Knowledge Management: Approaches and Policies

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Abstract

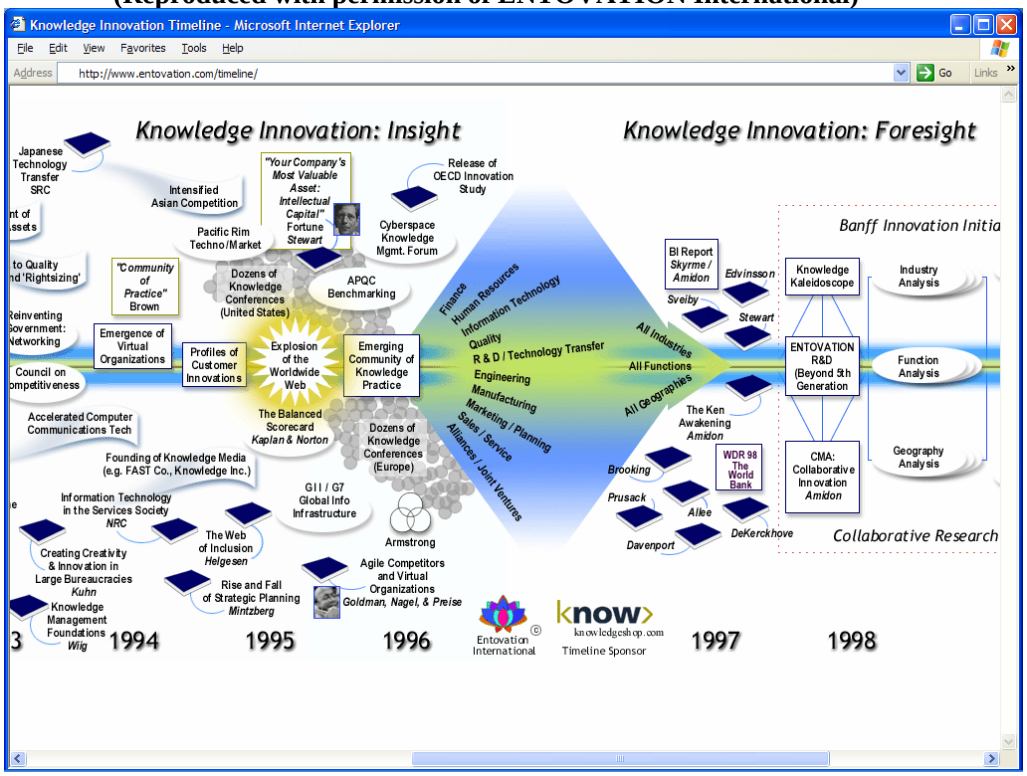
Knowledge management is now a well-established discipline in many large organizations. But what is its status and role in small and medium enterprises and what are the policy implications? This paper explores these questions. It starts by tracing the evolution of knowledge management and summarizes its key characteristics. This is followed by a review of current understanding of knowledge management in small firms. This suggests that knowledge innovation – the process of accessing, absorbing and converting knowledge into commercial products and services – is probably the most fruitful area for focus of policy initiatives. The paper concludes with some frameworks in which such initiatives might be developed and uses EKMF as an example of an initiative that already exists.

1. Evolution and Status

1.1 The Evolution of Knowledge Management

Knowledge management has a long and distinguished history. It was as long ago as the 1960s, when Peter Drucker first coined the term "knowledge worker". Debra Amidon has traced many of the early roots going back to the early 1980s on a timeline, an extract of which is shown below.[1]

Figure 1 Portion of Knowledge Innovation® Timeline
(Reproduced with permission of ENTOVATION International)



[1] Knowledge Innovation® Timeline – http://www.entovation.com/timeline/ Knowledge Innovation® is a registerd tradmark of ENTOVATION International

Some of the significant events were:

- 1986 – publication by Swedish knowledge management pioneer Karl-Erik Sveiby of *The Know-How Company* (with Tom Lloyd).
- 1987 – 'Managing the Knowledge Assets into the 21st Century' round table (between US academia, business and government) – one of the first nationwide efforts to harness intellectual capital.
- 1991 – appointment of Leif Edvinsson as Vice President of intellectual capital for Skandia, arguably the first formal board level appointment related to knowledge management
- 1991 – publication of seminal *Harvard Business Review* article by Ikujiro Nonaka on the 'knowledge-creating company', later expanded and published as a book with Hirotaka Takeuchi (1995)
- 1993 – 'Intellectual capital: your company's most valuable asset' – article by Tom Stewart in *Fortune* that helped raise awareness of knowledge management in the world of business
- 1995 – first business seminars and conferences in the USA e.g. *Knowledge For Strategic Advantage* – co-sponsored by Arthur Andersen and the American Productivity and Quality Center, held in Houston.
- 1996 – first business conferences in Europe
- 1998 – The World Bank chooses the theme *Knowledge for Development* as the topic for its annual world development report.

As can be seen from the part of the timeline in Figure 1, there has been a rapid spread of the influence and uptake of knowledge management following its wider promotion since 1996. Although first seen in knowledge-intensive large companies in the oil, pharmaceutical, high technology and financial services industries, it has spread into most other industries. In the last two or three years, after a somewhat slow start, national and local governments have started to adopt knowledge management. Partly, this has been driven by the need to "join up" government and provide seamless interfaces into information and services for the citizen e.g. through Internet portals.

Likewise, although knowledge management was originally most visible in northern Europe and North America, it has gradually been adopted by companies across the world. You will find national projects and initiatives in countries and regions ranging from the Parana region of Brazil, to Singapore (the innovation island). There is hardly a large company or national government that does not know recognize the wealth creating potential of knowledge, and has some kind of initiative. Recent studies indicate that some 75-80 per cent of all large companies have a formal knowledge management programme.[2]

1.2 Drivers of Knowledge Management

Why the growth and interest in knowledge management? In analyzing many case studies, a number of commonly recurring drivers are found:[3]

- Dispersion – the organization is dispersed over several geographic locations. This makes it more necessary to find out what is already known elsewhere to avoid "reinventing the wheel".

[2] Examples include *Annual Knowledge Management Survey*, KPMG (2000); *Beyond Knowledge Management*¸ The Conference Board (2000).

[3] There are over 30 case studies in *Creating the Knowledge-based business*, David J Skyrme and Debra M Amidon. The magazine *Knowledge Management* (http://www.kmmagazine.com) published 2-3 every month. Also websites such as http://www.apqc.org and http://www.icasit.org have several.

