InnKnow FORUM

Director: Professor Gregory P. Prastacos
Editor: Dr. Klas Eric Soderquist

No 4, Fall 2003

In Focus: Managing Knowledge

EDITORIAL - IDENTIFYING AND MANAGING DIFFERENT TYPES OF KNOWLEDGE

A buzzword in the late 1990s, that attracted enormous interest, capital and time investments, Knowledge Management has evolved towards a recognised and specific management activity and a scientific discipline in management research. However, the very notion of knowledge can be problematic. It is therefore of utmost importance to reflect on what is the actual "raw material" of knowledge management and try to identify and distinguish between different types of knowledge.

We basically distinguish two "archetypes" of knowledge:

- *Explicit Knowledge* or encoded knowledge is knowledge that can be structured, documented and stored. As such it can be easily expressed orally or in writing by the individual possessing it and is therefore relatively is easy to transfer and share.
- *Tacit Knowledge*, often referred to as know-how, resides within the individual. It is known as existing, but extremely difficult or even impossible to articulate (Newell et al, 2002). The only way of acquiring it is by actually performing the task that the tacit knowledge mirrors, for example through a process of job rotation or a system for apprenticeship. The latter is rule for all young recruits at management positions in, for example, large Swedish multinationals such as Scania, Ericsson or IKEA.

It is essential for the management of knowledge to recognise that these forms of knowledge are not exclusive. Rather, they are mutually constituted, i.e., possessed simultaneously by individuals and/or organizations (Tsoukas, 1996). Processes of transformation between tacit and explicit knowledge take place during operational work in all types of organizations. This leads to creation of new knowledge and deepening of existing one, as exhaustively explained by Nonaka & Takeushi in their landmark book from 1995.

Blackler (1995) has proposed a more detailed distinction where five types of knowledge represent different degrees of tacitness and explicitness:

- *Embrained Knowledge* (considered as purely tacit) develops through cognitive learning processes where the individual is motivated to relaitivise, analyse and take to a higher level of cognition specific problems and situations faced at work. Embrained knowledge is particularly important in consulting firms, health-care services, political organizations, educational institutions and design studios or departments (c.f., e.g., Hansen *et al* 1999, Bangle, 2001).
- *Embodied Knowledge* is action oriented and represents a mix of tacit and explicit knowledge where the tacit part dominates. It develops through reflection in practice, e.g., critical analysis "on-the-job" and correction/modification of workplace routines. In 3M, engineers, but also other managers such as marketers and project leaders, are constantly encouraged to experiment and try out new ideas and approaches to challenge current way of practice in a wide variety of job-specific applications.

CONTENTS no 4, Fall 2003

- *Encultured knowledge* refers to the shared underlying understanding and perception of how to do a specific job or how to solve a specific problem that is unique from one organization to another. Encultured Knowledge is a central component of the core capabilities of a corporation and largely tacit. The Easy Group of Stelios Haji-Ioannou is an example of a corporation that builds its success on the laws of simplification and optimized customer value. Making front *and* back office "easy" and customer oriented drives the development of unique encultured knowledge at all levels of the organization.
- *Embedded knowledge* is the knowledge that resides in systems and routines. An important competitive advantage of companies such as Dell, UPS or Amazon lies in unique knowledge built into their processes. It can also be embedded in products or services. BMW, Bang & Olufsen or Starbucks build their competitive advantage on difficult-to-imitate product performance, product "feeling" or service delivery uniqueness - all of which is represented by their respective brand name.
- *Encoded knowledge*, the final type of knowledge identified by Blackler (1995) is knowledge conveyed by signs and symbols, transmittable manually or electronically. This refers to explicit knowledge that play an important role in most organizations. Most often encoded knowledge should become the object of the first step towards a better management of knowledge. Automotive suppliers pay strict attention to store and consult previous design studies in order to avoid reinventing the wheel in the next component development project. International consulting firms have received quantum leaps in efficiency by storing and making globally available different methods and insights developed in individual consulting assignments.

Additionally, there is also the little-explored notion of *latent knowledge*, nicely summarised by Dave Snowden, Director of the IBM Institute of Knowledge Management, in the sentence "You don't know what you know until you need to know it". The essence here is that both individuals and corporations might actually leverage previously unexploited latent knowledge if only they are forced into situations, such as a corporate turnaround or an individual job promotion, where they need to face new radical challenges. Such latent knowledge enabled Nokia to transform from a manufacturing conglomerate to a world leader in telecoms and IBM to move from being a hardware producer to an IT solutions provider.

Summing up on the nature of knowledge it is of utmost importance to recognise that knowledge cannot be separated from the human being: "*Knowledge is based on data and information, but unlike them, it is always bound to persons*" (Probst & Steffan, 2000 p. 25).

In this Issue of InnKnow FORUM

The articles that follow deal with a number of critical aspects of Knowledge Management. Based on an observation of the exploding quantity of information available on the Internet and in corporate Intranets, Adrian Dale, Visiting Professor of Knowledge Management and Managing Partner of Creatifica Associates, presents and explains how Information Architecturing can provide organizations with tangible advantages as far as the management of explicit knowledge is concerned.

In the second article, doctoral student Dimitrios Brachos presents a framework for maximising the success of corporate knowledge sharing networks (KSNs). The model emphasizes the often tricky but so crucial cultural aspects of effective knowledge sharing.

Knowledge sharing is also the subject of the third article. John Kawalek and Diane Hart of the University of Sheffield explore the design challenges for a KSN between academics and practitioners in 11 different countries in the Mediterranean area.

In the final article, Gregory Prastacos and myself report on different forms of organizations for knowledge management identified from research into the product development processes of 12 large-sized global manufacturing firms.

References, and a list of useful weblinks are provided at the end of the newsletter.

Klas Eric Soderquist

INFORMATION ARCHITECTURE: A STRONGER FOUNDATION FOR KNOWLEDGE MANAGEMENT

By Adrian Dale

A University of California at Berkley Study in 2000 estimated that 250Mb of unique digital content was published in that year for every man woman and child on the planet. Today, the rate of publication is increasing. The world wide web alone is now doubling in size every year and the world's premier search engine Google now crawls and indexes 3.3 billion pages using a cluster of 10,000 indexing servers (statistics from Google at www.google.com). As knowledge management initiatives gather pace, the volume of online information available to employees is similarly increasing exponentially. Disk space usage in many organisations is increasing at a rate of 50-70% per annum (Source: StorageWorld Conference 2003).

