briefing

Technology Intelligence systems: how companies keep track of the latest technological developments…

Companies need to keep abreast of the latest technological innovations if they are to take advantage of new business opportunities and become aware of potential threats. Examples of disruptive innovations that have revolutionised an industry include liquid crystal displays (which have now largely displaced cathode ray tubes in televisions) and digital technology which has transformed the photographic industry.

Recognising the importance of these issues, many organisations have implemented and developed Technology Intelligence (TI) systems, designed to capture information about emerging technologies and trends and to deliver it in a usable form to decision makers. Establishing such a system can be challenging and requires the ability to evaluate large volumes of data, identify what is relevant and transfer it to those who need it.

A recent research programme at the IfM's Centre for Technology Management has been investigating these issues with the aim of establishing the underlying principles of an effective system. Researchers Letizia Mortara, Clive Kerr, Rob Phaal and David Probert studied 14 UK technology-based companies in a variety of sectors looking at the different approaches the companies were using to gather information, exploring their strengths and weaknesses and identifying practical ways to address common problems.

What kind of information?

The first step in the process is to decide what information a company needs. This will depend not only on the industry context and current product range but also on a company's future plans. It is important to consider the technologies that may be needed for tomorrow's products as well as those that might have a disruptive impact on existing ones.

It is not just information about technical matters that may be of interest. Many other factors contribute to the decisions made about the use of technology. Political, social, legal or environmental issues can all have an impact. For example social trends, such as an increasingly ageing population, can create a demand for new kinds of products or services.

In addition, information about technology should be complemented and integrated with information about other aspects of the business such as market and competitors' trends.

How to search

The research identified four principal search modes for gathering information, depending on whether it is located in or outside the company and whether it is something already identified or is totally new.

Search modes

• Trawling: making in-house information explicit, particularly information that is not known to be there.
• Mining: extracting explicit intelligence information from internal resources such as libraries and databases.
• Targeting: focusing on new technologies outside the company and monitoring their development.
• Scanning: keeping abreast of any unforeseen developments beyond the firm that could have an impact on the business.
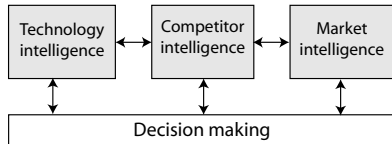
Scanning can be challenging to undertake but offers the greatest potential for identifying threats and opportunities for the business. The table below provides examples of activities in the different search modes.

	Internal	External
Open-ended	**Trawl** Trawling in a research organisation is facilitated by a guide called 'Who knows?' The document is available to the entire staff and lists company members according to their areas of expertise. In addition library personnel develop knowledge of who in the company has researched various topics, allowing them to direct those with similar queries to someone who is already familiar with the subject.	**Scan** In a large telecommunications company analysts collect information on current technologies across the industry. A list of the most interesting are kept under observation and publicised in an emailed newsletter within the company. Scouts are employed in technology hot-spots around the world to search for technologies held by start-ups. They participate in events attended by start-ups and publicise the company's interests.
Directed	**Mine** A technology consultancy maintains a database covering core technology topics in worldwide literature (books, journals, proceedings, theses, standards, patents). The database staff abstract and tag new literature with keywords, and perform searches on behalf on enquirers. A technical enquiry is typically answered with approximately 30 references.	**Target** The technology group in a printing equipment manufacturer targets four key technology sectors for intelligence gathering. The group, which has a broad range of expertise, holds weekly meetings at which specific intelligence projects are allocated to team members. Information collected is analysed to see whether a targeted technology could meet the company's future needs.

Examples of company search methods

The importance of communication

Simply collecting information is not enough. Companies must ensure it reaches the right people. Ideas to encourage communication include regular reports or newsletters and a yearly innovation retreat, bringing together individuals from different backgrounds.

Often technology, market and competitor information is collected separately. It is important to encourage communication between the three areas as both market and competitor intelligence can contribute valuable information about new technologies.

A manufacturer of printing equipment has a strong culture of communication so that Technology Group members usually know where to go for information internally on a particular topic. However, most intelligence is stored on individual computers and this makes intelligence reports difficult to locate. The company carries out separate intelligence activities for technology, marketing and business developments. Although all three report to the Board, there is no mechanism for linking the three intelligence activities at operational level.

Information also needs to be recorded and stored in such a way that it can be accessed in the future.

A UK telecommunications service company has a sophisticated system for monitoring technology development externally. However, the company's organisation of its internal knowledge sources is much less structured. There is heavy reliance on personal networks and although a formal system for codifying information has been discussed no solution has been chosen. There is no formal record kept of past intelligence.

If decision makers are not receiving all the information they need it may be helpful to develop a technology roadmap or 'watch list'. Roadmaps communicate technology strategy and link it to market opportunities. A technology watch list can be developed based on a roadmap. It summarises the areas in which intelligence gatherers should watch for developments.

A UK-based technology consultancy undertakes roadmapping exercises to guide its understanding of its future technology needs. Technology managers identify new technologies of interest and allocate responsibility for learning about each. Results are reported periodically to the rest of the group and kept in intranet digital archives. Each year a matrix is produced collaboratively by the industrial support teams and the technology groups, that matches current or desired technology expertise against industrial needs.

TI for a whole industry?

A second IfM research project is taking some of these issues further and considering how to create technology systems for use by multiple stakeholders – for example a whole industrial sector.

The project has developed 'FuturesLab' a prototype intelligence system which allows users to exchange and archive information based on their particular interests.

Users can define both their interests and their areas of expertise. This allows the community to identify issues of common interest as well as topics in which there is a knowledge shortfall. Users can upload information and link it to relevant keywords. They can also perform targeted searches and be kept informed about new content that may interest them.

Further information

Further information about both research projects can be found at:
http://www.ifm.eng.cam.ac.uk/ctm/research

The IfM has published a workbook, *'Technology Intelligence: Identifying threats and opportunities from new technologies'* that summarises the research into company intelligence systems and gives practical tools and advice.

Academic papers on technology intelligence include:

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, Vol. 2, No. 1, pp. 73-93.

Lichtenthaler, E. (2004) Technological change and the technology intelligence process: A case study. Journal of Engineering and Technology Management, Vol. 21, No. 4, pp. 331-348.

Norling, P. M.; Herring, J. P.; Rosenkrans, W. A.; Stellpflug, M. & Kaufmann, S. B. (2000) Putting competitive technology intelligence to work. Research-Technology Management, Vol. 43, No. 5, pp. 23-28.