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- Change / restructuring – constant reorganizations mean that the relationships in which informal knowledge is shared are often broken; some organizations e.g. the US federal government, have a demographic situation in which many experienced and knowledgeable staff will reach retiring age within a short period of time.
- Complexity / interdependencies – many organizational activities require inputs from other departments and their own activities may impact others.
- Improving business performance – by sharing 'best practices' across an organization, the performance of the less well performing units can be brought closer to that of the best.
- Customer relationships – the higher value placed on good customer service and customer relationships puts a premium on customer knowledge – understanding their needs, bringing together customer information into a single place, and using the knowledge so acquired to develop better products and services
- Need for innovation – faster, better, cheaper (a common mantra within business) is the result of more effective innovation; this requires an innovation system that converts knowledge (ideas) efficiently and effectively into products, services and processes.
- Better enabling technology – the growth of functionality of the Internet (including collaborative workspaces, discussion groups, content management systems and portals) makes it easier to assemble and share information across organizational boundaries
- Minimizing uncertainty and risk – better access to relevant knowledge will help managers make better decisions and so minimize various risks that may confront the business.
- Regulation – quality of information and reporting is increasingly required by regulatory bodies; a good approach to knowledge management will allow such information to readily accessed (c.f. the requirements of Freedom of Information legislation in various countries).

1.3 The Status of Knowledge Management

Despite its rapid acceptance, most observers believe that much has still to be accomplished. A typical evolution of knowledge management within an organization goes through several phases:

- Ad-hoc: knowledge management is being practiced to some level in some parts of the organization (although it may not be recognized as such or called 'knowledge management')
- Formal: knowledge management is recognized as a formal project or programme
- Expanding: the use of knowledge management as a discipline grows in practice across different parts of the organization
- Cohesive: there is a degree of co-ordination of knowledge management activity; knowledge can be more easily shared across departmental boundaries
- Integrated: there are formal standards and approaches that gives every employee access to most organizational knowledge through common interfaces (e.g. a corporate portal)
- Embedded: knowledge management is part-and-parcel of everyday tasks; it blends seamlessly into the background.

In its survey, KPMG reckoned that only 10 per cent of companies were operating at the higher three levels. Most knowledge management practitioners realize that it takes several years for knowledge sharing and knowledge activities to become embedded in an organizations culture and day-to-day business practice.

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2. The Practice of Knowledge Management

2.1 Definition

There are numerous definitions of knowledge management. The following definition is based on a synthesis of case material and interviews with Chief Knowledge Officers:

"the explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation, in pursuit of organizational objectives."

The underlined words are important:

- Explicit - unless something is made explicit it frequently does not get properly managed. Thus, although some management of knowledge is found in virtually every organization, including small and medium-sized enterprises, its benefits are only consistently realized if it is explicitly managed.
- Systematic - this helps create consistency of methods and the diffusion of good practice. Systematization also lends itself to automation, leading to additional efficiencies in handling explicit knowledge.
- Vital - every conversation and every new document in an organization adds to the organization's knowledge pool. Judgement must be applied as to which knowledge is critical, and therefore worth managing in a more formalized way.
- Processes - as well as being an important dimension of management and business processes, knowledge processes are important in their own right.

The main processes are knowledge sharing (of existing knowledge), knowledge creation and knowledge conversion (innovation).

2.2 Explicit and Tacit Knowledge

There are many types and forms of knowledge e.g. facts, know-how, specific skills, procedural knowledge etc. A common portrayal is that of a knowledge hierarchy that goes from data (facts and figures) to information (data with context) to knowledge (information with meaning) to wisdom or intelligence (knowledge with insight). For practical purposes the most important distinction is that between explicit and tacit knowledge, a distinction first elaborated in some detail by Michael Polyani.[4] According to Nonaka and Takeuchi explicit knowledge is that which:[5]

"can be expressed in words and numbers and can be easily communicated and shared in the form of hard data, scientific formulae, codified procedures or universal principles"

whereas tacit knowledge is:

"highly personal and hard to formalize. Subjective insights, intuitions and hunches fall into this category of knowledge."

[4] *The Tacit Dimension*, Michael Polanyi, Doubleday (1966). Since this source is difficult to find, a relevant chapter on Polyani's work can be found in *Knowledge In Organizations*, ed. Laurence Pursak, Butterworth-Heinemann (1997).

[5] *The Knowledge Creating Company*, Ikujiro Nonaka and Hirotaka Takeuchi, Oxford University Press (1995).

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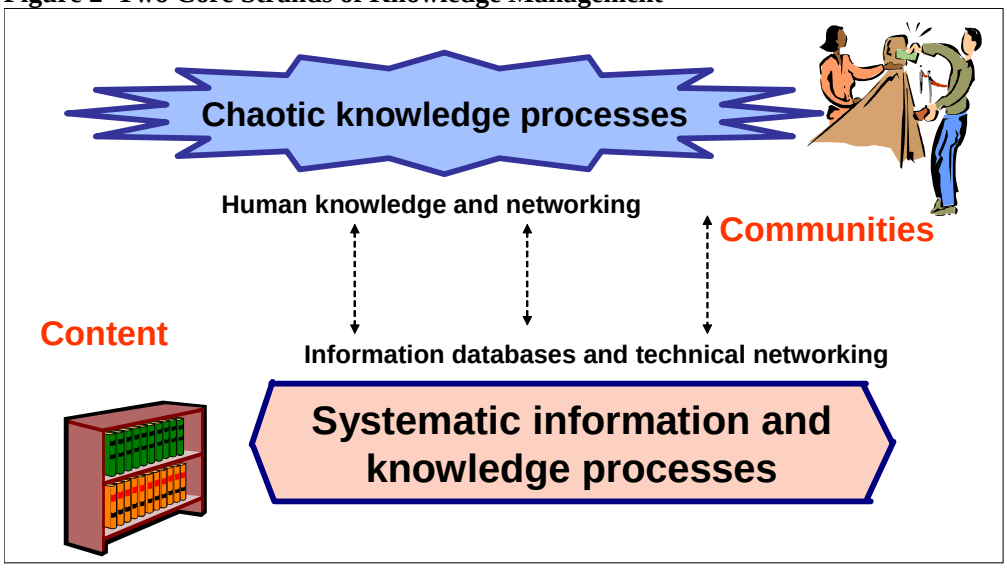
Thus, explicit knowledge (or information) in organizations is typically found in documents and databases, while tacit knowledge is that which is in the heads of people. Many knowledge management programmes have over-emphasized the approach of converting tacit knowledge into explicit knowledge. This approach has generally proved futile, since no database can replicate the years of experience of a knowledgeable individual or know (through judgement) which information to apply in a specific situation. The best that can be done in most cases is to make some tacit knowledge explicit, and provide pointers to the experts who will be able to put such knowledge into context and help those wanting to apply it.

The challenge of knowledge management is therefore best viewed as two-fold: 1) the management of explicit knowledge using techniques such as those used in the discipline of information resources management;[6] 3) creating the environment in which people can develop and share knowledge; a common approach for this is that of "communities of practice".[7] (see Figure 2)

Figure 2 Two Core Strands of Knowledge Management



According to Nonaka and Takeuchi, much of the value of knowledge is created as it is transformed between one type and other, from tacit to explicit and vice versa, back and forth, in what they describe as an ever evolving knowledge spiral that goes from individual tacit knowledge to organizational wide knowledge.

