Project management as a knowledge management primer: The learning ...
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Project management as a knowledge management primer: the learning infrastructure in knowledge-intensive organizations: projects as knowledge transformations and beyond

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Keywords

Knowledge management, Organizational learning, Project management

Abstract

The digital economy is based on knowledge and the ultimate objective is the reinforcement of performance. The business strategy has been shifted from the management of tangible assets to intangible resources and the traditional competitive position of business units is based on their capacity for effective action. The main conclusion is that a knowledge and learning management infrastructure is required in order to realize every knowledge organization as a learning organization capable of exploiting the organizational knowledge wealth.

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Introduction

The understanding of project and knowledge management convergence has to be based on a context of analysis. In our research work the concentration is on knowledge-intensive organizations where the knowledge is the vital resource. In this context, research units, R&D departments, universities, academia, IT and business consultancy industry are involved in projects where the interaction of various stakeholders with different cognitive levels, experiences and skills promotes the preparation of deliverables within pressured deadlines. This description assumes that the projects outcomes are milestones in a knowledge management activity and the various deliverables are just knowledge exploitations in meaningful formats (Pemberton and Stonehouse, 2000). The implied conceptualization is that project deliverables consist of knowledge artefacts integration through a social communication process. The dimension of learning in this context is of critical importance. Learning organizations (Zairi, 1999; Lytras and Odman, 2001) are exploiting knowledge in various formats and through the establishment of effective knowledge management mechanisms promote organizational performance (Lytras and Pouloudi, 2001a; Hong and Kuo, 1999). Several interesting approaches have been proposed (Brown and Duguid, 1991; McElroy, 2000; Lytras *et al.*, 2002a,b) trying to investigate the phenomenon of integration of learning, knowledge and organizational performance. In this paper we deal with the crucial implication of learning capacity in a knowledge intensive organization. Through action research the participation in several European- and Greek-funded projects is the basis for contribution in the scope of this particular issue. The starting-point of our analysis is the understanding that project management in the context of a high quality research unit is not only a managerial phenomenon of assigning tasks and setting GANTT and PERT diagrams for the organization of work, but also mainly a cognitive iteration of knowledge exploitation in various formats.

The knowledge management approaches

Knowledge management is as old as the existence of human beings. Intelligence, the

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human mind, the constructive and qualitative exploitation of knowledge for the achievement of desired goals are the qualitative difference of humans in the natural environment. So this archetype of existence is a crucial resource. Especially in the business organizations the management of this resource is a multifaceted phenomenon.

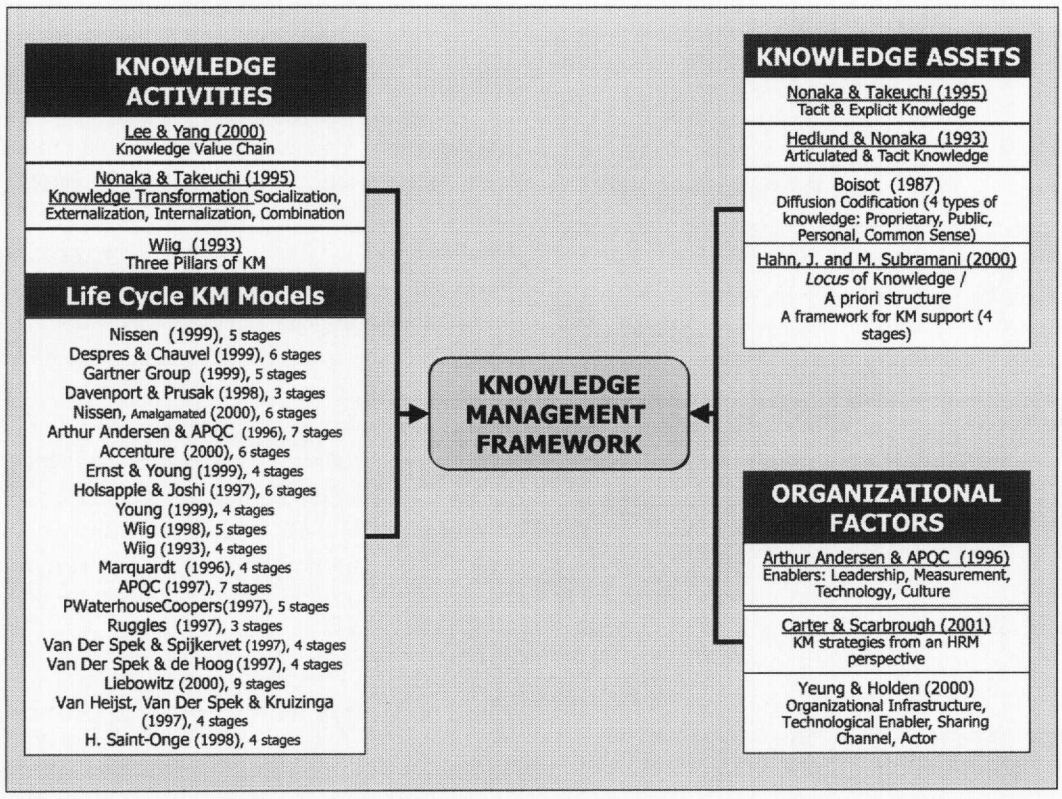
Figure 1 provides an overview of several approaches concerning the investigation of the several parameters of knowledge management. According to several researchers the phenomenon of knowledge management is investigated by describing distinctive phases that elaborate knowledge exploitation. In a business environment these activities have to support a wider web of interrelationships, politics and attitudes. The other facet is the fact that knowledge exploration promotes the realization of a reusable knowledge artefact. Past experiences, expertise, proficiency, competence – skills, capabilities and embedded knowledge of all kinds – are only a few examples of resources that in their integration promote the meaningful constructing structure element of knowledge.

