and Klemmer (2009, p. 172) also assume a positive effect on both “individual emotions and team dynamics". They mention that it is important for the teams to not only receive feedback on prototypes individually but to “perceive and interpret feedback collaboratively” (Dow et al., 2009, p. 172). They learn together and realize what they can achieve and what not, thereby developing a team identity (Doll, 2008). The prototype also works as a medium that incorporates the implicit knowledge of the design team. To this degree, the prototype serves as a moment of reflection for his designers. It is an agent that communicates back (Schön, 1983). Dow et al. (2009, p. 31) describe the role of prototypes for "designers (to) embody creative hypotheses” that also help to observe the outcome. Designers do so by sharing and discussing manifestations between each other (Junginger, 2007). This effect has been described as a shared mental model (Neyer et al., 2008) within the team. This implicit model is a result of the communicative interaction along the development of the prototype. Once developed, the prototype acts as a sender that delivers a signal to team members about the process being made (Neyer et al., 2008). Prior somehow diffuse ideas and vague models either turn into a prototype that the team can agree on, which indicates the existence of a shared mental model.

The prototype as an agent to interact with and to learn by users

Given that the project team agreed on a certain prototype, it is now possible to hand over the prototype to potential users or clients (Rambow & Bromme, 2000). As part of a user-centered design process such as Design Thinking, prototypes are regarded to be helpful to evolve a shared “language-game” between teams and users (Brandt, 2007) therefore fostering “human-human interaction” (Schneider, 1996). Users interact with the prototype, they resonate with it

and give interpretations from their individual points of view. The team has got the chance to re-interpret the impact of their solution. In software development for example, prototypes are understood as instruments for the clarification of system specification, to support decision processes and to gain practical experience with a planned software system before actually starting the implementation of system components (Doll, 2009). Referring to this praxis, Buchenau and Suri (2000) coined the term “experience prototyping”.

The prototype as an agent to transfer knowledge to team-external partners

After a prototype has been validated by users, the initial teams oftentimes hand over their product vision to other stakeholders for decision-making and further developments of prototypes, e.g. managers, engineers, marketing experts. External stakeholders may not be able to perceive the value and usefulness of a prototype for several reasons. One of them may be the fact that they do not perceive the level of resolution of the prototype as being sufficient: “Good ideas may be rejected by ill-informed executives based on what is perceived as inadequate execution of the prototype.” (Schrage, 2006, p. 7). The emphasis on the relevant implicit knowledge can be supported by the final prototype, in so far as it focuses on the relevant decisions of the design process. The final prototype therefore should not only represent the simple form but shall also disclose the arguments that led to certain decisions.

What follows from all this? David Kelley argues that organizations can either develop specification-driven prototypes or prototype-driven specification and both approaches can be suitable (Kelley as cited in Schrage, 2006, p. 4). That means, using prototypes across organizational teams does not only influence the development of a product but also the whole organization. Schrage (2006, p. 9) calls a prototype a “medium for interdepartmental integration” that is potentially capable of deconstructing organizational flows and structures. Especially management starts to become aware of incremental changes by looking at the “flow of prototypes” (Schrage, 2006, p. 10) through the organization and the questions being raised by that: “Who—insider and outsider—get to see what when? When are modifications made? Who requests them? Which requested modifications are ignored?” (Schrage, 2006, p. 10).

In our own empirical research we therefore emphasized the importance of prototypes as boundary objects for interaction and learnings within both Design Thinking teams, with users and partners (Rhinow et al., 2011). The next chapter gives a short introduction into the method of Design Thinking before presenting the results of our empirical testing and the development of a prototyping canvas.

3. WHAT IS DESIGN THINKING?

In order to understand the specific context and the needs of Design Thinking teams, we need to first clarify our understanding of Design Thinking as it is used in educational programs for

students, namely the HPI School of Design Thinking, and professionals, namely the HPI Academy, in Potsdam.

Design Thinking is a user-centered and teamwork-based approach that solves problems in an iterative way (Beckmann & Barry, 2007; Brown, 2008; Owen, 2006; Stanford d.school, 2010). It accentuates the importance of multidisciplinary teams that work within a framework consisting of different design methods. The multidisciplinary background of team members shall provide an extensive exchange of different knowledge, competencies and experiences resulting in a broad understanding of a given problem and its possible solutions.

The Design Thinking process is based on the intuitive workflow process of a designer. Design Thinking teams of 5 to 6 navigate through iterative six phases (*Figure 1*). In the first phase – understanding – the team sets the problem space. In the phase of observation, participants gain an outward view and form empathy for the users and stakeholders. In the third phase, which serves to define the perspective, the knowledge gained will be collated and summarized. In the fourth phase, teams develop a variety of ideas based on their point of view. The prototyping phase serves in the development of concrete solutions. These solutions can then be tested in different situations and for different purposes. The process guides teams iteratively from a vague understanding of a problem to a concrete and appropriate solution.

As a learning model, design thinking supports design creativity, utilizing project and process based learning by emphasizing creative confidence and competence (Rauth, Köppen, Jobst & Meinel, 2010).

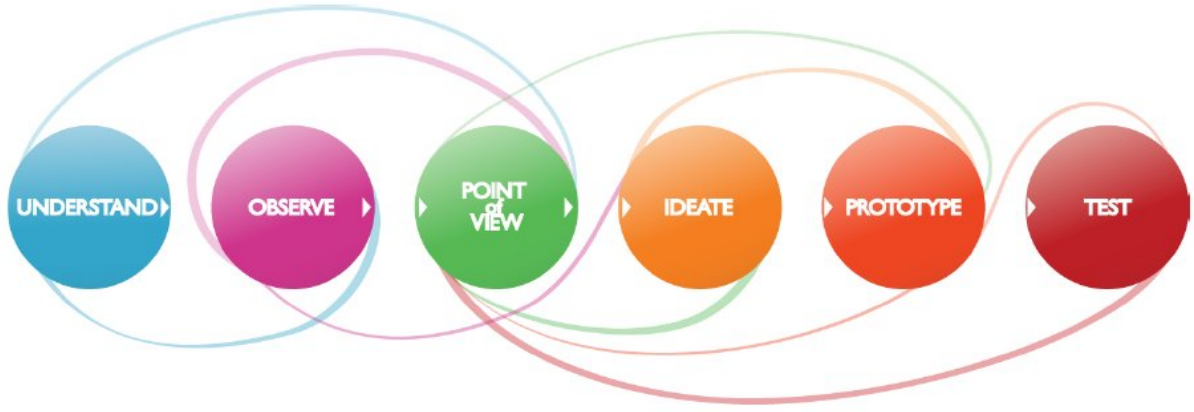

Figure 1: HPI School of Design Thinking (2012): Design Thinking process.

We will now present our findings from our empirical test setting within the context of Design Thinking.

4. RESEARCH RESULTS IN EDUCATIONAL AND CORPORATE SETTINGS

We conducted a long-term study on the integration of Design Thinking in a global corporation in 2012. Within this approach we interviewed team members, users and managers

(*n*=51) on their prototyping experiences in the context of Design Thinking. We furthermore cooperated with the HPI School of Design Thinking that develops educational programs for students in Design Thinking and with the HPI Academy that creates educational programs and trainings for professionals in Design Thinking. We observed how students, professionals and teachers developed and applied different kinds of prototypes within their projects.

Our results demonstrated that team members demand for guidance and inspiration on how to prototype. As interviewees indicated, there is a lack of knowledge regarding the variety of prototyping techniques. Oftentimes discussing these issues and recognizing the importance of prototyping in a wider context do not take place until the end of a relevant project. Theoretical insights into prototyping are hardly finding their ways into project based education and corporate project settings. As one interviewee stated:

> *I mean, I've also learned just now that there are prototypes, which you can show in terms of acting or via such mockup and that you should also dare to demonstrate them to management. I think it's all right too. But at the beginning this wasn't really clear for me. In this case would have probably planned the topics a bit differently.* (interviewee #23[1], 2012; translation by the authors)

Furthermore, Design Thinking beginners are unaware why they chose to build certain kinds of prototypes and how to best utilize them for further iterations:

> *And just rather at the end of the prototyping mode I would have liked to have more time. So we have spent a very long time with questionings, user perspectives and so on. Very, very long. Well, I then found that difficult, to find an essential point out of the findings and to knit a prototype out of it.* (interviewee #18, 2012; translation by the authors)

In Design Thinking, qualitative user research insights are commonly the basis for prototyping, however oftentimes the teams do not have a shared understanding of what kind of prototypes may rather fit to the context they are working in.

Our findings indicate that the development and the use of prototypes among novices in a company are rather intuitive, in some cases rather arbitrary. Student teams at the HPI School of Design Thinking tend to build and combine a mixture of prototypes, most of them unintentionally. As shown above, previous research indicates that that a certain anatomy of a prototype (Lim et al., 2008) is differently well suitable for demonstrating different properties of a target design and therefore can lead to different results, for example different feedback by users, different experiences and different interactions. Results in this regard mean for example interactions, that can be fostered by prototypes, as Schrage (1999, p. 20) stated: "The fundamental question isn't, What kinds of models, prototypes and simulations should we be building? but, What kind of interactions do we want to create?"

[1] Interviews were given on the basis of anonymity; individual statements and opinions are not cited by name.

As research shows, the selection, the development and the use of a special kind of a prototype in innovation processes should rely on what teams, oftentimes only implicitly, intend to achieve and what kind of interaction they want to create among different involved parties. However existing research on prototyping describes different application scenarios but lacks a concrete practical-oriented framework that indicates which kinds of prototypes to choose for which purposes. We aimed to fill this gap by developing a tool for concrete guidance that integrates insights from our empirical research and from previous academic research on prototyping as well.

5. THE DEVELOPMENT OF A PROTOTYPING TOOL FOR GUIDANCE

We pursued a research by design approach. We started the development of our prototyping tool by designing a collection of prototyping cards that would further support our research, in order to receive further feedback. We used these prototyping cards to arrange them to each other, e.g. according to different metrics, different intentions to prototype or different target groups to interact with. We then validated certain aspects of our arrangements and developed a new prototyping framework that may serve inexperienced practitioners in their future projects.

Creating a prototyping card set

We first started to identify all different prototypes that have been build and used over the last years during the educational projects of the HPI School of Design Thinking. We then consolidated prototypes that are similar and categorized them. The collecting of different prototypes was based on our personal experiences and observations as well as on our information from the expert interviews with Design Thinkers and teachers. In addition, we conducted an extensive web literature research and focused particularly on websites regarding design methods and tools[2].

We then categorized and validated all prototypes by using mindmaps. We added a picture for every single prototype and described them with a short text including responses to these questions: what's the prototype, how can you develop it, and for which situations or intentions is it suitable.

In a next step we created a first prototype of a prototyping card set (*Figure 2*). It consisted of 36 cards, illustrating prototypes with distinct characteristics. The card set aimed to provide an idea about the variety of prototyping techniques and its possible applications. It helped us to arrange existing types of prototypes along different intentions and purposes.

[2] e.g. http://www.designmethodenfinder.de, http://www.servicedesigntools.org

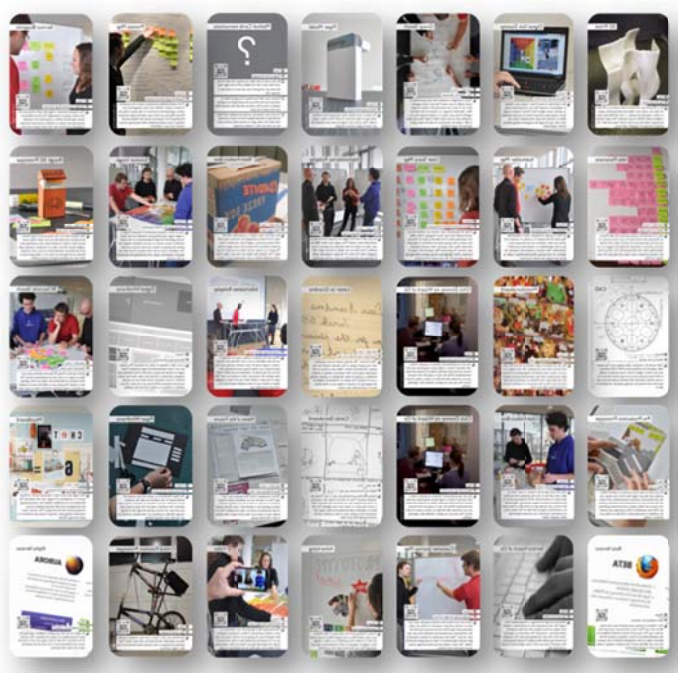

Figure 2: Design of the 36 prototyping method cards

Creating frameworks based on prototyping cards

We first arranged our cards according to the purpose of interacting with users or other stakeholders. As shown in *Figure 3* prototypes are distinguished as tools that rather promote so-called diverging or converging interactions among these groups. Diverging prototypes rather open up space for discussions about potentials, new possibilities to modify ideas, and inspire participating stakeholders. Converging prototypes rather promote the validation of concepts and decision-making processes that close discussions between stakeholders. Another dimension of this framework also distinguishes between prototypes that are rather successful for team-internal discussions and those that rather work for integrating external stakeholders who have not been participating in the early design process.

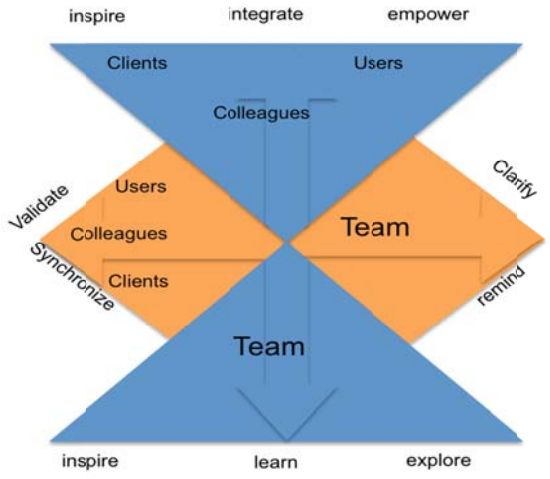

Figure 3: Model of prototyping interactions

This framework helped us to specify different characteristics of interactions, as they occur with those target groups. It also became clear, that practical implications out of this framework remain little. The framework did not help us to clearly position and thereby distinguish our selection of prototypes to each to other. Our expert coaches indicated that it does not seem to be possible to identify specific prototypes as more useful with regard to diverging and converging interactions and to distinguish them between those two groups. The distinction between different kinds of prototypes consequently became superfluous in this case. Rethinking our framework we created a new model.

Within a second framework, we positioned prototypes according to their resolution and the time it usually needs to build them, using 2 by 2 matrix, meaning two dimensions with each two extremes (quickly-costly and concept-detail). Prototyping techniques, which creation naturally doesn't take much time, for example a 30 seconds sketch, were aligned closer to the extreme "quickly" than for example 3D prints, which were positioned closer to the extreme "costly". Simultaneously all prototypes were also arranged under the aspects of whether they shall communicate still intangible and vague ideas ("concept") or whether they shall transfer already more detailed and elaborated proposals for solutions ("detail"). In practice we implemented this approach by using the back of all cards, which in combination show the matrix and therefore also the position of each prototyping technique on the back side.

In order to test and validate our new framework we introduced the prototyping cards to Design Thinking teams at the HPI School of Design Thinking. We performed user experience tests (n=12). Additional data were collected with a quantitative questionnaire (n=14). Results from this part of our research indicate that our prototyping cards are inspiring for Design Thinking beginners. Novices reflected on their unawareness of the variety of prototypes. Once confronted with more options, they immediately thought about their recent projects differently. A further insight confirmed our previous observations and assumptions, namely that beginners were mixing different kinds of prototypes and prototyped rather unintentionally than planned.

Despite the positive aspects of our prototyping cards the second framework again did not provide a meaningful guidance for those teams. Long discussions among the participants of the user tests showed that the different notions within the matrix remained unclear and appeared to be too abstract. Further and more importantly it turned out that the framework offers no added value for sense making prototyping. For example no team would decide to choose one of the prototyping techniques, which is rather close to „costly", because normally there is only limited time for prototyping in design and innovation processes. The new insights gave us a hint for the development of a third framework.

Development of a prototyping canvas

It turned out that novices are hardly aware of the specific limitations of different prototypes for different interactions.

Our aim was to consider why people prototype in Design Thinking. In fact, we collected our insights from previous research and testing and identified five different intentions to build prototypes within Design Thinking:

1. the intention to clarify and to understand the initial situation without having already a solution (Xplain as is),

2. the intention to make unclear and ambiguous ideas and moods/feelings insight the heads of the team more tangible (Xternalize),

3. the intention to test ideas and solution from the perspective of a user and to check, whether the solution in this form is at all wanted (Xperience),

4. the intention to demonstrate a concrete idea or solution so that third parties understand it in the respective contexts (Xplain to be) and

5. the intention to test functions for technical and economic feasibility (Xploit).

We arranged our prototyping cards according to those five intentions, which led us to five categories, and marked them in different colours (*Figure 4)*. Thus each different coloured area stands for a different intention to prototype. One can see all these areas with their names, each with a short statement of the associated intention already described above.

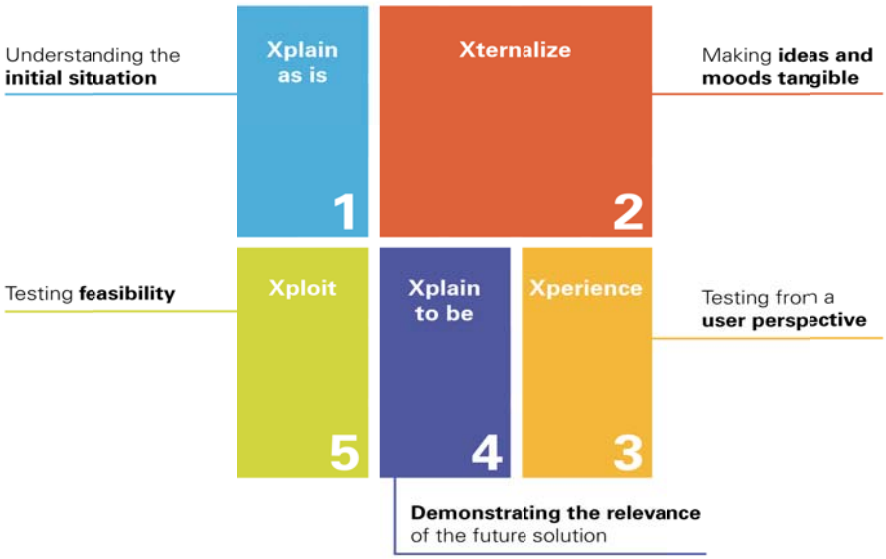

Figure 4: Different areas of prototyping in Design Thinking

In a next step we assigned each of our 36 different ways of prototyping to one of these areas, resulting in an arrangement of having four categories with a similar amount of types of prototypes and one category (Xternalize) with twice as much different types of prototypes that are suitable. Thereby each card could be clearly assigned. The canvas now serves as a basis to position prototypes and to give a brief overview of different interaction and learning opportunities for prototyping for future Design Thinking teams. The teams will then be able to select those cards that are rather suitable for their specific situation. Only recently we held a workshop with Design Thinking experts from the industry and designers presenting our

new canvas. The experts formulated an extremely positive feedback and assured us that we solved the former problem areas.

6. CONCLUSIONS AND OUTLOOK

Previous research has indicated that design prototypes are so called boundary objects, which foster different interactions and learning within teams and with target groups such as users, managers, engineers that are involved along innovation processes. There seems to be a lack of concrete guidelines for inexperienced practitioners that reflect those insights from previous research on prototyping. We conducted empirical research on how inexperienced practitioners in educational and corporate environments develop and interact with prototypes. As a result, we found that beginners in prototyping are often unaware of the great variety of different prototyping techniques and that they rather prototype unintentionally. We therefore concluded that there is a gap between the existing rather abstract knowledge stemming from the ambit of scientific research and the way inexperienced practitioners actually prototype in real-life projects. We aimed to close this gap by developing a tool that integrates research insights and provides concrete guidelines on how to prototype for different purposes. As a starting point, we identified a large number of distinct types of prototypes being developed and applied along innovation processes.

We therefore developed a set of cards and a prototyping canvas that may help inexperienced prototyping practitioners, namely Design Thinking teams to 1) become inspired by the variety of prototyping opportunities and 2) navigate through these opportunities fast and efficiently in order to identify the types of prototypes that are more suitable for their situation-specific purposes than others.

We created different frameworks to test our hypothesis that prototypes are means by an end to create interactions and learning within different groups and to further develop our understanding of our target users' needs. Our most recent framework is a prototyping canvas, consisting of 36 method cards, that shows which prototyping techniques are especially suited for five different intentions to prototype.

We are confident, that our prototyping canvas can be used a guidance for future teams in educational as well as in corporate settings, who will benefit by using different kinds of prototypes to develop and communicate their solution proposals along the innovation process. Besides, the method cards are also inspiring in terms of giving an overview about the variety of prototypes in a corporate context.

Apart from the positive feedback from our recent expert workshop we will of course introduce our framework and our set of cards to Design Thinking teams and observe whether they will significantly change their prototyping behavior, e.g. anticipating and reflecting on their intentions more than team without these tools.

Our research further showed that prototyping beginners mix different prototypes. Therefore, we also aim to identify meaningful combinations of different prototypes with regard to

different purposes.

Depending on the idea of developing a variety of prototypes for different purposes within an innovation project, the canvas may serve as a map to navigate through different options in order to trigger different interactions. Future Design Thinking teams may prototype more rapidly and also more in parallel in order to interact more and learn faster within different groups.

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Relating the artistic practice of design to the design thinking discourse

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Keywords: Design thinking, Artistic intervention, Art & Management

This paper introduces an approach to design thinking that integrates rather than separates the discourse from the artistic roots of design. We present a theoretical framework for the artistic foundation of design thinking. We relate design thinking, as a subarea of design management, to the concept of artistic interventions, theorized within the area of art and management. Our comparison of the two discourses, those of design thinking and artistic interventions, shows both similarities and differences. We suggest that the design thinking discourse can develop further by attending to several practices that are apparent in artistic interventions and thereby designers can reclaim the artistic roots and emotional core of their profession and a practice approach to design thinking.

Introduction

"Design thinking" is not one but many different discourses within the field of design management (Johansson, Woodilla & Cetinkaya 2013). It is also a rather messy area where a number of influential voices have recently withdrawn their support (e.g., Collopy 2009, Nussbaum 2011). Yet we do not think it is a good strategy to abandon the keyword "design thinking" for yet another new fad concept. Instead, we would like to reacquaint ourselves with the core themes of the concept rather than toss it aside as no longer useful.

In order to deepen our understanding and be inspired for a new typology that can provide further nuances, here we relate design thinking to the concept of artistic interventions. We do so for two reasons: First, since we consider design as applied art, we find it interesting to relate to what is not "applied" but the opposite, the core of art. Design is applied art that has been adjusted to a consumer/user perspective and functionality. It has also been adjusted to a production process and technical circumstances. Design therefore can be seen as a hybrid of art, functional, and technical circumstances – or the worlds of art, management, and

technology. So, to investigate the core of the artistic influence we need to go to the influence of art itself. From such a perspective, design management becomes a subarea of art & management. Relating design management to this broader area might also give new perspectives on the relation between design thinking and management, since design thinking could in turn be seen as a subarea of design management.

Second, there are a number of ongoing or recently completed empirical projects within the EU community that are labelled as "artistic intervention projects". They are all about artists doing interventions in private companies or public organizations in order to influence the organization in a positive way. Therefore, there are similarities with what is claimed in the design thinking discourse, namely that the artist/designer makes the employees think and act in new ways: getting more energy, being more creative and finding new solutions for innovations that they would not have done otherwise. Comparing this discourse of artistic interventions with the discourse of design thinking will enhance or give new perspectives that can deepen the understanding of design thinking and what it is about.

The paper presents a theoretical framework for the artistic foundation (or component) of design thinking. Our research begins with the questions: What are the links between design thinking and artistic interventions, and in what ways can these links point to ways that artistic interventions with their artistic core can strengthen the concept of design thinking that has design as applied art as its core? We begin with a short historical overview of design thinking within design management. The second section is an overview of the area of artistic interventions followed by a comparison of the two areas in order to see what design thinking can gain from such a comparison.

"Design Thinking" in relation to "Design Management"

Design management has an interesting history with respect to its twin foci on company practice and academic research. Though design management in practice entered companies like AEG, Olivetti, and IBM in the period after WWII (Walsh, Bruce and Potter 1992), it first entered the academic world in the 1970s when the London Business School started to teach classes in design management for managers and management students (Gorb 1990). Since it started in a business school with designers invited in, the discourse became grounded in the business world with the designers and their way of thinking as alien visitors who tried to tell their message in the language of their hosts.

In late 1970s and 1980s the focus of design management turned to the concept of "corporate identity" with coordination of different design areas (e.g., logo, product, packaging) related to the identity, aims and mission of the company, later replaced by "branding" under the dominance of the marketing function (Johansson & Svengren 2006). Meanwhile, the first academic research in design management, the Triad project (www.dmi.com) with researchers on three continents coordinated by the Harvard Business School, created a strong link

between design and strategy. Strategy thus became the dominant paradigm within design management in the 1990s academic world (Bruce and Bessant 2002).

After the millennium three things happened to the area of design management: first, innovation replaced strategy as an "economic engine" within the management area, allowing design to be recognized on its own premises rather than being added to strategic competences (Lockwood 2010). Second, within operations management service design started to systemize and make the delivery of services more efficient; this became an area for practicing designers, first as service as an extension to products (like phones and computers) and then as an area in itself where designers' competence and methods are used to produce service rather than products (Stickdorn and Schneider 2010). Third, design thinking became popularized through the American business press as the way designers work and approach problems, as exemplified by IDEO's way of working (Brown 2008, 2009; Kelley 2001, 2005). The discourse is closely related to both innovation and service design, and within the design management discourse it has been elaborated as a concept in itself, and as a skill managers should learn in their training (Dunne and Martin 2006, Martin, 2009) or a toolkit for use in their practice (Leidtka and Ogilvie 2011).

While the above summary logically places design thinking as designers' contribution to aid managers in areas of strategy, innovation and services, other understandings of the concept already existed in the academic field of design, a stream we label "designerly thinking" (Johansson, Woodilla and Cetinyaka 2013). This refers to the academic construction of the professional designer's practice (practical skills and competence) and theoretical reflections around how to interpret and characterize this nonverbal competence of the designers. Incorporating Simon's (1996/1969) classification of design as the science of the artificial and an opportunity to change situations into preferable ones, Schon's (1982) theorizing on the reflective practices of designers, and Rittel and Weber's (1973) notion of *wicked problems* embodying fundamental indeterminacy (Buchanan 1992), the discourse increasingly focuses both on designerly ways of working and thinking (Cross 2011, Cross, Dorst and Roozenburg 1992, Lawson 2006/1980, Paton and Dorst 2011) and the creation of meaning rather than artifacts (Krippendorff 1989, 2006). Designerly thinking is thus not a single discourse, but several, with allegiances to different epistemologies and centred on different core concepts. What is clear, however, is that these discourses remain apart from the managerial realm, although, as we have argued elsewhere (Johansson and Woodilla 2011), design management would benefit from cross-disciplinary research involving the different traditions.

Critiques against design thinking point to generalizations that simplify the role of designers and rely too much on the managerial discourse. The essential part of designers' way of working is abstracted *from* the design thinking discourse that has become "design minus practice". Instead, Kimbell (2011, 2012) argues for a practice perspective and attending to the situated, embodied routines of designers, while Dorst (2011) explores the way in which core design practices of framing and reframing can be adopted for organizational problem solving and innovation, and Tonkinwise (2011) laments the lack of attention to aesthetics, referring to

anything related to the pleasing appearance and feel of a design. These scholars point to ways in which designers operate within their learned, individual styles that are inherently subjective. In addition, all designers are socialized into design practice through the studio system, and in so doing they absorb artistic methodologies and processes that are overlooked when the focus is on technique.

The concept of design thinking is not unique in obliterating aesthetic connections. In a broader perspective, design has an interesting relationship with both art and technology/production: if the relationship with art is removed, it is no longer design, only technology (Johansson & Svengren-Holm 2008). Design deals with aesthetic relations and the senses of human beings, which are at the core of art (Dewey 1934), or as design consultant and author Marty Neumeier writes, "Good design does not depend on the eye of the beholder, but on a combination of aesthetics and ethics … or as framed by Apple's Steve Jobs, 'Design is the soul of man-made creation'" (2009, p.78). Yet in general there appears to be a rift between design and art in our culture (Coles 2005). In this paper we make a modest contribution towards righting this situation through consideration of artistic interventions in organizations and how they contribute to expanding our notions of design thinking.

The area of artistic interventions

Artistic interventions can be regarded as a subdiscourse of Art & Management, where the latter is more concerned about two perspectives: first, how to manage artistic organizations (opera, theatre, museums etc.) and second, how managers can learn how to become better managers through their encounter with art and artists. The art & management discourse emerged in the 1980s, with a philosophical orientation, specifically relating to culture and the narrative turn with a clear postmodern edge. The discourse developed along themes of recognizing emotions and senses as part of organizational life, with many theorists also being accomplished artists (e.g., Guillet de Monthoux 2004, Hatch 1999, Hatch & Yanow 2008, Kociatkiewicz and Kostera 2001, Linstead and Höpfl 2000, Strati 1992, 1999), while others made metaphorical connections to artistic practice (Vail 1989) or links with leadership (Steed 2005) and entrepreneurship (Daum 2005). In the US Nancy Adler (2006) wrote a compelling essay urging business schools to include artists and artistic processes in their approaches to both strategic and daily management and leadership; incidentally, this was published in the same issue of the *Academy of Management Learning and Education* as David Dunne and Roger Martin's (2006) treatise on how design thinking would change management education. In Europe, art and management has been a standing working group at EGOS, the European Group for Organization Studies, for many years.

Artistic interventions, on the other hand, began as a practical discourse, developed between the artists and organizational participants in early projects (cf., Harris 1999). Gradually an academic discourse developed when scholars began to take an interest in the work of these interventions. It is defined by Berthoin-Antal (2009:4) as:

> *a wide range of short- and long term forms of bringing people, processes, and products from the world of the arts into organizations. … to intervene means to come between, to involve someone or something in a situation so as to alter or hinder an action or development. Intermediary organizations, artists, and host organizations define the nature of the interaction, e.g., collaborative, provocative, entertaining, or playful.*

Research about artistic interventions has taken a number of different directions. Most research so far is presented as descriptive case studies, with conventional epistemology, taking a positivist stance in contrast to the postmodern discourse of art & management. Cases include salespeople from the John Lewis department store (UK) working with a theatre group (Tweedy 2004), the comprehensive Catalyst program at Unilever (UK) (Boyle & Ottensmeyer 2005), Learning Worlds artist-consultancy's work in US companies (Reaves & Green 2010), the NyX Innovation Alliances in Denmark, where 20 artists were paired with 20 companies for 20 days (Barry & Meisiek 2004). The projects were diverse, involving artists from different areas in contact with different sized groups of employees, and had varying success. In many, outcomes cited were intangibles in the form of different ways of thinking and doing, with little business evidence of impacts. Following a review of the Scandinavian research protocols, Berthoin-Antal (2009) prepared guidelines for more rigorous evaluation.

In a comprehensive review, Grzelec and Prata (2013) mapped artistic interventions lasting on average between a few days and a few months and spread over Western Europe. Producers (also called intermediaries or matchmakers) match artists and organizations on the basis of their own experience and knowledge, and provide process support by establishing a focused framework for the artistic intervention, monitoring its progress and addressing problems that arise. Client organizations come from a variety of areas: education, local authorities, creative industries, research, health, manufacturing and services, with a balance between private, public and non-profit organizations. They engage in artistic interventions (1) to develop new methods and processes, and (2) to cultivate a culture of creativity, change (flexibility) and motivation in the work environment. During the interventions, the clash of the two contrasting logics (of the artist and the organization) releases energy in the form of new ideas, new visions and deeper understanding of the organization that later can shape a new vision of the organization, its stakeholders and the environment. In this way artists within organizations contribute to strategic development of methods, processes, creativity, change management and motivation. A different approach is taken by Brattström (2012) who writes from the perspective of an artist within an artistic intervention. Using her artistic point of view she reflects on whether she has used her artistic knowledge (or some other knowledge) and if so in what ways. Jahnke (2012) writes a more detailed ethnographic report of an artistic intervention highlighting a number of different phenomena within the intervention.

Most studies discuss the value of artistic interventions, some of them explicitly (Schiuma 2009, 2011), while others offer more reasoning about the character of the values (Johansson 2012) or are critical, questioning just "what" is bring unleashed during the process (Gilmore

and Warren 2007). Bertholin-Antal and Strauss (2013) consider the individual and organizational values-added in projects coordinated through Creative Clash (www.creativeclash.com). Participants almost always reported the experience was positive, even if it entailed going through difficult phases of irritations and frustration, while organizational impacts were usually spill-over effects from benefits that individuals and groups have gained from an experience with an artistic intervention. These effects were often interrelated and reinforced each other, with responsibility for deriving benefits for the organization and sustaining the effects resting with managers and the employees. A few scholars theorize the value of the interventions, including Styhre and Ericsson (2008) who write about the manager's *comfort zone* being expanded by the artistic intervention. Barry and Meisieck (2010) take a sense making perspective, discussing differences between "seeing more" and "seeing differently", where the latter is an outcome of artistic interventions.

Some scholars relate the artistic interventions to an organizational learning perspective. For example, Darsö (2004), who comes from the educational field, writes about artistic interventions creating a space for practice, where employees can rehearse and develop innovative approaches that later become part of the team or organization's way of working, much the same way as an orchestra must practice before a performance. Berthoin Antal (2013) considers the "surprising" logic that artistic interventions can stimulate organizational learning through the clash of cultures. Following a review of the multiplicity of ways that arts are being brought into organizational spaces, she challenges theoretical frameworks in organizational learning to expand because artistic interventions put issues of space and diverse human senses, to which little attention has been paid to date, squarely on the agenda.

Comparing design thinking and artistic interventions

In this section we compare the discourses of design thinking and artistic interventions. We have chosen design thinking as used in the managerial world and not the more scholarly and academic "designerly thinking" for two reasons: First, both design thinking and artistic interventions are directed towards management, which is not the case with designerly thinking. Second, we believe the design management discourse would gain most from such a comparison.

We begin by reviewing definitions of the two concepts. Design thinking is defined differently by different writers: for example, Brown (2008) defines it as "a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity" and Leidtka and Ogilvie (2011) as "a systematic approach to problem solving. It starts with customers and the ability to create a better future for them" (p.4). The concept of artistic interventions has an inclusive definition as "bringing in people, practices, and products from the arts to help address issues their organizations are facing" Berthoin Antal (2013:7).

The definitions point towards both similarities and differences in the two discourses. Berthoin Antal's definition of artistic interventions could also include design thinking, however, it would then necessary for designers to define themselves as being within the realm of art – which is sometimes, but far from always, the case. However, in her encounter with Swedish designers during her study of the Swedish government's design program, Johansson (2006) found the most common identity among Swedish designers was that they were not artists but obtained inspiration from the world of art.

The historical context in which the concepts of design thinking and artistic intervention emerged also differs. While design thinking can be traced to the world's largest and US-based design company, IDEO, and its collaboration with Stanford University, artistic interventions are more Eurocentric with forerunners such as the Artist Placement Group that the artists Barbara Steveni and Jon Latham initiated in the late 1960s in the UK (Berthoin Antal 2012). Examples do exist in the US, most notably the Xerox-PARC Artist-In Residence program in the early 1990s, although this was a program where scientists and artists worked side-by-side without a brief for formal interaction (Harris 1999). The conceptualization and contact with academia came much later, and it is only after the millennium that there has been a sustained interest, which again is a similar feature of both discourses.

The central purpose of design thinking is to help the organization develop competitive advantage through increased innovation capacity. This point can also be made about artistic interventions when viewed as a managerial consultancy tool as well as a way to permeate society with (arts based) culture, the two premises of this discourse. However, from a more concrete perspective, design thinking tends to be obsessed with problems and problem solving, even if the problems often are defined as "wicked" and must be reformulated before they can be handled. Artistic interventions are less focused on problems, and when they are, seem to be more interested in "problem finding" than "problem solving" even if the latter often is the outcome of the process. So, in reality the differences seems to be subtle and no hard division between the two discourses exists.

Both discourses are grounded in a specific practice (although Kimbell, 2011, 2012, argues that design thinking is design minus practice) and differ in their logic from managerial logic, mostly by being based on emotional sensitivity as a basis for the work. When it comes to design Johansson, Svengren and Sköldberg (2003) argue that design is "born in the cradle of modernity but alien to its logic". They trace this conflict back to the 17th century when the logic of *techne* was divided into art and technology. So the difference between the design world and the art world would then be that the designer stands with one leg in each world while the art world in the modern society is separated from the technical-economical rationality.

An open process is at the core of both design thinking and artistic intervention. In an open process the character of the result is never fixed, making it impossible to know in advance what will be the outcome of the process. However, the process as such could very well have some specified features (for example, an innovation lab lasting 24 hours) and is often planned

in detail in advance by the process leader and the artist. This planning is in itself a creative and artistic work.

The artistic interventions are really practical interventions that introduce totally new activities based on the artist/facilitator's discipline enacted in the organizational situation, while design thinking has been promoted as consisting of techniques and methods that can be integrated into normal ways of working. (Brown 2009, Martin, 2009). There are examples of artistic methods being integrated into training sessions without an artist present, but these do not fall under the category of artistic interventions as defined in this paper.

What can design thinking learn from these comparisons?

Design thinking will likely continue to develop as instrumental thinking or a "pre-packaged" tool kit for innovation based on the managerial circumstances, rather than questioning the circumstances. This, we argue, will probably be a dead end since real development needs to question the fundamental ways of reasoning that are present in any company. Instead of narrowing its scope design thinking could take another direction in its development and affirm a more critical and different way of making sense of the situation. Here, design thinking could gain inspiration from artistic interventions.

One of the distinctive features of artistic interventions is that they generally have a coordinator or "matchmaker" who suggests a particular artist to facilitate the intervention, and who also acts as a "translator" between the artists and the organization. The selection is based on the organization leader's description of desired outcomes, and also on the ability of the artist to work with (coach) participants. In some design projects where the designer works in the fuzzy front end, there have been projects with a similar role of facilitator between designers and the organizations (Jahnke 2013).

Design interventions tend to focus on a specific problem requiring an innovative solution, while many artistic interventions are successful at establishing a more innovative culture within an organization. Might the latter be more beneficial over the longer term? If research shows this to be so, then refocusing design thinking on an artistically based design practice would be important.

Based on its current path, in the future design thinking could possibly develop in two different ways. First, it could develop in a way that is quite easy to imagine, as an increasingly more refined toolkit for brainstorming activities, with additional and different customer focus than currently present in companies. It will continue to be quite popular and regarded as something new, while the fundamental ways of reasoning and the managerial logic will not be changed. A second path of development would be to promote a practical discourse with the design thinking concept anchored in artistic design practice. This would entail a radical path that would lead to a more genuine innovative climate in organizations. Instead of being a tool kit for improving the existing situation this path has to be matched by

a more general managerial creativity and a readiness from the companies to meet more radical innovations from within.

When we consider the artistic influence on design thinking we arrive at the following conclusions:

- Designers must not give away the artistic roots of their profession, nor their emotional base of their work. If they do so there are no other categories in the companies that defend these perspectives – that for the customer not only are important but often the decisive dimensions.
- Design thinking without a practice perspective is not design thinking but just a imperfect variation of it, as nothing more than a dualism between thinking and knowing that ignores the diversity of designers practices while assuming the designer is the main agent.
- If taking a practice perspective, design thinking must consider an open process such that every process is unique, not created from a toolkit, and one that is emotionally rather than cognitively anchored.

In sum, the process is aesthetically based, rather than scientifically. Such a perspective places design thinking back in the hands of the designers, and tells design managers that if they want to benefit from the inspiration of design thinking for idea creation, they must do it on the designers' terms, who in turn consider end-users and other stakeholders within their situated practice.

A reverse implication also applies. Design thinking has become characterized as tools and recipe-driven, but early examples were designer-led and involved emotional work. Currently artistic interventions are anything but recipe driven, but with increasing popularity and promotion, there is a possibility that they too could be reduced to a formulaic approach. Here the fate of design thinking acts as a reminder to the future of artistic interventions.

Conclusions

From our reasoning above we have made evident the common foundation of design thinking and artistic interventions. The common foundation lies in their professional training with studio pedagogy based in an emotionally grounded practice perspective rather than a cognitive knowledge perspective. We have also demonstrated many similarities between the artistic intervention processes and the design thinking processes.

This implies that the artistic side of design thinking should not be removed but carefully incorporated. If the artistic side of design is forgotten, then design becomes only a matter of functionality and technique. And then design thinking has no raison d'etre. Similarities between the discourses of design thinking and artistic interventions with a focus on the emotional and the practice side rather than the cognitive "thinking side" should be cultivated rather than neglected - at least if design thinking is to develop into a discourse able to address the innovation necessary to face the current global economic conditions.

As argued above, two different paths exist for the future of design thinking and its relevance to design management. One is promoting the more instrumental side as a tool kit and the other is nurturing the more artistic and emotional side as a somewhat uncomfortable and ambiguous but ultimately fruitful way to handle the problems at hand. Here research can play a role by continuing to explore the common features of artistic interventions and design thinking, thereby helping both to develop in a positive way that provides more depth.

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Service design and urban color planning

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Keywords: Urban Color Planning, Service Design, Management and Implementation

This paper looks at the challenges and opportunities in urban color planning by applying the methodology of Service Design. Urban Color Planning is generally used to build the City-image. However, the planning always can't function effectively in China. The objective was to changing the color planner role from color designer to serving the design. The expected results demonstrate the proposed methods are able to improve the management and implementation of urban color planning, and make it usable and effective.

INTRODUCTION

Background

With the development of urbanization, urban color planning has been a popular topic in China recently. Several urban color planning projects have been carried out, however, the present projects, which consider mostly the overall color effect instead of a controlling method for the authorities, are not easy to carry out. Therefore, integrating Design Management especially Service Design with urban color planning projects is attempted to improve the urban color management and implementation. There are two urban color planning projects discussed in this paper to reveal the challenges and opportunities. One is the Nanjing River West New District Urban Color Planning; the other is Urban Color System Planning in Fushun.

Research and consultations

Dividing district is adopted in investigation: the district was divided into different parts. And several crucial roads and blocks have been selected to collect the information. By using the "Architectural Coatings Color Card", we collected the façade color and then collated the field data. We have studied the site and the existing urban color planning to identify the major issues. In the course of our research we have met with officers from the management

committee and interviewed many citizens to build up a balanced overview. And then summarized the main problems

There are two models of urban color planning in generally. One is the European model, which stresses strict and scientific color restoration method in historical block and has fewer requirements for other blocks. And the other one is Asian model, which the urban color planning projects are always initiated and controlled by the government (Gou Ai-ping, Wang Jiang-bo, 2010).

Asian model is represented by Japan. It became popular around Asian countries. Since March 2000, many cities have done urban color planning projects in China. Such as Beijing, Harbin, Nanjing, Xian, and Hangzhou have set out dominant color; Wuhan manages its urban color according to the function; Wenzhou, Chongqing, Wuxi and Fushun emphasize the color planning in characteristic regionals, etc. (Chen Qun-yuan, Deng Yan-hua, 2011) However, according to the research, most urban color planning projects have no obvious effect of the implementation (Table 1)

City	Start Time	Dominant Hue	Management System	Implement-ations	Control Mode	Evaluation
Beijing	2000	Grey	Regulations		Dominant Hue +Regulations	The early exploration without forming a system. The implementation effect is not good.
Wenzhou	2001	Elegant&Bright Neutral colour	Guideline		Dominant Hue +Function Division +Division chromatography	The early exploration without forming a system. The implementation effect is not good.
Wuhan	2003		Regulations &Guidline		Function Division +Division chromatography	Begin to form the system from design formulation guide to administration. No implement effect.
Harbin	2004	Beige&White			Dominant Hue +Color Cell Control	Lack of management system. No implement effect.
Nanjing	2004	Light Green			Dominant Hue	Not apply to a large-scale of urban color planning.
Ningbo	2004		Regulations &Guidline		Function Division +Division chromatography + Different parts of the building	Win the Urban Color Prize in China The implementation effect is not good.
Hangzhou	2005	Shades of grey with a yellow tinge	Regulations		Dominant Hue +Color Division +type of the architecture	Establish the color planning system basically. The implementation effect is not good.
Chongqing	2005	Elegant&Bright Warm Grey	Guideline		Guidance	Still in the research stage.
Datong	2006	Five color			Color Theme +Function Division	Lack of management system. No implement effect.
Guangzhou	2006	Yellow Grey			Guidance	Still in the research stage.
Suzhou	2008	Shades of grey Jiangnan Style			Guidance	Still in the research stage.
Xiamen	2008	Shades of Grey			Guidance	Still in the research stage.
Changsha	2008	Elegant warm color	Regulations &Guidline	Reform original architecture color &Control the new architecture color	Color Theme +Color Division +type of the architecture	Establish the color planning system and support system basically. Have some implementation effect.
Tianjing	2009	Bright Grey Red-orange			Guidance	Still in the research stage.
Fushun	2012	Warm Grey	Guideline		Dominant Hue +Color Division +type of the architecture	Lack of management system. No implement effect.

Table1. List of color planning process and evaluation of Chinese cities (Yin Gui, Zhang Nan-nan, 2012)

Objectives

The aim of the these two projects is to propose a practical solution to better urban color environment，which is full of economic vitality, rich in cultural characteristics and with excellent living environment. Through this solution not only offer an overall chromatogram system for this area but also form a usable, effective and efficiency management and implementation method.

Through investigation we realize that the local people pay great attention to the spatial perception instead of color itself. When interviewing the local people in Nanjing, most of them have no idea that light green is Nanjing's dominant color. So it is necessary to communicate with local people and let them involved in the design. In order to achieve that, the following aspects should be noted. Firstly, make some connections between color and urban space. Then, take into account the flexibility planning principle and pay more attention to the management process to leave more creative space to designers. Finally, consider fully of the users of the color guidelines, including developers, architects and designers. And formulate a "bottom up" urban color planning model.

Methodology

Color Geography, Color Seasonal theory, Color humanity and Spatial Configuration are the existing methods for urban color planning. And the present Chinese urban color plans are mostly based on the theory of Color Geography founded by Jean-Philippe Lenclos, who thinks that both the natural and cultural factors will influence the color of regional architectures. So the Chinese color plans always start with investigating and analysing the historical and traditional architectures. However，this causes some deficiencies for the rapidly developing Chinese cities: (a) Most of the present cities do not have intact historical districts. And there is little difference in color among cities in traditional China; (b) Many new districts have been settled in cities, convergence of high-tech building means and modern building materials weaken the urban color characteristics, leading to the present situation of urban color disorder, color similarity and color abuse coexisting.

Considering the complexity of color, it is not enough to merely discuss color by itself. According to the color space configuration founded by Aiping Gou, color should be arranged to make the urban space significant and attractive by emphasizing the particularity and grade of space dynamic. The three basic urban design elements of point, line, and plane are used for spatial analysis and constructing (GOU Ai-ping, 2013).

The people and their activities are as important as the stationary physical parts. When doing the urban color planning, we must consider not just the city only. We must be mindful of what matters to the different kinds of users, and take into account the needs of the local people, shopkeepers and visitors.

Besides, we need to consider the requirement of the city managers side, as well. However, the current management and implementation of urban color planning in China always have less effect.

There are some important issues that deal with urban color planning: from city manager side it refers to how to evaluate different choices and from the practitioner point of view how to choose a color according to the guidelines (Mauro Ceconelloet al, 2007). In China, the manager side is government, and the practitioners consist of property developers, owners, architects and designers. Urban color management is mainly the government's macro-control and guidelines to the construction project of developers about the image of color. Therefore, we must take full account of the different demands of different users and consider whole process of the urban color planning comprehensively.

Requirements of different users are the initiation for us to use the perspective and methodology of service design to do the research of this project.

Service Design is the design of the overall experience of service as well as the design of the process and strategy to provide that service (Stefan Moritz, 2005). The reason why we apply service design to urban color design lies in three aspects: (1) Service design is a new holistic, multi-disciplinary, integrative field, which helps to either innovate or improve services to make them more useful, usable, as well as more efficient and effective for organizations. Recent years, pressures on management and service have made it essential for Chinese government to use the methodology of service design to enhance working process. (2) Service Design is a "User-Centred" design, differentiated from the traditional "Design-Centred" design, which helps the design meet the needs of users and get people in the service industry to realize that they are involved in design and get help to improve it. Urban color planning is a complicated process related to different users, including government, developers, architects and designers. We provide all resources and components that are necessary for them to do what they want to do. Let the users know they are an integral part of the project. (3) Service design helps to the operation guidelines of urban color planning and to somehow avoid the disadvantage of color plan. Usually, an urban color planning project will be ended by the accomplishment of urban color chromatography and guideline. From the perspective of service design, the design/plan which should be involved in the whole process of implementation and management will change from physical orientated to process oriented, from the designer guide to user driven, to participate in the entire process rather than the feedback, to the open solution rather than a one-off result.

