COMMUNICATING INTELLIGENCE

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Communicating intelligence

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Abstract: Even if it has been amply argued that communication is crucial for the success of intelligence systems, the intelligence literature has so far only marginally touched on the circumstances and details of intelligence delivery, indicatively proposing that two phases (Document and Disseminate) are dedicated to the transfer of the intelligence insight to decision makers. This research, building on the extant knowledge of communication and persuasive recommender systems literature, and the review of real examples of intelligence delivery 'failures', obtains a detailed framework of intelligence delivery which shows the various facets and range of circumstances of insight delivery. In doing so it identifies that in the process of delivery, 1) cognitive barriers typify the carriers of the intelligence message, as well as the recipients; 2) intelligence messages should be delivered differently depending on the expectation of the recipients (expected or unexpected) and of the type of message carried (whether it is opportunities, threats or if it is incomplete or controversial); 3) the range of circumstances met in intelligence delivery call for a sophisticated array of delivery approaches. In response to this need, the paper develops an initial set of tactics for intelligence delivery combining the knowledge of practitioners (extracted during a focus group) and the findings of the communication and applied psychology research.

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Keywords: Technology Intelligence; Communication tactics; Persuasion; Decision-making; Technology Scouts; Barriers to communication; Documenting intelligence

1   Introduction

Firms are under increasing pressure to maintain a fast innovation pace and hence they feel the need to develop mechanisms to learn about new trends. For this purpose, they establish intelligence systems that can capture information from the environment and develop insight to support their decision making processes.

In particular Technology Intelligence (TI) systems are setup to capture and deliver technological information (Kerr et al., 2006). As technological development is often the source of important changes which could lead to new opportunities or to discontinuities and disruption (Bergek et al., 2013), TI activities provide an important capability for companies who want to achieve competitive advantage (Katila et al., 2002). TI is a broad term used to cover a variety of approaches and aims: from the identification of key trends and the state of the art in technology to anticipate future changes (e.g. foresight which could be used for strategic decisions), to the development of knowledge to support current and more specific technological needs (e.g. the identification of new innovation partners) (Veugelers et al., 2010).

Despite the recognised importance, companies still find TI to be challenging (Doz et al., 2006). Current research has identified that the systems of early warning suffer from several implementation pitfalls many of which relate to the lack of linkage, alignment and communication between the intelligence messengers and the intended recipients (Schwarz, 2005).

Despite this recognised gap, whilst much research is directed towards understanding how TI systems should be organised to effectively capture knowledge (e.g. (Lichtenthaler, 2003, Lichtenthaler, 2004b, Mortara et al., 2009b, Rohrbeck et al., 2009)), comparatively little research has focused on understanding how intelligence can be effectively delivered to the recipients. For instance, much of current work focuses on developing analytical approaches and tools to extract knowledge from data, for example by analysing patents more effectively (e.g. (Park et al., 2014)), whilst there is a gap in the literature covering TI the way in which TI should be communicated to the users of the message. In this sense, researchers so far have proposed a few approaches to increase the communicability of intelligence to decision makers (e.g. (Könnölä et al., 2012, Rohrbeck et al., 2006)) but little work has gone towards their validation and the identification of effective tactics.

Hence, this paper's objective is TI delivery: How can intelligence be documented and disseminated to encourage its assimilation by decision makers?

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In session 2 via the review of the literature on organisational behaviour, communication and intelligence, a basic framework for intelligence delivery was developed. The research methodology is illustrated in section 3 and explains that the specific intelligence messages delivery issues could be identified via case studies. As a result, the literature framework could be updated and adapted to reflect the intelligence delivery range of conditions (see section 4). Finally the key tactics to respond to the challenges in intelligence delivery were identified by matching the literature on persuasive communication and applied psychology to the specific issues identified by case studies. The findings are discussed in section 5 for implications for the TI literature.

2 Technology intelligence communication

Supporting stakeholders with relevant information in a timely manner is a key issue for organizations. Knowledge Management (Liao, 2003, Shin et al., 2001), Information Theory (IT)(Wang, 2011), Strategy and Foresight (Alsan et al., 2003) and Decision Support Systems (DSS) (Rogers et al., 2007) literature streams overlap in attempting to understand how firms could organise themselves to provide those who need to take decisions with the relevant and purposeful information.

Technology Intelligence (TI) is defined within the Innovation and Technology Management literatures as a firm activity that has the purpose of feeding contextualised and relevant knowledge about emerging technological trends to those in the firm who need to take decisions (Kerr et al., 2006). TI encompasses broadly all the people-based and computer-based processes which supply information to the decision makers, whilst works in the DSS and IT have become more involved with the computational technologies and techniques (such as Data-mining, Artificial intelligence) to support organisational learning (Bhatt et al., 2002).

It is known that business intelligence systems often fail or the tools implemented are under-used (Arnott, 2010) and authors have identified the importance of communication (the flow of information between intelligence consumers' (Bernhardt, 1993) and 'information brokers') for a successful information logistics plan (Dinter, 2013). However, whilst much research is going in the direction of understanding how TI systems should be organised to effectively capture knowledge, comparatively little research has focused on understanding how intelligence can be effectively delivered to the recipients. For example, in the Foresight and Futures literature, the attention is placed on developing effective methodologies for analyising weak signals. However, also within this stream of works, there is an awareness of the issues

of intelligence delivery (Schwarz, 2005, Ratcliffe, 2005) even if it is still under-researched. Markley, for instance, identifies the low 'credibility' of a message as the key barrier to intelligence delivery and suggests a methodology to increase the chances to pick up on important signals of change (Markley, 2011). Others build on this to identify that credibility is linked to the perceived usefulness of a message (Kawakami et al., 2013) but very few expand on how credibility could be increased.
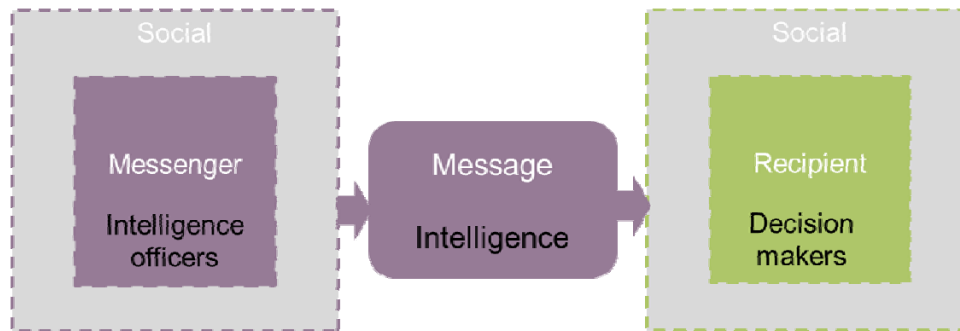
A technology intelligence communication model

The details of the interaction between decision makers and intelligence brokers are described by the process of intelligence (Kerr et al., 2006). Besides coordinating the TI activities (Battistella, 2014, Lichtenthaler, 2004a), intelligence brokers 'capture' information performing the "Search", "Filter" and "Analyse" phases of the cycle, while through "Document" and "Disseminate" they take care of the packaging of intelligence and its delivery to the decision makers (see Fig.1).
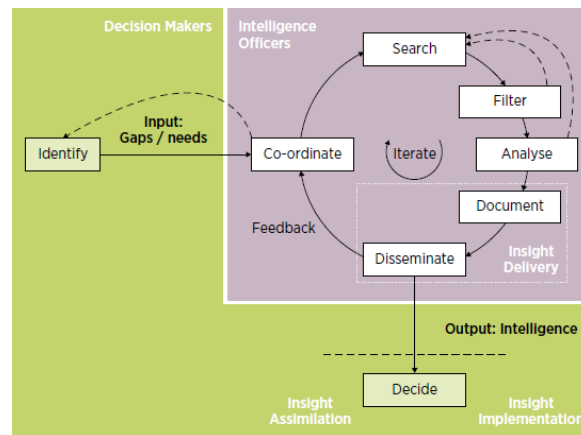
Figure 1 The intelligence cycle (adapted from (Kerr et al., 2006)).