In a knowledge-intensive organization this dimension of analysis is very crucial. Involvement in several projects is not a process that has a final corner-stone. The iterative process of building experiences and capacities for effective actions requires an infrastructure where the organization gains wisdom from participation in projects. Unfortunately modern business units suffer from this orientation. Their adherence to inflexible learning approaches, and their limited adaptation to facilitating knowledge as an asset set a corporate challenge. From this perspective the organization's purpose, direction, strategy, practices and culture are "soft" factors that are underestimated. These soft parameters are really worthy in the case of knowledge management where the communication, the exchange and the diffusion of knowledge require a context that promotes the knowledge management culture.

In our approach the knowledge management literature is investigated from three perspectives:

(1) By studying a number of life cycle descriptive knowledge management frameworks in order to understand how several knowledge activities have a direct effect on knowledge transformation.
(2) By investigating the nature of knowledge. Especially in the case of knowledge-intensive organizations the identification

Figure 1 An intensive KM literature mapping



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of what is knowledge has to be a task of high priority.

(3) By investigating the underpinnings of how learning leverages knowledge and secures the establishment of a flexible human resources management mechanism.

Research methodology

The XYZ research unit (we do not reveal the name of our research unit according to reviewing requirements), located in the Athens University of Economics and Business, has participated in many European-funded projects, under the programme of the European Commission, as well as Greek-funded programmes from the Ministry of Development and the Ministry of Education. The main areas of interest include electronic retailing, digital marketing, socioeconomic impact of the digital economy, e-learning, enterprise systems, process modeling, emerging e-business technologies, e-business-enabling software development tools and methods, security and availability, knowledge management. For the justification of our findings we choose to concentrate on e-learning and knowledge management projects. The main characteristic of the selected projects was our participation in the project teams. Another characteristic was the fact that in several cases we participated in more than one project at the same time and this situation required a knowledge management mechanism.

Evidence from projects

The organization of work in projects is based on work packages where specific tasks promote the preparation of specific deliverables.

Figure 2 provides an overview of the main logic in projects. Several projects run in a knowledge-intensive organization, and several project teams are working together in order to achieve the required outcomes within the given timetable. Each team utilizes the tacit and explicit knowledge of knowledge-intensive workers (Nonaka and Takeuchi, 1995; Boisot, 1987; Hedlund and Nonaka, 1993). Several people may participate in more than one project at one time, making more complex the presentation of knowledge flows in the organization. Moreover, the integration of business environment and globalization have extended the boundaries of the perceived internal space of the organization. The knowledge exploited in the projects is not an internal resource but in several cases has underpinnings in other origins outside the organizations. From the action research undertaken in our research unit a number of findings were very interesting:

- The use of a collaborative platform for the support of the knowledge workers supported a knowledge repository, where each researcher could have a reference in order to overview project deliverables or other project-specific documents. Unfortunately BSCW is mainly a repository without any concentration on the exploitation of knowledge. The training capacity that supports it is limited since a newcomer in a project team can just read the various catalogued documents.
- Many times the work of a knowledge worker/researcher could not be identified by another researcher who could use the same piece of wisdom in a relevant project. The repetition of effort in order to gain specific knowledge from other resources, even though this knowledge was dispersed within the organization, was an obvious problem. This implies that the web of knowledge diffusion and exploitation within business is not integrated.
- In the case of the training of a new researcher, the problem was the inability to support an effective learning experience. The use of BSCW could contribute in this direction but unfortunately the knowledge tapped in many deliverables was not just oriented for learning. Bryans and Smith (2000) claim that "Radical shifts are taking place in management theory; equivalent shifts need to occur, in the theory of training and development. The move towards a knowledge economy makes such a shift particularly urgent". Learning has to change in order to support the knowledge-intensive organization (Lytras *et al.*, 2002c).
- As the organization was growing up, the complexity of the knowledge web (Cohen, 1998), within the research unit, created broken links in the conceptual knowledge model of the organization. Especially in our research unit, where the

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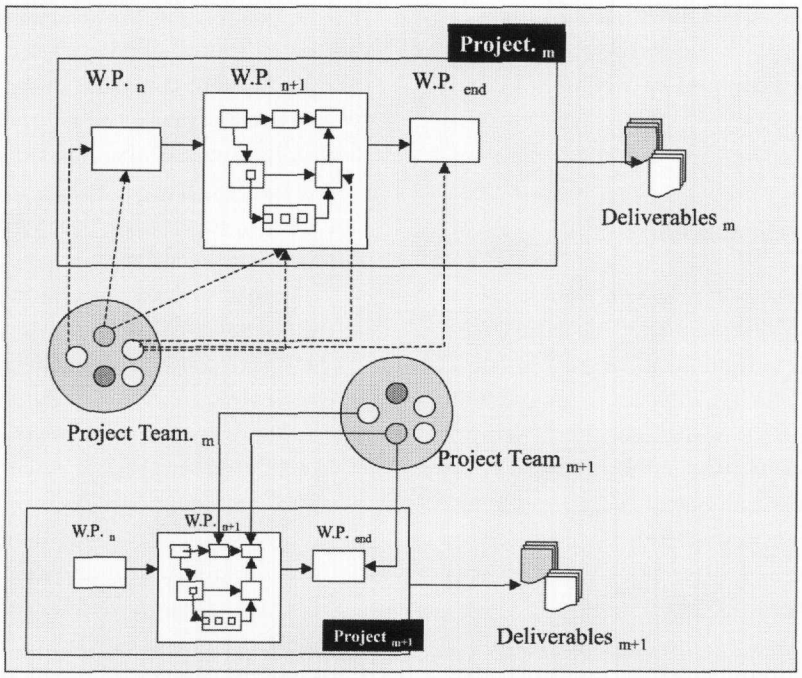
Figure 2 An overview of projects landscape in an organization



Note: W.P. $_n$ = Work Package $_n$

multidisciplinary character of the research areas is more than evident, the problem is that there is a lack of knowledge exploitation.

