Consolidating the Product Versus Process Approaches in Knowledge Management: The Know-Net Approach

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Abstract

Two main approaches to knowledge management have been followed by early adopters of the principle (Hansen, 1999), (Koehn, 1997): the *process-centred* approach, that mainly understands KM as a social communication process; and the *product-centred* approach, that focuses on knowledge documents, their creation, storage and reuse in computer-based corporate memories. This distinction is evident not only in KM implementations in companies, but also in supporting methodologies and tools. The Know-Net solution, that includes a theoretical framework, a consulting method and a software tool, is based on a *knowledge asset-centric* design that innovatively fuses the process-centred approach with the product-centred approach.

1. Introduction

Knowledge management's rise to prominence reflects a widespread recognition that fundamental changes are taking place in the way companies do business, with regard to their internal organisation and their external relationships with customers, suppliers and competitors. The first phase in the emergence of a knowledge management (KM) market – now drawing to an end (Ovum, 1999) – has been characterised by considerable hype and confusion. In this first phase early adopters followed different approaches to knowledge management with varying emphasis on technology, cultural, organisational and managerial issues. Nevertheless, if one has a look into the research landscape as well as into the business world, it is easy to notice that two main strategies for knowledge management have been employed by early adopters of the principle (Hansen, 1999), (Kühn, 1997):

- The *process-centred* approach mainly understands KM as a social communication process. In this approach, knowledge is closely tied to the person who developed it and is shared mainly through person-to-person contacts. The main purpose of Information Technology in this approach is to help people communicate knowledge, not to store it. This approach is also referred to as the 'personalisation' approach.
- The *product-centred* approach focuses on knowledge documents, their creation, storage and reuse in computer-based corporate memories. This approach is also referred to as 'content-centred' or 'codification' approach.

The main motivation of the Know-Net project[1] (Know-Net consortium, 1999), (Mentzas and Apostolou, 1998) has been to design, develop and test a total solution for KM that would explicitly address and integrate the two prominent approaches. Moving towards the conclusion of the Know-Net project this paper aims to substantiate the bias towards the process-centred and product-centred approaches in KM initiatives, methods and software tools, present the research findings and our approach regarding the integration of the two approaches and demonstrate how this integration is accomplished in all constituents of the Know-Net solution, that include:

- A holistic conceptual framework that can be used by managers as a roadmap for ensuring integrity of the Knowledge Management effort.
- A KM methodology that helps organisations define and document their knowledge management strategy, audit and design business processes that enhance and facilitate corporate learning, establish related organisational roles, facilitate knowledge sharing between people in the organisation, and explicitly measure and evaluate the quality and business value of the organisation's intellectual capital.

[1] The Know-Net project is a European research effort partly funded by the European Scientific Programme of Research in Information Technology programme of the European Commission and by the participating companies. The Know-Net consortium comprises the following companies: PLANET, a Greek management consultancy company; KNOWLEGDE ASSOCIATES, a UK-based international company specialising in knowledge management education, consulting, and systems development; DFKI, the German Research Centre for Artificial Intelligence, INSEAD's Centre for Advanced Learning Technologies; Gooch Webster, a UK Chartered Surveyors firm; the Greek Institute Of Communication & Computer Systems, a research institute active in the area of collaborative technologies; FHBB, an academic institution doing research and development in IT-based applied organisational learning; and the Credit Risk Valuation Department of the Union Bank of Switzerland.

- An intranet-based tool that supports the collection and categorisation of internal and external information, the re-use of stored knowledge using flexible and customisable Knowledge Navigators and advanced search mechanisms that include keyword-based as well as concept-based searching (the latter supported by a graphical visualisation of the concepts organising the information space), and the collaboration via on-line workspaces that allow people to work together from different locations.

2. The process-centred and product-centred approaches in knowledge management

Applied knowledge management is currently being shaped by three major influences: *software vendors* providing IT tools, a significant body of *early adopters* which have demonstrated the benefits of considering knowledge as a key asset, and *global consultancy firms* and *system integrators* that provide related services.

2.1. The process-centred and product-centred approaches in KM software

The goal for knowledge management technology is to create a connected environment for knowledge exchange. This connected environment acts as the technical embodiment of the corporate memory. The connections that knowledge management software must facilitate is between people as much as it is between people and information systems. In particular, the software must support the exchange and transformation from tacit to explicit knowledge. The movement from tacit to explicit knowledge is also a transformation of individual knowledge into organisational knowledge. The reverse flow is equally important – enabling individual draw on the corporate memory for decision making and problem solving. To be able to truly support sharing of information and knowledge between people and between people and systems two key components are required:

- *Collaboration facilities*. Facilitating collaboration between knowledge workers has largely been the domain of groupware products such as Lotus Notes, Microsoft Exchange and Novel's GroupWise. As well as providing a basic messaging infrastructure in the form of email services, these products also offer a range of collaborative features such as workflow automation, discussion groups, document management, shared databases, and calendar and scheduling functions that target the 'between people' sharing of informant.
- *Discovery facilities*. The requirement for a universal means of searching and retrieving information from different 'information silos' across the organisation is stronger that ever in modern organisations where knowledge workers are in constant need of finding and accessing information from a wide variety of information sources that include the Internet, corporate intranets, legacy systems, corporate LAN, etc.

Software vendors have adopted knowledge management with great enthusiasm and most of them have found a niche in the KM software market exactly because of the great diversity of facilities required. The information retrieval vendors have been promoting a major aspect of knowledge management – the need for coherent and integrated access to corporate knowledge resources. Groupware, mainly in the form of Lotus Notes and, to some extent, Microsoft Exchange, has benefited by being the de facto infrastructure for knowledge management in the absence of any more suitable products. However, groupware products have yet not integrated powerful classification and

information retrieval facilities required to support the 'between people and systems' information exchange.