There is a notable change when doing this research using service design methodology: When communicating with the clients, we need to build a service interface between us. Service Design works on the design of all different Touch-Points that together result in a designed service interface. The Service interface is the pattern derived from various contacts that a client has with a brand through different Touch-Points of a Service Journey (Stefan Moritz, 2005). In the urban color planning projects, the service interface is to build a connection between our clients, urban planning bureau, and the users. All the Touch-Points selected from

the service interface are taken into consideration in order to change the way of color managing from ‘‘top down’’ to ‘‘bottom up’’ (Gou Ai-ping, 2007) (Figure 1)

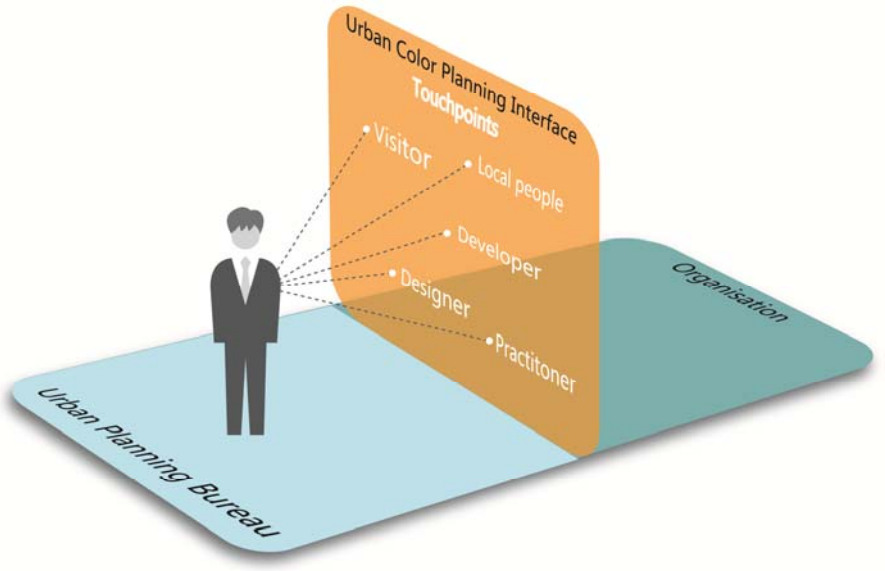

Figure1. Urban color planning interface

CASE STUDY

Urban Color System Planning, Fushun

Background

Fushun is a prefecture level city in Liaoning province, China, about 45 km east of Shenyang, with a population of 2,138,090 inhabitants and a total area of 11,271 km2. Fushun is situated on the Hun River. It is one of the industrial and economic development hubs in Liaoning province. Fushun is a highly industrialized area. It has developed as a thriving center for fuel, power and raw materials and is also offering more and more opportunities in textiles and electronics. The world's largest open-pit coal mine, known as the Magnificent West Pit, is located not far from downtown. Fushun is known as "the capital of coal". And there are a number of historic and cultural sites within the area.

According to the twelfth five-year plan and the requirements of overall planning of the city, Fushun speeds up urban construction and urban transformation, especially the new city zone of Fushun has made a great achievement. In the form of object image, color has a prominent visual character. And due to this character, color is the most prominent and the most eye-catching landscape element inside a city (Guo Hong-yu, Cai Yuan-nan, 2011). Urban color shows the city’s culture, humanistic charm and regional glamour. In this context, the control of the urban overall color is necessary to build a distinctive city image of Fushun.

Research and Consultations

Fushun is divided into seven parts on the basic of the planning profile. Therefore, we did the research and investigation according to different areas. To collect and record the current color, we applied tools such as the CMYK color model, used to describe the printing process, Pantone Matching System, a proprietary color space used in a variety of industries, primarily printing, though sometimes in the manufacture of colored paint, fabric, and plastics. And color card of Nippon paint, which can be used to describe the color of exterior walls, wood, metal surfaces and roofs. The main problems summarized through the research are as below: (Figure2)

- The overall color does not meet the general orientation of Fushun.
- The color of Fushun is disorganized, lacking main color.
- This area lacks territorial color characteristics.
- The collection of the color is not professional.
- The usage of the ornament color is too wide, influencing the overall effect of the color environment.
- The color random of commercial advertisements are everywhere.

Figure2: Photos of present color issues

Methodology

The seven districts of Fushun are divided on the basic of different land-use functions and regional characteristics. When doing the urban color planning of Fushun, we take corresponding measures for each district. For example, for the new district, we leave more space and have less restriction for designers to create a modern and fashionable district. While for the main city centre area, the requirements and guidelines would be more specific and strict since there are many traditional art deco buildings need preservation in this area. The strategy is to make sure the color of new buildings can be integrated with the traditional ones and show the art deco style in the meantime. And for the area where the open-pit coal mine located in, a new method, Environment Graphic Design, is adopted to create a colorful and interesting environment.

The entire process of the urban color planning is organized from the macroscopic view to the microcosmic view by using the Service Design methodology. At first, we investigate the current color of Fushun by using methods of Color Geography, Color Seasonal theory and

Color humanity. Through the research we set out the main color, warm grey, which can be integrated with various environment of Fushun. Then according to the different characteristic of the seven areas of Fushun, we set out seven regional main colours on the basic of the warm grey. When doing the depth design of each area, the main color can be expanded into a larger range, forming a color family of this area. Finally, from the microcosmic view, the color of each specific building is considering the factors of height, materials and texture, but still subject to the macroscopic color planning of the whole area. In the end, a control and evaluation process is provided to help the management side take the planning into practice.

Besides the traditional methods we used during the research, a color solid (Yin Zheng-sheng, 2013) is applied as a color standard during the entire process of planning. This color solid is more accurate compared with Munsell color standard. And can define a three-dimensional range of color, which leave more options and space for designers and architects. To make the color solid easier to understand, the three-dimensional model is interpreted into two-dimensional diagram to show the hue, lightness and purity. (Figure 3) Both the color solid and the two-dimensional chart show the application scope of the color. Colours in the same scope are integrated with each other. Therefore, the users of the guideline can easily pick up suitable color in this range which will be harmonious in this area.

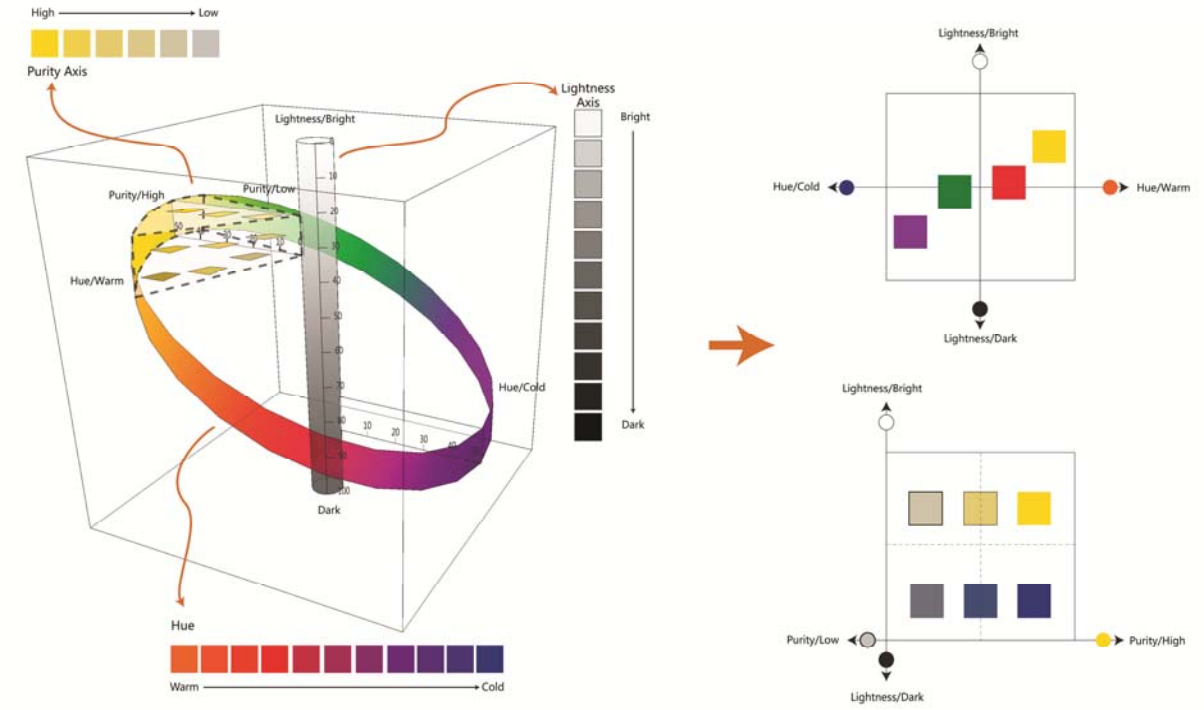

Figure3: Color Solid and its two-dimensional diagram

During the whole process of the urban color planning of Fushun, Service Design supports helps to establish several principles of the guidelines. And these principles can be the “touch points” between our team and the clients. These principles help the users understand the urban color planning guidelines more easily. The principles we applied in the project are as follow:

•Elastic principle: Since the urban environment is changing every day and influenced by society, economic, technology, nature, culture and custom, urban color planning should be elastic enough to leave more opportunities for further development.

•Integration principle: The objective of urban color planning is to create a pleasant color environment to improve the quality of the city, furthermore, enhance the people's quality of life. So the urban color planning should contain all the areas relating to human activities. That is to say we must take the feelings and needs of the people into consideration. Besides, the urban color planning should be included into the urban planning and carried out in both urban planning and urban management department.

•Guiding principle: The guidelines of urban color planning should not only provide specific requirements for urban color, but flexible rules to leave more space for designers and architects. The combination of control and guidance is essential for creating a harmonious and vibrant color environment.

Data and Findings

After the project accomplished, we acquire some feedback from Fushun government, the city manager side. They think that the urban color planning of Fushun is professional and comprehensive. The principles applied in the planning make the guidelines more flexible, easy to manage and evaluate. Nevertheless, there are still some aspects need to improve. Even though the color solid is a very professional color standard, its three-dimensional model is considered too abstract that most of the users cannot understand it. That leads to the difficulty of choosing colours.

Nanjing River West New District Urban Color Planning

Background

Nanjing River West new district locates to the west of the old Nanjing. Now it has an area of 55.7 square kilometres with a population of 210,000. Directed by Nanjing's overall urban development goal, it is planned to be another centre of commerce and culture & sport of Nanjing, as well as the luxurious residential areas. After a development of 5 to 10 years, it will become a symbolic district that can accommodate a population of 560,000 in modernized Nanjing.

Since Nanjing will hold the 2014 Youth Olympic Games, and both the Olympic Centre and Olympic village are located in River West New District, much attention will be paid to this area. In this context, Nanjing urban planning bureau invited our team to do the color planning for Nanjing River West New District.

Nanjing urban planning bureau, our client, raised some requirements for us, which can be summarized into two parts: Establish overall color image of River West New District and

form the overall chromatogram system of this area; accomplish the color zoning planning and put forward method of color management and implement.

The specific requirements are as follows:

•Give fully consideration to the current circumstance and the requirements of local people.
•The overall chromatogram should reflect the regional characteristics of River West New District.
•Establish color management process and basic auditing steps for River West New District color planning.
•Make sure the color planning guidelines are accessible to the authorities and convenient for them to communicate.
•The color research and plan project of Nanjing River West new district started from Mar. 2012 and finished in Dec.2012.

2. Research and Consultations

The River West New District was divided into three parts, northern, central and southern part. And ten observation spots have been selected to collect the information. By using the "Architectural Coatings Color Card", we collected the façade color and then collated the field data. The results of the main problems are summarized as below: (Figure 4)

•The color of new and old buildings conflict with each other, lacking main color
•Color of this district is various, destroying the systematic entirety of this district
•This area lacks territorial color characteristics
•The usage of the ornament color is too wide, influencing the overall effect of the color environment
•Some of the façade high-purity color is incongruous with the surrounding color environment
•The color random of commercial advertisements are everywhere.

Figure4: Photos of present color issues

3. Methodology

In River West new district, only three historical areas are located in northern part of it. Since this district is expected to be the new centre and symbol of the modern city of Nanjing, most the buildings and blocks in central part and southern part are new. So doing the urban color planning in River West new district only based on Color Geography is not proper. Therefore, we applied different methods to the research.

For the 2014 Nanjing Youth Olympic Games, the River West new district will be the most important area in Nanjing, and the passenger flow will increase dramatically. That impels us to put the feeling of the visitors in the first place. We need to make sure that the image of this district can help the visitors get to know the city more quickly and let them integrated into this place without feeling excluded. While to solve the problem we try to adopt the five basic elements of path, edge, district, node, and landmark put forward by Kevin Lynch in his book "The Image of the City". The five elements can construct the urban spatial cognitive map, and the elements which constitute the city can be recognized and can be organized into a coherent pattern (Kevin Lynch, 1960). That helps visitors understand the city in a legible way.

In the project, our whole working process is based on the five elements of the city image. According to the planning textbook Nanjing planning bureau offered to us, seventeen areas were picked up as the featured areas. And these areas, along with the main roads, the important road intersections and the boundary of this district, are all the cognitive reference point for visitors.

When starting the urban color planning project for the Nanjing river west new district, our client, the Nanjing urban planning bureau raised some requirements for us and the first one is easy to carry out and manage. In an organization Service Design supports helps to establish strategy, develop service concepts, solutions, designs processes and guidelines. When changing the whole design context from object to process, we are required to consider all the "touch points". The Touch-Points we applied in the project are as follow: (1) Fully understand the requirements of the clients before the research and generate the strategy of the whole plan. (2) Use the chromatic system NCS - Natural System Colour - in the planning phase. It is easy to understand compared with the Munsell color standard used by most of the Chinese color plans. The advantages of this tool such as objective, precise and capable of defining the range of color are provided with urban color planning.（figure 5）The flexibility of NCS leaves more space for designers. (3) We did our research and analysis, partition and control hierarchy, guidelines and management all based on the five elements of Lynch. It helps both the designers and planners reorganize the city efficiently. (4) Establish the guideline clearly and comprehensively. To make sure that every department will comprehend the guideline easily. (5) Get the feedback from the clients and users in the return visit. Through the feedback we can further improve the service.

The main color chromatography of the River West offers a usable range of building facade color, which maintain the overall color image of this district. The range also allows the designers and architects to use the color more flexible.

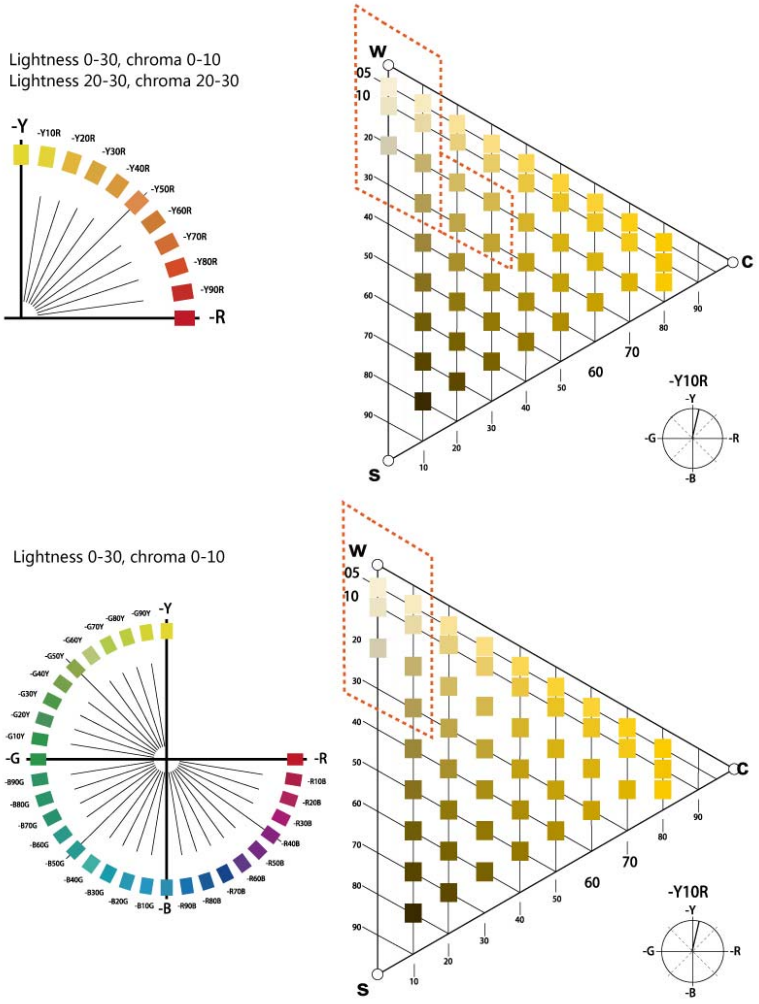

Figure 5. Range of color defined by NCS

When doing the River West new district color planning, we tried to combine different methods, including the color geography, color space configuration and the image of the city. We organized the color planning by using the Service Design methodology, and divided our plan into five parts: Overview, Research, Urban Color Orientation, Guideline of Urban Color Planning and the last part, Management and Practice. The research and plan structure is showed as figure below：（Figure 6）

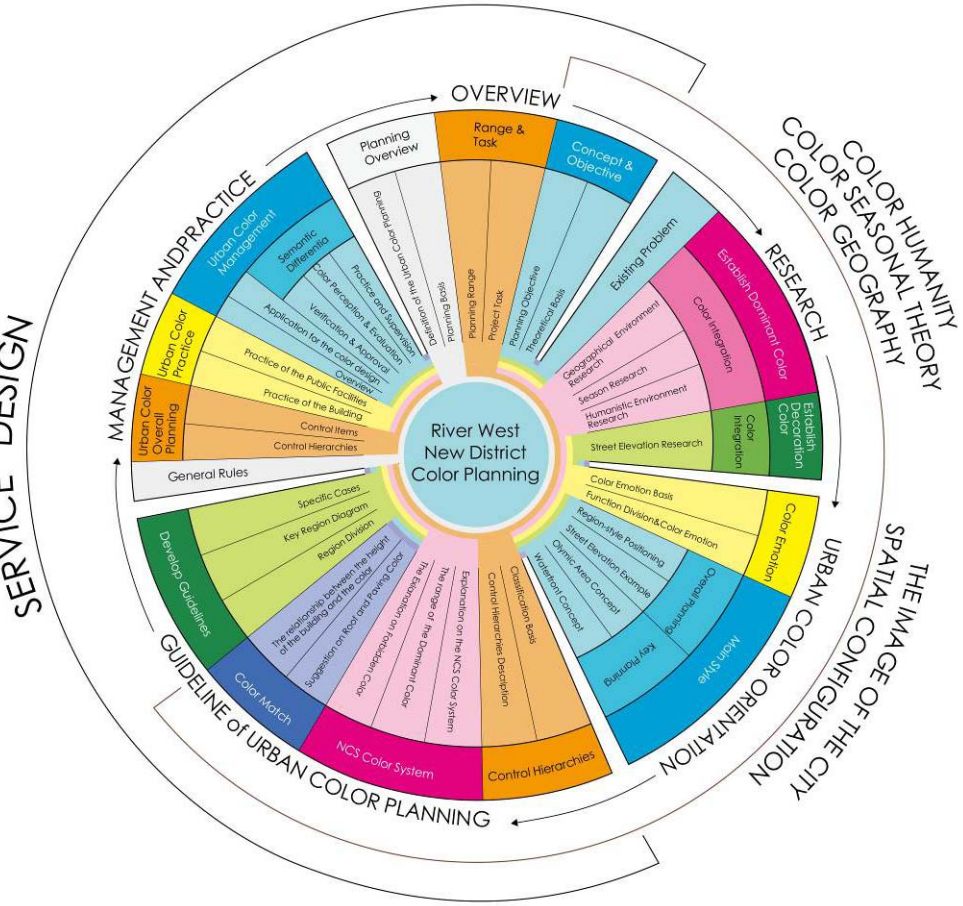

Figure 6. The research and plan structure of Nanjing River West New District Color Planning

4. Data and Findings

Since the Nanjing River West new district color planning has just accomplished, there is no feedback about the implementation. However, we revisited Nanjing urban planning bureau to acquire feedback and suggestions about the whole process of this project in the perspective of service design. And we will keep following up the implementation in the future. The follows are the feedback information we have gained.

Key findings:

•Our clients think the items in the guidelines are specific, and the project is expected to bring into effect.
•The NCS color system makes the color planning accessible to a wider public.
•The NCS color system presents the suggestive color and its usable range which contributes to the implementation.
•The NCS color patches provided to the users make the guidelines more intelligible.
•The control hierarchy of different areas leaves more space for developers and designers. And can enhance the management and implementation process of the urban color planning.
•The flexibility of the guidelines makes the color planning more practical, compared with the former projects they participated in.

Need to improve:

•Some departments reflect that the professional knowledge of color in the guidelines is difficult to comprehend.
•Urban color planning should consider more about the human, and think about perceptual factors of different users besides logical and scientific derivation.
•Urban color planning should be advanced to the position of mainstream design by educating managers and designers. Make sure the public recognize urban color planning as a useful, usable and practical design.

CONCLUSION AND RECOMMENDATIONS

The case study, research and considerations set out in this paper have led us to conclude that properly and purposed research and design of urban color planning can lead to a more usable, effective, efficiency and feasible management and implementation process. To guide the urban color planning requires an integrated interdisciplinary cooperation and research, and an interaction with our clients.

This article disagrees with the way of planning with color as the core and suggests planning with perspective of design management and service design under the Chinese urban planning system. From the view of service system, this project is still at an early stage. The findings so far are that the service design methodology makes a significant impact on government by designing the management, examination & approval, and supervision process. And its contents are suitable for review the whole urban color planning structure and help to avoid the disadvantages during the implementing process.

Acknowledgements

The study was supported by the Chinese Fundamental Research Funds for the Central Universities. We would like to show our deepest gratitude to Nanjing Urban Planning Bureau for cooperating during the project and giving suggestions to our research. And we also extend thanks to official Tang Jin and YU Bing for giving specific feedback to our interview, which contributed to our research a lot.

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Service design pattern congruency: Exploring the impact of value alignment on firm performance

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Keywords: Marketing Strategy, Marketing Practice, Service Design, Service Design Pattern, Service Design Pattern Congruency, Value, Co-creation, Pattern Congruency.

This research conceptualizes and empirically validates the influence of service design pattern congruency on firm performance. The authors present exploratory research developing a conceptualization of service design patterns based on both, the customers' and firms' viewpoint through a five-step process.

First, based on a review of the literature and interviews with service design and/or service delivery managers across various industries globally, we find that there is a continuum of practices based upon five dimensions: (1) how organizations define service design, (2) its scope and objectives, (3) its governance (4) how service design policy is developed and (5) how implementation challenges are addressed.

Secondly, these dimensions allow the authors to generate a typology of firms with regards to their service design practice and the corresponding service design patterns: Conventionalists, Convergence, and Protagonists.

In a subsequent study we select two financial service firms belonging to the anchor points of the typology, the conventionalist and protagonist service design clusters. We argue that these practices demonstrate two contrary views about the role of the customer in the service design, which is reflected in the corresponding service design patterns. We interview twenty customers of each firm and develop a service design pattern for each of the firms from their customers' viewpoint.

Next, we compare both; the firms and the customers' service design patterns with each other. Base upon this comparison we calculate the level of pattern congruency. We hypothesize

that a higher CX design pattern congruency will lead to higher satisfaction and, subsequently an increase in loyalty. We collect 200 responses from each firms' customer base to test the hypothesis. The overall customer satisfaction scores for both firms confirm our hypothesis.

In summary, our paper conceptualizes and validates the concept of service design pattern congruency. The research identifies that a strong pattern congruency between the customers' and firms' service design patterns results in a better firm performance, expressed by the well-established impact of customer satisfaction on revenue and sales growth.

Our research provides managers with evidence about the crucial role of service design pattern congruency and their firm's performance. Based upon our findings mangers will find guidelines on how to explore their customers' service design patterns and how to align their firms' patterns to develop congruency. It provides researchers with a sought-after conceptualization of service design patterns and its influence on firm performance.

We believe that this is the first empirically founded conceptualization of service design patterns and its influence on firm performance

INTRODUCTION

The primary objective of research is to explore phenomena to provide insights and explanations en route to predictive theory. Such insights and explanations are often informed by the identification of regularities in data; patterns of relationships among constructs which become apparent to the researcher (Eisenhardt and Graebner 2007). Such patterns fuel the creativity of the researcher to account for such regularities (Hempel 1966) through the conceptualisation of 'best guesses' and hypothetical assertions (Schmenner and Swink 1998). Of critical importance in the development of theory is the context in which the theoretical propositions/hypotheses hold true (Wacker 1998). This 'domain of theory' determines the extent of generalizability; a virtue of 'good theory' (Quinn and Ullian, 1980).

This paper reports on the exploration of service design phenomena, the patterns observed in empirical data and the subsequent explanation of the observed regularities in archetypal form (Conventionalists, Convergence, and Protagonists). Using the schema established, we explore the service design patterns from both a customer and firm perspective and determine the extent of congruency between them as a determinant of performance. Prior to the exposition of these service design types, and pattern congruency between perspectives, we carefully consider the 'domain of theory' and explore contextual contingencies for the work. These are particularly important given the lack of consensus with respect to the 'service context'. Eight service paradigms (Sampson, 2007) are considered before establishing contextual patterns to provide a operations-centric (rather than an economic-centric) approach for delimiting the 'domain of theory'. The derivation of these patterns is anchored in work on 'primary task' (Rice 1958), Unified Services Theory (UST) (Sampson and Froehle 2006), 'types of operation' (Morris and Johnston, 1987), characteristics of services marketing (Lovelock and Gummesson, 2004) and is rooted in systems thinking (Katz and Khan 1978). We present the resulting Primary Task-Type framework of the service system as a contemporary framework against which design patterns can be determined.. The Primary Task-Type logic, we argue, provides the means to overcome inherent difficulties theorising against the traditional manufacturing-service dichotomy.

The paper is therefore centred on 'patterns': patterns of context to form the domain of theory; patterns of service design from both a customer and firm perspective; patterns of congruency *between* firm and customer and *within* context. Our results, situated in a *change-properties/information-centric* Task-Type context, suggest that achieving congruency between customer and firm service design positively impacts upon sales growth. These findings provide the impetus to explore the notion of service design congruency in additional contexts while maintaining the Task-Type domain of theory.

PATTERNS

Service – Paradigms

In pursuit of theoretical generalizations within a service domain, it is important to clearly articulate the paradigm that determines the assumptions held by members of the discipline (Kuhn 1970, Lovelock and Gummesson 2004). This has been problematic within the service discipline with competing perspectives from both Marketing and Operations and conceptual frameworks grounded in economic classifications. Sampson (2007), provides insight into these competing perspectives. Drawing on extant literature he identifies and differentiates between eight service paradigms. Following Sampson (2007) critical argument may be presented as:

SP1 - Residual

The residual paradigm is based on the identification of core economic activities, exemplified in Standard Industrial Classifications, hereafter SIC (Schmenner 1995), such as agriculture, extraction (mining), and manufacturing. The service paradigm from this historical perspective is determined by the residual of these early economic classifications. While economic classifications have evolved to account for the prominence of service in developed economies (Machucca et al. 2007) it may be argued that these classifications provide little discriminatory power in determining appropriate design characteristics for service. There are two key problems: first, at an abstract (divisional) level the discriminatory power of SIC is weak - for example Division G - the combination of Retail, Wholesale, and Motor Vehicle Repair; second, if one engages at a SIC level of specificity the domain of theory is narrow and the ability to generalise is compromised (Edvardsson et al. 2005). In addition to these problems, Sampson (citing Judd 1964) points out that definitions by exclusion are defective and do not illuminate the key characteristics of service.

SP2 – Non-ownership

The non-ownership paradigm (Judd 1964) also characterises service by exclusion. Here services are determined by situations where there is not a transfer of a tangible commodity. Here there is clearly an attempt to distinguish between goods and service. One could question why such a distinction is attempted. The starting position of the dichotomy implies that sensemaking of service is attempted from a goods-dominant perspective i.e. relative to the known characteristics of goods. This paradigm holds similarities to the Rental-Access paradigm (SP6).

SP3 – Act-Performance

This paradigm attempts to differentiate between goods and services emphasising services as ‘acts’ and goods as ‘things’ (Rathmall 1966). This perspective has permeated through much extant research (Zeithaml, et al 2006, Shoestack 1987) where scholars emphasise processes and personal performances. This paradigm may be challenged on a number of points: first,

'process' transcends both manufacturing and service contexts – it is a central unit of analysis for any operation (Morris and Johnston 1987); second, a boundary issue emerges. A tight boundary around a customer-provider interaction would reveal a 'service process' for example in the specification and configuration of an automobile. Extending the boundary one would quickly identify with the manufacturing facility. This also resonates with current research that promotes a Product-Service System (Sawhney et al 2004, Bates et al 2003, Olivia and Kallenberg 2003) perspective, and with work that suggests abandoning attempts to differentiate goods and services (Vargo and Lusch 2004).

SP4 – Intangible Products

Intangibility is a common characteristic that is often used to differentiate between goods and service (Lovelock & Gummesson 2004). Intangibility from this perspective considers physical intangibility (immaterial) and mental intangibility (difficult to conceptualise) (Sampson, 2007). It is quite clear from the notion of intangible 'product' that the antecedents of this paradigm are located in product-based thinking. Sampson (2007) challenges the notion of intangibility with reference to servicescapes (Bitner 1992) and facilitating products (Fitzsimmons and Fitzsimmons 2006), both of which have clear tangible qualities.

SP5 – IHIP

The paradigm, originating in Service Marketing, which has dominated within the literature on service comprises Intangibility, Heterogeneity, Inseperability, Perishability (Fisk 1993). While this paradigm has dominated, and in some cases is still used, it has been argued that it is deeply flawed (Lovelock and Gummesson 2004), that it does not distinguish goods from service, only has meaning from a manufacturing perspective (Vargo and Lusch 2004), and is essentially a 'service mythology' (Grove 2003).

SP6 – Rental-Access

This paradigm holds similarities to SP2 where customers are provided temporary access to, and use of, facilities and artefacts. This paradigm is evident in the increasing popular approach adopted by manufacturing companies to servitize (Baines et al 2009) exemplified in the now infamous case of the Rolls Royce 'Power by the Hour' model. It could be argued that differentiating on this basis does little to establish paradigmatic neatness. Furthermore, contemporary theory suggested by Vargo and Lusch (2006) is that products are appliances through which value is obtained. From this perspective they argue that 'everything is a service' – this would again suggest little discriminatory power in the pursuit of theoretical generalisations.

SP7 – Customer Contact

This paradigm, originally introduced by Chase (1978) differentiates service from 'quasi-manufacturing' based on the degree of physical presence of the customer in the 'production system'. While this paradigm offers potential discriminatory power, based on contact, it is deficient in dealing with contemporary self-service contexts; an issue acknowledged by

Chase (2010). Furthermore, the design implications of introducing a decoupling point to deal with customer induced variety (Ashby 1956) in the front office and to protect the efficiency of the technical core in the back-office (Thompson 1967) suggests a hybrid model incorporating both service (acts, performances, processes) and production thinking; a paradigm that does little to inform service per se. The extent to which a service system is disrupted by customer-induced variety is nevertheless important.

SP8 – Customer-Supplier

Sampson (2007) extends the current paradigmatic thinking regarding services through the introduction of the customer supplier paradigm. Here the proposition is that customers provide a significant input to the production process (they are the supplier). This model utilises an input-production-output model that is common within the operations discipline, the antecedents of which are located in Open System conceptualisations of organisations (Katz and Khan 1978). Drawing on previous work on the Unified Service Theory (Sampson and Froehle 2006), incorporating the service classifications of Lovelock (1983), Sampson differentiates between manufacturing and service systems. 'Service' is determined when the customer 'supplies' the significant input in terms of: self (body/mind), possessions, and information. While this clearly provides discriminatory power, it also raises two key problems. First, it is possible to identify service systems, for example policing where there is no direct customer input. The supply of an arrested detainee to a custody suite is not necessarily provided by a customer – this would render policing non-service given the logic of this paradigm. This resonates with Lovelock and Gummesson (2004) who suggest significant differences among services each of which require separate consideration. Again, this would, however, compromise the ability to pursue generalised theory. Second, it is difficult to differentiate between a significant customer input and an order. This is particularly problematic in situations such as self-service vending.

Summary

It is clear in current literature that much discussion on service emanates from a position on the product-service/Manufacturing-Service dichotomy and whether or not principles from one context are applicable in another. A review of extant literature (Sampson 2007) clearly highlights conceptualizations of service which are grounded in this dichotomy and which are informed by economic classifications. In total eight competing service paradigms: Residual, Non-Ownership, Acts-Performances, Intangible Product, IHIP, Rental/Access, Customer-Contact; Customer-Supplier, are identified. The Customer-Supplier paradigm, informed by the Unified Service Theory (UST) (Sampson and Frohle 2006), and which in turn builds upon the work of Lovelock (1983) provides an interesting point of departure for considering contextual parameters and critical contingencies. We identify with the process-centric model, inherent in UST, (and taken from a systems perspective) as an appropriate conceptual framework for Service Design and Improvement. We would contend, however, that this model requires an extension to a Service-System conceptualization of service

provision/delivery – based on an activity-centric perspective (Smart et al, 1999; Smart et al 2009; Ponsingnon et al 2010).

TASK-TYPE Framework

To inform the identification of context specific contingencies for the design of the Service System we derive a number of 'TASK-TYPE' archetypical forms. These are derived from our characterisation of 'Primary Type' and the identification of 'Primary Task' (Rice 1958; Drazin and Van de Ven, 1985). The effectiveness of a service system is informed by the way its primary task provides corresponding value to its customer; the task the system is created to perform (Rice 1958). In addition to this 'Primary Task' we identify the 'type' of the transformed resource (Morris and Johnston 1987) acted upon by the Primary Task and use this to characterise the Service-System.

Combining a Service System perspective, which typically comprises, in abstraction, INPUT-TRANSFORMATION-OUTPUT, with four distinct customer input types: Belongings, Information, Self (Body), Self (mind) (Lovelock 1983; Sampson 2007) it is possible to identify a theoretical contextual space of service types.

Mapping the four categories of significant customer input (TYPES) to the input-transformation-output model it is possible to conceptualise a theoretical framework of 64 patterns of service-systems (Figure 1).

M-M-M	M-M-I	M-M-Cb	M-M-Cm	M-I-M	M-I-I	M-I-Cb	M-I-Cm
M-Cb-M	M-Cb-I	M-Cb-Cb	M-Cb-Cm	M-Cm-M	M-Cm-I	M-Cm-Cb	M-Cm-Cm
I-M-M	I-M-I	I-M-Cb	I-M-Cm	I-I-M	I-I-I	I-I-Cb	I-I-Cm
I-Cb-M	I-Cb-I	I-Cb-Cb	I-Cb-Cm	I-Cm-M	I-Cm-I	I-Cm-Cb	I-Cm-Cm
Cb-M-M	Cb-M-I	Cb-M-Cb	Cb-M-Cm	Cb-I-M	Cb-I-I	Cb-I-Cb	Cb-I-Cm
Cb-Cb-M	Cb-Cb-I	Cb-Cb-Cb	Cb-Cm-Cb	Cb-Cm-M	Cb-Cm-I	Cb-Cm-Cb	Cb-Cm-Cm
Cm-M-M	Cm-M-I	Cm-M-Cb	Cm-M-Cm	Cm-I-M	Cm-I-I	Cm-I-Cb	Cm-I-Cm
Cm-Cb-M	Cm-Cb-I	Cm-Cb-Cb	Cm-Cb-Cm	Cm-Cm-M	Cm-Cm-I	Cm-Cm-Cb	Cm-Cm-Cm

KEY: Input-Transformation-Output

Cb – Customer Body, Cm – Customer Mind, M – Material, I - Information

Figure 1 – Transformation perspective of service: contextual characteristics

It is clear that this theoretical space contains patterns (instances) that are logically impossible. For example (bottom right), an input based on a customer's mind, a transformation centred on a customer's body, with a material output (Cm-Cb-M). A first attempt to remove these from

the framework and to reduce the complexity of the theoretical space was undertaken by the development of a proposition (P1).

P1 – The output-type of a service system much have a corresponding transformation-type.

The application of this proposition would result in the significant reduction in the permissible patterns (Figure 2).

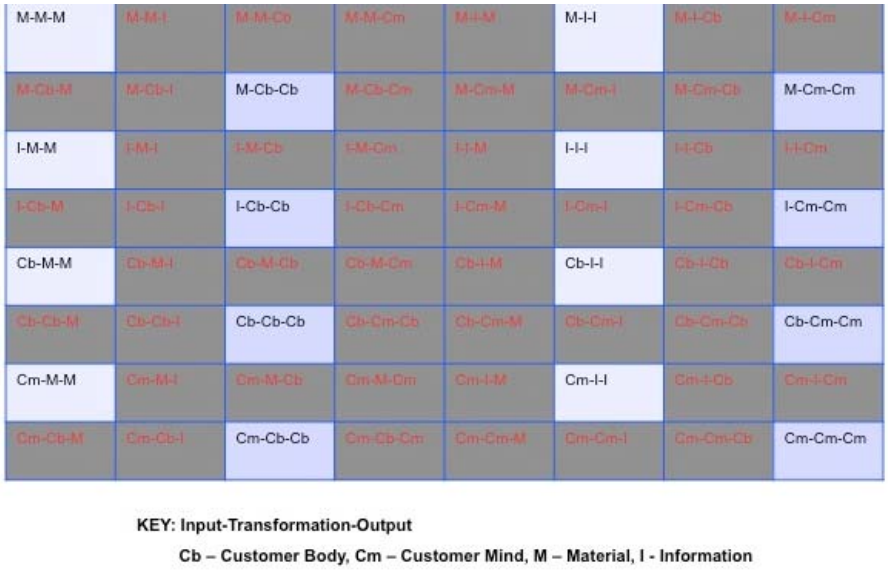

Figure 2 – Transformation perspective of service: permissible contextual characteristics

As can be seen in figure 2, the application of the proposition reduces the theoretical space to 16 separate patterns. It is interesting to note that 4 of these contextual patterns are symmetrical and the remaining 12 are asymmetrical. To further reduce the theoretical patterns it could be argued that the parameters ‘customer body’ Cb and ‘customer mind’ Cm could be combined. While this distinction was made by Lovelock (1983), it is difficult to envisage a service system where they would be separated. This further reduction results in three symmetrical patterns and six asymmetrical patterns. Taking the symmetrical patterns and combining them with the ‘Primary Task’ we arrive at a set of 12 patterns of symmetrical systems and a set of 6 further asymmetrical patterns.

It is therefore possible to explore service systems of similar type to identify contingencies: material belongings (such as parcel delivery, car repair, dry cleaning); information (Retail Banking, Insurance, Telecommunications); Customer (body) (Hospitals, tattoo parlours, airlines); Customer (mind) (Cinemas, Psychiatrists, live music performances). In addition to the primary ‘type’ of transformed resource being acted upon by the system it is possible to identify primary task: Change Location, Change Possession, Change Property, Accommodate/Store. It is therefore possible to create TASK-TYPE combinations as contextual parameters of the Service-System. Questions may then be formulated, for example, to address similarities of ‘Change Location’ systems (airlines, telecommunications,

parcel delivery); systems with different types: people, information, Material (belongings). It is also possible to explore Service-Systems with different Primary Task but similar contextual TYPE.

METHOD

Next, we develop a conceptualization of service design patterns based on both, the customers' and firms' viewpoint through a five-step process. First, based on a review of the literature and interviews with service design and/or service delivery managers across various industries globally, using Emerging Consensus Technique (ECT) to achieve behavioural aggregation (Klaus 2013) we find that there is a continuum of practices based upon five dimensions: (1) how organizations define service design, (2) its scope and objectives, (3) its governance (4) how service design policy is developed and (5) how implementation challenges are addressed. Our protocol follows the suggestions from well-cited research (e.g. Ericsson and Crutcher 1990) in terms of the exploratory nature of our study. Moreover, the protocol is based on our literature review and well-cited studies exploring marketing practice (Coviello et al. 2002). We achieved data saturation (Glaser and Strauss 1967) after conducting in-depth interviews with 16 managers, each interview lasting 30 to 90 minutes. Data saturation refers to the point at which no new information or themes are observed in the data (Glaser 2002). Guidelines for determining nonprobabilistic sample sizes are sparse, but according to Guest, Bunce and Johnson (2006) our sample exceeds the evidence-based recommendation of 12 interviews.

Secondly, the research team then scrutinized each interview individually according to the previously uncovered dimensions and attributes of service design practice to develop the typology. The three primary researchers ranked each item of each interview on a scale from zero (no evidence to support statement) to ten (explicit evidence to support associated statement). Based on a review of the literature and extensive exchanges among the researchers, the primary research team agreed that values below five represented weak evidence, values between five and six represents limited or moderate evidence, and above six stronger evidence to support the individual CX management practice item. The proportion of agreement among the judges was high, demonstrating high reliability. The Spearman correlation coefficient between judges is $r = 0.88$, $p < 0.05$. Scores were analyzed according to overall and average score per item, and for each individual organization (Appendix B), resulting in a three-cluster typology of service design practice and the corresponding service design patterns. The typology suggests three practices: Conventionalists, Convergence, and Protagonists, which differ in all five service design pattern dimensions (see Table 1).

Table 1 Service design pattern typology with dimensions

	Conventionalists	Convergence	Protagonists
Definition, Scope and Objectives	Extension of service	Acknowledge the broad nature of CE and its strategic importance	Broad and strategic. No other priority "tops" it.
Governance	Functional level, initiatives, Focus within the firm.	Link CE to organisational goals and strategy	Policy and operational levels aligned. Continual assessment and improvement
Management (Operational)	Service quality, channel integration	Channel integration, loyalty, brand perception, recommendation	Integration of business processes through the supply chain and across channels. Commensurate HR and Organizational Development policies.
Policy Development	Lack of over arching vision	Strategic intent, varies as to sponsorship	Committed top level sponsorship, cross functional ownership
Challenges	Not a strategic initiative, cannot make the business case for change	Looking for senior sponsorship, more appropriate metrics, business and process models	Reinvention, maintaining competitive edge. Business partners sometimes a limiting factor.

In a subsequent study we select two financial service firms belonging to the anchor points of the typology, the conventionalist and protagonist service design clusters. We argue that these practices demonstrate two contrary views about the role of the customer in the service design, which is reflected in the corresponding service design patterns. We interview twenty customers of each firm and develop a service design pattern for each of the firms from their customers' viewpoint.

Next, we compare both; the firms and the customers' service design patterns with each other. Base upon this comparison we calculate the level of pattern congruency. The score range is from 0 to 100, with 100 representing a perfect match of the company's and their customers' perception of service design patterns (i.e., complete congruence); if half the terms appear in both lists the score will be 50. In general, the lower the score, the less congruent is the relationship between the company and their customers. The data analysis reveals that the congruency score between the conventionalists and their customers is 46, while the congruency score between the protagonists and their customers is 73. We hypothesize that a higher CX design pattern congruency will lead to higher satisfaction and, subsequently an increase in loyalty. We collect 200 responses from each firms' customer base to test the hypothesis. The overall customer satisfaction scores for both firms confirm our hypothesis (see Table 2).

Table 2 Customer Satisfaction Scores

Company and sample size	*Customer Satisfaction Score (ranging from 1.0 to 5.0, 5.0 being the highest score)*	*Average score change over the last 3 years in %*
Protagonists	4.2	+ 1.2%
Conventionalists	2.9	+ 0.1%

In summary, our paper conceptualizes and validates the concept of service design pattern congruency. The research identifies that a strong pattern congruency between the customers' and firms' service design patterns results in a higher customer satisfaction, which is proven to be one of the main drivers of revenue and sales growth, and, ultimately firm performance.

Our research provides managers with evidence about the crucial role of service design pattern congruency and their firm's performance. Based upon our findings mangers will find guidelines on how to explore their customers' service design patterns and how to align their firms' patterns to develop congruency. It provides researchers with a sought-after conceptualization of service design patterns and its influence on firm performance.

We believe that this is the first empirically founded conceptualization of service design patterns and its influence on firm performance.

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Professor Andi Smart is Professor of Operations and Process Management within the Business School, University of Exeter where he is also Director of the centre for Innovation and Service Research (ISR). He has previously served on the Board of EurOMA and continues to lead the Service Operations initiative for this association. His research focus is on exploring new knowledge in 'Service Systems'. Broadly this involves: building upon Systems Theory as foundations for thinking; conceptualising organisations through an activity systems (business process) lens, which provides the framework for application; and conducting inquiry in service contexts. This work has involved close collaboration with a range of practitioners (for example, LloydsTSB, Virgin Media, MET Police, EDF Energy, NHS, Rural Payments Agency - RPA). In support of this work funding has been obtained from both private sponsorship (RPA, NHS, Microsoft, Lloyds/TSB) and research council grants (ESF, ESPRIT, EPSRC, HEFCE). A good track record of output has been achieved. This has included academic dissemination of 3* and 4* articles in journals such as the British Journal of Management and the International Journal of Operations and Production Management, practitioner reports and model architectures (e.g. for Microsoft, Vodafone, Rural Payments Agency) and collaborative reports with consultancy organisations (e.g. Gartner).

Silver Shoppers: designing a better supermarket experience for the older consumer

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Keywords: elderly consumer, supermarket experience design, ethnographic research

This paper presents a cross-culture investigation aimed at exploring the difficulties and challenges that elderly consumers face in a supermarket environment in the UK and China. Focus groups and an ethnographic design approach were employed as research methods. 26 senior citizens joined this research project as participants. Key difficulties that the UK and Chinese elderly consumers face at supermarkets have been identified, which include poor access to products, narrow passageways and poor signage. Design recommendations for improving supermarket service have been proposed.

INTRODUCTION

The population of the world is ageing. It has been forecasted that, by 2050, the number of people classified as old in the world could rise over 2 billion. As one of the largest ageing communities in the world, China will have over 440 million people aged over 60 at the same time and 34% of the UK population will be aged over 60 in 2050 (World Population Ageing Report, 2009). Because of this substantial demographic shift, many researchers are beginning to understand the importance of older shoppers to retailers (Meneely et al, 2009a). Much research is being conducted on improving ageing people's shopping experience from multiple dimensions such as transportation service, social care and pension system (Li et al, 2012; Kim et al, 2011; Martín, 2010). Researchers have also noted that ageing encompasses social, biological and psychological changes with elderly people having different requirements when shopping, compared to young adults (Park and Farr, 2007; Wilson et al., 2004; Wolfe, 2005). Numerous studies have identified characteristics of elderly consumers that differentiate them from their younger counterparts, such as decreased price sensitivity, preferences for quality

products, a tendency to make joint buying decisions and greater levels of store loyalty (Kohijoki, 2011; Wilson, et al, 2004; Whelan, et al, 2002). The greying population also has more disposable income than ever before (Hopkins, 2013). These factors play a significant role on their shopping experience and satisfaction. Thus a better understanding of consumer behaviour within and between age cohorts can support retailers in improving their service in particular for the ageing group (Angell et al, 2012; Myers & Lumbers, 2008).

Although the results from previous research are notable, some research gaps still remain. For example, many studies have identified difficulties that older shoppers face such as difficulties of using trolley (Angell et al, 2012), unclear product labelling (Petermans & Van Cleempoel, 2009), poor customer service (Kohijoki, 2011) and poor quality of packing (Meneely et al, 2009a), but few practical recommendations or solutions have been provided. Furthermore, the previous studies were undertaken mainly through questionnaires and interviews that largely rely on the memory recall ability of participants. As a result, they may have failed to obtain a true account of the problems faced by elderly consumers (Fournier, 1998). Moreover, another key factor that fails to be addressed is the issue of culture and how this impacts on elderly consumers' behaviour patterns when shopping. Within the globalized retail industry, China is regarded as the biggest and most profitable overseas market by major international firms such as Tesco (UK), Wal-Mart (US), Carrefour (France) and Metor AG (Germany) (Samiee, et al, 2004). Among these retailers, Tesco has 105 stores in China and is planning to develop more over the next five years so as to increase its market share and reach in China (Rigby, 2010). The other UK retail giant Sainsbury's is also keen to move into the Chinese market (Fletcher, 2010). However, due to the fact that cultural background plays a significant role in shaping consumers' shopping behaviour (Wang et al, 2010), consumers in China and the UK may have different requirements and needs within a supermarket service environment. By exploring the similarities and differences between these two sets of customers' shopping experiences it may be possible to develop universal design solutions for improving elderly consumers' shopping experience for both the Chinese and the UK market. The aim of this research is *to understand the key design factors that impact on elderly supermarket shoppers' behaviour in the UK and China*.

METHODLOGY

In order to achieve the research aim, there were four steps in the research design: theoretical evaluation focus groups, ethnographic user studies, data analysis and development of design recommendations. The following sections will explain each step in detail.

Theoretical evaluation focus groups

In order to examine the identified shopping issues from the literature review so as to explore key issues, which are associated with the UK and Chinese elderly consumers' shopping experience, focus group studies were conducted in the UK and China. For each of the focus groups, there were 15 participants, which included 3 elderly consumers, 5 supermarket store

managers and 3 design researchers. A focus group method was selected because it is a particularly useful means of understanding people's experiences from a range of perspectives (Krueger, 2000). Thus, it would support the researcher in establishing a comprehensive picture of the elderly consumer's shopping experience from the perspectives of elderly consumer's shopping habits, retail design and service based on interactive communications between elderly consumers, supermarket staff, and design researchers during focus groups.

In the focus groups, the research presented and explained the key issues that associated with elderly consumers' shopping experience based on the literature review findings, and then, the participants were asked to discuss those key issues based on their experience. Each of the two focus groups lasted 3 hours. Video cameras were used for data recording during the focus groups. As a result of the focus groups, some new issues that have not been mentioned in the literature were raised, such as walking support does not accommodate the shopping basket and promotion discount based on big volume pack is not very suitable for UK consumers, whereas, in-store air circulation, too many stairs and self-service lockers are a problem for Chinese consumers. Those new issues were then applied in the ethnographic user study design, which helped the researcher to pay more attention to those newly identified issues during the user studies.

Ethnographic user studies

In order to investigate the difficulties and challenges that elderly supermarket consumers face in the UK and China, an ethnographic user study approach that includes video-based direct observations and in-depth interviews were employed. This method was chosen as it supported the researcher in studying behaviour within a natural setting over a long period of time. It also represents a dynamic picture of the life of the targeted elderly consumer group (Burns, 2000).

For this study, senior citizens above 60 years of age and able to undertake their own shopping at least once fortnightly were invited as participants from both the UK and China. This ensured that they were mentally and physically capable of completing the experiment. A total of 26 participants, 14 from the UK and 12 from China, comprising 18 women and 8 men took part and their participations were voluntary.