In the face of this explosion in information volumes, many organisations are turning to Internet technology to solve their information retrieval problems. Search engine sales are increasing as these organisations look for a way to find the information they need from all the various disparate repositories on their servers. Unfortunately, many of these initiatives are doomed to failure. The popular techniques being used to capture and store corporate knowledge in the form of documents and web pages are simply adding to information chaos

by failing to impose any defined structure or context on the materials as they are stored.

Content Replication is a Major Issue

The StorageWorld conference also reported that over 80% of corporate digital data is replicated many times. Not only is this a waste of disk resources, it is creating "information noise" making focussed information and knowledge retrieval much more difficult. Searches often now yield multiple copies of the same document (often alternative versions) each stored in a different repository. For any document, the master copy exists in the file store or document management system. Several intermediate copies are probably stored in the mail boxes of employees as attachments. Yet another version is probably posted to the Intranet and the final version might be posted to the corporate web site or client newsletter as a PDF. Even worse, extracts are now easily taken from any of these various versions to be incorporated into other documents without any indication of their provenance or source.

Such a chaotic and unmanaged materials lifecycle would not be tolerated in any other part of an organisation's production system. Raw materials, parts and finished goods and are normally carefully managed – tracked efficiently around a factory by an Enterprise Resource Planning system. By contrast, the intellectual output of the firm is often left to fend for itself – stored and managed according to each individual's preferences.

Information Architects – White Knights to the Rescue

The time has come for organisations to pay more attention to the design of information and knowledge storage schemes. It is no longer practical or desirable to have multiple knowledge and information repositories around the organisation, each with a different structure. The relatively blunt instrument of a search engine is not enough to locate the material you need from the multitude of repositories available. Information and knowledge resources are too valuable to leave their storage and capture to chance.

These problems are now increasingly being addressed by Information Architects – a relatively new profession dedicated to improving the findability and navigability of enterprise information through more effective repository and interface design. The profession developed initially in the 1980's when information systems became more complex and needed to interact with each other. The field has recently moved into the mainstream of knowledge and information management in response to information navigation issues on the web.

Web Site and Intranet Information Architecture

As web sites increase in size and complexity it becomes more difficult for readers to locate the information they need. Web content today needs to be organised much more logically and yet still creatively enough to grab and sustain the interest of the reader. Site navigation systems need to deliver the shortest possible routes to the most requested content whilst still maintaining a coherent hierarchy.

For new Information Architects, Rosenfeld and Morville's (2002) "polar bear book" (so named for its cover) is the definitive text – required reading for all students and very useful for practitioners. This text covers all of the main aspects of information architecture design:

- Information seeking behaviours (browsing, navigating, searching)
- Information structuring (content modelling, taxonomies, meta data)
- Navigation interface design (global, local, contextual, blueprints)
- Search system design (ranking, clustering, classification)
- Content life-cycle design (editorial processes, content management)

The excellent implementation methodology described could be applied to any content centric knowledge management project – ensuring that the knowledge in the system is easily navigable and accessible, avoiding information overload.

Good Web/Intranet Design is not enough

Good Internet and Intranet information architectures are certainly important but in most organisations these systems represent only a small proportion of their total online content. Much more information exists in databases, office documents and e-mail – all potentially stores of corporate knowledge. As we have seen, the organisation and management of this material is usually poor – with findability and navigability a major problem. Here a different approach to information architecture is required – one working at a highly level of abstraction and based on the concepts of enterprise information modelling. Elaine and Roger Everden of the 4thResource have focused their work in this area – defining their branch of information architecture more generally:

Information architecture is the foundation for managing information in general as a corporate resource. It describes the theory, principles, guidelines, standards, conventions and dimensions that are necessary to design an effective management framework for information. Its purpose is to design information structures that help people to use information in effective, productive and innovative ways.

Their new book on the subject has just been published (Evernden & Evernden, 2003) and looks destined to become as much of a bible for this branch of the profession as the "polar bear book". The Everndens recognise 8 dimensions of enterprise information architecture, each of which needs to be analysed and understood in any organisation in order for a coherent enterprise architecture to be developed:

1. *Types of information* stored and used across the enterprise
2. *Levels of understanding* required to effectively access and exploit the information and knowledge in the enterprise
3. *Types of representation* defining how the information is structured and stored within the information and knowledge systems
4. *Levels of transition* looking at the lifecycle of the information and knowledge, how it changes over its lifetime.
5. *Types of knowledge* exploring the relationship between information and knowledge in the enterprise and the balance of tacit/implicit/explicit.
6. *Levels of Responsibility* defining content ownership and responsibilities
7. *Types of process* exploring how the various information and knowledge resources will interact with the business processes of the organisation.
8. *Meta levels* overarching the whole architecture and defining holistically how the various information and knowledge repositories interact.

Bridging the Two Schools of Information Architecture

In our experience, the 4thResource approach is a powerful framework for high level enterprise analysis. Equally, the Morville and Rosenfeld methodology is invaluable in the information and knowledge system design phase. However, we have also found a need for an intermediate approach in our work. We undertake architecture layer analysis (Figure 1) beginning with a simple mapping exercise to highlight the current state of an organisation's information and knowledge environment.

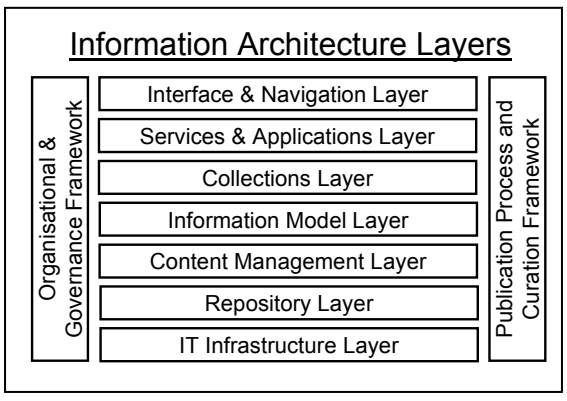


Figure 1. Information Architecture Layers.