This model could be overlapped with that described by traditional communication models across dyads (see Fig. 2 adapted from (Hellriegel et al., 1995) p.390) which imply that interpersonal communication occurs between sender and receiver via transmitters (used by the sender to send the message), receptors (used by the recipient to receive the message) and media or channels along which the message travels.

Whilst several authors (e.g. (Mortara et al., 2009a)) have pointed to the fact that sometimes intelligence gathering and decision making are done by the same individuals, the intelligence model by Kerr et al. (2006) is based on the idea that these are separate roles. The decision maker is the recipient of the message (and has the task of deciding), whilst TI operatives, such as technology scouts (Rohrbeck, 2010), are tasked to inform the decision makers with intelligence messages. Both messengers and decision makers live in a social environment from which they are influenced and from which they derive cues to assess situations (Baraldi, 2013).

Figure 2 The intelligence communication framework

Based on this framework, we extract from the literature what is known regarding the three elements: the technology intelligence officers (Messengers) , the decision makers (recipients) and the messages.

Messengers (technology intelligence officers)

To the best of my knowledge there is limited availability of literature about the practice of intelligence delivery, however the establishment of communication routines (Lichtenthaler, 2007) has been indicated as important by several authors to insure that intelligence reaches decision-makers. Scouts go through technology selling processes (Probert et al., 2013, Dang et al., 2011). Often TI operatives work in a solitary and uncoordinated way, in particular when they try to identify "unknown-unknowns" (Scan) (Mortara et al., 2009a, Schwarz, 2005) and hence it is reasonable to assume that they independently will convey the intelligence. When more people contribute to the development of an intelligence message, several roles could be identified (such as strategist, initiator and opponent) (Rohrbeck et al., 2011). The collective transfer of intelligence can be hampered by people with particular attitudes (such as "accountantitis" or "naysayers") or by certain communication situations (such as hierarchical meetings) (Patton).

Receivers of intelligence (decision makers)

On the other hand, literature has clearly identified that even with good data available, the decision makers' attitude to their interpretation and the decision makers' cognitive issues limit intelligence delivery (Shah et al., 2012). Even if the research on cognition has been progressing in the last 20 years (Kaplan, 2011), the tendency of much of current innovation management literature is to imply that decision makers are affected by biases often encompassed under terms such as "path dependency" or "bounded rationality" (Simon, 1945). However, it has been shown that different types of bias exist and they do not affect equally each type of decision making process (Das et al., 1999).

Cognitive barriers could vary depending on the attitudes and preferences of individuals (Shah et al., 2012), and the different circumstances in which the decision maker is compared to the message to be assimilated (i.e. the cognitive distance between the decision maker mind-set and the knowledge that they need to absorb (Wuyts et al., 2005, Fink et al., 1983, Nooteboom et al., 2007)). The cognitive distance is determined by several factors including the current decision makers' focus (Ocasio, 1997). The cognitive distance depends on the nature and the conditions in which the recipient finds him/herself (i.e. the environment in which s/he is placed and his/her own nature (e.g. intelligence, self-esteem, prior involvement with the issue and demographics)). For example, inexperienced decision makers are prone to be biased by negative framing of outcomes (e.g.' profits less than XXX', 'decreasing profits', 'reduction of

profits' etc.) more than experienced (Hodgkinson et al., 1999). Emotions are also a co-factor in the development of cognitive frames (Elfenbein, 2007). A further problem is that of "information overload" which exceeds the personal capability to understand and evaluate data (Eppler et al., 2004). The tendency is to see more clearly the bias in others' and to consider their own frames as more objective (Kaplan, 2008). However, sometimes it is the decision-making social processes to be dysfunctional (Frisch, 2008) as people attempt to mobilize others around a particular point of view by participating in the political discourse and in social activities (Kaplan, 2008).

At the basis of the management research on cognition in decision making stand huge leaps forward in the field of applied psychology in the past 40 years, briefly summarised below.

The psychological and economic theories of decision making

Applied psychologists have identified that humans make decisions in two complementary ways (Dual process theory (Kahneman, 2011)).

1) Instinctive, gut feel, heuristic, impulsive, unconscious, aka System 1 (S1).
2) Logical, rational, calculating, conscious, aka System 2 (S2).

Whilst S1 is the default decision making system, 'lightweight' and is always active, S2 requires a great effort to be activated. Hence, in everyday life, most decisions are taken relying on the first system, even if careful planning and decision making exercises are organized to stimulate the most rational decision making process. Engaging the most rational decision making process (S2) - which impartially evaluates pros and cons, second guesses the instinctive and impulsive decisions of S1, carries out complex calculations, and moderates urges and instinctive behaviours such as anger - requires great cognitive effort which humans are naturally averse to give. Hence, S1 provides the continuous decision making system which tries to quickly make sense of any situation and get to conclusions. It does so by assessing each situation in relation with what is already known, what it is considered to be the norm. 'The norm' is established progressively by adding experiences to the memory, so that the second time a situation is experienced, it becomes progressively less unusual. Because of how S1 works (explained in table 1 in the appendix in more detail), it is the source of many cognitive biases and systematic errors in decision making, as described in much literature (e.g. (Swami, 2013)).

To increase the S2 decision system managers often develop the conditions to rely on this rational decision making system for instance by implementing decision tools or cognitive mapping techniques (Hodgkinson et al., 1999) such as those that apply the Multi-Attribute Utility theory (MAUT) (Keeney, 1992) which relies on the opportunity of engaging the most rational decision making (S2). However, because for humans it is challenging to appreciate intangible and speculative factors (e.g. risks involved, occurrence likelihood etc.) the use of MAUT type of decision making tools is also susceptible of S1 biases.

This is why, in order to improve on insight delivery, it would be important to keep in mind how the most unconscious part of human decision making works so that, when possible, messages can be delivered indulging S1's working. Some specific studies have identified that:

- The most receptive recipients are those with an intermediate level of self-esteem (Rhodes et al., 1992).

- Any prior decisions to accept/take on board other messages. This principle of consistency - whereby people are more likely to try to behave consistently with their prior decisions.

- The consensus around the message – i.e. what decision makers feel others think of the message. In particular it has been shown that an audience's reaction to a message is more

important when people decide with low elaboration processes (S1) (Cacioppo et al., 1982).

- People are more likely to accept messages from people they know, even if the person is not present (Cialdini, 1993).

Intelligence message and communication tactics

Several authors propose a particular approach to communicating intelligence. For example, Rohrbeck recommends a radar visualisation to help decision makers taking in the full picture of the relevance of each technology monitored (Rohrbeck et al., 2006), whist others recommend scenarios as ways to communicate foresight advice (Önkal et al., 2013). However, there is still a lack of understanding of which would work better and about the underlying principles that should be used. Several researchers have studied persuasive communication for over a luster (see for instance a summary in (Yoo et al., 2013)) and their work could provide helpful background to develop communication tactics. In particular, for persuasive communication it is important to consider: 1) the relationship between the messenger and the recipient and 2) the message.