Each participant was required to visit 2 different supermarkets located in Hampshire, UK (for the UK study) or Beijing, China (for the China study). These two regions were selected because they have a comparatively high proportion of people aged 60 and over in the UK and China (ONS, 2011; National Bureau of Statistics of China, 2011). Meanwhile, the purpose of having 2 supermarkets in this study is to examine the differences within companies in the same business with different store sizes. Four supermarket stores participated in the study, A and B in the UK and C and D in China. Supermarket A and C had a small retail area, while Supermarket B and D had a larger retail space. All of the four supermarkets were easily accessible by main roads with public transport services. A video recorder was used at Supermarket B, C and D for data collection. As videoing was not allowed at Supermarket A,

a decision was made to use a still camera to capture key activities. At the end of the data collection, still images from the all set of records were analysed. Because of participants' personal reasons, some of them only visited one supermarket store. Therefore, the results from the data collection were based on 44 store visits, 24 visits in the UK (12 with A and 12 with B) and 20 store visits in China (10 with C and 10 with D).

Data analysis

After data collection, the data was intensively analysed through content analysis. The content analysis was selected as an analytical method for this project because it emphasises on a natural and empirical content rather than interpretative arguments (Seale, 2004).

For the focus groups, video data has been reviewed and relevant patterns to the research theme was extracted with a concise description. Together with focus group notes that was taken by the researcher during the focus groups, all text based data was examined by content analysis so as to explore any shopping issues associated with the elderly consumers that have been reported from the existing literatures.

Table 1. Ethnographic user study personal matrix

Category	Interview Findings	Observation Findings
Trolleys and Baskets	She thought shopping basket (with wheels) was not very easy to control as the wheels were too lose; trolley is too big and basket is too small for her; trolley and basket were not clean.	She had to bend down when put a glass bottle or a box of egg to the shopping basket; the basket was not very steady on escalator, it moved from her back to front; sometimes she pulled the basket and sometimes pushed the basket.
Store Layout and Aisles	She thought that the passageway was narrow. She indicated that her path was blocked by a member of staff, who was loading products on shelves.	Blocked passageway.
Shelves and Freezers	She thought that items in freezer were difficult to pick; Price labels of frozen products were listed together. It was difficult to find corresponding prices for the items that she wanted.	She picked up a product from an upper shelf and put it on a lower shelf so as to read the product information.
Products	She highlighted that elderly consumers have to use glasses to read information on products labels, as the font size was too small for them. Thus, she suggested that the store should locate some glasses for older shopper to use during shopping	Price label was located on the back of a pack of egg; thus, she had to lift the pack up to find the price. The big pack of egg was difficult to put into her shopping bag. So she had to hold it on the way home.
Customer Services	She mentioned the customer service is better than before. However, sometimes, it is still difficult to find staff when she needs help.	
Checkout	Long queues were a big issue for her. Sometimes she has to wait for an hour for checking out. She indicated that she would put the products back and give up shopping if queue is too long.	She removed her stuff from her shopping bag first, and then put purchased products into her bag.

For the ethnographic user study, segments from the videos and photographs that showed difficulties during the shopping trip were selected with a brief description. And audio data from the in-depth interviews was transcribed in to text-based data. After all video, image, audio data were transferred into text-based data, together with notes from observation and

interviews, all data were analysed by using content analysis. Based on information that was collected from each of the participants, key descriptions from the content analysis were compiled into a persona matrix based on six categories (Table 1). Following this, key patterns from the analysis were grouped into a table in order to identify common themes. This involved clarifying the findings with the participants; bringing words with the same meaning together; merging broader terms into identical concepts; and putting topics that are frequently mentioned into clusters (Spencer, 2010). The process was repeated for all the participants until no new themes could be identified (Mason, 1996; Dey, 1993). Lastly, the number of problem areas that occurred at supermarkets was counted. This process of tabulation quantifies the findings so that patterns can be identified (Silverman, 2006). The most signification findings are discussed in the next section.

FINDINGS AND DISCUSSIONS

Based on the data analysis, difficulties that the UK and Chinese elderly consumer currently face have been identified and compared. The following sections explain and discuss common and distinguish shopping issues between the UK and Chinese elderly consumers.

Trolley and baskets

In terms of trolleys and baskets, 20 issues have been explored which included 7 common issues, 7 with UK elderly consumers and 6 with Chinese elderly consumers. The top three common issues that were raised by the participants include: trolley hard to control (20%, N=44), size of trolley too big to manage (14%, N=44) and deep trolleys make it hard to reach for items at checkout (11%, N=44). All three common issues are linked with elderly consumers' physical abilities such as flexibility of body movement and strength. Some researchers have highlighted that as an individual's age increase, their ability to move, see, hear, learn, remember and handle product decreases (Pattison & Stedmon, 2006; Popper and Kroll, 2003). Consumers' abilities and limitations have considerable influence upon how they shop (Underhill, 2000), therefore, it must be taken into consideration by retailers when designing their service and to aim for understanding cross-cultural differences and issues. Other common issues that associated with trolleys and baskets have been listed in Table 2.

Table 2. Common issues of trolleys and baskets

Issue	British		Chinese		SUM
	A	B	C	D	
Trolley hard to control	0	1	0	8	9
Size of trolley too big to manage	0	1	2	3	6
Deep trolleys make it hard to reach for items at checkout	0	4	0	1	5
Baskets are too small	1	1	1	2	5
Basket caught in retail hook	1	0	2	1	4
Basket/ trolley basket handle was too low to reach	0	1	0	3	4
Baskets are too heavy to carry	1	0	2	0	3

Apart from these common issues, top three trolley and baskets issues with the UK elderly consumers are problems of inserting/removing the £1 coin for releasing/locking trolley, own

trolley does not accommodate basket well and trolley hits edge of floor skirting. For example, one UK participant mentioned that he planned to use a trolley for his shopping. However, as there was no £1 coin for him to release a trolley, he had to use a basket instead. Consequently, the basket was heavy for him to carry during shopping. For the Chinese elderly consumers, the top three issues are unsufficient numbers of trolleys, poor maintenance of self-check locker, trolley and trolley baskets need better maintenance and baskets were located too close to escalator landing area. The availability and operability of baskets and trolleys was also reported in the past (Pettigerw et al, 2005). In addition, it was found that the trolleys also served as a walking aid and this was highlighted by Meneely et al. as well (2009b).

Store layout and aisles

Regarding to store layout and aisles issues, 14 issues have been explored which included 6 common issues, 3 distinguish issues with UK elderly consumers and 5 with Chinese elderly consumers. The top three common issues between the UK and Chinese elderly consumers are: narrow passageways (39%, N=44), unclear signage (39%, N=44) and stores were small (23%, N=44). For example, one Chinese respondent highlighted that "*the passageway is very narrow. I think the store wants to display more product so they have to narrow the passageway*". One participant from the UK commented that "*the signs were not very clear and I must have missed (seeing) a lot of things*". The particular point regarding poor signage was also brought up in the research by Angell et al. (2012) and Hart et al (1999). Other common issues that associated with store layout and aisles have been listed in Table 3.

Table 3. Common issues of store layout and aisles

Issue	British		Chinese		SUM
	A	B	C	D	
Narrow passageways	0	3	8	6	17
Signage is not clear	4	4	3	6	17
Store is small	8	0	2	0	10
Products on floor obstructed passageway	2	1	3	3	9
Passageway too long	0	2	0	1	3
Finds store to be too big	0	1	0	1	2

Apart from these common issues, key store layout and aisles issues with the UK elderly consumers are no clear exit route, area should be cordoned off when repair work is ongoing and product displays were too small. Two UK participants indicated that the Supermarket B was too big for them and it was difficult to find out exit route. Another participant mentioned *"…there was member of staff who was repairing a freezer and several screwdrivers were located on the floor nearby. However, the repair area was not block and it was easy for a customer to step on the screwdrivers. Very dangerous to elderly consumer…*". For the Chinese elderly consumers, the top issues are product display keep changing and working staff block passageway and store is small. Some Chinese participants highlighted that it was difficult to find products because product display was keep changing and one of them explained " *… it is very difficult to find items that I want as the products are always displayed*

in different places…". Another Chinese respondent indicated that *"…store staff are very busy for loading products, however, they sometimes blocked passageway…*".

Shelves and freezers

In terms of shopping issues with shelves and freezers, 16 issues have been explored which included 6 common issues, 6 different issues with UK elderly consumers and 4 with Chinese elderly consumers. The top three common issues were items placed too high (57%, N=44), too low (45%, N=44) and too deep (22%, N=44). Similar as the issues with trolley and baskets, explored issues with shelves and freezers are also linked with the elderly consumer's decreasing physical abilities and limitation. "*If the shelves are too low, then I will have an issue because I have a bit of a knee problem when I bend down*" one Chinese participant mentioned. This result is in line with previous research about the poor access to products. Older shoppers who are unable to reach for products considered this problem as their main barrier towards a good shopping experience (Underhill, 2000). Pettigrew et al. (2005) also found that reaching for products from higher shelves or deep freezers was more difficult for older female customers as they tend to be shorter than younger adults and people sometimes lose their height as they age. Other common issues that associated with shelves and freezers have been listed in Table 4.

Table 4. Common issues of shelves and Freezers

Issue	British		Chinese		SUM
	A	B	C	D	
Items placed too high	8	8	3	6	25
Items placed too low	2	7	4	7	20
Items placed too deep	2	4	3	1	10
Labels and items do not correspond	1	1	3	1	6
Over stacking made it hard to remove items	1	1	1	2	5
Bigger sized products are always stuck between shelves	0	1	0	1	2

For the UK elderly consumers, they found the particular challenges with shelves and freezers were low shelf made items hard to remove, crates were overhanging and items were a distance away. It has been observed that items were difficult for elderly consumers to pick up due to the limitation of their body flexibility, especially big sized items such as multi-pack tin food products. These results are in line with previous research about the poor access to products in Underhill (2000). From the Chinese elderly consumer side, they found difficulties with disordered product display, items were a distance away in freezers and price labels on freezers were a distance away to read. One participant emphasised that "*products are mixed together and they all looks similar. I could not find the product that I want*". This could be improved by a better merchandise design or identical packaging design. 4 participants mentioned that it was difficult to pick items from the bottom of freezer. And price labels of frozen products were a distance away to read.

Product related

From a product related shopping issue perspective, 20 issues have been explored which included 3 common issues, 10 different issues between UK elderly consumers and 7 with Chinese elderly consumers. The common issues were product labels were unclear (20%, N=44), store did not have adequate range of products (16%, N=44) and location of product was not appropriately placed (11%, N=44). It was found that the list of ingredients was important to those with a special diet. "*I look at the ingredients – what goes inside. I have to look out for wheat as I can only take gluten-free food… and the expiry dates are sometimes too small*". This is confirmed by previous research that found elderly customers with visual impairments had problems reading labels and there was a clear need for larger text and contrasting colours on labels (Pettigrew et al, 2005). Other common issues that associated with products have been listed in Table 5.

Table 5. Common issues of products related

Issue	British		Chinese		SUM
	A	B	C	D	
Product labels were unclear	2	3	4	1	9
Store did not have adequate range of products	2	2	1	2	7
Location of product not appropriately placed	3	1	0	1	5

For the UK elderly consumers, the top issues associated with products were the preference to purchase items in small quantities, promotional discounts do not serve quantities and difficulty when lifting heavy items. There was a high preference for the UK senior shoppers to purchase smaller quantities of food due to their lifestyle requirements and most of them lived in single-households. "*I wanted Maris Piper potatoes but the big bags were too heavy and they didn't sell loose ones*". For the Chinese elderly consumers, the top issues were problems with reading information on the product package, product price labels too small to read and best before date was difficult to find on product package. Many participants felt that it was difficult to read product information on package because size of the font was too small. It was found that the list of ingredients was important to those with a special diet. "*I look at the ingredients – what goes inside. I have to look out for wheat as I can only take gluten-free food… and the expiry dates are sometimes too small*". This has been noted in previous research where elderly customers with visual impairments had issues reading labels, highlighting the need for larger text with contrasting colours as discussed in the literature review (Kohijoki, 2011).

Customer service

With regards to customer service problems, 9 issues have been explored which included 2 common issues, 3 main issues with UK elderly consumers and 4 with Chinese elderly consumers. The common issues were customer service assistants unavailable nearby (11%, N=44) and long queues to customer service counter (7%, N=44) (Table 6). 5 respondents highlighted the problems surrounding customer service. Participants commented that they

could not find a customer assistant easily. And 3 participants highlighted that long queues to customer service counter was an issues for them.

Table 6. Common issues of customer Service

Issue	British		Chinese		SUM
	A	B	C	D	
Customer service assistants unavailable nearby	2	0	1	2	5
Long queues to customer service counter	1	0	0	2	3

From the UK elderly consumer side, the main issues in this category was that customer service should show the way to the item and that the location of customer service counter was not clearly seen. Some UK participants complained that staff unable to take them to the exact the location of items. This shows the need for the availability of suitably trained and effective staff that could guide the customers properly. This particular issue, has also been raised by Petermans and Van Cleempoel (2010). Another participant felt that the information counter could not be easily seen and there was a need to have more staff available for help. For the Chinese elderly consumers, 4 participants felt that store staff was not friendly and indifferent to customers. Some other respondents mentioned that they could not find a customer assistant easily. 3 participants commented that supermarket staff was not very helpful due to their knowledge and information of the store and products were limited. One participant mentioned that " *...she tried to help me, however, after 20 minutes searching she still could not find the light bulb that I wanted. So, she gave up and asked me to find another supermarket employee for help. I was very upset...*" This shows the need for the availability of suitably trained and effective staff that could guide the customers properly. This particular issue has also been raised by Petermans and Van Cleempoel (2009). Some other participants also felt that more types of service should be provided such as a child centre or creche and food process service.

Checkout

In terms of checkout, 14 issues have been explored which included 4 common issues, 6 main issues with UK elderly consumers and 4 with Chinese elderly consumers. Top common issues were long queues (23%, N=44), lifting heavy items at checkout was an issue (14%, N=44) and checkout area was too narrow (11%, N=44) (Table 7). 10 participants indicated that the long queues were an issue. This is in-line with Goodwin and McElwee (1999) who found that the waiting time at checkouts were linked to the level of satisfaction among customers and long queues contributed towards their dissatisfaction. 6 respondents felt lifting heaving items from trolley or basket to checkout counter was difficult and 5 respondents were unhappy with the small checkout area.

The UK elderly consumers found difficulties with opening up plastic bags, card payment machine buttons are too small and issues with using self-checkout machine. Some UK respondents felt that the buttons on the card transaction terminal was too small. "*The buttons are too stiff and small, and I sometimes enter the pin number wrongly*". When asked about the use of the automated checkouts, a UK respondent said "*I find them too slow and prefer to*

use the cashier as they are much quicker". This has been supported in previous studies (Dean, 2008) that found older consumers having less confidence when using the self-service terminals and they missed the element of human interaction. With Chinese old shoppers, the top problems were free plastic shopping bag was not provided and difficulty with the putting basket back into the retail hook at checkout. 3 of Chinese respondents indicated that they prefer free plastic bags could be offered by retailers at the store. Another respondent highlighted an issue with payment machine. He said "*the payment machine was broken so I had to move from one checkout account to another. Also the buttons on payment machine are too stiff and small, and I sometimes enter the pin number wrongly*".

Table 7. Common issues of checkout

Issue	British		Chinese		SUM
	A	B	C	D	
Long queues	3	1	0	6	10
Lifting heavy items at checkouts was an issue	0	2	1	3	6
Checking out area is too narrow	2	0	3	0	5
Checkout staff should help in packing grocery	0	1	1	1	3

Additional feedback

When asked for additional feedback, 19 issues had been explored which included 1 common issues, 4 distinguish issues with UK elderly consumers and 14 with Chinese elderly consumers. The common factor was that the elderly consumer would like to have more seats available in the store (18%, N=44) (Table 8). These results echo Meneely's et al (2008) study that highlighted older consumers preferred to have more in-store seating area in a shopping environment.

In addition, the UK old shopper found that loose pieces of packaging on the floor were a hazard, promotional discounts for non-food products are attractive, transport and location are deciding factors and would like prices to be lowered. With the Chinese old shoppers, key additional feedback included: in-store air circulation should be improved, toilet should be provided and lighting system needs to be improved.

Table 8. Common issues of additional feedback

Issue	British		Chinese		SUM
	A	B	C	D	
Would like to have more seats available	0	2	1	5	8

DEVELOPMENT OF DESIGN RECOMMENDATIONS

According to the research findings and recommendations, potential solutions for improving elderly consumers' shopping experience have been discovered. For example, in order to improve useability of trolley, the size and height of trolley could be designed as an adjustable feature, a basket could be designed as an extra module on the trolley frame and the barcode scanner would be added on the trolley to support express checkout. For improving legibility issues with shelves and freezer, a magnifying glass could be designed as a part of the shelve

to support reading labels and product packages. In addition, colour coding, voice support and adjustable shelve design would help to improve interactions between elderly consumers, items and shelves. In terms of store layout and aisles design, it would be improved by adding a seating area in the store, placing elderly consumer preferred products within easy reach on shelves, offer disabled toilet and baby changing rooms within the store layout. For improving the checkout experience, seats need to be provided for the checkout. With a seating area available, elderly customer would have a rest and also use queuing time for socialisation as well. Furthermore, new product concepts for improving elderly consumers' shopping experience have been designed and developed based on the research findings, for instance, a lift-up trolley and a smart shelves design (Figure 1). With the lift-up trolley, the basket can be assembled into the trolley and it automatically lifts the basket up when customer pushes the trolley towards the checkout counter. The smart shelves, provide features of voice support, a scanning function for more information, easy read label frames, a magnifier and e-labels to ensure correspondence between products and labels.

Figure 1. Lift-up trolley and Smart shelves

CONCLUSIONS

Ageing has been closely linked to loss of agility and strength that makes shopping a challenge for the elderly (Kohijoki, 2011; Herne, 1995). The results from this research have revealed a number of issues that senior shoppers face at supermarkets in the UK and China. The main difficulties that were found include items placed too high (57%, N=44), too low (45%, N=44), narrow passageways (39%, N=44) and unclear signage (39%, N=44) for both the UK and Chinese elderly consumers. Design recommendations for improving supermarket service to the elderly consumers have been provided.

The findings of this research should be considered in the light of its limitations. This preliminary study comprised a small sample of 26 participants and while every effort has been made to obtain an equal number of elderly males and females, the female participants still outnumbered males. It is important that a larger sample is looked at, as there are likely to be differences between different socio-economic groups in the same age band. Also, this study was limited to 2 supermarkets in each market. Despite several attempts to invite other retailers to participate, they declined to take part.

The results from this study have several significant implications. First, this is the first investigation that explored and identified the key difficulties that senior shoppers face based on a cross-culture context, between the UK and China. Common and different shopping issues have been identified and discussed. Second, recommendations have been provided based on the research findings. The recommendations will allow retailers to cater towards a more customer-centered retail experience. It is proposed that future work should focus on the aspects of reading information on product package, product access, trolley & baskets and signage. Lastly, the use of ethnographic method has provided a more accurate, comprehensive and objective analysis for the study. In conclusion, this study has built greater awareness and provided an increased research focus on the elderly shopper, providing ideas for better-designed products and supermarket service in order to achieve a much better customer-centred retail experience.

ACKNOWLEDGEMENTS

The research was funded by the University of Southampton. The authors would like to thank the organisations and participants who took part in this study.

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Synergies between Strategic Design and Roadmapping: a development roadmap for the Rio de Janeiro State Biotechnology Cluster

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Keywords: Strategic Design, Roadmap, biotechnology, cluster development

The scope of the Design field, formerly limited to aesthetic and functional concerns, is expanding to include management and business strategy. That expanding frontier constitutes a promising new area for research and action, but still lacks a theoretical base and integrated systematisation of successful practical cases. Roadmaps offer a one-page visualisation of key points in a given system of variables. Since first applied by Motorola more than 30 years ago, they have become one of the tools most used to provide support to discussion of strategy and innovation.

In this article these two issues are addressed and explored conceptually. The experimental project towards a "Rio de Janeiro Human Health Biotechnology Cluster Development Roadmap" is then presented. Conducted using the "double diamond" methodology, the project comprised a final link of divergence and convergence in which the roadmapping technique was the main tool used for prototype co-creation and communication.

The article, by presenting a successful case of using the “strategic design” approach, is intended to serve as a basis and reference for other projects of this kind, as well as to highlight and examine the nature of the synergy between this approach and application of the roadmapping technique from the Design Thinking standpoint.

1. INTRODUCTION

The manner of thinking about design projects - characterised primarily by Design Thinking, as summarised by Godinho (2010) - is essentially a process of innovation centred on human considerations, using methods that include observation, co-creation, ethnography, prototyping and so on, intended to spur innovation and outline business strategies. Brown (2009) points to three complementary components - *insight*, *observation and empathy* - that should be contemplated in any design exercise.

Phaal & Muller (2009) argue that the roadmapping technique has become one of the most used design support tools since its first application by Motorola more than thirty years ago. The greatest benefit of the technique resides in the communication potential inherent to the development and sharing of roadmaps, which offer a visual interface summarising, in a single framework, the key points of the system under analysis.

This article endeavours first to provide a conceptual underlay to the strategic design field and the rodmapping technique, so as then to describe the methodology used in the "Rio de Janeiro State Human Health Biotechnology Cluster Development Roadmap" project and its results. Lastly, the theory and the practical project experience will be discussed and observations made on both the potential for applying design methodology to designing strategies and the complementarity that the roadmapping technique can bring to projects of this kind.

This article is intended to reinforce scientific production relating to strategic design, which - as indicated by Verganti (2008) - still lacks in-depth theoretical grounding and integrated systematisation of the practical know-how gained through successful cases. This article describes and analyses a successful design case with a view to informing the reference base for pursuing other "strategic design" projects.

2. STRATEGIC DESIGN AND ROADMAPS

2.1. From operational to strategic design

Formerly recognised only for its ability to address aesthetic and functional concerns, the Design approach to project thinking - Design Thinking - has spread to other areas of the organisation, rising to strategic, administration-related levels (FRANZATO, 2010). The term "strategic design" has come to be used to represent this shift in interpretation of the boundaries on design operations (ZURLO, 2004). Cautela & Zurlo (2006) state that the scope of strategic design spans product, service, communication and experience in an integrated fashion, constituting the so-called "system-product".

Strategic design seeks solutions to complex issues, redefining how problems are interpreted and, as a result, how they are solved. The literature reveals a recurrent endeavour to systematise basic tenets to be followed, i.e., strategic design should be: holistic (the whole system must be considered), user-centred (focussed on the user's real needs), co-creative (all

stakeholders should be involved in the creation process) and involve visual thinking (the ability a designer develops over years of training). As the role of design expands, so references and fundamentals have to be sought in other fields of knowledge, heightening the multidisciplinary nature of the design process.

A diversity of design processes are on the market and, to some extent, each organisation has its own particular features. IDEO, for example, operates on Design Thinking lines. This school considers the process to be a continuum of innovation, to be envisaged as a system of overlapping spaces following the stages *inspiration*, *ideation* and *implementation* (BROWN, 2009). This form of project thinking is often associated with the so-called "double diamond" process, comprising the four steps: Discover; Define; Develop; and Deliver. This approach will be commented on further below.

2.2. Roadmaps and Roadmapping

Phaal (2004) describes roadmaps as maps that give a "one-page" view of the key points of the system in question and of how they are likely to evolve over the analysis timeframe. As support for "strategic dialogue", the roadmap is intended to develop consensus, align information and identify risks, challenges and tensions, serving as a "strategic lens" through which the system can be viewed in condensed form.

Roadmaps are built up in two distinct dimensions: information architecture and graphic design. The information architecture comprises the layers and sub-layers, normally on horizontal axes, which represent the key points to be examined, and also delimits the time horizon in question, normally anchored on vertical axes. How the architecture is defined is critical to both the roadmapping process and the final results, because all the discussion - and consequently, the knowledge - generated will be on whatever themes are selected. Graphic design, meanwhile, addresses how the information is to be represented within the proposed architecture.

There are various types of roadmap - science and technology roadmaps, industry technology roadmaps, product/portfolio management roadmaps, and so on - finding widespread use in various sectors. In spite of that diversity, distinguished by highly personalised techniques, as noted by Phaal et al. (2010), all roadmaps tend to answer the following questions: Where are we now? Where do we want to go? How can we get there?

Holding roadmapping sessions entails mobilising a group of people who are able to confer authoritatively with regard to the perspectives offered and prescriptions made, even in spite of the uncertainty that reigns in the future. It is important for the group to be multidisciplinary and to be able to co-create holistically on the proposed theme. The session should be structured and managed in such a way as to encourage creativity, which may involve considering everything from, for example, the maximum number of participants per group through to the spatial distribution of the tables to be used.

2.3. “Strategic Design” and Roadmapping

The expanding role of Design as a discipline has led, at the frontier, to design projects whose final outcome is to enunciate a business strategy. Introduction of the roadmapping technique has been noteworthy in that context.

Roadmapping sessions operate as spaces for co-creation of prototypes, where the multidisciplinary nature of the group ensures a holistic approach that contemplates the main stakeholders involved.

Roadmaps are visual summaries of complex scenarios, and call for intensive processes of innovation and creativity, as well as considerable capacity for visual expression, both for the related ideation and in running the roadmapping sessions.

The next section describes the "Development Roadmap of the Rio de Janeiro State Human Health Biotechnology Cluster", as well as the methodology used and the results achieved. The results of this experiment will then be compared with the starting framework indicated here, and the implications of the case will be discussed.

3. THE EXPERIMENT

3.1. The project

The project grew out of a joint demand from Sebrae (a federal micro, small and medium business development organisation) and AgeRio (a Rio de Janeiro State funding agency), with a view to developing the Rio de Janeiro State biotechnology cluster. The initial briefing involved overall biotechnology development, without prioritising any subarea (as later proved necessary). Subsequently, it focused on human health-related applications also known as "red biotechnology".

3.2 The approach

The project was structured on the "double diamond" model, first proposed by the UK Design Council in 2005, which comprises four consecutive processes (Discover; Define; Develop; Deliver), intended to clarify the divergent and convergent waves intrinsic to the progress of design projects.

At the Discover stage, it is recommended to conduct research that feeds into the project. The results of that initial research are analysed and organised at the Define stage, to highlight bottlenecks, constraints and opportunities. At the Develop stage, a variety of prototypes are produced on the basis of the results, exploring solutions with the potential to solve the problem in question. Lastly, at the Deliver stage, the final concept - or in the project in question, key concepts - are refined and put onto the market.

Figure 1, below, summarises the main stages of the project, pointing up partial results and bibliographical references:

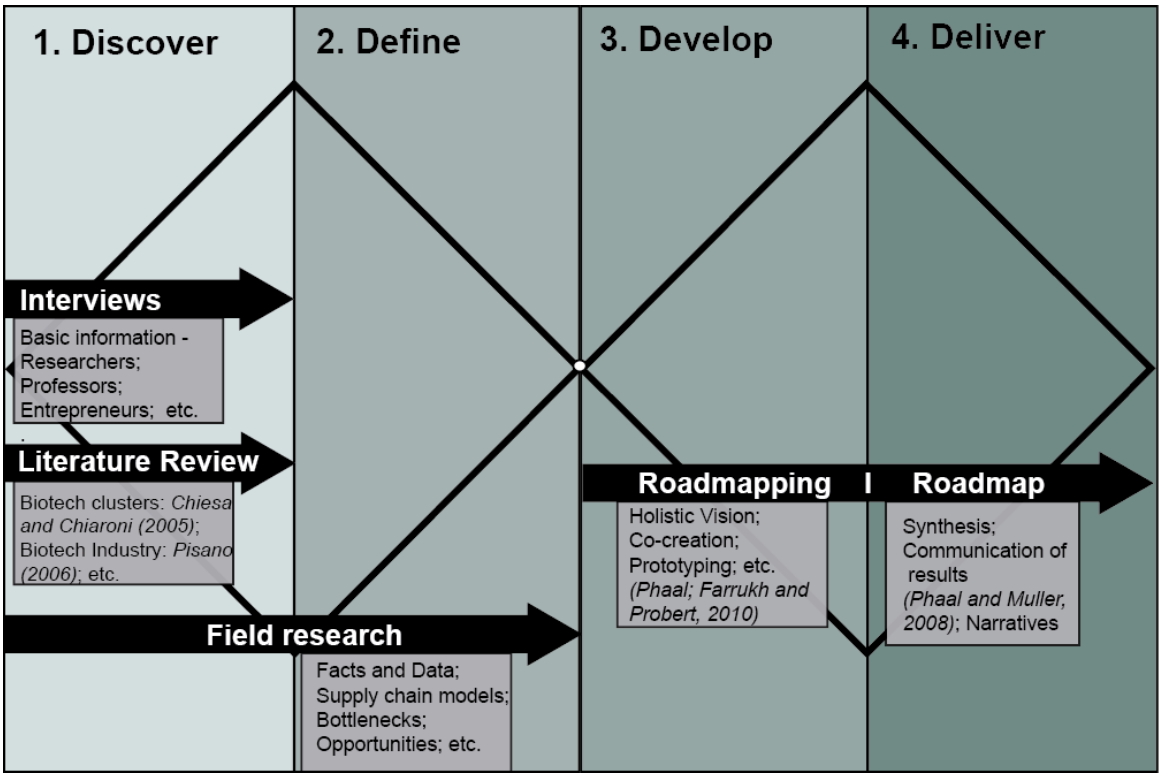

Figure 1: Methodology

3.3. Results

3.3.1. Discover: understanding biotech clusters

The project team familiarised itself with the subject of Biotechnology through interviews, primarily of academics and researchers, plus a systematic literature review, relating particularly to biotechnology clusters. The normative model proposed in *Industrial Clusters in Biotechnology* (Chiesa & Chiaroni, 2005) was used as a framework for appraising the *status quo* of the Rio de Janeiro State cluster.

On that model, the birth and development of a biotech cluster requires that four driving forces (Financial, Scientific, Industrial and Supporting) be balanced and enabled.

Given the background of much of the project team, a typically Production Engineering approach was used and, thence, one of the results delivered was a supply chain design. Subsequently, three biotechnology products (monoclonal antibodies, vaccines and cell therapy) were identified in line with the priorities set by Sebrae and AgeRio, and in accordance with information collected from biotechnology experts in Rio de Janeiro State.

Supply chain mapping involves identifying the stakeholders involved in the flows of goods, services, information, knowledge and finance necessary to deliver products to market, from their most primitive state as raw materials (BETTLEY *et al*, 2005).

3.3.2. Define: fact finding about the Rio de Janeiro State human health biotech cluster

At this stage, the research results were examined and structured according to the normative model, so as to build up a current picture of the state biotechnology cluster that captures, among other things, bottlenecks and opportunities. This requirement explains the extensive contact with participants from different spheres in the sector, without whose invaluable information and thinking this project would not have attained its goals.

More than 70 formal interviews were conducted in the course of the project. Unlike those conducted in the first stage, which were unstructured and designed to contribute to an overall understanding of the sector, these focused on surveying and structuring facts and data on the cluster, using a structured interview approach. These data were compared with those for leading clusters worldwide, and the thinking emanating from these benchmarks, in addition to underpinning the formulation of proposals, guided the choice of what, in the current scenario, appeared to be the most promising technological routes. The three routes worked on, each at a specific roadmapping event, were monoclonal antibodies, cell therapy and vaccines.

As described in section 2, deciding on the information architecture is critical to the results of the roadmap, as well as to how roadmapping sessions are conceived, planned and conducted.

The events in this project were structured to favour a balance among desirability, feasibility and practicability, which - as described by Tim Brown (2009) - must harmonise for the design process to attain its goal. The layers were organised into three large groups: global trends, opportunities for the state cluster and resources to be developed or "exploited" in order to attain the goals in question.

3.3.3. Develop: roadmapping

During the interviews, potential participants in the events were identified and agenda constraints and other considerations were probed. It became clear that in order to bring together the whole group as desired - senior members of government, directors of federal and state institutes, big-Pharma CEOs and so on - sessions would have to last at most half a day.

In view of this time constraint, we opted to send out advance explanatory material, introducing the technique and containing examples and specific instructions on the dynamic proposed.

Roadmapping events traditionally involve divergent and convergent stages. However, given the constraints already described, we focused on the divergent stage, encouraging the creation of a variety of proto-narratives, which were contested and explored in greater depth at subsequent stages of the event.

The three events followed the timetable below:

Time	Activity	Actors
8:30	Opening	GPI / UFRJ, with AgeRio/SCT-RJ and Sebrae-RJ
9:00	Group Dynamic	Guests
10:15	Presentations by Group	Guests
11:15	Debate	Guests; GPI/UFRJ Coordination
12:30	Closure	AgeRio/SCT-RJ and SEBRAE-RJ

The participants were separated into groups of 4 or 5, in such a way as to optimise their complementary skills, to form consistent multidisciplinary arrangements with the potential to think about, discuss and make proposals on all the topics (layers) suggested. In that context, the project team's function was to manage the process of co-creation of prototypes.

3.3.4. Deliver: roadmap

At this stage, the results of the events were analysed and, jointly with the proposals already formulated by the group, were organised into the roadmap.

The results of the events suggested organising the contributions into certain categories. Trends and opportunities were signalled, assets were differentiated (physical installations and their content in terms of equipment, software, organised personnel etc.) and other ongoing actions (public policies, new institutions and programmes being set up etc.) were listed. It was also necessary to distinguish already existing installations or institutions, those under construction and others that are merely proposals. These differences were characterised graphically using different colours and shapes.

Below is an illustration of the fully developed roadmap:

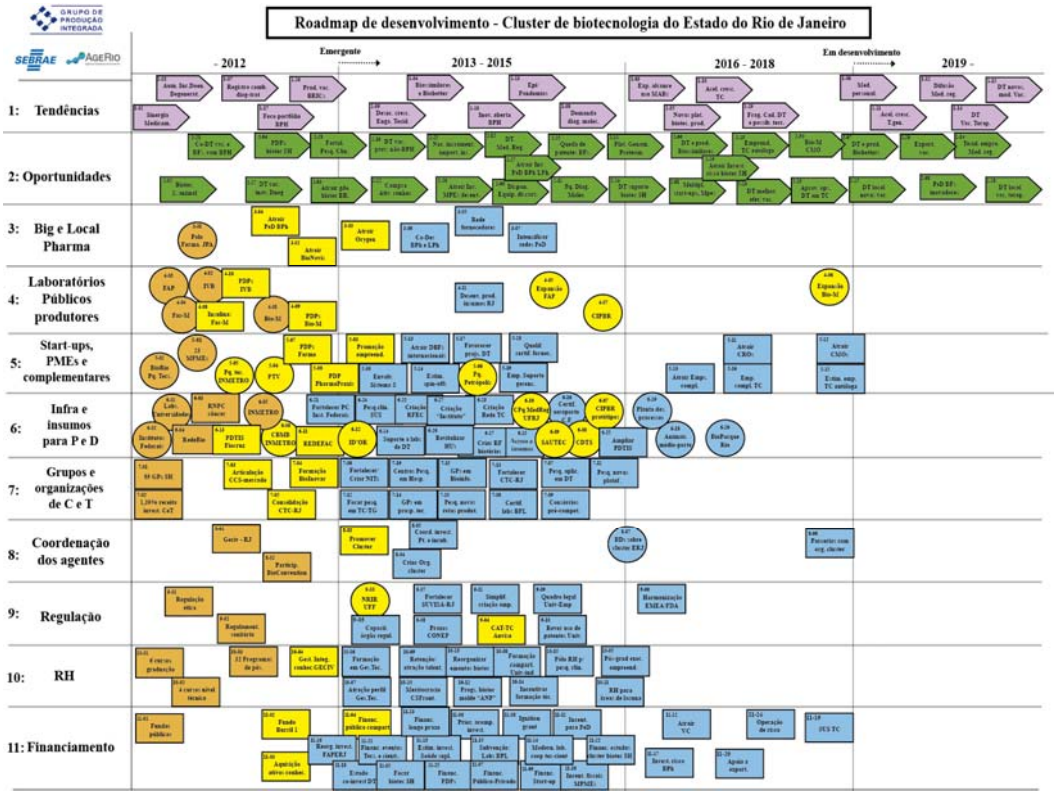

Figure 2: Complete Roadmap

As regards the timeline, unlike the long development cycle characteristic of this sector, it was clear from the results of the roadmapping exercises that 2019-2020 should be considered "long term", relatively imprecise and rarely referred to. This is one reflection of the political oscillations characteristic of the Brazilian scenario.

Of course, the information organised in the roadmap is open to various different interpretations. Following the tradition of this technique, one way of organising and expressing an understanding of what is read there is to highlight the chief elements associated with a given trajectory identifiable on the roadmap and, on that basis, build a narrative expressing the understanding of the connections among its constituent elements. Four examples of that exercise were constructed, centring on the main aspects highlighted in this study, one of them a trajectory that represents a plan to encourage the development of the micro, small and medium businesses in the cluster. Figure 3 below illustrates those results:

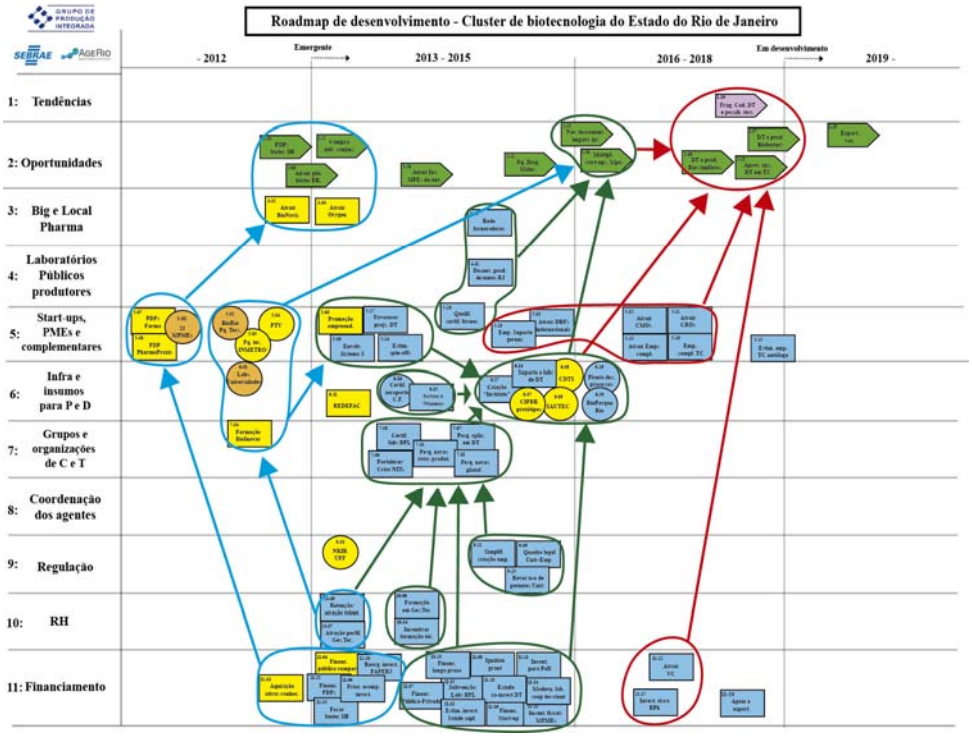

Figure 3: Narrative for development of the micro, small and medium businesses in the cluster.

In that narrative, the intention is to arrive at three distinct blocks of opportunities, each with its chief elements and represented by a colour on the map. These constitute three consecutive waves of actions, demarcated by their priority to development of the cluster.

As regards not just the Rio de Janeiro biotechnology cluster development roadmap, but any planning prone to oscillations in all manner of dimensions, the maps presented must be regarded as portrayals of the scenario at the time they were drawn, accordingly requiring constant updating to align with new conditions as these arise.

4. DISCUSSION

4.1. Strategy Design

The "double-diamond" model was used as a reference throughout the divergent and convergent waves of the project, the scope of which spanned Biotechnology overall, and some of its parts in detail. Better opportunities were perceived, for alternatives then to be plotted, developed and interpreted and eventually finalised and communicated through a complex visual interface. Just as important to the project as the traditional design methodology was the Design Thinking lens through which Design "sees" the world.

Interpersonal contacts were the largest, and qualitatively the best, project information source. At first, in this endeavour to formulate a strategy to foster development of a cluster, the quantity and diversity of stakeholders involved placed constraints on efforts to explore their realities in any depth. The option chosen was to extend the sampling of unstructured interviews, through which the project team worked to understand not only the facts and situations presented, but the related implicit issues. After the first round, some additional interviews were conducted in greater depth, generating new insights, through (among other things) perceptions of operational questions.

The main goal of the project was to develop a strategy capable of guiding the actions of not only the major stakeholders, but all stakeholders directly involved in the sector. For that purpose, the process by which the project was conducted, as well as the outlook characteristic of the Design field, were both essential to achieving the results presented. Indeed, Strategic Design should be regarded as a process to be executed not by a single practitioner, but by a multidisciplinary team comprising professionals with complementary skills arising out of all variety of backgrounds.

4.2. Complementation between Design Thinking and Roadmapping

In terms of ideating alternative futures, i.e., "prototyping" narratives, both the participants in the roadmapping events and the process by which those events were conducted constituted critical elements for the success of the project. The groups should be multidisciplinary arrays capable of co-creating holistically on the themes proposed.

The discussion was conducted on the basis of a visual interface, in which the layers represented carefully chosen topics intended to lead the participants in constructing pathways that were desirable to the stakeholders, commercially feasible and technologically practicable in the futures proposed.

As already described, the roadmap itself is a visual interface that seeks to elucidate, organise and interrelate the main points of the system in question. In the case of the roadmap developed in this project, the complete map contains 183 elements represented over 11 horizontal layers. Not only is the visual framework complex, but it is difficult for the layperson to understand. The solution encountered was to create an interactive visual display, in pdf format, through which users can filter for the desired information, so as to personalise the information displayed on the map.

In view of the foregoing, the complementation that the roadmapping technique brings to projects of this kind (strategy design) makes it inseparable from the quality of the process and the results obtained.

5. CONCLUSIONS AND WAY FORWARD

The case presented here sought to elucidate and exemplify the potential of "Design" as not just a participant along the value chain, but also a force in ideating and driving that chain. Despite that latent potential, as highlighted above, the field still lacks in-depth conceptual development. It is hoped that the case described here will serve as a basis for conducting other projects of the kind, which will in turn contribute to adapting application, thus strengthening the network of study and development in the field.

The roadmapping technique proved well suited to use in projects whose output is strategy design. Harnessing the strong potential for co-creation and communication inherent to the technique, it was possible to achieve results considered satisfactory by all the stakeholders involved.

Phaal & Muller (2009) point - as does our experience - to roadmapping-related research opportunities including: the visual language of strategy and innovation; how roadmapping integrates with other management processes, methods and frameworks; and extending application of the technique.

The boundaries on activities in the Design field are in constant expansion. As perceptions converge with regard to the obsolescence of traditional management and planning models, a series of studies have signalled Design as one of the main tools by which organisations achieve innovation. That situation is necessary given that in most cases it arises in response to market demand, underscoring the organic nature of expansion in this field. It is common knowledge that the portfolios of world leader design consultancies, including IDEO and Livework, now include the *business design* concept, further shaping expansion of activities in this field.

Finally, there is a need for practice and theory to be extended in depth with a view to strengthening the foundations of Strategic Design, thus facilitating its market acceptance and spread.

6. ACKNOWLEDGEMENTS

We would like to thank Sebrae-RJ, AgeRio, GECIV/RJ and Bio-Manguinhos for their ongoing support for this research effort.

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Strategic designer competence framework: Towards new understandings of the foundational skills

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Keywords: Strategic design, design thinking, design competences, creativity

The aim of this study is to inquire into the particular competences required in strategic design. Drawing on a review study of strategic design competences and juxtaposing that with a review study of creativity competences, the point of departure is here an outlining apparent differences and similarities between the two theoretical fields. While a striking convergence is found when it comes to creative, cognitive approaches; the field of strategic design appears to deprioritize "domain-relevant" skills, which in the field of creativity studies, are regarded foundational basis from which any performance must proceed. This discrepancy is discussed based on an empirical study and a new framework of strategic designer competences is proposed.

INTRODUCTION

As competition intensifies and the pace of change accelerates, the pressures for organizations to renew themselves in order to meet multiple and often complex demands are constantly increasing (Floyd and Lane, 2000). Managers are faced with the need to implement and facilitate continuous change and innovation (Ghemawat & Costa, 1993; March, 1991). Within the last decade strategic design has been introduced as a portal for the whole design area to contribute to organizational innovation, and design thinking has been offered as a concept of creative inspiration to the non-designer managers (Johansson-Skjöldberg, Woodilla & Cetinskaya, 2013). While in a traditional understanding of the designer role, designers are typically seen as being "experts in form" and "creators of good-looking artifacts", new conceptualizations of the role as strategic designer increasingly involves taking the responsibility of solving much more complex problems when designing not just beautiful things, but also processes, interfaces, services, business models, strategies, organizations etc. This calls for the designer to draw on a broader range of skills from the social sciences and particularly from the field of management, which transforms the designer from being "maker of things" to becoming "design strategist" (Holston, 2011). Following this new development in the field of design, designers are teaching managers how to innovate and as

Nussbaum expresses it: ”They pitch themselves to businesses as a resource to help with a broad array of issues that affect strategy and organization - creating new brands, defining customer experiences, understanding user needs, changing business practices (Nussbaum, 2004). Thus, strategic design and design thinking has been portrayed as a “powerful, effective and broadly accessible approach to innovation” (Brown 2008:3), and as “the next competitive advantage” (Martin, 2009). As opposed to that, critics state that design thinking is nothing but “good, old-fashioned creative thinking” (Norman, 2010), which by no means are restricted to designers. Based on an extensive literature review, Johansson-Sköldberg, Wodilla and Cetinkaya (2013) find that design thinking as described in the management literature – “where design practice and competence are used beyond the design context for and with people without a scholarly background in design, particularly in management” – is a simplified version of a complex design field that is in danger of being deemed as a hype or fad. They argue that translating the competences and mindsets of the design field into a popularized management version is “not an enduring concept to be used in academia or the management world” (Johansson-Sköldberg, Wodilla and Cetinkaya, 2013: 121). While Johansson-Sköldberg and her partners dismiss the idea of proposing clear-cut definitions of design thinking, arguing that it would be counterproductive for the academic development of the area, others call for exactly that: Clear-cut explanations of what designers contribute with when engaging in strategic design. As stated, for example, by Holston: “The price of a seat at the decision-making table is accountability… As designers participate more collaboratively, they need to be able to explain their work processes and how they create value” (Holston, 2011: 5).

The aim of this paper is to cast light on the particular competences required to be effective and innovative in strategic design. For the purpose of the present study, I will use the terms strategic design and design thinking interchangeably, thereby seeking to avoid becoming “mired in theory, polemics, and arguments about nomenclature” (Liedtka and Ogilvie, 2011) as often tends to happen in design studies. Drawing on a review study addressing the competences of design thinking (Hassi & Laakso, 2010) – and juxtaposing that with a review study of creativity competences (Amabile, 1983) – the point of departure in this study is an outlining of three apparent differences and similarities between the two theoretical fields. Based on that, I discuss the discrepancies between the two fields, and particularly one significant difference is analyzed and discussed by drawing in an empirical data set. Following that, this paper suggests a “strategic designer competence framework” describing three major levels of competences required to become a successful strategic designer. Some studies have already dealt with various elements of designer skills and abilities (e.g. Hassi & Laakso, 2010, Cross 2011, Löwgren & Stolterman, 2004), but none has so far focused specifically on a meta-level description of the levels of competences encompassing the role as the strategic designer. Trying to make a relatively clean-cut description of the strategic designer competences requires some generalizations and simplifications of very complex psychological concepts. Doing that, I challenge the widespread idea that ”..to understand design ability it is necessary to approach it slightly obliquely. Like all kinds of sophisticated cognitive abilities, it is impossible to approach it directly, or bluntly” (Cross, 2011). The aim is here to pave the way for a meta-understanding of the competences at play in strategic design. It is not as such an attempt to produce decisive definitions and categories. Thus, this paper responds to a call for an elevated focus on the strategic role of design within the organization, and in academic research (Noble, 2011).

JUXTAPOSITION OF DESIGN THINKING COMPETENCES AND CREATIVITY COMPETENCES

Design thinking competences

While the concepts of strategic design and design thinking have gained widespread attention over the past decade, they both suffer from the lack of conceptual clarity. It is widely debated what is meant by the terms and how it differs from, for example, creativity, innovation and systems thinking (Hassi & Laakso, 2010). As Kimble points out there is confusion about what it is, whether all designers can do it, whether it is something new or just a different name for what good designers have always done, and why it might be a good thing that non-designers can learn it and do it too – or perhaps they do it already (Kimble, 2009). A lot of studies have addressed this issue from various point of departure. Martin (2009) has framed design thinking as a particular concept encouraging the entire organization, including non-designers, to embrace the methodology designers routinely use in solving 'ill-defined' problems, and to adapt to uncertain situations. Liedtka and Ogilvie offer a simple, tool-based approach to design thinking regarding it as a process conveyed in the form of ten tools or skills that designer have – and that non-designer business people can learn from and use (Liedtka & Ogilvie, 2011). Boland and Collopy describe the concept as a "design attitude" (Boland, Collopy, 2004), which they define as a unique mindset and an approach to problem solving that "views each project as an opportunity for invention that includes a questioning of basic assumptions." In the same vein David Holston, in his book "The strategic designer", outlines how strategic design involves the capability to be collaborative and to embrace complexity (Holston, 2011). In referring to the six forms of intelligence identified by Gardner (1983), Cross (2011) suggests defining "design intelligence" as a seventh form of intelligence in its own right, as this is based on the ability to operate seamlessly across different levels of detail, to draw on cognitive skills of problem framing, and to engage in intense reflective interaction of problems and solutions (Cross, 2011).

