

Technology Management

Quarterly newsletter of the Centre for Technology Management



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Institute for Manufacturing

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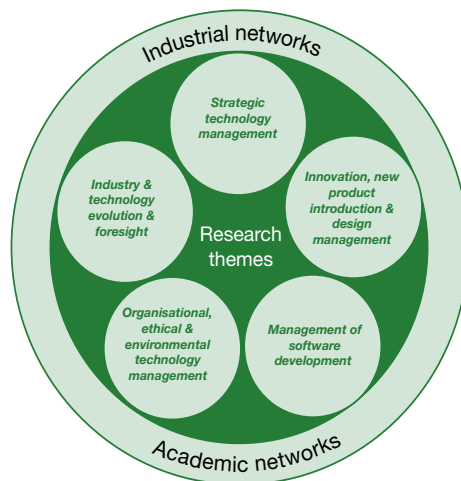
It's going to be a bumper year for technology management...

Growth will be the key theme of our activities in 2004. As CTM expands its research portfolio, with more research staff and students joining the team, industrial interest in technology management continues to grow and requests for short courses and executive education are increasing. The Teaching Company Scheme – now relaunched as Knowledge Transfer Partnerships (KTPs) – is a great opportunity for university and company collaboration, which CTM hopes to exploit. In addition, the outputs from completed research are increasingly in demand – our work in technology roadmapping, in particular, is generating a wide spectrum of interest and opportunity.

Open evening

This growth in technology management activities is typical of many parts of the Institute for Manufacturing (IfM). At the start of the year we held an Open Evening to present the work that goes on at IfM – both to each other and to visitors. Since CTM was founded six years ago, the IfM has grown from 30 to 160 people.

Such growth presents exciting opportunities – but also creates some stresses and strains, and we need to choose where to focus our effort. Within CTM we are guided by our research themes (see above), and the interests of our collaborating



organisations, particularly member companies. We are a key part of the IfM's Innovative Manufacturing Research Centre (IMRC) – further details on page 2. This gives us a great opportunity to work not only with other research Centres in the IfM, but also with the two other IMRCs in Cambridge. We have identified a core project within the IMRC which will be tackled over the next three years: *Business appraisal of technology potentials*. This builds on our work in technology assessment and valuation, and will give scope for active involvement from members companies.

A further new venture for us this year is the start of the EU-funded 'GUIDE' project. This brings us into collaboration with 25 European

partners. We shall be using our roadmapping methodology to underpin the exploration of e-governance in Europe. The leading companies in the project are BT, Visa and Siemens.

Website

With all that is going on, we hope for an even more fruitful engagement with our member community in the coming year. Take a look at the website at www.ifm.eng.cam.ac.uk/ctm and see what might be useful. We look forward to hearing from you and finding new ways to collaborate in 2004.

David Probert

Stop press – just published...

Bringing technology and innovation into the boardroom

This new book, published by Palgrave Macmillan, argues that technology management should be top of the board's agenda. It includes contributions from seven leading European scientific and engineering universities. CTM has been a central player in bringing this book to print.

www.palgrave.com

Product design package

Companies seeking ways to improve their product design capability now have a package of support measures available, thanks to the recently completed Good Design Practice (GDP) programme. Outputs from the three-year programme include: a series of training workshops, tailored in-company support, a workbook for companies to assess their own strengths and weaknesses and a dedicated website.

The GDP programme was a joint initiative between CTM and the Engineering Design Centre (EDC) at Cambridge, and the Department of Industrial Engineering at the Royal College of Art in London. Its aim was to support companies in developing and improving their product design capability, integrating engineering design and industrial design within the overall new product introduction process.

Programme activities

In the first phase of the programme, longitudinal projects were run with four companies following the course of live development projects. From these projects, two audits were developed and launched with the assistance of the GDP team.

In the second phase, the experiences gained from these projects and associated research were fed into a number of training courses and workshops, the development and testing of a workbook and the production of a website. Material from this project has also been fed back into IfM's teaching programmes.

Workbook

The workbook *Assessing and improving product design capability*, available from IfM, contains two audit tools:

- **Product audit** - this takes the form of a product 'health check', assessing product usability, performance, producibility, desirability, profitability and differentiation
- **Process audit** - this assesses the maturity of 25 key design activities covering both 'design execution' and 'design management'

The audits help to stimulate discussion about the performance of the company's new product design and development system and suggest possible improvement actions.

Website

The Better Product Design website, www.betterproductdesign.net, contains about 100 pages of information on design-related topics.

Training course

A training course, *Better Product Design: practical tools for navigating the 'fuzzy front end'*, was developed and delivered twice during phase 2. An overview of the course can be found on the GDP website. The course, described by one participant as "probably the best short course I have attended", provides a fun and thought-provoking review of the general principles of product design and development, with an emphasis on practical tools and a hands-on approach. It will be repeated on 27 April 2004. info@betterproductdesign.net

Centres of excellence in manufacturing

In 2001, the Engineering and Physical Sciences Research Centre (EPSRC) created a number of Innovative Manufacturing Research Centres (IMRC). The aim was to enable established centres of excellence to drive forward a more strategic approach to manufacturing-related research. Nationally, around 15 centres were created, including the IfM and the EDC.

The IfM gained a £2.95m grant over five years to develop its portfolio of research under the heading *Strategic and operational management of manufacturing and technology*.