- The expertise of researchers in many cases was not shared with other researchers but remained trapped in their minds. A knowledge-sharing culture within the research unit was promoted by the weekly organization of a presentation where each project team had the opportunity to present the main thesis of their work. This presentation included description of the research problem, description of the project's outcomes, partners' expertise and a special session where a discussion of potential integration of obtained expertise with other research areas or future projects was undertaken. Allee (1999) makes an interesting comment concerning knowledge flows in knowledge-intensive organizations. She suggests that the term "dynamic exchanges" is preferable to the term "knowledge flow", since this is much more in line with the new appreciation of this interconnected universe of complex interdependencies. "Flow suggests only one direction, while the idea of exchanges suggests that, for every action or transaction, there is some sort of response, a more immediate impact or reaction that can be understood, appreciated, and perhaps even measured in some way". Merrill Warkentin and Sugumaran (2001) investigate the role of e-knowledge networks for inter-organizational collaborative e-business. They suggest that in the new economy, characterized by ubiquitous and often automated information-sharing capabilities, the ability to create knowledge-based networks of partners will be critical to maintaining competitive advantage.
- Especially in our research unit the nature of the disciplines that it provide the context of our work is such that requires a continuous adaptation to the knowledge that is generated. For example, consider the case of mobile commerce technologies or the e-business-enabling software development tools where the knowledge life cycle is short since knowledge creation is a common phenomenon and technology evolution causes radical obsolescence.

If we put the emphasis of the analysis on e-learning and KM projects, then the problem is highlighted more. These cases are typical examples of what is happening when the

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deliverable of the work is an intangible asset with knowledge ingredients:

- In the cases where learning material for e-learning courses was required concerning some of the areas that our research unit involves, we had to spend much time and to put in enormous effort in order to collect knowledge elements. Moreover, when asking senior researchers to provide us with educational material, they felt uncomfortable since their knowledge capacity did not imply a role of learning facilitator.
- The development of learning material could not integrate the various knowledge objects (reports, deliverables, technical annexes, proposals, articles, documents, etc.) that were dispersed in the computers of the various researchers. The same was evident for the bulk package of deliverables from all the projects of the research unit, that remained unexploited on the shelf. This observation was really disappointing. It was not the fact that researchers of different areas were not allowed to read them but that they did not feel the need to explore the knowledge wealth of these deliverables. In many cases there were a direct linkage and relation of the content with their work but they did not know of their existence. Undoubtedly this fact causes a gap in performance. And unfortunately this gap is of critical importance since the effect of integrating different knowledge resources is not cumulative but exponential. Consider a researcher specializing in e-learning and knowledge management capable of exploiting the knowledge of other researchers who are experts in the fields of e-business, information systems or electronic retailing, digital marketing, and the socio-economic impact of the digital economy. This is the challenge in the context of the knowledge economy – the multi-disciplinary knowledge worker, who maybe does not have expertise in every field but is capable of understanding the main issues. The same story of the forest and the tree applies to the management science. Specialization in a field, especially in research environments, limits inspiration. Knowledge generation (Choo, 1996; Madhavan and Grover, 1998; Bhatt, 2000) is fertile if we are able to secure the conditions for inter-organizational learning and knowledge exploitation motivation (Merrill Warkentin and Sugumaran, 2001). The case of organizational learning or the knowing organization is not a theoretical abstraction but poses specific implications in an organization (Habermann and Scheer, 2000; Lytras and Odman, 2001; Brown and Duguid, 1991). According to Bhatt (2000): "Unlike manufacturing and operational processes, knowledge development processes are often chaotic, unstructured, and unsystematic, resulting in intangible products. In knowledge works, organizing strategies should be defined and initiated based on knowledge development phases (e.g. knowledge creation, knowledge adoption, knowledge distribution, and knowledge review and revision). Each phase, in the knowledge development cycle, needs to be evaluated in the context of its characteristics on repetition, standardization, reliability, and specifications".

The above findings describe the situation of a knowledge-intensive research unit, where knowledge is the most important asset, but unfortunately, despite the high performance, there is a question concerning how this performance would be speeded up if the management of knowledge was more effective (O'Dell and Grayson, 1997). The common statement only "If we knew what we know" is not a verbalism. It stresses the importance of establishing mechanisms that install knowledge management as a value driver at different levels. In the next section we will try to elaborate our contribution, the knowledge management and learning infrastructure for effective project management exploitation.

Towards the development of a framework

Understanding of the role of knowledge management in project environments can be investigated better if we assume as a first step in our syllogism that KM is targeted at the maximization of knowledge-related effectiveness.

Wiig (1997) recognizes four areas where the contribution of KM is evaluated as being of critical importance. Figure 3 provides an interesting overview of the stated propositions.