Unifying a large number of these diverse views of competences encompassed in the concept of design thinking, Hassi and Laakso (2010) develops a framework that outlines the skills and competences described in the design thinking field. Based on a thorough literature review on design thinking in the management discourse, they describe the dimensions and related elements underlying the concept of design thinking in three dimensions: Practices, Cognitive approaches and Mindsets. "Practices" refers to concrete activities, ways of working and the use of specific tools; and the competence categories found here are, human centered approach, collaborative workstyle, visualizing, thinking by doing and the ability to combine divergent and convergent approaches. The next dimension, "Cognitive approaches", refers to issues such as mentality, cognitive processes and thinking style and cover the categories abductive reasoning, reflective reframing, holistic view and integrative thinking. Lastly, the dimension "Mindsets" refers to mental orientations toward the work at hand and encompasses the categories experimental and explorative, ambiguity tolerant, optimistic and future oriented (Hassi & Laakso, 2010). The work of Hassi and Laakso (2010) gives a solid basis for outlining strategic designer competences. The aim is here, to compare this framework with an equivalent framework describing competences in a closely related but more mature theoretical field – namely creativity.

Creativity competences

The field of design, and not least strategic design, is closely linked to the field of creativity. Over the years, the field of creativity has been studied through various approaches (see El-Murad & West, 2004 for an overview). While early approaches was described as 'mystical', because creativity was considered to be a spiritual force (Faullant, R., Schwarz, E.J., Krajger, I & Breitenecker, R.J., 2012), the "traits" approach (e.g., Guilford, 1950) that regards creativity to be rooted in the personality disposition of an individual and as being describable in terms of certain patterns of traits, has long been dominating in creativity research. According to this approach it is possible to distinguish between creative and non-creative individuals by evaluating certain trait patterns of the individual. Today, however, the common understanding of creativity is based on the assumption that all individuals are creative, in various degrees, depending on the underlying cline of creativity (Amabile, 1983). Amabile's (1983) conceptualization of creativity, which has been one of the most influential theories in contemporary creativity studies (Rickards & Moger, 2006), outlines three dimensions of creativity skills: domain-relevant skills, creativity-relevant skills and task motivation. The underlying assumption is that multiple components must converge for creativity to occur. Amabiles conceptualization of creativity serves as a central framwork in this study, as it is compared with the design thinking competence findings of Hassi and Laakso (2010).

The first of three dimensions in Amabile's (1983) framework of creativity competences is "domain-relevant skills", which she describes as the foundational basis from which any performance must proceed. These include technical skills, factual knowledge about and familiarity with the domain in question. As Amabile says: "Certainly, it is impossible to be creative in nuclear physics unless one knows something (and probably a great deal) about nuclear physics" (1983:363). This level of skills is based on formal and informal education as well as on innate cognitive and perceptual abilities. According to Amabile, an increase in domain-relevant skills can only lead to an increase in creativity and by that she opposes "the popular notion that a great deal of knowledge in a given domain can be detrimental to creativity" (1983:364). This echoes what others in creativity research have found: "Creativity is not something where someone who has never worked in that field suddenly gets this marvelous idea. Creativity is relating a concept to a particular body of knowledge…. really creative people spend years and years acquiring and refining their knowledge base – be it music, mathematics, arts, sculpture or design" (John Hunt quoted in Stamm, 2008). The second dimension in the framework is "creativity-relevant skills" which is basically the ability to understand complexity and to break set in problem solving (Amabile, 1983). These skills are related to cognitive style and can be divided into the following seven categories: Breaking perceptual set, exploring new cognitive pathways, keeping response options open as long as possible, suspending judgment, using "wide" categories, remembering accurately and breaking out performance scripts (Amabile, 1983). "Task motivation", which is the last dimension in the framework, is based on the idea that freedom from external pressures and control is important for creativity to thrive. As argued by Amabile: "A person is said to be intrinsically motivated to engage in an activity if such engagement is viewed as an end in itself and not as a means to some extrinsic goals (1983:366)." Amabile splits this category in two – partly dealing with the person's baseline attitude toward the task and the person's reason for undertaking the task. Extrinsic constraints are factors that are intended to control the performance. Thus, as expressed by Amabile: "A primarily intrinsic motivation to engage in an activity will enhance creativity and a primarily extrinsic motivation will undermine it" (1983: 366).

Theoretical analysis and discussion

Juxtaposing Amabile's (1983) "creativity competence framework" with Hassi and Laakso's (2010) "design thinking competence framework" shows an interesting picture of differences and similarities between the two fields of theory (see table 1). A comparing analysis of each of the specific skills outlined in the two frameworks yields three interesting observations. The following will give a brief discussion of these findings.

Creative, cognitive approaches: Striking similarity

Comparing the two models of creativity and design thinking gives an immediate striking impression of convergence between the two theoretical fields. In the relatively young theoretical field of design thinking, the cognitive approaches such as reflective reframing, integrative thinking, ambiguity tolerance, are is often emphasized as an important aspect of the field. In their model of design thinking competences, Hassi and Laakso (2010) place such skills in two categories "cognitive approaches" and "mindets". But when comparing with the creativity skills, outlined by Amabile more than thirty years ago, it appears that the design thinking competences are very closely convergent with what Amabile has labeled creativity-relevant skills. What Hassi and Laakso calls "experimental and explorative", Amabile calls "exploring new cognitive pathways" and what Hassi and Laakso calls "ambiguity tolerance", Amabile calls "keeping response options open". And this goes for just about all the skills relating to these categories. While the present study is not a comprehensive and detailed analysis of the models, it does give a clear impression of why some of the critics of the design thinking concept argue that design thinking is just another word for creativity and that design thinking is nothing but "a powerful myth…[claiming] that designers possess some mystical, creative thought process that places them above all others in their skills of creative, groundbreaking thought" (Norman, 2010). Recognizing such critical voices, the analysis do, however, also indicate some differences between the two fields.

Designerly methodological skills: Particular focus in the design thinking literature

A striking difference, when comparing the two frameworks, is that while the design thinking field appears to focus quite much on designerly methods – what Hassi and Laakso calls "practices" – this is not offered much attention in Amabiles creativity competence model. She addresses the methodological skills peripherally by saying that creativity competences also encompasses "methods of approaching a problem that are most likely to lead to set-breaking and novel ideas rather than as strict rules that are applied by rote" (Amabile, 1983) and she points to studies on creativity heuristics saying for example: "When all else fails, try something counterintuitive (Newell et al, 1962: 152)" or "Make the familiar strange" (Gordon, 1961). But in their review of design thinking studies, Hassi and Laakso find a relatively much larger focus on skills such as visualizing and prototyping, and what they call "thinking by doing" (Hassi and Laakso, 2010).

"Thinking by doing" can be understood as an overarching term for techniques such as visualization, sketching, prototyping, mockups, scenarios etc., which, in the design literature, are often highlighted as effective ways for the designers to make an inquiry into the future situation of use (Cross, 2011) and to test potential offerings in a simple ways so that you can "make mistakes faster" (Liedtka & Ogilvie, 2011:143). This emphasis on designerly methodological skills, "thinking by doing", echoes the work of Liedtka and Ogilvie (2011). In their outlining of designer tools for managers, they define visualization as a "meta-tool" because they find it to be an intricate part of all kinds of designerly work: "Sometimes it's about representing text or numbers or other bits of data with pictures (which ..are worth a thousand words). Sometimes it's about assembling scattered ideas into a compelling story that can generate vivid mental images" (2011:49). Thus, by comparing the fields of design thinking and creativity, it appears that the design thinking field has a characteristic and very specific focus on practical tools and methods – what you might call a repertoire of designerly "tricks and gambits" (Lawson, 2003).

Domain-relevant skills: Not given attention in the design thinking literature

Perhaps the most striking observation from juxtaposing the competence models of design thinking and creativity is that the set of skills that Amabile has framed as "domain-relevant" skills and that she describes as "the foundational basis from which any performance must proceed" (Amabile, 1983), do not seem to be given any attention in the design thinking studies at all. According to Amabile "knowledge of the domain includes facts, principles and opinions, as well as knowledge of paradigms and performance scripts pertaining to the domain. Domain-relevant skills also include the technical skills necessary for practicing in the domain" (Amabile, 1983). In order to get a better understanding of what the domain-relevant skills actually are Faullant et al. gives two illustrative examples: "Clearly, in order to be creative in pharmaceuticals, one must know a lot about chemistry and medicine. (For example, Alexander Fleming, who discovered penicillin, was a bacteriologist in a hospital.)…[Also]…For composers, for example, this might include the skill of playing an instrument (e.g., Mozart was an excellent pianist as well as a composer)" (Faullant, 2012). The fact that the design thinking field do not stress the importance such domain-relevant skills, could be part of the explanation of why scholars like Johansson-Sködberg, Wodilla and Cetinkaya (2013) find that the management discource of design thinking is "less thoughtful and robust than contributions to the designerly thinking discourse" (Johansson-Sködberg, Wodilla and Cetinkaya, 2013:127). They acknowledge that the concept of design thinking "captures the design practice and the way designers make sense of their task, and 'a way of thinking' that non-designers can also use" (2013:127). This indicates that Johansson and her partner find that design thinking competences are represented by what I have described in the two sections above – namely creative, cognitive approaches and designerly methodological skills – but that it is profoundly lagging the foundational level of domain-relevant skills. In the design literature, there are, of course, plenty of studies showing that domain-relevant skills are important. Löwgren and Stolterman, for example, emphasize that: "Every designer needs knowledge and skill related to her specific profession. Having knowledge means understanding the vast amount of specific information and techniques existing within any design field. Skill concerns the necessary craftmanship. Both knowledge and skill are needed if a person wants to be a good designer."(Löwgren & Stolterman, 2004). Likewise, Cross finds that successful designers often have a strong commitment to their chosen fields of

endeavor, based on a personal motivation grounded already in the their youth (Cross, 2011). But what is often the case with studies like these is that they are referring to interviews with great successful classic designers – not strategic designers engaged primarily with design thinking. Thus, when Hassi and Laakso (2010) in their review find that the design thinking literature do not focus on the foundational domain-relevant knowledge and basic technical skills, one could speculate: *Are domain-relevant skills not important in the design thinking field or has it been replaced by other skills, of more relevance more for the strategic designer to succeed?* In order to find some possible answers to this question, let's turn to an empirical study on that issue.

METHODOLOGY

The empirical evidence for the analysis presented here is based on a multiple, field-based case study in four multinational, industrial corporations, each headquartered in Denmark. During the course of the study, sampling decisions have been made on two levels. Partly, at the organizational level, I have chosen a typical case sampling. The four industrial organizations does not in any major way appear atypical, extreme, deviant, or intensely unusual. Thereby I aim at describing and illustrating an issue that I expect is relevant and recognizable in many other organizations. At the individual level, I have interviewed designers from the design departments of the organizations all having roles as strategic designers. The individual designer define the "unit of analysis", among whom 16 qualitative interviews were made. The fieldwork was conducted in spring 2012.

EMPIRICAL ANALYSIS OF STRATEGIC DESIGNER SKILLS

Let's begin this small empirical analysis by repeating a quote from section 2.2: "Really creative people spend years and years acquiring and refining their knowledge base (John Hunt quoted in Stamm, 2008)." This is the quintessence of domain-relevant skills, and the question is here, why domain-relevant designerly skills do not appear to have particular importance in the design thinking field. After having conducted interviews on this question, it appears, that an overshadowing issue among the strategic designers is, that the field of design thinking and strategic design is in change. It's in change at so many levels that in order to discuss the reasons why domain-relevant skills might have been abandoned, it seems expedient to divide this discussion into three levels of change. As Holston has already indicated "the design profession is clearly starting to put more emphasis on a broader set of skills" (Holston, 2011). And that goes particularly for the strategic designer: The game is changing, the scene is changing and the roles are changing. And that, of course, affects the competences in focus in the field of strategic design – in theory as well as in practice.

Changing the game

What is special about strategic design is that it departs from the traditional design approach of 'framed problem solving', where the designer or design team focuses on creating discrete solutions—be it a product, a building, or a service. Strategic design deals, instead, with 'unframed problem solving'. It is about applying some of the principles of traditional design to a "bigger picture" of systemic challenges. This means that the strategic designer do not do what the stereotype of a designer does, he is actually playing a whole new game. In strategic design, a central task is to challenge the mindsets of central organizational players, while more classic design disciplines like being "the creator of good-looking artifacts" are deprioritized. As a consequence, styling and other classic designer tasks, relating to the domain-relevant skills, have become low-prestige work among the designers. Some strategic designers even look down on the designers doing styling.

"Some of the designers we have in our organization do not use their design methods. They simply are making things look nice. And that's not design. Well, you can come through a design school just by doing that, but that's not design. It's styling or something like that. It's not design".

Some designers are very determinedly turning their back against this kind of work in order to deal with some of the more strategic tasks. Thus, the strategic designer no longer offers the same services and deliveries as the organization might have been used to. Several of the strategic designers in this study reports how they have a hard time explaining the organization that it is not their job to style products or make graphic marketing material. But this is the classic stereotype of the designer, and the basic assumption in the organizations still typically is that the designers design – as in designers do the styling.

"Often, we are faced with a lack of understanding of why we are not just putting make up on the products, when the engineers have finished the product development phase. It is hard to explain the product managers that we should be part of the innovation process together with the engineers."

So, one big challenge of change for the strategic designers – and one possible reason for why the domain-relevant skills are not in focus among them – is that they have to introduce the actual concept of strategic design in the organizations. And that requires so many strategic and managerial skills. Domain-relevant skills are rarely in use for this purpose. This challenge of changing the game is often priority number one on the strategic designers agenda, not least because they continuously have to prove their worth and raison d'etre.

"Our biggest challenge is to make the organization understand that what we can offer is in fact important for the business. A lot of our colleagues are still challenging that. So yes, our challenge is to change this mindset in the organization… You have to be a good politician to that. You have to keep justifying what you do."

Changing the scene

For the strategic designer, the organizational context is in focus. Most of the strategic designers are not driven by a certain creative skill that they been fine-tuning most their lives. What is important is not the individual or his creative product – it is the business. Thus, compared to a more traditional

understanding of design, there is a change of scene. You don't focus on an introvert, context-specific domain-relevant skill. Rather, you are focused at an extrovert context-generic business approach. That means that the "foundational basis from which any performance must proceed" – to use Amabile's phrasing – is not centered on the individual or any knowledge or skill this individual might have. It is instead centered on the collective of all employees in the organization.

"In the design schools, we have been learning that a project is a very individual process. But in our organizational reality, the challenge always is to coordinate between all the different individuals and competences that are at play in the projects."

A central challenge for the strategic designer is, thus, to be able, not only to collaborate with a lot of different people, but to drive the collaboration among them. The strategic designer needs to be able to "speak a lot of different languages" in the organization – and be able to combine the best from the various worlds.

"Of course, we need to able to think creatively different and to challenge the people around us. But it is equally important that we as designers understand who we are working with; and that we are able to see things from their perspective. We need to be able to merge these different perspectives. So, being able to speak a business language and being able to communicate at eye level with the engineers is really, really important."

This ability to "speak a lot languages" relates to collaborating and communication skills and does not particularly call for the strategic designer to excel in domain-relevant skills. An underlying assumption in strategic design is, that the designer is the main agent in some form of organizational change process. As Kimble expresses it: "… when design thinking involves designers having empathy with users, the designer (or manager practicing design thinking) is presented as an agent of change within an organization or project" (Kimble, 2009). A change agent can be defined as a person who is responsible for initiating and maintaining a change effort in the organization. (Kendra & Taplin, 2004). Change agents are often described as persons with high cognitive complexity in thinking who understands "both the world of business and the world of human relations" (Quinn quoted in Kendra & Taplin, 2004:22). Such cross-disciplinarity requires for the change agent to draw on knowledge and skills from disciplines related to communication, process management, leadership, and strategic change (Kendra & Taplin, 2004). And the focus will always be business – and how strategic design can support the business.

"If you are working with strategic design, the core issue is how design can support business and how design can contribute to reach organizational performance goals. As designers we have to keep reminding ourselves to have this business focus."

Changing the role

Being in the center of a field in change, as the strategic designers appear to be, requires of the individual designer that he is able to be self-reflexive and open to change at an individual level. Most designers have been educated in a certain way in their respective design-schools and most

have been influenced by the dominating discourse at the schools. And for some, that is very hard to change

"From day one at the design school you are told that "you are special", "you are creative" as compared to someone else. And I guess that kind of sticks with you saying "I am a creative person" compared to someone who is working in a bank or someone else. It is more glamorous. You are never taught that you are glamorous when you do engineering or when you are studying computer science. When you enter design you seem to get this self-image to be one step above in the social structure."

This point of view is repeated from several of the strategic designers in this study: Aiming to be a strategic designer, your focus have to be on the collective rather than on the individual – and that has to affect your self-image. For some, it appears to be a challenge to realize, that all professions represented in the organization have equal value – everybody has something special to offer. And only when the designers change their mindset is it possible to drive strategic design.

"I think everybody wants to be a rock star designer. But there are very few rock star designers in our company … the real world hits you saying that you need to work with five other people. You are very good, but you are not special. I find that the issue arises when these people pretend to collaborate but in a sense always stick to their field, stick to their comfort zone and stick to what they are very good at. Some people have an ego and they know they are right and they are the ones who have the vision. But they do not have the understanding that without input and without being open to ideas from others, only very rarely something big will happen".

Thus, openness towards other ways of thinking, which on the one hand is a defining competence of design thinking and strategic design, can, on the other hand, be very hard to exercise at the individual, personal level. The challenge for the strategic designer might be, like Löwgren and Stolterman expresses it, that "everyone has to develop her own way of becoming a good designer" (Löwgren & Stolterman, 2004). Becoming a good designer is a question of "designing oneself as a designer…[it] is to some extent a design endeavor, and not an easy one." This means, that as strategic designer, you need some highly developed learning skills. You need to be very reflective about your own mindset – and to be ready to change your own mindset and self-image. And one of the skills the strategic designer needs to excel in is the ability to focus on the collective process – to cultivate the role as facilitator.

"Designers should be facilitators. We have chosen to become designers because we like to learn about people – we are interested in people. Well, of course, some designers are in it for the cool, but they are not gonna stay in strategic design. They are going to disappear anyway. But the whole idea of facilitation is that the facilitator dissappears, right. You can't go around and say "wauw you guys are awesome" or "look what you guys did". Some designers want their names on everything. Facilitators can't."

Such change of mindset will continuously take the strategic designers' focus further and further away from personal professional domain-relevant skills.

CONCLUDING REFLECTIONS

By juxtaposing the "creativity competence framework" (Amabile, 1983) with the "design thinking competence framework" (Hassi and Laakso, 2010) I found that there is a striking convergence in the two fields when it comes to creative, cognitive approaches. The field of design thinking appears to have adopted almost this full set of approaches from creativity. But on the top of that, the design thinking field can be characterized by specifically emphasizing certain designerly methodological skills. Techniques of "thinking by doing" seem to be part of the defining competences in strategic design. In suggesting a new framework of strategic designer competences, these findings lead me crystallize the two categories "creative, cognitive approaches" and "designerly methodological skills" as the top two level in the framework (se figure 1). The bottom foundational level of strategic designer competences is, however, in change. The stereotype understanding of what a designer can and does is linked to the skills that Amabile (1983) has described as domain-relevant skills, but as discussed in the empirical section, these skills are in the process of being deprioritized by the strategic designers. Instead, various strategic and managerial skills – facilitation, communication, project management etc. – seem to have replaced the domain-relevant skills (see figure 1). Such change will give rice to a lot of unclarity and confusion about the strategic designer competences: What do the strategic designers actually do, what skills do they contribute with? Maybe, such confusion is just a natural part when an entire field is in change, and maybe time will give the answers. But as expressed below by one of the interviewees in this study, it is important that strategic designers do find some foundational skills – and make sure that they excel in those. As Johansson and her partners have already indicated, offering only strategic designer competences from the two top levels in the framework (see figure 1) – creative, cognitive approaches and designerly methodological skills – will hardly be enough.

"Some of the new designers lack respect when they enter an organization as ours. They think that method and youth is enough to show the road ahead for the company. They are more confident than can be justified. They think that their methods are stronger than they actually are. They get on the stage with fancy presentations from Photoshop and all kinds of post-it notes, but that's all. You need to have a much stronger professional foundation to be able to inspire, give advice and innovate with people in a consolidated business. But they do not have that, they don't have that grounding at all."

More than fifty years ago, Dreyfuss described the designer as a man of many hats: "He does more that merely design things. He is a businessman as well as a person who makes drawings and models" (Dreyfuss, 1957 quoted in Holston, 2011). Today, I might conclude, that the strategic designer is in the midst of changing hats. And the change of focus in his foundational skills indicates that he, more than ever before, is becoming a businessman.

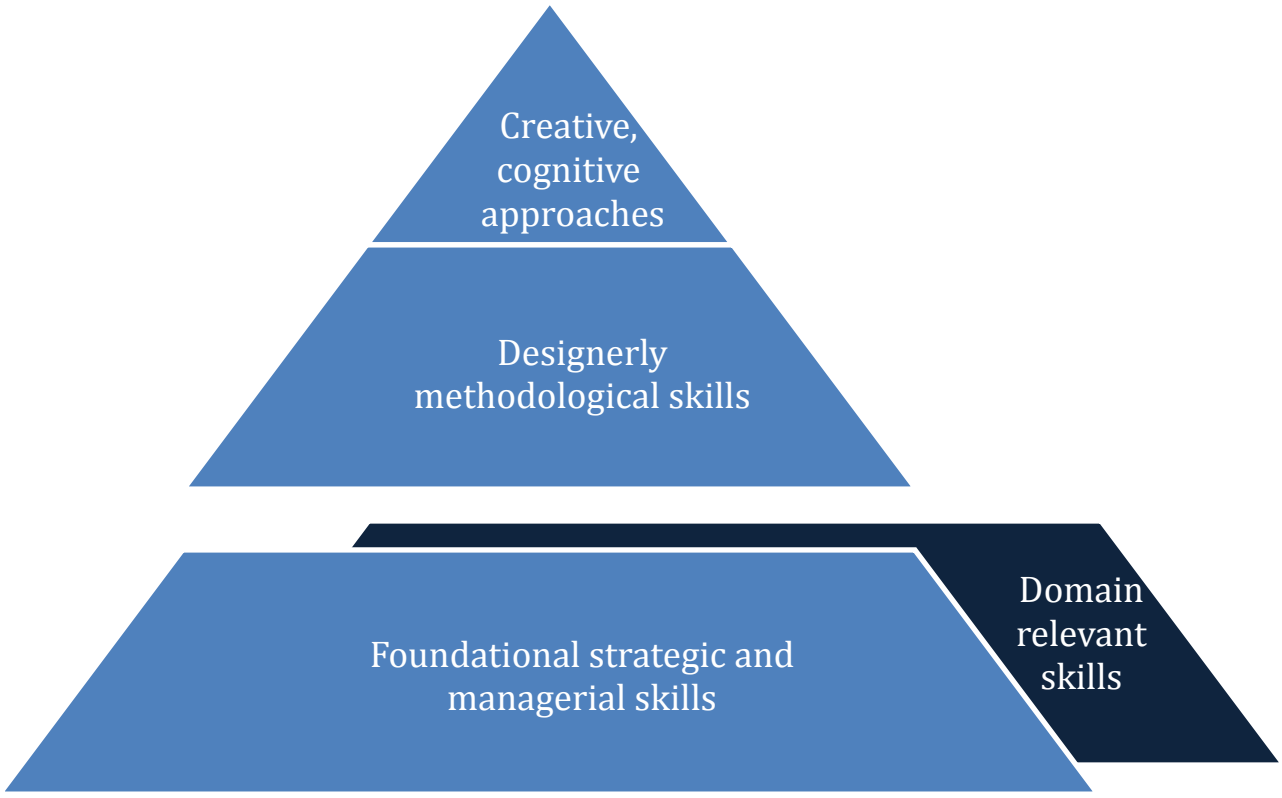

Figure 1: Framework of strategic designer competences

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Appendix A: Table 1: Juxtaposition of competence frameworks

Hassi & Laakso, 2010 **Design thinking competences**	**Amabile, 1983** **Creativity competences**	**Storgaard, 2013** **Strategic designer skills**
Cognitive approaches	**Creativity-relevant skills**	**Creative, cognitive approaches**
Abductive reasoning – "the logic of what might be"	Suspending judgement	
Reflective reframing	Breaking out performance scripts	
Holistic view - 360° understanding of the problem		
Integrative thinking – bringing competing	Using "wide" categories – and seing relations	

constraints into harmonious balance	between apparently diverse bits of information	
Mindsets		
Experimental and explorative – willingness to risk failure	Exploring new cognitive pathways	
Ambiguity tolerant – acceptance of a "liquid and open" problem-solving process	Keeping response options open as long as possible	
Optimistic – unwillingness to give in to constraints and obstacles	The ability to use "productive forgetting" – and temporarily put aside stubborn problems	
Future oriented – ability to anticipate and visualize new scenarios	Breaking perceptual set - seeing how things can be used in different ways	
Practices		**Designerly methodological skills**
Visualizing		
Thinking by doing – e.g. prototyping		
Human centered approach – putting people first		
Collaborative workstyle		
Combination of divergent and convergent approaches		
	Domain-relevant skills	**Foundational strategic and managerial skills**
	Technical skills	
	Factual knowledge about and familiarity with the domain in question	
	Task motivation	

The impact of design in social media today

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Keywords: design, social media

Social Media is becoming increasingly important as a global information space, holding more than a billion users. It is transforming the way we interact with everything. Little has been said about the importance of design as a research tool in social media and its influence on how we communicate with brands and markets by shaping it into a different and new type of market, which both users and brands are trying to understand.

A lot has been researched about social media: what is it used for; what companies can gain from using it; how to engage with costumers in social media; and different social media strategies one can use. However, design and designers have been 'left out' of the often vague and dispersed literature. This paper aims to collect that information in the form of a literature review, followed by an online survey done with design and marketing experts, aiming to clarify two areas: social media and design management, and possibly enrich future research.

AIMS

The aim of this research is to identify the importance of design when branding for social media. Social media concerns branding and a study shows that 82 % of managers in America use it as a branding tool (Herder, 2009). As social media is emerging as an important tool for both branding and design, it becomes increasingly important to define and understand its importance regarding these areas.

It has become clear that the designer has a substantial knowledge base related to brands and marketing. Understanding the role of design in branding and the different design disciplines is very important, and the use of social media by brands is becoming a challenge for designers. They are designing social media spaces, of which the look and feel and content is

ruled by marketing. However, there is little academic research on the use of social media in branding and design. Therefore this work investigates the role of design as a custodian, promoting brands within the social space.

Underpinning the work presented are five research questions:

- What is the role of design when branding for social media?
- What design skills are necessary to work in branding for social media?
- Is design strategy similar in any way to social media strategy?
- What value does design bring to branding for social media?
- What roles will designers play in the future of social media?

LITERATURE REVIEW - BRANDING TODAY

In the article "The lure of global branding", by the Harvard Business Review Journal (1999), it is said that most companies are viewing the world as their potential global market, and that brand builders want to globalize their own brands in a worldwide dimension, following what appears to be a market trend.

The world is facing globalization and this will impact brands as well. With the economy changing we are shifting from the service economy of the late 20th century in the "experience economy" or, as the Nomura Economic Research Institute describes it, "The age of creativity".

Brands need to match the shifts expressed by the economic model and develop experiential customer interfaces. These will fall into the 5 I's brand dimensions: identify; inform; imagine; immerse; and intrigue. Businesses need to define a balanced strategy for the bricks-to-clicks[1] paradigm, as well as the new economy of clicks-to-bricks[2]. They need to create synergy across the traditional and the new media rather than remain purely with a single one (Ellwood, 2002).

Although marketers control the placement of their brands (products and services) and packages on store shelves, they can't control it on cyberspace and this has become a major concern.

A brand is now the image of what consumers have of it. It is no longer what advertising agencies say it is. Modern-day branding has to adapt to an environment where consumers can talk to each other and their conversations are spread far and wide, and are even archived and available to inform future users. Every day there are consumers blogging about their preferences, and about how a company treated them. Consumers can review and rate products

[1] Is a business model by which a company integrates both offline (bricks) and online (clicks) presences.

[2] Is a business model that starts from the online (clicks) presences and moves to the offline (bricks)

and give each other feedback and recommendations. A brand shouting its message is no longer the only source of information, because consumers now have many other sources of trust and objective opinions.

Design has become global. A new capitalist context generation of design consumer's is emerging and the remit of design practice has been there during the same period. Design is no longer perceived as the "added value" of objects, rather it could be, for example, planning and shaping digital interfaces for computer games or the creation of a country's public image (Julier, 2008).

Aiga (2011) believes that designers are ideal to understand the human-centred solutions that can help people's lives.

Designers bring empathy and creativity to social challenges. The first helps to understand the human-centred solutions that can make a real difference in real people's lives; the former can defeat habits with innovative approaches to making a measurable difference. It is the designer's approach to the process of solving complex problems, particularly in the willingness to test risky options that transcend the traditional view of problems, which is a strategic advantage. Every designer is encouraged to become engaged with socially relevant projects in order to use their creative talents to their highest and best purpose and to demonstrate the value of designers and design thinking.

According to Greenfield and Yan (2006), the Internet is a powerful tool in social research. The newest phenomenon of online social network is now considered a new field of inquiry in social sciences (Herring, Scheidt, Wright, & Bonus, 2005; Mee, 2006). The phenomenon is rapidly changing as technology improves and takes social networks to a different level. As research advances there is a distinction between personal blogs and social networks sites (Williams, Amanda L., and Merton, Michael J., 2008).

Tapscott and Williams (2006) consider social networks as a part of a wider trend in communication, and call it "mass collaboration". Features like "transparency, peer collaboration, audience participation and globalization are changing markets", making companies like YouTube or MySpace very important. Wikipedia is described as influencing the communication of brands, fashion, markets, ideas and ideology by shaping a new type of market.

Jenkins (2006) characterizes it as convergence culture: media convergence; participatory culture; and collective intelligence (Jenkins, 2006). Social media was developed in this unique convergence of parameters.

This social media ecosystem has its focus on the consumer experience. Social networks are all about experiences, says Mike DiLorenzo, director of social media marketing and strategy for the National Hockey League. The experiences begin when marketers can successfully incorporate integrated marketing communication strategies into social media and combine them with traditional media. Some companies create social media platforms and operate them independently, not as an integrated strategy that brings the consumers experiences forefront.

Social media does not replace traditional media but it can expand marketing's ability to engage with consumers and achieve their attention and influence (Hanna R., Rohm A., Crittenden V., 2011).

Nowadays interactions between companies and consumers are quite different from ten years ago. The whole dynamic has changes and now consumers are dictating the rules. They influence brand messages and meaning, and their opinions are regarded when thinking about a product or a service (Hanna R., Rohm A., Crittenden V., 2011).

It has become politically incorrect to say that design has real strategic value (Reynders, Hendrik, 2003). Although several studies have reported otherwise (Porter, 1985; Stabell & Fjeldstad, 1998; Borja de Mozota, 2003), design is reportedly one of the first things that some companies cut when there is a financial set back. Best (2008) believes there are two different strategies existing in the current marketplace: low-cost producers; and those who use design as a way to differentiate their offer to add meaning and value to shoppers, consumers and sellers. We include a third one: companies who use design to differentiate their offer to add meaning and value and then produce their products and services with low costs.

Designers can work on solutions for mobility, communication, knowledge and identity (Cooper and Press, 2003) but also develop the corporate identity of a company. Designers also work on saleable products and operating environments (Cooper and Press, 2003).

Is it safe to say that social media spaces are part of these environments? Designers should be involved in the developments of social media approaches because that is one of the things design does best – design and operate environments. Social media is just another environment that might follow the brand's short and long-term strategies or have a specific strategy of its own. Bearing in mind the previous, what are designers actually doing in social media? Firstly, the social media professional is not called a designer, although he might actually do a designer's work. Secondly, the typecast for a social media person is admittedly around the areas of business, e-commerce, public relationships, strategy management or community management.

According to Haig and Matt (2003), brand failure on the Internet has become a norm and companies who do make a profit are seen as "freaks". Not being on the Internet is no longer an option, and companies that do not have a presence online are putting their brand position in danger.

So why are brands failing so much on the Internet? Brands have the tendency to see the Internet, and by extension, social media, as a separate communication medium or sales channel. What happens is that social media and Internet strategies should be a part of the companies short and long term design strategy plan. Social media has a very particular way of delivering messages, and a potential of engaging the consumer in a conversation about brands, whether as a back of mind participant, or as an active participant that shares, comments and "likes" brand content. Brands are afraid of social media because it can easily fall out of their control. But we ask if it is not happening already, whether there is a brand

presence online or not? Are consumers now holding the key that opens a communication channel between them and brands? If so, how can design, which has been outside the whole business strategy planning decisions, help build a solid foundation for social media channels to communicate brands in a more valuable way?

APPROACH

Each study type must have a number of important factors accommodated in order to describe the research methods effectively. Steps for how the study will be conducted must answer the vital questions: who, what, where, when, why and how (Gay et al., 2006; Isaac & Michael, 1981; Leedy & Ormrod, 2005; Yin, 1984; Levy & Ellis, 2006).

We considered most research methods before deciding on the approach necessary to undertake this study. We preferred Internet pooling to mailing questionnaires to respondents and aimed to develop on the topics that came out of the pilot study. The focus of this study is to answer the proposed research questions and aims to investigate into the role of design and designers in branding for social media

Pilot Study

In order to fulfil a range of important functions and get valuable insights from experts a need for a pilot study was determinant. More discussion about the subject at hand improves the process and provides better outcomes. Conducting a pilot study can provide warning in advance in the case of project faults, inadequate research protocols and whether the methods are appropriate or too complicated (Baker 1994: 182-3). Pilot studies can also improve the validity of the proposed questionnaire.

In the pilot study, a survey regarding the use of social media by companies in general was developed. It revolved around five questions, from whose answers a table of conclusions was made and analysed, which led to a better understanding of the value of design and marketing in social media, and also a better understanding of social media and why it is so largely used by companies and for what purposes is it being used for.

We choose the social survey method because it collects data in a standardized way from a specific sample of respondents. This enables the data to be later codified into a quantitative form. We conducted face-to-face interviews and internet surveys. There are also telephone surveys. The internet survey was an online questionnaire which enables us to collect a large amount of data from a number of people in a relatively short time. This questionnaire was sent out through email and the interviewer could read the questions and fill in the questionnaire at their own pace. In this case, questionnaire design was quite important to get the right answers. Although response rates on electronic surveys are low, people find it easy to respond given its confidentiality. In face-to-face interviews it can be hard to manage the field force of interviewees. These methods were organized in a logical and systematic fashion from the questionnaire design up to the face-to-face interviews.

Sampling

In the specific case of this study there were not many professionals to consider a large statistical population. Since the area of research is fairly recent, both professionals from Design, Marketing and Management were involved in our sampling. We sampled both United Kingdom and Portuguese professionals that were either: freelance workers dealing with branding for social media and had their own portfolio of clients; professionals who work for companies that do branding for social media and are part of the social media department; and professionals who have their own company or are consultants and/or are part of a department who deals with social media.

The population was defined by including all the people who deal with social media, or work with social media on a regular basis. We tried to search for companies through keywords, and once we found a professional they have often recommended another person they knew that did a similar job. From that we were able to develop a representative sample. It was interesting to find that using social media to reach social media professionals was very profitable in terms of interviewee response and the people who were contacted by that method usually replied positively to do a further in depth interview.

Survey Analysis

The survey questionnaire is composed by three open response items, two of them fill-in and short answers and the other question was for a longer answer. Two other questions were multiple choice ones and the other five consist of a five point Likert scales.

These questionnaires were emailed and messaged through social media networks such as Twitter and LinkedIn to the respective respondents. This survey collected a total of 103 valid responses, and it was available from April 19 2012, to April 9 2013.

Data Description

Each question has several options, and each option can be answered with a specific rank (apart from Question 1, the ranks have 5 ordered values). The data is interpreted as ordinal, so for each question we use the median as the measure of central tendency. The Median Absolute Deviation (*MAD*) informs about the absolute deviation of each score. It is determined by $MAD=median_i(|X_i-median_j(X_j)|)$, with X_i a score, and $median_j(X_j)$ the median of scores. To describe the probable variation of each answer in the population, the confidence interval used is 95%. Tables 1 to 4 show both lower (2.5%) and upper (97.5%) limits. To simplify the confidence interval columns, the ranks are encoded as numbers, according to each question.

Table 1. How often would you say the following business functions have asked you for Social Media Solutions?

Never (1), Occasionally (2), Sometimes (3), Frequently (4), Very Frequently (5)

Option	Median	MAD	CI 95% - 2.5%	CI 95% - 97.5%
Human Resources	Occasionally	±1	2	3
Sales	Frequently	±1	3	4
Customer Service and Support	Sometimes	±1	3	4
Product Development	Occasionally	±1	2	3
Marketing	Very Frequently	0	4	5
Strategy	Frequently	±1	3	4
Internal Collaboration and Learning	Occasionally	±1	2	3

Table 2. What skills would you say are more important for a Social Media professional to have?
Not Important (1), Slightly Important (2), Fairly Important (3), Quite Important (4), Very Important (5)

Option	Median	MAD	CI 95% - 2.5%	CI 95% - 97.5%
Strategy development	Very Important	0	5	5
Communication	Very Important	0	5	5
Creativity	Very Important	0	5	5
Public Relations	Quite Important	±1	4	4
Research development	Quite Important	±1	3	4
Networking	Very Important	0	4	5
Management	Quite Important	±1	3	4
Advertising	Failry Important	±1	3	4

Table 3. Please rate the contribution of design to add value in social media.
Not Important (1), Slightly Important (2), Fairly Important (3), Quite Important (4), Very Important (5)

Option	Median	MAD	CI 95% - 2.5%	CI 95% - 97.5%
Perception Value	Very Important	±1	5	5
Performance Value	Quite Important	0	4	4
Strategic Value	Quite Important	±1	4	5
Financial and Accounting Value	Fairly Important	±1	3	4

Table 4. In which stage(s) of the 'social marketing total process planning' do you think is more important for design to be involved?
Not Important (1), Slightly Important (2), Fairly Important (3), Quite Important (4), Very Important (5)

Option	Median	MAD	CI 95% - 2.5%	CI 95% - 97.5%
Scope	Quite Important	±1	4	4
Primary Develop	Very Important	0	4	5
Secondary Develop	Quite Important	±1	4	4
Implement	Quite Important	±1	4	5
Evaluate	Quite Important	±1	3	4
Follow Up	Quite Important	±1	4	4

Key Findings

The majority of respondents were involved in social media (91.3%). Marketing, Strategy and Sales were the areas within the company that resort more to social media solutions.

When questioned about which skills were necessary to be working in social media respondents referred communication, strategy development and creativity as the top three (table 2). When asked about the value that design adds to social media most respondents agreed it was the perception value (table 3), followed by performance value, then strategic value and lastly financial and accounting value. All of the referred phases of social media total marketing process were considered to be quite important, except for the primary development, which was considered to be very important. This means that design in the primary development stage has more relevance for the whole social process.

Facebook was the social media network that clients were more eager to be working with, followed by Twitter, YouTube and the company's own social media website. The least popular were Flickr and Foursquare. Also mentioned but not analysed were Pinterest and Instagram, who at the start of this survey were only in their early stages, with Pinterest just at

a beta stage. Although Google+ is referred as having a well-made and functional design by some of the interviewees, it only has a slight interest in the eyes of clients. This could be due to the lack of people interacting in that space when compared to Facebook or Twitter.

Survey Conclusions

The results of this survey provided some feedback from practitioners regarding the importance of design in social media. All confirmed the design's importance, although some mentioned that design has a limited influence due to how the platforms are designed nowadays. Some respondents believe that the current network websites does not allow for real engagement with the audience and there is a need to redesign those interfaces. Design is also crucial to create consistency throughout all media. Also, storytelling helps to bring people closer to the brand and that makes it more engaging to the user. Design can work as a differentiator and amplify interaction between brands, and clients and fans.

Although design has been proven to add financial value to a brand it is sometimes neglected to minimize costs. Most respondents believe good design equals trust and there is a higher chance for it to be shared or liked. Due to its strength in both communication and visual appeal, design is a major competitive advantage. Design thinking is a critical element because it gives shape to ideas and is critical to all effective communications. The aesthetics and friendliness of social media networks are highly dependable on design, and they need to attract as many people as possible. Perceptions of a product or service are influenced by their design and need to reflect the DNA of the brand.

Graphic appearance was mentioned by most of the respondents, mainly because design is a layered discipline, and it is used in every piece of information in social media. Social media is very visual and that is why content design is so important. In the online world it only takes from four to eight seconds to impress the audience. Eye-catching graphics are crucial for this process and they need to look consistent and professional.

Design is essential strategy wise, because it maximises the impact of messaging and drives the overall effectiveness of social engagement. Design allows for continual reassessment of strategy and goals and that can give a higher impact on the outcomes of social media campaigns. It allows for evaluation and problem solving in the overall social media strategy, playing an important role during the social media implementation.

User experience and interaction are vital to social media and these are important design areas that can determine the success of a social media platform, where there is the need to craft experiences with the users, who are visually overwhelmed by all sorts of images around them.

We also learned how design could be of importance in the different stages of the social media marketing total process model (table 4). Respondents agree that design is relevant in all stages but it is even more important on the primary development phase, which consists of marketing mix, messages, creative segmentation, pre-testing and adjustment. This survey also allowed us to understand which skills are necessary to be working in social media and we see

that the top three are strategy development, communication and creativity. All are highly important skills that designers already have and are very familiar with. One could even argue that those are the top three skills necessary to be a designer.

This new era of social media has taught both marketers and designers an important new truth: companies no longer control how consumers perceive its brands. What matters most today is not what a company says about its brand — it is what consumers say about it. It is a problem for both designers and marketers to understand how to integrate these multiple platforms, the different types of consumers and their behaviour, because not all engage with social media in the same way (Hanna, R., Rohm, A., Crittenden, V., 2011).

We have also learned that companies who are able to expand their ability to engage with consumers achieve their attention, and later influence, will be have more success in creating a relevant branding positioning (Hanna, R., Rohm, A., Crittenden, V., 2011).

Considering that social networks are part of a wider trend in communication called ‘mass collaboration’, it is important for design to be involved. Social media is influencing the communication of brands, fashion, markets, ideas and ideology by shaping a new type of market that designers should be aware of (Tapscott and Williams, 2006).

Globalization only increased the relevance of branding. With new communication channels like social networks, brands are able to connect faster and reach a larger audience of people (Kotler and Pfoertsch, 2006: 35). With this we have hyper competition, which makes branding an efficient tool to differentiate from competitors in the long-term (Kotler and Pfoertsch, 2006:37).

In order to build a strong brand DNA, design has to be involved. Design’s ability to perform branding solutions has proven to add return on investment (ROI) to a company. There has to be an input to the brand proposition and personality in the whole experience. Having a strong identifier helps to add value to the brand and keep it relevant in consumers' minds.

However, there are the obvious limitations of social media on brands. Facebook and Twitter cannot be personalized to better interact with the brand and consumer. An organization can put their logo and other limited visual branding both on Facebook and Twitter but it is still confined in the website’s interface, “(...) limiting the semiotic effect that traditional offline branding efforts might have on users. The visual cue of the brand is greatly lessened.” (Yan, Jack, 2011).

Does that mean that the design influence regarding the ‘visual’ is limited? The visual side of branding is important and it is part of the design spectrum of tasks but it is not the only thing that design can offer to brands in social media.

Brands need to build a connection with users based on engagement itself, as mentioned before. It has to be about experiences and storytellers. Designers are very well suited to craft experiences and create an intrinsic web of storytelling for the consumer.

Design not only creates value for businesses, offering a competitive advantage, but it is also an investment in innovation, positioning, branding and communication that can increase customer trust, loyalty and market share. Design thinking helps to deal with the complexities of this changing era of social media and add creative solutions. Human-centred design offers a competitiveness edge needed to gain market share and consumers attention. Design is of critically important as a strategic asset, and it has proven to be more effective when implemented early in corporate plans, not only as visual beautification. Research has shown relationships between design and strategy that go beyond the link between design and product. This comes to show the importance of design management in companies today, especially in a highly communicative area such as social media (Borja de Mozota, 2003). The design process is valuable and relevant to the use of social media, whether designing look and feel of background pages or undertaking a strategic approach.

IMPLICATIONS FOR THEORY/PRACTICE

Author Heather Fraser (2007) believes that any brand or organization will benefit from a ‘designer way’ perspective. Design strategy tunes team intelligence, creativity and makes a significant impact in the customer’s life, both functional and emotional. The design process is easy to follow but should be taken into the corporate plans and strategies in order to be at its full potential. The design approach is about combining the three gears of design with a ‘design mindset’, allowing the organization to discover ways of capitalize, explore new activities and then set the strategies to evolve their business model.

Engagement was a crucial theme in both the interviews and survey. Design is highly important in order to build a relationship that occurs with every interaction between two people, in real or digital life. Users today are desensitized and visually overwhelmed, and that is when good design strategy and good design takes over.

Design concerns the user experience and interaction part of social media as well. It deals with the projects usability and product desirability. It has helped connect and build relationships between brands and consumers since the ideas for the company started. In social media there is a need to craft experiences on a daily basis, content is king and design is a fundamental tool for storytelling. In order to make the story effective it has to embody the brand. Its uniqueness must be noticeable and be able to inspire people to share and eventually buy from it.

Braden Kowitz (2013) talks about story centred design and its connection to social media, explaining how designers present every sentence the customer reads, every action they take, and every screen its generated in response. The design follows a customer from the initial point to completing a goal, and shows how the design supports every step of it. These techniques are used for mobile apps, marketing websites, analytics dashboards and enterprise.

We have seen that the strategic value of design includes contributions from all design disciplines, beyond just industrial design within production. Designers can implement a firm's strategy by creating “ideas, products and product positions for a world where people’s buying decisions are influenced by emotion, fashion and context (...) They don’t study the market with the objectivity of a scientist [but] become part of it.” (Francis, 2001). Successful design-led companies apply and integrate design values to all aspects of the business, internal and external (Design Council 2005, 2006), to really understand their customers, and forge a unique relationship with them. Creating long-term emotional connections with customers in social media and in business in general has not been valued as highly as technological innovation or aesthetic design, but in mature markets it is increasingly important (Stevens, John, Moultrie, James and Crilly, Nathan, 2006).

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The Interaction between Technologies and Meanings: What Kind of Technologies Contribute to Radical Meanings

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Keywords: Meaning, Technological research, Design research

‘Meanings’ are the important value for consumers. Although there have been a lot of previous works with regard to the meanings in the fields of marketing or design studies, few researches have been focused on the relationship between technologies and meanings. The purpose of this paper is examining what kind of technologies has a significant effect of the meanings and how ‘technology research’ and ‘design research’ are related. Prior to some analyses, it is proposed the framework for describing a relationship between technologies and meanings in this paper. The findings from the case study of FPD industry present that the technologies with regard the product form and usability contribute to improve the meanings. Taking every factor consideration including the patent analysis for a Japanese company, both researches are conducted interactively, and the technologies particularly contribute to improve the meanings.

INTRODUCTION

As consumer needs become diversified, a lot of companies recognize not only rational values like spec and cost but also irrational ones that depend on symbolic and emotional factors of consumers (Levy, 1959). Most of researchers define the irrational value as a meaning. Chiksentmihy and Rochberg-Halton (1981) studied the significance of material possessions in contemporary urban life, and of the ways people carve meaning out of their domestic

environment. According to their definition, the things don't have the meaning unless consumers pay attention to them. The marketing and design management discipline has a lot of researches for industrial design and the technology management discipline has ones for engineering. Therefore, the issue how to integrate rational values and irrational ones is remained. Hirchman(1982) discussed an importance of symbolic innovations as well as technological innovations. He defined the symbolic innovations as communicative devices representative of different lifestyles and technology innovations changed the tangible attributes of products and the symbolic innovations changed intangible attributes of ones. However, he didn't mention the possibility that technologies changed intangible attributes. Verganti (2009) proposed that Italian manufacture firms created emotional and symbolic values for products. He described them as meanings and the evaluation values of products have two axes: one is a meaning and another is a functionally and defined the process to create innovative meanings as a design research, whereas one to create innovative technologies as a technological research (Figure 1). He didn't mention a relationship between a design research and a technological research whereas elaborated on the design research process of Italian manufacture firms and the definition of functionality on which a technological research focused was obscure. To reveal the possibility that technologies might contribute to an innovative meaning is very important issue for NPD. Goto(2012) accounted for the interaction between a design research and a technological research by focusing on the concept of exploration and exploitation. However, he didn't mention the possibility which novel technologies changed meanings of products.

The purpose of this paper is to examining how and what kind of technologies has an impact on meanings. In the following section, we first introduce the prior research with regard to meanings and propose our framework to describe the relationship between technologies and meanings. The second section presents the case study in a FPD industry to generate the theoretical findings. The third section examines them by the quantitative analysis of patents.

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Literature review

This paper defines design as "Design is making sense (of things)" (Krippendorf, 1989). Krippendorf and Butter (1984) defined product semantics as an inquiry into the symbolic

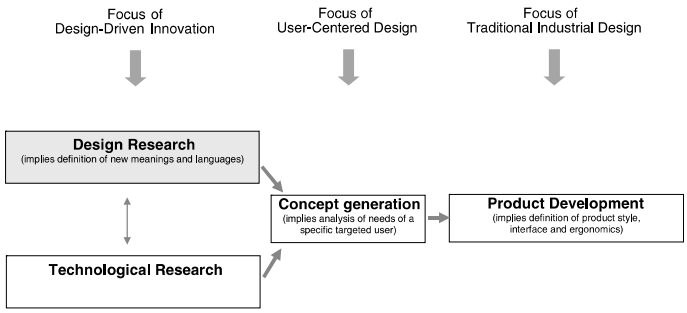

Figure 1: Design research and technological research (Verganti, 2009)

qualities of things and as a design tool to improve these cultural qualities and discussed how consumers gave meanings to things. In addition, the meaning has many definitions in various researches. Peter and Olson (1987) stated “Product meaning is a consumer's cognitive and affective representation of a product”. In product semantics, a meaning depends on symbolic and cultural aspect of things and manufactures cannot make sense on their own because meaning has dependence on a context of consumer (Klein, and Kernan, 1988). Therefore, manufacture should not ignore the emotion of consumers in their society. In addition, meaning also depends on a culture (McCracken, 1986). Solomon (1983) proposed bi-directional relationship between products and consumers and focused on how products were used by consumers in everyday social life. Mono (1997) applied the communication model (Shannon, 1948) to NPD. In his model, the product is viewed as the transmitter of the message and consumer receive and interpret its message and they give the meaning to the products. Not only manufactures but also consumers contribute to construct the meaning of the product (Hirchman, 1986). Therefore, a lot of researchers in the marketing discipline focus on the relationship between the meaning and purchase behavior. Levy (1959) stated the reason why consumer bought products is “People buy products not only for what they can do, buy also for what they mean”. Consumers buy the product not only for the rational value but also for the irrational value, so that the psychological meaning is important for the consumer (Friedman, 1986).