Relationship between messenger and recipient

The most important cue for a recipient is the liking of the messenger (Burgoon et al., 2002). Self-presentation is hence an important component in the communication tactics (Cialdini, 1994). Beyond this, the liking of another individual is also determined by similarity (Hogg et al., 1993), but only in relation to how the receiver recognizes their relevance to the message (O'Keefe, 2002), the cooperativeness and the kindness of the comments received from these specific individuals (Rhoads et al., 2002) as people who make others feel good are able to transfer this reaction to their communication messages (Rhoads et al., 2002). The credibility of the messenger is also a great influence on the believability of the content delivered which is linked to the messengers' authority in the eyes of receivers. Symbols of authority (such as uniforms, high power jobs, titles and degrees) substantiate the perception of credibility and people well and formally dressed are perceived as more credible (Sebastian et al., 2008).

The reception of the message increases if the recipient feels in 'debt' to the messenger. This is the principle of reciprocity (Hogan, 2011) which kicks in when people feel under social obligation to return favors to those who deliver a message. Caring for the recipient's interests could be another example of reciprocity (Hogan, 2011).

Finally, the messages are more persuasive when coming consistently from different sources (Harkins et al., 1987)

Message

For persuasive communications the following aspects need to be considered:
- Message credibility. The identification and persuasion of key people is pivotal in the increasing the credibility of messages (Kaivo-oja, 2012). According to Markley (2011) the scenario-changing events which should be of most concern are those with high probability, high impact but low credibility outside the community of specialists as these will be most naturally overlooked.
- Order of content delivery. Messages reported first are more convincing when the recipients are more rational while a message presented last tends to be more effective for people who decide using S1 (Haugtvedt et al., 1990). An explanation for this is that messages delivered at the beginning produce an effect on people who are highly involved with the theme. Messages left last work better for those less involved with the topic as they will remain in their audience's memories for longer.

- Sense-making vs. sense-giving. These two strategies correspond to two different ways to interpret past events to induce different reactions in audiences. Sense-giving is "directed towards affecting the other's attention and understanding of the issue" (Dutton et al., 1993). Sense-giving is conveyed for instance by portraying the past as an unpredictable set of events, a sense of uncertainty and to demonstrate the inadequacies of current systems to predict change. This could be a tactic useful to simulate the shocks which promote the shift in the decision makers' perception promoting the absorption of information otherwise blocked by cognitive biases (Kass et al., 2013).
- *S*pecificity of recommendations. More specific recommendations are more effective than generic ones (O'Keefe, 1997).
- Explicit conclusions vs. open messages which allow the audience to draw their own conclusions. In general, the former are more effective (O'Keefe, 1997). However, these results are controversial as researchers think there are circumstances when the latter approach is more effective, for example for some advertising campaigns (Chance, 1975)
- One-sided vs. two-sided arguments. One-sided messages are to be preferred for recipients who do not need to be strongly convinced of an argument as they are already in agreement in principle but are not well informed about the issue. Two-sided messages are more effective when the audiences hold opposing views or are knowledgeable about both sides of the argument (Pechmann, 1992).
- Timing of delivery. There is some evidence that messages delivered at close range to the decision making timing have a higher chance to get absorbed (O'Keefe, 2002).
- Repetition helps in improving persuasion, in particular when the content is complex (Cacioppo et al., 1989)). However, people build up 'resistance to arguments' (Inoculation theory, (McGuire, 1964)). If an argument is brought forward repeatedly but weakly at first and more vividly later, people are more likely to build up resistance and refute it. This is particularly the case when the message hits on some issues about which the receiver holds strong (and opposing to that of the messenger's) views. If, instead, the recipients are not previously involved with the topic, studies show that and early notice about the content of an argument may be unimportant or even motivate them to change their beliefs (Apsler et al., 1968).
- The communication channels. Although evidence on this is still controversial, communication media (Channels) seem to partly affect the delivery of messages (Johnson et al., 1992). This effect is secondary compared to the importance of the perception of the messenger's credibility and likeability. So, richer media which can carry more cues about the source such as videotape and audiotapes, and those which allow feedback and can be personalized are better for conveying complex topics (see Media richness theory (Daft et al., 1984)). Written messages are instead to be preferred when the impact of message content has to be enhanced over that of communicator characteristics (O'Keefe, 2002).
- Inducing fear or using humor are considered effective techniques in persuasion (O'Keefe, 2002).

3 Methodology

The ambition of the work was to identify guidance for effective intelligence communication. The approach taken is described in Fig.3, based on the identification of the issues in TI practice and a confrontation with the elements of effective communication tactics identified by psychological and communication literature.

As described above, in literature there is abundant research relative to decision makers' biases whilst there is still a lack of research on communication from the TI officers' perspective. For

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this reason, evidence from the perspective of TI officers about TI delivery practices were collected using an in-depth research methodology based on the grounded theory approach (Glaser et al., 1967) and used to generate a theoretical framework.

The sample: 12 managers who had experience of delivering intelligence in large companies or in technology consultancies were interviewed (see Table 1). Although the research did not discriminate between large and small companies deliberately, TI officers are more commonly employed in large companies. Further it was considered satisfactory gathering data from larger organisations as communication and decision making is more socially complex and structured in these organisations and hence would present the most detailed data. Further, to reduce possible national cultural biases, interviewees from two countries were invited to participate (Italy #1-3 and UK #4-12). Interviewees had at least one year of experience of delivering TI.

The interview protocol: Interviewees were asked to think ahead of the interview about a few instances when they deemed the intelligence delivery had been difficult. Interviewees were initially asked to describe their role within the organisation and to illustrate, in an anecdotal way specific instances of not successful delivery of intelligence. Interviewees were stirred away from generalising about their intelligence delivery practices and to stick as much as possible with the description of the events. Interviews lasted 1-2 hours and were tape recorded and transcribed for the analysis.
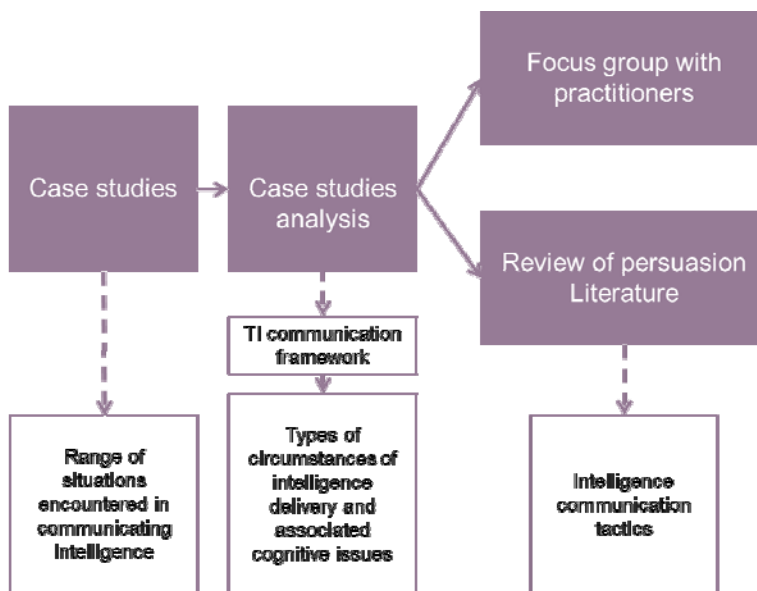
Figure 3 Overall research design

Each case obtained (i.e. specific instance of intelligence delivery) was taken separately and analysed for type of intelligence message (purpose, circumstances of delivery, cognitive issues emerged in the delivery (for all parties involved)) and results were used to adapt and update the intelligence communication framework in Fig. 2.