2.3 Knowledge Management Processes

Within organizations, much of the emphasis of early knowledge management programmes was on knowledge sharing "knowing what we know". More recently there has been growing interest in the knowledge processes that underlie innovation. It is useful to consider these as two distinct but interconnected knowledge cycles (see Figure 3).

[6] A helpful model here is the Willard model described in 'Information Resources Management', *Aslib Information*, Vol 21, No 5 (1993). See also *Infomap: A complete guide to discovering your corporate information resources*, C.F.Burk and F.W.Horton, Prentice Hall (1988).

[7] First described in such term through the research done at Xerox Palo Alto labs in the early 1990s. See for example *Communities of Practice*, Etienne Wenger, Cambridge Unviersity Press (1999).

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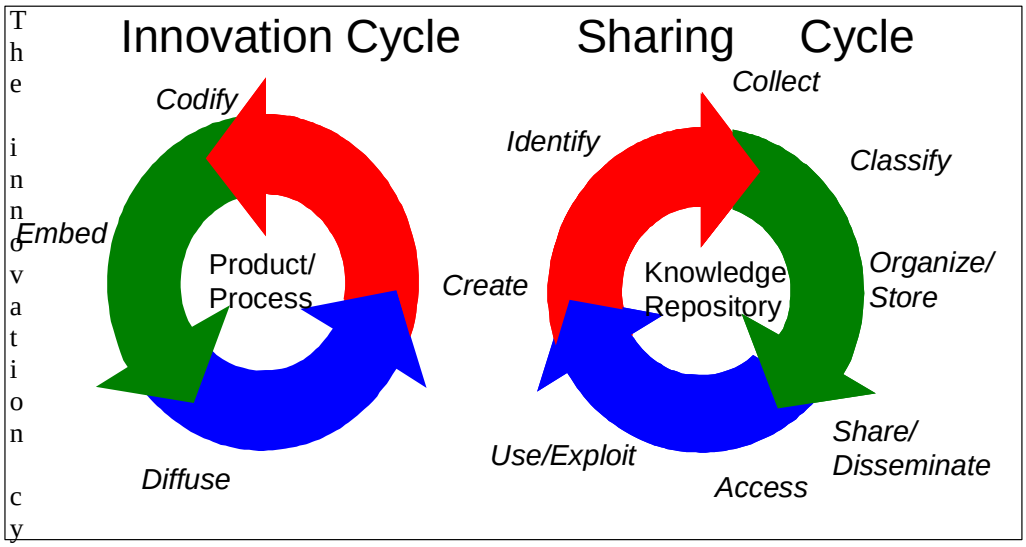
Figure 3 Two Knowledge Cycles



The cycle on the left – the innovation cycle – represents a progression from idea creation (unstructured knowledge) into more structured and reproducible knowledge, embedded within processes, products or services. The cycle on the right – the knowledge sharing cycle - shows the processes associated with gathering and disseminating existing knowledge, having a knowledge repository as its focal point. Although the activities in each cycle roughly follow the sequences shown, continual iteration through different levels of aggregation means that the actual paths between activities are rather more complex than those depicted.

In outline the innovation processes are:

- Create. New ideas are created. Knowledge networking stimulates the cross fertilization of ideas from different perspectives, and therefore often stimulates an innovation cycle.
- Codify. Here a prototype design or a process description is developed. This embodies the idea into a more transferable form.
- Embed. At this stage the prototype is further refined and its associated knowledge encapsulated in manufacturing processes and organizational procedures.
- Diffuse. Products are distributed in the marketplace or processes are implemented throughout the organization. Their application then generates ideas for improvements, and so the cycle repeats.

In the knowledge sharing cycle, the knowledge management processes are:

- Collect. Existing knowledge is gathered either on a routine basis or as needed. Often its existence is formally recorded in a knowledge inventory or knowledge map.
- Organize/store. The knowledge is classified and stored, often using an organization or industry specific thesaurus or classification schema. This makes subsequent retrieval easier. This process usually involves information professionals or librarians.
- Share/disseminate. Information may be sent routinely to those people who are known to be interested in it - this is information ‘push’. Meetings and events act as vehicles to share tacit knowledge.
- Access. Information is made easily accessible from a database, for example over an intranet. Users access it as they need it - this is information ‘pull’.
- Use/exploit. The knowledge is used as part of a work process. It is refined and developed. Through use, additional knowledge is created and the cycle repeats itself.

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A useful form of knowledge that can result from these cycles is meta knowledge - knowledge about knowledge. Thus, some of the most useful Internet or intranet pages are those that hold directories and indexes of what other information is available. Although the processes outlined above are very much geared towards explicit knowledge or information, similar processes take place in the deployment of tacit knowledge, though in a less structured way.

2.4 Techniques

In practice, knowledge management is the deployment of a set of tools and techniques that are used to help organizations manage the two knowledge cycles more effectively. Over 100 such techniques have been identified. They can be conveniently grouped according to which part of the knowledge cycle they augment (many tools can contribute to one or more phases). An illustrative set of techniques is listed below:

Innovation Cycle:

Create

- Creativity techniques: over 80 distinct techniques are described in Gundy's book[8]
- Creative abrasion: where people form different perspectives discuss ideas
- Simulation: business simulations and models often provide new insights as to how things works
- Skilful dialogue: an approach in which discussion is structured to reveal assumptions and to surface new ideas
- Morphological analysis: a specific approach in which the functions of a product are described and new combinations or alternative sought.

Codify

- Design methods: many disciplines now have formal approaches for design; these represent knowledge that was once tacit or ad-hoc and has now been systematized, often into computer-based applications
- Algorithms: many such applications have some core algorithms that embody design rules based on past experience
- PDM (Product Data Management): repositories for storing information about components that go into a complex product (widely used in the aerospace industry).
- Methodologies: particularly relevant to process design or the deign of work activities; a methodology in the form of procures, guidelines and workbooks represents codification of good practice
- EBOK (Engineering Book of Knowledge): this is the term used by Daimler-Chrysler to describe their repository of knowledge used by design engineers.

Embed

- Prototyping: initial 'proof of concept' of new knowledge; although the term is most commonly refers to new products, it can also be the prototyping of computer applications or even documents.
- Packaging: knowledge is made explicit and organized into some form of package, such as a document, a software application, or a database entry.
- Software development: this is another process used to embed knowledge into routine activities; a workflow routine is another

[8] *Techniques of Structured Problem Solving*, Arthur B Van Gundy, Van Nostrand Reinhold (1988).

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- Process engineering: in manufacturing industry, it is this activity that turns new knowledge into high volume production.

