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The KM Project in an Organization

1.1. Articulation of Chapter 1

The purpose of this chapter is to introduce the concepts of knowledge management (KM) in organizations, the concepts of operational methodology, as well as the need for a global and shared vision of a company's KM project.

In section 1.2, we recall the foundations of KM in organizations.

Section 1.3 is dedicated to the reference framework for a knowledge-based KM, which is based on the daisy model.

In section 1.4, we show how to obtain an operational instantiation of the daisy model in the form of the virtuous cycle of knowledge.

The four steps of the MASK method (Method for Analyzing and Structuring Knowledge), which will instrument the virtuous cycle of knowledge, are described in section 1.5. This operational approach will structure the rest of the book: the four steps (MASK I to MASK IV) of the method are respectively at the heart of Chapters 2–5, while the design and deployment of a global KM project based on these four steps constitute the heart of Chapter 6.

Section 1.6 illustrates how a KM project can be fed by a process repository dedicated to the organization's knowledge capital.

The study of the critical success factors relating to the design and operational deployment of a global KM project is discussed in section 1.7.

Finally, section 1.8 summarizes Chapter 1.

1.2. Knowledge management

Every company has always managed its knowledge and expertise by explaining it in documents and procedures, by disseminating it, for example through training, by organizing all kinds of exchanges with their employees, etc. In the case of know-how (the ability of an agent to carry out an activity based on the application of methodological knowledge), for example, the interest of KM is threefold: formalize, memorize and reuse. Formalization makes it possible to reach a stage of maturity in the field of the know-how concerned, by compelling the agent to structure thinking or to observe the physical elements manipulated and to describe them through models. The memorization function allows the formalized know-how to be preserved from a temporary or permanent unavailability of its owner. The reuse of expertise is the economic argument for the knowledge management approach, because, once formalized and memorized, this know-how can be implemented by other qualified agents, but in the absence of the person who possessed it.

C. Sargis-Roussel confirms that, although knowledge management is at the heart of a recent craze, it is nothing new in companies [SAR 02]. "Industrial families" passed on their knowledge from generation to generation: master painters trained apprentices and workers exchanged their expertise [HAN 99]. In the more recent past, specialists in armaments, nuclear or civil aviation have been implementing KM practices for several decades. However, it was only in the early 1990s that the term "knowledge management" truly emerged in the literature and that business leaders and researchers began to question the place of knowledge in the organization and how to manage it. Alongside the emergence of these questions, we can observe the development of information systems (which make it easier to codify, store and transmit certain information and knowledge), as well as the increase in questions on the possibilities and conditions of KM [FER 06].

For J.-Y. Prax, KM should meet four specific expectations of organizational agents seen as information users, the answers to these four expectations being constitutive of efficiency:

– providing at the right time the information that agents need, without their having to request it;

– satisfying requests, because knowledge management adopts a user-oriented logic, while the information system approach focuses on the accumulation of information;

– building a process for the creation, enrichment, capitalization and validation of knowledge and know-how involving all agents;

– contributing to collective performance and its sustainability [PRA 00].

However, KM also consists of providing employees with the necessary support for knowledge exchange, an exchange that allows them to go beyond their intrinsic cognitive limits, to value and develop individual and organizational knowledge. Knowledge management is therefore constructed at the crossroads of decision support systems, human resources management and the formal information system. It therefore comes to ask questions about organization. Moreover, particularly in recent decades, knowledge has suddenly taken on a crucial and decisive importance (particularly in its market dimension) in our society, which has been described as post-industrial and largely intangible, as a new driving force of growth, combined with the unavoidable imperative of innovation [BOU 12]. As a result, in recent years, with both sudden and unexpected force, knowledge management has emerged as a major challenge in companies. A new dimension has emerged, the strategic dimension of knowledge, as a resource for competitiveness, performance and risk prevention. A set of strategic elements contributes to this emergence: knowledge is an economic capital [FOR 09]; knowledge is a strategic resource, whose control is an attribute of the company [TAR 98]; knowledge is a factor of company stability, because it is slowly changing [TAR 98]; knowledge brings a decisive competitive advantage, etc.

According to [FOR 09], since the late 1990s, we have been moving into a knowledge-based economy. In this context, the production of knowledge becomes, first of all, a challenge to construct a new industrial policy capable of combating the deindustrialization of many Western countries. Thus, at the Lisbon European Council meeting in March 2000, European leaders decided

"to make the European Union the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion".

At the same time, companies are gradually becoming aware of this economic evolution: knowledge is becoming a crucial resource. They understand this all the more acutely as the entry into the knowledge economy coincides with the emergence of organizational dysfunctions linked to the loss of knowledge held by retiring baby boomers. Some industries, such as aeronautics, are finding it difficult to maintain their aircraft. Others, such as the steel industry, see technical know-how disappearing completely in a few years, creating risks for the safety of installations. The management of this resource then becomes an imperative to ensure the company's competitiveness, as well as the quality of service and the safety of the installations. These situations make it clear that KM and production are no longer solely the responsibility of research or innovation centers. The company's knowledge in all its fields of competence (research and development or R&D, production, marketing, accounting, finance, etc.) becomes a resource to be managed in the same way as an industrial park or the skills of employees. To face this challenge, companies are often required to implement specific management approaches (KM approaches).