We focus on exploring the seven layers shown and the surrounding frameworks:

1. *IT Infrastructure Layer* looks at the numbers and types of servers and storage systems involved together with their naming and the relationship between them.
2. *Repository Layer* documents the different content repositories used for structured data, email, documents and web pages.
3. *Content Management Layer* documents the various management tools used to manage the content. This might be a specialised content or document management tool sitting on top of a relational database repository, or it might be a simple arrangement of drive mappings on a server's file system.
4. *Information Model Layer* documents the metadata and controlled vocabulary schema in use across the organisation and any object models used to define more structured data.
5. *Collections Layer* explores the various logical information and knowledge collections that are in use across the organisation to meet the needs of its various business processes. Some information might reasonably exist in multiple collections in different formats but ultimately the architecture should find a way for the content to be stored once in a single location and repository in a neutral format.
6. *Services and Applications Layer* documents or defines the various functions that need to operate on the collections – authoring, depositing, approving, searching, visualising, syndicating etc.
7. *Interface and Navigation Layer* documents how the reader will interact with the various information and knowledge repositories in the architecture.
8. *Publication Process and Curation Framework* defines the lifecycle of the various information and knowledge resources in the architecture.
9. *Organisational and Governance Framework* defines the overall responsibility for the architecture and the local responsibility for each layer.

The maps resulting from this analysis can be powerful tools to drive the development of the information architecture as they highlight the inconsistencies that have evolved in the organisation without it. Figure 2 shows an example of an Information Architecture Map from a UK police force.

In this example, it was immediately clear that the organisation had a repository layer problem with multiple relational database platforms and no information model for unstructured data. There was a powerful data model for structured numerical data but there was a problem with compliance. Some districts of the force had developed non-compliant systems that were then impossible for the aggregation systems in the services layer to deal with. Across the architecture, there had been no investment of time or money in content management resulting in a proliferation of unconnected information and knowledge resources. This was compounded by the absence of a coherent publication process and curation framework and by the weakness of the overall governance framework. With a diagram of this nature and a few choice words it doesn't take long to convince a client that they have a serious problem.

Example of Information Architecture Map

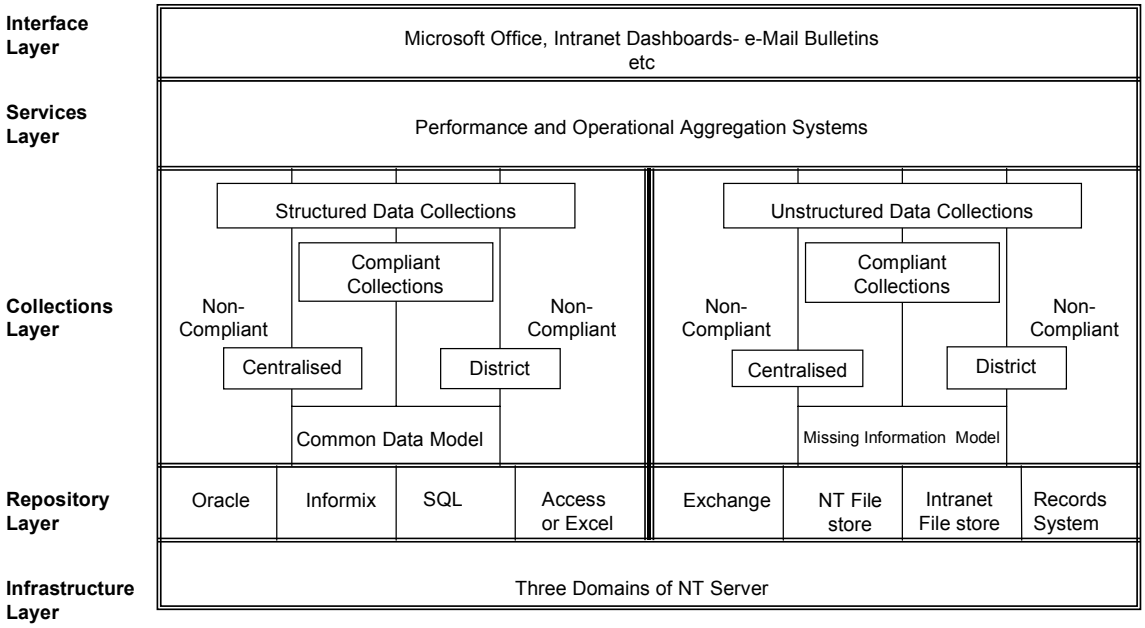


Figure 2. Example of Information Architecture Map.

Conclusions

The re-emerging field of information architecture has much to offer the knowledge management movement. It provides the thinking, the methodologies and the tools to make the knowledge management dream scalable – enabling it to deal with the countless terabytes of online information that will be flooding the world wide web and corporate information systems over the coming years. Without information architecture, information overload could well bring the whole knowledge management crusade to a halt – and we'll all be worse off.

HOW TO DEVELOP EFFECTIVE KNOWLEDGE SHARING NETWORKS: THE CULTURE MODEL

By Dimitrios Brachos

> *"The values, norms, and behaviours that make up a company's culture are the principal determinants of how successfully knowledge is transferred via IT"*
> *Davenport & Prusak, 1998*

Corporations need to achieve two potentially conflicting objectives: First, to build their knowledge bases cumulatively and learn from past experiences, second to ensure that they are learning beyond their core areas, generating the capability to assimilate new knowledge in order to be able to respond to change. A Knowledge Sharing Network (KSN) serves as a locus for facilitating knowledge sharing and effective knowledge work, since it has the potential of making knowledge permanent, accessible and portable to those who need it inside and outside organizations. The factors that lead organizations to form networks and develop sharing practices are many. The lack of adequate capabilities to respond to technological change and the desire of firms to remain competitive via innovation are the most important. Encouraging knowledge sharing through networking is a primary emerging function of knowledge management.