Diffuse

- Marketing: effective marketing is a common way of promulgating new knowledge; this may take the form of articles, conference presentations, as well as the more traditional marketing approaches such as brochures and promotion
- E-marketing: the Internet has considerably extended the scale and scope available for the diffusion of new knowledge
- Networking: for less structured and intangible knowledge informal networking is one of the effective ways of disseminating; many innovations are the result of networking along the supply chain e.g. academia with industry, and producers with customers.

Knowledge Sharing Cycle

Identifying

- Information audit: a process of identifying core knowledge needs and how well they are met; typically duplication of effort and some key gaps are identified
- Knowledge mapping: visual presentation of the location and structure of knowledge
- Expertise profiling: identifying the knowledge and experience of individuals, either through defined keywords for skills or free text descriptions
- Text mining: procedures for identifying core concepts within a body of textual material
- Conceptual mapping: visual mapping of knowledge, showing relationships between different entities.

Gathering

- Interviewing: semi-structured interviews are an effective way of gathering and making explicit core knowledge
- Intelligent agents: software that searches the Internet and alerts the user when new items of interest have been downloaded
- Search/retrieval: a core feature of knowledge-based software; the prevalent way of finding information on the Internet.

Organizing

- Thesaurus: a defined vocabulary of terms, used to aid retrieval from large databases; it helps users identify similar information, even when the terminology may differ
- Knowledge trees: a visual representation of categories of information
- Meta-data tools: facilities to simplify the addition of metadata (such as author name, keywords, audience etc.) to a block of information, such as a document or Web page.

Sharing

- Best practices: a best practices database is a common first project within a knowledge management programme; such entries not only describe in outline a recommended practice, but also give pointers to additional material and experts
- Office design: Scandinavian architects, in particular, have shown the important of good office design that takes account of people flows, and provides informal areas for wedge exchange
- Share fairs: an event whose purpose is to connect knowledge providers (e.g. R&D teams) with knowledge users or exploiters (e.g. business units or venture capitalists)
- Communities of Practice: an informal network or community that cuts across normal departmental boundaries to develop and share knowledge around a common interest or organizational problem

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- Document management: documents are a key way of formalizing and sharing explicit knowledge; their value is enhanced is a community is built up around a key corpus of documents
- Portal: a single p0oint of access to information and knowledge held in many different forms
- Cross-functional teams: teams with people from different disciplines and organizational units; such teams are a good way of sharing knowledge – especially informal knowledge - across normal discipline or organizational boundaries.
- Knowledge centres – an evolution of the corporate library; a knowledge centre will typically staffed by information scientists (librarians) who act as a conduit between the requester and suppliers of knowledge.

Learning

- AAR (After Action Review): a procedure developed by the US Army, but now widely used in large organizations; it is a systematic process carried out at the end of an assignment that asks: what should have happened? What actually did happen? What can we learn from what went right and what went wrong?
- Project reviews: a formal session at the end of a project to distil the lessons learned.
- Decision diaries: diaries kept by decision makers that explicitly state the assumptions and the rationale behind a particular decision
- External forums: events and networking with external peers, such as at a meeting of a professional society, to learn from the experience of others in similar situations
- Storytelling: the use of 'stories' as a way of transferring knowledge and making it memorable.[9]

Applying

- Packaging: putting knowledge in a form that makes it more widely accessible
- Decision support: using knowledge to inform decision making
- Process/ workflow: embedding knowledge into a process to improve quality and consistency
- Case based reasoning (CBR): interpreting a situation based on analogues from the past or related situations. CBR is a particular type of artificial intelligence software.

Evaluating

- KM assessment: an assessment of activities within a knowledge management programme, gauged against generally accepted good practice
- IC measurement and accounting: a formal approach for classifying intellectual capital into its components (typically human capital, customer capital, structural capital and intellectual property) and developing metrics to assess how it is changing over time
- Benchmarking: comparison of a specific process with other organizations or units carrying out the same process; the comparison is done via a set of metrics that may reflect input parameters (e.g. level of skill used), processes and outputs / outcomes.

The above list is used to indicate the many ways in which knowledge management manifests itself within an organization. As the discipline of knowledge management becomes more established, each technique becomes better understood, documented and diffused. Many techniques have associated computer tools that make them easier to implement and diffuse through an organization.

[9] Storytelling has been populairzed by Stephen Denning, formerly knowledge director at the World Bank. See *Springboard: How Storytelling Ignites Action in Knowledge Era Organizations*, Butterworth-Heinemann (2001). Denning has subsequently articulated different patterns that are effective in different situations.

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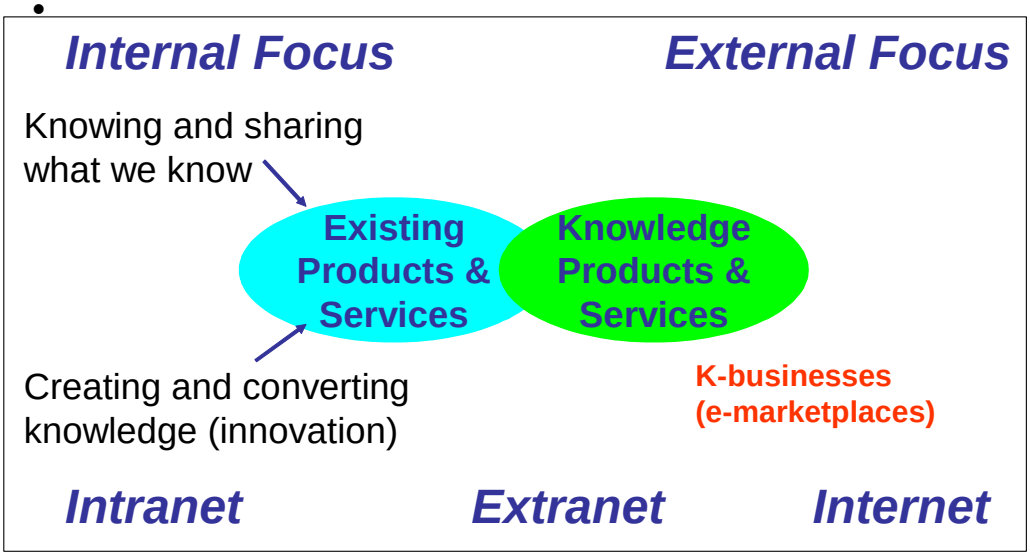
2.5 Some Core Technologies

At the heart of many knowledge management practices are some general collaborative technologies, such as email, document management and intranet. The last few years has seen strong growth and interest in the following technologies:

- *Enterprise Information Portals (EIP):* these provide a single point of access, not just to information, but to specific applications and even online communities. Most portal products allow customization by type of user (e.g. marketing professional), and even individual preferences e.g. filtering and ordering search results according to a user's profile.
- *Content Management Systems (CMS):* these allow content to be published once and used many times; thus a portal (intranet) page may consist of several information blocks, while one block (such as name and address) may appear on many pages; thus as individual information blocks change, this is reflected automatically on many Web pages, thus making websites easier to maintain.
- *Categorization software*: this uses natural language analysis to identify the core concepts within a document; such systems make the classification a semi-automatic process e.g. it may suggest keywords that a librarian can accept or modify.
- *Visualization software:* this shows the relationship between different elements of knowledge; used in conjunction with a categorization engine, for example, visualization could show patterns of clusters of related documents.
- *Expertise profiling:* this software by analysing what a person writes or which questions he or she answers in a community infers what they are knowledgeable at; such automatically generated profiles can augment the profiles that are manually generated and make it easier for a user to find relevant experts.