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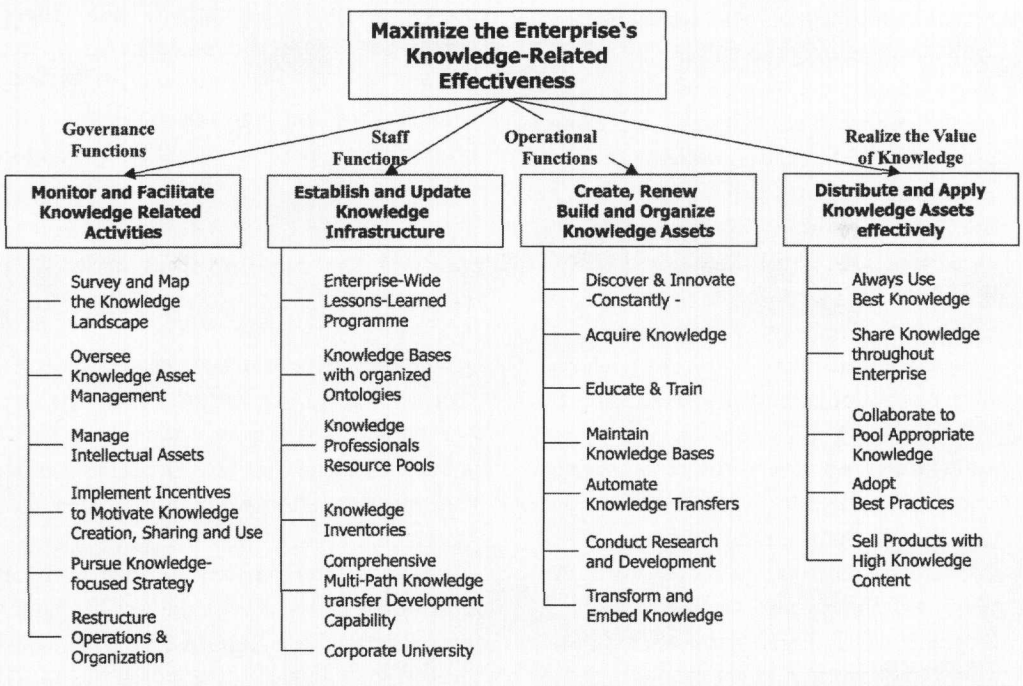
The monitoring and facilitation of knowledge-related activities refer to governance functions, which set a context for knowledge exploitation. The second area of importance for KM relates to the establishment and update of the knowledge infrastructure, which is the required vehicle for the support of any initiative in technological terms. The third area refers to the creation, renewal, building and organization of knowledge assets. The realization of knowledge value is the final variable in KM implementations. Each of these factors in project environments promotes a context for KM convergence and exploitation. If we review carefully all the related activities then we can admit that KM in general integrates people, processes, behavior, attitudes, business objectives and available resources in a manner where the desired outcome is organizational effectiveness. In project environments the whole spectrum of Wiig's model is quite evident. We believe that in this abstraction the role of learning, which leverages knowledge and behaves as such a value carrier, has to be emphasized. Knowledge is perceived to be the capacity for effective action. But actions are realized through behaviour, which is affected by learning. In the case of knowledge-intensive organizations the human factor has to be appreciated.

Learning in Figure 3 is a hidden factor, another knowledge-related activity that is assumed in every aspect of effectiveness. In our approach the objective is to position this factor in conjunction with knowledge as two value drivers. For this reason we decided to concentrate our analysis mainly on two aspects of the knowledge management phenomenon that seem to match in the context of project environments. The first aspect refers to the continuum of knowledge processes that describe the whole phenomenon. Especially in projects environments this dimension is of critical importance. The understanding of activities that facilitate the management of knowledge provides a common framework for the perception of the dynamic flows. From this perspective we will consequently investigate the knowledge life cycle from the perspective of a knowledge worker and the way that this abstraction facilitates the organizational learning capacity in projects environments. The second aspect refers to the definition of knowledge as an artefact. Especially in knowledge-intensive organizations knowledge is mainly tacit and the effort to transform it to explicit formats is not the easiest task.

In the next section we will try to investigate these two aspects by providing a thorough literature review of relevant research works. The ultimate objective is to reveal a framework that in descriptive form could assist knowledge management in knowledge-intensive organizations.

Figure 3 Four areas of knowledge management emphasis



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The evaluation of knowledge management life cycle frameworks

Two interesting papers investigate the KM life cycle frameworks. The attempt to model knowledge activities in a life cycle model is interesting since the distinction of several phases permits the further analysis of requirements for the support of KM activity in each phase. Two interesting papers that investigate this aspect are Nissen *et al.* (2000), as well as Hahn and Subramani (2000).

In Figure 4, we present an adaptation of Nissen *et al.*'s (2000) work concerning the integrated analysis and design of knowledge systems and processes. Four frameworks are overviewed and the amalgamated model consists of six phases. The main finding is that learning as a phase is underestimated. There is not even one model that recognizes the special role of learning in the life cycle of knowledge management. The knowledge activities depicted can be realized in any knowledge-intensive organization. Unfortunately the descriptive nature of these models does not imply the way in which knowledge-intensive organizations can improve performance.

Rubenstein-Montano *et al.* (2001) provide a systematic analysis of 15 more life cycle models that have been proposed (Accenture, 2000; Ernst & Young, 1999; Holsapple and Joshi, 1997; Young, 1999; Marquardt, 1996; O'Dell and Grayson, 1997; Ruggles, 1997; Van der Spek and Spijkervet, 1997; Liebowitz, 1999; Van Heijst *et al.*, 1997; Saint-Onge, 1998; Wiig. 1998).

Many of them are proposed by consultancy companies who have implemented for many years knowledge management projects. A critical overview of these frameworks permits and to claim that several terms are used in order to describe the same knowledge process/activity. A synthesis of the various ideas is provided by Lytras *et al.* (2002a). Figure 5 provides a synopsis of the investigated KM models. These models will provide a context of the the synthesis concerning our contributions.

In the case of project environments the context is very specific. The organization utilizes various internal and external knowledge resources and this knowledge is transformed in deliverables that have specific target groups. If we assume that in the knowledge-intensive organization the overall knowledge is trapped in a general knowledge base, then we have to consider transformations of knowledge in reusable formats that correspond to different project contexts. In many cases of our research we found enormous repetition of effort concerning knowledge that has been previously generated but unfortunately was untracked in the knowledge web of the organization.