In order to evaluate meanings, a lot of researches proposed their conceptual frameworks. Ligas (2000) proposed functional product meanings and symbolic product meanings. Functional product meanings are the rational values and ability to accomplish specific acts, based on properties such as its physical characteristics and feature (Fournier, 1991). Symbolic product meanings depend on the social context of consumer (Fournier, 1991). Klein and Kernan (1991) showed that meaning was based on individual perception or interpretation of an object and consisted of two dimensions: an interpretation of the object’s attributes (attributes dimension) and of its action potential (the performance dimension). Tsai (2005) showed that meaning had Symbolic value and Affective value, Trade off value and they had

an impact on consumer's purchase behavior. In addition, the elements of consumer's cognitive response consist of Aesthetic impression and Semantic interpretation, Symbolic association (Crilly, Moultrie, and Clarkson, 2004).

Product form is a first contact to consumers and aesthetic impression of product form has an effect on their purchase behavior on first impression. Therefore, although many researchers addressed to establish the objective index or the design principles to evaluate the aesthetic value, its issue is still remained. Visible attraction of a product depends on sociocultural or historical, technological context (Crozier, 1994). Bloch (1995) showed that the evaluation for product form was affected by individual tastes and preferences that were consisted of social and cultural context. Although the specified color or form may be accepted by the specified culture or individual, other may not accept them (Armstrong, 1991). Semantic interpretation means user-interface, which is based on ergonomics, and it also depends on its product form. In other words, product form makes a user interpret its usability of a product. Usability of product is a contact between the product and the users and it could also change their purchase behavior. Additionally, users can interpret functionalities of a product by its form (Townsend, Montoya, and Calantone, 2011). Symbolic association is value that is established by interactions between a product or a company and thought and emotion of consumer or society. It may play a role to communicate their identities to others by having the product. Norman (2004) proposed three categories to describe cognitive response to product form: visceral level, behavior level and reflective level. Visceral level depends on the aesthetic attractiveness of product behavior level depends on the functions, utilities and qualities and reflective level is the perception of what a product says about its owner or user (Crilly, Moultrie, and Clarkson, 2004).

Framework

To innovate aesthetic impression, semantic interpretation and symbolic association have an impact on creating radical meanings. Although there are a lot of researches that focus on consumer, the issue what kind of the technologies contribute to improve them is remained. Thus, this paper addresses to describe the relationship between aesthetic impression, semantic interpretation and symbolic association and the technologies.

Aesthetic impression depends on the product form, which is composed of color, material and geometry, and novel color, material and geometry cannot realize without technology innovation with regard to material or processing. For example, the evolution of machining centers made the product form be complicated geometry at a low price and stimulated the imagination of industrial designers. Semantic interpretation is that consumers interpret usability or functionality of product at first sight. Thus, the technology for UI or based on

ergonomics are the most important element. Symbolic association has an intangible attribute, which does not arise from the physical nature of the object itself (Hirschman, 1982). Consumers can change intangible attribute without technology innovation. For example, advertisers can create a symbolic innovation by relabeling an existing product or by providing differentiating intangible attributes to a product that is physically identical/similar to its competitors (Hirschman, 1982). Therefore, this paper regards symbolic association as the index which technology cannot change.

The spec of a product, which includes functionality and cost, is rational value whereas the meaning is irrational one. Radical technology is requisite to improve the spec as well as the meaning. Although Verganti (2009) proposed the following evaluation axes; meaning (language) and functionality (technology), this paper defines meaning and spec and they have an impact on product performance (figure 2).

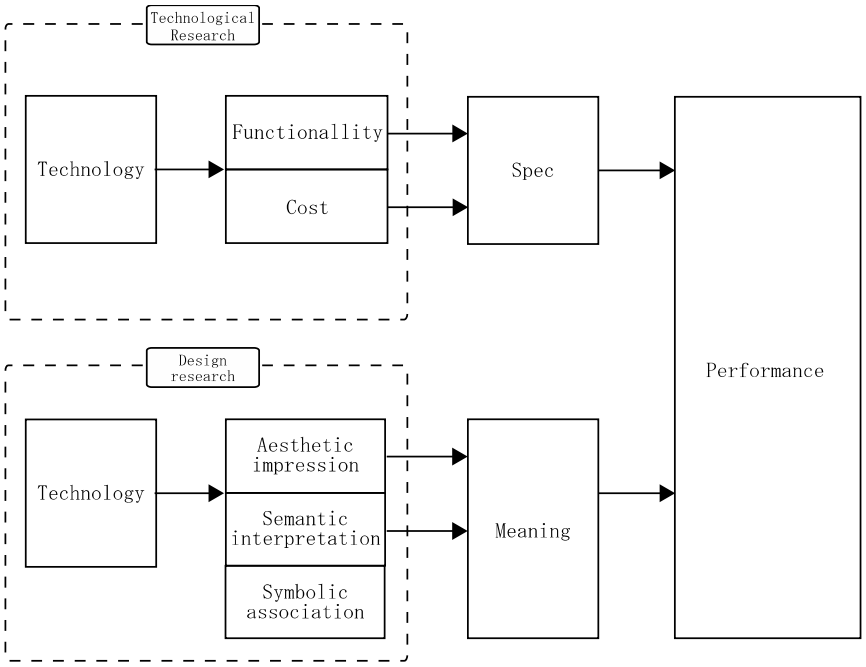

Figure 2: Framework

CASE STUDY

Methodology

This paper adopted a case study methodology of FPD industry in order to collect comprehensive data and refine our conceptual proposal. Case studies can explain relevance and cause-and-effect relationship of a variety of observations through detailed insights with consideration given to qualitative information (Yin, 1997; Shibata, 2012). The reasons why

this paper adopted the FPD industry were (1) FPD industry have been mature, (2) there were a lot of market participants across the world, (3) Japanese manufacture lead to technology research before marketing them. Figure 3 shows the diffusion rate of FPD (Nagano, Ishida, and Ikeda, 2011). This paper focused on what kinds of the technologies are developed in the technology research and the design research of Japanese manufacture Panasonic, and examines the transition between the technology research and the design research. In this case study, semi-structured interviews and secondary date was collected. In semi-structured interviews, we conducted 2 hours interviews on 2 top managements of Panasonic. We collected secondary data from 1998 to 2012.

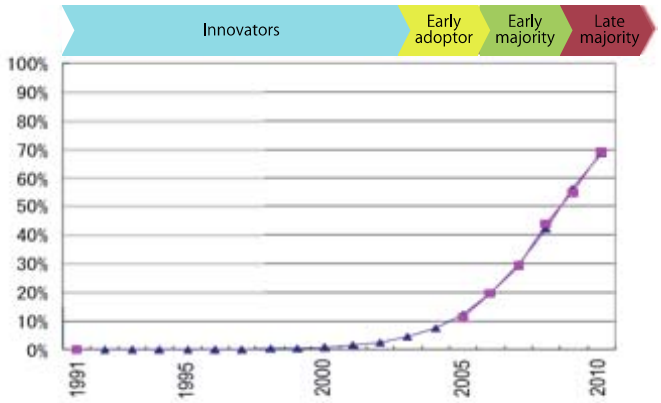

Figure 3: Diffusion rate of FPD (Nagano, Ishida and Ikeda, 2011)

Technology research

In Japan, the technology research for PDP has been started in 1960's and Panasonic started its research in 1973. Although Panasonic have invested their resource in DC technology for PDP consistently, they bought up Plasmaco, inc., which had already accumulated AC technology for PDP. After the Nagano Olympics in 1998, Panasonic launched AC-system color PDP monitors. At that time, their research institute for technology led to the product development of this PDP monitor and the mass production. The Task Force launched in 2001 incorporated engineers that were charged of the other devices in addition to engineers for PDP element technology and finally became a team with the purpose of achieving the high image quality.

In 2002, Panasonic established their first product planning department in the company. This department, however, was positioned in the engineering department and worke on adjustments between the marketing department and the engineering department. Therefore, the engineering department seized the initiative of NPD and it focused on the high image quality. The market for FPD larger than 40 inches in 2004 was dominated by the PDP, however, the LCD began to compete with PDP due to the gradual increase in size. From about this time, the technical focus was placed on how high-level image quality could be

achieved at low cost in order to differentiate PDP from LCD. In 2005, Panasonic started to sell 65-in. full HD TVs, applying their technology to smaller full HD TVs. In addition to the image quality, reduction of electricity consumption by 35% of this product appealed to consumers. In the summer of 2006, the global shipments of LCD, even though 40 inches or larger, exceeded those of PDP. With Pioneer Corporation's withdrawal from self-manufacturing of plasma panels in 2008, the market conditions significantly changed. The price of TVs dropped at an annual rate of 20% to 30%. In addition, Chinese manufacturers also expanded the share of their self-manufactured products. Although surrounded by such circumstances, Panasonic tried to expand the production of PDP by starting to operate a new factory in 2007. On the aspect of the product development, Panasonic coped with their rival companies by improving the image quality and adding more convenient functions by the efforts made by the engineering department. Panasonic then released the 42-in. full HD TV in 2007, two years after the release of LCD. Sometime after 2009, Chinese and Taiwanese chip manufacturers started to sell single-chip image processing engines. This made it possible to produce a FPD of the high image quality. As a result, Japanese manufacturers could no longer maintain their technical competitiveness in the image quality. Given such a situation, Panasonic brought out the 3D plasma TV. However, other manufacturers also released 3D TVs immediately. Actually, Samsung's 3D TV was the top-seller in the market of North America in this year. As shown by this fact, it became very difficult to feature technical differentiations because overseas manufacturers rapidly caught up with Japanese manufacturers in terms of technology.

Design research

Design research aims to create radical meanings and PDP had a possibility to create them because its thin form have been radical differentiation from CRT. The design department of Panasonic spent a year to survey the consumer and to create the concept and the product form as a interior good for VIERA series, which is Panasonic's PDP. In order to realize this concept, the small capacity to assembly the speaker was the difficult technical issue because of its thinness. The technology called "Candy Speaker" brought the solution for this issue.

Market conditions changed around 2005 with the presence of Samsung of Korea that gradually grabbed a bigger share of the market. After 1993, as a companywide goal, Samsung aimed to improve their industrial design . With their products having high aesthetic, winning the gold award in IDEA in 2003, Samsung expanded their share of the market over the next year. At this time in 2006, Samsung was actually better than Japan in power-source technology to make the TV panels thinner and housing technology that produces aesthetic. In particular, the Bordeaux TV that was released in 2006 was designed not as a traditional TV, but as an interior product and succeeded commercially on the global market. Those FPD at

that time generally had speakers installed on both sides whereas the Bordeaux TV had speakers embedded in the bottom and not visible to users. This clearly made a distinctive difference in Samsung's TV designs from other company's TVs.

From around this time, each manufacturer started to focus on and stepped up their efforts to make a TV panel and bezel thinner. Thin TV panels made the power source be low power to prevent it from overheating and thin bezel made space to assembly the speaker smaller. Therefore, Panasonic also addressed the technical issues related the thin panel and bezel. As technology progressive of Chinese and Taiwanese manufacturers made Japanese manufactures difficult to keep their technological competitive advantages, the integration between TV and IT was important as a source of them. Many manufactures proposed the new concept "Smart TV" and the meaning of TV was transited from watching the TV program to one of the device for internet. Therefore, apps that worked in close collaborate with smart-phone or Internet became important function for TV.

Interaction of technology research and design research

When Panasonic commercialized the PDP for the first time, they focused on the technology research. In fact, the research institute for technology seized the initiative with their development and manufactured process. In the development of VIERA, the design department played a crucial role and analyzed the sociocultural model by the consumer survey. Therefore, Panasonic might conduct the design research. At that time, the diffusion rate of FPD was not over 5% and consumer recognized FPD as the novel product that might have the radical meaning. In fact, consumer expected product form of FPD like interior goods, which they called FPD "dream wall mounted television". However, the early PDP was at heave price and image quality was inferior to CRT. Therefore, R&D focused on the technology research for cost reduction and improvement of the image quality.

As the diffusion rate of FPD went up and LCD captured the market of large size from PDP, high image quality of PDP became more important for differentiation with LCD. Therefore, Panasonic recognized the technology research as the source of the competitive advantages and the technology department lead to their development process. Although Samsung gradually expanded their share of FPD, Panasonic continued to focus on their technology research, especially full-HD high image quality and 3D TV, cost reduction. However, Japanese manufacturers could no longer maintain their technical competitiveness in the image quality because of single-chip image processing engines. Thus, Panasonic needed to invest their resource to thinner panel, thin bezel and connect to Internet. The new meanings which were interior goods or one of the device connect to Internet might be added to traditional ones of PDP. This paper guesses that Panasonic changed their investment from the technology research to the design research. In order to realize new meanings, Panasonic

developed thin panel and bezel, especially technology to solve decrement of capacity of speaker.

In conclusion, the rise of the diffusion rate made a differentiation of technology difficult and focus of the research activity might be changed from technology research to design research. Additionally, the key technology for new meaning was thin panel and bezel with regard to aesthetic impression. This result makes this paper suggest following proposition.

P1: Technology research and design research has a positive impact on company performance.

P2: Rise of investment for design research has a negative impact on the one for technology research.

Quantitative analysis

Methodology

The case study showed the importance of the design research gradually increased in Panasonic as diffusion rate rose. This paper examines a few propositions by quantitative analysis with patents. Patent data have several attractive features for this research. They do not suffer from retrospective bias since they are collected continuously; moreover, because the information in a patent has to comply with a fixed format, they are systematic. Patent data do not suffer from success bias—patents are filed prior to commercialization, or, at least, before the commercialization outcome is perfectly known (Dahlin and Behrens, 2005). Technology for patents is chose by case study (Table.1); sales volume and sales share of PDP and the number of model which was launched as output, the technology for high image quality, cost reduction and low power consumption as spec, the technology for thin panel and bezel, heat dissipation and electromagnetic shielding as aesthetic impression (meaning), the technology for Electronic Program Guide and remote controller as UI (meaning).

This paper used Partial Least Squares (PLS) for estimating relationship between the technology research and the design research. PLS is a methodology to estimate the structural equation such as LISREL, and AMOS and was chosen over LISREL or AMOS for theory development (Kang, Lee, Park and Shin, 2012). PLS interprets research model by using CR (composite reliability), R^2, path coefficients and t-value. R^2 is similar to linear regression and t-value, which is the index for evaluating support or not for propositions, can be calculated by p-value (Bollen, 1989).

This paper analyzes the quarterly patents published, sales volume and share of PDP and the number of model from 2001 to 2010 and total number of every data were 40. Although there is the time lag between the day of patent publishing and the term which the patents were

reflected on the sales, this paper don't take account of their time lag because this paper aims at developing holistic theory.

Results and discussion

This paper shows the result of PLS in Figure 5. The reliability of this analysis is demonstrated because Cronbach's alfa indexes are above 0.74, CR are above 0.84 and average variance extracted values are above 0.64 (Kang, Lee, Park and Shin, 2012). This paper shows the result of the structural model analysis. Endogenous variables (R^2) of Spec shows 46% and Performance shows 72%. Thin panel and bezel and UI have a positive impact on Spec (0.61 $p<0.01$, 0.19 $p<0.01$) and Performance (0.49 $p<0.01$, 0.41 $p<0.01$). Spec has a positive impact of Performance (0.19 $p<0.01$). These results support P1 but don't support P2.

Although the case study demonstrates the possibility of transition from technology research to design research to the accompaniment of growing the diffusion rate, this results demonstrate that technology research don't drop because of growing design research. However, the top management of Panasonic in interview for this case study said "We must accept the importance of design, but our engineers never give up their enthusiasm for improving the image quality". Most of Japanese manufactures have captured growing share of the global market by innovating their technology and have accelerated their pace of technology innovation (Song and Parry, 1997). Therefore, Panasonic might conduct the technology research and the design research concurrently and it may create strong competitive advantages (Goto, 2012) In addition, the patents for design research may contribute to improve Spec too, especially cost reduction. It may be difficult to separate clearly the effect of a patent into each parameter. However, this result shows that technology research and design research depend on each other and the technology contribute to improve the meanings.

Conclusion

This paper proposes framework to describe interaction between technologies and meanings by bringing out the elements that are composed of a meaning from previous researches, examines its interaction by the case study of PDP in Panasonic and suggests the few propositions. One of the propositions is not supported in quantitative analysis. This result may show that Japanese manufactures in FPD industry are not able to get over the idea that spec, especially the high image quality, is the most effective as their competitive advantages. However, this result shows that the technology research and the design research depend on each other and the technologies could contribute to improve meanings. Previous researches haven't discussed the interaction between technology and meaning whereas there have been a

Table 1: Result of analysis

Latent variable	Item	Factor loading	t-value	Cronbach's α	CR	AVE
Performance	Sales volume	0.99	2216.36*	0.98	0.98	0.95
	Share	0.97	848.21*			
	Number of model	0.97	606.79*			
Spec	Image quality	0.66	19.56*	0.75	0.84	0.64
	Cost reduction	0.95	224.07*			
	Low power consumption	0.77	22.14*			
Thin panel and	Speaker	0.92	77.27*	0.80	0.86	0.68
bezel	Heat dissipation	0.64	23.24*			
	Electromagnetic shielding	0.89	108.65*			
UI	Remote controller	0.92	88.03*	0.74	0.88	0.79
	Electronic Program Guide	0.85	39.77*			

*p<0.01.

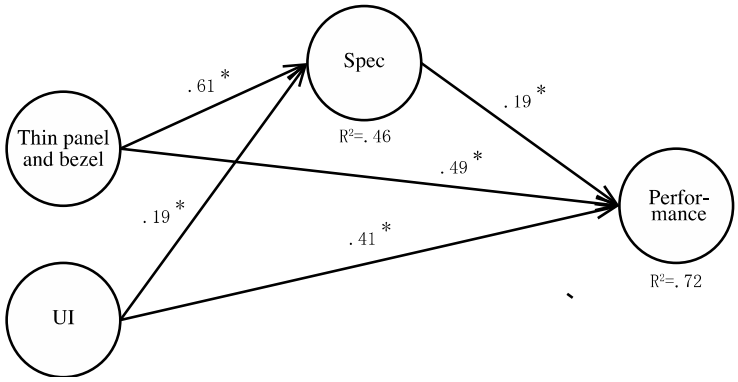

Figure 5: Result of path analysis

lot of researches with respect to the meaning in detail. In addition, quantitative analysis of meaning was not enough. Therefore, this paper has a few academic and practical implications. One is that the technology contributes to improve the meaning. This result may become the trigger that the discipline of technology management expands its field to address the issue related product meanings. The other is to analyze quantitatively the interaction between technology research and design research by patent analysis. As a practical implication, manufactures may be able to invest the technology to improve meaning on purpose. The research of marketing discipline tended to focus on consumers for measuring the meaning.

However, there are some limitations in this paper. First of all, it is difficult to generalize our framework in this paper because of lack of field studies. In the case study and quantitative analysis, we mainly focus on Panasonic. The investigation of other related manufactures is needed to argue deeply. Additionally, to widen a patent search, which is category of technology and the number of company surveyed, is needed to elaborate our quantitative analysis. However, our finding that technologies may contribute to radical meanings is a first step for future research with regard to interaction between technologies and meanings.

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The potential and shortcomings of strategic ambiguity as management practice in design labs: An ethnographic study of MIT SENSEable City Lab

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Keywords: strategic ambiguity; corporate ethnography

This paper explores the role of strategic ambiguity (Eisenberg, 2007; March & Olsen, 1976) as a management practice, as used in SENSEable City Lab - a design-oriented lab located at Massachusetts Institute of Technology in Cambridge, MA.

The paper reports on an ethnographic study conducted by the author in 2011 and reflects on both the potential of strategic ambiguity as an effective dialogic strategy to appreciate differences among organization members and its shortcomings, such as the level of anxiety reported by some members of the lab.

AIMS

The notion of strategic ambiguity was introduced in organizational studies by March and Olsen and later elaborated by Eisenberg. Strategic ambiguity is a "strategy for suspending rational imperatives toward consistency [that helps organization] explore alternative ideas of possible purposes and alternative concepts of behavioural consistency" (March & Olsen, 1976, p. 77). Eisenberg describes strategic ambiguity as a managerial approach where people in organizations deliberately use communication strategies that are not consistent over time or omit important contextual cues thus leaving space for multiple interpretations by others; people within organizations are thus freer to interpret and act according to their own viewpoint (Eisenberg, 2007). Ambiguity does not replace accurate information and efficient processes, but can be used as an effective dialogic, plurivocal strategy to appreciate differences among organization members.

This paper explores the role of strategic ambiguity as a management practice, as used in SENSEable City Lab - a design-oriented lab located at Massachusetts Institute of Technology in Cambridge, MA.

SENSEable City Lab's projects span from architectural interventions, such as *The Cloud*, a responsive building in London, to innovative product design, such as *The Copenhagen Wheel*, a system that transforms ordinary bicycles into hybrid sensors/actuators that provide feedback on pollution, traffic congestion and road conditions in real-time, or to future sensing technologies, such as *TrashTrack,* an initiative that used hundreds of small location aware tags to track different types of trash to reveal the final destination of our everyday objects.

SENSEable City Lab is organized through a hybrid structure: most of the activities are carried out by small teams with a large degree of autonomy, whilst some management positions (the lab's directors and senior members) still keep a close oversight of the organization. Within this structure, the role of the lab's directors is delicate, as they want to drive the organization and at the same time leave space for the self-organizing dynamics of the teams. The organization is paradoxically controlled by a top-down vertical reporting system and by emergent, horizontal mechanisms.

Strategic ambiguity is an important component of the management practice of the lab as it helps the coexistence of hierarchical organizational processes and team-based horizontal dynamics. Strategic ambiguity is a resourceful management practice, as it creates organizational dynamics where team members can more freely position themselves, but it also poses some threats, as it renders organizational communication more unclear, inconsistent and indefinite.

This paper draws upon an ethnographic research conducted by the author at SENSEable City Lab in 2011 and presents some critical reflections on the potential and the shortcomings of strategic ambiguity as management practice within the lab.

THE NOTION OF STRATEGIC AMBIGUITY IN LITERATURE

The role of ambiguity as strategy to regulate and align collaboration between different parties within and beyond the organization has been explored in several studies, such as the already cited March and Olsen (1976) and Eisenberg (2007).

Meyerson conducted a study with social workers in hospital and she found that social workers usually shared a common orientation and faced similar problems, but they used different methods and approaches to solve these problems (Meyerson, 1991). Meyerson found that when the hospital's culture was open to support these multiple approaches and the different and conflicting meanings behind them, social workers experienced less burnout. Heller studied how the ambiguity related to code-switching - the use of more than one language in the course of a single conversation - is a crucial element to aggravate or mitigate acts such as requests, denials, comments and, as such, to manage social interactions and collaboration (Heller, 1988). Bernheim and Whinston argue that ambiguity and

incompleteness are essential features of well-designed contracts in those conditions when some aspects of performance are not verifiable (Bernheim & Whinston, 1998). Contracts are seen as the crucial component that disciplines relationship between different parties and ambiguity is an important element that allows the involved parties to more freely perform their duties.

Some other scholars have problematized the concept of strategic ambiguity. In one of these critical accounts, Markham recounts the difficulties experienced by the members of a small design company in a work environment where the management firmly believes in freeing designers from rules, standards, directives, an environment "riddled with ambiguous communication" (Markham, 1996, p. 389). Markham is not entirely convinced that strategic ambiguity can allow the members of an organization to freely express their viewpoints because they might not be able to overcome the context of hierarchy and authority of the organization and feel free to have the critical stance to re-interpret ambiguous messages and instantiate their own positioning. Her conclusion is that the potential of strategic ambiguity has to be re-evaluated in a more critical light.

APPROACH

Ambiguity is tied to the cultural and communication spheres of the organizations, where multiple, competing, conflicting meanings emerge and come in contact[1]. In the last few decades, the investigation of the cultural and communication dimension of organizations has been an important element in organizational studies (Dandridge, Mitroff, & Joyce, 1980; Hatch, 2006; Jones, 1996; Schein, 1985; Schultz, 1995). The application of an ethnographic approach with the direct involvement of researchers in the field has proven to be a common method of a good number of these organizational studies (Czarniawska, 2012).

Based on this literature, I decided to use an ethnographic approach that allowed me to get in touch with the organizational life of SENSEable City Lab and to explore some of its dimensions, such as its organizational structure, its process of engagement for new members, its communication flows. The next paragraph will illustrate how in my analysis these three dimensions constitute organizational areas where ambiguity plays an important role.

I followed the daily activities of SENSEable City Lab's members in Cambridge MA (USA) across a period of 4 months (from February to May 2011), observing and interacting with its members, both at workplace and during face-to-face conversations. I participated to meetings, brainstorming sessions, events and dinners organized by the lab's members. The findings

[1] This paper draws upon the symbolic-interpretive theoretical notion of organizational culture as presented by Hatch: the main focus of organizational culture studies is the investigation of "how people give meaning and order to their experience within specific contexts, through interpretive and symbolic acts, forms and processes" (Hatch, 2006, p. 14).

reported here draw upon data collected through direct observation, my experience as participant, unstructured conversations, email exchanges with members.

I already knew SENSEable City Lab and was aware of its prolific design and scientific production. In summer 2010, I wrote to SENSEable City Lab's board, sending my research proposal and they invited me in Cambridge as a research affiliate across the winter and spring 2011. In this period, I met several times Carlo Ratti and Assaf Biderman, the lab's founders and directors, to discuss the initial thematic orientation of my research project. Nashid Nabian, a senior researcher from the lab, and Bettina M. Urcuioli, the lab's senior administrative manager, have greatly helped me during my study. Across the entire period I have always been granted the freedom to observe the lab and participate to its daily activities.

The lab's members knew about my presence in the lab, since I was asked to give a pecha kucha[2] presentation of my work immediately after my arrival at the lab. Following an important organizational ritual, all the new members of the lab have to introduce themselves through a pecha kucha presentation in the Tuesday lunch meetings. In February 2011, during my pecha kucha presentation I introduced myself trying to give some (but not too many) details on my research project. Nonetheless, after my presentation all the lab's members were fully aware of my presence and of my research goal. Therefore my situated observation influenced the behaviour of the members during my staying at the lab and subsequently the final outcome.

Field source data mainly consisted of photographs, sketches and to a lesser extent of a collection of artefacts. This source data was edited and organized in a single profile document; photographs were positioned in sequence with relative caption (data, caption). Notes from direct observation were placed in a loose thematic narrative structure. Photographs were organized accordingly to coincide with this narrative. All this resulted in a concise textual and visual documentation of all source data. This source data was then elaborated to write the draft of the final report.

As situated anthropologist (Clifford & Marcus, 1986; Clifford, 2003), I have studied myself while conducting the fieldwork through a kind of meta-observation that allowed me to be (somehow) aware of how my personal, emotional and cognitive involvement affected the results of the research project.

KEY FINDINGS

In her book *Leadership and the New Science: Discovering Order in a Chaotic World,* Wheatley borrows some concepts from quantum physics to describe the complexity of

[2] Pecha kucha is a presentation format where 20 images are shown each for 20 seconds. The images forward automatically and presenters talk along to the images (http://www.pecha-kucha.org/).

organizations: “Each organism maintains a clear sense of its individual identity within a larger network of relationships that helps shape its identity. Each being is noticeable as a separate entity, yet it is simultaneously part of a whole system”, and she continues saying: “For years I had struggled conceptually with a question I thought important: In organizations, which is the more important influence on behavior—the system or the individual? The quantum world answered that question for me with a resounding 'Both.'” (Wheatley, 2006, p. 26). Wheatley clearly illustrates the complex agency that takes place in organizations: individuals', teams' and organization's visions and needs are interconnected “like a vast network of interference patterns” (Schwartz & Ogilvy, 1979, p. 14).

How does SENSEable City Lab tune these multivocal agencies together in order to reach its institutional goals?

This is a particularly important question, since SENSEable City Lab lives within an institution (MIT) that clearly defines high standards for its labs. The viability of the lab depends on the results obtained both at an academic level and with its external (and funding) partners. There is the need to carry out projects that set new standards in terms of scientific production, innovation, scale of architectural (and societal) intervention.

What organizational strategies allow SENSEable City Lab to meet these high standards but maintaining the flexible dimension of a self-adjusting organism? What kind of paradoxical organizational approach allows to maintain some control and at the same time to get shaped by self-emergent processes?

Ambiguity across the organizational structures

Two conflicting organizational structures co-exist in SENSEable City Lab.

On one side, the lab is not structured as a bureaucratic pyramid with a traditional vertical reporting system. Small teams are the key elements of a more flexible organizational order. Each team is in charge of one or more projects. Some of the projects have a pre-set outcome and a clearly specified deadline. Others start as ideas that get shaped along the way and therefore are initially oriented towards less defined outcomes. Projects' lifetimes span from few weeks (e.g. the preparation for a TED talk) to several months or years (e.g. *The Copenhagen Wheel*, *Live Singapore!).* The number of members per team varies from few people for smaller projects (e.g. *The wireless city*, *Spacebook*, *GEOblog*) to several dozens (e.g. the *Digital Water Pavilion*, *TrashTrack*). In the past 5 years, more than 300 people have worked with one of these teams on SENSEable City Lab's projects.

A vertical organizational chart would probably be too rigid to respond to complex, transdisciplinary problems that need to be addressed with different, specific strategies and competences. Teams can be easily configured or reshuffled to quickly respond to opportunity-based changes (Malone, Laubacher, & Morton, 2003).

Within this kind of decentralized organization, power originates at lower structures and each team can move within its own sphere of independence. A network of authority and control

based on knowledge of the task replaces the traditional hierarchical structure. Within the team, tasks and responsibilities are distributed depending on the available personal expertise and the operational context. Mutual adjustment and redefinition of tasks are common within and across teams.

At the same time, this decentralization is highly moderated by the management. The lab is structured to have some clear some management roles (Carlo Ratti, Assaf Biderman, Kristian Kloeckl, Bettina M. Urcuioli) that are transversal to the entire group. In a highly dynamic environment, with new lab members joining at a regular basis and team members frequently reshuffling, the role of the management is important in order to make sure that all the efforts have a common orientation. It is necessary that the lab fulfils both the expectations from external partners that provide funding and the institutional expectations from MIT. The role of the management is also important as it provides some sort of historical memory of the lab and as it decides how the lab should be externally communicated in order to create a consistent presentation of its vision and activities.

Within this organizational domain the role of the lab's directors is crucial but also potentially dangerous, as highlighted by a senior member of the lab: “At times, the oversight that Carlo and Assaf choose to have over projects significantly limits the progress of our work”. The scale is one of the biggest challenges for this organizational structure. In SENSEable City Lab the number and the dimension of projects continue to increase over time and this multiplies the amount of messages and feedbacks requested to the directors from the teams and the team leaders.

The organizational structure of SENSEable City Lab therefore literally emerges from the interweaving of processes carried out by these distributed teams and by the top down interventions of the management board. This emergent process carries some ambiguity as it sees the contextual presence of overlapping, conflicting and competing horizontal and vertical dynamics of power and authority. In some cases, it is not clear how to synchronize the power and authority of the management with the power and authority granted to and originating from teams and team members. As I will illustrate in the following paragraphs, the lab has a low formalization or rules, positions, standard, processes and therefore this complex horizontal and vertical integration is constantly reshaped as a relational configuration drawn together by conflicting top-down and emergent behaviours.

Ambiguity in engagement roles

Teams are usually managed by a team leader. This is not a rule that applies to all the projects, though bigger projects tend to have a project leader. Team leaders are generally not professionals specifically trained in project management techniques, but members of the lab who have knowledge and competencies for the task. Since some projects have a longer lifespan, there are cases where different project leaders have been in charge during different phases of the project. Teams are usually started and initially shaped by lab's senior members, but the distribution of roles is flexible: during my stay several new projects were introduced

to the lab's members at the Tuesday lunch meetings and people were invited to nominate themselves if they thought that they could contribute to them.

Below is an email sent by a senior member to the internal mailing list where he introduces a new project and asks if anyone is interested in joining the team:

> Subject: trash track moma
>
> Sent: 26 March 2011 18:33
>
> To: SENSEable City Lab Mailing List
>
> hello everyone,
>
> you might have heard that the lab got invited by MOMA to participate in a new exhibition called "talk2me", dealing with communication between humans and objects.
>
> we have proposed a global ewaste tracking project, based on the notion that the discarded objects continue their life even after they get thrown away and send images, sounds and coordinates from their afterlife in the e-waste chain. we hope to get some interesting material from overseas.
>
> as usual, time is quite short - the opening is in july, but everything should be ready by june. if you are interested in joining the team, let me know. it should be a very nice project with high visibility.
>
> we are looking for help with the following tasks
>
> - tracking technology (based on commercial trackers / phones, but we also need to find ways to record images / sounds)
>
> - server backend stuff (collecting data from the trackers and preparing it for the visualization)
>
> - visualization development (this time we will not just render the traces, but also pull in additional data such as satellite images and other location specific data, possibly routes of cargoships / planes that match the sensed location)
>
> - deployment team (3-4 ppl), who attach the trackers to ewaste (deployment in new york)
>
> - webdesign / video
>
> - exhibition design
>
> let me know, & please forward also to UROPs in the lab
>
> d.

Membership within the lab and among the teams is extremely fluid. Short and part-time engagements with flexible roles over time are rather common. The lab's current members reflect a combination of academic and professional competences. Some people collaborate at a distance, while others from the lab in Cambridge. In some projects, SENSEable City Lab extensively collaborates with external partners, such as in *The Cloud* that has witnessed the involvement of artists, research centres, and design and architectural studios geographically distributed over three continents (Atmos, Arup, Schaich Bergemann und Partner, Agence Ter, Studio FM Milano and Tomas Saraceno among others).

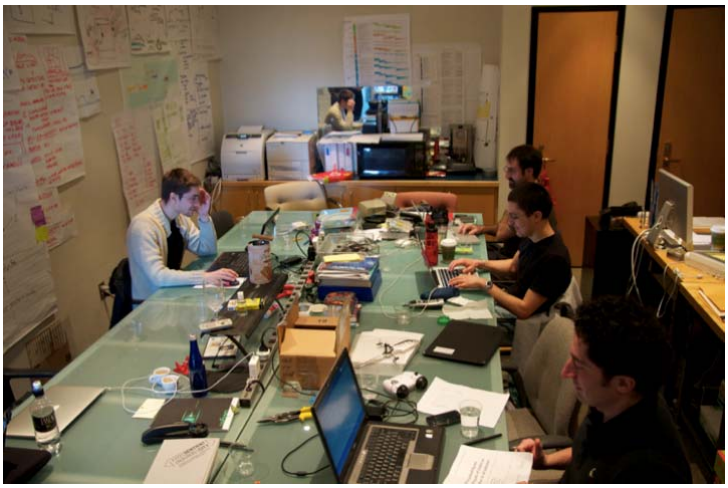

Figure 1 SENSEable City Lab, open space in Cambridge, MA (US), 2011.

In these situations, it is quite common that - within the length of a single project - researchers from SENSEable City Lab, personnel from other organizations, external collaborators, artists travel across different geographic locations and frequently reshuffle their position: officials from the Municipality of Copenhagen are offered temporary positions at the lab in Cambridge; researchers from SENSEable City Lab are relocated in Singapore to work on some programming activities with local coders; personnel from BMW joins forces with lab's motion graphic designers at Berlin's Guggenheim Lab.

In some of these cases, even though some people are not formally affiliated with SENSEable City Lab, they are still a crucial component of the projects and as such - at the end of the project - are credited as members of the SENSEable City Lab team.

A short conversation recorded during my observation captures the fluidity of the membership processes. A senior member of the lab was collecting biographies from all the current lab's members for a publication on SENSEable City Lab. During a plenary meeting in Cambridge she then asked all the lab's members to send her a 250-word biographical text. A few days later, I recorded this dialogue:

> Senior member: "Hey, I'm collecting biographies from all the members of the lab. Did you send me your bio?"
>
> Researcher 2: "Should I? Am I part of the lab? I've only been working here for a few weeks!"

The answer from the researcher 2 clearly describes a situation of ambiguity, where he is unsure of his position in the lab.

Within this fluid context, what defines the membership with the lab? Is membership defined by the boundaries of the lab (if I am inside these boundaries, then I *am* part of the lab)? If so, what happens when the lab has ambiguous, not clearly defined and continuously reshuffling boundaries?

Communication flows as regulatory mechanisms

When I arrived at the lab, I was given a PDF leaflet describing the basic administrative steps required for visiting students and scholars and the most important operational rules of the lab (e.g. how to access the lab, how to get travel reimbursements, …), some of which are inherited from MIT procedures. This leaflet is clear and helpful and is the main source where lab's rules and procedures have actually been formalized. The leaflet is usually given to new members of the lab at their arrival by the senior administrative manager.

Some organizational areas such as functions, departments, organizational charts, work processes are not illustrated in the PDF. In general, in SENSEable City Lab position descriptions, job classifications and individual goals are not set in a standard hierarchical process and formalized in an official way. Along the same line, there are no centralized to-do-lists or project management tools (PERT, GANTT) shared by the entire lab as a group.

When I asked two senior members what they thought about the formalized rules at the lab, they answered:

> Researcher 1, asking to the other: “Are there rules in the lab?”
>
> Researcher 2: “Not in a strict sense. But I guess there are unspoken rules…”

Again, the relatively low formalization seems to be a necessary element to allow the organizational system to perform in a flexible way. The team leaders and the team members are granted some independence and autonomy and then the coordination mechanisms have to be loose enough to allow them to operate within their discretionary margins.

Established upon this philosophy, some control mechanisms based on information exchange and communication among members constitute a quite common management practice in the lab. Common coordination mechanisms are quick meetings, brainstorming sessions and pecha kucha presentations (often given during Tuesday lunch meetings).

Figure 2 SENSEable City Lab: pecha kucha presentation during Tuesday lunch meeting. Photo downloaded from SENSEable City Lab's Flickr account.

Meetings among team members and with the board are periodically held in order to create feedback loops to control teams self-organizing activity and emergent behaviours.

Other less frequent coordination mechanisms are individual meetings between the lab's directors and researchers. During these meetings researchers are asked to give their own evaluation of the lab and to share their expectations for the future.

These feedback loops give both some regulatory feedback when they signal deviations from the established goal and some positive feedback when they notice something new and amplify it disseminating information to wider groups within the lab.

Communication and information flows across these feedback loops are common coordination strategies for the lab. The definition of rules, responsibilities, instructions and job methods is therefore quite loose, variable and depending on the situation, the resources available and the operational context. Communication exchanges and flows instead play a big role as organizing mechanism.

It is interesting here to notice that a coordination mechanism that highly relies on communication flows presents some elements of openness and, potentially, ambiguity. For example, in several cases during my stay at the lab discussions among the team members arouse in order to interpret what was said in some previous meetings with the board directors. These discussions allowed the team members to enter into a dialogic mode, express their own viewpoints and act based on their own interpretation of the ideas of the board directors.

DISCUSSION

The findings from the ethnographic study show how ambiguity plays a strategic role within the daily management practice of SENSEable City Lab, across its organizational structure and processes. During my stay at the lab, I had several conversations with the lab's director Carlo Ratti. In our conversations, he never used the term 'strategic ambiguity' to describe his management practice. Nevertheless, what I described in the previous pages in terms of ambiguity across the organizational structures, ambiguity in engagement roles and ambiguity in communication flows is the outcome of a deliberate management strategy. In this sense, I argue that strategic ambiguity plays an important role in harmonizing the tensions resulting from a hybrid vertical and horizontal organizational structure. Strategic ambiguity helps the coexistence of the overlapping, competing, conflicting power and authority positions generated by the vertical, top-down management processes and the team-based horizontal dynamics. This ambiguity is at the same time a resource, as it generates more open organizational structures where the members of the lab can more freely position themselves and express their differences, and a threat, as it does not clearly present a unified organizational meaning.

This ambiguity renders the organizational communications more complex and uncertain, thus arising the anxiety level for some members of the lab. As a researcher told me: "The lab desperately needs a hierarchical system so that group leaders are the only ones reporting to the directors and the rest of the team can focus on their work under direction of project leaders". Along a similar line, another researcher praised the importance of "leading figures through a project development". Another one simply commented: "Make it less chaotic".

In line with Markham (1996), I also argue that the level of anxiety in some members of the lab is related to how these members are positioned within the dynamics of power and authority at play in SENSEable City Lab. In some cases, some members of the lab might not be able to freely express their viewpoint, for example because they do not feel to have the power and authority to do so in the complex and ambiguous vertical-horizontal structure of the lab.

This study therefore suggests that strategic ambiguity as a management practice can play a positive role in creating an environment where multiple viewpoints can co-exist, sometimes conflicting and some other times getting harmonized in the organizational life. This comes with a price, as this multiplicity can also lead to ambiguous communication within the organization and thus to a lack of unified meanings. This can be a stressful situation for some members of the organization. Strategic ambiguity should therefore be used in a critical way as an effective dialogic strategy to appreciate differences among organization members, but also with the idea of the potential shortcomings of its application.

A witty comment left by a researcher of the lab gives what could be a short summary of the potential and the shortcomings of strategic ambiguity in SENSEable City Lab: "Potential cross-pollination = potential misunderstanding".

FINAL REMARKS

Exploring new territories means crossing the mood of maybe, a somehow uncanny no-man's land. Complex real-world problems call for truly transdisciplinary adventures. This needs coordinated action from a wide rage of stakeholders (academia, industry, government, NGOs, activists, …) in order to reshape the way research is carried out and to tackle crucial ethical and societal challenges.

Organizations operate in complex environments, constantly referring to the stakeholders' dynamically and historically situated imaginings. Within this complicated, labile and interchangeable array of economic, political, social and cultural negotiations, strategic ambiguity could constitute a management practice to create spaces where multiple meanings from different stakeholders can co-exist yet maintaining the possibility of a coordinated action.

Within these multiple points of view, there will be surely positions that will highlight the shortcomings of strategic ambiguity, for example as a management practice that leads to a lack of clarity or to stressful situations.

The potential of strategic ambiguity as a management practice will therefore rely on the ability of organizations to apply it in a critical way, carefully reflecting upon the frictions and tensions elicited in the process.

ACKNOWLEDGMENT

I would like to thank my supervisors Maria Hellström Reimer and Per Linde for their support and the reviewers for their insightful comments. I would also like to thank SENSEable City Lab's board, Carlo Ratti, Assaf Biderman and Kristian Kloeckl for having invited me and let me curiously wander around the lab and across meetings, brainstorming sessions and events. Nashid Nabian has been an invaluable guide throughout the research project. Bettina M. Urcuioli has set in an impeccable way the conditions for my stay at the lab.

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AUTHOR BIOGRAPHY

Luca Simeone

Luca Simeone's trajectory crosses design management, interaction design and design anthropology.

He has published some 50 academic papers on organizational models behind constructive design research and participatory innovation and on strategies and technologies for publishing, especially within smart cities models. He co-edited the books Beyond Ethnographic Writing (Armando, 2010) and REFF (DeriveApprodi, 2010) exploring new narratives that combine traditional writing with augmented reality technologies.

In 2009 he founded FakePress, a think tank exploring new publishing models and editorial projects and in 2011 he was a research affiliate with the SENSEable City Lab at Massachusetts Institute of Technology (MIT) in Cambridge MA.

He is also the founder and managing partner of Vianet, a digital design agency focused on delivering advanced technology and design solutions based on ethnographic research methods. Vianet has created more than 500 high-impact and award-winning products for Clients such as big corporations, NGOs, public institutions and SMEs all over the world.

Luca also works as consultant for public and private institutions (European Commission, German Federal Ministry of Education and Research) in order to help defining strategies, policies and funding schemes to support strategic design approaches targeted to innovation.

As from 2011, he is PhD candidate in Interaction Design at Malmö University in Sweden.

Over time, Luca's work has acquired a socio-political perspective aimed at using design as a tool to foster participation and dialogic processes.

The Real Value of the Developmental BOM in a Gated NPD Project

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Keywords: Risk Management, Procurement, Bill of Materials, NPD, Real Options

The paper develops and demonstrates a theoretical method to notionally hedge and thereby value the stochastic price risk embedded in the cost of the materials and components specified in the developmental BOM (Bill of Materials). This is a novel extension, based on financial option theory, to the deterministic target costing pricing method developed by Cooper and Slagmulder and values the BOM "learning" achieved by the NPD project team at each milestone GO/NOGO meeting, in gated NPD projects. Empirical testing would be required to verify whether its adoption leads to improved NPD outcomes reducing the number of new products with low financial contributions.

INTRODUCTION

This is a theoretical paper, which proposes a method to notionally hedge and thereby value the price risk inherent in the procurement cost of the components specified in the developmental BOM (Bill of Materials). The method is a novel extension to the target costing pricing (TCP) method (Cooper and Slagmulder 2002) and integrates the value of the "learning" achieved by the project team, at the end of every individual stage, in developing the BOM in gated GO/NOGO NPD (New Product Development) projects. The developmental BOM, produced in the first stage of the gated NPD project, invariably has the biggest influence on the final procurement requirements of manufactured products. The BOM value represents the major portion of many companies' turnover and was reported as 68.5% for UK manufacturing industry (Office of National Statistics 2001).

Target Costing is a pricing method that has been shown to significantly improve NPD success in the product development literature (Cooper and Slagmulder 2002). It is a method which supports NPD decisions by ensuring constant monitoring of the cost and functionality of a new product and its components. The actual mechanics of how it works has been reported on in accounting literature via case studies (Everaert et al 2006, Ibusuki and Kaminski 2006, Cooper and Slagmulder 2002). The target cost of a product is simply determined by

subtracting the required contribution from the estimated selling price and then apportioning individual target costs to each of the Bill of Materials (BOM) components taking into account a combination of cost estimates of the individual components and the constraint of the overall target cost. If the actual developmental BOM cost is greater than the required or target BOM cost at any of the crucial project milestone reviews then the project is generally halted (NO GO). Current TCP methodology is however essentially deterministic and takes no account of the systematic risk associated with cost price fluctuations.

Literature demonstrates that options, which allow companies to benefit from downside BOM price movements but not suffer from upside price movements, are used within procurement (but not development) functions to hedge component cost exposure. Large multinational companies such as HP use real and financial options within their risk management processes to smooth their procurement cash flows (Nagali, 2005) thereby supporting their share prices. He reports that HP's approach impacts on about $6 billion of memory chip spend and saved at least $100m by designing a custom options contract that pays suppliers a premium for the option to buy a fixed quantity of memory devices at a capped price. Although there is the cost of the option price, HP claim this expense is often less than the exposure cost of carrying excess inventory. Fu et al. 2006 provide a framework for analysing the cost impact of the optimal contract portfolio procurement strategy. Ng et al. 2004 describe a method to quantify the savings that a buyer in the construction industry can make by agreeing a long term material contract with a price cap rather than making spot purchases. Chen & Parlour 2007 considers an extension of the single-period inventory model with stochastic demand where a put option can be purchased to reduce losses resulting from low demand. These methods focus on the procurement function and not the developmental function.

The crucial and unique insight offered by this paper however, is that the option is originated by the NPD project team who create the developmental BOM and not the procurement function. None of the papers above view the hedging of procurement costs as the offsetting of an option created earlier at NPD project inception. The choice of BOM product components by the NPD project team is not a costless reversible decision and although non-systematic component cost price risk may dissipate towards the end of the NPD process, inherent material systematic risk can never dissipate. The BOM component price "learning" acquired by the NPD project team as they move from NPD stage to stage should also be valued. In other words, is the NPD team building more or less price risk into the developmental BOM?

PROBLEM FORMULATION AND METHODOLOGY DEVELOPMENT

The proposed methodology calculates, during the course of the projects' design and development stages, the extra premium needed to hedge the manufactured product as specified in the developmental BOM against future uncontrollable cost changes and adjusts the traditional (deterministic) BOM target price downwards. The project should only proceed if the actual developmental BOM cost at each decision milestone is less than the adjusted BOM target.

We formulate the problem by assuming that (in an analogous manner to a financial investor) the GO/NOGO milestone decision is made by a NPD committee who desire (among other things) a risk free return on their product portfolio. The investment decision is therefore made conditional on the developmental BOM cost achieving its target cost. This is demonstrated diagrammatically in Figure 1a, a so-called pay off diagram, which shows that when the "spot" BOM_a cost is less than the target BOM_d, the payoff is positive and negative when the "spot" BOM_a is greater than the target BOM_d. The committee can set up a combined risk free investment by simultaneously hedging the BOM with a real option that has an opposite and equal dynamic behaviour. We demonstrate the effect of one such real call option in Fig 1b showing the resulting payoff. It is of course possible to design other payoffs as e.g. Figure 1c. where other types and combinations of real options are created or purchased.

Figure 1 Diagrammatic Representation of the Hedging Effect on the BOM Payout

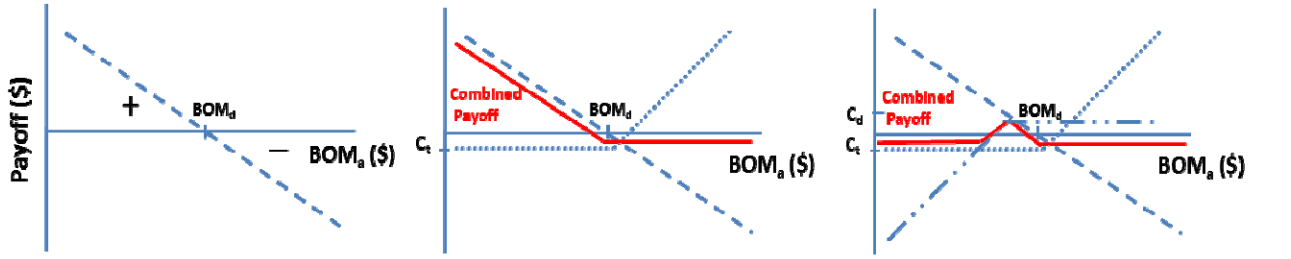

Figure 1a. An Un-Hedged BOM Strategy
The dashed line represents the gain or loss as the actual BOM_a price changes w.r.t the target BOM_d

Figure 1b. A Hedged BOM Strategy
The dashed line represents the gain or loss as the actual BOM_a price changes w.r.t the target BOM_d
The dotted line represents the gain or loss on the hedging option which costs C_t as BOM_a changes.
The full red line is the payoff from the combined strategy as BOM_a changes.