A comment worth making is that, as knowledge management has grown, it has spawned a whole raft of businesses to support it. Most of these are small niche companies specialising in consultancy, training or software for one of the many techniques described above. Intellectual Capital Services (London) and Intellectual Capital Sweden (Stockholm) are two consultancies specializing in IC measurement (based in London). Knowledge Management Software (Manchester) provides a suite of software, and Albert (Brussels) an innovative search and categorization product. Historically, some of these companies have grown significantly, notably Autonomy of Cambridge.

Figure 4 General shifts in knowledge management focus



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2.6 Where Next?

The usage of the above techniques and the actual way that knowledge management is implemented in an organization varies widely according to the types of organization, its industry, and culture. However, over the course of the last five years three general shifts of new focus stand out:

- Sharing existing knowledge: this was the thrust of many early knowledge initiatives and is reflected in the knowledge sharing cycle of Figure 3.
- Creating and converting new knowledge: this is the innovation thrust
- A growing external focus: this has led to an upsurge in interest in customer relationship management systems and interest in knowledge markets.

The situation of knowledge markets is an interesting one. The first premise is that an organization can make a business out of knowledge. For example, consultancy BestPractices LLC in North Carolina now makes more revenue through selling examples of best practice over the Internet than it does from its original consultancy practice. The second premise is that independent online marketplaces are a more efficient vehicle for trading such knowledge assets. Thus, Du Pont found that commercialization of patents was a haphazard affair, with patent owners often not finding use within their own organization and not knowing who else might be interested in licensing from them. Thus, companies like Yet2.com provide a marketplace for buyers and sellers of such intellectual property. With the growth of B2B electronic marketplaces, it was not long before some of these were devoted to buying and selling of other knowledge assets. Organizations like Askme.com, iqport and eTrask created pioneering online emarketplaces for knowledge (k-markets). Unfortunately, these markets have failed to live up to their existing promise, though overall there are steadily increasing sales of information and knowledge assets over the Internet in general.

To summarize this section, knowledge management in large organizations is now well established, with new techniques and new technology tools continually adding to the corporate armoury for exploiting knowledge management. The result of more effective knowledge management has led to reduced operating costs, faster time-to-market for new products, better customer service, reduced risk and many other reported bottom line benefits. As the innovation agenda grows in prominence, and e-business becomes more established, we expect that organizations will continue to exploit their knowledge assets in novel ways, and create knowledge-intensive businesses.

3. Knowledge Management and SMEs

3.1 Current Status

So far in this article, most of the emphasis has been on knowledge management in large organizations. This has been where effective knowledge management has had the most obvious impact. It has also been the sector which has been most studied and written about.[10] Furthermore, many of the software tools mentioned earlier (e.g. portals, content management systems) are enterprise-wide systems costing millions of Euros.

That does not mean to say that knowledge management is irrelevant for small businesses. The situation is not unlike that in many large organization prior to 1995. Knowledge management is practiced, but is not recognized as such. Since 1999, the results of a number

[10] Whereas bibliographies on knowledge management list hundreds of books and thousands of articles, a similar bibliography by Eric Tsui on knowledge management for small to medium sized enterprises has only 25 entries - http://www.knowledgeboard.com/cgi-bin/item.cgi?id=83979

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of studies on knowledge management in small business have started to be published.[11] Perhaps the most significant research is that undertaken by the West Midlands Knowledge Management Centre in the UK. This centre is a regional partnership between a university, and local city council, and business support agencies. It has a research programme to identify and address the business support needs for small and medium sized enterprises (SMEs) in developing their knowledge management (KM) practices. Based on analysis of patterns in more than 100 small businesses that have used the centre's business education and support services, its research director John Sparrow describes four aspects of knowledge management that feature strongly in small firm knowledge projects[12]:

- *Appreciation of personal and shared understanding* – this is reflected by "an emphasis in management upon 'management by perception' i.e. ongoing recognition of the meaning and interpretation of events by others". Managers' mental models also affect the way in which they react to outside knowledge. For example, there is strong evidence that business / owners do not act (e.g. on bringing in new techniques like knowledge management) until there is compelling reason or a fear of difficulties.

- *Effective knowledge bases and knowledge systems* – typically small firms are more ready to embrace technology when they have a good grasp of the importance of information management. There is usually a strong business benefit, such as increased efficiency, better access to information, comprehensiveness of coverage, usefulness of information that determines the need and type of information system to install.

- *Integrated and contextualized action* – the knowledge approach grounded in the way that the small firm operates. Knowledge projects in small firms are "formulated and implemented within an *integrated framework* of that manages the impact of knowledge projects in *operational, strategic and uncertainty management* terms." Small firms also tend to be more strategic in their view of knowledge and take a holistic perspective, considering all aspects of the business. An important element here is the capture and utilization of intellectual property rights, with intellectual capital valuation being a consideration at times of succession.

- *Effective learning processes* – small firms are very social organizations, yet owner managers may deliberately restrict diffusion of their core knowledge to protect their firm's competitiveness. On the other hand, renewing and developing knowledge through learning is another approach to developing competitiveness.

A key point to evolve from research is that the more 'formal' knowledge management approaches of large firms should not be imposed on small businesses. However, a small firm's 'informality' belies their actual complexity and often high degree of sophistication of decision-making. Sparrow reports that in contrast to large firms, where KM solutions are often viewed as disseminating knowledge *to* users, that small firms benefits from the perspective of understanding their business in knowledge terms, i.e. "the emphasis on the development of knowledge as a *lens* (as opposed to a knowledge management system) together with the emphasis upon knowledge system *principles* (as opposed to ICT knowledge system elements).

[11] SINTEF in Norway has studied knowledge management in a group of law firms. There are other studies currently under way in Australia and Canada.

[12] 'Knowledge Management in Small Firms' John Sparrow, *Knowledge and Process Management*, Vol. 8, No. 1, pp. 3-16 (2001).