Table 1 List of interviewees and participants to focus group

Case #	Company role	Sector	Interviews	Focus group
1	CEO	Consultancy	1	
2	Market Insight Business Partner	Pharmaceutical	2	
3	Strategy & Services Intelligence	Financial	1	
4	Group Marketing	Packaging	1	

5	Director of Technology	Packaging	1	
6	Strategy Adviser	Oil and Gas	2	FG
7	Corporate Venturing Group	Oil and Gas	2	
8	Corporate Venturing Group	Oil and Gas	2	
9	Industrial database consulting services	Technical consultancy	1	
10	Head of intelligence information management	Technical consultancy	1	
11	Archives and Records Management Officer	Technical consultancy	1	
12	Innovation manager	Rail	1	
	Innovation manager	Packaging		FG
	Innovation manager	Pumps		FG
	Global R&D collaborations	Chemicals		FG
	Head of discovery	Chemicals		FG
	Systems and integration manager	Instruments		FG
	Innovation manager	Consumers goods		FG
	Professor	Academia		FG
	Head of technology	Printing		FG
	Technology Officer	Printing		FG
	Technology Officer	Printing		FG
	Lecturer	Academia		FG
	Director	Consultancy		FG
	Director business development	Refrigeration		FG

As part of the framework, a typology of the different circumstances of insignt delivery and the associated cognitive issues emerged.

Intelligence officers and managers were then invited at a focus group meeting (see Table 1), as the synergistic group effect in focus groups can generate larger number of ideas through the interactions and stimulated discussions (Stewart et al., 1990). The aim was to gather elements of practical responses to the issues of intelligence delivery and take advantage of the energy and diversity of opinions that distinguishes focus group interviews from conventional one-to-one interviews (Berg, 2001). At the event, intelligence managers were presented with the examples of intelligence delivery problems, extracted from the case studies and presented in an anonymous format. The participants were divided in groups and asked to develop practical approaches to deliver intelligence to overcome the specific issues in the case presented, based on their personal experience. In parallel, the same cases were used to develop specific tactics of intelligence delivery, based on the persuasion literature. Tactical approaches for intelligence delivery were compared and together represent a catalogue of possible tactics which could be used by real life intelligence officers.

3 Results

From the case studies analysis archetypal situations and problems in intelligence delivery were obtained, three pertaining to the decision makers and two to the intelligence officers.

For the decision makers key issues matched with much of what highlighted in literature.

1. **Cognitive distance:** Drawing upon a concept widely used in literature, "Cognitive distance" between communicators and recipients was mentioned very often. Interviewees used words such as "distracted"(3), "short attention span"(3), "inertia"(7,8) and "our [decision makers] have not been used to XXX" (3,5,6, 7,8,10,12). One representative example came from the financial industry (3). As a result of the latest financial crisis, a newly established unit of analysts had the task of

providing analyses to the CEO and other senior managers on how the industry in this sector is evolving, what types of business opportunities may arise and what types of disruptions might impact on the firm and its sector. Despite the CEO championing the work of the analysts, the time he can devote to this was limited. The other top managers were even less sensitive to intelligence messages and did not appear to proactively seek information or read reports. The feeling was that for certain scenarios the analyses were not believed as they looked too threatening and different from past experience.

These cognitive distance symptoms were particularly manifested when intelligence was unexpected, was outside the scope of the initial requirements of the day-to-day business or came from the unprompted initiative of the intelligence team (1, 2, 3, 6, 7, 12). One of the interviewees (6) initiated a project to forecast the optimal operating conditions for a manufacturing plant in consideration of the major economic drivers. Broadening the analysis, he noted that some drastic changes in operational and logistic tactics would most likely yield improved outcomes, not just for the plant to run more efficiently, but for the firm to increase their business. These changes emerged from a wider approach taken which went beyond the scope of the analysis originally commissioned. However, the decision makers had already committed strongly to the original plan and were unable to understand or make use of this important opportunity. In this case, he thought that "intelligence was an afterthought" (6). Other managers remarked on how much they stir away from doing intelligence spontaneously :"Spontaneous work (i.e. not being sponsored by senior executives) is usually a waste of time" (7).

2. **Anchoring and adjustment**. Sometimes the communication difficulty results from the fact that decisions are unjustifiably influenced by prior information which is used as a reference point for subsequent information (1, 2, 3, 6). This happens for example when intelligence exercises are produced over a long period of time and interim results are fed to the decision makers. This was the problem observed by one of the interviewees (6) who was part of an exercise carried out by his firm to support long term strategic planning. "We have produced only one outlook insight so far and this is the only one that people [decision makers] have seen to date. [..] The scope was to provide material for strategy discussion but now the first scenario presented [..] is the one they are talking about and they are forming their opinion upon. [..]The challenge is to keep them informed so that they have a feeling that work is progressing but at the same time make sure they do not take the interim material as the final answer."(6).

3. **Message distortion through social network.** Decision making systems are complex and social. The intelligence message needed to travel across many levels before getting to the final decision maker. The acceptance or else of new knowledge became a more of a political matter (4, 6, 7, 8, 9, 11). In these cases messages become distorted or are not transferred at all. "sometimes you send reports to the head of the group and they do not pass it along"(4). Individual managers are both the 'interpreters' and the 'translators' of messages and transmit the message to sway, consciously or unconsciously, others' opinions towards their own: "Strategy is being done behind closed doors and you are kept at arm's length. The outcome insights were getting in my opinion somewhat shaped to reflect people's biases." (6).

For the intelligence officers, two issues impact on the message delivery:

1. **Lack of kudos**. When delivering their message to the decision makers, intelligence teams become "the source" of the knowledge and their credibility reflects on the efficiency of the knowledge transfer. The junior status, and relative low credibility of internal TI officers, emerged clearly in several interviews (1, 2, 6). "In our organisation there is the expectation that only the senior executives own a brain big enough to think about strategy. And this is why the TI analysis has to be presented by someone more senior. [..] It's about people hierarchy and chain. [..] People want to be associated with important decisions. Big name consultancies and research institutions who have established brands are appreciated even if their work is less

precise or detailed" (6). Engaging an external consultancy is sometimes a deliberate communication tactic taken by internal managers "Sometimes we feel that we are hired to communicate unpalatable results, something internal TI officers cannot communicate. It feels like they leave untapped internal TI potential" (1).

2. **Ethics and repercussions for the messenger.** It would be incorrect to assume that the intelligence team is totally neutral to the message they convey. This was the case of the consultant (1) who was hired by the CTO of a firm in the medical sector to perform the analysis of the commercial opportunities for a new technology project, and of the market channels which could be activated to commercialize the technology. The client was already well into the development of the technology and strongly believed in its innovativeness and potential. During the analysis the consultant realized that the commercial window for the client's innovation was very short-term. The consultants were faced with the difficult task of challenging their customer, if necessary reaching out to their superiors and potentially putting the person who sought their services in a bad light with his company, putting also at risk the future of the relationship with that customer. "You displease people with whom you need to work again" (1). "Saying, 'I do not recommend you to enter the IT sector' has been hard. But they thankfully understood our intellectual honesty" (1). This ethical issue applies also for internal TI officers: having spent several years on a project, a technology officer (4) was so taken by the idea of developing a particular product that he retrospectively realised that he positively skewed the analysis in its favour without thoroughly testing the evidence prior to investment.

