

Quarterly Diary

March	9th	5-7.30pm	Evening Workshop Cambridge	<i>Make or buy - sourcing parts and technology</i>
April	29th	10am-4pm	Day Forum Cambridge	<i>Strategic Technology Management</i>
	29th	Evening	Members' Annual Review and Dinner Cambridge	

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Conference reports

1st International Symposium on Manufacturing Strategy (ISMS '98) Tokyo, November 1998

Ken Purcell, a researcher at the Centre, visited Japan recently to attend this symposium and to undertake industrial and academic visits to gain an understanding of technology management in Japan.

ISMS '98 was held at Waseda University in Tokyo last November, with the theme of providing challenging opportunities to explore new paradigms of manufacturing strategy for the next Millennium. The Institute for Manufacturing was invited to conduct a workshop and the CTM paper presented was '*Approaches to research in the management of technology*'.

Technology management in Japan

Visits were made to a total of twelve Japanese organisations with an active interest in technology management. Adopting an academic viewpoint, the study identified two universities significantly involved in technology management teaching and research; Kobe University in the west of Japan and Hitotsubashi University near Tokyo, in the east of Japan.

Industrial practice

Examining industrial practice at a number of technology-based corporations (including Sony, Mitsubishi, Sharp, Canon, Fujitsu) revealed that, in the companies visited, Japanese managers seldom make reference to external models and tools. Managers generally describe technology management as an informal process largely based on intuition, business analyses and management experience. Furthermore, in the majority of cases, the benefits provided by technology management were not made explicit.

Issues identified included difficulties in motivating researchers conducting basic R&D projects, improving inter-group communication and deciding when a research project should be stopped. Managers also discussed the need to maintain and continually develop core competencies already held within the corporation, despite the attraction of potential "quantum innovation leaps" which might be gained by introducing different technologies.

Ken Purcell

8th International Forum on Technology Management *Leveraging Intellectual Capital: The Key to Sustained Innovation* Grenoble, 2-6 November 1998

This conference, organised by the Jupiter Consortium, brought together practitioners and academics in technology management from around the world. We presented a paper and took part in a workshop on company processes for technology foresight. The paper, '*Stimulating intellectual capital: industry/academic experience of technology management networking*', (see enclosed publications list), draws on the literature and our own experience to develop the case for successful operation of the EPSRC Technology Management Network.

There were many interesting highlights amongst the industrial and research presentations, including the technology foresight programmes in the Netherlands, South Africa and France and company perspectives from Mitsubishi, Hitachi, Sumitomo, Toshiba and Xerox. The last in particular showed how Xerox had implemented an internal knowledge management system.

David Probert

Technology Management

February 1999



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Hot topics in technology management

Our research project activities and discussions with practitioners have highlighted a number of key issues in technology management over the last year. Topics which appear to attract most interest are:

- Facilitating the technology/marketing dialogue
- Managing technology across organisational boundaries
- Measuring the contribution of technology to company value
- Looking at technology change in the future

We are addressing all of these in one way or another in current and future projects.

The technology/marketing link is a key aspect of our major project 'Strategic technology management: linking technology resources to company objectives'. We are developing a practical tool to help make this link, to be used as the first step in a technology route mapping process. Recent work with Centre member Domino Printing Sciences has shown encouraging results. The Forum on April 29 will review the work to date.

Putting a value on technology will be explored in the second phase of this project starting in Marconi (New British Aerospace) during the next few weeks. A Network focus group meeting on November 23 looked at metrics to help with valuation and provided a good starting point for this work.

The cross-boundary issues were the subject of a recent meeting we held with CRIC (ESRC Centre for Research in Innovation and Competitiveness) at Manchester to explore common research possibilities. Their work on technology management in mergers and acquisitions, together with our focus on in-company processes, looks like an exciting area for a joint project. We aim to have a proposal by Easter.

Foreseeing the future impact of technology is an on-going theme. We have taken an active part in developing in-company techniques for this in the national Foresight programme; scenario building techniques are particularly useful - see the article by Dr Rob Phaal inside. We believe we can contribute something in this area to support technology route mapping, which is emerging as a key integrating tool for technology strategy.

Workshops

The keen interest in these topics has been demonstrated by the huge response we have had to our current evening workshop series. Many of these issues are being covered over the course of the three evenings, together with a new framework of factors to help with sourcing decisions for parts and technology. We have had to close bookings at around fifty people per evening in order not to jeopardise the valuable, small group discussions.

Work has also started on two other important areas identified for research by Centre members. Firstly, the project to study factors affecting the growth and success of innovative high tech start-up companies is well under way. Dr Elizabeth Garnsey and Dr Tim Minshall will be reporting on this by the end of March. Secondly, we are currently recruiting a researcher to tackle the application of technology management techniques to software manufacture - an area of great potential.

We shall hold a brief review meeting for members of these and other projects following the day Forum on April 29. The Forum will be at Fitzwilliam College and the review and annual dinner will be in the Cockcroft Room at Churchill College (details to follow). We look forward to a stimulating discussion and convivial evening!

David Probert

Contents

R&D Project selection

Mike Lamb.....2

Foresight: future markets – future business

Rob Phaal.....3

Conference reports

Quarterly diary.....4

Tools to help with R&D project selection

R&D represents a considerable investment for many manufacturing companies and project selection decisions have a significant impact on future business performance. Recent research in the Centre has developed new insights into the use of R&D project selection tools.

Project selection tools

There are many tools designed to assist R&D project selection. However, few of these have been developed from an understanding of industrial practice.