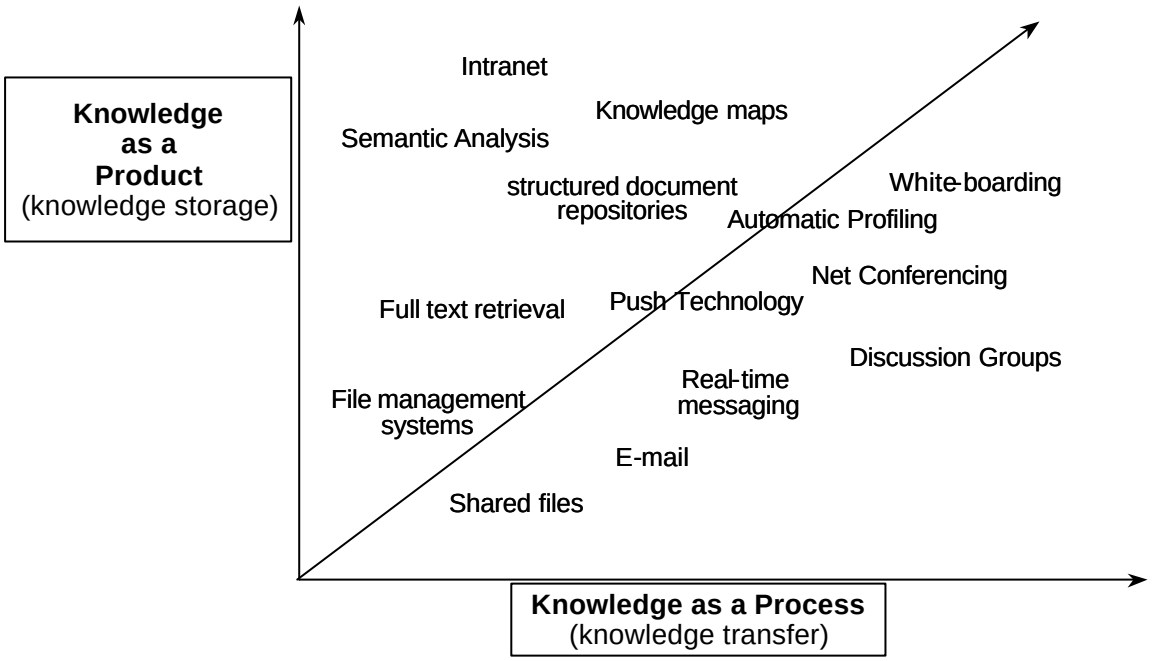

Figure 1. The process-centred and product-centred approaches in KM software (adapted from Ovum, 1998)

2.2. The process-centred and product-centred approaches in KM projects

A similar bias is evident in existing KM initiatives in the industry. Davenport and Prusak (Davenport and Prusak, 1998) have found that most KM projects attempt either to create knowledge repositories or to improve knowledge access while there is a third group of projects that focuses on improving the culture and environment for knowledge exchange.

In the first type of projects, much of the energy has been spent on treating knowledge as an "it" (*product-centred*), an entity separate from the people who create and use it. The typical goal is to take documents with knowledge embedded in them—memos, reports, presentations, articles, etc.—and store them in a repository where they can be easily retrieved. Another less structured form of knowledge as an "it" is the discussion database, in which participants record their own experiences on an issue and react to others' comments. Three common types of repositories are for:

1. External knowledge, e.g., competitive intelligence. External knowledge repositories range from information delivery "clipping services" that route articles and reports to executives to advanced customer intelligence systems.
2. Structured internal knowledge, e.g., research reports, product-oriented marketing materials, and techniques and methods.
3. Informal internal knowledge, e.g., discussion databases full of know-how, sometimes referred to as "lessons learned". This is softer, more experiential knowledge that must be interpreted and adapted by the user in a new context.

The second type of project was predicated on providing access to knowledge or facilitating its transfer among individuals (*process-centred*). These projects recognise that finding the person with the knowledge one needs, and then successfully transferring it from one person to another, are difficult processes. If the metaphor of a library is useful for conceptualising knowledge repository projects, then the Yellow Pages represents the purpose of knowledge access projects. The underlying strategy here is to facilitate connections between those people who possess and those who need knowledge.

2.3. The process-centred and product-centred approaches in KM methods and services

The global consulting firms are often case-studies for KM implementations because they were among the first businesses to make heavy investments in the management of knowledge, their core asset. In their internal KM initiatives the bias toward the process or the product approach is evident (Hansen, et. al. 1999), (Apostolou and Mentzas, 1999).

In selling KM services to clients, most global consultancy firms are taking a long-term 'programme' approach to implementation. In KM assignments all global consultancies address strategy, people, process and technology issues, all considered as key factors that need to be altered so that they are aligned with the knowledge management principles. Nevertheless, despite the 'holistic' consideration of knowledge management, individual approaches show to a lesser extent some bias towards the 'product' or 'process' approaches. Ernst & Young (Ovum, 1998) for instance considers community enablement as a key solution that runs across most E&Y's KM implementations. The firm focuses on the creation of communities of interest or communities of practice (self-organised groups which 'naturally' communicate with one another because they share common work practices, interests, or aims) to address knowledge generation and sharing. On the other hand KPMG, although also takes a holistic approach covering all 'seven key knowledge processes' (creation, application, exploitation, sharing, encapsulation, sourcing, and learning), its technology implementations are based on knowledge repositories, such as document management systems for storing captured knowledge assets and data warehousing for knowledge discovery and decision support (Ovum, 1998), (Ovum, 1999). Similarly PricewaterhouseCoopers solutions, which targets knowledge management at key business areas within the organisation, are often implemented as part of a wider ERP or data warehouse project (Ovum, 1999).

In specialist knowledge consultancies, that usually provide expertise on niche areas, the focus on either the process or product view is more clear. For instance Knowledge Associates, Collaborative Strategies and NetForm are all firms with expertise and methodologies for facilitating KM through collaboration and informal people-to-people interaction.

3. The Know-Net approach

In developing the conceptual, methodological and technical architecture of the Know-Net knowledge management solution we have been particularly concerned to ensure that it fuses the product centric KM approach with the process centric KM approach. For doing so we needed a conceptual, theoretical foundation that would ensure this fusion and that would be underlying every aspect of the solution (software tool, consulting methodology, measurement system, etc.). Both the process and the product-based approaches aim to support the identification, managing and

leveraging of knowledge, through better managing of the organisation's knowledge assets. Knowledge assets are the resources that organisations wish to cultivate. In essence, knowledge management is working to better manage the content, quality, value and transferability of knowledge assets.