However, knowledge is not a resource like any other. By becoming a key resource for companies, it will obviously lead them to change their organizational methods. In-company knowledge is often inseparable from the individual. It develops according to a particular process (Nonaka and Takeuchi's spiral of knowledge, associating the individual with the organization [NO 95]). It is very largely tacit [POL 67], integrated into work situations and practices [WEI 95], [WEN 98]. It is this property that creates the value of a company's knowledge and also makes it neither controllable nor manageable according to traditional business resource management methods. While companies have greatly evolved the classic organizational model (Taylorian and Weberian models) to adapt it to changes in the economic and competitive environment, they remain organizations built around the "myth" of rationality and control. The organization of collective action, i.e. the planning of each actor's tasks and the use of resources, is based on a rational and optimal decision that makes it possible to achieve the collective objective. The corollary is that any organizational resource, whatever it may be, must be controlled by the organization. Knowledge,

which has now become crucial for organizations, but cannot be controlled, obviously disrupts this organizational logic. Beyond that, in this traditional organization, hierarchical legitimacy is based on this capacity to control resources and on the rationality of the resulting division of tasks. As the "knowledge" resource is not controllable, by becoming a crucial resource for the organization, it also calls into question the legitimacy of the hierarchical logic and specialization of tasks. As Hatchuel, Le Masson and Weil point out, considering knowledge as a key corporate resource thus leads to a real crisis of collective action, which heralds the necessary reassessment and transformation of relationships in companies and should lead to an organizational transformation like the one they experienced at the beginning of the 20th Century [HAT 02a].

Just as there is a knowledge economy, there is a new perspective to be adopted on management with the emergence of knowledge as a key resource for companies. As Dorothy Leidner writes, the issue of KM as a key resource for organizations introduces "a new theoretical perspective for understanding and interpreting organizational phenomena. It is like glasses that we put on to better understand the nature of the managerial problems we face and until such an important new perspective emerges, KM will continue to play this essential role in management research and in understanding organizational phenomena" [LEI 08] (author's translation).

To best manage the company's knowledge capital, which is now considered as a strategic resource, company managers will have to define global objectives based on three key points:

– capitalizing: "knowing where you come from, knowing where you are, to better know where you're going";

– sharing: "moving from individual to collective intelligence";

– creating: "creating and innovating to survive".

KM, now in the reality of the company, is therefore a new and complex approach. But understanding what KM really is in an organization is not an easy task, as it cuts across almost every component of it. Indeed, it concerns:

– strategy, because it is really a new type of management that responds to a new socio-economic environment and a new vision of the organization;

– the structure of the organization, because knowledge is made and broken down through complex networks, connected to the environment, which can challenge traditional structures;

– many processes already in place in organizations (fortunately, human beings have always managed their knowledge!), but which need to be reviewed in new perspectives of optimization or development;

– the organization's staff, who are at the heart of the problem, so much so that knowledge is only created, shared and developed through people, who must mobilize themselves personally and collectively for this objective;

– information and communication technologies, which are powerful vectors for knowledge management, provided they are used effectively.

While, as we have already pointed out, KM in companies is not new, what has changed is this new strategic dimension of knowledge as a resource for competitiveness and performance. This requires the company to adopt a global, conscious and reasoned approach to its knowledge capital. Such a global approach, capable of managing the company's knowledge capital, is therefore a long-term task. This work must be carried out gradually, building on all the KM actions that have already been carried out in the organization (most often "like Mr. Jourdain"), broadening their scope of action and focusing on strategic issues. It is also a cultural work, which must gradually become part of working habits and not as a revolution that must turn everything upside down. In a word, it is a long-term project, built around a continuous improvement approach, based on what already exists. After 20 years of maturation, KM has now entered an operational phase. The objective for companies now is to plan, establish and maintain an effective KM program.

1.3. A reference framework for a knowledge-based KM

1.3.1. *Knowledge-based KM*

The nature and driving forces of companies have evolved considerably since the beginning of the industrial era. In the past, the company focused on two essential elements: the productive tool and work in the Taylorian sense [ERM 03]. In 1911, Taylor thought he had demonstrated that business management can be made a science by codifying all the actions of the company and removing all uncertainty through the division between those

who specify tasks and those who perform them [TAY 11]. The main functions of the company, at the top of the hierarchical pyramid, were production, R&D, sales, accounting, etc.

Apart from these two initial points of view (production tool and Taylorian division of labor), important levers have emerged as the world's macro and microeconomic evolution has progressed. These are, for example, customer relations, the information system, economic intelligence, quality, etc. New professions crucial to the company have emerged (purchasing, marketing, communication, strategy, etc.). The company has continuously reorganized itself in relation to its environment to meet new economic challenges (and continues to do so), particularly through the development of processes, according to the concept of business process management [TAR 95]. For many years, the company has enhanced its process repository to take into account all these changes.

As a company project, KM must link the classic visions of the basic professions with these new challenges and these new requirements. The aim of the KM project is to bring together, in coherent processes of its own, the critical knowledge, essential resources for the production of goods and services and that which comes from the increasingly important economic and competitive environment. According to the basic assumption formulated in [ERM 18a], coherence is organized around the company's knowledge capital, to which all key KM processes must contribute and through which they cooperate. This is called knowledge-based KM.

These key processes are organized according to a model, known as the daisy model, described in the following section.

1.3.1.1. *The daisy model*

This section is based on [ERM 03].

The processes that strategically contribute to the management of the company's knowledge capital are internal, such as capitalization and sharing or creativity and learning, as well as external, such as economic intelligence or surveillance, which must be nourished by internal knowledge to better return to it or like customer relations and marketing, which act as a filter on the immense potential for creating and developing companies' knowledge.