Emerging framework for TI delivery

As a result of the data gathered via case studies, the framework for TI delivery (see Fig 2) could be modified as represented in Fig. 3. TI officers (messengers) could be internal to the firm (2-12) or external consultants (1). They could suffer from cognitive issues related to their lack of credibility (kudos), particularly if they are internal (3, 6), and are affected by the consequences of their messages with ethical issues emerging (1, 4). Also the resources available to them (e.g. the time to complete their insight development or the chances to access the recipients) impacts on their capability to deliver the message (6, 7, 8).

The cognitive barriers of TI recipients ('decision makers') identified through case studies substantially follow what highlighted by literature: decision makers live in a social environment with which they interact (and from which they receive multiple influences and cues). Because of how the human decision making works, cognitive barriers will, to some extent, prevent them from absorbing intelligence messages. The entity of the barriers depends on circumstances, but it is likely to be shaped by their prior knowledge and mental models, and by their political and social attitudes.
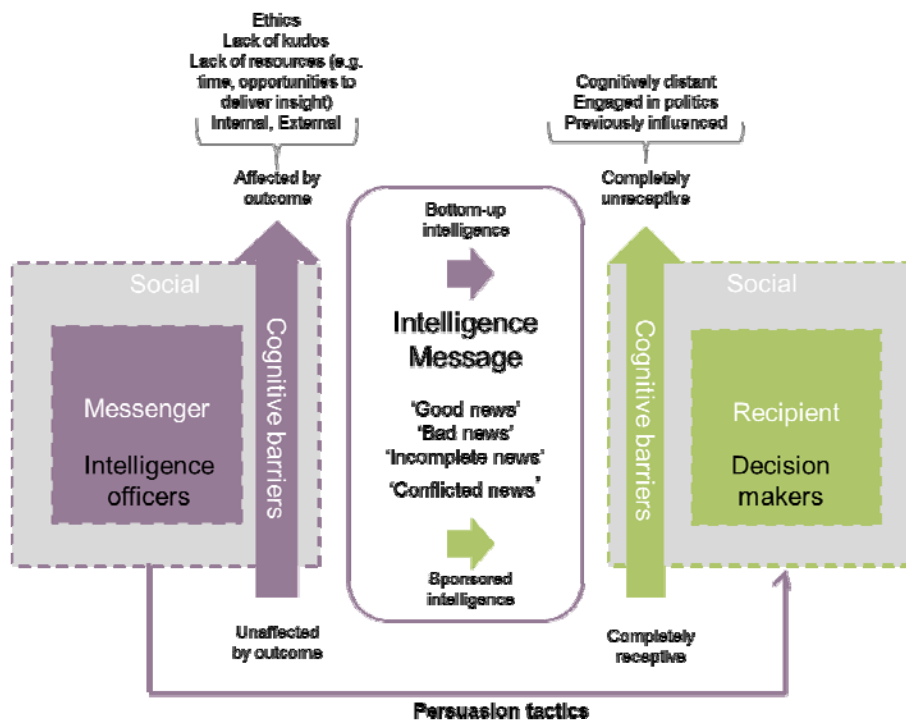

Figure 4 Emerging framework for intelligence delivery

The insight (aka 'intelligence message') could vary from 'good news' (e.g. highlighting a 'gain' or a positive outlook - drawing a positive emotional response) to 'bad news' (e.g. highlighting a threat, a challenge, a potentially negative outlook) while sometimes it is neither (e.g. could report contrasting views on the same problem, or a number of scenarios for strategic discussion). Further, the message could be incomplete, such as when an interim update is given. There are two flows of intelligence messages emerging from the case studies "sponsored intelligence" and "bottom-up (unexpected) intelligence" respectively.

In the middle are the 'persuasion tactics', i.e. the ways in which intelligence can be packaged (documented) and disseminated to the recipients. The term 'persuasion' refers to the communication literature (Yoo et al., 2013) however it can be a controversial term as the communication should aim to make the insight permeate the cognitive barriers of the receivers and be absorbed, so that decision makers can reach their own judgment (Kerr et al., 2006).

Development of persuasive tactics

The five types of issues in intelligence delivery have been the basis for the development of delivery tactics, based on review of persuasion approaches and applied psychology and the results of a focus group.

Tables 2-3 below represent the results of the two exercises.

Table 2 Key tactics derived by experienced managers to overcome each of the common issues in TI delivery

Problems	Tactics
Cognitive distance	• Give a sense of urgency • Develop coalitions (identify key stakeholders) • In interim communication only talk about the process not the content
Anchoring and adjustment	• Formalise the process so you can always refer to it • Minimise shock by pre-emptive networking • Take care of setting right expectations • Remain agnostic • Show always even (balanced) scenarios
Intelligence distortion	• Identify key translators (build coalitions) • Develop a short and clear executive summary • Use case studies/examples • Get access to external messages and challenge the findings
Lack of kudos	• Leverage on the internal knowledge • 'Externalise' internal system (put it to work for external people too) • PR of services
Repercussions for the messenger	• Establish trust – understand the audience, regular updates • Richness of data (case studies) • Lobbying • Face-to-face communication

Table 3 Key tactics derived from literature on persuasive communication and applied psychology (see literature section)

Problems	Tactics				
	Recipient	*Recipient-messenger relationship*	*Message structure*	*Message content*	*Message delivery approaches*
Cognitive distance	• Highlight similarities with more familiar scenarios • Show that there is consensus about the issue (Particularly with trusted entourage)	• Work on building the relationship with the recipient (follow the tactics of reciprocity and similarity) • Work on building your credibility (se lack of kudos) • Increase the credibility by identifying key opinion leaders within the firm and link with their views.	• Phrase the issues in a negative way showing potential losses if the scenario is ignored. • Do not show your opinion • If the recipient is not yet involved with the issue leave the key message until last. • Present an argument by showing how the analysis has been done.	• Be specific on potential outcomes • Show both sides of the argument. • Use vivid case studies more than statistics on their own	• Deliver messages close to when decisions are taken • Reduce the time distance (make the future present). Useful techniques are war-gaming and pre-mortem exercises.
Anchoring and adjustment	• Formalise the process and talk about the analysis techniques but do not give details of the interim outcomes. • Get the decision makers in the same room with people with similar seniority but with different opinions	• Work on building the relationship with the recipient (follow the tactics of reciprocity and similarity) • Increase the credibility by identifying key opinion leaders within the firm and link with their views. • Work on building your credibility (se lack of kudos)	• Do not show your opinion • Reshuffle the order of scenarios when presenting them. • Refer to equally authoritative sources for each scenario. • Frame scenarios in the same way (either gains or losses).	• Be generic on potential outcomes • Show two sides of an argument.	• Convey a sense of uncertainty (e.g. distribute different versions of the same data to the decision makers) • Use open messages which allow individuals to make their own conclusions.
Intelligence	• Analyse the	• Work on building	• Develop a short incisive summary.	• Be specific about	• Use repetition to