Figure 1c. An Alternative Hedged BOM Strategy
The dashed line represents the gain or loss as the actual BOM_a price changes w.r.t the target BOM_d
The dotted line represents the gain or loss on the hedging option which costs C_t as BOM_a changes.
The dashed dot line represents the gain or loss on the hedging option which receives C_d as BOM_a changes.
The full red line is the payoff from the combined strategy as BOM_a changes.

This problem formulation is very common in corporate finance where investors who are short in shares (e.g. analogous to our BOM) can hedge or create a risk free portfolio by buying a call option from a financial intermediary. The financial intermediary may in their turn hedge or lay off their financial risk by buying or shorting another financial asset. We suggest that this approach can be replicated within large multinational companies whereby the investment committee has two assets 1) the "shorted" BOM being the responsibility of the NPD project team and 2) the hedging option underwritten by the procurement function. We assume that the procurement function is in a position to layoff its risk in worldwide commodity and financial markets either through natural or financial hedging techniques. The offset or premium C_t in Figure 1b is the theoretical cost of the hedging option and therefore a measure of the inherent riskiness of the developmental BOM. The procurement function would, in practice, hedge its future BOM exposure by discovering through a negotiation process with key suppliers actual hedging terms and costs. If the additional or estimated cost of hedging the developmental BOM (5% in HP's case) is more than the theoretical premium C_t then the investment committee should consider the decision more cautiously before allowing the project to progress to the next stage in the gated development process.

Although many types of financial options products are available on financial markets we choose in this theoretical exposition to use so called Asian options, which pay-out on the arithmetic average of prices calculated over an agreed time period. This is motivated by the recognition that this type of path-dependent option is generally accepted (Zhang, 1998) as being one of the most cost effective solutions, with the lowest premium C_t, to hedge material (BOM) costs over a period of time. Asian type options are offered by exchanges in the petroleum market (NYMEX) as well as the metals market (TAPOs in the LME).

A notional Asian option would therefore be sold to the NPD developmental team by the procurement function at the start of a new NPD process to hedge the resulting material liability for the complete product life cycle effectively reducing the BOM_d target. BOM's which were well within target (out of the money) or had low material price volatility would have low premiums and negligible effect on the BOM_d target. On the other hand, where material price volatility is high and actual BOM_a's are close to the target BOM_d's then the notional hedging or option cost could be significant making the achievement of the BOM_d target more difficult. New experimental materials, which on first sight might appear cheaper than conventional materials would bear a larger proportion of the hedging cost or premium due to higher price volatility resulting from as yet unknown capacity or technical issues. Cost price estimates of new materials used in developmental BOMs are in the author's opinion, supported by considerable developmental experience, notoriously unreliable and biased.

Asian options do not have closed form solutions if the underlying price process is assumed to follow Brownian geometric diffusion and are commonly valued using numerical techniques. Given the discrete type (monthly) averaging period, the high number of averaging fixings and the relatively low volatility, we use the Vorst (1992) discrete Asian approximation method.

NPD Developmental BOM Characterisation

During the initial NPD stages the BOM will be inaccurate and subject to both systematic and unsystematic risk of a technical, operational or commercial nature. Most of the risk would be regarded in financial terms as unsystematic since it is under the direct control of the company and could in theory be diversified away. However, a large proportion is systematic; especially that element associated with the cost price of the purchased materials. As the project proceeds through its stages, the reliability and accuracy of the BOM will improve until at the moment of manufacture its accuracy is 100% and represents the actual material cost price of the manufactured product. Thus, certainty about the BOM at the start of manufacturing may remove most non-systematic risk but still leaves the systematic risk due to on-going stochastic material input prices.

Let the value of a BOM at time t be denoted by $B_{j.v,t}$ where *j* is the indicator of the BOM for product *j* and *v* is the version number of that BOM. Consequently $\sigma^{B}_{j.v,t}$ is the standard deviation of the value of $BOM_{j.v}$ at time t. Let $P_{i,t}$ be the cost per unit amount of component *i* at time *t* and $A_{i,j.v,t}$ the amount of P_i in $BOM_{j.v,t}$ at time *t*. The value of BOM $B_{j.v,t}$ at time t is

$$\sum_{i=1}^{n} P_{i,t} A_{i,j,w,t} \qquad (1)$$

Where n = number of components in the BOM. Both $P_{i,t}$ and $A_{i,j,w,t}$ are assumed to be random variables, independent of each other, with zero correlation. $\sigma_{i,t}^{P}$ and $\sigma_{i,j,w,t}^{A}$ are the standard deviations respectively of the two variables at time t.

The pair wise covariance matrices of the change in material prices with the other material prices are calculated. The general formula is (see Appendix 1 for an example)

$$\widehat{\sigma_{j,w,t=0}^{B}} = \sum_{i=1}^{n}\sum_{k=1}^{n} X_i X_k \rho_{ik} \widehat{\sigma_i^{A,P}} \widehat{\sigma_k^{A,P}} \qquad (2)$$

$X_{i,k}$ = proportion of $X_{i,k}$ in the BOM Portfolio *j.v*

$\widehat{\sigma_i^{A,P}}$= the estimated standard deviation of component *i*

ρ_{ik} = correlation of BOM component *i* and *k*

n = the number of BOM components

Asian Option Calculation – Averaging Not Yet Started at t = 0.

We now demonstrate the derivation of the Vorst (1992) approximation. The arithmetic average of the BOM prices does not have a closed form solution in contrast to the geometric average. Therefore, a closed form solution is firstly derived for the geometric average and used as a lower bound whereby the arithmetic average call value is then approximated.

A complete market with no transaction costs is assumed for BOM B. Let B(t) be the BOM valuation given by (1) and that the price process for BOM B follows a stochastic process described by

$$dB(t) = \mu B(t) + \sigma B(t) dZ(t)$$

in which Z(t) is a Wiener process. The parameter μ is the expected drift per unit time and σ is the volatility of the BOM. We have also assumed that the individual components of the BOM or combination of components can be also described by a similar process.

We derive initially a solution for the case of an average BOM call option before the start of the averaging period- i.e. implying that the NPD project has not commenced and no actual BOM values can be included in the average. Let t be the current date and t_1……..t_n = T be the periods (monthly) over which averaging will occur.

Thus the payoff of the average rate call option with strike price S at maturity T is:

$$\text{Max}\{A(T)\text{-}S,0\}$$

Where $A(T) = \frac{1}{n}\sum_{i=1}^{n} B(t_i)$

A riskless hedge for the option can be created by removing the BOM induced risk and the value C^A of the option is equal to its expected value with respect to an equivalent measure for which the discounted BOM price process is a martingale:

$$C^A = e^{-r(T-t)}\hat{E}[Max\{A(T) - S, 0\}|f(t)]$$

Where $\hat{E}$ denotes the expectation w.r.t the equivalent martingale measure. The BOM process is

$$dB(t) = \mu B(t)dt + \sigma B(t)d\hat{Z}(t) \qquad (3)$$

where $\hat{Z}$ is the Brownian motion under the new probability measure. Each BOM price $B(t_i)$ is log normal distributed and thus A(t) is the sum of log normal distributed variables.

We now consider another option based on the geometric average G(t) of the BOM price B(t):

$$G(T) = \left[\prod_{i=1}^{n} B(t_i)\right]^{1/n}$$

Where in a similar fashion to the arithmetic option the payoff is given by:

$$\text{Max}\{G(T)\text{-}S,0\}$$

The value of the geometric average rate option C^G is given by

$$C^G = e^{-r(T-t)}\hat{E}[Max\{G(T) \quad S, 0\}|f(t)]$$

Similarly we can take the expectation with respect to (3) and because G(T) is a product of log normal distributed variables, it is also log normal distributed with mean M

$$M = \hat{E}[Ln(G(T))] = Ln(B((t)) + \frac{1}{n}\sum_{i=1}^{n}\left(\mu - \frac{\sigma^2}{2}\right)(t_i - t) \qquad (4)$$

And variance V

$$V = Var[Ln(G(T))] = \frac{\sigma^2}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n}\min(t_i - t, t_j - t) \qquad (5)$$

With C^G now given by

$$C^G = e^{-r(T-t)}\left\{e^{M+\frac{V}{2}}N\left[\frac{M - Ln(S) + V}{\sqrt{V}}\right] - SN\left[\frac{M - Ln(S)}{\sqrt{V}}\right]\right\} \qquad (6)$$

Where N is the standard normal distribution function. For Proof of (4) ,(5) and (6) see Vorst 1992 .The arithmetic call option is valued by observing that the geometric average is always less than an arithmetic average G(T)≤ A(T) for all values of B(t) implying that $C^G \leq C^A$ and

$$Max\{A(T) - S, 0\} \leq Max\{G(T) - S, 0\} + A(T) - G(T)$$

So that

$$C^A \leq C^G + e^{-r(T-t)}\{\hat{E}A(T) - \hat{E}G(T)\} \qquad (7)$$

Where $\hat{E}A(T)$ is equivalent to $\hat{E}\{A(T)|f(t)\}$ and $\hat{E}G(T)$ is equivalent to $\hat{E}\{G(T)|f(t)\}$

Thus equation (7) is the upper bound for C^A where

$$\hat{E}A(T) = \frac{B(t)}{n}\sum_{i=1}^{n} e^{\mu(t_i - t)} \qquad (8)$$

And

$$\hat{E}G(T) = e^{M + \frac{V}{2}} \qquad (9)$$

The upper bound is constructed as a correction of the theoretical price by the difference between the expectation of the arithmetic and the geometric average by correcting the exercise price S for the difference between these two expectations.

$$C_t \approx e^{-r(T-t)}\hat{E}[Max\{G(T) - (S - EA(T) + EG(T)), 0\}|f(t)] \qquad (10)$$

Which according to (6) becomes

$$C_t \approx \hat{C} = e^{-r(T-t)}\left\{e^{M + \frac{V}{2}}N\left[\frac{M - Ln(S') + V}{\sqrt{V}}\right] - S'N\left[\frac{M - Ln(S')}{\sqrt{V}}\right]\right\} \qquad (11)$$

With $$S' = S - [\hat{E}A(T) - \hat{E}G(T)]$$

It follows from equation (10) that $\hat{C}$ lies between the lower and upper bound and that the approximation error is at most the difference between the two bounds i.e.

$$C_t - \hat{C} \leq e^{-r(T-t)}[\hat{E}A(T) - \hat{E}G(T)]$$

Vorst (1992) compares the results from his approximation with a Monte Carlo simulation and in almost all cases with volatilities less than 20% the approximation error is well below 1% and in many cases below 0.1%. Even for a volatility of 50% the approximation error is still below 2%. Considering that the purpose of the approximation is to improve upon an

estimated deterministic TCP then the accuracy of the option premium value using the Vorst approximation is sufficient.

Asian Option Calculation – Averaging Starts at Time t

We now extend the formula from the situation where the averaging period has not yet begun to the more general case where the time t lies between t_1 and T. This formula is used to value the premium as more information is gathered about the developmental BOM costs at the end of individual NPD project stages. Favourable movements in the BOM costs or substitution of lower volatility components will lower the expected hedging premium and vice versa.

Let $t_m \leq t < t_{m+1}, 1 \leq m \leq n$ so that at time t the values $B(t_1)$, ….$B(t_m)$ are known. Define

$$R(t) = \frac{1}{m}\sum_{t=1}^{m} B(t_t)$$

and $$D(t,T) = \frac{1}{n-m}\sum_{t=m+1}^{n} B(t_t)$$

R(t) is the average of the first m BOM values and is known at time t, while $D(t,T)$ is the unknown average over future time periods. It follows that

$$A(T) = \frac{m}{n}R(t) + \frac{n-m}{n}D(t,T)$$

Hence $$Max\{A(T) - S, 0\} = \frac{n-m}{n} Max\left\{D(t,T) - \frac{n}{n-m}\left(S - \frac{m}{n}R(t)\right), 0\right\}$$

Since none of the values of D(t,T) are known, the term

$$Max\left\{D(t,T) - \frac{n}{n-m}\left(S - \frac{m}{n}R(t)\right), 0\right\}$$

can be viewed as the payoff of an average exchange rate option where the averaging has yet to begin with exercise price equal to

$$S'' = \frac{n}{n-m}\left(S - \frac{m}{n}R(t)\right)$$

The value of this option is approximated in a similar manner as previously outlined and is

$$C_t = e^{-r(T-t)}\left\{\hat{E}A(T) - S\right\} = e^{-r(T-t)}\left\{\frac{m}{n}R(t) + \frac{n-m}{n}\hat{E}(D(t,T)) - S\right\} \quad [12]$$

NUMERICAL APPLICATION TO A STYLISED DEVELOPMENTAL NPD BOM

This section demonstrates, by way of a stylized example, the application of the Asian option approach to the financial evaluation of a new product at a NPD milestone meeting. The key financial evaluation criterion for senior management is the difference between the actual BOM cost and target TCP adjusted downwards by the Asian option premium C_t.

NPD lead times in the consumer electronics industry are typically 12-18 months long (automobile are more typically 3-5 years) followed by up to 5 years manufacturing. We assume a total product life cycle N of 48 months consisting of

a) 1 month Feasibility Stage (t=0)
b) 4 months Design Stage (t=1…4)
c) 7 Months Tooling and Manufacturing Preparation Stage (t=5…11)
d) 36 months Manufacturing Stage (t= 12…48)

A conventional TCP approach has been followed, during the initial feasibility stage (t=0) of a NPD project, to estimate the product value resulting in an expected selling price of $4200, a constant phased sales projection over 36 months and a minimum expected net margin of 5%. Consequentially, a minimum required target cost price (TCP) of $3990 has been agreed. Based on assumed direct labour costs, indirect overheads and investment costs (35%) this is equivalent to a maximum allowable BOM_d cost of $2594.

Together with the functional specifications of the product, the NPD project team would now construct a developmental BOM at time t=0 consisting of metal, plastic, electronic and packaging components. We assume without any loss of generality that the historical unit material cost price $P_{i,t}$ for i=1..4, for the materials in the product are indices of relevant commodity sectors. Details and descriptive summaries of the specific price series used can be found in Appendix 1. The volatility σ of materials used in the BOM has been estimated (using equation 2) in Table 1, Appendix 1 at σ = 7%. Furthermore, from an examination of the historical (index) price movements the average drift over the last 7 years of materials intended for use in the developmental BOM has been μ=+0.4%.

The Asian option methodology consists of the following steps:

1) Agree the deterministic TCP target of $3990 as per the traditional approach.
2) Agree the deterministic maximum allowable BOM cost BOM_d of $2594.
3) Characterize the underlying volatility and price drift of the current developmental BOM at t=0 (σ = 7% and μ=+0.4%) using equations [1] and [2].
4) Calculate the premium C_t (equation 11) required to hedge the developmental BOM using the current BOM price at t=0 and setting S the option strike as the deterministic BOM cost $BOM_{d.}$
5) Calculate the extrinsic (or time) value of the option C_t.
6) Adjust the maximum allowable developmental BOM cost BOM_d by subtracting the intrinsic hedging cost C_t to get a new stochastic target $BOM_{s.}$
7) Repeat the calculations 1) to 6) each month at t= 1, 2, 3, 4 and 5 as new information is collected and changes are made to the developmental BOM, volatility etc. using equation [12]. The use of this equation implies that gains or losses in previous months will be averaged out i.e. the option takes account of any project learning achieved.
8) Adjust the target BOM_s on a monthly basis to take account of changes in BOM_d or C_t.
9) At t = 5 the project team must make a GO/NOGO decision as to whether to proceed to the tooling and manufacturing preparation stage. We concentrate specifically on the BOM cost decision where three scenarios are possible:

    a) The current and expected developmental BOM cost is below the stochastic BOM target BOM_s in which case the decision is GO.

    b) The current and expected developmental BOM cost is above the deterministic BOM target BOM_d in which case the decision is NOGO.

    c) The current and expected developmental BOM cost is between the stochastic BOM target BOM_s and the deterministic BOM target BOM_d in which case the decision (either GO/NOGO) should strictly speaking be NOGO. This may be mitigated by the risk preferences of the investment committee and the ability of the procurement department to "layoff" the hedging premium of the developmental to suppliers, financial or commodity markets.

We demonstrate the calculations and decision for three actual developmental BOM values at t= 0: BOM_a = $2400, $2590, $2700 in Table 1 below. In this case it can be seen that were the developmental BOM be estimated at say $2590 at t=0 then it would attract an extra hedging cost of $90 which would reduce the BOM target to $2504 or approximately 3% - a not insignificant change in the competitive consumer electronics consumer market. Were no improvements made in the BOM costs by t=5, when the decision must be made to invest in tooling and manufacturing then the investment committee should strictly speaking reject the

project on the basis of the stochastic BOM target but accept it on the basis of the deterministic BOM target.

Table 1 Comparison of the Deterministic and Stochastic BOM Target Costing Process

Deterministic BOM Approach	@t=0	@t=0	@t=0
Selling Price $	4200	4200	4200
Deterministic BOM Target BOM_d	2594	2594	2594
Actual Bom Cost BOM_a	2400	2590	2700
	@t=5	@t=5	@t=5
Actual Bom Cost BOM_a	2400	2590	2700
Investment Committee Decision	GO	GO	NOGO

Stochastic BOM Approach	@t=0	@t=0	@t=0
Selling Price $	4200	4200	4200
Deterministic BOM Target BOM_d	2594	2594	2594
Extrinsic Asian Option Cost C_t	20	90	54
Stochastic BOM Target BOM_s	2574	2504	2540
Actual Bom Cost BOM_a	2400	2590	2700
	@t=5	@t=5	@t=5
Actual Bom Cost BOM_a	2400	2590	2700
Investment Committee Decision	GO	NOGO	NOGO

C_t using Equation 11 where BOM_d = S =2594, BOM_a as assumed, N=48, Averaging Period = h = 1/12, Period T = 4 years, r=μ=0.4%, σ=7%,

σ , μ estimated using Equations 1, 2 on a notional BOM (Appendix 1), an assumed Selling Price of 4200 and deterministic BOM_d target of 2594

As with the deterministic approach, monthly improvements in the BOM cost price would make the likelihood of a GO decision more likely. However, any improvements which might be achieved by using riskier or more volatile components (from a cost perspective) would be "punished" by attracting a higher hedging premium C_t. Conversely, any use of less risky or volatile components would be "rewarded" by a lower hedging premium C_t. Alternatively, the procurement function may commit to the investment committee their belief in being able to "layoff" any extra hedging premium to suppliers.

CONCLUSIONS

The calculation of the premium to hedge a developmental BOM using an Asian or averaging option methodology has been demonstrated by way of a numerical example to be a theoretically viable method to improve the effectiveness of the traditional deterministic TCP process used to evaluate the financial viability of NPD products. The results clearly show that where NPD GO/NOGO decisions are marginal then the use of a stochastic BOM target instead of the traditional BOM target might provide useful information. The method does not replace the traditional Target Price Costing process but rather augments the current process by taking into account the real effect of time and volatility on component prices.

The assumptions and concepts underlying this approach are based on those already used in the hedging of commodities and FX transactions. Because of the path dependent nature of the

option it values any component price reductions achieved by the project team during the early stages of the project implying that good cost progress by the NPD team reduces the option value to the purchasing function and poor cost progress conversely increases it. Another important benefit is that better knowledge of component level volatility and drift characteristics may assist during that part of the process where the overall TCP is decomposed into individual component target prices. Thus for example (in Appendix 1) the metal component has a positive drift while the electronics component has a negative drift suggesting that specific development resources aimed at reducing the overall sensitivity of the BOM to metal prices should be considered as well as adjusting the component level BOM price targets for this effect. Where complete or semi complete OTC or exchange based markets exist in semiconductors, metals, plastics or paper a futures price structure may also exist and these structures could be used to "calibrate" the future implied volatility to give a better representation of possible BOM price movements and hedging requirements.

From a real option research viewpoint, this paper contributes by being the first to consider and demonstrate numerically a BOM to be a general class of financial assets suitable for analysis by a real, discrete, path dependent and flexible arithmetic average Asian option.

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A highly experienced development professional and consultant with extensive knowledge and skills in finance, project management, purchasing, engineering and operations, gained at director level in a wide range of functional positions within companies such as Philips, Russell Hobbs/Pifco, Time Computer Systems and latterly as a self-employed management consultant. My career path has developed via the product development and operational route directing large design departments and operational units. Notable product successes include the Alessi kettle, innovative kettle scale filters and flat elements for Philips and Russell Hobbs. The author has just completed and successfully submitted his doctoral thesis to the Manchester Business School Accounting and Finance department, investigating the real option value of strategic negotiation.

Appendix 1 Stock Market Indices used as Component Price Proxies

Price series 1) to 4) were taken monthly from January 2000 to August 2007 (92 observations)

a) Dow Jones US Semiconductor Index

b) S&P 500 Metals & Mining Index

c) S&P 500 Paper & Forest Index

d) Taiwan SE Plastics and Chemicals Index

We calculate the continuously compounded returns ($Ln[P_{i,t}] - Ln[P_{i,t-1}]$) of the relevant P series for i =1…4, and their sample drift μ and variance σ are then estimated below.

Summary Table of BOM Component Characteristics

	(1) Elec.	(2) Metal	(3) Pack.	(4) Plastics
Sample μ	-0.0064	0.0098	0.0001	0.0045
Std. Dev.	0.1280	0.0760	0.0735	0.0889
Skewness	-0.5600	-0.3250	-0.3013	-0.3286
Kurtosis	4.0018	2.8567	3.9020	4.9641

Calculation of BOM value $B_{A.0,t=0}$ and σ using Equations (1) and (2)

	Electronics	Metal	Packaging	Plastics	Total
Using Equation(1)					
Amount (A)	0.5	5	1	4.5	
Cost/Amount (P)	1347	242	141	212	
Initial Cost (A*P)	673	1212	141	955	2982
% Weighting	23%	41%	5%	32%	
Sample μ	-0.0064	0.0098	0.0001	0.0045	0.40%
Using Equation (2)					
Electronics	0.000826	0.000424	0.000036	0.000212	0.001498
Metal	0.000424	0.000945	0.000069	0.000260	0.001698
Packaging	0.000036	0.000069	0.000012	0.000026	0.000143
Plastics	0.000212	0.000260	0.000026	0.000803	0.001300
				Variance	0.00463941
				Volatility σ	7%

Towards a Taxonomy: Classifying design innovation policies in Europe

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Keywords: design policy, innovation policy, taxonomy, European policy

Abstract: The role of design as an enabler of innovation has become the object of policy focus within the European Union. The European Commission seeks to provide policymakers and other stakeholders a means of evaluating the impact of design in innovation policies. Sponsored by the European Design Innovation Initiative (EDII), 'DeEP: Design In European Policies' through the development of a policy evaluation tool, has demonstrated the need for evaluation frameworks suitable for design processes and activities as components of both policy-making and policy instruments - at both macro and micro level. This paper outlines some of the inherent challenges encountered in developing a specific design innovation taxonomy from which to develop indicators and inform the design of the DeEP policy evaluation tool itself.

INTRODUCTION

The research presented in this paper comes out of a 2-year funded project titled ‘DeEP: Design in European Policies’. DeEP is one of six projects funded by the European Design Innovation Initiative (EDII) and aims to better understand the impact of design in innovation policies through the development of frameworks and indicators with which to evaluate policy actions at both the macro (regional, national, European) and micro (specific initiative) level.

Specifically this paper will: i) discuss the role of design in innovation policies, ii) present an approach to classifying design innovation policies in the form of a taxonomy, and iii) consider how a taxonomy has the potential to inform the evaluation of design innovation policies. The paper concludes by identifying and assessing the challenges inherent in evaluating design innovation policy and suggests how these challenges may be addressed.

A key aspect of the research focus for DeEP was to better understand design’s relationship with innovation policy and as a consequence of this understanding, describe the interactions

between design and innovation policies, initiatives (policy actions) and stakeholder organisations.

Europe 2020 (European Commission 2010) identifies ‘design as an enabler of innovation’ – it was important to assess the extent to which an enabling role presently exists, its potential for development and subsequent implications for future design innovation policy, particularly in respect of national and regional design policy.

Extensive data collection of design innovation policies and policy actions across all 28 EU member states provided the project with a comprehensive understanding of the landscape of design innovation policy. Alongside this an in-depth understanding of the policy-making process particularly in respect of policy evaluation, provides a lens to view existing design innovation policy and policy actions. This understanding helps to frame both the success and limitations of existing design innovation policies but does reveal the lack of rigour in the limited number of policy evaluations that have been conducted.

Similarly, a review of existing categorisations/taxonomies (both related and unrelated to policy) informed the development strategy of the design innovation policy taxonomy. Compared with innovation, was a distinct lack of design policy categorisations and even more alarming was the apparent absence of indicators appropriate to design innovation policy. The limited literature in the area of design policy indicators and design policy classifications underscored the need for the research within DeEP to develop innovative and novel approaches to how its research was conducted.

After the development of a robust understanding of the design innovation policy landscape in Europe, it's theoretical base and key challenges, our research explored three main research streams – macro design innovation policy indicators, micro design innovation policy indicators, and the nature and role of macro and micro design innovation policy indicators and their contribution to the evaluation of design innovation policy.

Consortium partners are engaged in the joint completion of three key work streams:

- Macro Evaluation of Design Innovation Policies
- Micro Evaluation of Design Innovation Policies
- Designing, developing and testing a DeEP Design Innovation Policy Evaluation Tool .

A key element in bringing these work streams together, and the main focus of this paper, is the development of common frameworks and a taxonomy of design innovation policies. The purpose of the taxonomy is to classify design innovation policies, which in turn informs the development of a set of micro and macro design innovation policy indicators. These indicators informed the development of the DeEP Design Innovation Policy Evaluation Tool. This tool provides a robust source of qualified information for decision-makers and other policy stakeholders within the design innovation policy ecosystem.

The research utilises a mixed method approach and as such has aimed to triangulate research findings to develop an evidence base for policy makers. Case studies, interviews,

participatory workshops, visualisation, and prototyping, testing and refining policy evaluation tools were conducted.

DESIGN IN INNOVATION POLICIES

The relationship between design and innovation is not straight-forward or well established (Cruickshank 2011), particularly in respect of academic studies of innovation, where 'design is not often not represented at all'.

Despite the growing prominence of design, particularly product design, in industry and commerce and the recognition that 'in recent years, a quite substantial shift in the way innovation policy is viewed' (European Commission 2009), it is questionable as to whether the emerging use of innovation in design literature identified by Cruickshank (2011) has been matched by the use of design in innovation literature.

Innovation has broadened out considerably from its origins in science, technology, research & development and a broader, more comprehensive view of innovation policy has evolved, through the integration of related policy areas – e.g. R&D, industrial policy – and the multiple levels at which innovation takes place. This broader, more comprehensive view 'expands the boundaries of the policy instruments that may be applied to support innovation' (European Commission 2006 cited in European Commission 2009).

A review of innovation policy documents identified a tendency to position design in a supporting role aimed at realising specific objectives (which may or may not be related to design), rather than as an end in itself. These design elements are usually referenced in an ad-hoc way throughout the document, rather than as a coherent and fully formed component of innovation support policy.

Most European member states have innovation policies that are intended to increase levels of innovation and competitive advantage, although many do not reference innovation explicitly in the title, or include as a component of other policy. Others have regional polices which either complement or co-exist with national policy – or are specific to the region where no national policy exists.

The UK Government's present innovation strategy document 'Innovation and Research Strategy for Growth' (BIS 2011) provides a good example, pledging a commitment to support 'design-driven' innovation and to 'strengthen our innovative capability', recognising that whilst developing emerging technologies is essential, it is insufficient on its own. The growth of the UK economy 'depends on the extent to which businesses in all industries and services invest in adapting technologies and developing their own complementary non-technical innovations. This increasingly encompasses investing in intangible assets, from skilled human resources to new business models, design and branding' (BIS 2011).

In additional to being considered an intangible asset, the strategy perceives design as a component of broader innovation such as 'branding, training, design and improvements in business processes'. The strategy identifies specific touch-points where design will be used

to improve innovation, for example, within technology-based 'Catapult Centres'; emerging technologies; and investing in 'complementary forms of innovation' – amongst which are cited design, managerial & organizational competencies, human resources and intellectual property.

However, design's strategic role in supporting UK Innovation is defined principally through the Design Council and its activities, primarily through explicit design programmes and initiatives (policy actions), however other initiatives can be identified within the Strategy that have some design element – i.e. are essentially tacit in their designerly support for innovation. The relationship between design and innovation in policy terms is clear from the strategy and are considered as part of our thinking for DeEP.

Innovation policies are the most usual 'container' into which design as a supporting activity for jobs and growth is placed. Other Europe 2020 Priority Axes (Flagship Initiatives) have equivalent strategies and policies – i.e. other policy 'containers'. By examining and understanding the framework for innovation support, it is possible to identify areas where design has particular value as an 'enabler' and capability-builder.

However there are other 'containers' in which design-related policies reside. It would a mistake to assume that all design policy actions are solely developed for, and communicated within, innovation policy. For example the jobs and growth agenda can also be served through education, social mobility and health policy, to name but three – any of which would benefit from design-driven innovation.

PRO INNO Europe has developed a useful framework which, maps a range of policy actions in support of innovation. It identifies four distinct levels at which innovation occurs - activity, firm, sector and market - and distinguishes between specific support policies and horizontal support policies. This provides a degree of granularity which can be populated with appropriate policy actions, for example: facilitating access to finance at firm level, and introducing cluster development policies at sector level (European Commission 2009).

This framework is very much innovation-orientated although it is possible to observe similar characteristics as defined by the DeEP Design Innovation Policy Framework for example:

- Degrees of specificity within support policies
- Recognition of an eco-system by the presence of horizontal support policies
- Enterprise level policy actions

However, mapping innovation support measures e.g. design policies and actions, onto this framework would still represent design as an intangible asset, indistinct from other innovation support measures.

CLASSIFYING DESIGN INNOVATION POLICIES

At this stage, a number of initial general points about the literature can be made:

- There are a considerable number of types of taxonomy, each offering alternative views of a particular dimension or aspect of policy.
- The literature review demonstrated a distinct lack of design policy taxonomy in any form. Most literature referenced innovation policy taxonomy e.g. business support and R&D taxonomy wherein the presence of design is completely absent or embedded.
- Conversely, the review revealed a plethora of innovation, business support and R&D taxonomy, wherein the presence of design is completely absent or embedded, again predominantly in terms of NPD or process.
- Whilst it is possible to detect both tacit (predominantly) and explicit design elements within these taxonomies, the relationship and 'embeddedness' of design within innovation policy is not always apparent.
- A brief overview of empirical taxonomies of historical patterns of innovation (de Jong & Marsili 2006) showed a particular emphasis on sector-based R&D, manufacturing and supply with limited recognition of service innovation or cross-disciplinary activity.
- Godinho et al (2005) present a classification of aspects, dimensions, variables and indicators as a taxonomy for a National Innovation System. The result, from a design innovation viewpoint is clearly macro, comprising very 'high-level' innovation-orientated indicators – to the extent that they could be considered contextual as far as their usefulness as design indicators.

A DIP Landscape was developed and is a description of the terrain in terms of its (selected) elements. The term 'ecosystem' articulates the functions, relationships, inter-dependencies etc. that exist within the landscape. An ecosystem, in a business context, rather than its native ecological context, was described in Moore (1993) as: 'an economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. The economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organisms also include suppliers, lead producers, competitors, and other stakeholders.'

An eco-system exists within a landscape and can interact with parts of it – therefore the 'access' part of our framework diagram refers to interaction between landscape and ecosystem. BIS (2011) pledge support for 'innovation' ecosystems comprising national and international networks which develop into clusters of 'innovative, high productivity businesses which drive economic growth'. The DIP Landscape provides a useful aspect in the categorisation framework and acts as the 'first cut' of the available data relevant to our research. The DIP Landscape consisted of five categories:

1. Policy – policy documents that include or reference design innovation e.g. national design policy, growth strategies etc.

2. Initiative (also referred to as 'Programme') – an activity resulting from a policy, or manifestation of a policy decision.
3. Organisation – a body or group relevant to design innovation policies/initiatives.
4. Research – published, peer-reviewed research into design innovation policy/initiatives.
5. Report – other published reviews, assessments etc. of design innovation policy/initiatives.

These five categories can be used to structure the data for use in the evaluation of design innovation policy thus:

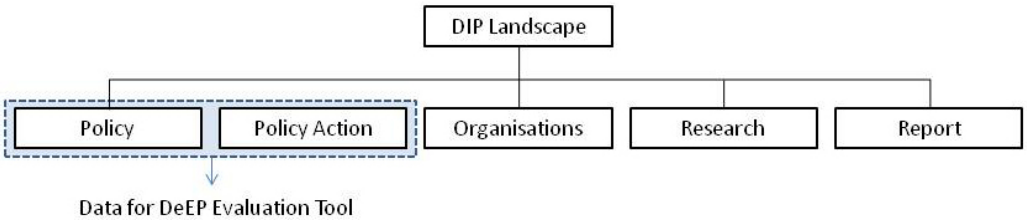

Figure 1. Categorisation - Policy and Policy Action

The DeEP General Framework identifies 3 key constituents within the defined scope of DeEP: Design Policy, Ecosystem, and Enterprises.

The relationships between these constituents are represented on Figure 1. 'DeEP Policies' Impact Channels' – where design capability is increased as a result of programmes & initiatives (policy actions) initiated by design policy.

Effective policy actions result in an increase in design capability in the enterprise, the eco system itself, and in accessing the ecosystem (i.e. the bridge between ecosystem and enterprise).

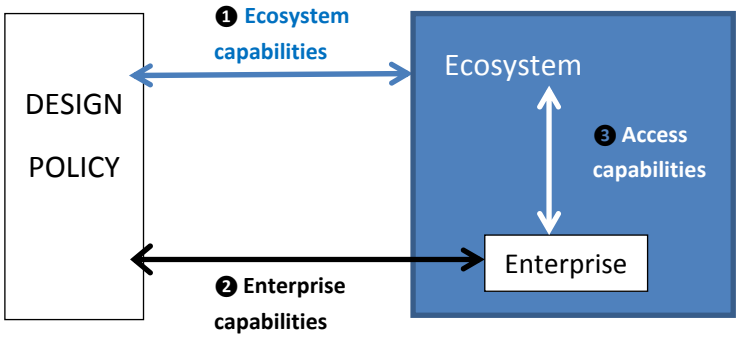

Figure 2. DeEP Policies' Impact Channels

Policies and Policy Actions can be further categorised by through consideration of route and specificity, where:

- Route represents the paths by which enterprises access policies
- Specificity describes how explicit is the focus on design in policies

The framework identifies three possible options each for Route and Specificity:

Route

- Direct policies are aimed to improve ENTERPRISE CAPABILITIES – directly increasing the design capability of the enterprise itself;
- Collaborative policies are aimed to improve enterprise ACCESS CAPABILITIES (i.e. the capability to access external knowledge and collaborate with other subjects) through increasing the design capability of surrounding ecosystem;
- Indirect policies are aimed to improve the ECOSYSTEM CAPABILITIES (i.e., the capabilities of design schools, design firms, etc.) through increasing design capability collaboratively by connecting enterprise with surrounding ecosystem i.e. improving access to ecosystem resources.

Specificity

- Specific policies are TARGETED TO DESIGN (for design). The policy is specifically focused on increasing design capacity in an enterprise using specific design policies/initiatives where these have been explicitly stated from the outset.
- Complementary policies USE DESIGN (through design) to increase design capacity in an enterprise through complementary policies/ initiatives where focus is not on design, but design is recognised as a significant, or contributory, factor in increasing design capability.
- Opportunistic policies (by design). In these cases the policy has a broader scope than the development of design capabilities (e.g., policies aimed at promoting innovation in firms).

The framework is represented on a 3x3 matrix, onto which is was possible plot initiatives from the Landscape (Figure 3. Route & Specificity 3x3 Matrix).

	Specificity

		Specific *'for design'*	Complementary *'through design'*	Opportunistic *'by design'*	
Route	**Direct** ❶ *Enterprise*				
	Indirect ❷ *Ecosystem*				
	Collaborative ❸ *Access*				

Figure 3. Route & Specificity – 3x3 Matrix

The result is a representation of all initiatives (policy actions), classified in accordance with one of the nine specificity/route combinations and based on data received from consortium partners via the Landscape. In this form it would provide an indication of where policy has had most impact based on resultant policy actions.

We needed a linkage to policy actions and indicators. Figure 4, 'Route & Specificity – Taxonomy Tree' shows how this might be achieved by expanding and adding dimensions to the matrix grid which contain specific policy actions and their indicators.

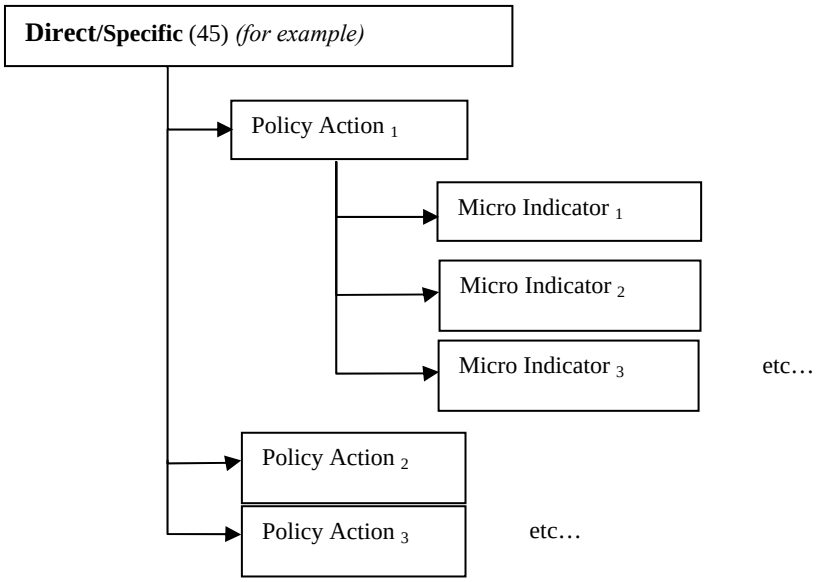

Figure 4. Route & Specificity – Taxonomy Tree

We identified a number of caveats to the concepts we were pursuing:

- A missing temporal element – there was no indication or accommodation of the timescale in which these processes were taking place.

- Even as a theoretical model, there should be some recognition of context – every member state will have different contexts (geographical, governance, political, historical etc.) – perhaps these could be represented as ‘modifiers’.
- The Landscape, as a data set ‘feeding’ the taxonomy, will require a particular degree of data accuracy and completeness. Whether this is achieved through contributors / moderators or through singular responsibility is a discussion point.

As a next step it would be necessary to populate the grid and tree with data from the Landscape and perform a limited test to see if this particular approach was appropriate to the requirements of DeEP.

The development of the categorisation framework and taxonomy is based upon the following premises:

- Data for macro level design policy indicators is not available in a meaningful and consentient form across the EU member states
- Data for macro level innovation policy indicators that is available includes design within wider innovations
- There is a high degree of ‘embeddedness’ of design policies in innovation policies/growth strategies yet the explicit contribution of design policies is not stated
- The design innovation policy eco-system relates to the macro environment
- The design innovation policy enterprise-system relates to the micro environment
- We are evaluating rather than measuring the impact of design innovation policy

In light of the above, and based upon extensive literature review, it is suggested that macro design innovation policy indicators cannot be identified reliably based on available data but their presence can be inferred by aggregating micro design innovation policy indicators (for which data is available). This premise has helped to drive the development of our design innovation policy categorisation framework and taxonomy.

An innovation taxonomy is unsuited to design innovation policy because:

- The 'design' component is not stated;
- Design is a means to the end (innovation) just as innovation is a means to its end (jobs and growth);
- Design is dissipated ‘amongst’ innovation;
- Innovation taxonomy can take more direct route – v. broad front;
- Design can enhance any part of an innovation policy – in reality it appears in varying degrees and at various points.

We represent the relationship between Policy and Policy Actions and Route and Specificity by employing the 3x3 matrix mapping (Figure 5).

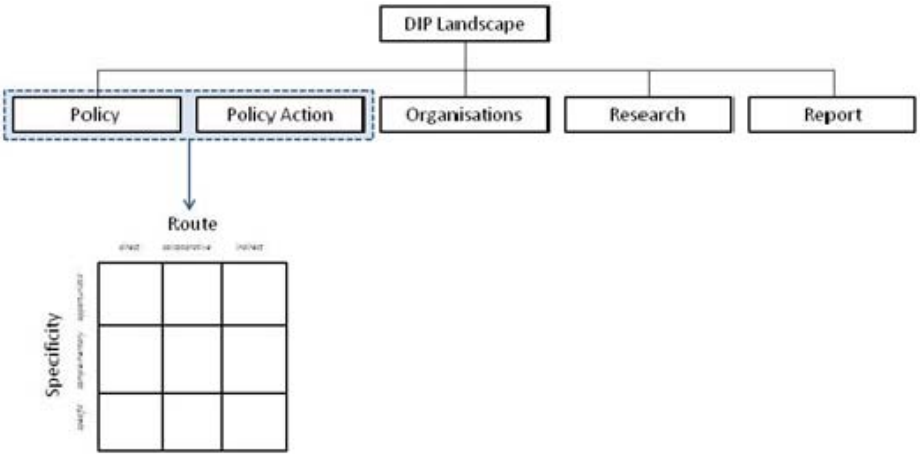

Figure 5. Categorisation – 3x3 Matrix (Route and Specificity)

The above illustrates the proposed approach to the categorisation of design innovation policies. It classified all of the Design Innovation Policies and Policy Actions into 9 sub-categories within the 3x3 Characteristics of Design Innovation Policies Matrix. This approach provides two key benefits:

1. Firstly, data from the DIP Landscape can be filtered through this classification framework and through analysis, a number of observations drawn from the characteristics of the 9 sub-categories of design innovation policies and policy actions, and

2. Secondly, the data collected within the specific case studies can be used to augment the characteristics of the 9 sub-categories.

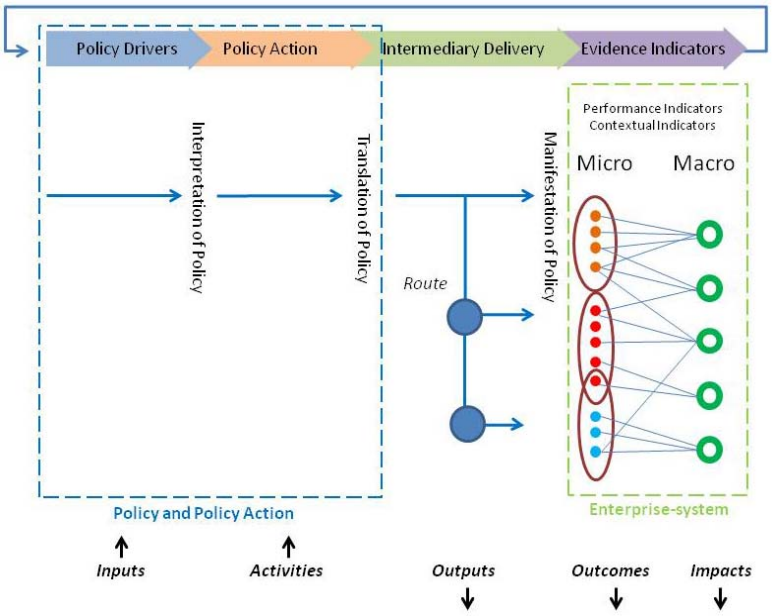

Figure 6. Design Innovation Policy Flow Model (based on UNAIDS 2010).

In this approach we have attempted (in simple terms) to triangulate the research observations from both a macro and micro scale. To assist in the understanding of the conceptual link between individual elements of the eco-system, a design innovation policy flow model has been developed (Figure 6, Design Innovation Policy Flow Model).

The design innovation policy flow model indicates (at a conceptual level) the flow of activities within the eco-system - from policy drivers (established by policy makers), through policy action (in the form of policy programmes and/or initiatives), via delivery of policy action (normally by intermediaries), and which manifests the policy (at a micro level) by acting on the enterprise-system.

The design innovation policy flow model identified a relationship between micro and macro indicators within the enterprise-system. Based upon our key macro-micro indicator premise we believe that it is possible to organise micro design innovation policy indicators in such a way that the presence of macro design innovation policy indicators (by inference). The exact nature of the relationship between indicators at the micro and macro scale needs to be determined.

FINDINGS

Our research identified difficulties in the evaluation of designs contribution and impact in innovation policies. This is compounded by a lack of evaluation frameworks and a paucity of robust evaluations leading to less effective and disconnected design innovation policies.

In developing a design innovation taxonomy we identified the challenge in determining the presence and contribution of design within broader innovation policies. Then need to develop a taxonomy that explicitly identifies and leads to design policy indicators was evident. This, the authors assert, cannot be achieved by adapting existing innovation taxonomy's as:

- The design component is not explicitly stated;
- In the context of Europe 2020, design is a means to the end (innovation) just as innovation is a means to its end (jobs and growth);
- Design is dissipated 'amongst' innovation policy;
- Design can enhance any part of an innovation policy – in reality it appears in varying degrees and at various points.

The design innovation policy categorisation framework and taxonomy aims to provide a mechanism in which the relationship between macro and micro indicators can be accommodated and articulated. In taking forward the three work streams, detailed consideration was needed in terms of the relationship between macro and micro indicators.

This document has attempted to contextualise and develop a categorisation framework and taxonomy of design innovation policies. It is clear from the work we have conducted that there are more than one way of categorising design innovation policies and as such there isn't a right and wrong approach.

We have used literature to ground many of our concepts but admit that there is still more relevant literature that could be reviewed. We do not necessarily believe that a more extensive literature review would provide a substantial return on our investment as there is little rigorous and meaningful policy literature related directly to design policy.

Our categorisation framework and taxonomy is still a work in progress and until additional work in undertaken – particularly in terms of indicators, Scoreboard and the initial stages of the DeEP Evaluation Tool – this framework will remain largely conceptual. To ensure that we develop a robust and defensible categorisation framework we advocate an iterative and collaborative development process, one in which all of the consortium feel able to contribute. This process would also include a distinct phase of testing and refinement.

Some key observations regarding our proposed categorisation framework and taxonomy include:

- We have not developed a classic taxonomy - in the true sense of the term - as we believe that such a narrow approach would potentially miss out on opportunities for a more robust and flexible categorisation framework.
- There is a need to link the activities of WP2 and WP3 particularly in terms of design innovation policy indicators. In doing so we look to develop a categorisation framework that enables the relationship between micro and macro indicators to be decoded. We envisage that over the coming months that there will be opportunities to integrate the outcomes of these respective WPs and develop a series of design innovation policy indicators – both at micro and macro levels – will be developed.
- We recognise that within this document we have discussed a number of micro policy indicators. We are aware that the focus of WP2 is macro policy indicators but it is very apparent to us that much of the literature related to policy indicators focus upon micro factors. As noted in the previous point, the integration of WP2 and WP3 should enable a rich understanding of both micro and macro policy indicators.
- We have attempted to develop an approach that is able to accommodate policy indicators at both micro and macro levels and critically attempted to consider the potential relationship between these indicators. The Design Innovation Policy Flow Model (Fig.6, page 11) presents an outline relationship between micro and macro policy indicators and is based upon the premise that macro design innovation policy indicators cannot be identified reliably but their presence can be inferred by aggregating micro design innovation policy indicators.
- Literature related to macro policy indicators utilises terminology related to ‘success measures’ of ‘how do we measure success’ rather than simply referring to indicators. Some commentators state that researchers and policy stakeholders should shy away from developing new policy indicators claiming that if new policy indicators were needed, they would have already have been identified. This presents DeEP with a

challenge – how do we identify existing policy indicators that have an appropriate level of 'designerlyness'!

There are more issues that deserve attention in terms of categorisation of design innovation policies but we have attempted to identify the key issues for consideration by the consortium.

A final point to end on is the lack of information available in terms of macro design policy indicators. We have been unable to identify any meaningful and reliable sources of macro design policy indicators that can be utilised within DeEP. To this end there may be a case for the development of new 'designerly' macro policy indicators while ensuring that these relate clearly to micro policy indicators.

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Understanding the nature of service design research: A theoretical classification and explication

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Keywords: service design, design theory

This paper adapts a taxonomy of theory developed by Gregor (2006) to classify research articles appearing in two leading services journals. The aim of this classification is to understand how service design research fits within the broader services discipline, and to promote discussion around the requirements for a stronger theory base for service design research moving forward.

INTRODUCTION

Despite more than three decades of service-related research, the topic of service design has only recently emerged as a distinct field of enquiry. Drawing from research traditions in the areas of marketing, management, interactive design, systems engineering (and others); the research to date could be described as eclectic at best. These different research traditions create tension due to the different disciplinary priorities, and the inherent ontological, epistemological and methodological paradigms that exist within these disciplines. What is lacking is a clear understanding of the nature and value of the different theoretical contributions that can be made to the service domain, and importantly, an appreciation of the contribution of service design to theory.

The aim of this paper is to understand the role and nature of service design theory. Using a typology of theories developed by Gregor (2002, 2006), we distinguish between (i) theory for analysing and describing, (ii) theory for explaining, (iii) theory for predicting, (iv) theory for explaining and predicting, and (v) theory for design and action. The classification system proposed is drawn from work in the field of information systems, and has resulted from an

iterative process. This work involved the study of the nature of theories evident in social science, analysis of prior empirical and non-empirical work, and refinement of an analytic classification method that distinguished among the classes of theory on the basis of their purpose.