KM is the management of these processes and the consideration of their relationship to the company's knowledge capital. They can be described in four main classes, which correspond to the "petals" of the daisy, plus a class that corresponds to the heart of this model:

– the capitalization and sharing of knowledge class. It carries out the virtuous cycle of knowledge and ensures the sharing (recycling) of the knowledge resource within the company;

– the interaction with the environment class. A system isolated from its environment is a dead system. This is particularly true for knowledge that feeds on the ever-increasing flows of information from the company's environment. The class contains complex processes that transform these information flows into a capital of useful knowledge for the company. These include, among others, the processes of surveillance or economic or strategic intelligence (business intelligence). The interaction with the environment class currently focuses mainly on the external information aspect, but little on the interaction with the company's own knowledge;

– the learning and knowledge creation class. This class contains endogenous and collective processes that form the basis for the evolution of knowledge. It includes the issues of the learning organization and creativity;

– the selection by the environment class. Evolutionary *par excellence*, this class ensures the selection of the knowledge created, by introducing market criteria, acceptability criteria, etc., criteria that are both economic and socio-technical. This class addresses marketing, customer relations, etc. The problem of KM is integrating this type of problem into a strong relationship with the company's critical knowledge, particularly business knowledge, for example;

– to these four classes, a fifth can be added, which is entirely internal to the knowledge capital, since it concerns the evaluation of it (qualitative evaluation, quantitative evaluation, financial or managerial evaluation for strategic management, etc.). More than a tool, evaluation is seen here as a real process, which requires sophisticated implementation and monitoring and which generates transformation within the organization.

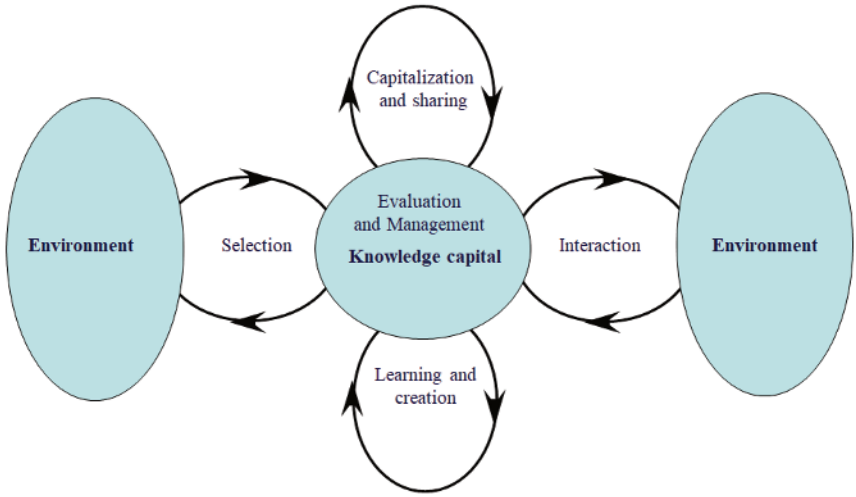

Figure 1.1. *The daisy model: key processes of knowledge management*

It should be noted that none of these process classes are absent in organizations, in one form or another, in an intuitive or formalized way, in simple or sophisticated forms. Fortunately, knowledge management has always been present in companies. What is new is its generalized and strategic aspect, due to new challenges and the willingness to cooperate in a common objective of activities hitherto perceived as disparate and often located on the periphery of the company's experience. In a very caricatured way, we could entrust the capitalization process to documentation service, or even an archive service, the sharing process to an IT service, the interaction process to a surveillance service, the learning process to a training service, the creation process to an innovation service and the selection process to a marketing service. These services may well never talk to each other and work without close or daily contact with the company's business lines. Unfortunately, it seems that this situation is not just a caricature!

The objective of a KM project is to define a set of consistent methods and tools to manage all these process classes and, thus, fully achieve the objective of KM. The four petals of the daisy, mentioned here, are only a starting point. If they are detailed, they can be separated into many other petals. Implementing a knowledge management policy will then consist of "picking the daisy petals".

1.4. The virtuous cycle of knowledge

We now wish to complete the daisy model approach with a more operational approach allowing us to set up a real KM project in the company.

The knowledge-based approach illustrated in this book is implemented in a four-step cycle, called the virtuous knowledge cycle, as shown in Figure 1.2.

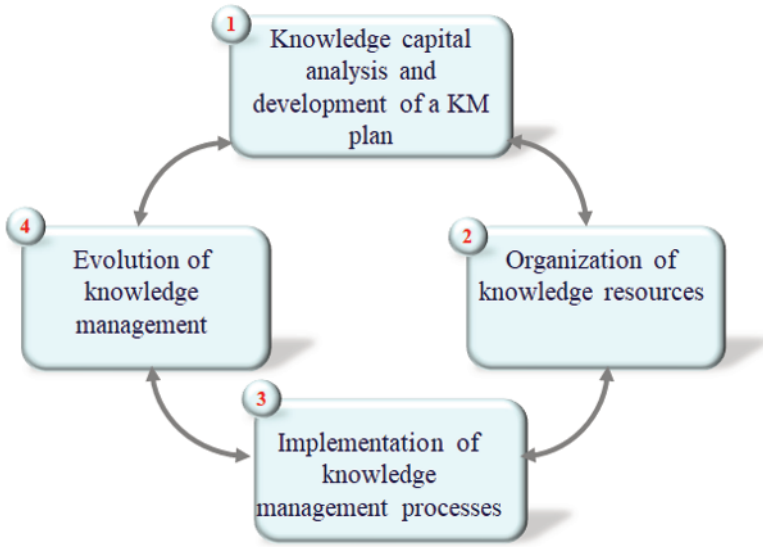

Figure 1.2. *The virtuous knowledge cycle*

1.4.1. *Step 1: analysis of a knowledge capital and development of a KM plan*

Since a company's knowledge resources are its key advantages, building on these knowledge capitals and maximizing its potential are essential conditions for developing and achieving sustainability. However, these resources are vulnerable and may be threatened, for example, by the loss of knowledge (mainly a significant loss of tacit knowledge). Therefore, it is essential to plan for the preservation, transfer, evolution and creation of knowledge throughout the company's activities and its interactions with its

environment. The KM plan must be designed and integrated as a strategic business process.

The construction of a KM plan requires answers to the following questions:

– What are the essential knowledge areas for the company?