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For small businesses, the drivers for knowledge management are more specific subsets of the more general ones for large companies:

- Customer driven - the need for better customer knowledge to meet their needs
- Process improvement – the need to become more efficient is often a powerful motivator
- Product-related - knowledge of technologies and marketplace to help the development of new products
- Restructuring – as small businesses grow, they need to add new functions and restructure; this often creates the need to be more explicit with what was previously informal knowledge
- Joint ventures – knowledge to help the creation and effectiveness of a joint venture
- Succession planning – knowledge to fill the gap when the owner / manager retires or moves on (they often hold much knowledge of the business in his or her head)

Sparrow also suggests a general pathway by which knowledge management can be introduced in a small firm:

- strategic bus analysis – knowledge projects should evolve from the core needs of the business; often a core business process provides the focus for a knowledge project;
- KM (and IPR) audit – the KMC team have developed an audit tool that fits neatly into the diagnostic toolkits widely used by business advisers
- business process analysis – use of visual flow diagrams can boost understanding
- knowledge mapping – the explicit way in which knowledge structures, culture (including incentives) and systems are linked to business processes
- knowledge-base development – the introduction of appropriate technology and systems solutions.

The latter is significant, in that in larger companies, it is often the introduction of a new technology that provides the impetus for other knowledge management activities. In other words, the need for a formal knowledge management programme does not come until quite late in the overall evolution. In my own experience there are other determinants that guide when it makes sense to embark on a formal programme in an SME:

- The overall size of the business – below about 50 people, most staff will probably know each other fairly well; it probably therefore does not make sense to implement KM unless one of the following additional conditions are met;
- Degree of dispersion – if the organization is based at several locations, even when there are fewer than 50 employees, there are benefits to be had by putting key information into a shared repository;
- Number of distinct core documents – there is a number, probably around 1,500, where the location and retrieval of documents starts to become time-consuming and ineffective;
- Knowledge-intensity of business – in organizations like legal firms, consultancies, engineering, that blend high degree of internal expertise with outside knowledge the benefits of knowledge management are more immediately obvious.

Clearly, the West Midlands Knowledge Management Centre has developed much knowledge of how knowledge initiatives can benefit SMEs and how to introduce them effectively. This is a corpus of knowledge that has wider potential for support of SMEs across Europe (as indeed does the experience of other research and business support organizations across Europe). At this stage of evolution there is still much that we do not understand about knowledge management in SMEs. The sheer number and variety of small businesses means

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that it may be difficult in the short term to draw any firm patterns that can act as guidance for policy.

However, if one thinks of knowledge management in its broader context, that of exploiting knowledge to further the development and growth of a business, then the innovation perspective is likely to be a more fruitful one in the small business context.

3.2 Knowledge Innovation

An innovative small business, particularly one that is aiming for high growth (a favourite target of many policy makers because of their wealth creation potential) there are several areas of focus that can improve the utilization and exploitation of knowledge:

- Better absorption of external knowledge – this can encompass many sorts of knowledge such as knowledge of the marketplace, knowledge of customers, technology and product trends, knowledge of core science, technologies and processes used by the firm, knowledge of IPR, plus many areas of small business knowledge: financing, venture capital, business development, marketing, employment regulation etc.[13]

- Faster conversion of new ideas into commercially viable products and services – for many small businesses this time is much longer than anticipated (hence their need for advice on financing, market development etc.). Speeding up the process may involve better knowledge sharing, in a controlled way, with various business partners and in various networks.

- Adequate identification and protection of unique knowledge which if leaked could prove detrimental to future business prospects.

For the small and especially start-up business, many of the approaches to deal with this kind of knowledge approaches are likely to come from centres of innovation and commercialization, such as business incubators and business support organizations. However, many of these are themselves small businesses and may not have formalized their own knowledge management for efficient deployment. Hence, the role of tacit knowledge, informal networks and personal contacts feature strongly. Another point to note is that although there may be some generic knowledge and knowledge principles, that the type of knowledge and knowledge system may vary significantly according to the type of SME, the nature of their products and services and the markets which they serve.

3.3 Knowledge Intensive SMEs

In today's economy, many of the high value-added SMEs are likely to be knowledge intensive, either in the processes they deploy or the products and services they produce and sell. The normal way that a body of knowledge evolves from tacit to explicit, provides commercialization opportunities at every stage (Figure 5).[14]

[13] The UK Small Business Service has coordinated much of the knowledge needs for start-up and small businesses on its national Business Link website http://www.businesslink,org. Analysis of needs shows that the four most sought after types of knowledge are: start-up advice, guidance on financing, employing people and understanding the relevance and dealing with a plethora of regulations emanating from many government departments.

[14] The diagram is described in more detail, together with many real-life examples of business opportunities, in 'Productizing knowledge' chapter 5 in *Captilzing on Knowledge: from e-business to k-business*, David J. Skyrme, Butterworth-Heinemann (2001).

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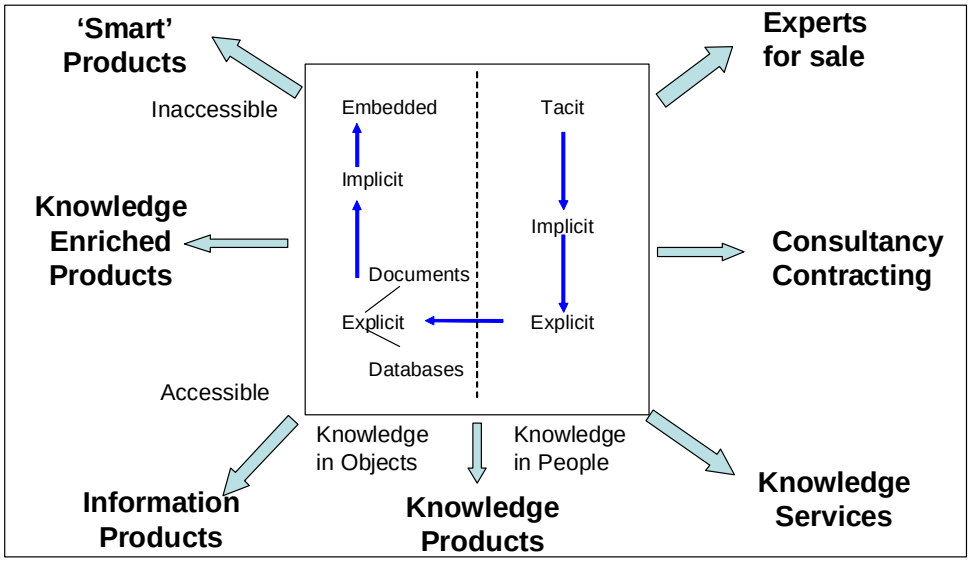
In the early phases, before knowledge has been codified, the knowledgeable people could provide a consultancy service. However, the value of doing this needs to be assessed against the additional value that might be created by packaging some of this knowledge in more tangible form as knowledge 'objects' which are easier to reproduce and sell electronically (as in the case of BestPractices LLC mentioned earlier). As knowledge becomes explicit, it can be turned into knowledge-based products and services, or might be licensed to other companies, particularly if it is patented. Likewise, other small firms have turned core knowledge into methodologies that are licensed to other consultants.[15]

By thinking through the different opportunities, and particularly offering combinations of explicit knowledge and surrounding services using tacit knowledge, a small firm can develop any number of knowledge intensive products and services. A core body of knowledge can be converted into many different forms for different customers and different needs. It can blend the best of both worlds – highly contextualised people-based services which can command premium prices, with explicit forms of knowledge that can be packaged and marketed in high volume using the tools of e-commerce.