distortion	stakeholders landscape (influence and interest) to identify the key dissemination path to reduce risks of distortion.	the relationship with the recipient (follow the tactics of reciprocity and similarity) • Increase the credibility by identifying key opinion leaders within the firm and link with their views.	• Show causality to link facts to conclusions.	implications leaving out the most generic and speculative issues which could be used in different ways	reinforce key story. • Use rich media to deliver (e.g. video) which cannot be easily tampered.
Lack of kudos	• Analyse the stakeholders landscape (influence and interest) to identify the key dissemination path to reduce risks of distortion. • Understand the decision makers' point of view	• Work on building the relationship with the recipient (follow the tactics of reciprocity and similarity) • Be pleasant and show concern for the recipient's issues • Be accurate in personal presentation • Use as many symbols of authority as possible. • Listen first.	• Show both sides of the argument to increase trustworthiness.	• Refer to authoritative sources • Be specific in recommendations and link it to the decision makers' needs. • Make it special and personal • Leverage internal knowledge	• Deliver in person or using rich media (audio-visual) • Make careful use of humour
Repercussions for the messenger	• Identify and build consensus in the decision makers' network	• Work on building the relationship with the recipient (follow the tactics of reciprocity and similarity) • Work on building your credibility (se lack of kudos)	• Show both sides of the argument to increase trustworthiness. • Pre-mortem techniques can be used to anticipate the consequences of a decision and reach agreement as a group.	• Refer to authoritative sources • Remain agnostic	• Ask credible external sources to deliver the message (e.g. consultants)

3 Discussion and conclusions

Even if it has been amply argued that communication is crucial for the implementation of intelligence (Schwarz, 2005, Ratcliffe, 2005), the intelligence literature has so far only marginally touched on the circumstances and details of intelligence delivery, indicatively proposing that two phases (Document and Disseminate) would be dedicated to the transfer of the intelligence insight to decision makers (Kerr et al., 2006).

The present work has explored in more depth this understudied issue of intelligence delivery merging and building on the extant knowledge of communication and persuasive recommender systems (Yoo et al., 2013) and reviewing real examples of intelligence 'delivery failures'. As a result, a detailed framework of intelligence delivery has been obtained which shows the various facets and range of circumstances of insight delivery.

In particular, this work has identified that in the process of delivery, cognitive barriers typify the carriers of the intelligence message, as well as the recipients. Whilst this might be at first sight an obvious finding, much of current literature acknowledges mostly the biases of decision makers. In some cases, TI officers' analytical biases had been mentioned (e.g. (Ebert et al., 2009)) but so far there has been no treatment of the informants' biases in communicating the results of their findings.

Further, the model of TI (Kerr et al., 2006) implies that sometimes "decision-makers have requirements for intelligence provision [..] which direct the technology intelligence activity, […] whilst sometimes the brokers find critical and timely intelligence that the consumers should be made aware of" (Kerr et al., 2006). Although the TI model seems to indicate that these two intelligence flows follow opposite trajectories, communication is always from the intelligence broker to the decision maker. The difference rather than in the flow direction is in the expectation in the recipient regarding the intelligence message. What seems relevant from the analysis of the case studies is the level of expectedness of these messages, whereby, also positive outlooks could be ignored if the recipient is not ready to absorb them.

The work has also shown that the intelligence message itself varies not only depending on whether the intelligence represents an opportunity or a threat (Kerr et al., 2006), but also because it might be ambiguous either because it is still under development or because it is conflicted. Hence different techniques for intelligence delivery are needed to respond to the various circumstances and current approaches and routines proposed in literature (Lichtenthaler, 2007) such as radars (Rohrbeck et al., 2006) or scenarios (Önkal et al., 2013) seem inadequate to cover all the situations.

Hence, this work has moved a step forward and attempted to develop practical approaches to deliver insight combining two different methodologies. Firstly the pragmatic solutions to each of the issues in insight delivery emerging from the case studies were developed by intelligence practitioners during a focus group. Secondly, via a review of the applied psychology, and persuasive communication literature, I have tried to develop key guidance to support the development of insights in each circumstance. Whilst there is coherence amongst the two methods on many fronts in the recognition that the relationship between decision makers and technology intelligence officers has to be cultivated, as well as the need for developing a capability to sell the arguments as indicated by prior research (Dutton et al., 1993, Probert et al., 2013), amongst practitioners there is a weaker awareness about how persuasive arguments should be built and messages constructed. Hence, the adoption and dissemination of tactical approaches derived from applied psychology and communication literature might come particularly useful.

Appendix

Table 4 Main characteristics of System 1 (S1)

Characteristic	Description
Uses ONLY the information available to create a 'plausible' story	This is done without challenging whether the evidence is a partial account of reality. In doing so S1 looks for causes and intentions even when there are none (e.g. humans easily anthropomorphize objects attributing them characters and personalities as demonstrated by a famous experiment by in which viewers of a cartoon concerning triangles and a circle attributed personalities and intentions to the objects involved).
Searches for patterns	In doing so S1 is more sensitive to **content** than to probability. There is a tendency to generalize on small numbers and specific incidents and be less sensitive to evidence about large samples. In particular, linked to this there is a proneness to treat personal problems as unique and ignore historical statistics (the 'Inside view').
Uses attractiveness to evaluate sources' (people) credibility	This is linked to the capability of distinguishing friends from foes.
Substitutes difficult questions with easier ones	For example, answering the question "are you happy?" is quite hard. If prompted with easier questions to answer (e.g. about one's romantic or family conditions, wealth etc…) in advance, the response to the question above is easier to give as the results will correlate with the answers given to the specific easier questions. This means that it possible to 'prime' (influence) the answer to difficult questions using other cues.
Suppresses doubt, neglects ambiguity	This is linked to #1
Uses heuristics (shortcuts) **to estimate frequencies of occurrences**	In particular: a. Things that are easier to remember are considered to be more common (Availability). However, this assumption is often not correct. As an example, we remember more easily striking news about rare causes of death because they are portrayed in the news, despite these being far less common than other more mundane causes of death. b. Characteristics which in our view are representative of a class are more likely to occur (Representativeness). This is not necessarily the case. We quickly draw conclusions about someone's job when we hear about his/her personal characteristics and we are less likely to base our guesses on other more fundamental data – such as information on what the most common jobs are. This latter information would lead to more accurate guesses, but because of point one above, if not provided it is not considered.
Uses 'anchors' (retrievable data points, starting points) to adjust judgment and is susceptible to 'halo effects' (exaggerating emotional consistencies).	Because of the heuristic of availability and the capability to abstract intensities of scale from one context to another (see below), estimations are unduly influenced by numbers previously heard (anchors) even in other contexts. Also, judgment previously passed on people impacts the judgment of these people in future circumstances (halo effect). For example the first scoring given to a student is much more significant in the mind of an assessor than the following ones, and also, the nice feeling about a new acquaintance makes people inclined to judge positively other characteristics of

Makes parallelisms across different scales	these acquaintances about which they know factually nothing. e.g. equates suffering with punishment
Is overly optimist and downplays risk of failure	This characteristic helps in carrying out new enterprising ventures and provides resilience against setbacks, but blinds people about the risks and difficulties concerning these tasks and exposes people to failure outcomes.
Is more sensitive to changes than to states	In particular it is more sensitive to losses than to gains. The variations in values (steeper for losses than for gains of value) are perceived differently depending on the reference point. For example, when owning an object, its value (e.g. its sale value) is higher in our estimate than in the eyes of external people (Endowment effect). Hence the loss of an owned object is more costly to us who would tend raise its price if we were to sell it, compared to the estimated value given to it by those who would like to own it - who are ready to spend less to own it than we would like.
Lives in the NOW	Or better it has a different perception of value and risks depending on the time frame of the assessment (if the decision is about something that will have a value/risk in the future compared to something that has value/risk now).
Is influenced by physical reactions and associates these with emotions	For example, frowning or smiling induce a change of mood and frame of mind

Source: (Kahneman, 2011)

References and Notes

ALSAN, A. & ATILLA ONER, M. 2003. An integrated view of foresight: integrated foresight management model. *Foresight,* 5.