Knowledge assets can be human, such as a person or a network of people, structural, such as business process, or market, such a brand name of a product. Naturally the product approach is more concerned with accessing and organising knowledge assets while the process approach makes direct connections between the organisational knowledge assets - both explicit and tacit. Both approaches however are using some form of knowledge representation as a means of packaging and transferring knowledge either from a person to a system and vice versa or between people. If we define as 'knowledge objects' the means of representing knowledge then the following statement outlines the relation between knowledge assets and knowledge objects:

A knowledge asset creates, stores and / or disseminates knowledge objects.

For example:

- A person is a knowledge asset that can create new ideas, learnings, proposals, white papers (k. objects).
- A community of interest is a knowledge asset that can create new ideas, best practices (k. objects).
- A process is a knowledge asset that can create and/or store and disseminate best practices, company standards, R&D material (k. objects).
- A vision is a knowledge asset that can create a new mission statement, strategic plan, goals (k. objects).

A Knowledge Object represent the information required to be processed by humans and transformed in to knowledge. Knowledge derives from information through knowledge-creating activities that take place within and between humans. Typical knowledge-creating activities include (Davenport and Prusak, 1998):

- Comparison: how does information about this situation compares to other situations known?
- Consequences: what implications does the information have for decision and actions?
- Connections: how does this bit of knowledge relate to others?
- Conversation: what do other people think about this information?

The Knowledge Objects aim to facilitate and leverage such knowledge-creating activities by providing to human the information need. A Knowledge Object has the following characteristics:

- It acts as a catalyst, enabling the fusion of knowledge flows between people, with knowledge content discovery and retrieval, through technology. That is to say, a knowledge object acts, amongst other things, as the primary connecting node for all key components in a KM system (strategy, people, process, content, technology) - 'the KM glue'.
- It facilitates the knowledge transfer from person to person, or from information to person.
- A Knowledge Object is created and maintained by a KM process.

- A Knowledge Object is used to search, organise and disseminate knowledge content.

Therefore, we conclude that **the Knowledge Object (Figure 2) is the common unifier and lowest common denominator of a holistic KM solution incorporating and integrating process and content, and we have used it as the 'resultant manifestation'** in the design of the Know-Net solution that fuses the process centric approach with the product centric approach.

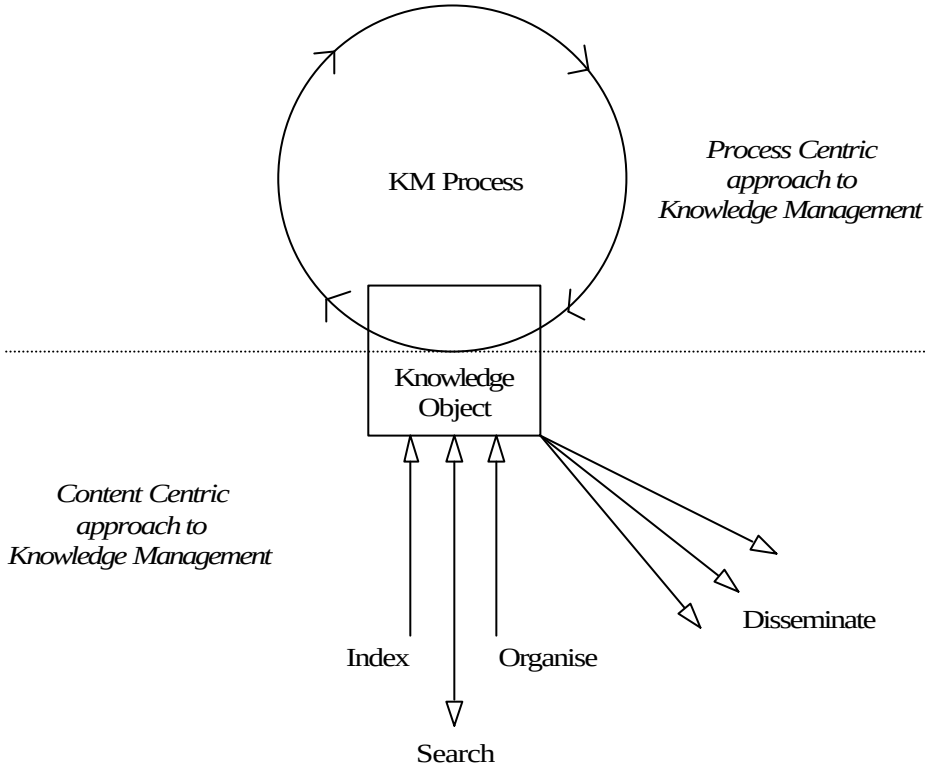

Figure 2 The Fusion of the 'content' centric with the 'process' centric approach.

4. Practical applications of our approach

The consideration of the knowledge object being the common unifier for integrating the process and product approaches, not only underpins each one of the three constituents of the Know-Net solution (framework, method, tool), but also links these three constituents together into one holistic solution, as described in detail in the following sections. Figure 3 highlights the overall interdependencies of the Know-Net framework, method and tools.