Figure 5 Different types of knowledge-intensive product and service



4. Implications for Policy

4.1 Framework for Policy

Knowledge management covers a broad spectrum of activities and operates at many levels, from the individual to the enterprise, between enterprises (as in virtual organizations). Until the late 1990s, it was viewed primarily from the perspective of an enterprise. However, realizing the wealth creation potential of knowledge, many governments, and indeed the EU, have in the last few years, created policy initiatives for the knowledge-based economy.

[15] NLP (Neuro Linguistic Programming) is a good example. As well as accrediting NLP practitioners, products and services include books, workbooks and training.

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Additionally, effective knowledge management is the result of a holistic approach, addressing not only technology solutions, but also people, processes and links into core business activities. Table 1 depicts some of the key elements of knowledge management across these two dimensions.

Table 1 – Elements of Knowledge Management

	Policy / Strategy	**Processes / Methods**	**People / Skills**	**Technology**
Governments (inc. EU)	Stimulation Good practice Regulation	Guidance Standards	Qualification and Skills	Interoperability standards
Intra-organization	Collaborative associations	Collaboration methods and standards	Skills development	E-business networks
Organization	Knowledge-based business	Best practice KM processes	Personal development programmes, elearning	Corporate portals
Teams	Tasks and outcomes	Virtual working	Team roles	Collaborative workspace
Individuals	Career / life planning	KM specialities	Professional development	ICT / Internet proficiency

What is becoming apparent is the value of synergy and alignment across these cells. Thus, in organizations, individual professional development is closely tied to team development and also to organizational capability needs and human resource programmes. As mentioned earlier, the most successful knowledge management programmes have been where there is cohesiveness horizontally, from business needs to improved processes, supported by appropriate technology and taking account of human factors.

Only more recently is the value of the link between organizational knowledge management and the government level being appreciated.[16] A good example is that IC methods developed in companies such as Skandia are now being applied to whole countries, such as Israel.[17]

In terms of influencing the lower layers of the framework of Table 1, government has three roles:[18]

1. As a regulator - providing an legal and regulatory framework that is neither too restrictive that it stifles innovation, nor too 'laissez-faire' that it allows dominant forces (e.g. large companies in established industries) to prevail.

2. As an intelligent user - being a good provider, customer, and partner in knowledge initiatives, thus stimulating good practice and encouraging development of new products and services.

[16] In this context we are referring to government in its role of policy maker. Government departments are, of course, enterprises in their own right that should be addressing their own knowledge management approaches through the lower tiers of the diagram.

[17] *Intellectual Capital of the State of Israel: Hidden Values in the Desert*, Edna Pasher Associates (1999).

[18] 'The Public Policy Agenda', Chapter 9 in *Knowledge Networking: Creating the Collaborative Enterprise*, David J Skyrme, Butterworth-Heinemann (1999).

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3. As an actor - stimulating the development of efficient knowledge management, knowledge emarkets and enterprises, embracing Internet technologies, virtual working, e-commerce and innovation.

In terms of regulation, areas that warrant attention (beyond those receiving attention in the e-commerce arena) include:

- development of standards – there is growing need for standard of describing knowledge (e.g. through metadata standards, such as the Dublin core), standards for interoperability (e.g. XML and associated schema[19]); however, what is the role of government vs. well-established industry and user bodies?
- common methods of reporting – measuring intellectual capital and its contribution to economic wealth; setting standards for IC reporting in industry (the European Commission's MERITUM and PRISM programmes are addressing this aspect)
- intellectual property rights – to what extent does current regulation stifle innovation (c.f. Naptser) and protect vested interests? Do the patent laws need harmonisation? Are they appropriate for today's economy?
- regulation of knowledge emarkets - can we avoid the problems of financial markets, with scandals, lack of transparency etc. The development and behaviours in financial markets are a good indication of what might happen in knowledge markets.
- knowledge mobility – this involves transfer of information across borders, but also transferability of skills and qualifications.

In its role as intelligent user, many governments to date have trailed behind large corporations in influencing or even stretching the supply side of industry. Nevertheless, as eGovernment takes hold, there are new challenges in which effective coordination across departments can stimulate new developments.

The final role is one where governments, through various support agencies and infrastructure development can play a crucial role. In the field of small business, and especially innovation, the role of Innovation Relay Centres, business support agencies, regional development agencies and others in promoting good knowledge practice . There is however, a knowledge management problem – with a plethora of agencies and initiatives, where do small businesses tap into the knowledge that is available? What is their equivalent of corporate portal? At European level, within the fifth framework programme, there have been nearly 40 projects within IST – Key Action 2 (new methods of work and electronic commerce) involving over 200 academic and commercial organizations to stimulate research in knowledge management (many of them with a technology basis).[20] Arising from this has been a broader initiative, the European Knowledge Management Forum (EKMF).

4.2 EKMF (European Knowledge Management Forum)

The forum was created with a focus of prompting *Knowledge Management Made in Europe*. Launched at the *ecommerce and eWork* conference held in Madrid in 2001, it promotes dialogue, cooperation and knowledge sharing among different actors within the knowledge management community. It holds workshops, runs summer schools and hosts

[19] The UK e-envoy's office is promtoing a set of standards (eGIF, eGovernment Interoperability Framework) for use *within* government.

[20] Paul Hearn of the European Commission has posted a list and overview of the projects at http://www.knowledgeboard.com/cgi-bin/item.cgi?id=69381

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KnowledgeBoard, a European KM portal (website) that hosts various resources and activities including:

- Library of resources – bibliographies, contributed articles, results of surveys etc.
- Community discussion groups
- Online workshops – using a synchronous 'chat' facility, there is a one hour workshop every month where participants can dialogue with a knowledge management expert on a specific topic.
- News of development in knowledge management
- Details of KM conferences and events
- Profiles of members – both individual and corporate members
- Special Interest Group (SIG) zones – there are SIGs on innovation, communities of practice, standards, workspace design, KM in the public sector and KM in SMEs

