

Technology Management

Quarterly newsletter of the Centre for Technology Management



UNIVERSITY OF
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Institute for Manufacturing

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Rekindling the creative spark

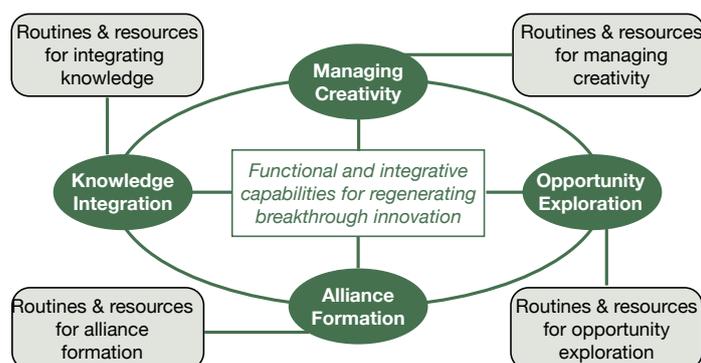
Small, entrepreneurial firms that develop innovative product technologies represent a growing challenge to established multinationals.

In sectors such as telecoms, healthcare or consumer electronics, it is the ability to produce breakthrough products, rather than market positioning, price or quality, that increasingly decides who will succeed. Large enterprises may need to regenerate entrepreneurial capability in order to compete in such dynamic environments.

Two recent examples of this phenomenon concern the European telecoms giants Alcatel and Siemens, both of which suffered significant threats to their competitive advantage when failing to respond to an increasingly destabilised product market. In each instance, disruptive technologies contributed to upsetting the market, thereby forcing each firm to radically restructure its organisational capabilities in order to compete.

CTM researcher Scott Wilson has just completed a three and a half year investigation that offers new insights into these issues. The study sought to understand how firms could reconfigure and develop routines and resources that would allow them to develop dynamic capabilities for innovation.

Eight multinational firms operating in the healthcare, telecoms, consumer



electronics and domestic appliances sectors participated in the research. The study focused on the evolution of each firm's front-end innovation capability in the face of a dynamic and uncertain market environment.

The research proposes an *integrated capabilities* approach to regenerating breakthrough innovation that could enable large firms to compete in such environments. The suggested framework could provide a basis for managers to assess their existing front-end innovation capability and to formulate strategies to bridge any 'capability gaps'.

This can be achieved by defining and categorising combinations of 'functional' capabilities – those that are used to exploit new knowledge in the innovation process – and 'integrative' capabilities which, are used to identify, acquire, assimilate and disseminate new knowledge into and beyond the innovation process.

Inherent to these capabilities are the routines and resources that tackle the issues of creativity, knowledge management and entrepreneurship within the large firm.

By using such an approach it is believed that firms can develop new and existing resources and processes for the 'invention' phase of innovation, helping to dispel some of the myths that currently surround this traditionally vague phase of the product life cycle. A structured approach to develop what is essentially an entrepreneurial capability, with breakthrough product innovation as its output, would enable firms to match and even create market change.

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The issues raised by this research are being explored further by CTM. See 'How can I make my company more innovative?' – page 2.

How can I make my company more innovative?

Scott Wilson's research into regenerating innovative capability (front page) raises issues that concern a growing number of firms. CTM has been approached by several companies interested in practical help with such questions as:

- How does an established company become more innovative?
- What can be done to encourage entrepreneurial activity?
- What diagnostics and metrics can be used to assess current status and guide improvement?

Most companies will already have a defined new product process, but this may often be biased towards relatively incremental development.

It may be that a quite different approach is needed, involving phased funding coupled with tough kill criteria and an expectation that a number of projects will be terminated.

From suggestion schemes to internal or external venturing, what approaches and associated metrics have been found to be successful in managing the innovation process?

CTM is considering exploring these issues further. If you would be interested in discussing these topics further, or would like to be involved in future research in this area, please contact ctm-enquiries@eng.cam.ac.uk

Getting to grips with sustainability

Sustainability is an important issue for many industries. The oil and gas industry is in a particularly challenging position as it has to balance two conflicting demands – the market demand for hydrocarbons and the stakeholder demand for sustainability.