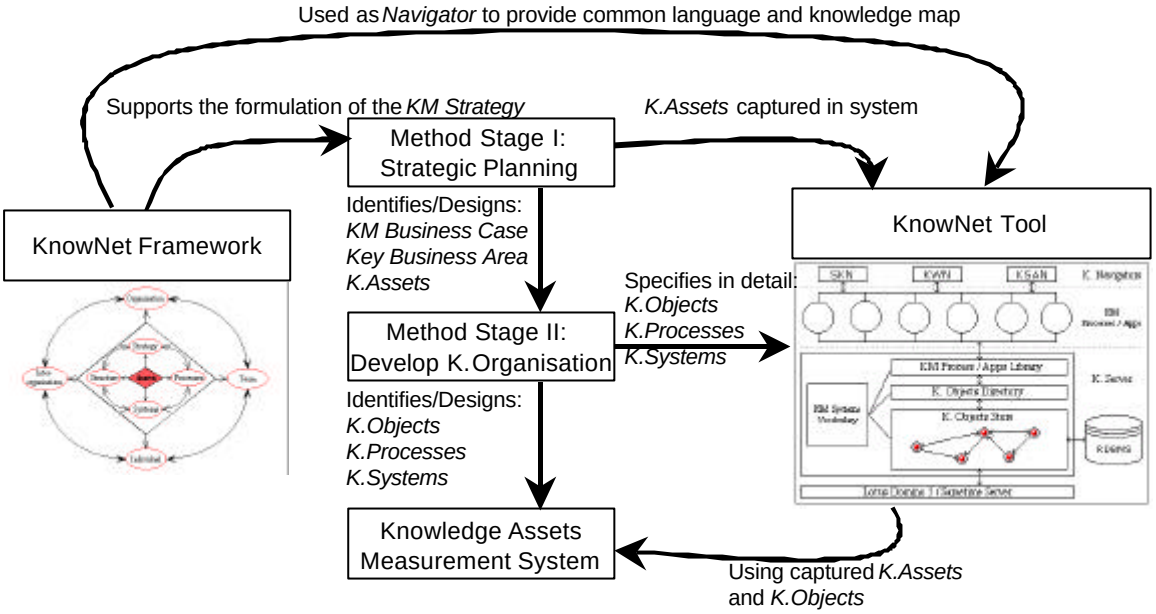

Figure 3 Interdependencies of the Know-Net framework, method and tool

4.1. The Know-Net framework

Know-Net has developed a holistic conceptual framework (Figure 4) that can be used as a roadmap for ensuring integrity of a knowledge management effort. The Know-Net framework depicts graphically the important and central role of knowledge assets and knowledge objects in our approach.

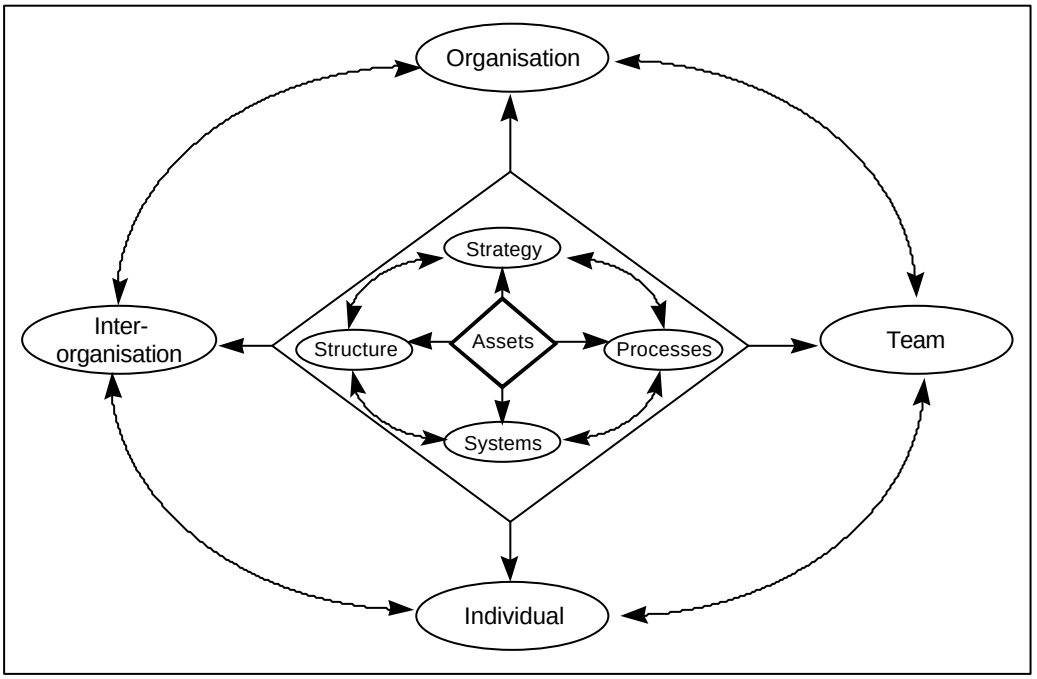

Figure 4 The Know-Net Framework

In the centre of the Know-Net framework are the knowledge assets. As defined previously the

knowledge assets create / use / disseminate knowledge objects that are the representations of knowledge (both explicit and tacit). The Know-Net framework also represents:

- the knowledge strategy, processes, structure and systems a company develops in order to facilitate knowledge creation and leveraging among and between; and
- the knowledge interaction networks at the individual, team, organisational and inter-organisational levels.

In fact even these elements that are drawn in the periphery of the knowledge assets (structure, systems, processes, strategy) can be considered as knowledge assets themselves. A process for example can be a knowledge asset if for instance it creates best practices, company standards, R&D material, etc. Having them as discrete entities linked to the knowledge assets aim primarily to indicate that they are or should be the constituents of the **Knowledge Management Infrastructure** (KMI) which should be established within a company, in order to facilitate knowledge leveraging initiatives.

The different levels of knowledge networking, represented in the outer section of the framework correspond to what Nonaka calls the "*ontological dimension*" in his model of organisations as knowledge creating mechanisms; see Nonaka (1994). This ontological dimension refers to the social interactions which begin at the individual level and then by communication between organisational boundaries let knowledge expand and grow-up.

According to Nonaka [see Nonaka and Ray 1993)] if new knowledge is relevant to the needs of the organisation, it is likely to permeate through groups and divisions and thereby extend the community of interaction dealing with that knowledge. New knowledge that has a potential to support more advantageous ways of doing things is likely to be retained as a subject for further debate within the network and may also lead to an extension of the **community of interaction.**

Within Know-Net we distinguish between four levels of knowledge networking: *Individual, Team, Organisation,* and *Inter-Organisation:*

> The *individual* level refers to the capabilities, experience, competencies and personal development issues treated at the individual level of the knowledge worker.
>
> The *team* and *organisational* levels include the internal company networks, i.e. the informal, self-organising or the formal networks of communities of knowers with common interests, the communities of practice involved in similar activities, the engagement teams, etc. that are built within an organisation.
>
> The level of *inter-organisational* networks refers to inter-enterprise relationships, value networks where each focuses on core competencies, as well as on the accessibility to external, developed capabilities. Hence networks with customers, competitors, subcontractors, partners etc. are included in this level.