In order to maximize the efficiency of knowledge sharing practices, we propose an integrated model of the knowledge sharing process baptised the CULTURE Model. The CULTURE model structures the development of a Knowledge Sharing Network building on research and practical experiences from two main types of work-related networks namely networks of practice and communities of practice (c.f., e.g., Brown & Duguid, 2001 and Newell et al, 2002).

Participants of such KSNs may belong either to the same company forming an inter-organizational knowledge sharing network or to different companies forming an intra-organizational knowledge sharing network. The process of knowledge sharing is initiated by individuals that are seen as the core cells of every KSN, continues with the formation of intra-organizational identities, evolves towards the construction of Communities of Practice (CoPs), then to the formation of network identities and, finally, ends up in the construction of network communities through which the social life and operational momentum of the KSN takes place.

Critical success factors for efficient processes of knowledge sharing are the existence of an appropriate socio-cultural environment (CULTURE), a social identity and the establishment of the KSN as a community. Figure 3 illustrates this relationship and the stepwise process leading to efficient knowledge sharing.

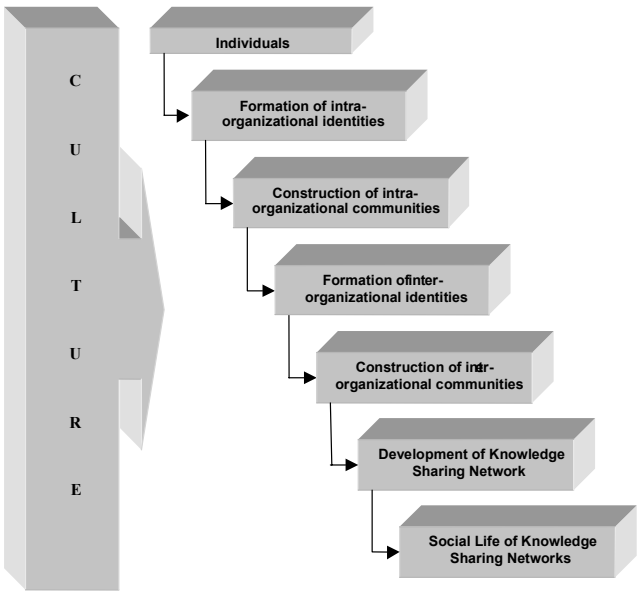


Figure 3. The CULTURE model for developing and managing Knowledge Sharing Networks.

The CULTURE model advance our understanding of knowledge sharing in inter-organizational networks in two principal ways. First, by proposing and analysing a socio-cultural environment that enables and motivates people to share knowledge. This environment is influenced and characterised by the following factors: Community, Understanding, Language, Trust, Unification, Reflection and Emotion (CULTURE). We consider such an environment to be the fundamental prerequisite of any successful knowledge sharing networking arrangement. Second, the model considers KSNs as a result of both intra-organizational and inter-organizational networks. In order for a KSN to be created, an intra-organizational network needs to be formed firstly, then an inter-firm network.

The CULTURE Environment

Each of the interrelated factors making up the CULTURE acronym needs to co-exist for the achievement of effective knowledge sharing processes:

- A basic building block is the creation of a *Community*. This requires some form of shared goals and shared cognitive frameworks for how to deal with specific issues among the individuals that will ultimately form the network.
- Second, a certain overlapping in the *Understanding* of goals and work practices is essential in order to actually be able to learn through participation in the network.
- *Language* constitutes a critical success factor of knowledge sharing networks since it is a core characteristic of identity and communication that will enable knowledge to flow from person to person and from organization to organization.
- As knowledge is embedded in particular organizational settings and contexts, and largely tacitly held in the minds of individuals, the degree of *Trust* is a critical issue on the journey towards sharing knowledge. Research has shown that trust is an important mechanism for lowering the transaction costs involved in KSNs in order to make them economically viable (Ebers, 1997).
- The concept of *Unification* highlights the importance of the knowledge sharing environment to be "supervised" by a core organizational unit (intra-organizational KSN) or a core firm (inter-organizational KSN) whose role is to unite the network, resolve conflicts and tensions as well as prevent 'free riders', i.e., individuals or organizations that only take, not give, from the KSN
- By *Reflection* we understand the ability of involved parties to engage in a democratic process in order to refuse for example specific requests or changes in the operation of the network requested by members or the core firm of the network. Reflection on the propositions, especially those coming from the core firm prevent conflicts, tensions and upheaval among participating organizations and individuals.
- In any network, finally, *Emotions* constitute a fundamental factor for cultivating relations. Important for the success of KSNs is that the participating individuals and organizations feel emotionally engaged in the success and productivity of the network. The emotional disposition of network members define how a specific individual perceive other individuals and how a specific community consider other communities, and requires particular attention for the efficiency of the KSN.

The Process of Developing KSNs

The process of knowledge sharing starts with the individuals that are seen as the core cells of KSNs. It continues with the formation of intra-organizational identities. Here, every participant of the KSN within one and the same organization develops an identity which characterises him/her in terms of, e.g., job position, competencies, experience and knowledge. The next step is the construction of intra-organizational Communities of Practice (CoPs). This means that all participants, having developed identities, become members of several communities of practice. A community of practice can be defined as a tight-knit group of

people who know each other and work together directly on common problems and assignments. Members continually negotiate, communicate and coordinate with each other directly in the course of work (Brown & Duguid, 2000).

The following step is the formation of inter-organizational identities. These identities are double-faced in the sense that they characterise both the individual as an individual and as a member of one particular organization. Hence are added to the individual characteristics in terms of job position, competencies, experience and knowledge, specific identificational traits of the organization where the individual works such as position in the supply chain, product service offering, organizational capability, reputation etc. Next inter-organizational Communities of Practice must be formed. These are similar to the intra-organizational ones with the exception that they now span organizational boundaries. For example, expert engineers and technicians in plastic moulding working in component supplier firms, manufacturing equipment supplier firms and the final assembler firm might form an inter-organizational Community of Practice for the design and development of a new plastic component designated to replace an older one in metal. Communities of practice are excellent means of sharing tacit knowledge.