– Are they strategic?

– What are the main threats and risks to these areas?

– Who owns this knowledge?

– What are the possible and relevant operational actions to manage this knowledge?

– How can we ensure that the action plan is aligned with the company's strategic objectives?

To answer these questions, it is necessary to carry out an analysis of the company's knowledge capital, guided by the strategy defining the company's missions. The proposal for a KM action plan for preservation then comes with the objective of sharing and developing knowledge in accordance with this strategy.

1.4.2. *Step 2: organization of knowledge resources*

For the strategic knowledge areas identified in the first step, a wide range of knowledge resources can be identified, hence the need to put them in order and determine how they should be organized and structured.

Usually, this huge body of knowledge is scattered in various places, tacit knowledge is not sufficiently made explicit, links between blocks of knowledge are often missing, etc. There is no complete view of the body of knowledge (tacit or explicit) associated with each knowledge domain and it is far from being easily accessible. It is difficult to map resources, to design a coherent repository to facilitate their organization, to allow their maintenance and to ensure their availability. This often involves adding new knowledge resources and tools to this repository.

1.4.3. *Step 3: implementation of KM processes*

The next step is to organize the use of knowledge resources in the daily work of actors: how to share, transfer, acquire, etc. their knowledge in order to be effective in their operational or decision-making tasks? As business processes are implemented to support business activities, KM processes must be implemented to support the use of knowledge in these business processes, as required by the KM plan.

1.4.4. *Step 4: evolution of a knowledge capital*

The ultimate objective of KM is to transform the company into a creative organization. Thus, the ultimate goal of KM processes is to foster innovation. KM develops the company's ability to strategically develop all its knowledge resources by creating new and relevant knowledge. To do this, KM must use all the resources created in the previous steps to promote the evolution of the company's knowledge. In addition, it is necessary to ensure that KM continues to focus its efforts on the right resources and thus remains relevant. A good way to do this is to put in place a mechanism (survey, supervision, evaluations, etc.) to measure how knowledge is used and how it benefits the organization.

1.5. The MASK method

The MASK method (Method for Analyzing and Structuring Knowledge) is a knowledge management method developed by Jean-Louis Ermine, first at the *Commissariat à l'Énergie Atomique et aux Énergies Alternatives* (CEA), to solve knowledge capitalization problems (this part is now called MASK I). The method was then extended to the general problem of KM. It is based on a formal theory of knowledge, a structured methodology and a set of tools [ERM 18a].

This method respects the principles set out above and is therefore an example of illustrating the virtuous knowledge cycle, on a (non-exhaustive) set of crucial topics in a KM approach. It is this set that will provide a large number of the case studies presented in this book.

The MASK method is organized into four modules, covering the four steps of the KM cycle.

Note: the numbering of the MASK I to MASK IV modules corresponds to the chronology of their development. Thus, the first module developed, MASK I, for knowledge capitalization deals with step 2, while the second module developed, MASK II, for strategic knowledge analysis deals with step 1.

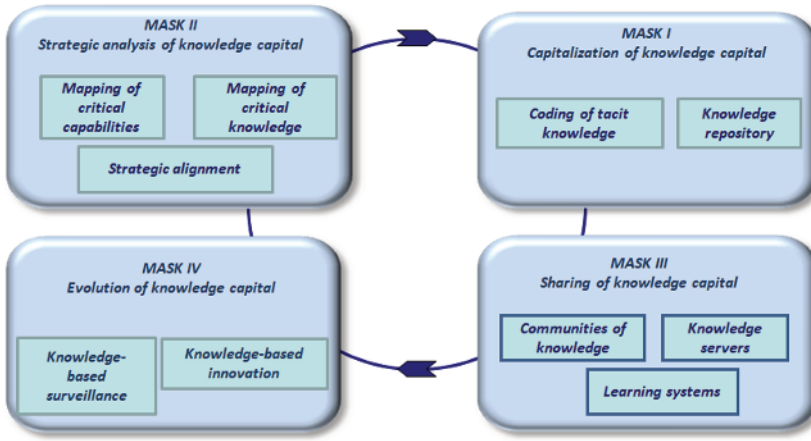

Figure 1.3. *The complete MASK operational approach. For a color version of this figure, see www.iste.co.uk/saulais/knowledge.zip*

We briefly recall here the MASK approach [ERM 13].

1.5.1. *MASK II: analysis of a knowledge capital*

The knowledge capital analysis process is an audit of the company's knowledge in order to create a KM action plan to manage this corpus asset.

1.5.1.1. *Step 1: analysis of critical capacities*

In a nutshell, this capacity will be defined as a collective one that integrates a set of individual skills to achieve the organization's strategic objectives. Critical capacity analysis consists of identifying and qualifying the capacities required by the company to successfully carry out its missions and achieve its operational objectives.

To do this, it is first necessary to identify the objectives that the company (or unit of the company) concerned is trying to achieve. An objective map is built, which is a clear and simple representation of the operational strategy of the company or unit in question. It formulates the missions in the form of objectives to be achieved for the organization.

The next phase consists of identifying and qualifying the capacities required by the company to achieve the objectives mentioned in the strategy map. Each of the identified capacities is qualitatively assessed by its criticality level. A capacity can be assessed as very critical, moderately critical or non-critical, knowing that it is more or less critical depending on whether it is more or less rare, useful for the company, difficult to acquire or difficult to implement.

1.5.1.2. *Step 2: analysis of critical knowledge*

The analysis of critical knowledge consists of identifying and qualifying the different areas of knowledge present in the company. In a simplified way, we will define a knowledge domain as a body of business knowledge perceived as homogeneous. This knowledge is carried by people realizing one or more activities characteristic of the company and constituting the company's "knowledge network". They are materialized by a set of documents or they gather a set of tacit knowledge and know-how.