4.2. Information Technology implications

A technical implementation, that would exploit the consideration of the Knowledge Object being the common unifier of information retrieval (product) and groupware (process) technologies, is, at the architectural level at least, relatively simple and straightforward: Applications that support the process-view of KM, such as groupware applications, should use Knowledge Objects that are also accessible by applications and tools that support the product view, such as searching and indexing

tools. Therefore Knowledge Objects have to be separated from the applications that create or use them in order to be accessible also by other applications. To achieve this, a three-tier architecture is suitable, with a separate repository, a 'place holder' for storing the Knowledge Objects. Such a knowledge repository is a store of both codified knowledge (information) and metadata - information on that information. Metatdata can be simple information such as the author's name, current version number or more complex information that are organisational –specific and add value to information based on the organisational environment and context. The knowledge repository does not have to store all the items needed to be captured, but it should 'know' where these items 'reside' and point to them. In fact, due to the heterogeneity and variety of Information Systems and sources existent in any organisation, it is more meaningful for the knowledge repository to act as a knowledge broker rather than to actually store information. The knowledge repository can serve requests for information, and use whatever mechanisms are necessary to retrieve and deliver the results to the user.

4.2.1. The Know-Net tool

The primary objective in the design of the Know-Net tool has been to have an architecture than exploits the integration of the two approaches (product and process). It has three fundamental elements and associated components, as listed below, and shown diagrammatically in Figure 5.

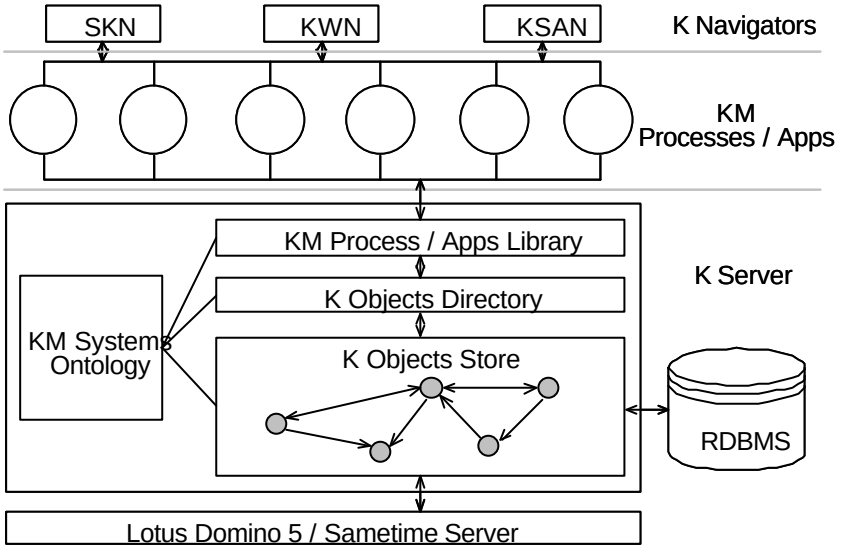

Figure 5. The Know-Net tool architecture

The Know-Net Knowledge Navigators

The user interacts with the Know-Net tool through the navigators which are accessible through standard Web browsers. Three different navigators are available for three different types of users:

- From a knowledge professional/knowledge workers perspective, in his/her day to day work, a very simple to use, pragmatic and highly practical Navigator is sought here. We have called this navigator the 'Knowledge Worker Navigator' (KWN).
- From a KM Systems Administrators point of view, the Know-Net Framework is very relevant, from a technical infrastructure perspective, but not in its entirety. We have developed a technical Navigator, the 'Systems Administrators Knowledge Navigator

(SAKN).

- However, from a Chief Knowledge Officers (CKO) perspective, or Director of Knowledge Management, and/or a KM Consultants point of view, the Know-Net Framework is highly relevant. Not least, in the design and implementation of a KM Solution. The Know-Net Framework, therefore, has been integrated as part of a 'Strategic Knowledge Navigator' (SKN) to the tool . Furthermore, it provides the comprehensive framework required supporting the KM initiative and integrating key aspects of the Method (Stages I & II) directly into the tool.

The Knowledge Management Processes/Applications

Underpinning every organisation is a set of processes to perform the business. Typical key business process are sales and marketing processes, human development processes, manufacturing and distribution processes, etc. Significant organisational knowledge is embedded in these processes, and therefore business processes are considered key knowledge assets themselves. In addition, significant knowledge is being created and shared by people that are involved in different business processes. Equally important is the more tacit type of knowledge that exists in people, or networks of people, formal and informal, that collaborate and socialise within or even outside the business environment.

The KM Processes/Applications Library is designed to contain a growing suite of KM applications that support key business and operational processes. These processes/applications are the prime source to create, amend and delete Knowledge Objects.

The important points that differentiate the Know-Net KM applications/processes are:

- **The KM Processes/Applications automatically write and read Knowledge Objects from the Knowledge Object Store** which the is the primary repository and part of the Knowledge Server (described in more detail below).
- **The KM Processes/Applications offered can support both the actual execution of the business process and, perhaps more importantly, the management of knowledge within the business process.** A simple cycle of knowledge processes is embedded in all KM Processes/Applications. The cycle consists of the following steps:
    - Perform a task/activity and learn from the experience.
    - Review the learnings and document them (capture and make explicit).
    - Develop new learnings into improved codified 'Best Practices' and share them.
    - Develop from 'specific' cases of Best Practices the Best Knowledge, 'generally' applicable.
- **The tool contains a library of pre-defined and configured KM Applications/Processes**, that have been developed using Lotus Domino® technology by Knowledge Associates and are part of their Knowledger® software suite, and can support different business areas ranging from human development to project and bid management. Additional KM Processes/Applications can be easily defined and developed in order to support specific needs.

