MGKME: A Model for Global Knowledge Management within the Enterprise

Michel Grundstein
Lamsade Paris Dauphine University - MG Conseil, France
mgrundstein@mgconseil.fr

Abstract: This article, introduces a Model for Global Knowledge Management within the Enterprise (MGKME). This model supplies a global vision that reconciles the two main approaches underlying KM, a technological approach, and a managerial approach. It can be seen as a pattern useful for the conception and for the implementation of a Knowledge Management System (KMS) that would integrate individual as a component of the system. .

Keywords: KM, Capitalizing on company's knowledge assets, Deming's wheel, Organizational learning, Japanese concept of *Ba*, MGKME.

1. Introduction

Numerous Knowledge Management (KM) Frameworks have been suggested all over the world as mentioned in the European Guide to Good Practices in Knowledge Management edited by the European Committee for Standardization (CEN-CWA 14924-1, 2004,). According to our contribution to this project, we could distinguish two main approaches underlying KM: (i) a technological approach that answers a demand of solutions based on the technologies of information and communication (ICT); (ii) a managerial approach that integrates knowledge as resources contributing to the implementation of the strategic vision of the company. Moreover, we could observe that few of them were "*people-focused"* as highlighted by Wiig (2004). In order to fill in this gap, we have conceived an empirical model called *Model for Global Knowledge Management within the Enterprise (MGKME)* that is the object of our on-going research.

Even so, KM becomes a reality in the implementation of a system, which is, paraphrasing Joel de Rosnay (de Rosnay, 1975): "*A set of components in dynamic interaction organized according to a purpose*." The purpose of this system is to amplify the utilization and the creation of knowledge so as to improve the enterprise's effectiveness. This system is often called Knowledge Management System (KMS) although this term "*does not seem to have a consensus definition*" (Jennex, 2005, p. i). So we have to distinguish between a model for a KM initiative and a KMS which is its implementation in the real world.

In this paper, after having set out the background theory and assumptions, we make an in-deep description of the underlying and operational elements of the MGKME. Finally, we put in perspective how this model could serve as a pattern to implement a KMS that would integrate individual as a component of the system. This should result in conceiving KMS giving means to allow individuals to be autonomous and to achieve their potentialities.

2. Background Theory and Assumptions

Very often, KM is considered from a technological viewpoint that induces to consider the knowledge as an object, and so to disregard the importance of people.

For example, let's see the European Project Team, in charge to elaborate *The European Guide to Good Practice in Knowledge Management* on behalf of the European Committee for Standardization Workshop on Knowledge Management, which was running from September 2002 till September 2003 (CEN-CWA 14924-1, 2004). This team has collected, categorized and analyzed more than 140 KM Frameworks, in order to identify those elements and aspects that are mostly widely used over the world. It may be noted that this work has produced a high-quality practical outcome that can be used as a reference point to achieve a good understanding of the KM. Nevertheless, as contributors to this project, we can underline the predominant positivist paradigm and the technological approach of KM that have inspired the project team. As a result, the authors consider a system of interrelated objects that can be described independently of individual. That has induced them to consider the knowledge as an object, and so to disregard the importance of people. The authors place too little emphasis on

knowledge creating activities that, as mentioned by Davenport and Prusak (1998), "*take place within and between humans*" (p. 6).

In the same way, Jennex and Addo (2005), borrowing from the Knowledge Management and Organizational Learning literature define KM as:

> *"the process of selectively applying knowledge from previous experiences of decision making to current and future decision making activities with the express purpose of improving the organization's effectiveness" (p.536). This lead to the goals of KM being:*
>
> - *Identify Critical Knowledge,*
> - *Acquire Critical Knowledge in a Knowledge Base or Organizational Memory,*
> - *Share the stored Knowledge,*
> - *Apply the Knowledge to appropriate situations,*
> - *Determine the effectiveness of using the applied knowledge,*
> - *Adjust Knowledge use to improve effectiveness."*

Accordingly, they conclude by the following definition of a KMS: "*A KMS is the system used to accomplish these goals.*" Doing so, it seems that these authors agree with the technological approach: from our point of view, they consider that knowledge can be handle as if it was an object, without any relation with individual's perspective.

Although this idea is greatly shared, we insist on the importance to integrate the individual as a component of the system. In fact, relying on the professor Tsuchiya's works (Tsuchiya, 1993), we argue that knowledge is dependent of the individual's mental model and the context of his action. Consequently, knowledge resides primarily in the heads of individuals, and in the social interactions of these individuals. It cannot be consider as an object such as data are in digital information systems. Likewise, information can be misunderstood as it makes sense for an individual through his interpretative framework. As mental models and interpretative frameworks are directly forged by cultural factors, it induces to stress the role of cultural factors when social interactions and sharing information and knowledge are essential to enable efficiency in the global economy. This has been pointed-out by Cohen and Prusak (2001) under the Social capital concept: "*Social capital consists of the stock of active connections among people: the trust, mutual understanding, and shared values and behaviors that bind the members of human networks and communities and make cooperative action possible*" (p.4).