The first phase of knowledge criticality analysis is the construction of the knowledge domain map (or knowledge map). Then, for each knowledge domain, the criticality analysis must be performed. The criticality assessment of a domain consists of assigning a criticality score by evaluating several criteria: the more critical the domain, the higher the score. Each domain is evaluated independently of the others.

1.5.1.3. *Step 3: strategic alignment*

The objective of this step is to compare the strategic visions developed in the first step (capacities required to achieve the objectives and their criticality) and the field business visions developed in the second step (knowledge necessary for the businesses in their activities with their criticality).

This step also makes it possible to formulate relevant recommendations on the knowledge management actions/systems to be implemented. These recommendations result from the intersection of the analysis of critical capacities with that of critical knowledge. This crossing of strategy and business lines activity is called strategic alignment. In particular, it makes it possible to identify "strategic dissonances": on the one hand, cognitive biases in the representation of strategic objectives by business actors and, on the other hand, cognitive biases in the representation of the impact of the objectives set on the business activities by strategy actors. In addition, the considerable material collected during the interviews with strategy and business actors can be summarized in light of this strategic alignment, to make recommendations on a knowledge capital management action plan.

Examples of how this method of knowledge capital analysis can be applied are provided in Chapter 2 of this book.

1.5.2. *MASK I: capitalization of a knowledge corpus*

In the audit carried out in phase 1, there are very often critical and strategic domains of knowledge where knowledge is very tacit in the heads of a group of "knowers". This knowledge is threatened (by the departure of some people, for example) and must be transferred to others. The aim of MASK I is to collect this knowledge in an explicit form, in order to have a structured and tangible body of knowledge, which should be the essential resource of any knowledge transfer system. This is called "capitalization", because it involves putting a previously invisible capital of knowledge into tangible form. These actions therefore involve a process of converting tacit knowledge into explicit knowledge. This process, often referred to as "externalization" or "codification", is central to the creation of organizational knowledge, as Nonaka points out: "it is a process that is the quintessence of knowledge creation because tacit knowledge becomes explicit in the form of metaphors, analogies, concepts, assumptions or models" [NON 95, author's translation].

The MASK I approach chooses to use graphical models and diagrams. It is a method based on the explicitation of knowledge using knowledge models. Knowledge modeling is a technique that developed in the 1970s and 1980s for artificial intelligence purposes and has since grown considerably to become the basis of a new engineering discipline, called "knowledge

engineering". The approach takes up and adapts known knowledge models and proposes more original ones.

To analyze, represent and structure knowledge with models, the method is based on a theory of knowledge (adapted to engineering) which is described in detail in [ERM 18a]. Knowledge is perceived as information that takes on a given meaning in a given context. There are therefore three fundamental points of view for modeling knowledge: information, meaning and context (we use the symbolic equation K = IMC). Each point of view is broken down into three other points of view: structure, function and evolution. This gives nine points of view, each represented by a specific model. The point of view of information is classic: the structural aspect is modeled by data structures, the functional aspect by data processing, and the evolution aspect by dating and version configuration. The method focuses on the other six points of view. For the point of view of meaning (semantics), the structural aspect is modeled by networks of concepts, the functional aspect by cognitive tasks and the evolutionary aspect by lineages. For the contextual point of view, the structural aspect is modeled by phenomena, the functional aspect by activities and the evolutionary aspect by histories and lineages.

Examples of the application of this method of knowledge capitalization are provided in Chapter 3 of this book.

1.5.3. *MASK III: sharing the knowledge base*

When we talk about knowledge sharing in the company, we are essentially thinking of two contexts. The first context is that of the very diverse social communities within the company (business communities, communities of practice, project communities, etc.), where a great deal of knowledge and know-how are exchanged. The second context concerns the transfer of knowledge through a wide variety of mechanisms, ranging from training to networks of people.

1.5.3.1. *Knowledge communities or communities of practice*

In practice, in any organization, people interact with each other. They thus create the conditions for the circulation and dissemination of their tacit knowledge, without necessarily resorting to their codification. This very often leads to the creation of specific social networks of knowledge and

communities of people sharing certain knowledge. It is therefore becoming essential for organizations that want to manage their knowledge to organize these knowledge networks and support their operation.

In KM, in companies, the most popular way to implement the knowledge sharing process is through the use of "communities", which are very specific social networks. There are many types of communities and many definitions. Here are two main definitions:

– a knowledge community is a group of people in the company who engage in knowledge sharing activities with a common work objective (shared responsibility for a process, a product or a service, a project, etc.). The knowledge community can include people from different disciplines within the company and even participants from other companies or the surrounding environment (service providers, logistics partners, customers, etc.);

– a community of practice is a group of people who share a common professional interest in a practice and who regularly interact to learn how to progress in their practice.

Not every group of people, every social network, with a common interest, is necessarily a community of knowledge or a community of practice. Most networks of people in a company are essentially set up to exchange information.

1.5.3.2. *Knowledge transfer*

Knowledge transfer is the practical problem of transferring knowledge from one part of the organization to another. It aims to organize, capture, create or disseminate knowledge and ensure its availability for future users.

Knowledge transfer can be understood in a very broad sense, sometimes even equivalent to KM. Here, it will be seen as a process that involves a set of interactions between individuals and groups to communicate and share knowledge, so that the final recipients of the transferred knowledge acquire the understanding and ability to apply it.

Before being implemented, a knowledge transfer process must be clearly defined in terms of:

– justification of knowledge transfer needs;

– knowledge to be transferred;

– expected benefits and indicators of success (to measure the effectiveness of knowledge transfer);

– context of knowledge transfer;

– actors (knowledge holders, knowledge beneficiaries, etc.).

The knowledge transfer process can be illustrated by the model shown in Figure 1.4.