Additional features of the Know-Net tool that are available through the KM Processes/Applications

include:

- Centrally managed categorisation of documents. Enables the accurate categorisation and indexing of both internal and external information. Supports categorisation of documents with respect to multiple indexing dimensions. Index models or ontologies for the several dimension / viewpoints are centrally managed by the system administrator and graphically designed using the Know-Net Ontology Editor.
- Advanced Search Capabilities. The Know-Net search facilities go beyond the standard full text search facility to provide:
    - A metadata schema that itself is browsable.
    - Searching based on the defined index models / ontologies in a graphical manner which exploits the human's excellent ability to remember and deal with visual structures.
    - Immediate feedback in the result panel thus supporting an "iterative refinement" search.
- Collaboration. The Know-Net tool allows users to collaborate on-line at real time using Video and Audio Conferencing (using Lotus Sametime® technology) or at their own pace using multiple asynchronous collaboration facilities.
- User notification mechanisms. Knowledge workers do not have much time to spend seeking new items of importance that are being added to the system, on a daily basis. By clicking on 'What's New' - going to 'one place, to see what has been added' - the knowledge worker can quickly ensure that he/she is fully informed and up to date. This concept is based on the KM 'Share Model' where a knowledge worker can go to look for something when he/she wishes, as opposed to the 'Send Model' where all new notifications are 'pushed' through the e-mail to all users, adding to the e-mail traffic and e-mail overload. In addition, and in order to embrace both models above the Know-Net tool provides email notification of 'Mandatory Readings' to the user.
- One Place knowledge entry. Our research and experience shows that a typical knowledge worker is continually 'switching thoughts' from minute to minute in his/her thinking from say, client/project work - to receiving new telephone calls and new contacts/information. Currently, having to interrupt work and go to a specific application to add a contact or an idea, with current applications, can be slow and is not in line with the way our brain typically works. As a result, much valuable information gathered by the knowledge worker is not added or updated into the KM system 'because it is too much effort and I simply don't have the time'. By clicking 'One Place' on the Know-Net Tool a listing appears, in alphabetical sequence - in one central place, of all the input forms from all the Applications that the knowledge worker uses in his/her daily work. By clicking once on the selected input form, it appears ready for entering data. The data will then be entered directly into the Application.

The Know-Net Knowledge Server

The Know-Net architectural approach is based on the idea of a central Knowledge Object Store, a place to hold Knowledge Objects, as these are being created by the company's Knowledge Assets. They shall be stored only once, together with the most important relationships and interdependencies

between them. The Knowledge Object Store allows for central administration of Knowledge Objects and for generation of simple knowledge maps that show the hierarchy and relationships between them.

However, despite the Knowledge Object Store capability of being an **integrated** knowledge and information system, in all organisations there exist nevertheless, a fragmentation of the organizational knowledge base, caused by an extreme heterogeneity of knowledge and information sources to be dealt with. It is impossible to anticipate all future uses of knowledge items and documents such that you can only realise one specific storage and access approach Further, heterogeneity naturally comes into play when legacy systems and other information sources external to the Know-Net tool are to be linked into the system.

For these reasons there must exist flexible means for defining new views and mechanisms (such as alternative classification mechanisms) for easily organising and accessing information that reside within and outside the Know-Net Server. This is the second, and equally important, aspect of the Know-Net Knowledge Server: its metadata storage, management and search facilities. It includes a knowledge modelling mechanism, the Know-Net Ontology Editor (Figure 6), comprising all dimensions of metadata relevant to describe a Knowledge Object, including conceptual structures that logically organise the knowledge content. Based upon these metadata, the tool offers a uniform search interface with a mixed browsing-searching approach through which all underlying information repositories are accessible.

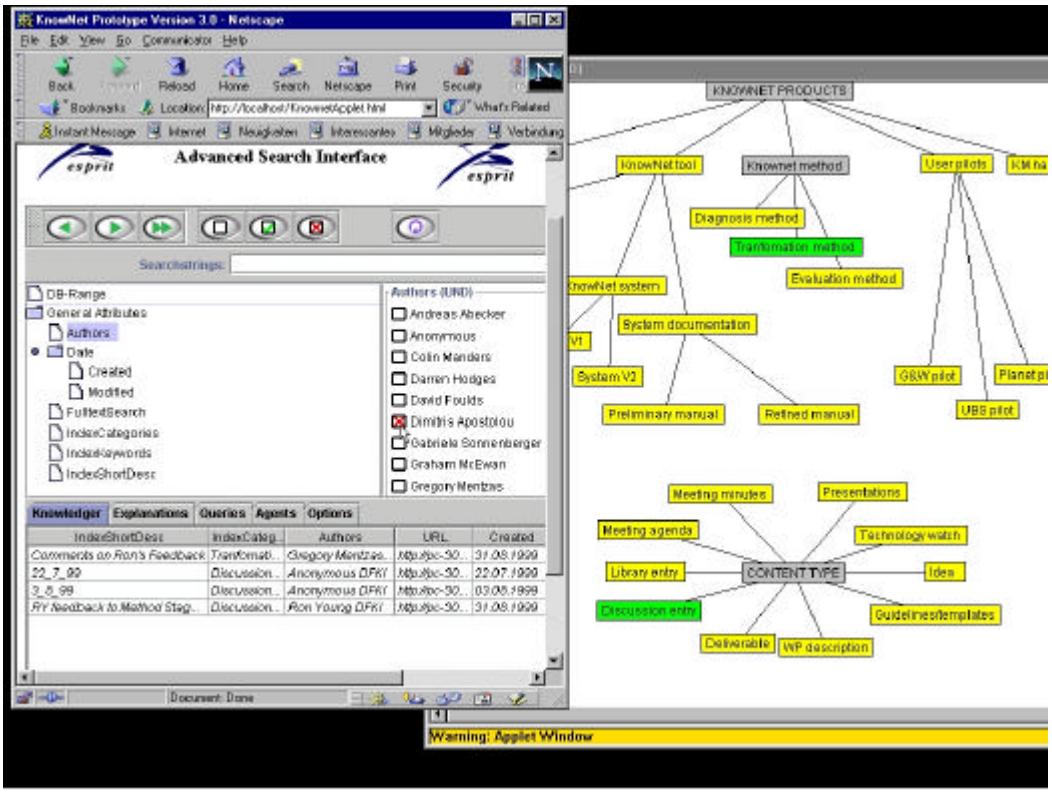

Figure 6. The graphical interface used both for indexing and searching

4.3.The Know-Net Method

A basic tenet of knowledge management is that it is not primarily a technical issue. Knowledge management addresses basic cultural and organisational issues of how knowledge is shared, distributed and created, and how these processes relate to key business goals. This emphasis on the business as well as human element of knowledge management implies that for a km initiative to be successful significant education, communication and consulting is required in parallel to technology implementations. To support these activities, we have developed a methodology with the following distinguishing characteristics:

- **It exploits the theoretical approach of integrating the process and product views** using the Knowledge Assets and Objects as the unifying elements.
- **It is tightly linked to the Know-Net tool** supporting the customisation and configuration of the specific tool as well as additional software that supports the KM initiative.
- **It is complete** because it covers the design, development, implementation and measurement of the initiative, and holistic in the sense that it addresses all components of knowledge management (strategy, people, processes, and technology).