Actually, as mentioned by Grundstein and Rosenthal-Sabroux (2003): "(*Employees) become decision-makers who use and produce more and more knowledge as a basis for their efficiency… Commonly pointed out as « Knowledge-Workers», (they) have to access know-how and skills widely distributed in the global and influence spaces of their organization… The computerized workstation becomes a window opened on the company's planetary space of activities*" (p. 979). As a result, the information and application portals have become essential for the knowledge workers who have to share with colleagues disseminated all around the world.

Thus, portals must be seen as collaborative information systems, as mentioned by Chua and Brennan (2004) in their study on Collaborative Knowledge Management System (CKMS) defined as follows: "*A Collaborative Knowledge Management System (CKMS) is an integrated systems tool that enables collaboration between its users and its components*" (p. 171). They emphasize that "*one of the most important components of CKMS is the knowledge workers, which are also the users of the system, and the workspaces they are associated with*" (p.172). Moreover, analyzing ISO/IEC 9126 (1991) Quality Standard, Chua and Brennan point out that, "*existing interpretations of ISO 9116 account for their role as users however not for their role as systems components*" (p. 172).

In this paper, we argue that we need a systemic vision that leads to emphasizing the link between knowing and action, with due regard to the basic constraints of the social system, that is to give a sense to working time: KM initiative should result in a KMS that takes into account the individuals, and which has to allow them to be autonomous and to achieve their potentialities.

The MGKME, described hereafter, supplies a vision that fosters a "*people-focused KM*" as proposed by Wiig (2004): "*our emphasis is on people and their behaviors and roles in enterprise operations*. (p. XXV)." It establishes a complementary approach based both on our experience within the industry, and on our research works. It rests on the *General System Theory* first established by von Bertalanffy who cares very much on the humanist approach (von Bertalanffy, 1968, p. XI). It is inspired by the

work of Morin and Le Moigne (1999) who focused on Complexity. Moreover, the MGKME presents an attempt to articulate the *Deming's Cycle* (Martin, 1995, p. 207) and the *Single-Loop Learning and Double-Loop Learning* defined in the Argyris & Schön 's organizational learning theory (Argyris & Schön, 1996). Thus, we will point out the key contribution of KM to *Change 2* defined by Watzlawick, Weakland and Fisch (1975).

3. MGKME Description

The MGKME supports our full meaning of KM that is: "*the management of the activities and the processes that amplify the utilization and the creation of knowledge within an organization, according to two additional goals closely interlinked, and their underlying economic and strategic dimensions, organizational dimensions, socio-cultural dimensions, and technological dimensions: (i) a patrimonial goal; (ii) a sustainable innovation goal.*"

The MGKME should be seen as an empirical model. It consists of two main categories of elements: the Underlying elements and the Operating elements. Each of those elements is described here after (ref. figure 1).

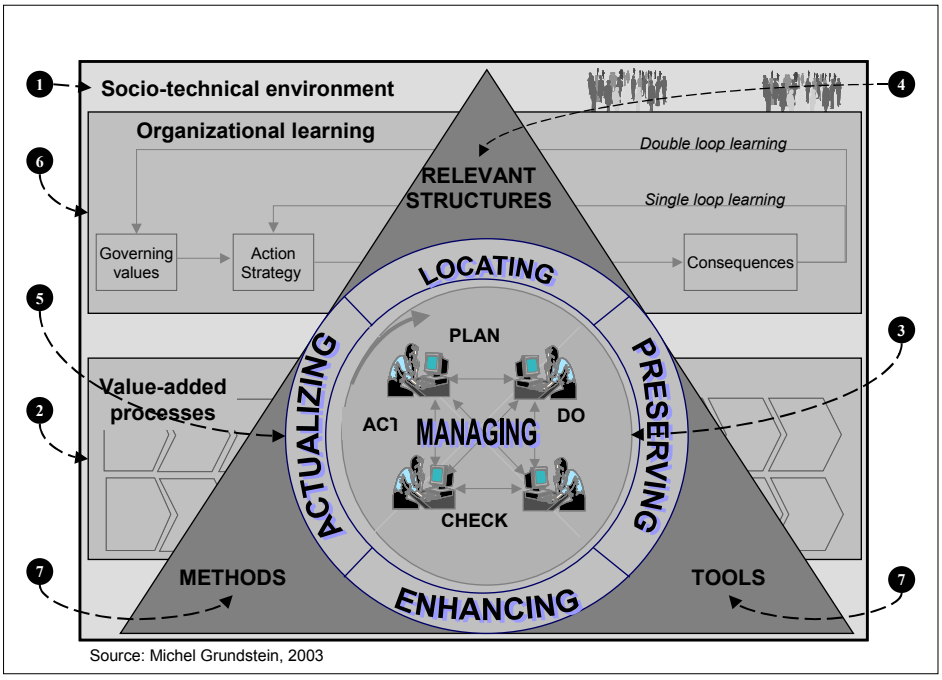

Figure 1. Model for Global Knowledge Management Within the Enterprise (MGKME)

3.1 The Underlying elements

The core knowledge is embodied in people heads and their abilities to utilize them, and to generate new knowledge at the same time. The information technologies and the tangible technical resources enhance their competence, while value-added processes, and organizational infrastructures are structuring their activities. Nevertheless, their social interactions are essential factors, which leverage their potentialities, and that actually enable them to achieve effective results. Therefore, from our perspective, socio-technical environment, and value-added processes are fundamental components of the Knowledge Management System. As a result, they constitute the underlying elements of the MGKME upon which the other elements should be focused.