APSLER, R. & SEARS, D. O. 1968. Warning, personal involvement, and attitude change. . *Journal of Personality and Social Psychology,* 9**,** 162-166.

BARALDI, C. 2013. Forms of Decision Making: Gatekeeping and Dialogic Coordination in CISV Organizational Meetings. *Journal of Business Communication,* 50**,** 339-361.

BATTISTELLA, C. 2014. The organisation of Corporate Foresight: A multiple case study in the telecommunication industry. *Technological Forecasting and Social Change,* 87**,** 60-79.

BERG, B. 2001. *QUALITATIVE RESEARCH METHODS FOR THE SOCIAL SCIENCES* Needham Heights, MA ALLYN AND BACON

BERGEK, A., BERGGREN, C., MAGNUSSON, T. & HOBDAY, M. 2013. Technological discontinuities and the challenge for incumbent firms: Destruction, disruption or creative accumulation? *Research Policy,* 42**,** 1210-1224.

BERNHARDT, D. 1993. *Perfectly legal competitor Intelligence*, Pitman Publishing.

BHATT, G. D. & ZAVERI, J. 2002. The enabling role of decision support systems in organizational learning. *Decision Support Systems,* 32**,** 297-309.

BURGOON, J. K., DUNBAR, N. E. & SEGRING, C. 2002. Nonverbal influence. *In:* DILLARD, J. P. & PFAU, M. (eds.) *Persuasion handbook: Developments in theory and practice.* Thousand Oaks: Sage Publications.

CACIOPPO, J. T. & PETTY, R. E. 1982. The need for cognition. *Journal of Personality and Social Psychology,* 42**,** 116-131.

CACIOPPO, J. T. & PETTY, R. E. 1989. Effects of message repetition on argument processing, recall, and persuasion. . *Basic and Applied Social Psychology,* 10**,** 3-12.

CHANCE, P. 1975. Ads without answers make brain itch. . *Psychology Today,* 9.

CIALDINI, R. B. 1993. *Influence: The psychology of persuasion. ,* New York, William Morrow.

CIALDINI, R. B. 1994. Interpersonal influence. . *In:* SHAVITT, S. & BROCK, T. C. (eds.) *Persuasion: Psychological insights and perspective.* Massachusetts, Allyn and Bacon: Needhan Heights.

DAFT, R. L. & LENGEL, R. H. 1984. Information richness: a new approach to managerial behavior and organizational design. *In:* CUMMINGS, L. L. & STAW, B. M. (eds.) *Research in organizational behavior.* Homewood, IL: JAI Press.

DANG, R. J., MORTARA, L., THOMSON , R. & MINSHALL, T. 2011. Developing a Technology Intelligence Strategy to Access Knowledge of Innovation Clusters. *In:* HÜLSMANN, M. & PFEFFERMANN, N. (eds.) *Strategies and Communications for Innovations. An Integrative Management View for Companies and Networks.* Berlin Heidelberg: Springer-Verlag

DAS, T. K. & TENG, B.-S. 1999. Cognitive Biases and Strategic Decision Processes: An Integrative Perspective. *Journal of Management Studies,* 36**,** 757-778.

DOZ, Y., WILSON, K., VELDHOEN, S. & ALTMAN, G. 2006. Innovation: is global the way forward? : INSEAD and Booz, Allen Hamilton.

DUTTON, J. E. & ASHFORD, S. J. 1993. Selling issues to top management. *Academy of Management Review,* 18**,** 397-428.

EBERT, J. E. J., GILBERT, D. T. & WILSON, T. D. 2009. Forecasting and backcasting: Predicting the impact of events on the future. *Journal of Consumer Research,* 36**,** 353-366.

ELFENBEIN, H. A. 2007. Emotion in Organizations. *The Academy of Management Annals,* 1**,** 315-386.

EPPLER, M. J. & MENGIS, J. 2004. The Concept of Information Overload: A Review of Literature from Organization Science, Accounting, Marketing, MIS, and Related Disciplines. *The Information Society,* 20**,** 325-344.

FINK, E. L., KAPLOWITZ, S. A. & BAUER, C. L. 1983. Positional discrepancy, psychological discrepancy, and attitude change: Experimental tests of some mathematical models. *Communication Monographs,* 50**,** 413-430.

FRISCH, B. 2008. When teams can't decide. *Harvard Business Review,* 86**,** 121-126+138.

GLASER, B. G. & STRAUSS, A. L. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research.,* Chicago Aldine.

HARKINS, S. G. & PETTY, R. E. 1987. Information utility and the multiple source effect. *Journal of Personality and Social Psychology,* 52**,** 260-268.

HAUGTVEDT, C. P. & STRATHMAN, A. J. 1990. Situational product relevance and attitude persistence. *Advances in Consumer Research,* 17.

HELLRIEGEL, D., SLOCUM, J. W. & WOODMAN, R. W. 1995. *Organisational Behaviour,* Minneapolis, New York, Los Angeles, San Francisco, West Publishing Company.

HODGKINSON, G. P., BOWN, N. J., MAULE, A. J., GLAISTER, K. W. & PEARMAN, A. D. 1999. Breaking the frame: an analysis of strategic cognition and decision making under uncertainty. *Strategic Management Journal,* 20**,** 977-985.

HOGAN, K. 2011. *The Science of Influence: How to Get Anyone to Say "Yes" in 8 Minutes or Less!,* Hoboken, New jersey, John Wiley and Sons.

HOGG, M. A., COOPERSHAW, L. & HOLZWORTH, D. W. 1993. Group prototypically and depersonalized attraction in small interactive groups. *Personality and Social Psychology. Bulletin of the World Health Organization,* 19**,** 452-465.

JOHNSON, J. D. & MEISHCKE, H. 1992. Differences in evaluations of communication channels for cancer-related information. *Journal of Behavioral Medicine,* 15**,** 429-445.

KAHNEMAN, D. 2011. *Thinking, fast and slow,* London Allen Lane.

KAIVO-OJA, J. 2012. Weak signals analysis, knowledge management theory and systemic socio-cultural transitions. *Futures,* 44**,** 206-217.

KAPLAN, S. 2008. Framing Contests: Strategy Making Under Uncertainty. *Organization Science,* 19**,** 729-752.

KAPLAN, S. 2011. Research in Cognition and Strategy: Reflections on Two Decades of Progress and a Look to the Future *Journal of Management Studies,* 48**,** 665-695.

KASS, L. & LONDON, J. P. T. 2013. Surprise, Deception, Denial and Warning: Strategic Imperatives. *Orbis,* 57**,** 59-82.

KATILA, R. & AHUJA, G. 2002. Something old, something new: A longitudinal study of search behavior and new product introduction. *Academy of Management Journal,* 45**,** 1183-1194.