4.3.1.Overview of the Know-Net method

The Know-Net method proposes the below-mentioned phased approach (see also Figure 7) to enable structured thinking and planning for a knowledge management project:

- **Awareness** about the benefits of knowledge management and its relationships to strategic as well as operational and day-to-day issues in the corporate environment.
- **Stage I: Plan** refers to the Knowledge Management Strategic Planning phase.
- **Stage II: Develop** is the phase in which an organisation transforms itself to a knowledge intensive company based on the company-specific KM value proposition derived in Stage I.
- **Stage III: Operate** is the phase in which an organisation rolls-out a company-wide implementation plan with a holistic approach to KM.
- **Measurement** of the level of leveraging of knowledge assets with a KM effort.
- **Training** of both the knowledge workers to the new processes and technologies as well as of the staff to take up new knowledge-related roles (e.g. CKOs, knowledge analysts).

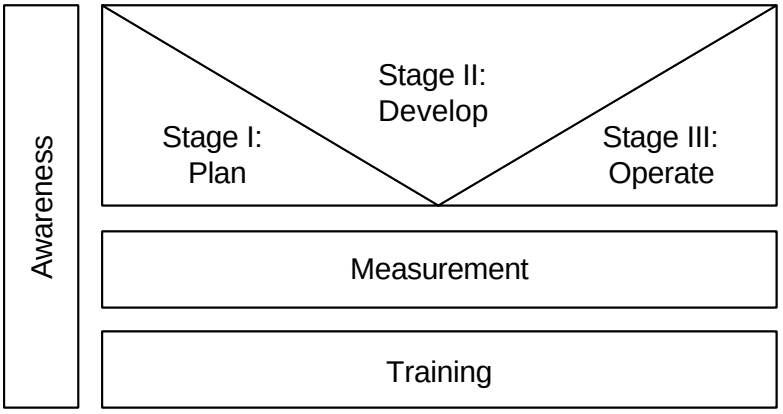

Figure 7. Building blocks of the Know-Net method

The method is designed to be modular so that an organisation can choose to start at different levels depending on its readiness, needs and requirements.

In Stage I of "Strategic Planning for Knowledge Management" an organisation determines:

- The vision and readiness for a knowledge management initiative; and
- The scope and feasibility of the project.

In Stage II of "Developing the Knowledge Organisation" the structure and the design of a holistic solution (that covers processes, people and technology) are iteratively developed, tested and reviewed.

Stage III is the company-wide implementation of the KM initiative, while the Measurement part of the method aims to provide consistent support for measuring the creation, sharing and use of knowledge assets within the company.

4.3.2.How the methodology supports the integration of the process and product approaches

Strategic planning is an important stage of a knowledge management project because it helps the organisation quickly focus on knowledge that counts and delivers value to the firm. Based on the corporate strategy and objectives a clear knowledge management strategy needs to be defined to help the firm set forth the criteria for choosing what knowledge a firm plans to pursue and how it will go about capturing and sharing it. A key deliverable of Stage I is the identification of key knowledge assets that the organisation wishes to improve. At this stage some basic ideas are captured into the Know-Net tool about how the Knowledge Assets are to be defined and measured.

Stage II of the know-Net method identifies and defines at a deeper level the Knowledge Assets and Objects that need to be better managed in the organisation. At this stage two results are accomplished:

- A comprehensive Knowledge Assets Schema is specified. The schema includes both the hierarchical organisation of Knowledge Assets and Objects that will be the basic data model to be used by the KM Application/Processes, and the definition of alternative classification schemata to be entered via the Ontology Editor in the Knowledge Server. The knowledge asset schema therefore supports the *product view*.
- Based on the Knowledge Asset Schema, and within three discrete pairs of modules, the

method assists in the audit, design, implementation and incitement of business processes, knowledge networks and supporting systems to leverage the *process view* of knowledge management.

These results are accomplished through the execution of eight available modules presented schematically in Figure 8, and outlined in Table 1. Each module is a self-containing, value-adding entity and therefore not all modules are mandatory in an assignment. Ideally however, just as the Knowledge Object is the common unifier of our holistic approach, Module 7 (Develop the Knowledge Asset Schema) acts as the frame of the Know-Net method that is being constructed with input from the 'audit' Modules 1, 3, and 5, while it supports the consistent execution of the 'design/implement' modules, 2, 4, and 6. All 'audit' modules among other issues aim to identify in detail the Knowledge Assets, and corresponding Knowledge Objects and their attributes. Module 1 (Analyse Business Processes) for instance produces processes maps that depict key information , tacit and explicit knowledge that is being used or created in selected business processes. Module 7 (Develop the Knowledge Asset Schema) collects this information, along with similar information from Modules 3 and 5, arrange possible overlappings, logically groups content, and creates the formal schema (Knowledge Asset Schema) on which the 'design/implement' modules are based. For instance Module 4 (Leverage Knowledge Networks) designs and organises communities of practice and interest around the core Knowledge Assets of the organisation and proposes the already specified Knowledge Objects as information units for knowledge creation and sharing within these communities. Table 1 broadly describes each Module while it presents how each Module relates to the integration of the process and product approaches and to the Know-Net tool.

