

Techniques and Technologies for Knowledge Management

This edited extract is taken from the interim report of a 2-year study, *Knowledge Management (KM) for Sustainable Construction Competitiveness* funded by the Department of Trade and Industry (DTI) as part of the Partners in Innovation Programme (Pii).

The interim report provides an overview of the technologies and techniques available for knowledge management in organisations. A further report is due in September 2003.

For the full interim report and detailed information on the study visit the ITCBP web site or the project web-site www.knowledgemanagement.uk.net

Knowledge Management Techniques

KM techniques do not depend on IT, although they can provide support, for example, in knowledge sharing, which can take place through face-to-face meetings. KM techniques are affordable as no sophisticated infrastructure is required although some techniques require more resources than others. They are easy to implement and maintain due to their simple and straightforward nature. Finally, they focus on retaining and enhancing the organisational tacit knowledge, a key asset to organisations.

KM techniques include:

- Brainstorming
- Communities of Practice (CoP) also called knowledge communities, knowledge networks, learning communities, communities of interest and thematic groups.
- Face-to-Face Interaction
- Post-Project Reviews
- Recruitment
- Apprenticeship, Mentoring and Training

Knowledge Management Technologies

KM technologies depend heavily on IT. Different technologies are used for different KM processes. For example, Knowledge Mapping Tools, Knowledge Bases, and Case-Based Reasoning are technologies for capturing knowledge. Although there is a debate about the degree of importance of KM technologies, many organisations consider them as important enablers to support the implementation of a KM strategy as they consume a third of the time, effort and money required for a KM system. The other two-thirds mainly relate to people and organisational culture. From a return

on investment (RoI) perspective, organisations need to capitalise and exploit IT for KM. With the evolution in IT hardware and software, IT tools can act as dynamic capabilities or core competences for organisations, if effectively exploited.

KM technologies consist of a combination of hardware and software technologies.

Hardware technologies and components are critical in a KM system as they form the platform for the software technologies and the medium for the storage and transfer of knowledge. Hardware requirements for a KM system include:

- Personal computer or workstation for access to the required knowledge
- Highly powerful servers enabling the organisation to be networked
- Open architecture to ensure interoperability in distributed environments
- Media rich applications requiring Integrated Services Digital Network (ISDN) and fibre optics for high speed
- Asynchronous Transfer Mode (ATM) as a multi-media switching technology for handling the combination of voice, video, and data traffic simultaneously
- Use of the public network (e.g. Internet) and private networks (e.g. Intranet, Extranet) for access to and sharing of knowledge.

Software technologies play an important part in the implementation of KM. The large number of vendors providing KM solutions makes it extremely difficult to identify the most appropriate applications. Organisations have therefore adopted a range of models for establishing KM systems:

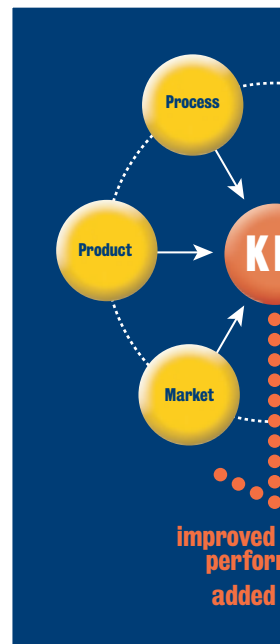
- **Customised Off The Shelf (COTS)** – the applications are identified and examined against the functional needs of the organisation. A short test period may be needed to pinpoint the most suitable application. Once an application is acquired, it can be customised to integrate it into the organisation's information system.
- **In-house Development** – usually with external technical help. Examples are Notes, Domino, and Intranet applications. There are several reasons that make this option generally less attractive. These include the difficulty of establishing KM systems' requirements, high cost, risk and the complexity of developing bespoke systems.
- **Solution Re-engineering** – involves adapting an existing generic solution to the KM problem with the help of KM consultants and technical architects.

Examples are online knowledge communities and virtual collaboration tools.

- **Knowledge Services** – knowledge applications provided by a third party that hosts the application on the Web. The user accesses the service via a thin-client such as a browser. The main benefits are the waived software licensing fee and the avoidance of in-house maintenance. Disadvantages include reduced security and privacy.
- **Knowledge Marketplace** – a third party vendor hosts a web site, grouping together suppliers of knowledge services. Suppliers may include expert advisors, vendors of product support services, KM job placement agencies, procedures for the evaluation of KM and portal software, and research companies providing industry benchmarks and best practice case studies. Two types of Knowledge Marketplace exist. One provides common information and services to all industries while the other offers only certain services to a specific industry.

KM software technologies have seen many improvements since 2000 due to alliances, and mergers and acquisitions between KM and portal tool vendors. Despite this, none gives a complete solution to KM. These tools are better described within technology groups such as data and text mining, groupware, etc.