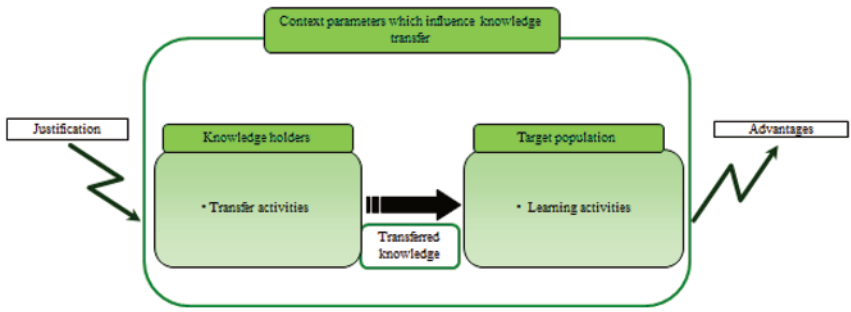

Figure 1.4. *The knowledge transfer process*

There are many methods and processes for knowledge transfer. The choice of one or more knowledge transfer processes in a given context is therefore difficult.

Let us give some examples of knowledge transfer mechanisms:

– training;

- face-to-face training;

- autonomous e-learning;

- supervised e-learning;

- virtual classes;

– learning.

Learning is the process of acquiring practices and knowledge in situations through observation, imitation and repetition:

– learning through mentoring;

– alternating learning;

– educational games/role-playing games;

– knowledge networks;

– project groups (includes working groups);

– communities of practice;

– network of experts.

Knowledge transfer processes are multiple and diverse. They can be a transfer from one person to another, from one person to another group, from one group to another group, within a group, etc. A transfer is not necessarily in a given direction, from a transmitter to a receiver. This may depend on the knowledge to be transferred, the context of the transfer. The transmission of information should not be confused with the transfer of knowledge. There are countless ways of transferring knowledge within a company: many of them are traditional, and have been in the company for a long time. Others are in development or emerging, mainly due to the arrival of new digital technologies. KM must take into account all this diversity. It can propose and manage a number of innovative transfer systems, but, above all, it must ensure that the systems set up are oriented towards managing the company's knowledge capital. It must ensure that the system works on an identified and evaluated part of the knowledge capital and must assess its impact on the knowledge of the target audience. It is by adding value to the company's global knowledge capital that any knowledge transfer process fulfills its objective in the sense of KM.

Examples of the application of this method of knowledge transfer are provided in Chapter 4 of this book.

1.5.4. *MASK IV: evolution of a knowledge capital*

The exploration of the evolution of a knowledge capital will be carried out through the implementation of two action concepts: knowledge-based surveillance and knowledge-based innovation.

1.5.4.1. *Knowledge-based surveillance*

The company's surveillance activity consists of transforming external information into useful knowledge for the company (scientific and technical surveillance, environmental analysis (strategic, competitive surveillance, etc.)). This requires organizing the collection and collective interpretation of information from the external environment.

A knowledge search process is divided into three main phases:

– Analysis of information needs and formulation of requests

It is a knowledge-based phase, which is based on the state of the art of knowledge in the field concerned in the company.

– The search for information

This phase ranges from the collection of requests to the development of information corpus.

– The creation of knowledge

It is a matter of summarizing the corpus of information obtained, making it understandable and giving it shared representation, and then activating a process of interpretation and creation of knowledge that must be useful to the company for the purpose intended by the search for knowledge process. This phase is, by nature, a knowledge-based phase.

KM can therefore provide significant added value in environmental surveillance activities, which are often strategic for the company. A relevant questioning can be supported by the good management of a knowledge capital already existing in the organization. The analysis of external information can be translated into useful and operational knowledge if this analysis is carried out by mobilizing the knowledge actors and the existing knowledge capital that needs to be enriched.

1.5.4.2. *Knowledge-based innovation*

From KM's point of view, the knowledge creation process is the part of the innovation process that requires KM support, because it is strongly knowledge-based.

Most innovation models and methodologies propose, in part or in whole, an eight-phase process (Figure 1.5).

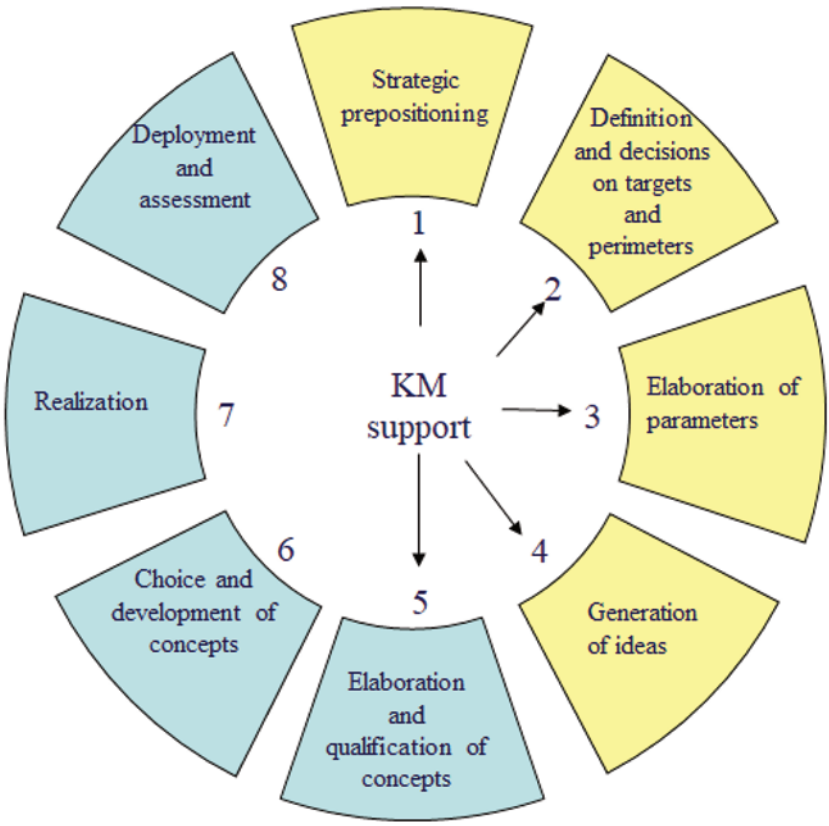

Figure 1.5. *The innovation process*

Only processes 1, 2, 3, 4 and 5 are linked to KM processes. For example, process 1 requires the support of a search for knowledge process, as discussed in the previous section.