The view adopted here is that service design research needs to be based upon well-defined constructs, definitions and propositions that both explain and predict phenomena. The difference, however, is that service design research also has an additional role to prescribe and provide guidance. In this way, service design research needs to go a step further and address "*how something should be done*." It needs to present general principles to solve classes of business problems, and in doing so, inform the design of context-specific solutions to unique service delivery challenges. The abstraction and generalization that needs to occur in order to theorize distinguishes the academic study of service design from what typically occurs in consulting and practice.

The importance of design theory in services should be recognized. Services are, essentially, an applied phenomenon. As such, academic research should seek to provide guidance to people who have to take action in the "real" world. A critical examination of what service design theory entails, and importantly, how it is related to and varies from other types of theory would make a valuable and timely contribution. In addressing these issues, the present paper seeks to establish some common understanding of the form that knowledge claims can take in the area of service design theory, and in doing so, provide some clues about how such knowledge claims can be developed and tested.

DIFFERENT TYPES OF THEORY

In this paper the categorization of theory depends on the primary purpose that the theory under consideration is to serve. This purpose will, in turn, depend on the focal question of the research to be undertaken. For example, Gregor (2002) suggests that if we are interested in describing and categorizing the entities that we believe are relevant to a particular area of enquiry, development of descriptive theory is appropriate and sufficient. However, if the objective is to explain, predict, or to design some particular intervention then a different type of theory is needed.

We acknowledge that theory can be considered from many different perspectives, and can be classified in ways that differ from the categorization adopted in this paper. To this end, Neuman (2000) adds that theory can be categorized in terms of (i) the direction (deductive or inductive), (ii) the level of the theory, (iii) whether it is formal or substantive, (iv) the forms of explanations it employs, and (v) the overall framework of assumptions and concepts in which it is embedded.

Table 1 presents a summary of the characteristics of the five dominant types of theory within the social sciences that emerge from a classification of theory based on research purpose. While this work was informed by prior research in the field of information systems (Gregor,

2006), it has been adapted here to reflect the relevance of the service context. Following this table is a brief discussion of each type of theory. Importantly, this discussion will include a consideration of what the theory aims to achieve, the types of situations in which the theory may be applied, and the methodological traditions associated with the particular type of theory.

While one might seek to identify a dominant epistemology, we agree with Gregor (2006) that none of the types of theory presented here belong to a particular research paradigm *per se.* Though we have chosen not to include a criterion related to epistemology, we acknowledge that certain paradigms may favour a particular type of theory. An observation regarding Gregor's (2006) original taxonomy, however, was that it blurred the boundaries between the categories of theory. A more careful distinction between taxa based on purpose, means of conceptualization, and methods could further strengthen the validity of the original taxonomy.

Table 1. Taxonomy of theory within the social sciences

	Type I	Type II	Type III	Type IV	Type V
Purpose	Analysis and description "what is"	Explanation "how, why, when, and where"	Prediction "what will be"	Explanation and Prediction "how, why, when, where, and what will be"	Design and action "how to do something"
Means of conceptualization	Logical models	Explanatory models	Statistical models	Structural (mathematical) models	Process models
Methods	Descriptive (non-empirical)	Primarily qualitative	Primarily quantitative	Mixed methods	Action/ design research
Causal explanations	No	Yes	No	Yes	Yes
Testable propositions	No	No	Yes	Yes	Yes
Prescriptive statements	No	No	No	Some, though not the main objective.	Yes

Type I: Theory for Analysis and Description

Descriptive theory says “what is.” Theories for analysis and description are the most basic type of theory that tend to describe or classify specific dimensions or characteristics of individuals, groups, situations, or events by summarizing the commonalities found from observation. This type of theory is needed when nothing or very little is known about the phenomenon in question (Fawcett and Downs, 1986, p. 4).

Stevens (1984) posits that there are two categories of descriptive theory – naming and classification. A naming theory is a description of the dimensions or characteristics of some phenomenon. A classification theory, on the other hand, is more elaborate in that it attempts to describe the inter-relationships between the dimensions and/or characteristics of a phenomenon. The dimensions may be mutually exclusive, overlapping, hierarchical, or sequential. Classification theories are frequently referred to as typologies, taxonomies or frameworks.

Research approaches for building a descriptive theory include analysis of existing evidence or data, philosophical and historic enquiry. This type of theory usual results in summary models that depict a set of logics.

Type II: Theory for Explanation

The second type of theory explains “how” and “why” something occurred. It is not formulated in such a way, however, that predictions about the future are made so that they can be tested. At least two types of work may be distinguished here. In the first, theory is used as a “sensitising device” to view the world in a certain way (Klein and Myers, 1999, p. 75). Similarly, DiMaggio (1995, p. 391) describes “theory as enlightenment” where theory serves as a tool for promoting enlightenment. From this perspective theory is complex, defamilarizing, rich in paradox. Theorists enlighten not through conceptual clarity… but by startling the reader into satori. The point of theory, in this view, is not to generalize, because many generalizations are widely known and rather dull. Instead, theory is a ‘surprise machine’... a set of categories and domain assumptions aimed at clearing away conventional notions to make room for artful and exciting insights.

In a second type of theory for explanation, “conjectures” are drawn from a study of how and why things happened in some particular real world situation. These conjectures could form the basis of subsequent theory development, or be used to inform practice.

Research approaches that can be used to develop this type of theory include case studies (Yin, 1994), interviews, ethnographic, phenomenological and hermeneutic approaches (Denzin and Lincoln, 1994), and a grounded theory approach (Strauss and Corbin, 1994a, 1994b). Type II theory typically leads to explanatory models depicting key observations and relationships that form the building blocks of new theory.

Type III: Theory for Predicting

Theories aimed at prediction concern “what will be”. These theories are able to predict outcomes from a set of explanatory factors, without necessarily understanding or explaining the causal connections between the dependent and independent variables. Associated research approaches include statistical techniques such as correlation or regression analysis. Correlation work can be longitudinal, that is, we can show how Y varies with a number of independent variables (X1, X2, …) over a time period. Correlation studies can also be multi-directional, that is we can say larger values of X are related to larger values of Y, and also larger values of Y are related to larger values of X (as in height and weight of the population). While various quantitative methods can be used in support of this type of theory, experiments and quazi-experiments are particularly useful for isolating extraneous factors.

Type IV: Theory for Explanation and Prediction

This type of theory says “what is”, “how”, “why” and “what will be”. To many it is the real view of theory (the traditional view). A theory is a set of interrelated constructs (concepts), definitions, and propositions that presents a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting the phenomena (Kerlinger, 1973, p.9).

This theory type implies both prediction and understanding of underlying causes, as well as good description of theoretical constructs. Authorities can be found for the dimensions and specification of theories of this type (for example, Dubin, 1978). In the social sciences, the predictions made are not expected to take the form of universal or covering laws, but rather to be probabilistic-type propositions (Little, 1999, p. 705) which are sometimes described as law-like generalizations (Hunt, 1971).

Almost all research methods can be used to investigate aspects of theory of this type, including case studies, surveys, experiments, statistical analysis, field studies, and also interpretive methods if they are used to extend a theory’s predictive power. Increasingly, this type of theory will rely on a mixture of the above research methods (Creswell and Clark, 2007). As the goal of this type of theory is to understand the causal relationships among constructs, the dominant means of conceptualization is structural and/or mathematical models.

Type V: Theory for Design and Action

This type of theory has two aspects. First, it can concern the methodologies and tools used in the development of service systems. Second, it can be about “design principles”, which are design decisions and design knowledge that are intended to be manifested or encapsulated in an artefact, method, process or system. In both cases it must be possible to articulate the principles instantiated in the method, tool, process, or design. It is this articulation, whether in natural language, diagrams or similar, that constitutes the design theory. In a service setting, this type of theory is typically represented as a process model that details the sequence of

steps in the formulation and delivery of a service. This type of theory is discussed in greater detail in later sections of this paper.

CLASSIFICATION BY THEORY TYPE

Using this taxonomy of theory as a classification schema, we undertook an analysis of articles published during 2012 in the two main outlets for multi-disciplinary services research—*Journal of Service Research* (JSR) and *Journal of Service Management* (JSM). This resulted in a total pool of 61 articles after exclusion of editorials and other non peer reviewed contributions (see Appendix for details).

Table 2. Classification of services research

Theory type	Frequency of occurrence		
	JSR	JSM	Total
Type I – Analysis and Description	5	6	11
Type II – Explanation	3	7	12
Type III – Prediction	5	3	8
Type IV – Explanation and Prediction	15	12	27
Type V – Design and Action	1	4	5
Total	29	32	61

Based on the above classification, we can see that the dominant type of theory represented in the services literature is Type IV. This analysis also reveals that service design theory represents only a small proportion of the overall services-related research published in the two journals (~8%). The data also suggests that the *Journal of Service Management* is more theoretically diverse, and statistically more likely to publish service design research.

TOWARD A BETTER UNDERSTANDING OF SERVICE DESIGN

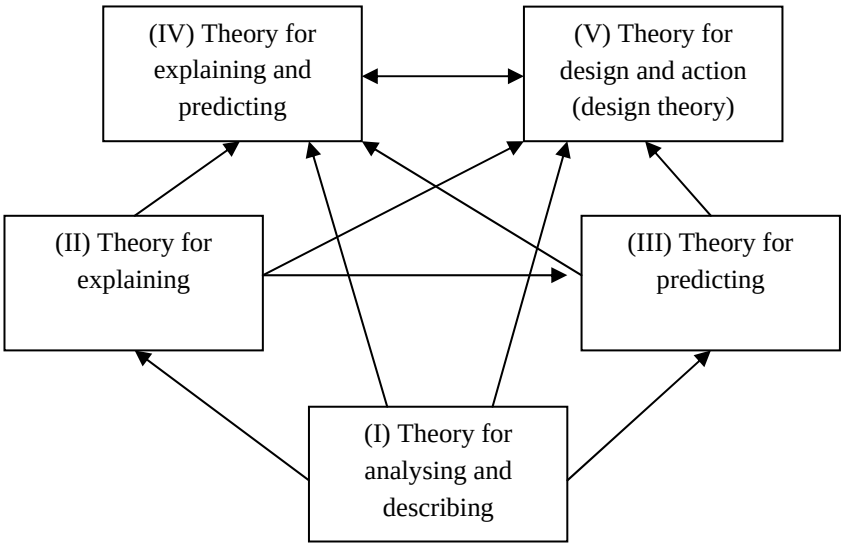
Design theory is, in essence, a variation of traditional theory that both explains and predicts. In this sense design theory should have well-defined constructs, definitions and propositions that both explain and predict phenomena. The difference is that this type of theory has an additional role in that it is normative or prescriptive. The propositions go a step further and say “how something should be done”.

The paper by Teixeira et al (2012) is a good example of a theory of this type. It gives explicit design and development principles for converting an understanding of customer experience (obtained via Type II) into a service design (Type V). The paper used grounded theory to

identify the constructs that impact on consumer perceptions of multimodal entertainment services. The authors provide examples of design guidelines (factsheets) that codify different value creating activities based on customer experience requirements and service characteristics such as location and performance requirements. These guidelines were then translated into a Customer Experience Model that provided a practical service design solution that considered both the service encounter and service experience. Embedded within this model were advanced design principles such as those relating to the reliability of technology artefacts involved in the provision of multimodal entertainment services. Such principles (propositions) have a predictive component that can be phrased in a fashion similar to propositions in traditional theory. For example, this principle implies that poor performance reliability will impact negatively on user experience and demand for a multimodal entertainment service. Other researchers can test these propositions with Type IV theory, or with Type V theory where the goal is to design and test improved artefacts. The design theory proposed by Teixeira et al. (2012) consists of general principles to solve a class of business problems (customer experience with an entertainment services), rather than a unique set of system features to solve a unique business problem (a particular service from a particular provider). The abstraction and generalization that occurred here distinguishes the study from what would occur in consulting.

The above example also demonstrates how design theory can be informed by (and inform) other types of theory. A general, formalized methodology can build on particular idiographic studies of what has worked in practice, on predictive relationships that are known but not fully understood and on traditional theories such as those relating to data representation or human behaviour. Figure 1 illustrates these relationships.

Figure 1. Inter-relationships among the types of theory (adapted from Gregor, 2006)



The inter-relationships between the theory types can be bi-directional. Work on design theory can lead to advances in other types of theory. For example, principles of artefact design (as in the case of the above example) could lead to improvement in underlying theories of consumer behaviour (of the traditional type). Similarly, practical implementations of methods may lead to refinement of frameworks, taxonomies or construct definitions.

In this sense, design theory (type V) can be considered a special case of traditional theory (Type IV). In much of the work of the traditional-theory type, the primary focus is on developing an integrated body of knowledge – where the design implications are secondary. In contrast, design theory seeks to identify and codify general design principles to inform practice. The knowledge needs to be stated in such a way that it provides guidance in practice for the design, development and use of information systems. To this end, we highlight Cook and Campbell's (1979) idea of recipes, and Alexander's (1979) pattern design principles.

Design theory can arise from a situation in which imagination, art, or a designer's insights result in a new way of solving problems being "discovered". This discovery can be instantiated in a design solution, providing a proof-of-concept. The new design theory could be based on existing theories of Type IV – what Walls et al. (1992) term "kernel" theory – that are combined together or interpreted in new or novel ways. This situation is similar to "theory-building" in traditional theory, and is congruent with views in the philosophy of science. Popper (1976) says that the act of conceiving or inventing a theory is a matter of conceptualisation and not the province of science.

What constitutes a contribution to knowledge with design-type research? Drawing on the work of Gregor (2002), March and Smith (1995) and Gregor and Hevner (2013), we proffer some criteria that may be useful:

- In the theory-building phase, the value or utility to a community of users is important, especially with the first design solution of any type: Building the first of any set of constructs, model, method or instantiation is deemed to be research, provided the design has utility for an important task. The research contribution lies in the novelty of the solution and in the persuasiveness of the claims that it is effective (March and Smith, 1995, p. 260).
- With research that builds subsequent constructs, models, methods and instantiations, judgement is based on 'significant improvement"; whether the design solution offers, for example, improvements such as better performance, efficiency, understandability or ease-of-use.
- Instantiations that apply known constructs, methods and principles, to novel tasks may be of little significance. The prime concern is with the uncertainty of the success of the design solution – for example, applying new communications technology to a service system in a well-structured domain is likely to be of little significance when there is little uncertainty about its chance of success.

- In theory-testing, the evaluation of design solutions is worthwhile design theory research. Different solutions can be evaluated with respect to different metrics. For example, evaluation of constructs tends to involve completeness, simplicity, elegance, understandability. Models are evaluated in respect of their fidelity with real-world phenomena, completeness, level of detail, robustness, internal consistency and usefulness in practice. For example, service development methods or tools can be evaluated with respect to the quality of results obtained by others applying the methods or tools.

In addition, it is assumed that the general design principles represented in the design solution are articulated clearly so that they can be followed and tested by others. To this end, we note that criteria for evaluating artefact designs in other disciplines (e.g., information systems) may also be effective for evaluating service designs, with some adaptation.

CONCLUSION AND DISCUSSION

This paper has distinguished five different types of theory important for the study of service systems: (i) theory for analysing and describing, (ii) theory for explaining, (iii) theory for predicting, (iv) theory for explaining and predicting, and (v) theory for design and action.

The fifth category of design theory was discussed in detail. Prior discussion of this type of theory in services is relatively sparse and what work does exist is not entirely congruent. We argue that service design theory should be distinguished from other types of services theory to allow its nature to be examined in more detail. Service design theory is seen as a special case of traditional theory that allows for both explanation, prediction and testing of propositions. The distinctive feature of service design theory is that it is normative and gives guidance (design principles) for action in the real world. These design principles relate to artefacts that include system or subsystem models, features of the service delivery system, and development methodologies and tools.

The importance of design theory in services should be recognized. It is essentially an applied discipline, one which should provide guidance to people who have to take action in the world. Thus, a critical examination of what design theory entails is valuable. It would be advantageous if the service research community could come to some common understanding of the form that knowledge claims in this theory can take, and the means by which such knowledge claims are developed and tested.

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Byron is a Professor of Service Management at the University of Canberra. With more than 20 years of commercial and academic research experience, Byron has undertaken studies for a range of clients including Tourism Australia, DHL, Westpac, National Portrait Gallery, National Capital Attractions Association, Tourism NSW, Australian Capital Tourism and many more. His research has been published in journals such as Proceedings of the IEEE, European Journal of Information Systems, and the Journal of the Academy of Marketing Science, His PhD, which examined the impact of technology on service delivery and consumption in different service settings, won two international dissertation awards. Professor Keating has also received numerous best paper awards and was recognised in 2009 with an Endeavour Fellowship to work with the National University of Singapore to examine the impact of CSR on service, and in 2012 he was awarded an Australian Research Council linkage industry fellowship to further his work on service experience within the cultural sector.

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Appendix: Classification of Research Articles

Journal issue	Title of research article	Author/s	Theory type
Journal of Service Research			
2012; 15 (4)	Health Care Customer Value Cocreation Practice Styles	Janet R. McColl-Kennedy, Stephen L. Vargo, Tracey S. Dagger, Jillian C. Sweeney, Yasmin van Kasteren	Type II - Explanation
2012; 15 (4)	Can Customers Detect Script Usage in Service Encounters?	Liana Victorino, Rohit Verma, Bryan L. Bonner, Don G. Wardell	Type III - Prediction
2012; 15 (4)	A Neurophysiological Assessment of Consumers' Emotional Responses to Service Recovery Behaviors: The Impact of Ethnic Group and Gender Similarity	Christo Boshoff	Type III - Prediction
2012; 15 (4)	"I'm Mad and I Can't Get That Service Failure Off My Mind": Coping and Rumination as Mediators of Anger Effects on Customer Intentions	Yuliya Strizhakova, Yelena Tsarenko, Julie A. Ruth	Type IV - Explanation and Prediction
2012; 15 (4)	How Does Language Matter for Services? Challenges and Propositions for Service Research	Jonas Holmqvist Christian Grönroos	Type 1 – Analysis and Description
2012; 15 (4)	The Impact of Vertical Service Line Extensions and Brand Salience on Reciprocal Transfer of Image and Performance Associations	Jean Boisvert	Type IV - Explanation and Prediction
2012; 15 (4)	The Long-Term Influence of Service Employee Attrition on Customer Outcomes and Profits	Mahesh Subramony Brooks C. Holtom	Type III - Prediction
2012; 15 (4)	Antecedents to Consumer Perceptions of Sacredness in Extended Service Experiences: The Case of Golf	Lee Phillip McGinnis, James W. Gentry, Tao (Tony) Gao	Type IV - Explanation and Prediction
2012; 15 (3)	Customers as Resource Integrators: Toward a Model of Customer Learning	Sally Hibbert, Heidi Winklhofer, Mohamed Sobhy Temerak	Type 1 – Analysis and Description

2012; 15 (3)	The Impact of Process Recovery Communication on Customer Satisfaction, Repurchase Intentions, and Word-of-Mouth Intentions	Yves Van Vaerenbergh, Bart Larivière, Iris Vermeir	Type IV - Explanation and Prediction
2012; 15 (3)	Understanding Trust in Financial Services: The Influence of Financial Healthiness, Knowledge, and Satisfaction	Torben Hansen	Type IV - Explanation and Prediction
2012; 15 (3)	Understanding the Relationships Between Commitment and Voice:Hypotheses, Empirical Evidence, and Directions for Future Research	Sharon E. Beatty, Kristy E. Reynolds, Stephanie M. Noble, Mary P. Harrison	Type IV - Explanation and Prediction
2012; 15 (3)	On the Role of Empathy in Customer-Employee Interactions	Jan Wieseke, Anja Geigenmüller, Florian Kraus	Type IV - Explanation and Prediction
2012; 15 (3)	How Can Supervisors Improve Employees' Intention to Help Colleagues? Perspectives From Social Exchange and Appraisal-Coping Theories	Ching-I Teng, I-Chen Lee, Tsung-Lan Chu, Hsin-Ting Chang, Tzu-Wei Liu	Type IV - Explanation and Prediction
2012; 15 (3)	Measuring and Improving the Performance of Health Service Networks	Maik Hammerschmidt, Tomas Falk, Matthias Staat	Type III - Prediction
2012; 15 (2)	Dibs! Customer Territorial Behaviors	Merlyn A. Griffiths Mary C. Gilly	Type II - Explanation
2012; 15 (2)	My Customers Are in My Blind Spot: Are They Changing and I cannot See It?	Karolina Wägar, Inger Roos, Annika Ravald, Bo Edvardsson	Type 1 – Analysis and Description
2012; 15 (2)	Service Locus of Control and Customer Coproduction: The Role of Prior Service Experience and Organizational Socialization	Marion Büttgen, Jan H. Schumann, and Zelal Ates	Type IV - Explanation and Prediction
2012; 15 (2)	Visualizing Service Operations	Scott E. Sampson	Type V – Design and Action
2012; 15 (2)	Understanding Priorities for Service Attribute Improvement	Donald R. Bacon	Type III - Prediction
2012; 15 (2)	Key Drivers of Frontline Employee Generation of Ideas for Customer Service Improvement	Cristiana R. Lages and Nigel F. Piercy	Type IV - Explanation and Prediction

2012; 15 (2)	Moderating Role of Stress in Evaluating Negative Services:Encounters With the Police	Sangeeta Singh and Lola C. Duque	Type IV - Explanation and Prediction
2012; 15 (1)	Spectator Rage as the Dark Side of Engaging Sport Fans:Implications for Services Marketers	Stephen J. Grove, Gregory M. Pickett, Scott A. Jones, Michael J. Dorsch	Type 1 – Analysis and Description
2012; 15 (1)	Linking Service-Dominant Logic and Strategic Business Practice: A Conceptual Model of a Service-Dominant Orientation	Ingo O. Karpen, Liliana L. Bove, Bryan A. Lukas	Type 1 – Analysis and Description
2012; 15 (1)	Fostering Innovation in Cultural Contexts: Market Orientation, Service Orientation, and Innovations in Museums	Carmen Camarero and Ma José Garrido	Type IV - Explanation and Prediction
2012; 15 (1)	Characterizing Value as an Experience: Implications for Service Researchers and Managers	Anu Helkkula, Carol Kelleher, Minna Pihlström	Type II - Explanation
2012; 15 (1)	Disclosure Antecedents in an Online Service Context: The Role of Sensitivity of Information	David L. Mothersbaugh, William K. Foxx II, Sharon E. Beatty, Sijun Wang	Type IV - Explanation and Prediction
2012; 15 (1)	Customer Delight: Distinct Construct or Zone of Nonlinear Response to Customer Satisfaction?	Adam Finn	Type IV - Explanation and Prediction
2012; 15 (1)	A Complementary Resource Bundle as an Antecedent of E-Channel Success in Small Retail Service Providers	Yun Kyung Cho and Larry J. Menor	Type IV - Explanation and Prediction
Journal of Service Management			
2012; 23 (5)	How organizational and employee-customer identification, and customer orientation affect job engagement	Nwamaka A. Anaza, Brian Rutherford	Type IV - Explanation and Prediction
2012; 23 (5)	Collaboration competency and partner match for e-service product innovation through knowledge integration mechanisms	Hung Tai Tsou	Type IV - Explanation and Prediction

2012; 23 (5)	Antecedents to participation in corporate social responsibility programs	Anna S. Mattila, Lydia Hanks	Type III - Prediction
2012; 23 (5)	Exploring internal mechanisms forming customer servicescape experiences	Jörg Pareigis, Per Echeverri, Bo Edvardsson	Type II - Explanation
2012; 23 (5)	Shaping, organizing, and rethinking service innovation: a multidimensional framework	Luis Rubalcaba, Stefan Michel, Jon Sundbo, Stephen W. Brown, Javier Reynoso	Type 1 – Analysis and Description
2012; 23 (4)	The emergence of the new service marketing: Nordic School perspectives	Evert Gummesson, Christian Grönroos	Type 1 – Analysis and Description
2012; 23 (4)	Viable service systems and decision making in service management	Ralph Badinelli, Sergio Barile, Irene Ng, Francesco Polese, Marialuisa Saviano, Primiano Di Nauta	Type 1 – Analysis and Description
2012; 23 (4)	“Five Co-s” in innovating: a practice-based view	Tiziana Russo-Spena, Cristina Mele	Type II - Explanation
2012; 23 (4)	Practices and experiences: challenges and opportunities for value research	Anu Helkkula, Carol Kelleher, Minna Pihlström	Type II - Explanation
2012; 23 (4)	Value co-creation and university teaching quality: Consequences for the European Higher Education Area	Montserrat Díaz-Méndez, Evert Gummesson	Type II - Explanation
2012; 23 (4)	Co-creating customer-focused solutions within business networks: a service perspective	Taru Hakanen, Elina Jaakkola	Type II - Explanation
2012; 23 (3)	Customer co-creation in service innovation: a matter of communication?	Anders Gustafsson, Per Kristensson, Lars Witell	Type IV - Explanation and Prediction
2012; 23 (3)	Co-creation and learning in health-care service development	Mattias Elg, Jon Engström, Lars Witell, Bozena Poksinska	Type V – Design and Action
2012; 23 (3)	How to transform consumers into fans of your brand	Benedikt Jahn, Werner Kunz	Type IV - Explanation and Prediction

2012; 23 (3)	Customer experience modeling: from customer experience to service design	Jorge Teixeira, Lia Patrício, Nuno J. Nunes, Leonel Nóbrega, Raymond P. Fisk, Larry Constantine	Type V – Design and Action
2012; 23 (3)	Pushing the frontier of sustainable service operations management: Evidence from US hospitality industry	Jie J. Zhang, Nitin Joglekar, Rohit Verma	Type III - Prediction
2012; 23 (3)	Reversing the green backlash in services: credible competitors help large companies go green	HaeEun Helen Chun, Michael Giebelhausen	Type IV - Explanation and Prediction
2012; 23 (3)	Transitioning from a goods-dominant to a service-dominant logic: Visualising the value proposition of Rolls-Royce	Irene Ng, Glenn Parry, Laura Smith, Roger Maull, Gerard Briscoe	Type V – Design and Action
2012; 23 (3)	Service innovation in manufacturing	John E. Ettlie, Stephen R. Rosenthal	Type 1 – Analysis and Description
2012; 23 (3)	Service's scientific community: a social network analysis	Michele Esteves Martins, Guilherme Silveira Martins, João Mario Csillag, Susana Carla Farias Pereira	Type 1 – Analysis and Description
2012; 23 (2)	Waiting for service at the checkout: Negative emotional responses, store image and overall satisfaction	Allard C.R. van Riel, Janjaap Semeijn, Dina Ribbink, Yvette Bomert-Peters	Type IV - Explanation and Prediction
2012; 23 (2)	Coping with customer aggression	Ruhama Goussinsky	Type IV - Explanation and Prediction
2012; 23 (2)	Online apparel retailing: roles of e-shopping quality and experiential e-shopping motives	Sejin Ha, Leslie Stoel	Type IV - Explanation and Prediction
2012; 23 (2)	Communication channel consideration for in-home services: The moderating role of customer participation	Marcel van Birgelen, Benedict G.C. Dellaert, Ko de Ruyter	Type III - Prediction
2012; 23 (2)	Proactive diagnosis: how professional service firms sustain client dialogue	Jan Henrik Sieg, Alban Fischer, Martin W. Wallin, Georg von Krogh	Type II - Explanation
2012; 23 (2)	Governing for innovation in horizontal service cooperations	Silvia Steinicke, Carl Marcus Wallenburg, Christina Schmoltzi	Type IV - Explanation and Prediction

2012; 23 (1)	EXQ: a multiple-item scale for assessing service experience	Philipp “Phil” Klaus, Stan Maklan	Type IV - Explanation and Prediction
2012; 23 (1)	Refinement of the technology readiness index scale: A replication and cross-validation in the self-service technology context	Jiun-Sheng Chris Lin, Pei-Ling Hsieh	Type IV - Explanation and Prediction
2012; 23 (1)	Customer choice of self-service technology: the roles of situational influences and past experience	Cheng Wang, Jennifer Harris, Paul G. Patterson	Type II - Explanation
2012; 23 (1)	Role of web site design quality in satisfaction and word of mouth generation	Young Ha, Hyunjoo Im	Type IV - Explanation and Prediction
2012; 23 (1)	Specifying business services: learning from software engineering	Joaquin Peña-Siles, Maria del Mar González-Zamora, José A.D. Machuca	Type 1 – Analysis and Description
2012; 23 (1)	Service-driven manufacturing: Provision, evolution and financial impact of services in industrial firms	Heiko Gebauer, Guang-Jie Ren, Aku Valtakoski, Javier Reynoso	Type V – Design and Action

Using Design to Initiate Collaborative Networks

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Keywords: Collaborative Networks, Knowledge Sharing/Exchange, and Boundary Objects.

Collaborative network formation is necessary for the development of Product Service innovations used to address societal challenges. Initiation of collaborative networks requires the recognition and understanding of the interdependence necessary for sharing/creating knowledge, which in turn requires a high sense of trust. We report on an effectively executed case study. A workshop with context specific boundary objects was designed and executed to facilitate a context in which actors from different organizations could experience mutual trust and understanding, and learn from each other. Through this experience participants were able to discern the value of collaboration, unite with common visions, and form a collaborative network.

1. INTRODUCTION

We live in a world, which is put to test on a daily basis by local and global societal challenges (e.g. aging) that have to be addressed. A societal challenge is defined as a major social, economic, political, and cultural issue for the society, also known as a wicked problem [Churchman 1967; den Ouden 2011]. Addressing wicked problems requires systemic solutions that have potential to instigate radical change in society [McAloone *et al.* 2002; Tan *et al.* 2006]. One promising approach developed for addressing wicked problems in the past decade is the concept of Product Service Systems (PSS) [McAloone *et al.* 2002; CRISP 2010; den Ouden 2011; Sturkenboom *et al.* 2013]. A PSS offers a space in which providers can optimize user experience, product efficiency, and cost whilst minimizing the waste of resources. PSS allows for control over products, services and value flows within an economic system that is hard to penetrate, copy, or to forfeit. This system is usually supported by one or more stakeholders that have merged their assets for it to exit [Baines *et al.* 2007]. Some scholars have motivated the potential of design as a discipline to initiate PSS and support

networked innovation [McAloone *et al.* 2002; Morelli 2003; den Ouden 2011]. In what follows, we look more closely at wicked problems and the potential of PSS design for addressing them.

1.1 (Addressing) wicked problems

Churchman (1967) first introduced the phrase 'wicked problems' (WP's) when discussing moral responsibility of operations research to show managers how scientific solutions fail to tame their WP's. Rittel & Webber (1973) describe WP's within social policy planning according to ten characteristics, which can be distilled into the following:

(1) There is no definitive framing or solution for a WP as it is dynamic in nature. Addressing WP's requires frequent reframing of the problem, which determines how a solution is designed and applied [Rittel & Webber 1973; Paton & Dorst 2012]; (2) WP's are unique and have no definitive or pre-fixed solutions; (3) Knowledge about WP's is often incomplete, contradictory, and changing. This makes it difficult to create a set of requirements for solving the problem; (4) Every attempt of addressing a WP has significant impact within society and therefore should be thoughtfully framed and executed; (5) Every WP can be considered to be a symptom of another problem, making it systemic.

WP's have also been recognized outside social planning areas and become a topic for many other fields including design (research). Within the Dutch national 'Creative Industry Scientific Program' (CRISP) (see section 3.2), the context in which this paper is written from, we aim to address the societal challenge of 'an aging society' [CRISP 2010]. Currently, knowledge on how to cope with an increasing aging population is both incomplete and even contradictory, creating different perspectives on how to deal with ageing. It is difficult to recognize user requirements, as how an individual copes with ageing is very much dependent on their physical, sociocultural, environmental, and economic conditions within society. Therefore, addressing the WP of an aging society, in the first place is not about coming up with a solution but rather about understanding of the WP in the first place [Martin 2009 cited in den Ouden 2011].

1.2 Product service system design

The concept of PSS exists about fourteen years but is relatively immature within design research and the creative industry [Goedkoop *et al.* 1999 cited in Baines *et al.* 2007]; CRISP 2010]. PSS innovation design, especially for addressing WP's, is seldom a single stakeholder act; Scholars like Mandell (2009) and den Ouden (2011) argue that collaborative network formations are required. Within such a network, stakeholders combine their knowledge, expertise, and resources to definite, understand, and address the WP's. By accumulating these assets, the likability increases that the network develops an appealing and innovative solution, which is supported throughout a society. Collaborative networks distinct themselves from other types of stakeholder networks by having a 'horizontal hierarchy' (easy access to resources) that highly depends on trust, recognition of interdependence among stakeholders,

and learning through the exchange of knowledge [Mandell 2009; Dovey 2009 cited in den Ouden 2011]. To date, PSS and networked innovation still face significant adoption and implementation barriers [Baines *et al.* 2007; Mandell 2011]. The adoption barriers are socio-culturally oriented and twofold: (1) Consumers have difficulty with the cultural shift from 'ownership' to 'usership' [Scholl 2006 cited in Rexfelt *et al* 2009; Rexfelt *et al* 2009]; and (2) Producers have difficulty with shifting from traditional ways of doing business to the new ways of doing business (e.g. loosing control, changes in the business model, knowhow for collaborating with other organizations, maintenance responsibilities, infrastructure risks, etc.) [Mandell 2011].

Within design management literature, various scholars have argued that designers can both play an important role within the initial phase of network formation for PSS innovation design and in PSS innovation design itself [CRISP 2010; Morelli 2003; McAloone *et al.* 2002; Cruickshank *et al.* 2012; Sturkenboom *et al.* 2013]. Challenges related to this critical, initial network formation, phase are twofold: (1) The involvement of key actors from potential stakeholders with the right mix of specific knowledge and capabilities for understanding and addressing the WP's [Nonaka *et al.* 2000; Reed *et al.* 2009]; (2) Creation of meaningful relationships based on interpersonal relations in form of trust, as commitment underlies the human knowledge creating activity [Polanyi 1958 cited in Nonaka *et al.* 2000; Mandell 2009; Morelli 2006]. Although there are many consultants developing and delivering collaborative network initiation and formation activities and tools there are few designers active in this space consciously designing collaborative network initiation and formation approaches, tools, and mechanisms [Nonaka *et al.* 2000; Cruickshank *et al.* 2012].

1.3 Research question and structure of this paper

Our goal in this paper is to understand how designers can support the initiation of a collaborative network. The research was done through a case study within a real-life context where designers designed and step-by-step facilitated a workshop encouraging a collaborative network formation to confront the societal challenge of 'an aging society'. This paper is structured in six sections. We start by providing a literature review on stakeholder management, knowledge (sharing), boundary objects, and the role of design (section 2). This is followed by an explanation of our research methodology, context, and setup (section 3). We then present the results of our case study (section 4). From there we first reflect on the case study (section 5) and later draw conclusions (section 6). Finally, in section 7, we discuss our future work.

2. LITERATURE REVIEW

In this section, a literature review is presented to motivate why aspects such as stakeholder management, knowledge (sharing), boundary objects, and the role of design are interesting to be considered for collaborative network initiation and formation.

2.1 Stakeholder management

In traditional stakeholder management literature, the first step towards initiation of a collaborative network is selecting appropriate stakeholders that are fit to contribute to an already well-defined solution. This step is dealt with through three main approaches: (1) Focus groups; (2) Semi structured interviews; and (3) Snowball sampling [Reed *et al.* 2009]. Although these methods are useful for finding stakeholders that are able to contribute in addressing well-defined problems, they fall short when one wants to address wicked problems (WP's) that are complex and dynamic in nature, especially during the early stages of innovation [Mandell 2009]. Problems for which stakeholder and solution possibilities are unknown and dynamic can be unappealing to work with. Often within the ill-defined WP's, there is no immediate value found for collaboration and if any, this poses the risk of becoming redundant at a later stage. Added to this, it is likely that stakeholders are unwilling to collaborate with natural or potential competitors [Randall *et al.* 2007 cited in Koskinen *et al.* 2011; Mandell 2009; Isaksson *et al.* 2011].

In contrast to a traditional solution based approach, when it comes to WP's, stakeholders first need to learn and understand what role they can play in the collaborative network (i.e. what can they bring in), why the collaboration is/can be meaningful, and how it can be valuable to them. Therefore, the formation of a collaborative network for addressing WP's requires a learning oriented approach that focuses on trust and recognition of interdependency through exchange and creation of knowledge (Mandell 2009). Knowledge creation is considered a critical factor in creating competitive success over time [Kogut & Zander 1992 cited in Carlile 2002; Nonaka & Takeuchi 1995 cited in Carlile 2002; Nonaka *et al.* 2000]. Therefore, learning, sharing, and accumulating different assets of knowledge makes a powerful incentive for collaboration, whilst also contributing to understanding of the WP, the recognition of interdependence, and creation of trust [Mandell 2009; Cruickshank *et al.* 2012]. The first step towards realizing a learning approach is carefully selecting actors from stakeholders that are in a position that qualifies them as a 'Chief Knowledge Officer' or something close to this [Nonaka *et al.* 2000]. In addition, forming a collaborative network requires a different understanding and ways of managing knowledge, so knowledge can be effectively and meaningfully exchanged, created and internalized [Nonaka *et al.* 2000; Mandell 2009; Cruickshank 2012; Scharmer & Käufer 2010].

2.2 Knowledge sharing (SECI & Ba)

In this paper we understand knowledge according to the definition of Nonaka & Takeuchi (1995) cited in Nonaka *et al*. (2000): "a dynamic human process of justifying personal belief toward the 'truth'", considering information only as knowledge when considered as a meaningful contribution the to the project context [Hislop 2005]. Knowledge can then be distinguished into two types: (1) 'Explicit knowledge', which is expressed through systemic methods and formal language and shared as data, scientific formulas, manuals and so on. Explicit knowledge is processed, transmitted and stored relatively easily [Nonaka *et al.* 2000]; (2) 'Tacit knowledge', which in contrast, is deeply rooted in action, procedures,

routines, commitment, ideas, values, and emotions [Polanyi 1966 cited in Nonaka *et al.* 2000; Schön 1983]. This category of knowledge is highly personal, hard to formalize and difficult to share but still equally important within the context of knowledge creation [Polanyi 1958 cited in Nonaka *et al.* 2000; Mandell 2009]. Advancing on this understanding of knowledge, Nonaka *et al.* (2000) continue to define knowledge as: (1) Dynamic: it is created within social interactions amongst individuals and organizations; (2) Context-specific: it depends on a particular time and space that is shared among actors; (3) Humanistic: it is essentially related to human action; and (4) Relational: it is rooted in an individual's value system(s).

To continuously create, convert, and transfer knowledge among actors, Nonaka & Hirotake describe an iterative, spiraling process of interactions between tacit knowledge and explicit knowledge for organizational learning, also known as SECI [Nonaka & Hirotake 1995 cited in Nonaka *et al.* 2000]. SECI distinct four modes of knowledge conversion: (1) Socialization: tacit-to-tacit knowledge transfer; (2) Externalization: tacit to explicit knowledge conversion; (3) Combination: a synthesis of knowledge; (4) Internalization: explicit to tacit knowledge conversion.

Because of the recognition of tacit and humanistic factors within knowledge creation (e.g. tacit knowledge is intangible, unbounded and dynamic), Nonaka *et al.* (2000) put a special emphasis on the context within a space and time that is shared among actors during knowledge creation, termed as 'Ba*'*. In the following section (2.3) we introduce a concept called 'boundary object' which we believe has potential for strengthening the Ba and this way supporting the knowledge conversation for collaborative network initiation and formation.

2.3 Boundary objects

The term 'boundary object' (BO) was initially coined by Star (1989 cited in Nonaka *et al.* 2000) and has been recognized by numerous scholars as 'an effective method to cross knowledge and cultural barriers among actors using shared and shareable visual/tangible objects' [e.g. Henderson 1991 & Wenger 1998 cited in Nonaka *et al.* 2000; Carlile 2002; Cruickshank *et al.* 2012]. Within new product development Carlile (2002) has considered the capacity of BO's to be both 'practical' and 'political'. Practical because they must establish a shared syntax for representing or specifying differences and dependencies at the boundary; Political because they must facilitate a process of knowledge creation/transformation which is localized, embedded, and in which boundaries are crossed. Moreover, Carlile has provided three characteristics of 'effective' BO's: A BO (1) "establishes a shared syntax or language for individuals in representing knowledge"; (2) It "provides a concrete means for individuals to specify and learn about their differences and dependencies across a given boundary"; (3) It "facilitates a process where individuals can jointly transform their knowledge" (p. 10).

We believe that within innovation design BO's can be distinguished into two types: (1) Type one: These are usually generic design or innovation tools (e.g. the Board of Innovation tools); and (2) Type two: BO's which are specifically designed for the context in which they are to be used, yet to some degree are open for interpretation by their users (e.g. Cultural Probes).

As design researchers, we are mainly interested in type two BO's as Cruickshank *et al.* (2012) have argued that designers possess the appropriate skills for designing effective BO's to support the process of knowledge exchange.

2.4 The role of design

In design management literature, where the understanding of PSS is relatively new, some authors have argued that designers can play a key role within collaborative network initiation and formation by providing initial PSS value propositions with potential to seduce/convince stakeholders into forming ties for collaboration [CRISP 2010; Morelli 2003; den Ouden 2011]. Designers often have been actively involved or seen within (new) product development as functional specialists, as part of a multi-functional team, or even the leader within new product development [Perks *et al.* 2005 cited in Tomico *et al.* 2011]. It is argued that designers hold highly developed skills that are relevant at larger levels of scope and complexity [Sanders & Stappers 2008 cited in Tomico *et al.* 2011; Stompff 2012]. Han (2010 cited in Tomico *et al.* 2011) identified three skills, i.e. producing, facilitation, and leading, which designers use to manage multi-stakeholder involvement in new service design. Our earlier work [Tomico *et al.* 2011] on initiating open innovation within multi-stakeholder through co-reflection sessions also confronted us with making, empathic, and entrepreneurial skills that designers advance from in such a setting.

Although the potential role of designers within PSS innovation design has been described as promising, the number of practical case studies that use step-by-step guidelines, clearly explain, and reflect on a suggestive invitational approach for collaborative network initiation and formation towards PSS innovation design are limited or unknown [Morelli 2006; McAloone 2006; Dougill *et al.* 2006 & Prell *et al.* 2008 both cited in Reed *et al.* 2009].

3. RESEARCH METHODOLOGY, CONTEXT, AND DESIGN

In order to answer the research question posed in section 1.3, our research triangulates between three pools of data and evidence: (1) The literature review presented in the previous section; (2) An in-depth case study that is performed by developing and executing a workshop within a real life societal challenge project; and (3) Observations and experiences from the initiated collaborative network, and related actors (participants) during and after the workshop.

3.1 Research approach

Based upon the insights from our literature review, we performed a case study by developing and executing a workshop based on a 'research through design' approach [Frayling 1993 cited in Koskinen *et al.* 2011]. In this approach, design action and reflection on action are considered creators of knowledge, and the design outcome is considered the physical proof of the knowledge generated [Schön 1983]. Since tacit knowledge among stakeholder actors,

requires human interaction in order to be shared and acquired, a design workshop was found the most appropriate method (see section 2.2).

3.2 Research context

The case study was performed within the project Grey but Mobile (GbM), a part of the CRISP research program. This program is developing a knowledge infrastructure, which consolidates a leadership position and stimulates the continuing growth of the Dutch Design sector and other creative industries. Moreover, CRISP focuses on the design of PSS, generating and disseminating the knowledge, tools, and methods necessary for designing complex combinations of intelligent products and services with a high experience factor [CRISP 2010]. The goal of GbM is to address the societal challenges of 'aging and care in relation to mobility and social participation of elderly in the Netherlands' through PSS solutions that instigate meaningful change in society. To achieve this goal, based on the quadruple helix innovation model, a collaborative network consisting of various actors from the industry, the public sector, knowledge institutions, and societal representatives (active citizens) had to be initiated [Carayannis & Campbell 2009].

3.3 Case study setup

In this section we explain our experiment design; i.e. who where the workshop designers/facilitators, what was the purpose of the workshop, and who participated.

3.3.1 The workshop designers

The workshop was designed and executed by the first two authors based on earlier practical experience [Tomico *et al.* 2011; Sturkenboom *et al.* 2013] and the literature review (see section 2). The third and forth author played an expert role within the experiment design.

3.3.2 The workshop

The preparation of the workshop took three working days. Its execution was done within five hours including lunch and two coffee breaks. The intentions for the workshop were as following: (1) Frame a boundary for collaboration and motivate actors to commit to that boundary, while diminishing barriers between them and their organizations; (2) Facilitate actors (who did not know each other) to introduce themselves to each other and to make their different knowledge assets, organization resources, and near future plans and ambitions visible to each other; (3) Support actors to identify wicked problems (WP's) and see them as common grounds; (4) Help actors define innovation visions for the WP's to be used as a basis for collaborative elderly mobility PSS innovation design.

For each phase of the process, type two (see section 2.3) boundary objects (BO's) were designed in form of stage templates, related cards, and labels to support discussion, group commitment, and knowledge sharing. Each BO was created for a purpose (see table 2) while intentionally some room was left for actor interpretation and facilitation spontaneity. This was done to stimulate self-organization that could increase actor commitment and the

generation of unexpected knowledge, referred to as 'potential command' by Nonaka *et al.* (2000).

3.3.3 The workshop participants

Various actors were provided the opportunity to join the workshop in September 2012. Eventually, nine stakeholder actors, considered as knowledge officers, were selected and invited to join the workshop. The participants were chosen based upon their organizational position and expertise, creating a group that mixed gender and different knowledge domains that formed context for the cross-boundary knowledge creation and innovation [Nonaka *et al.* 2000]. To be more specific, two actors from the care services industry, one actor from a public transportation services industry, two actors from the City of Eindhoven, one actor from a rehabilitation (research) institute, one actor from a design academy, and two actors with design/business research backgrounds from different universities of technology.

4. RESULTS

The empirical findings gathered from the case study can be summarized twofold: (1) The development of the knowledge assets for initiating and forming the collaborative network through the workshop design. This applies to both the mechanisms (workshop program) and the tools (boundary objects (BO's)); and (2) The workshop outcomes.

4.1 Workshop design

4.1.1 The program

A program consisting from four phases was designed for the workshop (see table 1). The phases were as following: Phase 1: Icebreaker and introduction; Phase 2: Stakeholder profiling and exploration; Phase 3: Benchmark and ideation; and Phase 4: Forming ties and envisioning. We deliberately did not provide detailed explanations for how to go about each phase to leave some room open for participant and facilitator interpretation and improvisation [Nonaka *et al*. 2000; Carlile 2002; Cruickshank *et al.* 2012]. The program was created for a five hours workshop including lunch and two coffee breaks.

As motivated in section 3.3.3, before the start of the workshop, by means of tags that they received to wear during the workshop, the actors were divided up into four groups, each group representing a main organization. The groups worked separately on each phase but pitched and questioned the outcomes of each phase to each other after the completion of the related BO's. This was done to stimulate sharing, reflection, and as a result benefiting more from the knowledge available in the workshop [Schön 1983].

4.1.2 The boundary objects

A series of BO's were carefully tailored to support the objectives (see section 3.3.2) of each workshop phase. Table 1 and 2 provide overviews of each workshop phase and related BO's as well as their intended purpose.

Table 1: The four workshop phases and related boundary objects

			
Phase 1 (45 min): Icebreaker and introduction	**Phase 2 (45 min): Stakeholder profiling and exploration**	**Phase 3 (1 hour): Benchmark and ideation**	**Phase 4 (1 hour): Forming ties and envisioning**
Icebreaker Cards	*Stakeholder Profiles*	*The Innovation Landscape, Innovation Cards, Voting Stickers*	*Vision Radar, Vision Radar Tags*

4.2 Workshop outcomes

The outcomes of the workshop can be organized into three main categories: (1) The actor information and stakeholder profiles; (2) The innovation landscape overview; and (3) The collaborative network visions. A compilation of the workshop can be viewed on: http://vimeo.com/51707218.

4.2.1 The actor information and stakeholder profiles

The workshop design and related BO's enabled actors to socialize and get to know the participating organizations. Four detailed organization profiles were created with the following components driven from management tools like SWOT and Porter's (2008) five forces: Mission/vision/identity/history, strengths/weaknesses/barriers/challenges, resources, product/service offerings, distribution channels, target segments, customer relationships, operation region, latest innovation, partners, competitors, and future ambitions (see table 1 phase 2 for a profile example or the workshop compilation video 4.2).

4.2.2 The innovation landscape overview

During the workshop, an innovation landscape was constructed providing an overview in which all organizations were present with their current (PSS) offerings and new PSS proposals they were ambitious to create. The innovation landscape also included some innovation cards selected by actors for inspiration. Voting stickers were placed by different actors on the new PSS proposals to indicate interest for collaboration on that PSS proposal. PSS proposals with more stickers were this way highlighted as a common ground for collaboration (see table 1 phase 3 or the workshop compilation video 4.2).