Once identities and communities of practice have developed according to the above, a formal knowledge sharing network can be developed in terms of defining management procedures, leadership roles, processes for communication and interaction, technology for supporting knowledge sharing, and last but not least, the appropriate cultural environment. Finally, particular attention needs to be paid to the social life of the KSN. In each of these procedural steps of development, the role of the CULTURE variables is critical.

***

The interrelated parts of the CULTURE model provides a roadmap for the development and implementation of Knowledge Sharing Networks. The factors presented above have been carefully selected from an in-depth literature review of theories and practical application of effective KSNs. The model is currently undergoing refinement and applied tests in the framework of the research conducted within InnKnow.

CHALLENGES OF DESIGNING A KNOWLEDGE MANAGEMENT PROCESS TO SUPPORT A MULTICULTURAL KNOWLEDGE SHARING NETWORK: THE CASE OF THE MEDFORIST PROJECT

By John Kawalek and Diane Hart

The MEDFORIST project is a EU project funded under the EUMEDIS (Euro-Mediterranean Information Society) initiative. The project aims to help e-business practitioners in the Mediterranean region to be more able to manage the changes they face. The initial project phase involves building a community of instructors from twelve countries in the Mediterranean area so that they can share and develop their knowledge about e-business through sharing experiences, ideas, concepts, techniques, methodologies and frameworks. The project designers therefore considered that a 'knowledge management' process was an essential element, and that the success of the project would depend on the effectiveness of this process in enabling community members to develop appropriate knowledge to improve their practice.

Such a project presents significant challenges. Not least of these is the divergent membership of the community, which includes diversity in, e.g., academic disciplines, experience, culture, languages, expectations, commitments, and individual situational contexts. It is difficult to conceptualise the requirements of what 'managing knowledge' entails in such a context, and this is also complicated by the fact that e-business itself is also an emerging discipline, and the skills and knowledge needed by instructors and practitioners in this field are also not clearly defined.

Facing these challenges it became apparent that in preparing to design a 'knowledge management' process it would be necessary to determine the assumptions about the nature of 'knowledge' in the context of the project, and on the basis of these assumptions how its sharing and development could be 'managed'. In taking an action-research approach to the project, it was also hoped that, in addition to meeting the project goals, it would be possible to develop a methodology that could be applied to other 'knowledge management' initiatives by others taking on a 'knowledge management' role.

Abstractions from Literature and Best Practice

There is no shortage of guiding literature on the nature of knowledge and knowledge management, but current thinking consists of multiple viewpoints (Schultze, 1998). Although a broad literature review was undertaken, a priority was to consider how knowledge could be developed to improve the practice of each of the individuals in the MEDFORIST community. Therefore the work that was most helpful to the work of the MEDFORIST project was found to be where knowledge was considered to be largely "*tacit or rooted in tacit knowledge*" (Polanyi,

p.144), and hence a result of individuals learning from experience, using critical reflexive thinking (see Kolb 1984 and Schön 1983). Brown and Duguid (1991) and Lave and Wenger (1991) also provide useful insights on the contextual nature of knowledge development within 'communities of practice', and how knowledge development depends on common understanding of the context and language used. More experienced members of a community play a large part in helping newcomers towards full participation. These works also highlight the dynamic nature of knowledge, and that knowledge development is also highly dependent on the social behaviour that creates an appropriate environment for knowledge development.

Further insights were gained about potential design considerations by reviewing case studies of KM initiatives across a variety of sectors to abstract lessons about what could be considered to be 'best practice'. Given the conclusions drawn about the nature of knowledge in the context of this project, it is therefore unsurprising that 'best practice' was found to be where technology was not seen to be the focus of the initiative, but an enabler that helps to organise aspects of the learning processes, for example activities, resources, communications.

For example, in the humanitarian sector, knowledge development was linked to improving operational effectiveness but often structural, political and cultural dimensions to operational effectiveness were ignored (Minear 1998, Van Brabant 1997), limiting improvement. In MEDFORIST the KM process will need to be designed in a way that encourages members to consider these dimensions and potential impacts in their own situations.

In the military sector, there are lessons to be learnt from the After Action Review process, which encourages learning through open and honest debate (Morrison and Meliza 1998). A key factor in the success of this process is the role of the facilitator, and the extent to which they focus proceedings according to the perceived intended learning outcomes. This also depends on the extent to which they understand the purpose of the activities or the issues under review, and does not necessarily involve prescribing the issues. Success of the process also depends on developing a culture of trust between the parties involved, by understanding when it is appropriate to maintain the confidentiality of participants, and by respecting this.

In the UK health sector organisational policy and structural constraints often inhibit effective action. One initiative aimed at improving the opportunities for healthcare professionals to learn is through discussion forums on particular topics, proposed by users, on *www.ecommunity.nhs.co.uk.* However, these forums assume that learning can be achieved through unfacilitated and unstructured discussions. It is unlikely that this can be the case, and at the very least it demonstrates how users could benefit from guidance on how to facilitate and structure the process for themselves, to reach some agreement on potential learning outcomes, and ensure focus on the issues and activities that could achieve these.

Finally, initiatives in the construction industry also have particular relevance to the MEDFORIST project in their attempt to bring together groups of learners with diverse learning needs, in a sector which has traditionally experienced problems integrating learning and knowledge due to the transient nature of the workforce and the 'project-based' nature of its operations. The COLA initiative (further details at http://is.lse.ac.uk/b-hive) is aimed at using ICT to form virtual communities of practice, which conduct reviews of operations and practices when there is a perceived need. These processes use critical reflexive techniques, and the use of information and data owned by the partnership is governed by rules, which in addition to respecting copyright law also engender a culture of trust within the community.

Design Challenges

Given the geographical spread of the community, it will be largely reliant on ICT for communication and resource sharing. This will require individuals to share their experiences, ideas, concepts etc. by making them explicit. Given the tacit, individually embedded, dynamic and contextual characteristics of knowledge and the critically reflexive processes required for knowledge development, it is inevitable that the use of ICT will have its limitations. Challenges in creating a virtual environment conducive to knowledge development will be:

- Developing an understanding of the diverse nature, viewpoints and situational contexts of the community and developing a knowledge management process in which this diversity is a strength;
- Determining the most effective use of ICT for knowledge development;
- Developing the skills of the community members to enable them to make judgements about how their existing knowledge can be applied to a new situation, assess where they are lacking in appropriate knowledge, and to decide how best to acquire new knowledge that is appropriate to the situation;
- Structuring and facilitating the learning process appropriately;
- Developing protocols for participation and encouraging appropriate social behaviours that develop a culture of trust.