KAWAKAMI, T. & PARRY, M. E. 2013. The impact of word of mouth, information credibility, and network externalities on the perceived usefulness of an innovation. *Journal of Product Innovation Management*.

KEENEY, R. L. 1992. *Value-focused thinking,* Cambridge, MA, Harvard University Press.

KERR, C. I. V., MORTARA, L., PHAAL, R. & PROBERT, D. R. 2006. A conceptual model for technology intelligence. *International Journal of Technology Intelligence and Planning,* 1**,** 73-93.

KÖNNÖLÄ, T., SALO, A., CAGNIN, C., CARABIAS, V. & VILKKUMAA, E. 2012. Facing the future: Scanning, synthesizing and sense-making in horizon scanning. *Science and Public Policy,* 39**,** 222-231.

LIAO, S. H. 2003. Knowledge management technologies and applications - Literature review from 1995 to 2002. *Expert Systems with Applications,* 25**,** 155-164.

LICHTENTHALER, E. 2003. Third generation management of technology intelligence processes. *R&D Management,* 33**,** 361-375.

LICHTENTHALER, E. 2004a. Coordination of Technology Intelligence Processes: A Study in Technology Intensive Multinationals. *Technology Analysis & Strategic Management,* 16**,** 197-221.

LICHTENTHALER, E. 2004b. Technology Intelligence processes in leading European and North American multinationals. *R&D Management,* 34**,** 121-135.

LICHTENTHALER, E. 2007 Managing technology intelligence processes in situations of radical technological change. *Technological forecasting & social change,* 74**,** 1109-1136.

MARKLEY, O. 2011. A new methodology for anticipating STEEP surprises. *Technological Forecasting and Social Change,* 78**,** 1079-1097.

MCGUIRE, W. J. 1964. Inducing resistance to persuasion: Some contemporary approaches. *In:* BERKOWITZ, L. (ed.) *Advances in experimental social psychology.* New York: Academic.

MORTARA, L., KERR, C. I. V., PHAAL, R. & PROBERT, D. R. 2009a. Technology intelligence practice in UK technology-based companies. *International Journal of Technology Management,* 48 115 -135.

MORTARA, L., KERR, C. I. V., PHAAL, R. & PROBERT, D. R. 2009b. A toolbox of elements to build technology intelligence systems. *International Journal of Technology Management,* 47**,** 322-345.

NOOTEBOOM, B., VAN HAVERBEKE, W., DUYSTERS, G., GILSING, V. & VAN DEN OORD, A. 2007. Optimal cognitive distance and absorptive capacity. *Research Policy,* 36**,** 1016-1034.

O'KEEFE, D. J. 1997. Standpoint explicitness and persuasive effect: A meta-analytic review of the effects of varying conclusion articulation in persuasive messages. *Argumentation and*

Advocacy, 34**,** 1-12.

O'KEEFE, D. J. 2002. *Persuasion: Theory and research,* Thousand Oaks, Sage Publications.

OCASIO, W. 1997. Towards an attention-based view of the firm. *Strategic Management Journal,* 18**,** 187-206.

ÖNKAL, D., SAYIM, K. Z. & GÖNÜL, M. S. 2013. Scenarios as channels of forecast advice. *Technological Forecasting and Social Change,* 80**,** 772-788.

PARK, I., JEONG, Y., YOON, B. & MORTARA, L. 2014. Exploring potential R&D collaboration partners through patent analysis based on bibliographic coupling and latent semantic analysis. *Technology Analysis & Strategic Management***,** 1-23.

PATTON, K. M. The role of scanning in open intelligence systems. *Technological Forecasting and Social Change,* 72**,** 1082-1093.

PECHMANN, C. 1992. Predicting when two-sided Ads will be more effective than one-sided Ads. *Journal of Marketing Research,* 24**,** 441-453.

PROBERT, D., DISSEL, M., FARRUKH, C., MORTARA, L., THORN, V. & PHAAL, R. 2013. The process of making the business case for technology: A sales and marketing perspective for technologists. *Technological Forecasting and Social Change,* 80**,** 1129-1139.

RATCLIFFE, J. 2005. Challenges for Corporate Foresight: towards Strategic Prospective through Scenario thinking. *7th Annual international conference Foresight*

Management in coprporations and organisations. New visions for sustainability. Helsinki, Finland.

RHOADS, K. V. & CIALDINI, R. B. 2002. The business of influence. *In:* DILLARD, J. P. & PFAU, M. (eds.) *Persuasion handbook: Developments in theory and practice.* London, United Kingdom: Sage.

RHODES, N. & WOOD, W. 1992. Self-esteem and intelligence affect influence ability: The mediating role of message reception. *Psychological Bulletin,* 111**,** 156-171.

ROGERS, W. & NEGASH, S. 2007. The Effects of Web-based Technologies on KNOWLEDGE TRANSFER. *Communications of the ACM,* 50**,** 117-122.

ROHRBECK, R. 2010. Harnessing a network of experts for competitive advantage: technology scouting in the ICT industry. *R & D Management,* 40**,** 169-180.

ROHRBECK, R. & GEMÜNDEN, H. G. 2011. Corporate foresight: Its three roles in enhancing the innovation capacity of a firm. *Technological Forecasting and Social Change,* 78**,** 231-243.

ROHRBECK, R., HEUER, J. & ARNOLD, H. M. Year. The Technology Radar - an Instrument of Technology Intelligence and Innovation Strategy. *In:* The 3rd IEEE International Conference on Management of Innovation and Technology, 2006 Singapore. 978-983.

ROHRBECK, R., HÖLZLE, K. & GEMÜNDEN, H. G. 2009. Opening up for competitive advantage - How Deutsche telekom creates an open innovation ecosystem. *R and D Management,* 39**,** 420-430.

SCHWARZ, J. O. 2005. Pitfalls in implementing a strategic early warning system. *Foresight,* 7**,** 22-30.

SEBASTIAN, R. J. & BRISTOW, D. 2008. Formal or informal? The impact of style of dress and forms of address on business students' perceptions of professors. *Journal of Education for Business,* 83**,** 196-201.

SHAH, S., HORNE, A. & CAPELLÁ, J. 2012. Good Data Won't Guarantee Good Decisions. *Harvard Business Review,* 90**,** 23-25.

SHIN, M., HOLDEN, T. & SCHMIDT, R. A. 2001. From knowledge theory to management practice: Towards an integrated approach. *Information processing and management,* 37**,** 335-355.

SIMON, H. 1945. *Administrative Behaviour,* New York, Macmillan.

STEWART, D. W. & SHAMDASANI, P. N. 1990. *Focus Groups: Theory and Practice,* Newbury Park, California, Sage Publications.

SWAMI, S. 2013. Executive functions and decision making: A managerial review. *IIMB Management Review*.

VEUGELERS, M., BURY, J. & VIAENE, S. 2010. Linking technology intelligence to open innovation. *Technological Forecasting and Social Change,* 77**,** 335-343.

WANG, Y. 2011. Generalized information theory: A review and outlook. *Information Technology Journal,* 10**,** 461-469.

WUYTS, S., COLOMBO, M. G., DUTTA, S. & NOOTEBOOM, B. 2005. Empirical tests of optimal cognitive distance. *Journal of Economic Behavior and Organization,* 58**,** 277-302.

YOO, K.-H., GRETZEL, U. & AZANKER, M. (eds.) 2013. *Persuasive Recommender Systems. Conceptual Background and Implications,* New York: Springer.