New CTM projects

During the first year of funding, a strategic framework was developed against which internal project funding bids could be evaluated. As a result of this process, several projects within CTM have been authorised, including:

- *Alliance based business models – investigating resourcing and partnering needs of early stage technology ventures*
- *Acquiring new technology through technology scanning networks*
- *Rapid distributed innovation – exploring the opportunities for break-out innovation due to emerging markets in innovation services*
- *Management of technology and knowledge across organisational boundaries – a smaller feasibility study*

In July 2003, the 'production processes' IMRC transferred from Liverpool University to the IfM. This group is working on next-generation manufacturing technologies to enable high speed, reconfigurable and flexible production. This exciting development offers strong potential for collaborative work, bringing together management and process issues. www.ifm.eng.cam.ac.uk/imrc



Software – the good, the bad and the ugly!

Software is increasingly important in all sorts of products. It enables extended functionality and mass customisation. It provides interconnectivity and the potential for in-service upgrades. It offers the promise of intelligent diagnostics and user assistance. It can also create serious difficulties for those working with it...

Project overruns

Software problems have been the cause of some of the most spectacular project overruns, in terms of both time and budget – the Denver baggage handling system is just one example. Software difficulties have also been behind some major systems failures, such as the incapacitation of the USS Yorktown, the destruction of Ariane V and the loss of the Mars Climate Orbiter.

Many businesses are understandably cautious about getting involved with software and wonder if they should develop their own or ask another company to do it.

Software sourcing project

The *Software sourcing in manufacturing* project was set up in 2001 to investigate this interesting and increasingly important issue. It has developed a draft process for tackling software sourcing decisions, based on research and recent case studies. The guide takes into account both strategic issues and downstream project and risk management factors. It contains a set of embryonic management tools for supporting the process.

Company trials

We would value your views on how useful the guide is, and how it matches your experience. We are seeking companies with which to apply the draft process to a suitable, real-life problem. The result should provide an insight into the company's problems as well as indicating how the guide can be improved.

Evening workshop

We are holding an evening workshop on software sourcing on 12 February. We will be discussing the project and draft guide and Pi Research, a company that has successfully navigated this issue, will be talking about its experiences. If you would like further details of the project or a free copy of the draft guide, please contact Francis Hunt (fhh10@cam.ac.uk). Further details of the workshop, including how to book, are available at:

www.ifm.eng.ac.uk/events

Recent CTM research papers

Members can get further details of any of the publications below from the CTM Members' website.

A framework for supporting the management of technological knowledge. Rob Phaal, Clare Farrukh, David Probert. *International Journal of Technology Management*, 2004.

This paper presents a high-level framework that has been developed to support practical and theoretical understanding of the management of technology. The framework links technology resources in the firm with core business and technology management processes, in the context of the organisational and business environment, focusing on the 'pull' and 'push' knowledge flows that need to occur between the commercial and technical functions within the firm.

Technology roadmapping - a planning framework for evolution and revolution. Rob Phaal, Clare Farrukh and David Probert. *Special issue on roadmapping, Technological Forecasting & Social Change*, 2004.

The paper emphasises the utility of technology roadmapping in helping companies to survive turbulent environments. The use of roadmaps is considered from two main perspectives: firstly company - roadmaps that allow technology developments to be integrated with business planning, and secondly consortium - roadmaps that seek to capture the environmental landscape, threats and opportunities for a particular group of stakeholders in a technology or application area, supporting collaboration and network development.

Starting-up roadmapping fast by Rob Phaal, Clare Farrukh, Rick Mitchell and David Probert. *Special issue on technology roadmapping, Research Technology Management*, March/April 2003; also published in *IEEE Engineering Management Review*.

This paper gives an overview of the T-Plan fast-start roadmapping process, illustrated by the Domino Printing Sciences story.

Development of a structured approach to assessing practice in product development collaborations by Clare Farrukh, Pete Fraser and Mike Gregory. *Proceedings of the Institution of Mechanical Engineers* (2003)

This paper reviews the development of practical techniques for the assessment of product development collaboration practices and describes their application within four companies. The tools assist in identifying risk, required contingency plans and areas for improvement of skills or transfer of good practice.

Managing product development collaborations - a process maturity approach by Pete Fraser, Clare Farrukh, and Mike Gregory. *Engineering Manufacture*, 2003.

This paper documents the development of a collaboration maturity model as a tool to assess the performance of firms which outsource a significant amount of design or development activity. A separate collaboration maturity grid describes key process areas at four levels of maturity.

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

CTM people

New research student joins CTM to study open source software

Martin Michlmayr joined the Centre for Technology Management as a PhD student in January 2004. He will work under the supervision of David Probert and Francis Hunt to study management and quality aspects of Free and Open Source Software.

After completing an MPhil in Philosophy and an MSc in Psychology at the University of Innsbruck, Martin attended the University of Melbourne for a year to study for a Masters in Software Systems Engineering. He has been involved in various free software projects for more than eight years. He used to be the Volunteer Coordinator for the GNUstep Project and acted as Publicity Director for Linux

International. In 2000, Martin joined the Debian Project, an association of roughly 1000 members working on a completely free operating system. In March 2003, he was elected Debian Project Leader (DPL).

Sponsors are welcome for this research: contact David Probert (drp@eng.cam.ac.uk).



Martin Michlmayr

Welcome back Geraldine...

Welcome back to Geraldine Güçeri, who has returned from maternity leave to take up her post as CTM's Research Co-ordinator.

Geraldine gave birth to a baby boy in March named Timuçin Jun Wen Güçeri.

Many thanks to Sian Bunnage, who has been holding the fort for CTM while Geraldine has been away.



Geraldine Güçeri

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Diary

www.ifm.eng.cam.ac.uk/events

Feb

12th	<i>Software outsourcing</i>	Institute for Manufacturing Cambridge
17th	<i>Making it in China</i>	Robinson College Cambridge

March

9th	<i>Creative problem solving for managers</i>	Institute for Manufacturing Cambridge
11th	<i>Technology roadmapping</i>	Madingley Hall Cambridge