3.1.1 Socio-technical Environment

The Socio-Technical Environment constitutes the social fabric where autonomous individuals supported by ICT and tangible resources interact and are conversing through physical or virtual places (coffee machines, collaborative work spaces, weblogs, wikis, CoPs). Interacting is not enough. As pointed out by Stewart (2001): "*Making time to converse at every level of an organization is not an*

indulgence, not a luxury, it is an imperative" (p. 1). He observed what happen when interacting without conversing: "*Stories are not told and associated sense of adventure is lost; knowing is not shared because questioning is not fostered; people become isolated, angry, resentful and do what they do with no real joy; while a business may be profitable it is likely that it is not operating at anywhere near its potential*" (p. 17).

3.1.2 Value-added processes

Value-added processes represent the organizational context for which knowledge is essential factors of performance. It is in this context that is implanted a KM initiative. As pointed out by Tonchia and Tramontano (2004): "*Process Management, with the concepts of internal customers and process ownership, is becoming one of the most important competitive weapons for firms and can determine a strategic change in the way business is carried out*". These authors specify that: "*Process Management consists in the rationalization of processes, the quest for efficiency/effectiveness, a sort of simplification/clarification brought about by common-sense engineering*" (p. 20). As Process Management engenders structural changes, when doing Business Process Reengineering we should consider KM activities in order to identify knowledge that is essential factor to enable value-added processes to achieve their goals efficiently.

3.2 The Operating elements

The operating elements of the MGKME focus on the underlying elements.

3.2.1 Managerial Guiding Principles

The Managerial Guiding Principles should bring a vision aligned with the enterprise's strategic orientations, and should suggest a Knowledge Management Governance Guide by analogy with COBIT®, which concerns IT principles of coordination and control of performances (COBIT®, 2000, 2002). In particular, KM indicators must be established. Numerous publications and books relates to that subject (Bontis, Dragonetti, Jacobsen, & Roos, 1999; Moore, 1999; Morey, Maybury & Thuraisingham, 2000, section III; CEN-CWA 14924-4, 2004). From our viewpoint, two main categories of indicators should be constructed in order to monitor a KM initiative: (i) a category of indicators that focus on the impacts of the initiative favoring enhancement of intellectual capital; (ii) a category of indicators that insure monitoring and coordination of KM activities, measuring the results, and insuring the relevance of the initiative.

In addition, we should find a way to get a good articulation between the Deming's cycle and the Organizational learning (ref. figure 2).

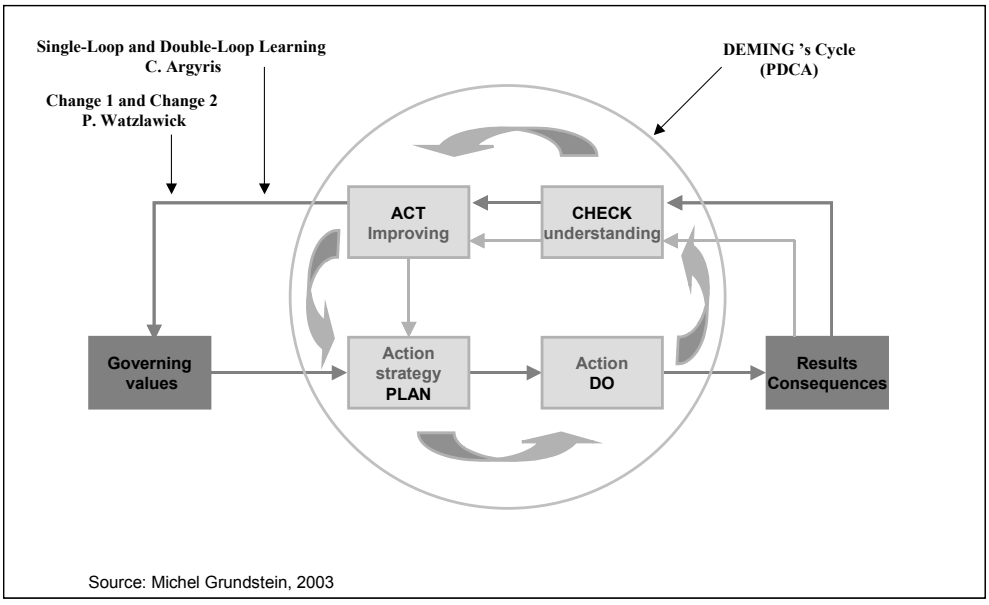

Figure 2. Deming's Cycle and Organizational Learning Articulation

Firstly, we refer to the PDCA cycle of activities – plan, do, check, and act (Martin, 1995, p. 207). This cycle, first advocated by Deming (1992) is well known as the *Deming's Cycle* by Quality Management practitioners. The PDCA cycle has inspired the ISO 9004-2000 Quality Standards in order to get a continuous process improvement of the Quality Management System.