Data and text mining - A technology to extract meaningful knowledge from masses of data or text. Data are single facts (structured) about events while text refers to unstructured data. The process of data or text mining enables meaningful patterns and associations of data (words and phrases) to be identified from one or more large databases or 'knowledge-bases'. The approach is useful for identifying hidden relationships between data, creating new knowledge. Used in business intelligence, direct marketing and customer relationship management applications, it is difficult to access data through an enterprise-wide corporate



portal where an organisation only has a small group of data miners.

Groupware - Useful for group decision-making, Groupware supports distributed and virtual project teams where team members are from multiple organisations and in geographically dispersed locations. Groupware tools usually contain email communications, instant messaging, discussion areas, file area or document repository, information management tools e.g. calendar, contact lists, meeting agendas and minutes, and search facilities.

Intranet – An inter-organisational network that is guarded against outside access by security tools called firewalls. **Extranet** is an Intranet with limited access to outsiders, making it possible for them to collect and deliver certain organisational knowledge. This knowledge can therefore be made available to geographically dispersed staff members.

Knowledge bases – Repositories that store knowledge about a topic in a concise and organised manner. They present facts that can be found in a book, a collection of books, web sites or even human knowledge.

Taxonomy – A collection of terms, and the relationships between them, commonly used in an organisation. A relationship can be hierarchical, where one term is more general and so subsumes another term, functional, where terms are indexed based on their functional capabilities, and networked, where there are multiple links between the terms.

Ontologies – Define the terms and their relationships, which comprise taxonomies, as well as supporting deep (refined) representation for both descriptive and procedural knowledge of each term (concepts). Ontologies also support defined domain theories that govern the permissible operations with these concepts.

A taxonomy or ontology can be developed manually by using building tools, automatically from a repository of knowledge assets, or purchased off-the-shelf. Taxonomies and ontologies serve

multiple purposes in an organisation. They can be used as a corporate glossary holding detailed descriptions of every key term used in the organisation. They can also be used to constrain the search space of search engines and prune search results, identify and group people with common interests, and act as a content or knowledge map to improve the compilation and real time navigation of Web pages.

KM Tools used by UK Construction Organisations

A range of techniques and technologies can be used in construction organisations for knowledge management. Most of the technologies are relatively new and are still evolving. A recent survey of 170 UK construction organisations carried out by Loughborough University shows that communities of practice are most widely used as a technique in large organisations. Large construction organisations with a range of specialist skills tend to have the need and resources to set up communities of practice and to benefit significantly from them. Conferences and seminars were identified by small construction organisations as the most popular technique for knowledge sharing and updating knowledge.

According to the survey, the most widely used technology is the Intranet. Intranets can provide a platform for knowledge sharing in large construction organisations, geographically dispersed with diverse knowledge to share. Other popular technologies are document management systems (e.g. Documentum and Sage Desk), groupware (e.g. Lotus Notes, Lotus Quickplace, Live Link and e-Room) and taxonomy tools (e.g. Autonomy). The use of these technologies is likely to increase as collaborative working becomes more important in construction supply chains. Extranets and electronic discussion forums are used to a limited extent but the use of Extranets should increase as new ways of procurement involving several construction supply chains, as in partnering arrangements, become more widely used. These techniques and technologies provide valuable support for knowledge management. However, the large number of technologies available in the market place makes it difficult to identify the most appropriate tools for an organisation. The goal of the KM strategy, the nature and location of knowledge and the capabilities of the tools will all inform the selection of appropriate techniques and technologies.

Keeping your web site secure



UK Online for Business publishes a series of guides for small and medium sized businesses on IT issues. Most of these

are relevant to construction businesses and the guides can be downloaded from the ITCBP web site. The following is an extract from **E-Security: A Guide For Small Businesses**, which provides some simple, practical measures to help you reduce the risk to your company's communications, data and services.

The chances of vandals attacking your web site are slim – but if it can happen to some of the world's high-profile sites, it's not a good idea to take the risk. Whether you host your own web site or outsource to an Internet service provider (ISP), the following checklist will reduce your risk to virtually zero.

- Install a firewall. It will detect and prevent any security attacks and control what Internet connections you allow in and out of your business.
- Keep a back-up of your site on a separate, secure computer.
- No matter how carefully chosen, passwords can still easily be cracked using password-cracking tools. So, for certain types of information consider using one-time passwords which can easily be achieved with strong authentication tokens.
- Only people who really need it should have access to the server.
- Check your system and web logs for suspicious activity. Keeping a log of web activity can help you spot the early signs of a system break-in.
- Get the latest software updates and security patches as soon as they're available.
- If you outsource – check the ISP's own security policy and make sure they have controls in place for protecting your information. Get a written service level agreement in which the ISP commits to providing agreed levels of security. BS ISO/IEC 17799 provides guidance and defines the key security requirements in third party contracts.

Ring the UK Online for Business Infoline on 0845 715 2000 or visit www.ukonlineforbusiness.gov.uk

