Technology Management

Quarterly newsletter of the Centre for Technology Management

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UNIVERSITY OF CAMBRIDGE

Symposium highlights the technologies of the future

Creating and capturing value: 21st Century Technology Collaborations

Report of the 8th Annual Technology Management Symposium
Cambridge, 11 - 12 July, 2002

The fizz may have gone out of technology stocks, but progressive companies still recognise the importance of investing in future technologies. The question is, how and where to invest in an era of increasing cost and risk?

The background to this challenging issue was set by Professor David King, the UK Government's Chief Scientific Adviser (right). He identified the key areas of technology that had high potential for the future: nanotechnology, biotechnology, genomics, molecular electronics, e-science, aeronautics and new energy sources.

Sustainable technologies, especially energy supplies in relation to climate change, will be key factors in the years to come. Particular issues facing the UK are investment in education, research and narrowing the productivity gap. Other speakers at the Symposium illustrated how leading organisations were facing these challenges.

David Pulling described how GKN is harnessing new technologies in the aerospace and automotive sectors, and Donncha Scollard of Unilever outlined the collaborative application of RF tagging technology to the transformation of supply chain operations. An example of innovative collaboration between a small technology provider and a large engineering company was described by Mark England of Sentec and Arlin Rummel of Invensys. The importance of trust in developing a value-creating partnership was graphically illustrated.

Separate case study sessions looked at the activities of the Foresight Vehicle programme (see page 2) and explored the ways in which innovation could be encouraged in mature organisations. Delegates also had the opportunity to get hands-on experience of two of the Centre's recent research products: technology roadmapping and managing collaborative new product development.

The surroundings of the Møller Centre provided an excellent context for networking and discussion, and feedback from the delegates was extremely positive. As ever, it is the opportunity to exchange ideas with leading practitioners and researchers which seems to be much appreciated, and the Symposium now has a unique place in the programme of technology management events. The proceedings will be published in September and sent to delegates and CTM members. Watch this space for details of next year's Symposium.

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Mapping the future of road transport

Identifying future developments in road transport is the goal of a Government-led initiative in which CTM is playing a key part.

Foresight Vehicle is a collaboration between industry, academia and the Government that aims to identify technologies for sustainable road transport. Future products and technologies must satisfy market requirements, at the same time meeting the objectives of improving the quality of life and wealth creation in the UK.

CTM has recently completed a DTI-sponsored project to facilitate a technology roadmapping process for Foresight Vehicle. A series of 10 workshops brought together more than 130 experts from across the UK road transport sector, representing more than 60 organisations. The goal was to use the roadmap structure to share views about how road vehicle markets, products, systems and technologies could evolve over the next 20 years.

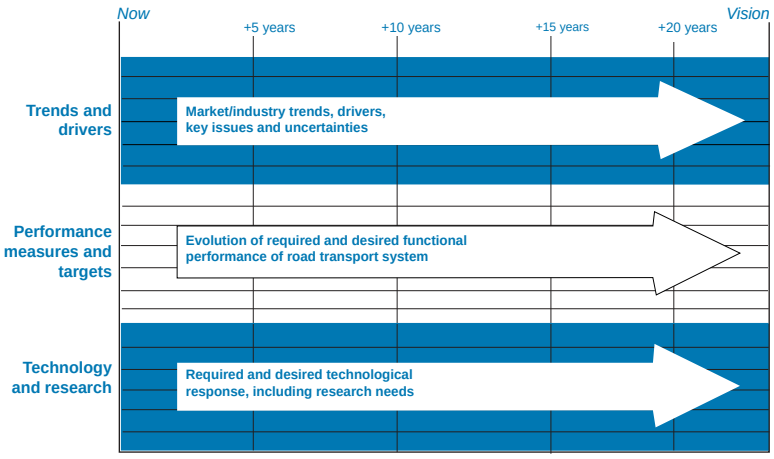
Focus for the future

The scope of the Foresight Vehicle technology roadmap is broad, reflecting the complex nature of the road transport system. It is not intended to act as a complete and accurate forecast, but rather a means of capturing and structuring information, and to improve the focus and relevance of the research agenda. The intention is to provide a framework for representing information that is important to the future of road transport in the UK, and for use on an ongoing basis to track and review the situation over time.

Primary goals

Investment in road vehicle technology and research should be considered in terms of the contribution that the investment is expected to make towards the primary social, economic and environmental goals. These are:

- Socially sustainable transport system, providing equitable, safe and secure road transport that meets the needs and aspirations of UK society.
- Economically sustainable transport system, supported by a dynamic and successful UK automotive industry.
- Environmentally sustainable transport system, with a low environmental impact in terms of energy consumption, global warming, waste and health.



Key technology areas

The Foresight Vehicle programme is organised around five primary technology areas. Each of these has good potential to deliver technology solutions that will contribute significantly to meeting the programme's social, economic and environmental goals:

1 Engine and powertrain technology development, leading to improved thermal and mechanical efficiency, performance, drivability, reliability, durability and speed-to-market, together with reduced emissions and cost.

2 Hybrid, electric and alternatively fuelled vehicle technology development, leading to new fuel and power systems, such as hydrogen and fuel cells.

3 Software, sensors, electronics and telematics, leading to improved vehicle performance, control, adaptability, intelligence, mobility and security.

4 Structures and materials leading to improved safety and product flexibility, together with reduced cost and environmental impact.

5 Design and manufacturing processes, leading to improved and sustainable industrial performance, considering the full vehicle life cycle from 'cradle to cradle'.