Developing a Methodology

Although some useful principles for designing the KM initiative for the project can be abstracted from the literature, they do not provide any methodological guidance for potential 'knowledge managers', which we stated at the beginning of this article, was one of the longer term research aims within the project. One of the principles emerging from the review was that the concept of 'knowledge' as embedded within the individual means that it

cannot be the knowledge that is being managed but the activities that develop or apply knowledge. Here the emphasis shifts to the management of these human activity systems. Recognising this leads to the conclusion that systems thinking applied holistically to the consideration of the human activities involved in 'knowledge management' initiatives, rather than focusing on limited sub-components such as the supporting technology, could lead to the development of a methodology for 'managing knowledge systems' in practice. Such a methodology could be tested and evaluated during the MEDFORIST project lifetime.

The first stage in this process will be to explore the use of systems modelling to help structure thinking and stimulate debate about (i) the nature of the operational activities, which, in order to function, require human knowledge; (ii) the nature of activities by which human knowledge is developed for use within different forms of operational systems; (iii) the nature of purposeful human actions which elicit learning from action, and (perhaps) explicitly represent it in someway; and (iv) the inter-linkage between each of these. These three conceptualised systems are shown in figure 4.

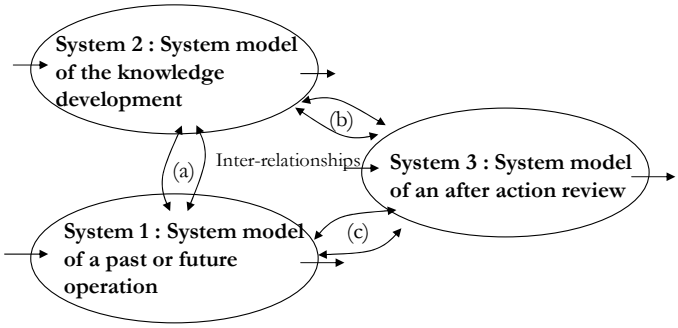


Figure 4. High level systems models depicting human activities involved in 'managing knowledge'.

It is anticipated that refining these high-level systems concepts, and breaking them down into a lower level of detail, will provide findings that can be applied to other 'knowledge management' initiative by those taking on a 'knowledge management' role.

The work and ideas expressed in this article is a synopsis of a paper titled "Designing knowledge management systems for a Euro-Mediterranean network of practitioners: Preparatory work for the MEDFORIST project" presented at the European Conference in Knowledge Management, September 2003, Oxford, UK.

The InnKnow Center is partner in the MEDFORIST project where staff members play the role as technical evaluators of the more than 30 deliverables produced or to be produced during the life of the project between August 2002 and May 2005. More information about the project will soon be available on the website www.medforist.net.

PROS AND CONS OF DIFFERENT WAYS OF ORGANIZING THE KNOWLEDGE MANAGEMENT FUNCTION: LEARNINGS FROM PRODUCT DEVELOPMENT IN 12 LARGE MANUFACTURING FIRMS

By Klas Eric Soderquist and Gregory P. Prastacos

There is little knowledge developed on how to actually organize a knowledge management function in corporations. The most efficient organization for KM would of course be dependent on a range of factors such as the industry, the size of the company, the major objective for managing knowledge and the type of knowledge that is intended to be managed (c.f., the editorial in this issue).

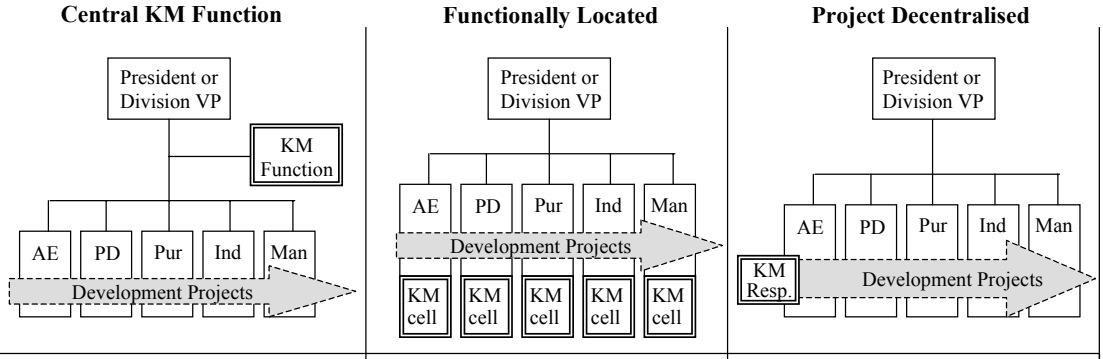
As part of two larger research projects into product development management in 12 large-sized global manufacturing firms in the vehicle, appliances and electronics industries, we wanted to explore how the knowledge management function could be organized in product development. The product development process is an inter-functional inter-organisational process involving a large number of internal and external players in Original Equipment Manufacturers (OEMs) and different supplier companies. It is also a process where the related flows of information are extremely complex, and where innovation, fuelled by individual and organisational learning processes, is a daily preoccupation. A large part of the information input needed to develop products and processes will be available from within the organisations involved, stored in the minds of people, in archives, in procedures, in equipment and so on (Kerssens-van Drongelen *et al*, 1996). Learning in this context concerns the increasing effectiveness of product development efforts as a result of practice, and the refinement of development / innovation skills.

For the account of the research projects, R&D Managers, Project Leaders, Product Planning Managers, Engineering Managers, Production Managers, and Engineers in three North American, three German, three French, and three Japanese companies were interviewed over a period of one year.