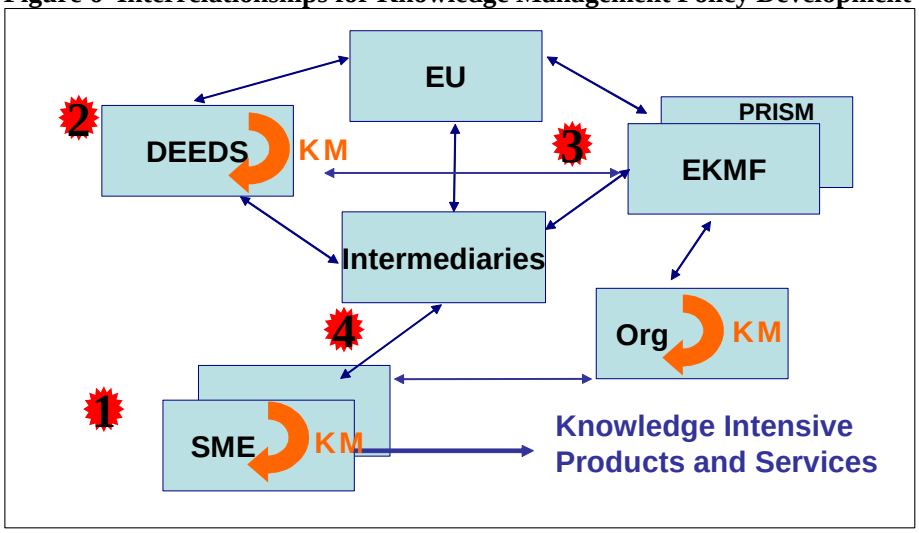
Members of the forum have contributed to several projects that are under way as part of the IST programme. One is a knowledge management assessment tool, based on review and analysis of existing tools. The results are freely available to the wider KM community on *KnowledgeBoard*. Other work has involved development of a KM framework, while work is progressing on developing a set of standardized guidelines for the introduction and application of knowledge management.

More recently, it has started a review to determine which of the many tools and techniques used in large enterprise are suitable for small- to medium-sized businesses.

4.3 Relationship of Policies and Approaches

With various strands of activity taking place at European level in the field of KM, and separately in the development and support of SMEs, it is appropriate now to portray the main inter-relationships with a view to identifying potential areas of KM policy that the DEEDS project could address. Figure 6 shows some of the main relationships. Implicit in these relationships are a set of knowledge creation, sharing and flows. There are several critical interfaces (numbered 1-4 in the figure) that have potential policy implications.[21]

Figure 6 Interrelationships for Knowledge Management Policy Development



[21] By 'policy' we refer not just to regulation, but to the wider role of stimulation and prmoting good practice.

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1. Knowledge and SMEs

As described in section 3, knowledge management in SMEs is still a relatively new topic, and research continues to understand its unique characteristics. Policy initiatives should encourage further research and encourage more initiatives that provide practical help to SMEs of the type practiced by the West Midlands Knowledge Management Centre. Our broader premise is that rather than focus solely on knowledge management within SMEs, that policy should consider the wider aspect of "knowledge for the development of SMEs" e.g. the knowledge innovation and commercialization process.

2. Knowledge Management Within DEEDS

DEEDS is collating existing knowledge and generating new knowledge about SME policies. It is both a collaborative project, working across organizational boundaries, and also acts a hub of knowledge for its stakeholders and policy makers in general. As such, it has the characteristics of a knowledge intensive, networked small enterprise. It could therefore be practicing what it preaches and developing its own knowledge management approaches and validating approaches used elsewhere, *and making them explicit.*

3. Knowledge interaction with EKMF

At the moment EKMF represent a hub of knowledge about knowledge management in Europe and is a forum for ongoing dialogue. It has started to address some of the issues affecting SMEs. DEEDS should strengthen it knowledge sharing dialogue with EKMF.

4. Knowledge to Support SME Development

SMEs garner knowledge from a variety of sources, including informal networks. Policy initiative should help make SMEs aware of authoritative sources of knowledge for their specific development needs. The development of portals focussed on SME issues is one approach. At the moment there are many private portals, many acting as marketing vehicles for services to small businesses, such as financial, legal and business advice. On the other hand, government sponsored portals, such as Businesslink.org in England, can provide an authoritative one-stop show which alerts smalls businesses to both regulatory information and sources (including commercial organizations) of good advice.

Grater coordination and consistency of the knowledge emanating from the many different policy initiatives, at community, regional, national and European level, and amongst different types of intermediaries e.g. business support, innovation centres, regional development agencies etc., will also be beneficial to SME development.

5. Conclusions

In this paper, we have considered several complementary facets of knowledge management. We have outlined the general approaches and techniques used in large organizations. However, research indicates that many of these are unsuitable or need adaptation for small to medium-sized enterprises. Our understanding of KM within SMEs is still embryonic, and further research and collation of knowledge is required to develop this understanding and to derive generally applicable good practice guidelines. The evidence is that SMEs do benefit from looking at the development of their business through a 'knowledge lens', and ways should be found to encourage this perspective.

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One dimension of the DEEDs policy formulation framework[22] is that of 'knowledge access'. In this paper we have suggested that 'access', while necessary (e.g. in provision of knowledge through intermediaries as described above) is insufficient. The wider challenge for SMEs is one of absorption (are they ready to receive and act on this knowledge?) and of conversion (knowledge innovation – the conversion of ideas into commercially viable products and services).

We have identified that there may be regulatory issues in specific areas that affect SMEs, such as inter-operability standards, intellectual capital reporting, intellectual property rights and regulation of knowledge emarkets. Traditionally, policy in these areas has tended to lag the needs of business and business practice. This suggests a need to think ahead, on how, for example, knowledge marketplaces may evolve and what the policy implications are.

A more immediate and fruitful area for policy development is that of stimulating diffusion of quality knowledge to the SME community, through various bodies and mechanisms. These might include the support of business networks, development of SME portals and creation of communities of SME business advisers.

The knowledge perspective is one that is important to the development of SMEs, particularly those in knowledge intensive businesses and where high-growth is likely. An increased understanding of the role of knowledge, of knowledge management and of knowledge diffusion for these types of SMEs in particular will most probably lead to good returns in economic and social benefits.

Finally, there are very many SMEs. Also, knowledge is highly variable and differentiated. Therefore any policy development must take account of which segments of the SME market are addressed and avoid the "one size fits all" syndrome.

About the Author

David Skyrme is an independent knowledge management consultant and writer. His publications include in-depth management reports *Creating the Knowledge-based Business* (co-authored with Debra Amidon, 1997), *Measuring the Value of Knowledge* (1998) and the books *Knowledge Networking: Creating the Collaborative Enterprise* (1999) and *Capitalizing on Knowledge* (2001). His *Knowledge Connections* website (http://www.skyrme.com) is heavily used by KM practitioners, researchers and policy makers from around the world.

His consulting clients have included large organizations, such as BP, Siemens, the World Bank as well as UK public sector bodies (National Health Service, Ministry of Defence, Office of Government Commerce) and business support agencies (Small Business Service, Thames Valley Enterprise). He is currently a knowledge management adviser to the IST project Beep (Best eEurope Practices – http://www.beep-eu.org).

Important Notes

The views expressed in this paper are the views of the author and do not necessarily reflect the views of the DEEDS project team.

[22] *Policies for SMEs in the Digital Economy: from Policy Assessment to Policy Innovation*, Patrizia Fariselli, Inputs to 2nd Policy group Meeting, pp. 21-24 (4 Dec 2001).

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