Existing tools can be classified according to two dimensions:

- The type of data considered - qualitative or quantitative
- The number of projects evaluated - single or multiple projects

Four categories of tools are documented in the literature (their relationship to each other is shown in Fig. 1):

- **Enquiry tools** emphasise the learning gained by using each tool
- **Gate tools** test project capability against one or more groups of criteria ('gates') on a common theme
- **Portfolio tools** assume there is a need for balance in a set of R&D projects
- **Scoring tools** rank individual projects against a set of criteria

Fieldwork in manufacturing companies suggests that the process of R&D project selection forms a set of linked activities:

- Approval - confirming that a project is either good for or acceptable to a company
 - Funding - providing a project with financial resources
 - Monitoring - observing the progress of a project
- Most existing project selection tools are focused on the

first activity of approval. Funding and monitoring are not well supported by the tools literature. Fieldwork also suggests that many companies with R&D project selection problems have attempted to use 'approval' tools without success - because their problems lie in the areas of funding and monitoring. This may help to explain the dissatisfaction that many managers have with tools.

Choosing appropriate tools

Our research enabled us to formulate a method for choosing appropriate tools. This suggests that managers should choose a tool to match their specific R&D project selection problem. The framework has two dimensions which require two questions to be answered:

- Which problem area is the tool intended to support? (Approval, Funding, Monitoring)
- How is the problem going to be solved? (Enquiry, Gate, Portfolio or Scoring)

Mike Lamb

Mike Lamb completed his research at the Centre last year. He is currently working as a consultant at OCEC Strategy Consultants.

Recommended reading

- Pearson, A. (1983), "Project selection in an organisational context", *IEEE Transactions on Engineering Management*, Vol. EM-21, pp. 152-158
- Steele, L. W. (1988), "Selecting R&D programs and objectives", *Research Technology Management*, Vol. 31 No. 2, pp. 17-36.

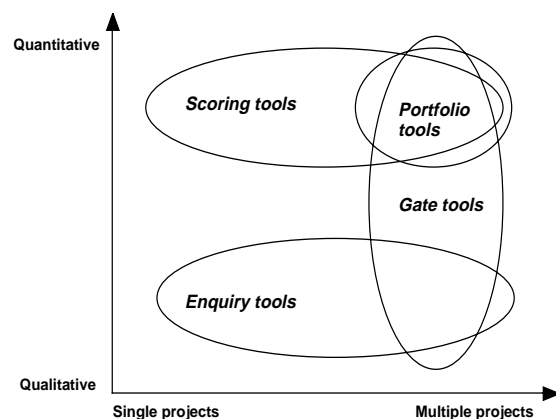


Fig. 1 Positioning of tools

	Company problem		
Tool category	Approval	Funding	Monitoring
Enquiry	Becker 1980 Merriemfield 1981 Duchon et al. 1989	Scholefield 1994	Reynolds 1965 Krogh et al. 1988
Gate	White & Grabam 1978 Frobman 1982 Benson et al. 1993	O'Connor 1994	
Portfolio	Lockett & Freeman 1970 Bitondo & Frobman 1981 Matheson & Menke 1994		
Scoring	Cooper 1984 Brenner 1994	Liberatoire 1987	

Fig. 2 Framework for the choice of tools (detailed references available on request)

Foresight: future markets – future business

The Centre for Technology Management facilitated a Foresight workshop at the Manchester Science Park on November 20 on behalf of the Office of Science and Technology (OST). The half-day workshop was organised in collaboration with Cambridge-based ER Consultants. Its aim was to test a recently published OST guide “Foresight: future markets – future business”¹. A total of about 25 organisations attended the workshop including small high-technology firms, university incubators and business schools, together with venture capitalists and banks.

Foresight is a process, a way of thinking about the future in order to answer the following questions:

- What are the key trends and drivers for change affecting the business?
- What opportunities and threats do future markets and technologies pose?
- What kind of organisation is likely to be capable of succeeding in the future?
- What are the strengths and weaknesses of the organisation?
- What competencies, knowledge and partners are needed for the future?

The aim of the workshop was to explore how foresight can be applied in practice. Participants were able to work through an outline foresight process which they could then apply within their companies. In addition, the event supported the development of a local network of companies interested in foresight concepts, based around the Manchester Science Park.

The workshop was introduced by Dr John Allen (Chief Executive, Manchester Science Park), followed by an overview of the National Foresight Programme by

Professor Mark Ferguson (Chair of the Health and Life Sciences Panel). The main focus of the day was on practical, hands-on activity by the participants, who were divided into four groups, each working on a possible scenario for the future (year 2010).

The participants were asked to assess the impact of the scenario on their business, in terms of changing markets, processes and technologies, and to identify opportunities and threats posed by the scenario. The participants then explored the types of organisation response which would enable the opportunities to be exploited and the threats mitigated, in terms of required competencies, knowledge and partners.

Each group presented findings during a feedback session where common issues from the four scenarios were assessed. In each case the importance of knowledge management and information technology was stressed, together with the key role that effective business networks will play in the future.

The day was considered to be a success, with participants gaining a practical insight into how foresight processes can be applied within their organisation.

Rob Phaal

¹Copies available from the OST at <http://www.foresight.gov.uk/>

Farewell and welcome!

We have two farewells to make. Geoff Gardiner, who has been researching into new product introduction for six years, has returned to industry to play a key role in the setting up of a new Cambridge company, Synomics.

Tony Venus, who has worked for the Centre for over a year co-ordinating several of its activities including this newsletter and the EPSRC network, is moving on to a technical consulting role with IBM. We wish them both every success for the future.

Many of you will remember Noordin Shehabuddeen, who completed his MPhil in the management of technology change 18 months ago. Noordin has returned to Cambridge to continue his research for a PhD, working on particular aspects of technology change. During his earlier time with us, he was a key player in starting up this newsletter and we are looking forward to his enthusiastic involvement in Centre activities.

David Probert