Secondly, we refer to the *Single-Loop Learning* and *Double-Loop Learning* defined in the Argyris & Schön's organizational learning theory (Argyris and Schön, 1996). Thus, we point out the key contribution of Knowledge Management to *Change 2* defined by Watzlawick, Weakland and Fisch (1975).

3.2.2 Relevant Infrastructures ❹

The Relevant infrastructures are adapted sets of devices and means for action. Beyond a network that favors cooperative work, it is important to implement the conditions that will allow sharing and creating knowledge. An *ad hoc* infrastructure must be set up according to the specific situation of each company, and the context of the envisaged KM initiative. This infrastructure could be inspired by the Japanese concept of *Ba* that "*can be thought as a shared space for emerging relationships*" (Nonaka & Konno, 1998, p. 40).

There exist four types of *Ba* (ref. figure 3) corresponding to the SECI spiral of conversion model proposed by Nonaka in a series of article and books dating from the early 1990s. The SECI model incorporates the following: two forms of knowledge (tacit and explicit); a conversion cycle; three levels of social aggregation (individual, group, organization); four knowledge-creating processes (Socialization, Externalization, Combination, Internalization).

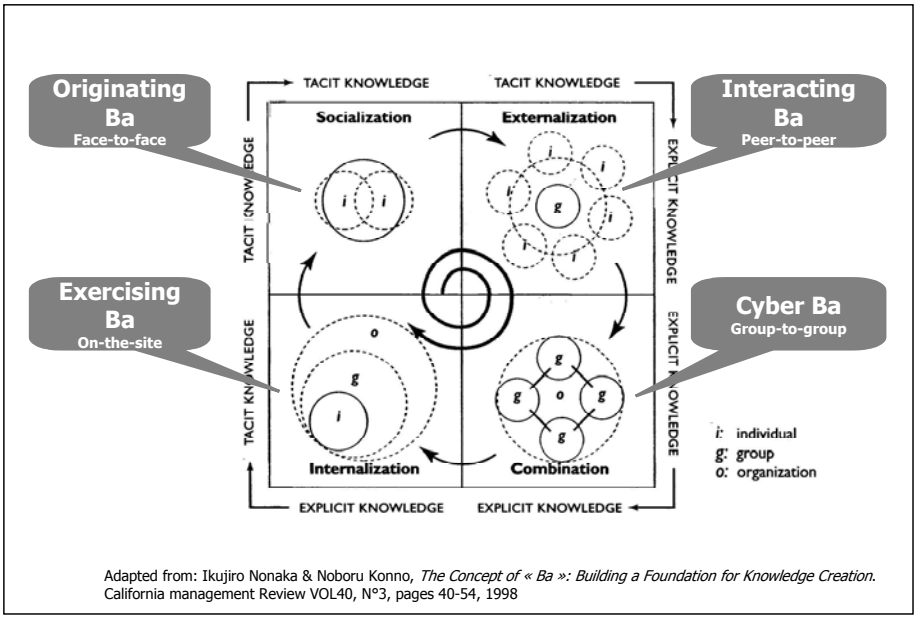

Figure 3. Concept of *Ba* and the SECI model

The four types of Ba are described as follows:

- **Originating Ba** is a place where individuals share feelings, emotions, experiences, and mental models. It is the primary *Ba* from which the knowledge-creation begins and represents the socialization phase. Physical, face- to- face experiences are the key to conversion and transfer of tacit knowledge.
- **Interacting Ba** is a place where tacit knowledge is made explicit, thus it represents the externalization process. Through dialogue, individuals' mental models and skills are converted into common terms and concepts. Two processes operate in concert: individuals share the mental model of others, but also reflect and analyze their own. Dialogue is key for such conversions; and the extensive use of metaphors is one of the conversion skills required.
- **Cyber Ba** is a place of interaction in a virtual world instead of real space and time; and it represents the combination phase. The combination of explicit knowledge is most efficiently

supported in *collaborative environments* utilizing information technology. The use of on-line networks, groupware, documentations, and database enhance this conversion process.

- **Exercising Ba** is a space that facilitates the conversion of explicit knowledge to tacit knowledge. It supports the internalization phase. Thus the internalization of knowledge is continuously enhanced by the use of formal knowledge (explicit) in real life or simulated applications.

Awareness of the different characteristics of *Ba* can facilitate successful support of knowledge creation. *Ba* can inspire infrastructures that bring the dynamism to continually create new knowledge through a cycle of converting tacit knowledge into explicit knowledge and then reconverting it into tacit knowledge.