Figure 4 KM frameworks

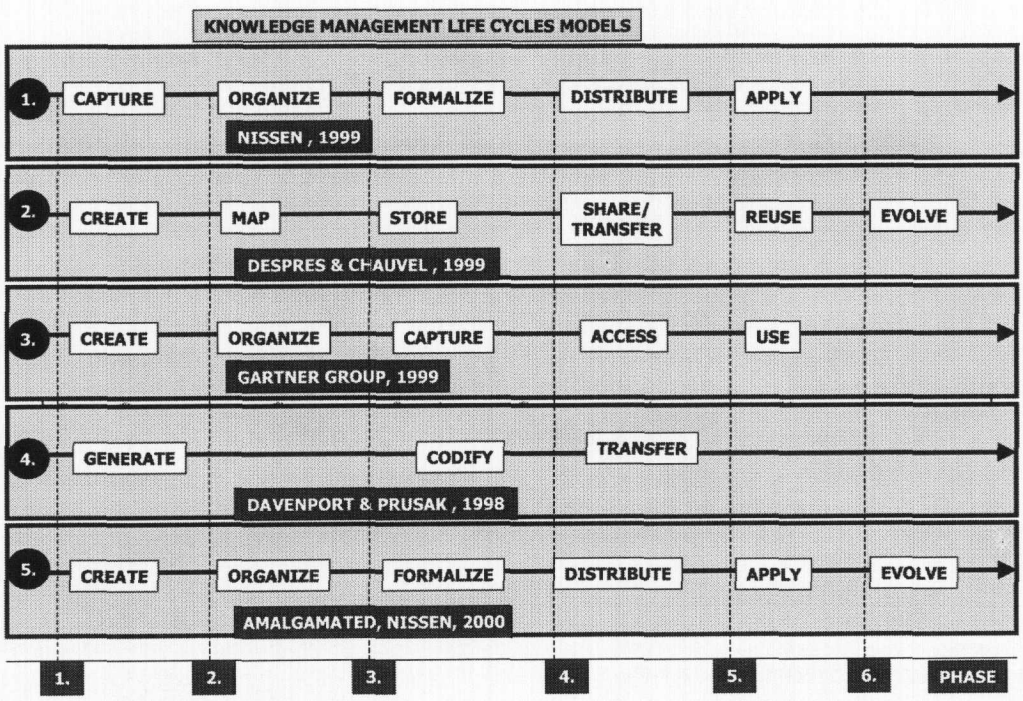

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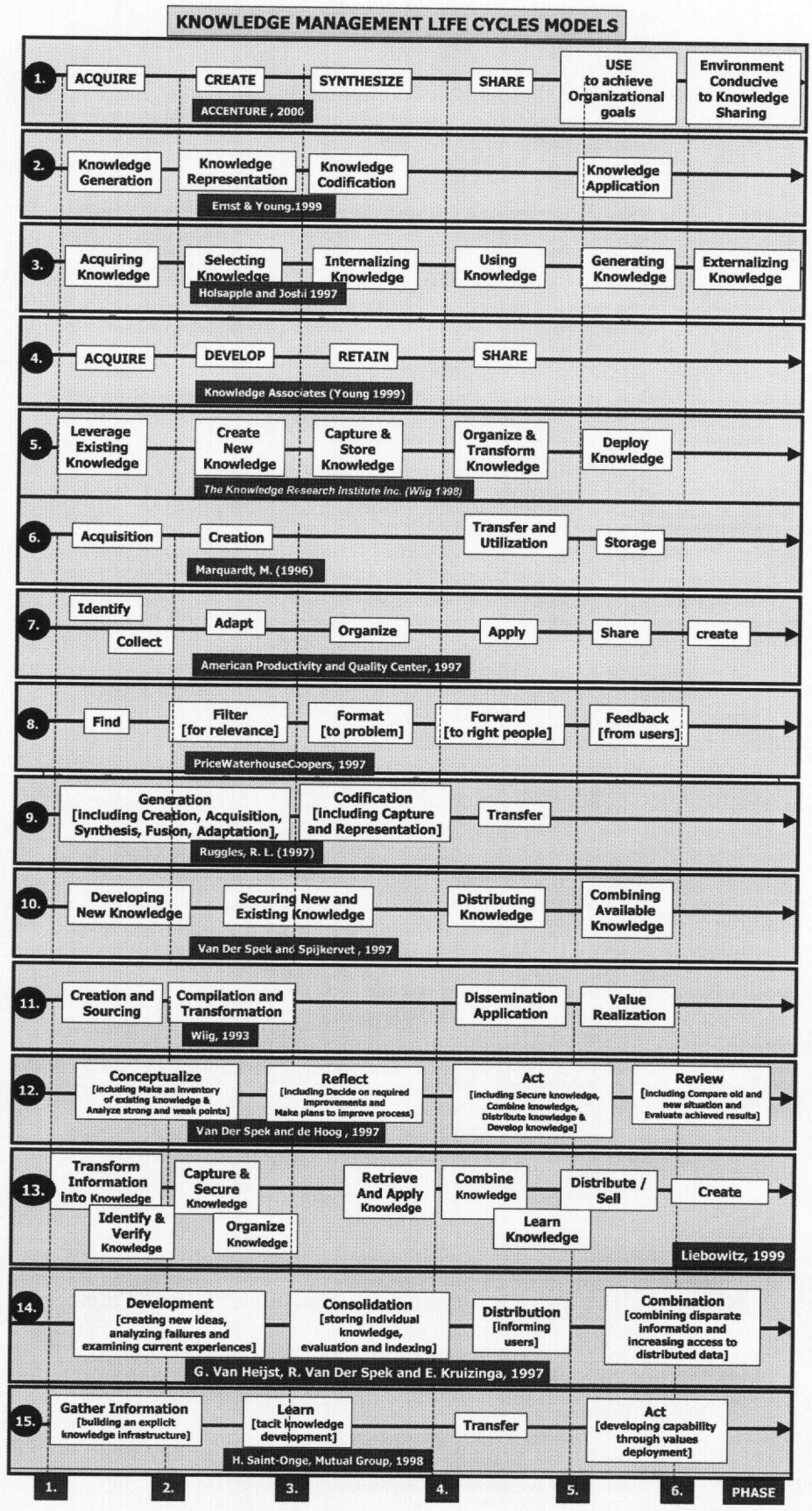
Figure 5 An overview of knowledge management frameworks



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The inefficiency in learning exploitation of knowledge is of critical importance for knowledge-intensive organizations. A new era of knowledge management tools is targeting this mass market. For example, the MODEL IST project (http://www.model2learn.org) is investigating the way that the dynamic delivery of case studies can support executives' training in business units. In the next section we try to provide a conceptualization that potentially can pose specific technological implications in the direction of sophisticated knowledge management tools.