Three Organizational Forms Identified

The responsibilities of the KM function included management of the *creation*, *storage*, *transfer*, and *usage* of development related knowledge. Under names such as "Projects Efficiency", "Internal Consulting Department" or "KM Cell", these functions were staffed with former management consultants and people with long operational experience from within the respective company. The latter's profound knowledge of a company's development history, patent base and core engineering capabilities, and the formers' analysis and assessment skills, that additionally were said to be less culturally biased, proved to be a productive combination of skills for this function. The responsibilities for KM could also fall directly under

the R&D Director, the Quality Director or a Directorship for Product Planning with a project manager assigned to lead the initiative. A third organisational structure was the dissemination of KM activities to the project management level. Figure 5 shows these three type organisations for KM identified in the 12 companies together with an identification of their major pros and cons as described by our interviewees.



	Central KM Function	Functionally Located	Project Decentralised
PROS	• Strategic integration of KM efforts • Knowledge transfer imperative for effective NPD is well understood and constitutes a central objective • Benefits from expert staff with broad and deep external and internal experience	• Focus on state-of-the-art knowledge in functional areas • Strong transfer within the development function, i.e., transfer of engineering knowledge between product families	• Strong process orientation • Pragmatic perspective grounded in operational work and needs • Facilitates the understanding about what KM practices, tools and methods pay off "in the field"
CONS	• Risk of hierarchical isolation and negative bias in operative teams of the kind "Hide! Here come the KM Special Forces!"	• Poor coordination of different Knowledge Management Efforts • Poor incentives for knowledge transfer between different functions	• Risk of project isolation, i.e., knowledge is not transferred well between projects • Lack of project portfolio overview • No clear mechanisms for transfer between product families

Legend: The following operative functions are illustrated in the organizational charts: AE - Advanced Engineering, PD - Product Development, Ind - Industrial/Process Engineering, Pur - Purchasing, Man - Manufacturing

Figure 5. Three different organisational structures for KM in the new product development function.

In companies that disposed of a central KM function, the R&D Managers reported high satisfaction with the strategic importance given to Knowledge Management. They found strong support for KM initiatives, as KM was a central goal in these companies. Conversely, project managers and engineers felt that the approach to Knowledge Management could be too distanced from operational development work and problem solving. The quote in figure 5 about the "KM special forces" comes from an engineer in one of the European OEMs and illustrates this potential conflict between KM as a support function and the operational reality.

The functionally located organisation was quoted as very strong for knowledge creation. This seems natural as KM cells within each function can focus on highly specialised state-of-the-art knowledge. While a KM cell in product development was efficient for transferring engineering knowledge between product families, this organisation could not efficiently contribute to inter-functional knowledge sharing. In one of the American OEMs an R&D Manager said "It is of course nice to know that they [manufacturing] dispose of the latest and most advanced know-how, but it would be even nicer if we could share that knowledge between them and us [product development] so that we improve our design for manufacturing performance".

The project decentralised organisation, finally, provided the strongest process orientation and therefore was quoted as most efficient for interfunctional knowledge sharing. However, once a project is finalised, this structure provides few incentives for transfer of knowledge between projects and product families.

From the above, it seems that different approaches are complementary in the sense that what is gained in one is somewhat lost in another, indicating that a combination of the central approach, the functional approach and the project approach would be an optimal solution. Such an integration was not fully deployed in any of the companies at the time of our interviews.

***

For top management, the understanding of the pros and cons of different structures for KM in product development is an important input for decision-

making. Knowledge Management as a "function" is relatively new, making it even more important to learn from the experiences of early adopters. Further empirical survey research would be needed to specify in more detail the three identified organisational forms, search for and specify other possible forms, and relate organisational forms to performance outcomes in terms of the effectiveness of KM efforts. This could lead to the development of a contingency dependent typology of KM organisations in NPD or, more generally, at the corporate level.

This article draws from a paper presented at the Third European Conference on Organizational Knowledge, Learning and Capabilities OKLC, Athens, April 2002.

REFERENCES IN THE ARTICLES

Bangle, C. (2001), "How BMW Turns Art into Profit", *Harvard Business Review*, 79 (1), 47-55.

Blackler, F. (1995) "Knowledge, Knowledge Work and Organizations: An Overview and Interpretations", *Organization Studies*, Vol. 16 (6), 1021-1046.

Brown, J.S. and Duguid, P. (1991) "Organizational learning and communities of practice: Toward a unified view of working, learning and innovation", *Organization Science,* 2, 40-57.

Brown, J. S. & Duguid, P. (2001) "Knowledge and Organization: a social practice perspective", *Organization Science*, 12 (2), 198-213.

* Brown, J. S. & Duguid, P. (2000), *The Social Life of Information*, Boston, MA: Harvard Business School Press.

* Davenport, T. H. & Prusak, L. (1998), *Working Knowledge*, Boston, MA: Harvard Business School Press.

Ebers M., 1997, *The Formation of Inter-Organizational Networks*, Oxford University Press.

* Evernden, E. & Evernden, R. (2003), *Information First: Integrating Knowledge and Information Architecture for Business Advantage*, Butterworth-Heinmann.

Hansen, M.T;, Nohria, N. & Tierney, T. (1999), "What's Your Strategy for Managing Knowledge", *Harvard Business Review*, (77) 2, 106-116.

Hayes N., (2001), "Boundless and bounded interactions in the knowledge work process: the role of groupware technologies", *Information and Organization*, 11, 79-101.

Hayes N., Walsham G., (2001), "Participation in groupware-mediated communities of practice: a socio-political analysis of knowledge working", *Information and Organization*, 11, 263-288.

Kerssens-Van Drongelen, I.C. de Weerd-Nederhof, P.C. & Fisscher, O.A.M. (1996) "Describing the Issues of Knowledge Management in R&D: Towards a Communication an Analysis Tool", *R&D Management*, 26 (3), 213-229.

Kolb, D.A. (1984), *Experiential Learning: Experience as the Source of Learning and Development*, Prentice Hall Inc., New Jersey.

Lave, J. and Wenger, E. (1991) *Situated Learning: Legitimate peripheral participation,* Cambridge University Press, Cambridge.

* Newell, S., Robertson, M., Scarbrough, H. & Swan, J. (2002), *Managing Knowledge Work*, New York: Palgrave.