As an illustration of *Ba* let's consider the *Semi-Opened Infrastructure of Work.* This infrastructure has been implemented in order to deploy Knowledge-Based Systems (KBS) within the Framatome Group, The French Nuclear Power Plant Company integrated into AREVA Group in September 2001 (Grundstein, de Bonnières, & Para, 1988). Today, it could be seen as a guiding infrastructure for the implementation of Organizational Learning.

The aim of the *Semi-Opened Infrastructure of Work* was to encourage the individual and the collective apprenticeship, to favor knowledge acquisition, to leverage emergence of new products, and to implement computer applications using artificial intelligence technologies. This infrastructure presents two complementary approaches: (i) Analytic approach specific to each profession, and to each discipline; this approach is based on determined and detailed models, and deductive reasoning. (ii) Systemic approach that connects elements; this approach is based on the perception of the whole, and inductive reasoning. To expand, the *Semi-Opened Infrastructure of work* requires *Multidisciplinary Competencies Group*, and the existence of an *Evolution and Progress Space*. With reference to the KBS deployment case, the functioning is briefly described below (ref. figure 4).

- The *Working Space* ❶ represents two operational units (Core Competence A and B), whatever is their geographical localization, where P1 and P4 are employees whose roles are to communicate on KBS, and to implement applications in their own unit. P1 and P4 are used to deductive reasoning.
- The *Evolution and Progress Space* ❷ represents a place, which was a physical room situated at headquarter where P1 and P4 had to work and to learn in interaction with a *Multidisciplinary Group*.
- The *Leadership Space* ❸ was constituted with engineers, organizers, and sociologists accustomed to doing inductive reasoning. This Multidisciplinary Group was in charge to deploy KBS over the whole company.

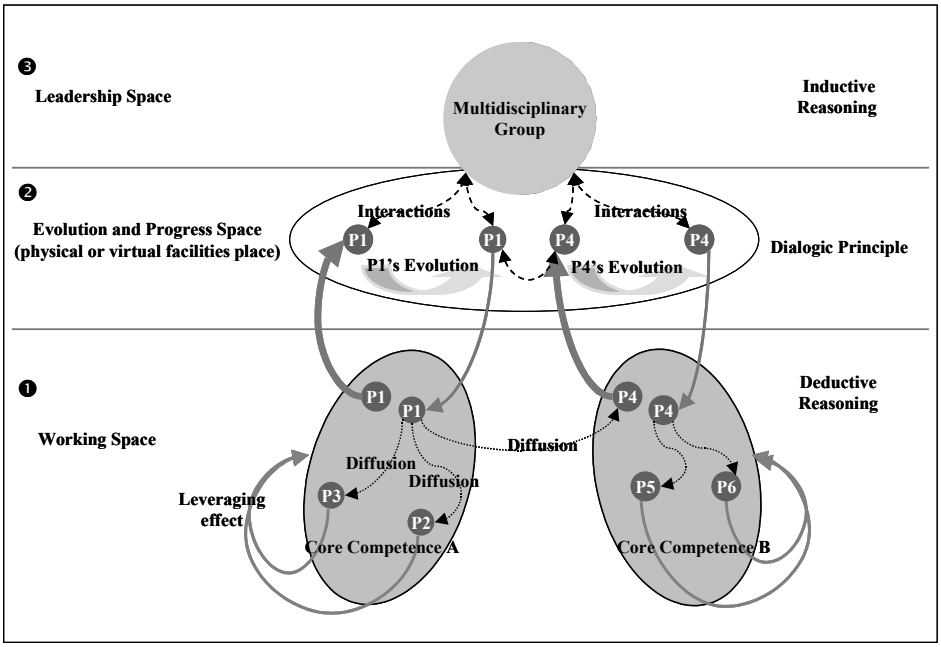

Figure 4. Semi-Opened Infrastructure for the Implementation of Organizational Learning

In the *Evolution and Progress Space*, P1 and P4 have had to practice they own deductive reasoning and to learn to work with the *Multidisciplinary Group* practicing an inductive reasoning. So two ways of reasoning had to interact. It is what, Edgar Morin call *Dialogic Principle* that "*combines two principles or notions that must be mutually exclusive, but that are integral parts of the same reality*" (Morin & Le Moigne, 1999, p. 264). In the *Evolution and Progress Space* learning was especially effective, and mental models of P1 and P4 were evolving. Arrows show: (i) how P1 and P4 evolved in the *Evolution and Progress Space*; (ii) how P1 and P4 disseminated their new knowledge in their own unit, and how organizational learning was deployed.

The *Evolution and Progress Space* has proved to be a place of contacts, a field of multiple cultures, where the potentialities of each knowledge owner have been capitalized.

3.2.3 Core Processes for Knowledge Management

The core processes for KM answer the problem of capitalizing on company's knowledge defined in the following way: "Capitalizing on company's knowledge means considering certain knowledge used and produced by the company as a storehouse of riches and drawing from these riches interest that contributes to increasing the company's capital" (Grundstein, 2000, p. 263).