The knowledge artefact aspect of knowledge management in project environments

The reasoning behind what knowledge means in a knowledge-intensive organization is a complex issue. The interaction of people within specific business processes and a given organizational structure and mission and the openness of every organization in the context of globalization challenge the anticipation of a knowledge base. Organizational memory (Ackerman and Halverson, 1999; Habermann and Scheer, 2000) is not an abstract idea. We have to specify the various flows and to determine the relevant contributions in a reusable context where performance is concerned as a knowledge-oriented achievement.

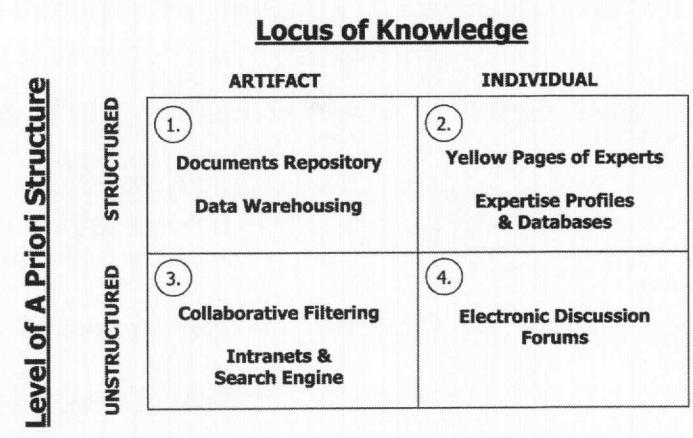
Hahn and Subramani (2000) recognize two important factors for the classification of knowledge and a framework that describes the way that each knowledge type can be supported. The main distinction is that two parameters vary the nature of knowledge, namely the *locus* of knowledge and the level of perceived a priori structure. The artefact or the individual *locus* is of critical importance for knowledge intensive organizations. In our research unit this is evident. A number of experts or researchers retain in their minds excellent expertise in various fields and in parallel a number of artefacts contain the wisdom (e.g. project deliveries, technical annexes, proposals, research papers and various publications). The a priori structure is of critical importance also. Common sense dictates that structure promotes reusability and facilitates the knowledge management. But in many cases the unstructured means are leveraging knowledge generation more effectively. Electronic forums, collaboration tools, and the utilization of information that is dispersed in a business intranet are considered to be unstructured pieces of knowledge. From this perspective the framework of Hahn and Subramani gains flexibility and can support knowledge management in various forms. The context of a project environment and the case of our research unit can use the matrix of Hahn and Subramani in order to position the various elements of knowledge wealth. The challenge is to leverage the hidden capacity of knowledge workers in the direction of integration.

The framework depicted in Figure 6 stresses the variety of approaches that potentially can support knowledge management in an organization. In our research unit a documents repository, expertise profiles and collaborating filtering through intranets and search engines are provided. The available electronic discussion forum is not a typical one but the concept of forum is provided in many cases for the specific scope of a research area (http:// www.mobiforum.org, http://www.ist-domino.net). The critical question concerning all these applications is their effectiveness in supporting the leverage of knowledge and the generation of new knowledge through learning.

A proposed framework for knowledge management and learning convergence in knowledge-intensive organizations

One implication of the two general pillars of KM literature that were investigated is the understanding that in a project environment a number of knowledge activities are taking

Figure 6 A framework for knowledge management support



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place integrating the various stakeholders and through a constructive approach promote the preparation of deliverables. These two approaches can be investigated in a different context. Can we define a way of standardization where the concept of a knowledge repository does not imply just a library of electronic documents but incorporates various value components that are exploitable for the objectives of a project?

In Figure 7 we propose an integration of three basic contributions: the four areas of knowledge management emphasis proposed by Wiig (1997), the knowledge value chain proposed by Lee and Yang (2000), and the integrated learning knowledge management framework proposed by Lytras *et al.* (2002a). The main underlying concept is the critical role of the human factor in knowledge management. Knowledge management is not a technological phenomenon but is mainly a qualitative shift in people's behaviour within business environments that challenges knowledge sharing.

Additionally, since learning is the main carrier of behavioural changes and a facilitator of commitment, these two archetypes converge. Especially in the case of knowledge-intensive organizations where knowledge creation is the prerequisite for the securing of viability, learning performance relates directly to knowledge management effectiveness. The knowledge management infrastructure as a theoretical abstraction incorporates three of the four areas that were depicted by Wiig, and additionally incorporates the alignment of organizational strategy in a knowledge management philosophy direction. In the knowledge management processes section of the Figure the detailed analysis of the life cycle KM models is summarized in six processes that in a following section will be explained further. In the centre of the value chain the learning infrastructure is highlighted. Learning as a function and as a corner-stone in knowledge exploitation impacts every aspect of the whole model. The critical question is how we can boost learning performance in knowledge-intensive organizations, and how the learning content can be derived from the knowledge or the wisdom that several artefacts and individuals manage. In Figure 8 the proposed integrated model is presented in more detail.