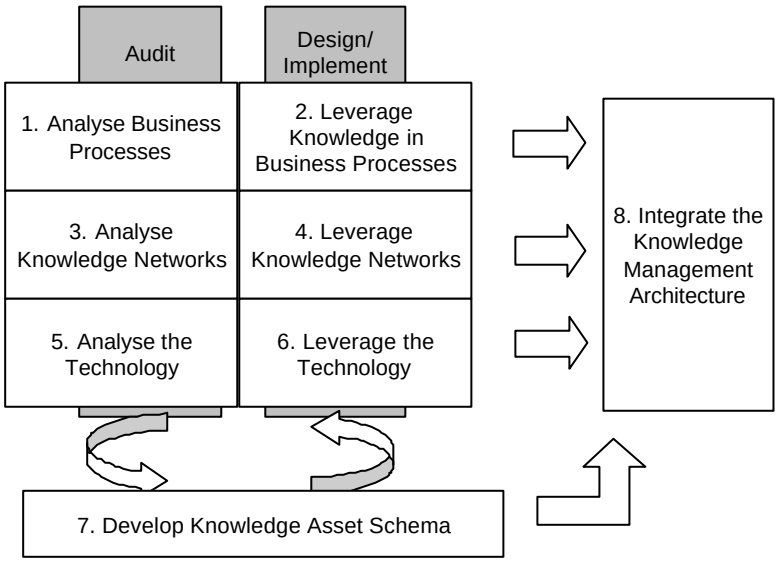

Figure 8 Modules of Stage II: Developing the Knowledge Organisation

5. Concluding Remarks and Future Work

Know-Net is built around a knowledge asset-centric approach that is a unique fusion of the knowledge-as-a-product (content) and knowledge-as-a-process (context) perspectives to knowledge management. The knowledge asset-centric approach underlies both the framework, method and tool that comprise the Know-Net solution.

The early application of the solution in three professional services organisations - a bank (Sonnenberger, 1999), a consultancy, and a chartered surveyors firm (Manders and Topintzi, 2000)- has revealed that the approach is generic enough to support organisation in different industries. Nevertheless significant customisation of both the method and more over the tool is required to support specific business needs. To this end future work will include the development of a Know-Net API to allow external applications and be linked to the Knowledge Server.

It is important to stress that our approach aims to ensure that both the process-centred view and the product-centred view can inter-operate, in the sense that they are not isolated from one another and one can make use and add value to the other. It does not mean that all organisations should follow and excel in both approaches. In fact, targeting both the process and product views at equal proportions could be overwhelming (in terms of resources and organisational and cultural changes needed) for new comers to the KM area (see also Hansen, 1999).

Further refinement of the solution will be achieved though further pilot-testing and feeding back of requirements. An implementation in a group of software companies will follow. Real-world experience has also revealed the need for a reference model for knowledge management: a set of predefined and proven solutions covering all aspects of KM (strategy, structures, people and technology). The Know-Net tool for instance contains a library of KM Applications/Processes covering most usual business areas. The tool could be enhanced with predefined Knowledge Assets, Objects and their attributes, from which the user could select as appropriate. Furthermore, the method could include indicative structures of business processes that could serve as templates. Such a predefined KM infrastructure is particularly appealing to SMEs that do no whish to invest heavily in consulting and customised solutions.

Module	Description	Relation to the process and product integration	Relation to the Know-Net tool
1. Analyse Business Processes	This module helps the knowledge audit of business processes. in order to understand how business processes, people, systems and content are related in order to reveal *who* needs *what* knowledge and *when* they need it.	Detail identification of Knowledge Assets and Objects involved in business processes (*product view*). Detail identification of the knowledge flows within business processes. (*process view*).	Provides requirements for the creation / customisation of KM Processes / Applications (including functionality, user rights, etc.). Profiles people and roles involved in processes (to be used in personalised facilities of the tool). Provides a "first cut" of the knowledge objects that correspond to the knowledge assets.
2. Leverage Knowledge in Business Processes	This module helps the enhancement of KM within exiting business processes and the design of new business processes and corresponding roles for managing specific knowledge assets.	Design of formal business processes and roles for km. (*process view*). Incorporation of Knowledge Objects, relations, and attributes (metadata, classification, indexing, etc.) into business processes. E.g. who creates a Knowledge Object, which metadata should be used, how is the indexing been done, etc. (*product view*).	Definition of Access Rights for Knowledge Objects / Applications. Customisation of KM Processes/Applications to support business processes.
3. Analyse Knowledge Networks	This module helps analyse the informal flow of knowledge within networks of people in the organisation.	Detail identification of Knowledge Assets and Objects involved in informal communication / collaboration of employees (*product view).* Comprehension of patterns of informal knowledge flow, collaboration habits and requirements for improvement (*process view*).	Provides requirements for the creation / customisation of KM Processes / Applications. Emphasis here is on the groupware support of the tool, e.g. applicability of specific collaboration requirements such as VIDEO/AUDIO conferencing, customisation of community / team support applications of the tool, etc. Profiles people and roles involved in networks (to be used in personalised facilities of the tool). Provides a "first cut" of the knowledge objects that correspond to the Knowledge Assets.
4. Leverage Knowledge Networks	This module helps the design and stimulation of Knowledge Networks using a set of 'non-management' techniques'. The module addresses critical success factors fro the network, content quality assurance issues	Design of informal networks (communities of practice / interest) in support of km (*process view*). Incorporation of Knowledge Objects, relations, and attributes (metadata, classification, indexing,	Definition of Access Rights for Knowledge Objects / Applications. Customisation of KM Processes/Applications to support knowledge networks. Emphasis on groupware applications.

	quality assurance issues, motivation and reward issues, etc.	etc.) into knowledge networks. E.g. who has ownership of which Knowledge Object in the network, which metadata are suitable for the network, filtering rights, etc (*product view*).	
5. Analyse the technology	Assesses the current state of IT in the organisation and identify existing information sources.	Mostly related to the *product view*, looks at knowledge artefacts that are stored in Information Systems.	Examines the applicability of the Know-Net tool from a technical perspective (network bandwidth, geographical distribution, etc.). Identification of existing information sources within and outside the organisation.
6. Leverage the technology	Presents the technology element in knowledge management.	n.a.[2]	n.a.
7. Develop the Knowledge Asset Schema	This module guides the design the knowledge asset schema that comprises: 1. The Knowledge Object Store (for the formal knowledge organisation according to a data model) 2. The Knowledge Ontology (for alternative, loose classification mechanisms)	*Product view*, only, as discussed in section 4.3.2	Direct mapping to the Knowledge Server. During this module the Object Store and the Ontology are customised and configured for the organisation.
8. Integrate the KM architecture	Synthesises and integrates all changes done in different modules in one working solution, seamlessly incorporated in the existing business environment.	n.a.	n.a.

Table 1 Overview of Stage II modules of the Know-Net Method

[2] Not applicable

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