Table 2: An overview of all designed boundary objects and their intended purpose

Boundary Object	**Description**	**Purpose**
Icebreaker Cards	Polaroid lookalike photos of elderly engaged in an activity	For knowledge to be shared, barriers between actors need to be diminished. In other words actors have to feel safe. This phase requires actors to become inspired in being committed to a goal, which is not made for them but also by them for themselves. It allows them to share something personal about themselves and getting to know others. In sum, the icebreaker cards contribute to knowledge creation by fostering love, care, trust, and empathy with each other and the target user [Krogh 1998 cited in Nonaka *et al.* 2000].
Stakeholder Profiles	Profile of each organization with current (knowledge) assets, challenges, and (future) ambitions based on management tools like SWOT and Porter's five forces [Porter 2008].	After setting the stage for an inspiring and trustful 'Ba', we continue with the spiraling process of knowledge creation by introducing Stakeholder Profiles [Nonaka *et al.* 2000]. Stakeholder profiles are useful for externalizing knowledge. They facilitate actors to express their organization and understand the strengths, weaknesses, opportunities, challenges, offerings, and ambitions of each other.
Innovation Landscape	A metaphoric canvas consisting of four different elements: the worlds of mobility and care, the target region (air balloon that stand for overview), and a river with a bridge (standing for inspiration streaming by and the aim to cross-boundaries for innovation).	The innovation landscape provides a relational overview of all knowledge and related boundaries, towards the creation of new knowledge by crossing boundaries. It captures the current and desired offerings of all organizations, expressing the vision of the distributed actors in one space. This overview is to generate inspiration and provides room for expression, confrontation, interest, and reflection on each other's current and desired offerings (made possible through the voting system) [Nonaka *et al.* 2000]. The latter contributes to the creation of joint visions [Cruickshank *et al.* 2012].
Inspiration Cards	A set of cards with innovations related to aging from all over the world. The cards have a photo, a short description of the innovation, and a QR code linked to a movie on the subject.	Knowledge assets, especially routine knowledge assets, can hinder as well as foster knowledge creation [Nonaka *et al.* 2000; Carlile 2002]. Innovation cards are there in addition to the stakeholder profiles to stimulate boundary crossing. They are a form of explicit knowledge that supports acculturation from tacit knowledge.
Voting Stickers	Four sets of different color stickers with colors matching and representing the colors of the four groups.	Within knowledge creation, it is important for actors to commit and become one with the group. This happens through the transcendence of the inner and outer boundaries of the self and organizations [Nonaka *et al.* 2000]. Voting stickers facilitate this process [Cruickshank *et al.* 2012].
Vision Radars	A canvas with a radar graph allowing for a N number of axis, tags, and mappings.	Allowing the sum of the individual intentions and ideas to be synthesized to a group vision. This vision can be a proposition towards the group upon which the collaborative network ties can be formed.
Vision Radar Tags	Two sets of tags. One set equipped with contrasting keywords (e.g. freedom vs. security). Another blank set, on which keywords can be written.	Support the positioning of the group vision, the collaborative network vision, with respect to existing visions out there run by other organizations/collaborative networks, sometimes competitors.

4.2.3 The collaborative network visions

The final workshop outcome was a set of four vision radars for new PSS innovations. Each of these was a preferred proposal voted on by most actors, targeted and mapped next to existing solutions within the operation/target region. E.g., one of the PSS proposals was to create a scoot mobile hub with various scoot mobiles and related services near the central station of Eindhoven (see table 1 phase 4 or the workshop compilation video 4.2 for a vision radar e.g.).

5. REFLECTION AND DISCUSSION

Our reflection is from the collaborative network initiator's viewpoint, mainly on the workshop design and execution (September 2012), yet also on some informal observations and experiences with the initiated collaborative network after the workshop up to now (July 2013). Due to limited space we focus the reflection mainly on the process and BO's with few content examples and intention to elaborately report on the content reflection in another, perhaps a journal publication.

Table 3 summarizes a list of suggestions that were able to come up with and recommend when designing BO's for collaborative network initiation and formation workshops:

Table 3**:** Boundary object design suggestions for collaborative network initiation and formation workshops

Suggestion	**Description**
Also target facilitators	The BO's should not only be designed and targeted at actors/stakeholder but also the workshop facilitators. In addition to stimulating actors to see opportunities and become motivated, the BO's also enable the workshop facilitators to reflect and improvise in action upon the course of the workshop and generated knowledge. We believe the quality of a BO is highly related to capable facilitation.
Design context specific	Type two BO's, the ones that are more context specific, can stimulate risk reduction or even boundary crossing/combining; e.g. in the sense that actors can recognize that there is no competition between them, in identifying their role in something, or in e.g combining two initially given boundaries.
Leave room and be open to interpretation and adaptation	The open nature of BO's has potential to stimulate learning, which is an important factor for getting actors/facilitators out of their comfort zone for boundary crossing. One can better observe and listen to how people give meaning to the BO. There is also more room for 'the unplanned' and more stimulus for coming up with improvised interventions, hence ending with potentially more novel/solid created knowledge. This also stimulates self-organization by participants, supporting the facilitators, and eventually resulting into a more bottom up and horizontal (easy access to resources) SECI process.
Do not forget the relations	The BO's should be designed in relation to each other and not only according to the workshop program as not all relations are sequential. Overview and visibility can contribute to recognizing differences, interdependencies, and value. In learning, and forming meaningful visions/relationships.
Design for high mobility	Since BO's are tools for communication, their mobility and proportion/form in relation to the human body is important. This is e.g. sometimes for affording literal boundary crossing/breaking or trust building. Furthermore, BO's can be used after workshops for further analysis e.g. or for other events.
Care about aesthetics:	The aesthetics of the BO's should not be underestimated as this plays a significant role on the quality of the Ba and SECI process, stimulating creativity and increasing the workshop experience.
Push for digital and dynamic	Last but not least, we highly recommend the BO's for WP's to be dynamic, perhaps digital and interactive (time and space aware).

Using a time and activity wise and initially commitment free low barrier workshop (see section 3.3.2) seems to be promising for initiating collaborative networks. It might not create the best possible network formation immediately but a series of these workshops and more design and facilitation experience can be useful for attracting and matching key actors/stakeholders. Actors participating in our workshop felt empowered in socializing, expressing themselves and their organizations (i.e. their backgrounds, resources, ambitions, etc.) through a shared syntax and in seeing PSS innovation opportunities which otherwise would have been impossible or hidden from them. The participants gave us compliments for our approach and more importantly, almost all of them committed to and joined the following events. To date (June 2013), this collaborative network is still active. In the past year twelve elderly mobility PSS concepts have been designed of which two are currently being piloted.

6. CONCLUSIONS

With this work we aim to provide guidelines for the creative industry when playing a strategic, and in our opinion worthwhile emphasizing, strong role within the initiation and formation of collaborative networks, more specifically necessary for PSS innovation that aims to address societal challenges. By enabling designers to design and execute such strategic workshops, one can contribute to the acculturation of actors from different domains so that they may step out of their comfort zones (traditional paradigms) and open towards a learning oriented network approach in which boundaries are crossed for societal PSS innovation. This is not easy yet a key factor to achieve since most of the organizations in our society are based on a vertical hierarchy while our societal challenges require networked innovations created in based on the concept of horizontal hierarchy.

We do not believe in design taking over business or business taking over design but certainly see a very important and justified role for designers in collaborative network initiation and formation. In specific through designing and developing right conditions in the sense of appropriate Ba and SACI processes for creating/transforming knowledge in an invitational, tailored, meaningful, and preferably aesthetically engaging way. This approach acknowledges human emotions, values, and culture in relation to knowledge sharing that results in strong ties between actors. Trust, interdependency, and a learning oriented approach should be emphasized, as they are the correct attributes for collaborative networks.

7. FUTURE WORK

There are more experiments based on a research through design approach needed to improve this collaborative network initiation and formation process using type two BO's. Think of optimization of the workshop protocol based on the type of societal challenges, the number of participants, or design and use of more dynamic, digital, interactive, and effective BO's from an interaction design point of view.

ACKNOWLEDGEMENTS

We thank the following organizations for participating in our case study: Connexxion, Zuidzorg, PuntExtra, the City of Eindhoven, Roessingh Research and Development, Eindhoven University of Technology, and Design Academy Eindhoven. Our appreciation specially goes to the following representatives: Marco Cowan, Gereld van Bakel, Annette van Raaij, Patricia Braat, Jacquelien Smits, Lettie Hoogstra, Annette Visser, Lotte van den Munckhof.

This research was funded within the Creative Industry Scientific Program (CRISP). CRISP is supported by the Dutch Ministry of Education, Culture, and Science.

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Utilising visual communication design as a strategic tool in Bahrain

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Keywords: Strategy, business strategy, design strategy, visual communication design, Bahrain vision 2030.

ABSTRACT

Visual communication design can be utilised as innovative approach to structure business thinking strategies. Tamkeen, a semi government organisation in Bahrain attracts the Bahraini people attention by establishing a series of visual communication campaigns that works in parallel with the organisation's strategies. This model offers an outline that highlights the vital role of visual communication practice in an engaging case study.

INTRODUCTION

The use of visual communication can be seen all around us everyday. Evidence of visual communication expression can be traced back to prehistoric civilisations. The visual signs and paintings found in caves can be seen as an initial method of human communication. Meggs and Purvis (2006) claims that early man relied on these signs; to communicate, search for food, and to document events.

Visual communication design is understood as the exposure of ideas through the visual presentation of information. It is an interactive process between sender and receiver. This paper suggests that a similar interaction will occur between organisations and targeted audiences. Moreover it will illustrate how Tamkeen a semi-government organisation in Bahrain, has built a successful image by applying visual communication design strategy in line with the organisation vision to enable Bahrainis to participate in the national economy reform.

VISUAL COMMUNICATION DESIGN AND STRATEGIES

Strategy is a group of activities set to achieve specific aims. Recent publications demonstrate various views on visual communication design with an emphasis on the design strategy. The subject has been tackled from two different perspectives: business management and design management as shown in (figure 1). Starting with the business managers point of view, Campbell, Stonehouse, Houston (2002), divided the strategic decision into three stages; strategic, tactical, and operational. Accordingly visual communication design was positioned in the operation level. Therefore Armstrong and Kotler (2011), and Clow and Baack (2010) emphasise how important the visual communication design for businesses and consider it part of the integrated marketing and communication plan, which take place in the operation strategy.

In contrast the design industry considers design a strategic tool. Best (2006), in her book Design Management, argues that design in organisations is emerging as a driving force among strategic, tactical and operational levels. And it can affect business management on various stages in setting short and long-term aims. In addition Cooper and Press (1995) explained how visual communication design could be a valuable strategy to achieve business aims. Consequently the design industry discusses how visual communication design is involved in all decision-making strategies starting from the strategic decision to the operational level.

Taking into consideration the two different perspectives, a study was carried out to analyse the success of Tamkeen visual communication designs, which is reflected in the organisation achievements.

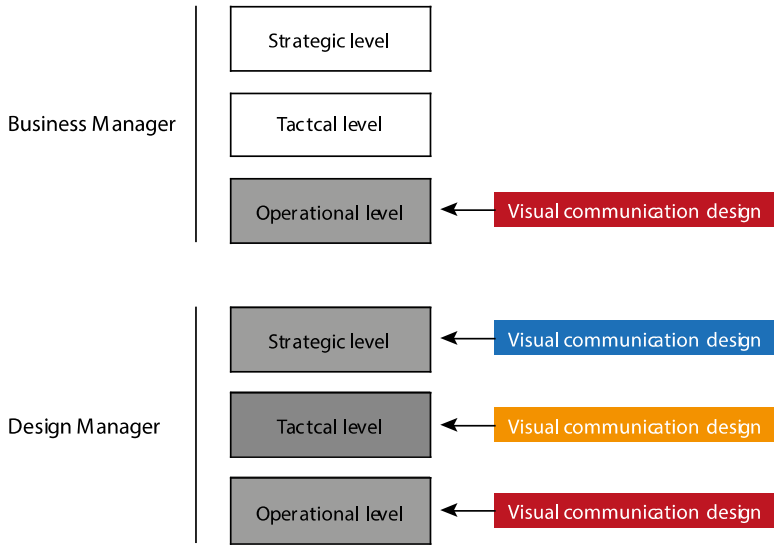

Figure 1

ABOUT BAHRAIN

The story of Tamkeen took place in the pearl of the Arabian Gulf, the Kingdom of Bahrain, situated in a strategic location in the Gulf region, with a total area of 741sq km approximately. Bahrain is a member of the six Gulf Cooperation Council (GCC) countries: Saudi Arabia, Kuwait, Qatar, United Arab Emirates, Oman, and Bahrain. The estimated population in 2012 was 1.407,000. “Bahrain” in Arabic means the two seas, its name refers to the spring that once supplied sweet-water aquifers and the sea saltwater that bound the island.

Bahrain is a Kingdom, led by the King Hamad bin Isa Al Khalifa. The country is rich in culture and heritage since its strategic location was attractive to different civilisations tracing its roots to the Dilmun nation. Today, the modern landscapes wrapping the wonderful old sites in Bahrain symbolise the social and economic achievements that have taken place in a short period.

Accordingly the Economic Development Board (EDB) in Bahrain set the ‘Bahrain Vision 2030’, which is an inclusive economic vision, in order to provide a clear path for a sustain improvement, to offer Bahraini’s a better life style, and raise the performance level of the Bahraini economy.

BAHRAIN VISION 2030

"We have to build an economy that is based on productivity and in order to do that we need to invest in education, skills and new technologies." HRH Prince Salman bin Hammad Al Khalifa, the crown Prince and Deputy Supreme Commander of Bahrain.

The Bahrain Vision 2030 has been developed over the past years with the input of different segments of the society: public sector, private sector, academia and public society. A National Economic Strategy was set to support the vision's initiatives, aiming to boost interest in the development process among different sectors to convey the aims drawn within the vision into real economic drivers.

Reform and development of the country's economy depends on its capability to face challenges nationally and internationally, especially with the booming development that is taking place on the shores of its Gulf neighbours, Qatar and the United Arab Emirates. The main challenges are to improve the skills of Bahrainis in order to leverage the quality delivered, which will offer a new job opportunities. Also to encourage Bahraini's to enter global markets through innovation and development, and to make use of the extraordinary opportunities in the GCC countries.

The main 'Bahrain Vision 2030' principles that directed the economic aims are sustainability, competitiveness, and fairness. This will happen with changing the Bahraini economy from oil base to a competitive economy, increasing the role of the private sector since in the past the economy has been driven by the Government spending, while improving the Bahraini skills and investing in the education sector, as this will give the opportunity to all Bahrainis to improve their quality of life.

To achieve the economic vision the principles will be converted to actions according to the main three areas: economy, government, and society. In this paper the economy will be the main focus, even though there will be an overlap with the other two parts: government, and society.

ABOUT TAMKEEN ORGANISATION

Bahrain Vision 2030 mainly concentrates on transferring the economy from depending on the natural resource; oil to a productive and diversified economy. Government and private sector organisations will play a major role in the adaptation. The government has designed

development programs to enhance social productivity, and to empower Bahrainis to become entrepreneurs', and to contribute to the socio-economic improvement. Accordingly one of the organisations spearheading this process is Tamkeen (formerly the Labour Fund). Tamkeen was established in 2006. To give a clear identity to the organisation, the name was changed to "Tamkeen" instead of using Labour Fund to clarify that the organisation does not subsidised unemployed Bahrainis.

Tamkeen is an Arabic word means empower and enable, which reflects the organisation's mission. It is a semi-government organisation, function in line with Bahrain's economic Vision 2030, to support and improves the skills of Bahrainis and Bahraini corporations.

In 2006, funding development and consulting programmes were offered. Also training and skill development programmes were available for different concentrations, in order to empower the Bahraini to become the first choice in the private sector. In addition, skill gaps in the market were studied to fulfil the requirements and to improve productivity.

The organisation targeted the entrepreneur, student, and employee, which gave the opportunity for every Bahraini or enterprise in Bahrain to take part in the economic and national development. To achieve the Bahraini's economy Vision 2030 and Tamkeen's aims, the organisation steadily endeavoured to offer its programmes to the public by using different channels to reach the majority in a very transparent method.

Over the past few years the organisation was able to accomplish a unique recognition at a regional level. Accordingly in 2012 it was awarded the Mohammed Bin Rashid Award for young business leaders, being named as the "best initiative supporting SMEs in Arab Countries". The organisation also earned the 'Middle East accountancy and finance excellence awards' and the "Excellence in Training and development of Finance professionals" award.

Tamkeen's visual communication design strategy

In this paper the word strategy is used to define how organisations achieve their mission by clarifying the route that they will adopt in their business. Bennett (1996) argued that business strategy is defined as management decisions that draw on the organisation's routes and enhance its main goals, actions, and policies in order to reach its objectives. This is well

demonstrated in Tamkeen's organisation strategy, since the management team is responsible for developing and refining actions and polices to achieve Tamkeen's objectives.

To obtain in-depth information about Tamkeen's visual communication design strategy, a number of interviews were carried out with the marketing and communications manager at Tamkeen. In addition, the main visual communication designs of the organisation were studied and analysed, starting with the corporate visual design identity, followed by reviewing the previous advertising campaigns and publications.

Cooper and Press (1995) emphasise that "corporate strategy is about defining business objectives and how they are to be achieved".
Accordingly the objectives of Tamkeen were defined and the visual communication design strategy was integrated in the different levels of the organisation. At the level of strategy, policy, and mission, design leaders were involved, and were responsible for the process. As for the operational stage, designers worked on delivering the required material. Tamkeen's visual communication design was managed by setting the design strategy aligned with the organisation's objectives, which reflect the success of the process.

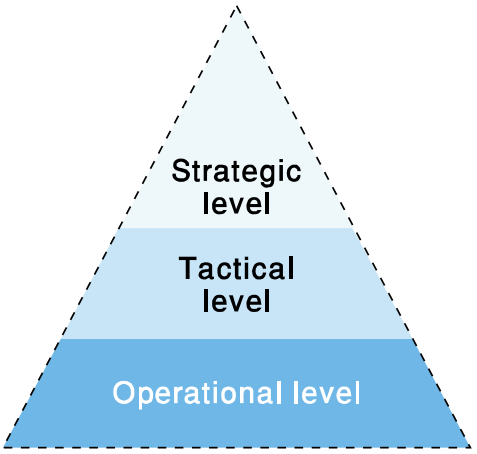

Figure 2 Levels of strategic decision-making/ Source: Campbell, Stonehouse, Houston (2002)

What is so distinctive about the Tamkeen case study is the illustration of the whole process took a very different direction than is the usual practice. According to Campbell, Stonehouse, Houston (2002) the strategic decision making process starts from the top of the pyramid and proceeds in a vertical method to the bottom in a structured hierarchy. Starting with the organisation's vision, mission, and strategy, moving to the second stage where systems and processes are set,

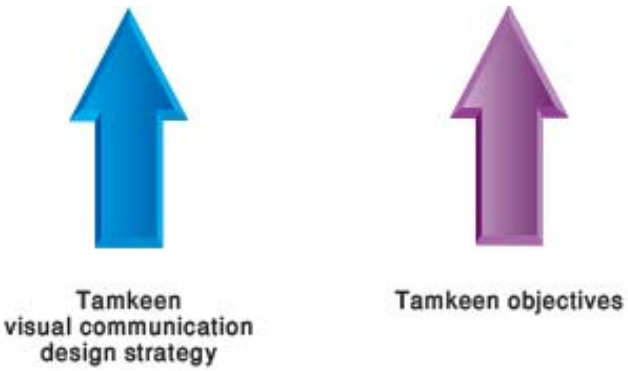

Figure 2

and finally the operational strategy will be implemented where the visual communication design takes place (figure 2).

In Tamkeen's case the strategic decision making process follows the usual structure but what distinguishes the process is the visual communication design that took a parallel direction with the business strategy, moving from bottom to top to achieve the organisation's objectives as shown in (figure 3).

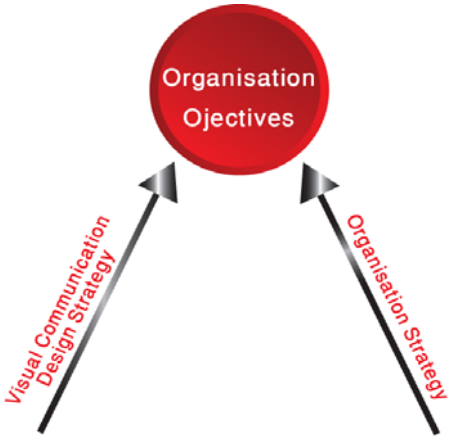

Figure 3

To explain the strategy that Tamkeen followed to achieve the organisation's objectives, the visual communication design stages will be discussed starting with the organisation's corporate visual identity.

Tamkeen corporate visual identity design

The creation of the Tamkeen corporate identity is the first visual communication aspect that will be discussed. A new corporate identity was designed to communicate visually the organisation's vision, mission and objectives, conveying the perception of empowerment and steady unremitting upward movement. The identity encapsulates a spirit of energetic movement expressing it by using a symbol adopted from the Bahraini flag, evolving to represent a positive sign moving upwards. This could also be interpreted as a sail moving forward in a repetitive direction from small to large, to express the progress and developments of the organisation. The various colours used in the identity in addition to the red Bahraini flag colour, were employed to show the different partners that will take part in the process and help to fulfil the organisation ambitions. (Figure 4)

Figure 4

Tamkeen campaigns

In 2007 the first message that was employed to communicate with Bahraini was ‘Become’ “become to a promising future, become to opportunity.” It was used on printed publications to motivate Bahrainis to embrace a dream, a promise and a vision, by taking part in the reform process to achieve their dreams, since it is the promise that everyone deserves to obtain their goals. Every Bahraini has the potential to become a leader; it’s the vision of seeing the private sector prosper to reach international levels.

In phase one we see “Working for a prosperous future”, “Step by step towards a prosperous future”. A ladder image was used as a visual component that represents success throughout the campaign (figure 5). It was an invitation for all Bahraini’s to join Tamkeen’s journey of empowerment and to benefit from its services for a prosperous and productive life. Therefore for the campaign’s use of the image of a ladder shows a step towards the future, since Tamkeen will be path to take the beneficiary into a brighter future. The Ladder was used in the campaign as the main element of the visual design to communicate, and to show that the person who was climbing the ladder was taking steady and sure steps looking upward to the open sky; to symbolise the new opportunities that he/she can obtain to reach their goals. The whole campaigns were expressed by using different media: TV, radio, outdoor advertisements, publication, and social media.

Figure 5

“Enhancing a vision”, “Pass on the baton for a great future.” was the main message in phase two (figure 6). In this campaign, the golden triangle of the three strategic Cs: customer, corporation, competitors, was represented (Ohmae 1983). The customers are the Bahraini people, Tamkeen represents the corporation and the competitors are not real competitors, but it is the organisation competing to achieve its objectives.

In this campaign the Tamkeen team image was captured in one of the designs on a racetrack, and as beneficiaries race they do not compete with anybody, they are racing toward achieving. The concept of racing continues in all other advertisements, since the main theme was to show how different people could benefit from the services of Tamkeen. To express this idea, people in different locations and from various backgrounds were captured while they were catching the baton, which symbolises the variety of opportunities that they can choose from. The campaign also incorporates beneficiaries passing the baton from one person to the other, using images representing different people from various sectors, walking together to a specific meeting point. By collecting the entire Baton all will be used to build the ladder rungs that will lead to a prosperous future, which represents Tamkeen message: “building on our success and looking to the future”

Figure 6

In phase three the core of Tamkeen visual communication design was the beneficiaries testimonials. A number of the beneficiaries’ testimonials where captured and used in the organisation advertisements and publications as shown in figure 7, to illustrate the value of the services that the beneficiaries received from Tamkeen. This phase helped to build the credibility of the organisation.

Figure 7

In the fourth phase “Achieve your potential” the images of the beneficiaries were conveyed with the type of the service they obtained from ‘Tamkeen’ (figure 8 and 9). These images were used in all advertisements and publications. This has helped to build a strong resonance with Bahrainis since these models are relatives,

friends and neighbours, or from the same industry that the viewer can relate to.

Figure 8

In phase five, the entrepreneurs' beneficiaries talk about their success stories in their own words to share their experience and how they benefited from Tamkeen, either in supporting them to establish their business or to further develop it. Accordingly a new promotional publication was introduced; a catalogue was designed to demonstrate the beneficiaries' success stories. Through this case study approach they become Tamkeen 'ambassadors'. At this stage the target audience can learn how they can benefit from Tamkeen programmes after they have been informed how others achieved their potential.

Figure 9

The influence of Tamkeen's visual communication design

In organisations, business strategy is driven by the ability of the organisation to achieve and retain good advantage in satisfying the business goals. It merges various actions, makes decisions in a rational manner, and clarifies the directions that the organisation will adopt.

Kotler and Rath (1983) debate that design is a strategic element in the growingly challenging market. At Tamkeen the importance of recognising how visual communication design perspectives can be effectively managed, and employed as a source for invention and adaptation, was demonstrated and reflected in the number of beneficiaries of its services.

The influence of Tamkeen visual communication design was not only reflected in the economy but also on the Bahraini business thinking. Since the establishment of Tamkeen until June 2013 over 54,000 Bahraini's individuals and enterprises have benefited from its programmes; the organisation assisted 3,500 Bahrainis to find profitable employment, and supported more than 3,000 Bahrainis to obtain professional certifications in their fields of specialisation. In addition more than 19,000 enterprises have benefited from Tamkeen's financing and business support services.

By promoting the concept of entrepreneurialism, and displaying real models of success stories in the visual communication campaigns, particularly where ambitious Bahrainis, in their own words share their stories with the community. In this way people start realising that they can become business leaders and innovators. They can also develop their future careers by improving their skills and adopting new business ideas.

The success leads us to the strategy that the organisation adopted during the implementation phase. Visual communication design took part among the three decision-making levels; strategic, tactical, and operational. ‘Tamkeen’ strategic decisions are interested with the challenge of achieving a maintainable competitive improvement for the short and long-term. A senior manager with various conceptual abilities worked together to set the general policies, vision and missions, and accordingly visual communication design was associated with the organisation policies, vision and missions. Moving to the tactical level, systems and processes were discussed and set, leading to the operation level where visual communication design is implemented and become a tangible item.

CONCLUSION

Tamkeen's vision of "empowering Bahrainis to prosper and contribute to the national economy" expresses the challenging journey of building a productive community in Bahrain. The successful aspect of any strategic plan is always in the organisation's ability to execute upon it. Tamkeen has used visual communication design successfully to build communications channels to motivate its target audience by using design as a strategic tool. Accordingly, Tamkeen managed to conduct economic modifications by using visual communication design to motivate people to take part in the economic transformation. Tamkeen is considered a major component in the national reform plans and Bahrain's Economic Vision 2030, it has not only been successful in executing a highly effective visual communication strategy, it has also been able to make effective contribution to improving the ability and skills of individuals and enterprises in the private sector by introducing a full range of integrated support programmes.

Tamkeen's visual communication design is Moreno longer the third horizontal layer in the organisation's operation strategy; it is becoming a vertical action, in line with the business strategy. Even though the business plan is always set in advance still visual communication design always works hand in hand with the business goals, which Tamkeen has demonstrated through the success of its visual communication design strategy, shown in the number of beneficiaries it has reached, which since its inception is more than 150,000.

ACKNOWLEDGEMENT

My special thanks to Tamkeen, to its marketing and communications manager, Ms. Hala Sulaiman, and to Dr. Tina Barnes-Powell and Dr. Richard Chips from De Montfort University, who supported me in preparing this paper.

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BIOGRAPHY

Lilian Hallak has worked with national and international design firms on a variety of design projects. She began her career at Infographix CAD and Graphics Studio in Jordan as a studio manager after completing her undergraduate degree in Fine Arts, Design and Applied Arts.

After obtaining a Masters Degree in Design Management from Birmingham City University in the UK, Lilian Hallak joined the Enhanced Productivity Centres Programme in Jordan. She held the position of corporate communications manager, working on developing and supervising the implementation of a plan to promote and create awareness of the program among individuals in local communities, and supervised all media campaigns.

Since 2005 she has taught visual communication design at the University College of Bahrain. Lilian Hallak is currently a PhD student at De Montfort University examining how managers in Bahrain evaluate visual communication designs for a strategic advantage.
Throughout her career as a designer, design manager and lecturer she has worked to develop the role of design by concentrating on design thinking and strategy improvement.

Lilian Hallak participated as a jury member in Sheikh Nasser Award for Creativity and Excellence, three years in a row, which is organised by the General Organisation for Youth and Sports in Bahrain.

Most recently Lilian Hallak was the conceptual leader of the University College of Bahrain Exhibition 2013, which aimed to demonstrate and explore the expanding role of design and designers as a connection through disciplines, concepts, and culture.

Visual Sense-Making in the Innovation Process. Tools for Innovation Acceleration.

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Keywords: Visual Sense-Making, Visualization Tools, Innovation Acceleration

This paper reports on a design research project conducted together with the innovation team of a mid-sized manufacturing company. It starts from the working hypothesis that the front-end innovation process can be accelerated by means of conceptual management tools whose applications create visual outputs, hence the term visualization tools.

Based on the concept of visual sense-making that is informed by the knowledge domains of organizational sense-making and knowledge visualization, visualization tools are conceptualized as thinking instruments that help transform existing problem situations into clear problem settings for better decision-making, targeted action, and problem resolution.

The conclusion from the project is that acceleration can indeed be achieved. However, acceleration does not occur simply as a one-dimensional root-cause relationship between tool application and outcome, but rather as a result of interdependencies between visualization tools, process as well as human, infrastructural and cultural enablers of an organization.

The result of the project is an actionable model – delivered in the form of a guide – that consists of three interdependent elements, namely a tool, process and enabler entity. The guide is extended by means of a set of instructions and suggestions for implementation based on perceived gaps between a current and desired situation in an organization. The project contributes to theory on visual sense-making and related managerial practice.

1. INTRODUCTION

The goal of this project is to shed light on an aspect of the epistemological relationship between design and innovation with a specific focus on the value design can create by means of visualization tools at the fuzzy front end of the innovation process. The project is positioned in new emerging contexts of management work that increasingly face new types of problems that have to be understood in order to devise alternative actions towards intended outcomes. Martin (2009) talks about “mysteries” that require thinking activities in order to be understood before action can take place. Mysteries require a faster and qualitatively better understanding and navigation of related problem areas.

Contexts for management work become increasingly turbulent and volatile (Rhodes, 1991, cf. Eppler, 2000). Organizations are forced to sense new problems, challenges and opportunities early on, to navigate and understand them faster and better, and to introduce innovations with greater success ratios in order to stay competitive. To that end organizations are adjusting and accelerating their innovation activities by various means such as new organizational structures (e.g. Innovation Acceleration Practice, e.g. Nestle Innovation Acceleration Team), new processes (e.g. Innovation Management, e.g. Swiss Post Innovation Management), and new methodologies (e.g. Human-centred Design, e.g. Swisscom). Especially with regard to the latter, visualization tools are worth mentioning.

Eppler (2000) argues that decision-making of managers on strategic issues increasingly has to be based on their ability to use and apply appropriate conceptual management tools instead of specific domain expertise and work experience. While visualization tools have clear benefits for problem solving processes, theme illustration, and the acceleration of individual and group processes, their use is often discouraged due to various inhibiting factors, namely continuous availability of tools, knowledge about available tools, and time investment for learning such tools (Eppler, 2000). As a result such practices are not widely adopted.

Collopy (2009) argues for a “trial-size access to a (…) body of knowledge” (p. 3) based on the lessons learned from the failure of adopting Systems Thinking. Instead of understanding and accepting a whole theory before actually using it, he suggests favouring a try-it-out approach that is more in line with how one is usually acquiring knowledge. Trying out parts of a theory extends existing practices fitting work culture and individual preferences, thus keeping the barriers of adoption as low as possible. Or in other words: overcoming such barriers with as little effort as possible.

While the use of visualization in management work is nothing new, existing research has focused either on structural taxonomic (Botta, 2006) or representational issues (Judelman, 2004) of visualization from a designerly perspective, or on knowledge creation and transfer (Eppler & Burkhard, 2004) from a knowledge management perspective.

While both perspectives are valid, they fall short of addressing the issue of making sense of unclear problem terrains as is the case at the so-called fuzzy front end of the innovation process. However, problem definition and sense-making are closely related. Schön (1983, cf.

Weick, 1995) regards problem definition as a key component of professional work and links it to the concept of organizational sense-making.

By moving visualization into the realm of language-based sense-making, in this paper visualization is re-framed as a key thinking device for sense-making activities, thus stretching beyond knowledge creation and transfer as mentioned under the knowledge management perspective, and stretching beyond an artefact focus under the design perspective. By bringing visualization in a sense-making context, visualization is extended and conceptualized as a tool for knowledge navigation, thus the term “Visual Sense-Making”.

This paper is structured as follows: The literature review constructs an argument for Visual Sense-Making. This is followed by the data collection and analysis part that reports on an action research approach conducted during two workshops. The results chapter lays out the findings and how they inform the design of an actionable model that links visualization tools to acceleration. This is followed by a discussion of the results, the participants´ roles and the resulting guide. The paper concludes with a reflection on the contributions of this project to knowledge and managerial practice and an outlook based on the limitations of this research.

2. THEORY

Visualization is nothing new. Judelman (2004) argues that it dates back to century-long practical and theoretical developments. The use of images for the purpose of representation of knowledge ranges from mediation support to the representation of fundamental elements of nature. Judelman (2004) writes:

> Visualization, the representation of information on an interactive map, is a strategy to make more efficient use of cognitive resources when processing complex information. (p. 5)

From the perspective of knowledge visualization, research activities relate to problems and ways of visualization as well as visualization taxonomies (Judelman, 2004; Botta, 2006). From the perspective of knowledge management, various research activities have focused on visualization as such, the use of conceptual management tools, the use of visualization, and the structuring of visualization methods for the context of strategy development (Eppler, 2000; Eppler & Burkhard, 2004; Eppler, Platts, & Kazancioglu, 2006; Eppler & Lengler, 2007).

While both strands of research activities relate to visualization in the knowledge space, they are either focusing on the craft of visualizing or relating to visualization for the purpose of knowledge creation and transfer as well as communication support. While creation relates to enabling innovation by means of knowledge, transfer relates to speed and quality of innovation (Eppler & Burkhard, 2004).

Despite this notion of innovation, both strands are not explicitly framed within and for an innovation space, let alone its fuzzy front end. The closest reference to innovation is the

application of visualization tools for the development of strategy. Eppler & Lengler (2007) write:

> Strategy Visualization, like a Strategy Canvas or technology roadmap is defined **'**the systematic use of complementary visual representations to improve the analysis, development, formulation, communication, and implementation of strategies in organizations.**'** This is the most specific of all groups, as it has achieved great relevance in management. (p. 4)

Visualization tools enable strategy development, because visualization makes knowledge visible in order to be accessed easier, discussed better, valued better, and managed better, and improves the creation and transfer of knowledge in order to reconstruct it, remember it, and apply it correctly (Eppler & Burkhard, 2004).

Furthermore, it is interesting to note that in the context of strategy and innovation processes as well as in the related areas of knowledge management, knowledge visualization and visualization as such, the concept of sense-making is not explicitly mentioned. This might be because sense-making is put forward by Weick (1995) from the perspective of organizational psychology. It focuses primarily on organizational learning and is not directly related to enabling acceleration in innovation or problem solving contexts.

Nevertheless, exploring and understanding the concept of sense-making makes it possible to see the potential it might have for the innovation space. Sense-making, according to Weick (1995), is "the making of sense and the construction of the unknown", and "the reciprocal interaction of information seeking, meaning ascription, and action" (p. 4). Sense-making is "intended to include the construction and bracketing of the text-like cues that are interpreted, as well as the revision of those interpretations based on action and its consequences", meaning "authoring as well as interpretation, creation as well as discovery" (p. 8).

Dervin (1983) describes sense-making as a label for research efforts that investigate how human beings create "sense of their worlds", or how they construct information needs and the use of information in their sense-making processes. Sense-making according to Dervin (1983) rests on the following model (Fig. 1):

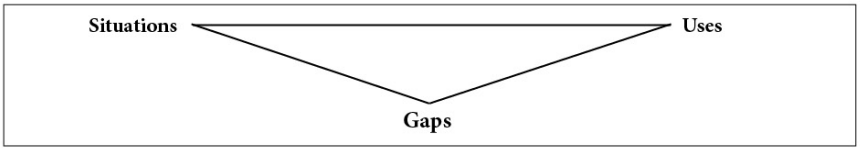

Fig 1. Sense-making model according to Dervin (1983, p. 6)

Dervin (1983) explains the model as follows:

> Thus, it is stated as assumption that people who are sense-making have gaps in situations and assess the value of information, regardless of how constructed, in terms of the uses to which they can put it. (p. 6)

Schön (1983, cf. Weick, 1995) is the one that connects sense-making to the context of problem definition as a key component of professional work:

> Problem-setting is a process in which, interactively, we name the things to which we will attend and frame the context in which we will attend to them. (...) In real-world practice, problems do not present themselves to the practitioner as givens. They must be constructed from the materials of problematic situations, which are puzzling, troubling, and uncertain. In order to convert a problematic situation to a problem, a practitioner must do a certain kind of work. **He must make sense of an uncertain situation that initially makes no sense**. (p. 9. Bold type by the author)

According to Schön (1983) the context between problem setting and problem situation can be displayed in the following way (Fig. 2):

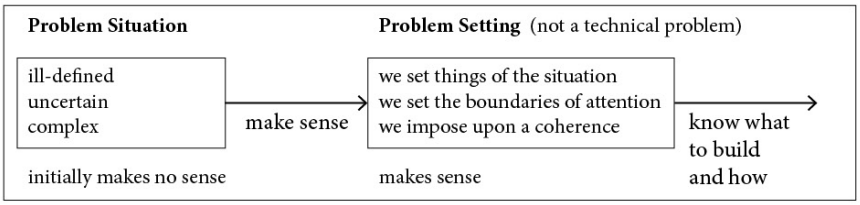

Fig 2. From problem situation to problem setting (Hugentobler, 2010)

The term Visual Sense-Making combines the two terms visualization and sense-making into one concept. Belova (2006) relates the term Visual Sense-Making to the „ontological and epistemological status of the practice of looking“ (p. 94). She traces the concept to “the event of seeing” (p. 96) and “making sense of the visual” (p. 104). However, this understanding of sense-making still remains on the level of visualization as such. When looking through the lens of sense-making, visualization receives a different function extending the creation and transfer of knowledge as understood under the knowledge management perspective.

Related to the sense-making model of Dervin (1983), Visual Sense-Making becomes a tool for bridging a gap between a current situation and an intended use. These gap-bridging activities are changing the mental models of a situation to the extent that a new frame of reference (new mental model) can be constructed. Thus, Visual Sense-Making focuses on and investigates the behaviour that allows for constructing and designing movements through a time-space continuum (Dervin, 1983). By moving visualization into the language-based sense-making realm, visualization is re-framed as a thinking device for sense-making activities. We propose that enabling individuals to construct and re-construct new situational understandings by means of appropriate visualization tools, sense-making activities at the fuzzy front end of the innovation process can be accelerated.

The following model (Fig. 3) illustrates this proposition:

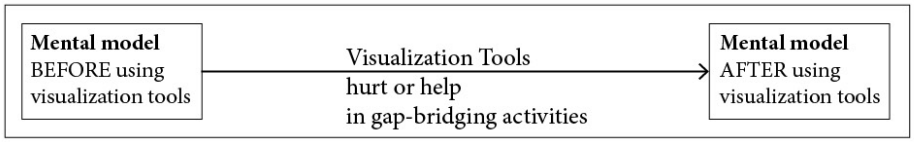

Fig 3. Integration of visualization tools in Dervin's (1983) sense-making model (Hugentobler, 2010)

To investigate this proposition it can be split into two interrelated research questions, one focusing on the aspect of understanding and one on the aspect of enabling. How do

visualization tools help accelerate sense-making in the innovation process? How can the visualization tools adoption process be supported and facilitated?

3. METHODS

The research objective of this project was to understand the effects of applied and facilitated Visual Sense-Making in a corporate setting. The result of this research was envisioned as an actionable model – delivered in the form of a guide – to be used by cross-disciplinary innovation teams. The project was limited to a single case with a mid-sized manufacturing company involving the innovation department that is managed by two engineers, the director of development and the innovation manager. Their activities include defining and conducting innovation projects derived from screening technologies, new regulations, etc., and ultimately evaluating their feasibility.

The project set-up consisted of five workshops, of which two key workshops provided the relevant data. Each of the two workshops lasted between four and five hours. In the *Visualization Tools Workshop*, the research team facilitated the application of specific visualization tools. In the *Design Process Workshop*, the research team facilitated the use of the first phases of a human-centred design process. In both workshops the researchers acted at the same time in two roles of facilitators and of observers of the unfolding events. The following diagram (Fig. 4) depicts the set-up:

Phase:	1	2	3	4	5
Topic:	Preparation	**Visualization Tools**	**Design Process**	Guide Review	Project Review
Format:	Conversation	**Tools Workshop**	**Process Workshop**	Feedback	Feedback
Synthesis:			**Conceptual Model**	**Guide**	**Academic Paper**
Reflection:	Individual, annotated and synthesized **Reflective Diaries**				

Fig 4. Project set-up (Hugentobler, 2012)

The researchers conducted their study using an action research approach including:

. Related to the acceleration strand: an in-situ “doing”, “conversational” and “reflection-in-action” (Schön, 1983) approach in order to apply visualization tools and the design process.

. Related to the facilitation strand: an in-situ “trial-size access” (Collopy, 2009) approach in order to facilitate the application of visualization tools and the design process.

Both strands were supported by “reflective diaries” written by all participants after and in preparation for the next events. Collected data comprises collaboratively developed artefacts/diagrams (captured on paper), in-situ conversations (captured by means of audio- and videotapes), individual reflective diaries of the participants (captured as word-files), annotated reflective diaries (done by the key innovation manager), synthesized reflections (done by the author), and the project review document.

The analysis approach used in this project was informed by interpretive sociology that is defined as follows:

> Interpretive sociology is a theoretical perspective based on the idea that a sociological understanding of behaviour must include the meaning that social actors give to what they and others do. When people interact, they interpret what is going on and this is what gives social life its patterned quality.
> (http://sociology.about.com/od/I_Index/g/Interpretive-Sociology.htm. Accesssed September 2009.)

The interpretative approach goes back to Max Weber and includes various perspectives "on the significance of meaningful action in the production of social life" (David, 2010, xxvi). However, the interpretative approach was used in a less ambitious way. For example no attempt was made to discuss the concept of generalization in interpretive sociology (Williams, 2000). The scope of the analysis was restricted to identifying relevant issues as related to acceleration and facilitation that represented specific points of attention during the sense-making activities of the innovation group. The researchers engaged themselves in activities of making sense and eventually reaching consensus on what they had been observing.

4. Results

Data collected represents sense-making activities as well as reflections on these activities by both the innovation team and the research team. The following findings relate to the two research questions, one focusing on the acceleration of sense-making by the innovation team and one focusing on the facilitation provided by the research team.

In workshop 1, the manufacturing company´s non-functioning Employee Suggestion Scheme (among other problem areas) was addressed. The research team proposed to use three visualization tools, namely Flow Chart, Fishbone Diagram, and System Dynamic Model, together with a set of questions to be asked. The research team facilitated the application of these three visualization tools to the problem situation and the related key question: how to proceed with the scheme? to come up with a better problem definition. From this workshop the following findings resulted:

. The more the tool descriptions are illustrated, the better the understanding of the tools and the transfer from knowledge to application.

. An extended understanding of a problem situation by means of a variety of visualization tools allows for a broader understanding and description of a problem as well as superior solutions beyond unquestioned heuristics.

. Facilitation accelerates the build-up of tool related knowledge as well as the ability to skillfully use the tools.

The research team concluded that action depends on the way a person is enabled. It became clear that the use of visualization tools is determined by enablers, i.e. conditions such as

individual knowledge and skills related to visualization tools that enable the application of these tools. Therefore further development of instrumental capabilities depends on developing these enablers.

In workshop 2, the development of the guide was addressed. The research team proposed to use the generic double-diamond process model (Design Council, n. d.) and facilitated its usage, namely the process from problem situation to problem setting along the phases 1 (discover) and 2 (define) of the process model towards a joint conceptualization of the innovation acceleration guide, in order to come up with a better front-end process understanding. It could be observed:

. The generic design process as a reference process allows the adjustment/alignment of questions, activities and results with real procedures and work activities.

. The process model implies problem understanding prior to solution finding, thus treating and dealing with all relevant aspects. A thorough formulation of the problem related question is a prerequisite and allows for grounded decisions.

. Facilitation helps newcomers accelerate the understanding and transfer of the abstract process model into practice.

The research team concluded that the double diamond process demands some intellectual capability as well as facilitation to be understood and applied. The exercise revealed the potential of the design process as a meta thinking device for addressing innovation tasks by means of phases-related questions.

From the analysis of both workshops it could be concluded that:

. Self-motivation and a curious attitude is a strong driver for further development and individual learning, and indispensable for initiators.

. Entry-point for further development and individual learning can be set up on the axis between process and visualization tools, with implications for self-initiated changes on the enabler level where the immediate interests and values are seen.

. An existing natural ability and experience towards the application of visualization tools accelerates acceptance and application.

. Facilitation by external professionals can be in support of individual learning and further developments.

Visualization tools, design process and enabler form a dynamic system. While visualization tools contribute to sense-making, they are related to process and enablers, thus a systemic perspective applies. This was an unexpected finding from the analysis phase. Enablers stand for conditions related to the facilitation and use of visualization tools and design process.

Therefore the resulting model builds on the interrelationship of three elements:

. Visualization tools: thinking devices that enable to see options for targeted action in a way that could not be seen prior to using the visualization tools.

. Design process: procedures that enable the team to participate in what it takes to develop en envisioned solution.

. Enabler: parameters that define the conditions under which visualization tools and design process can be brought to life in the desired way. Enablers are resources that can be acted and improved upon, and include “Humans and Interaction” (knowledge and skills), “Organization and Culture” (self-motivation and attitude), and “Infrastructure and Systems” (way of doing things and workspaces). While the first two resources are derived from the analysis, the latter was included as a response to the intention of the innovation team to change and upgrade their collaborative workspaces.

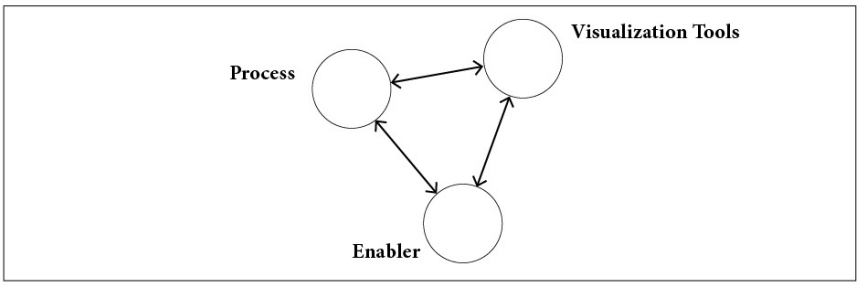

Fig 5. The actionable model (Hugentobler, 2012)

The results of this project were put into a “Guide for the Acceleration of Sense-Making in the Innovation Process.” The guide´s properties are: 1. the rationale of Visual Sense-Making as an accelerator of the problem identification and definition phases at the fuzzy front end of the innovation process. 2. the model of Visual Sense-Making as a system of visualization tools, process, and enablers. 3. the implementation of Visual Sense-Making as a synchronization exercise (that can be accelerated by means of facilitation and training), through which the three elements and their relations can be assessed by means of six sets of questions. 4. Tips for how to use the guide in the best possible way. The eight visualization tools that were used during the project supplement the guide in the form of detachable cards.

6. DISCUSSION

During the project, the members of the innovation team confirmed the value of visualization tools and of the design process for their work. While the breadth of the exercises allowed for seeing across a spectrum of visualization tool applications and the use of the front-end part of the design process, conversely this occurred at the expense of more depth with respect to specific visualization tools or specific issues related to distinct phases of the design process. Thus the project stayed at a more general level versus a level where more specific types of questions as related to specific sense-making activities could have been addressed.

Nevertheless, the use of visualization tools and process model demonstrated their value in relation to the acceleration of sense-making during innovation work, i.e. “the making of sense

and the construction of the unknown" (Weick, 1995). The results of the two key workshops led to a confirmation of our proposition.

In addition to the understanding of the relationship between visualization tools and the design process, the researchers´ observations and reflections resulted in the understanding of an additional relationship between the two elements, the "enablers". The findings therefore suggest that acceleration can indeed be achieved depending on process and enablers. However, the aspect of facilitation as a key enabling lever to overcome adoption barriers turned out to be a more critical issue than was expected, which is reflected in the enabler element.

An issues to be mentioned is the constellation of participants´ roles. The research team members played the roles of facilitators and observers at the same time, which creates a difficulty to separate the activities of acting and observing. It could have made sense to separate these roles. The same issue applies on the side of the innovation team. This balancing act was bolstered by means of a reflective path where both teams reflected on each others diaries by commenting and integrating their perceptions and understandings.

The guide summarizes the conceptual model and provides guidance for implementation. However, it does this on a rather abstract level and not as a practical hands-on device that provides visualization tools or techniques as sense-making heuristics. According to the innovation team, the adoption of visual sense-making in the sense of a "try-it-out approach" based on the guide seems limited. Therefore it might rather serve the purpose of a policy and management tool. It also frames the topic significantly enough in order to be used for individual coaching or team facilitation settings as well as for formal trainings or workshops.

At the end of the project, the research team learned that the project experience fell on fertile ground with the two managers in the way that it served as a catalyst for further action after project completion, the first one being a workspace upgrade.

7. CONCLUSION

The project contributes to research around the learning, the use and the implementation of a competency and literacy in Visual Sense-Making for innovation work. Visual Sense-Making can be regarded as a key competence to address unclear situations and issues. The main contribution is that Visual Sense-Making seems to have the potential to catapult visualization out of a rather passive role into a powerful lever for thinking activities. This is an aspect that has been overlooked in literature. Thus Visual Sense-Making could become an acceleration engine for organizations, teams and individuals tasked with work at the fuzzy front end of the innovation process. From the standpoint of the design discipline, a vast field of applications and new professional qualifications (e.g. Visual Sense-Maker) opens up.

The guide in its current form might not be sufficient to substitute self-initiated facilitation without having some minimal enabling knowledge and skills. With reference to a "do-it-yourself" or "try-it-out" approach, further research could address the idea of providing sense-

making heuristics in order to address self-initiated learning. A starting point might be the general entity-relationship diagram concept that is abstract enough to cover a wide area of issues on a level between heuristic sketches ("sketching for sense-making" that addresses general questions) and highly specific tools (such as e.g. a Fishbone diagram) that are applied towards specific questions).

8. ACKNOWLEDGEMENTS

This project was funded by CTI, the Commission for Technology and Innovation of the Swiss Confederation. Project collaborators: Jorge Hirter, MBA/INSEAD, and Robert Bossart, Dipl-Des., both Lucerne University of Applied Sciences and Arts.

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ISBN: 978-1-902546-33-9

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