The basic idea is that project teams interact with the project context through a facilitating knowledge management and learning layer. This layer consists of two general pillars: knowledge management and the learning infrastructure. In particular they have to be seen as an integrated whole. Knowledge management and learning are two facets of the same business attitude: the adaptation of organization to the environment. The knowledge worker utilizes the intervening layer in order to get prepared for his participation as a member of a project team. His/her personal capacity, including experiences, cognitive, level skills and expertise, are inputs into this facilitating mechanism. The depicted analysis of each infrastructure has a knowledge management orientation. Several phases are distinguished in order to be clear that projects are mainly knowledge transformations where the dynamic flow of knowledge objects promotes the integration of meanings. The KM infrastructure includes six phases that

Figure 7 Knowledge management and learning infrastructure in knowledge-intensive organizations

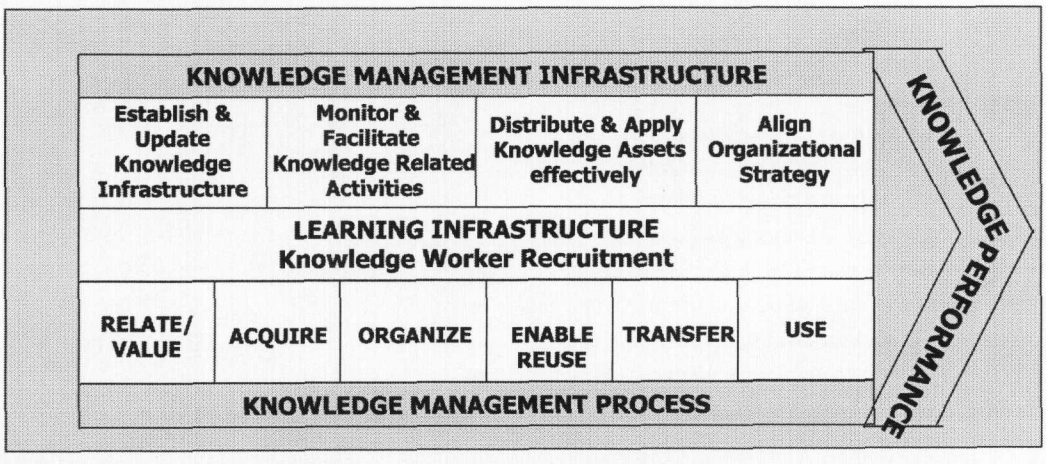

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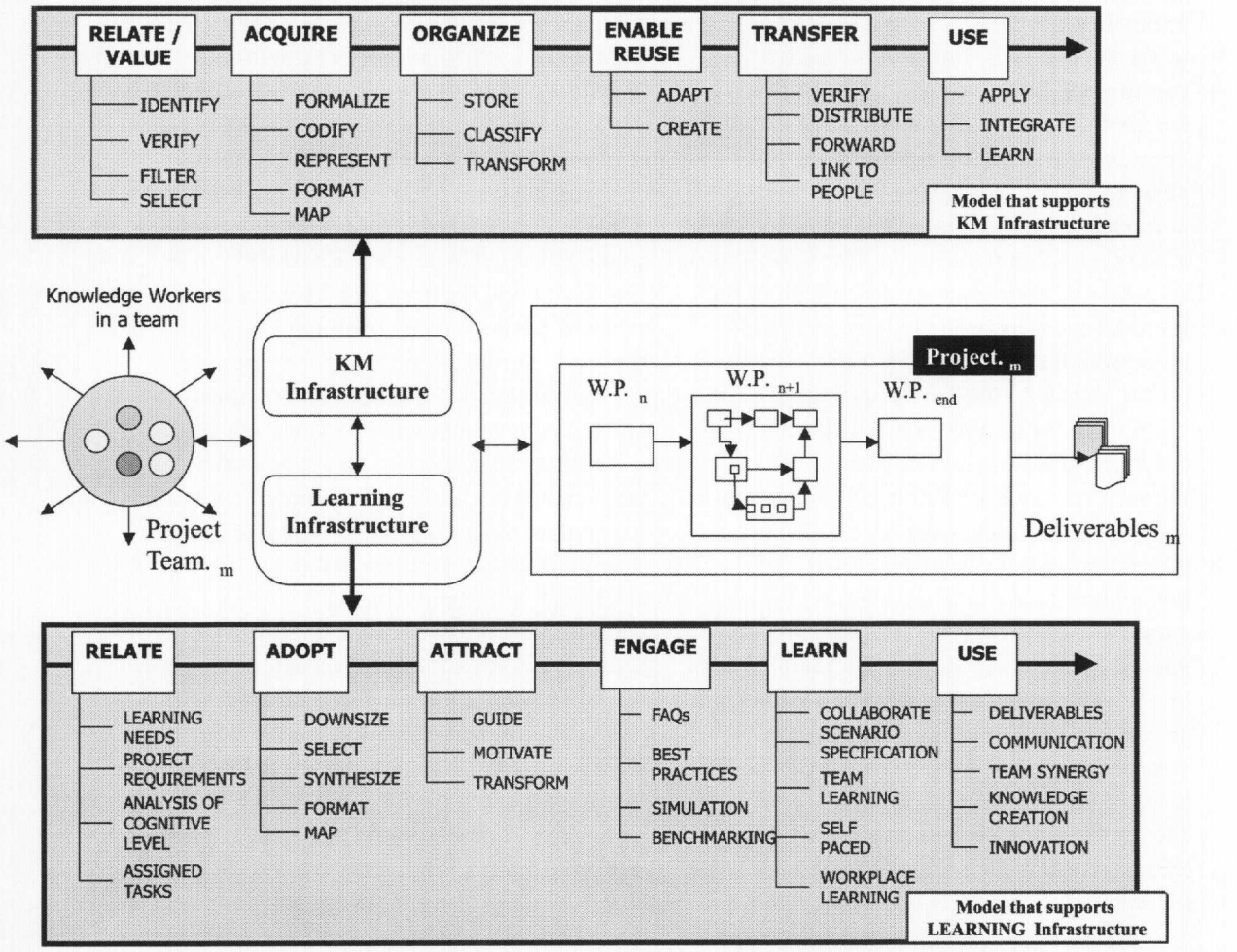
Figure 8 An integrated model for KM and learning convergence in knowledge intensive-organizations



summarize the main activities that were depicted in life cycle models. Each phase intends to investigate deeper the route of sequence. In an abstract way the KM infrastructure describes the way that several knowledge sources in individuals' minds or in knowledge repositories are determined, evaluated and transformed in a capacity for effective action. The orientation of this continuum is not on cataloguing stages but in value-adding processes.