Minear, L. (1998) "Learning to learn", [online], discussion paper prepared for OCHA, http://www/reliefweb.int/library/documents/stock.htm.

Morrison, J.E., and Meliza, L.L., (1999) *Foundations of the After Action Review Process*, United States Army Research institute for the Behavioural and Social Science, Special Report 42.

* Nonaka, I. & Takeuchi, H. (1995), *The Knowledge Creating Company*, New York, NY: Oxford University Press.

Polanyi, M. (1964) "The Logic of Tacit Inference" in *Knowing and Being: Essays by Michael Polanyi,* Grene, M. (Ed) (1969), Routledge and Kegan Paul Ltd, London, pp138-158.

* Probst, G., Steffan, R., (2000), *Managing Knowledge: Building Blocks for Success*, Wiley.

* Rosenfeld, L. & Morville, P. (2002) *Information Architecture for the World Wide Web*, O'Reilly.

Schön, D.A. (1983), *The Reflective Practitioner: How Professionals Think in Action*, Basic Books, New York.

Schultze, U. (1998) "Investigating the Contradictions in Knowledge Management", in *Proceedings of the IFIP 8.2 and 8.6 Joint Working Conference in information Systems: Current Issues and Future Changes*, Helsinki, Finland, 10-13 December.

Tsoukas, H. (1996), "The Firm as a Distributed Knowledge System", *Strategic Management Journal*, 17 (Winter Special Issue), 11-25.

University of California at Berkley (2000), *How Much Information?*, available at

http://www.sims.berkeley.edu/research/projects/how-much-info/.

Van Brabant, K. (1997) *Organisational and institutional learning in the humanitarian sector, opening the dialogue,* a discussion paper for the Active Learning Network on Accountability and Performance in Humanitarian Assistance, ODI, London.

* Indicate books particularly useful for the practising manager.

USEFUL WEB LINKS

The Knowledge board,
www.knowledgeboard.com The site provides a European-based space for information exchange, discussion and debate (communities and on-line forums available) on a wide range of topics related to KM. Special areas are devoted to implementation, processes, public sector, SMEs, etc. A searchable archive with articles and case studies is available.

The KM Network,
http://www.KMNetwork.com The site is developed by the Brint Institute and contains numerous weblinks and pdf documents from a wide array of sources structured under headlines such as KM Trends, Technologies of KM, Creativity and KM, etc. Requires time to "surf around" and the interface is not the most aesthetic or readable but there is A LOT of information available.

KnowMap: **The Knowledge Management, Auditing and Mapping Magazine,**
www.knowmap.com The sites gives access to a bimonthly web-based journal "targeted to the needs expressed by knowledge management practitioners for tangible tools and methods to ensure successful strategies and implementation of knowledge management initiatives". There is a rich content with some free of charge access, else there is a subscription fee ranging from 40 to 66 US$.

KM World,
http://www.kmworld.com For KM professionals. Of specific interest is the News section that contains updates on specialized KM issues.

KmetaSite,
http://www.kmetasite.org Useful and clearly organized directory site for practitioners searching for an introductory overview of the field. Contains links to a variety of sources and a specialised KM search engine.

The E Knowledge Center,
http://www.eknowledgecenter.com The site provides a Knowledge Management Program, which is the largest knowledge-based professional program in the world designed to provide education and support to serious knowledge-based practitioners. More than 1000 professionals are enrolled in the program and workshops, representing organizations and governments worldwide.

ICASIT,
http://www.icasit.org/km/ This site is hosted by the International Center for Applied Studies in Information Technology (ICASIT), George Mason University, Virginia, USA. Besides nicely structured general content, it has a specific section on KM in Academia, useful for trainers and researchers.

Fourth Resource - Innovations in Information,
www.4thresource.com The site is a gateway to the emerging and rapidly growing issue of Information Architecture. Contains guides to tools, reviews of latest methodological developments and brief articles on information management subjects.

The Knowledge Management Tool
http://www.kmtool.net A global community for knowledge management professionals. This site was created to share interesting links, reading materials, and vendor information among KM and Information Management Professionals.

CONTRIBUTING AUTHORS

Dimitrios Brachos is Doctoral Candidate at the Department of Management Science and Technology of AUEB. He conducts his research within the InnKnow Center.

Adrian Dale is Visiting Professor of Knowledge Management at AUEB and Managing Partner of Creatifica Associates a UK based consulting firm specialising in the effective communication and management of knowledge.

Diane Hart is a Research Assistant at the The University of Sheffield Management School, UK.

John Kawalek is Lecturer in Systems at the The University of Sheffield Management School, UK.

Gregory P. Prastacos is Professor of Management Science, and Director of the Management Sciences Laboratory and of the Graduate Program in Decision Sciences at AUEB.

Klas Eric Soderquist is Head of the InnKnow Center and Visiting Associate Professor of Operations Management at the Graduate Program in Decision Sciences of AUEB.

NEXT AND PREVIOUS NEWSLETTERS

The next InnKnow FORUM, to be published Spring 2004, will be devoted to **Competency Management**.

The focus of previous newsletters, available on our website, were:

Change Management (no 1, 2002),

Strategic Performance Measurement – Balanced Scorecard (no 2, 2002),

Innovation and Entrepreneurship (no. 3, 2003).

CONTACT

The Innovation and Knowledge Management Center, Management Sciences Laboratory, Dept. Of Management Science and Technology, Athens University of Economics and Business.

Director of MSL

Professor Gregory P. Prastacos, gpp@aueb.gr

Head of InnKow and Editor of InnKnow FORUM

Klas Eric Soderquist, soderq@aueb.gr

Research Fellows:

Yiannis Spanos, spanos@aueb.gr

Maria Vakola, mvakola@aueb.gr

George Kakouros, gkak@aueb.gr

Doctoral Students:

Dimitrios Brachos, Konstantinos Kostopoulos, Alexandros Papalexandris, Sophia Philipidou.

Administrator:

Eleftheria Psathogiannaki, epsatho@aueb.gr

Phone: +30 210 8203 660, Fax:+30 210 8828 078

Website: www.msl.aueb.gr/innknow