Several problems co-exist. They are recurring problems with which the company was always confronted. These problems constitute a general problematic that has been organized in four categories (Grundstein, 2000, p. 268). Each of these categories contains sub-processes that are aimed to contribute a solution to the set of overall problems (ref. Figure 5). Thus, we have identified four Core KM Processes corresponding to the resolution of these categories of problems. These processes are described below.

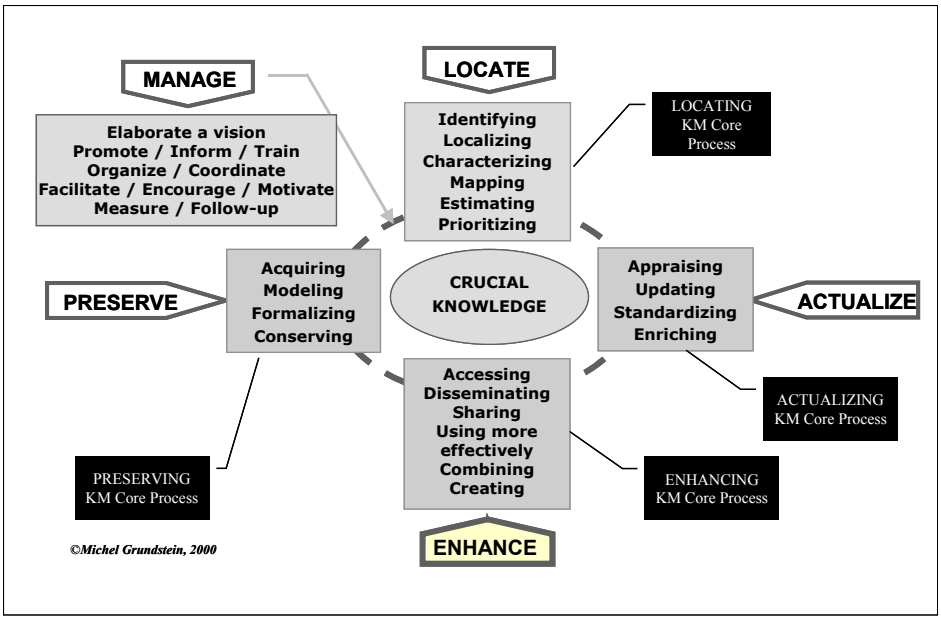

Figure 5. Generic Core Processes and the Capitalizing on Company's Knowledge Assets Problems

- The **Locating Process** deals with the location of *Crucial Knowledge*: it is necessary to identify it, to locate it, to characterize it, to make cartographies of it, to estimate its economic value, and to classify it. One can mentioned an approach named GAMETH® (Grundstein, 2000)(Grundstein & Rosenthal-Sabroux, 2004) specifically aimed to support this process.
- The **Preserving Process** deals with the preservation of know-how and skills: when knowledge can be put into words, it is necessary to acquire it with the bearers of knowledge, to represent it, to formalize it, and to conserve it. This leads to Knowledge Engineering activities that are notably described in (Schreiber *et al*, 2000). When knowledge cannot be put into words, then interactions through communities of practice or other types of networks must be encouraged.
- The **Enhancing Process** deals with the added-value of know-how and skills: it is necessary to make them accessible according to certain rules of confidentiality and safety, to disseminate

them, to share them, to use them more effectively, to combine them, and to create new knowledge. Here is the link with innovation processes.

- The **Actualizing process** deals with the actualization of know-how and skills: it is necessary to appraise them, to update them, to standardize them and to enrich them according to the returns of experiments, the creation of new knowledge, and the contribution of external knowledge. Here is the link with business intelligence processes.

3.2.4 Organizational Learning Processes

The Organizational learning processes underlay the whole Generic Core processes. The aim of the organizational learning process is to increase individual knowledge, to reinforce competencies, and to convert them into a collective knowledge through interactions, dialogue, discussions, exchange of experience, and observation. The main objective consists in fighting against the defensive routines that make barriers to training and change. So, it is a question of helping the members of the organization to change their way of thinking by facilitating an apprenticeship of a constructive way of reasoning instead of a defensive one. The *Semi-Opened Infrastructure* presented in this article has proved to be efficient in the case of Knowledge-Based Systems deployment.

3.2.5 Methods and supporting tools for KM

The methods and supporting tools relevant for KM can be determined only when considering the enterprise context and the envisaged KM initiative. One can find the descriptions and the characteristics of technologies, methods and supporting tools relevant for KM in many publications such as, for example, (Baek, Liebowitz, Prasad, & Granger, 1999) (Coleman, 1999) (Becker, 1999) (Huntington, 1999) (Wensley & Verwijk-O'Sullivan, 2000).

Among all these tools, the information and applications Portal, that supplies a global access to the information, can meet the needs of KM. In that case, the functional software and the tools answering the ends of KM are integrated into the digital information system.