Processes 4 and 5 deal with creativity and inventiveness, which are two parallel activities: "idea generation", on the one hand, and "elaboration and qualification", on the other hand. Creativity is considered as a generation of ideas while inventiveness refers to the creation of knowledge from these ideas (design knowledge). There is often no distinction between creativity

and inventiveness. Creativity techniques practiced in the company are often not correlated with existing knowledge or the creation of new knowledge, materialized as new knowledge resources (e.g. patents or documents).

The correlation with the company's creativity and knowledge resources is called knowledge-based innovation [SAU 12]. The process of knowledge-based innovation has two main phases:

– Knowledge drilling as a support for creativity.

– *Creation of innovative knowledge* as a support for inventiveness.

Chapter 5 of this book gives some examples of knowledge-based innovation processes.

1.6. The KM process repository

The virtuous cycle of knowledge can be implemented through a set of processes that constitute a KM repository. The latter must be integrated into the company's process repository.

We give here an example of such a reference system, as developed in the *Club Gestion des Connaissances* supervised by Patrick Coustillière [CLU 17]. It is structured around eight fundamental processes:

– P1: assessing and managing the knowledge capital

This process examines the state of the company's knowledge capital in terms of content and control.

– P2: bringing knowledge capital to life and ensuring its application

This process ensures that the knowledge capitals are maintained and applied.

– P3: managing and controlling knowledge acquisition systems

This process ensures the increase in knowledge and recruitment.

– P4: supporting creative initiatives

This is a knowledge-based innovation process (KBI or Knowledge-Based Innovation).

– P5: supporting design processes

This process supports knowledge-based design in the company.

– P6: transforming external information into knowledge for the company

This process ensures links with all kinds of external surveillance monitoring processes.

– P7: equipping KM processes

This process implements an information system and appropriate uses.

– P8: controlling the KM system

This process ensures a sustainable system, and the progress loop that governs its evolution.

Since each company is unique and has a specific maturity in the management of its knowledge capital, such a process repository must be customized, but the principles remain the same if we are to set up processes that effectively manage the company's knowledge capital.

1.7. Critical success factors for a global KM project

As a global corporate project, KM is a vast undertaking. It must mobilize very diverse resources; it must be managed at the highest level and involve all levels of the company. It must work on a completely new subsystem of the company: the knowledge system. In a way, setting up a global KM project is above all an operation of profound change in the company, which aims to achieve cultural evolution, social evolution and structural evolution.

In other words, there are many pitfalls and maturity in this field can only be acquired gradually, in a long process of continuous progress. We wanted to show here that, in the long term, it is possible to envisage an operational management of knowledge on a daily basis, through controlled processes, in ways that do not upset the company's fundamentals, but that make them evolve positively. However, much feedback, particularly in regard to failures, indicates that the changes involved in these projects are not sufficiently taken into account. Change indicators and change management methods are still poorly identified: what relationships are induced by KM

projects? What are the motivational levers, the obstacles to success? We will give some suggestions based on real-life experiences.

1.7.1. *The water lily strategy*

One of the keys to change in a KM project is the project deployment strategy. This is a radical change from a traditional project.

Deployment strategies of the "master plan" type for a knowledge management project (like information systems projects) have often proved to be failures. They are too linear and do not take sufficient account of motivational factors. A "socio-technical" strategy is necessary.

A deployment strategy radically opposed to that of the master plan can be recommended under the name of "water lily strategy", an expression resulting from a childish guessing game on the exponential growth of water lilies. This term takes up the idea expressed by "steady organic growth", which refers to the mode of cell growth (morphogenesis), which is carried out by successive cellular divisions to create viable and complex structures.

The "water lily" type deployment is the most appropriate for a KM project. It is the one that best takes charge of the process of change, the motivational factors and the emergence in complexity, such as the growth model of living cells: a process of reasoned and persevering growth. The water lily strategy is a strategy of constant effort and cumulative effect, which is perfectly suited to the cumulative economic nature of knowledge. In particular, it indicates that, while efforts can be considerable to start the project (in human or material terms), they will not necessarily increase tenfold as the project is deployed. Motivation factors being essential, we benefit from a ripple effect. Material costs are not necessarily the most important, so they do not increase linearly, etc. One of the major benefits of this type of approach is minimizing costs and risks. The first "water lilies" are not too expensive. Decisions, often unavoidable on medium-term projects, are not detrimental. Failure does not necessarily call into question the whole process.

The water lily strategy generally consists of three phases:

1) The pilot project(s)

The first "water lilies" are "conviction" projects. They are autonomous projects, concerning a limited part of knowledge capital. It is often possible to identify such projects that have already emerged spontaneously in the company for a long time, as it is true that KM has (fortunately!) always been practiced in a pragmatic way. Among their characteristics, we can mention:

– they concern a limited but significant domain of knowledge;

– they are led by people who are convinced of the need to act on their knowledge and who are therefore likely to be the driving forces behind a global approach;

– these are projects that are decided and implemented locally in the units. They are not necessarily supported by hierarchies (however, at a minimum, what is called the "benevolent neutrality" of the hierarchy is required). This avoids making everything depend on a "strong management commitment", which is often a prerequisite for strategic projects, but which is sometimes a delaying or even blocking factor;

– they are an example of the possibility of working on knowledge capital.