Valuing technology – recent project findings

The financial value of technological projects or investments is difficult to ascertain because they are highly uncertain. Often, the result is either a too conservative approach, based on the traditional net present value (NPV) analysis, or an overly optimistic approach, based on scoring and ranking methods. Technology projects typically require sequential investments and projected rewards are not realised till the final investment is made. In addition, as technology is inherently uncertain, assessing future threats and opportunities, and incorporating flexibility into managerial action in response to them, is essential. The 'real options' approach (originating in investment analysis) offers a way in which the value of this flexibility can be captured and used as an input to the decision making process of investing in promising technologies.

CTM researcher, Chester Wong, has recently completed a project which addresses these issues: 'Valuation of technology: A real option approach in venture capital and technology firms'. The idea is to assess the value of flexibility in the decision making process for a risky, sequential technology investment. This can enable financial analysts to justify projects without forecasting far-fetched revenues and technical people can justify their 'gut feel'. It also encourages more proactive management of projects by keeping options open and making decisions based on future information.

Since sequential investments are commonly found in venture capital as well as R&D laboratories, a case study based on a start-up technology firm, where sequential investments are required, is used to illustrate the application of real options to technology projects.

Using the data provided, a spreadsheet model calculated the compound option value of the project and performed sensitivity analyses. Graphs were plotted to allow visualisation of important decision points and provide additional insight into the decision making process. Interviews were also conducted with both venture capitalists and technology managers to discuss the practicality of the model as well as problems currently faced when valuing technology.

Chester's findings are that a 'hybrid real options' approach is realistic and easy to visualise. The approach supports the justification of investments in risky technology projects by placing value on flexibility in the decision making process. However, some of the inputs to the model, such as underlying asset values and volatility figures, are difficult to obtain and are areas for further research. Contact David Probert (drp@eng.cam.ac.uk) if you are interested in seeing a copy of the project report.

Organisational issues in Technology Management

CTM research has always recognised the importance of organisational issues and the vital role that people play in the management of technology. We are now starting a short exploratory project which will examine organisational issues more directly.

'Speeding technology to market – managing technology and knowledge across organisational interfaces' will identify and characterise the key boundaries to help improve effective technology management.

MSc in organisational behaviour

To gain a better understanding of how such issues can be analysed, CTM researcher Clare Farrukh has been studying part-time for an MSc in Organizational Behaviour, and has just completed the first year. Modules have included Organisational Change and Organisational Analysis. Other students on the course are from a wide range of organisations such as London Underground, Railtrack, DTI and large and small consultancies.

If you are interested in being involved in the new project, please get in touch with Clare (cjp2@eng.cam.ac.uk).

New network to aid technology transfer

Matt Schofield, who gained his PhD studying in the Centre for Technology Management, is helping launch a new industrial network for technology transfer from London's universities - the London Technology Network (LTN).

London's research base is as large as both Stanford and MIT, with over 2000 life science and 800 high tech researchers. LTN will help technology-intensive companies work more effectively with the universities involved by identifying their needs and matching them with the most appropriate researchers.

Business Fellowships

LTN will award over 100 Business Fellowships to senior researchers in leading technology departments, funding them for half a day per week. Companies may use LTN to support graduate recruitment, staff training, access to academic technologists, meetings on emerging technologies, commissioned research or licensing of technologies.

LTN was formed as a not-for-profit joint venture of University College London and London Business School, with initial funding of £4 million by the UK Government.

(http://www.cselondon.com/MainCSE.html)

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 focus

Members' meeting

The annual CTM members' meeting was held on 23 May at Churchill College, Cambridge. There was a good attendance by member companies including BAE SYSTEMS, Consignia, Domino Printing Sciences, GSK, Marconi and Philips.

The meeting began with a brainstorming session on 'Knowledge requirements of today's Technology Manager', followed by a useful discussion relating to issues of current and future TM course content.

The meeting continued over dinner, with a stimulating discussion of members' priorities and research interests. Contents and actions of the meeting can be obtained by emailing ctm-enquiries@eng.cam.ac.uk.

Product design

Product design is the focus of several Institute events to be run this autumn.

A 2-day course in Cambridge on 26-27 September will provide a thought provoking review of the general principles of product design and development, with an emphasis on practical tools and a 'hands-on' approach. Attendees will receive a free copy of the "Better Product Design" workbook. The course is being presented by Pete Fraser and James Moultrie of CTM.

Evening workshops

The Institute's autumn series of evening workshops is entitled "Winning through innovation and design". The four workshops will tackle key aspects of the design and development of innovative products including:

- adopting the right innovation strategy
- integrating technology, aesthetic and human factors into the design of successful products
- easing the transition from design to production
- managing collaborative product development projects

Each workshop will be held in both Cambridge and Peterborough between September and December. More details from the Institute's Industry Links Unit (ifm-enquiries@eng.cam.ac.uk) or visit our website: www.ifm.eng.cam.ac.uk/events

Diary

August		
18-20	IEEE International Engineering Management Conference	St John's College, Cambridge
28	Risk management	NPI Club, Cambridge
September		
23	Innovation and new product strategy (To be repeated in Peterborough on 30 September)	Evening workshop Cambridge
26-27	Better product design	2-day course, Cambridge
October		
1	Product-technology roadmapping	1-day workshop, Cambridge
2	TM Network Forum - Innovation	Bath
15	TRM User Group	Loughborough
21	Successful product design (To be repeated in Peterborough on 28 October)	Evening workshop, Cambridge

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