From our viewpoint, the digital information system, centered on the knowledge-worker, requires a human centric design approach to place the knowledge-worker into the heart of the design process [Rosenthal-Sabroux, 96] [Kettani *et al*., 98]. The design must not dissociate the knowledge-worker, stakeholder of different functional and organizational groups and lines of business or projects, from the professional processes in which he is engaged, the actions he performs, the decisions he makes, the relations he has with his company environment (persons and artifacts). As such, the design must integrate individuals as components of the system. Consequently, the conception of the digital information system has to take into account the nature of the information that the individual, as a decision-maker, must be able to access. Three natures of information must be distinguished: the *Mainstream-Data*, the *Source-of-Knowledge-Data*, and the *Shared-Data* (Grundstein and Rosenthal-Sabroux, 2003):

The Distinction between three natures of information is situated very much in the acceptance of the term *Knowledge* that does not dissociate people, the individuals placed in the heart of the company's processes, from the actions that they perform, the decisions that they make, and the relations and interactions that they have with their company environment (people and information systems).

4. Future Trends and Conclusions

In this article, observing the evolution of KM, we have distinguished two main approaches of KM: a Technological Approach, and a Managerial Approach. Then we have centered our analysis on KM Frameworks and Knowledge Management Systems (KMS). In that way, we have shown how positivist approach leads to ignore an essential factor linked to the notion of Social Capital, and we have introduce our own experience and research by proposing a Model for Global Knowledge Management Within the Enterprise (MGKME), which is people-focused.

We expect that the MGKME will serve as an open model that allows everyone to take into account his own situation, to establish his own KM Framework, to supply a KM vision to his company, and to be able to assess where the company’s KMS is and where it has to go. Moreover, the MGKME can be seen as a pattern that can be used for the conception and for the implementation of a KMS including individuals as users who are also components of the system.

In the future, we should complete and validate the MGKME, by developing our researches in that sense. That will result in developing appropriated methods, constructing a set of qualitative indicators and specific tools to enable assessing the status of a company's KMS.

References

Argyris, C., & Schön, D.A., (1996). *Organizational Learning II. Theory, Method, and Practic*e. Readings, MA: Addison-Wesley Publishing Company.

Baek, S., Liebowitz, J., Prasad, S.Y., & Granger M. (1999). Intelligent Agents for Knowledge Management, Toward Intelligent Web-Based Collaboration within Virtual Teams. J. In Liebowitz (Ed.), *Knowledge Management Handbook* (Section IV, pp. 11-1 – 11-23). Boca Raton, Florida: CRC Press LLC.

Becker, G. (1999). Knowledge Discovery. In J. Liebowitz (Ed.), *Knowledge Management Handbook* (Section IV, pp. 13-1 – 13-27). Boca Raton, Florida: CRC Press LLC.

Bontis, N., Dragonnetti, N., Jacobsen, K., & Roos, G. (1999). The Knowledge Toolbox: A Review of the Tools Available to Measure and Manage Intangible Resources. *European Management Journal, Vol. 17*, *No 4*, 391-401.

CEN-CWA 14924-1 (2004). Knowledge Management Framework. In *European Guide to Good Practice in Knowledge Management* (Part 1). Brussels: CEN, CWA 14924-1:2004 (E). Retrieved June 19, 2004, from ftp://cenftp1.cenorm.be/PUBLIC/CWAs/e-Europe/KM/CWA14924-01-2004-Mar.pdf

CEN-CWA 14924-4 (2004). Measuring KM. In *European Guide to Good Practice in Knowledge Management* (Part 4). Brussels: CEN, CWA 14924-4:2004 (E). Retrieved June 19, 2004, from ftp://cenftp1.cenorm.be/PUBLIC/CWAs/e-Europe/KM/CWA14924-04-2004-Mar.pdf

Chua, B.B. & Brennan, J. (2004). Enhancing Collaborative Knowledge Management Systems Design. In D. Remenyi (Ed.), *5th European Conference on Knowledge Management* (pp.171-178). Reading, UK: Academic Conferences Limited.

COBIT® (2000, 2002). *Gouvernance, Contrôle et Audit de l'Information et des Technologies Associées*. Translation of *Control Objectives for Information and Related Technology. Information Systems Audit and Control*, (3rd Edition). Rolling Meadows Illinois: IT Governance Institute. Translated into French language by AFAI the French Chapter of the Information Systems Audit and Control Association - ISACA. Paris: AFAI.

Cohen, D. & Prusak, L. (2001). *In Good Company: How Social Capital Makes Organizations Work*. Harvard Business School Publishing.

Coleman, D. (1999). Groupware: Collaboration and Knowledge Sharing. In Liebowitz (Ed.), *Knowledge Management Handbook* (Section IV, pp. 12-1 – 12-15). Boca Raton, Florida: CRC Press LLC.

de Rosnay, J. (1975). *Le macroscope. Vers une vision globale*. Paris: Éditions du Seuil.

Davenport, T.H. & Prusak, L. (1998) : *Working Knowledge. How Organizations Manage What They Know*. Boston, MA: Harvard Business School Press.

Deming, W.E. (1992). *Out of the Crisis*. Massachusetts Institute of Technology Cambridge, MA: MIT Press Editor Center for Advanced Engineering Study.