Recently completed research at the Centre for Technology Management provides guidance in relation to these issues and focuses on ways to measure and report sustainability performance in the gas and oil sector.

Industrial sustainability should not only be seen in terms of the contribution to global sustainable development. It should also include the sustainability of the business, the industry and the community in which the company operates.

The one-year research project by Subashini Paramanathan concludes that sustainability is best understood by considering it in terms of the 'triple bottom line' model of environmental, social and economic issues (see model below).



In terms of the gas and oil industry issues to consider include:

Environmental

- maintaining the stock of natural hydrocarbon reserves
- developing commercially viable, renewable energy resources
- minimising the environmental impact of operations

Social

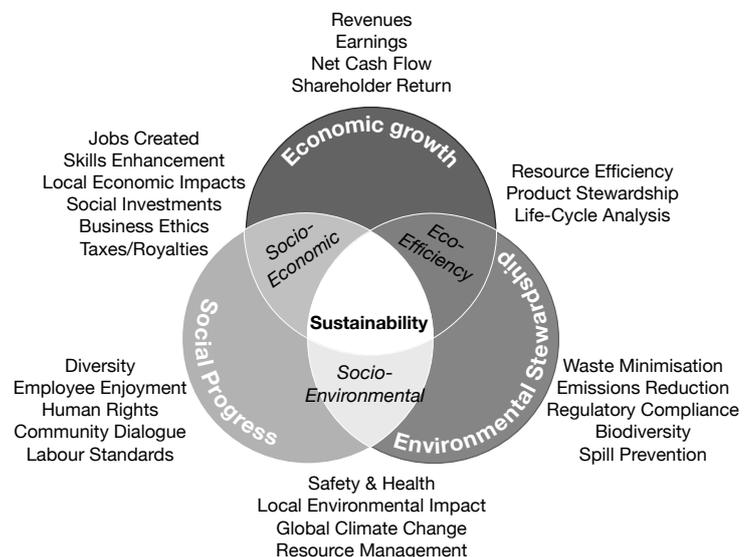
- compliance with human rights, labour laws, land rights
- investment in health, training and education
- awareness of stakeholder concerns

Economic

- generating profits to remain in business
- creating economic development in the locations where the company operates

The research suggests that the business case for sustainability is generally driven by an awareness of corporate social responsibility.

The most important business benefit from tackling sustainability issues is maintaining the license to operate, which, in today's world, is not only granted by governments but also by stakeholders at large.



Producing great products...

We all know a good product when we see one. It has that certain *je ne sais quoi*. It provides clear benefits to its target customers. It is beautiful, well engineered, cost effective to produce and a delight to use.

Really great products also incorporate the right degree of technological, functional or visual novelty. These simple values apply to all products, be they consumer electronics or high tech instrumentation.

In practice, however, many products emerge from the end of a development programme failing to meet these exacting standards. Not to mention the project being late and over budget!

There are many possible reasons, from poor planning to the wrong mix of skills in the design team. The *Better Product Design* workbook contains two tools – a ‘product audit’ and a ‘process audit’ which aim to support planning in the early phases of a project. The product audit provides a structured way to consider the utility, usability, producibility, desirability and novelty of a proposed product. The process audit takes a ‘maturity’ based view of the product development process and aims to encourage improved performance in a wide range of key design activities.

Both tools have been created to encourage group discussion and to increase the chances of producing great products.

If you would like to know more, please contact James Moultrie, (jm329@eng.cam.ac.uk) or take a look at the website which also includes a collection of design tools, www.betterproductdesign.net

CTM hosts student project



Jun Jhen Lew, an engineering undergraduate student, is working at CTM over the summer. Jun Jhen has joined the Centre through a pilot programme run by the Cambridge MIT Institute to provide undergraduates with experience of working on research projects. Such programmes are common at MIT but are new to

Cambridge. Jun Jhen's projects will include research into the predictability of technological advancement, environmental technologies, and technology valuation.