In a project environment the RELATE/ VALUE process is very specific. The project requires the team member to verify, identify, filter and select the knowledge objects that promote the objective and facilitate the undertaken role. The knowledge web of the organization, sources of knowledge outside the organization and the ego of the project member are thoroughly investigated in order to formulate an exploitation plan of selected knowledge elements. This cognitive process requires a well-established knowledge repository and a knowledge-sharing culture.

The ACQUIRE process refers to the ability of the project team member to formalize, codify, represent, format and map the knowledge elements in order to secure their existence in an exploitable format. The information resource is enriched in order to make available a number of metadata that describe the resource. The next two phases, namely the ORGANIZE and the ENABLE REUSE, establish administrative mechanisms for the exploitation of catalogued knowledge. The capability of the KM infrastructure to support the reusability and the flexible management of resources is very critical. In this context the standardization is a process that facilitates the overall goal. Unfortunately the KM standards are not widespread and many initiatives investigate the standardization issue. The phase of TRANSFER has to be designed very carefully. The establishment of knowledge paths, where knowledge repositories and specific knowledge objects are linked to people, promotes the exploitation of knowledge. Finally the USE stage is

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goal-oriented. Knowledge that has been transformed in reusable formats must be applied in the context of specific projects, has to be integrated in order to construct meanings of higher value and of course has to support the learning process. This organization of logical assumptions concerning the knowledge flow is not an abstraction that facilitates a descriptive model. The practical implications refer to the ability to define in each stage of the model all the required technological components that increase the effectiveness of KM.

The learning infrastructure expands further the KM infrastructure and promotes deeper the exploitation of knowledge wealth. Consider the assumption where all the technological capabilities for each stage of the KM infrastructure have been developed. The learning infrastructure utilizes the communication channels, the established knowledge repositories, the metadata, and all the corresponding technological components in order to develop a flexible learning environment that supports knowledge workers in every step of their involvement in projects. The model that supports the learning infrastructure includes six learning-oriented processes that intend to develop a kind of learning product for the knowledge worker. This subsystem includes dynamic features: in the RELATE stage the interaction of the knowledge worker with the subsystem permits the recognition of his learning needs. The system has to consider the specific project requirements and, after a detailed analysis of the cognitive level of the knowledge worker, to set the basis for a learning scenario where the main effort is to support the assigned tasks of the knowledge worker. In the ADOPT phase the learning infrastructure recognizes that the knowledge trapped in knowledge repositories is usually in big containers and from this perspective the downsizing is required in smaller, meaningful learning units through a selection, synthesis and formulation of the key aspects in each, catalogued by the KM subsystem document (for example, deliverables). The ATTRACT stage is targeted at the the motivation of the knowledge worker to use the learning infrastructure and to participate actively in the usage scenarios that describe the functions of the subsystem. A systematic guidance and the attachment of motivational elements are two features that have to be incorporated in the meaningful learning units that are distinguished in the learning infrastructure. To this end the learning infrastructure has established a context of meaningful learning units that have been derived from the general knowledge repositories. The next stages utilize learning as an active participative process. In the ENGAGE stage the knowledge worker is capable of overviewing FAQs, documents, best practices reports, simulation sessions, and benchmarking reports. The LEARN process permits the learner to collaborate and to learn through learning scenarios that incorporate several models of learning, e.g. team learning, self-paced learning, workplace learning and e-learning. The ultimate objective is the reinforcement of knowledge workers to be able to increase their capacity for effective action. The exploitation of deliverables, the establishment of communication or communities of practices, the recognition of team synergy as a value driver set a context of use of knowledge. Knowledge creation and innovation are considered to be the ultimate objectives of the learning infrastructure. Learning is not a passive process of absorbing knowledge. The new generation of learning platforms must promote the dynamic construction of learning scenarios for specific learning needs and is not just a book-based approach of reading static modules of content (Lytras and Pouloudi, 2001b). In this direction the semantics enrichment of knowledge objects is of critical importance (Lytras *et al.*, 2002c).

Conclusions

The presentation of the proposed model in this paper was from a descriptive point of view since we tried to summarize our syllogism. Our research unit is working hard in the direction of specifying extensive semantics that transform this descriptive model into an advanced tool for KM exploitation. XML language is used in order to specify several document types definitions and to define the value container, which could be knowledge and the learning product.

The main conclusion is that knowledge management and learning convergence in knowledge-intensive organizations require an enormous effort of metadata/semantics enrichment of knowledge objects and an extensive capability for exploiting knowledge from dispersed applications. This area can

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really derive wisdom and from the enterprise application integration concept. Learning has to integrate information resources that are generated through a variety of systems. A hidden learning infrastructure has to act as an information receiver, and our proposed model describes the basic concept, that learning is utilizing knowledge.

The practical implications of our theoretical propositions aim at the development of a new KM infrastructure that will promote learning as a major functionality. Of course the realization of our ideas in such a system is demanding in terms of required effort from knowledge providers. The extensive annotation of resources needs a cultural and behavioural change. People very often do not share knowledge and the success of such a KM tool requires dynamic knowledge flows and metadata. Projects environments define a huge market for the exploitation of such a product. The realization that such a tool is required from the industry is evident through a survey that was undertaken in an IST project where our research unit participated. In this direction and since the vision of the development of a KM tool that puts emphasis on learning needs as a multidisciplinary instrumentality, we welcome support in the direction of the preparation of a proposal for a project.

Further research

In the current stage of our research we are conducting an exhaustive analysis of proposed metadata schemata and we investigate the formulation of KM standards concerning the semantic enrichment of knowledge and learning objects. A prototype has been developed and we are trying to get feedback from stakeholders. The justification of "valuable" metadata and semantics is going to provide the infrastructure for the establishment of dynamic KM systems that make real the verbalism of knowledge management and learning convergence. At the back of our minds is the international launch of such a product.

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