Grundstein, M., de Bonnières, P., & Para, S. (1988). *Les systèmes à base de connaissances Systèmes experts pour l'entreprise* (chapitre XIII, pp. 221- 236). Paris: Afnor Gestion.

Grundstein, M. (2000). From capitalizing on Company's Knowledge to Knowledge Management. In D. Morey, M. Maybury, & B. Thuraisingham (Eds), *Knowledge Management, Classic and Contemporary Works* (chapter 12, pp. 261-287). Cambridge, Massachusetts: The MIT Press.

Grundstein, M., & Rosenthal-Sabroux, C. (2003). Three Types of Data For Extended Company's Employees: A Knowledge Management Viewpoint. In M. Khosrow-Pour (Ed.), *Information Technology and Organizations: Trends, Issues, Challenges and Solutions*, *2003 IRMA Proceedings* (pp. 979-983). Hershey, PA: Idea Group Publishing.

Grundstein, M., & Rosenthal-Sabroux, C. (2004). GAMETH®, A Decision Support Approach to Identify and Locate Potential Crucial Knowledge. In D. Remenyi (Ed.), *Proceedings 5th European Conference on Knowledge Management* (pp. 391 – 402). Reading, UK: Academic Conferences Limited.

Huntington, D. (1999). Knowledge-Based Systems: A Look at Rule-Based Systems. In J. Liebowitz (Ed.), *Knowledge Management Handbook* (Section IV, pp. 14-1 – 14-16). Boca Raton, Florida: CRC Press LLC.

ISO/IEC 9126 (1991). *Information technology -Software Product Evaluation – Quality characteristics and guidelines for their use*, International Standard.

Jennex, M., E. (2005). Editorial Preface: Knowledge Management Systems. *International Journal of Knowledge Management, Vol.1 No.2*, i-iv. Hershey PA: Idea Group Publishing.

Jennex, M., E., & Addo T., B., A. (2005). Issues in Knowledge Management Strategy. In M. Khosrow-Pour (Ed.), *Managing Modern Organization with Information Technology, 2005 IRMA Proceedings* (pp. 536 - 539). Hershey PA: Idea Group Publishing.

Kettani, N., Mignet, D., Paré, P., & Camille Rosenthal-Sabroux, C. (1998): *De Merise à UML*. Paris: Editions Eyrolles.

Martin, J. (1995). *The Great Transition. Using the Seven Disciplines of Enterprise Engineering to Align People, Technology, and Strategy*. New York, NY: AMACOM, a division of American Management Association.

Moore, C., R. (1999). Performance Measures for Knowledge Management. In J. Liebowitz (Ed.), *Knowledge Management Handbook* (chapter 6, pp. 6.1-6.29). Boca Raton, Florida: CRC Press LLC

Morin, E., & Le Moigne, J-L. (1999). *L'intelligence de la Complexité*. Paris, France: L'Harmattan.

Nonaka, I. & Konno, N. (1998). The Concept of "Ba": Building a Foundation for Knowledge Creation. *California Management Review, spring 1998, Vol. 40 No. 3*, 40-54.

Rosenthal-Sabroux, C. (1996). *Contribution méthodologique à la conception de systèmes d'information coopératifs: prise en compte de la coopération homme/machine*. Mémoire HDR. Paris, France: Université Paris-Dauphine.

Schreiber, A.Th., Akkermans, J.M., Anjewierden, A.A., de Hoog, R., Shadbolt, N.R., Van de Velde, W., & Wielinga, B.J. (2000). *Knowledge Engineering and Management. The CommonKADS Methodology*. Cambridge, Massachusetts: The MIT Press.

Stewart, A. (2001). *The Conversing Company, its culture, power and potential*. Retrieved June 2004, from http://www.knowledgeboard.com/download/3343/conversing-company.pdf

Tonchia, S., & Tramontano, A. (2004). *Process Management for the Extended Enterprise*. Berlin-Heidelberg: Springer-Verlag.

Tsuchiya, S. (1993) : *Improving Knowledge Creation Ability through Organizational Learning*. International Symposium on the Management of Industrial and Corporate Knowledge. Compiègne, France: UTC-IIIA, ISMICK'93 Proceedings.

von Bertalanffy, L. (1968). *General System Theory*. New York: George Braziller Inc. (French translation: *Théorie générale des systèmes: physique, biologie, psychologie, sociologie, philosophie*. Paris France: Dunod 1973).

Watzlawick, P., Weakland, J., & Fisch, R. (1975). *Changements : paradoxes et psychothérapie*. Paris: Éditions du Seuil. (Original title: Change. Principles of Problem Formation and Problem Resolution).

Wensley, A.K.P., & Verwijk-O'Sullivan, A. (2000). Tools for Knowledge Management. In C., Despres, & D., Chauvel (Eds), *Knowledge Horizon: The present and the Promise of Knowledge Management* (Chapter 5, pp. 113-130). Woburn, MA: Butterworth-Heinemann.

Wiig, K. (2004). People-Focused Knowledge Management. How Effective Decision Making Leads to Corporate Success. Burlington, MA: Elsevier Butterworth-Heinemann.