CTM website revamp following members' meeting

The annual CTM members meeting on May 8 produced an interesting exchange of ideas on the justification for long term technology research and development. In addition to the CTM research perspective, BAE SYSTEMS, GSK, Philips, Royal Mail and Domino Printing Sciences all presented their approach to this important technology management issue.

A key recommendation from the meeting concerned how to make best use of the CTM members website to keep the exchange of ideas flowing. The website is currently being revised and the presentation and outputs from the meeting will form part of the new content.

New research proposals

CTM researchers are preparing funding applications for several new research projects. Topics include:

- managing technology across organisational interfaces
- acquiring new technology through technology scanning networks
- alliance-based business models for early-stage technology-based ventures

The objectives of the proposal are to:

- develop a generic framework for linking technology business start-up resource requirements with partnership selection and management issues
- provide tools and techniques to support new technology ventures in developing and managing business models that utilise partnerships

Funding will be provided from the Institute for Manufacturing's block grant as an Innovative Manufacturing Research Centre. Decisions should be made during August so that work can start very soon. Members interested in getting involved with any of these projects should get in touch.

Don't forget to book for the CTM Symposium

Details of this year's Technology Management Symposium, *Accelerating innovation through technology and design*, on October 1-2, have been sent out and bookings are already coming in. Make sure you get an early reservation if you would like to come – and remember, each full member company gets a free place. You just have to decide who gets it!

Technology management research at Cambridge

- Good design practice
- New product introduction collaboration
- Strategic technology management
- R&D project selection
- Software sourcing in manufacturing
- Product planning
- Technology change
- Technology management: a process approach
- Technology selection
- Technology evolution in hi-tech firms
- Innovation management in hi-tech firms
- Technology management in software production
- Strategic management competences
- Strategic make-or-buy
- Industrial make-or-buy decisions
- Sustainability and knowledge management
- Engineering re-use
- Technology foresight

Events

12th International Conference on Management of Technology, Nancy, France, 12-15 May 2003 (IAMOT)

IAMOT 2003 was entitled 'From Information to knowledge competencies: key success factor for innovation and sustainable development'.

Keynote speakers included Francois Guinot, Vice-President of the Academy of Technologies of France and CEO of Pharmagenesis and Dr Werner Wobbe, EU Science and Technology Foresight Unit.

The EITIM was represented by a panel session led by David Probert and Professor Thomas Durand based on the forthcoming book, 'Bringing technology and innovation into the boardroom'. Three papers were presented by CTM researchers:

Managing technology and knowledge across organisational interfaces (Clare Farrukh), *Adopting new technology: the case of open source software at Marconi* (Francis Hunt) and *Integrating capabilities to regenerate architectural innovation: towards a contingent approach* (Scott Wilson).

25th R&D Management Conference, Manchester, 7-9 July 2003

This conference took as its theme: 'Implementing the theories of R&D management – advancing the state of the art'. David Probert and Suba Paramanathan from the Centre for Technology Management presented a paper entitled 'Implementing industrial sustainability: the research issues in technology management'.

Presentations at the conference

covered road mapping, innovation, new product development, knowledge management and the introduction of R&D in China.

Plenary sessions provided an opportunity for an industry perspective to R&D. These included presentations on Silicon Valley-styled start-ups and innovation in railway technology.

CTM events

CTM courses and events are now planned for the next year. Topics include technology roadmapping, new product development, make or buy, regenerating innovation and software sourcing.

To find out more, contact us by email (ctm-enquiries@eng.cam.ac.uk) or go to our events website at www.ifm.eng.cam.ac.uk/events.

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Diary

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Sept

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| 24th | <i>Make-or-buy</i> | Downing College Cambridge |
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Oct

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| 1st-2nd | <i>CTM Symposium</i> | Downing College Cambridge |
| 8th | <i>Technology roadmapping</i> | Lucy Cavendish College Cambridge |
| 29th | <i>Design and new product introduction</i> | Cambridge |

Nov

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| 14th | <i>Better product design</i> | Cambridge |
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