The pilot project(s) are the catalyst for a comprehensive and strategic approach to KM. A pilot project must show that it is useful to work on knowledge and provide original added value compared to a more traditional project (quality, documentation, IT, etc.). It is a concrete and pragmatic start to communication with the company's managers and other people, who can contribute to raising awareness in this area.

2) The federation of knowledge management projects

The first water lilies grow through an emergence phenomenon specific to the complexity of the knowledge system. This emergence phenomenon must be carefully managed in the first phase. We then enter into an evolutionary cycle. Coordination tasks must be undertaken to bring together and federate the various projects, the strategic and global dimension is not yet preponderant, but it acts implicitly. Then come cooperation tasks, where it is a question of giving an official color to this federation of projects which is

organized in a network (the company's KM network). Several points in this regard should be highlighted:

– the definition of common objectives that give meaning to all projects and a shared vision. This provides a persuasive and driving force for the entire company;

– formalization through communication and explanation actions with the relevant hierarchies. This makes it possible to give a formal structure to the network of actions and the means to structure it, as well as a strong legitimacy to the project;

– regular and consistent communication on KM within (perhaps also outside) the company.

3) Deployment

With the "water lily" network now in place, the aim is to ensure its "reasoned and persevering" growth, in order to cover all the company's needs for the management of its knowledge capital.

This deployment can usefully be based on a mapping of critical knowledge. All critical areas and corresponding actions to be carried out can thus be defined and covered by an action plan.

KM processes must be put in place, with evaluation tools corresponding to their objective of enhancing the value of knowledge capital. Global management tools must also be put in place.

The communication and motivation systems attached to the knowledge management project must be particularly studied, as a global project must mobilize a large number of people to enrich and sustain the KM system put in place. The latter generally leads to a profound change in habits and beliefs. Motivation is not always of a classic type and often involves more intellectual or intangible satisfaction than material rewards. The critical success factors are also (and perhaps most importantly) in these motivating factors, which are the essential driver of change in this type of project.

1.7.2. *Key stages of change*

A KM project, whether localized (a "water lily") or global in the company, involves building a system that:

– materializes, explicitly (through information) and/or tacitly (through knowledge communities) a company's capital of critical knowledge;

– manages the "cognitive" flows of the actors who use and bring knowledge to the system.

A KM system is complex to construct and implement. The construction of a KM system can only be done with the actors. How then to motivate the actors concerned to bring their knowledge to the system, to use it, to feed it and to make it evolve continuously? We give below some elements, validated according to significant industrial practices.

1.7.2.1. *The mirror stage*

The mirror stage (which can also be called the mirror effect, although common sense gives it a less powerful meaning than here) is so named in reference to the psychoanalyst Jacques Lacan, who referred to a stage of cognitive development in early childhood, where babies suddenly recognize themselves as structured personalities, as a whole, distinct from their environment.

When constructing a KM system, a similar phenomenon occurs (or should occur) with the people who provide the knowledge to be put into the system (experts, specialists, various contributors, etc.). They recognize themselves, thanks to the work done on their knowledge, which is often a work of reconstruction, restructuring, as a "knowing" personality structured in their field, of which they were not really aware before, at least not from this angle. They also realize the volume and quality of the knowledge they have accumulated in their professional experience, which is generally not easy to recognize (for the holders themselves, professional knowledge and know-how are self-evident). They therefore recognize themselves in the mirror provided by the KM system, which gives them a structured and rewarding vision of the knowledge they have deposited there. The mirror stage is a prerequisite for the success of the implemented KM project. With few exceptions, if this phenomenon does not occur, the project has a high

probability of being a failure: this leads to the rejection of the pieces of knowledge included in the system by the very people who are supposed to deposit them.

It is the work of restructuring knowledge that reveals to each contributor that their knowledge forms a global, rich and structured system. The mirror stage phenomenon is a personal, but not a collective, experience. The people who have provided their knowledge for the system then become the first bearers of the KM project. Without this first stage of change, they become the first gravediggers!

The change due to the mirror stage can be identified by information that the contributor will express, such as: "I didn't know I knew so much" or "it's a good summary image of my field". It also makes the expert understand the potential, the power, contained in their knowledge corpus. In emotional terms, this also translates into (great) satisfaction due to the expert's discovery of an unsuspected inner richness.

1.7.2.2. *Consensus*

The consensus building step is to establish a shared agreement on the content of the knowledge management system (all contributors, possibly with their teams). This is the first step of collective appropriation, after the individual appropriation represented by the mirror stage. Agreement is reached on the content and presentation.

To do this, it is necessary to present to all contributors both the formatting and the overall structuring of individual contributions in a complete version, even though it must be provisional. This presentation usually leads to discussions, negotiations, explanations and mutual corrections. A final agreement on content is reached, through mutual learning thanks to the integration of everyone's contributions. This leads to a collective acceptance of the contributions to the project as well as a collective appropriation of the content.

The change brought about by the consensus building phenomenon can be observed through the progressive understanding of the representation of the other and the emergence of a common vision, the objective of this step. It often leads to a strengthening of identification with professions and/or a sense of identity. It is a consequence of a shared, constructed and explicit vision.

Without the change created by consensus, the knowledge contained in the system will remain valid knowledge for a few individuals and will not have the status of collective knowledge, defended by a corporate knowledge community.

1.7.2.3. *Legitimization*

Legitimization is a phenomenon of "peer validation". Peer validation aims to legitimize the knowledge contained in the system in the organization. In fact, it is recognition of system content (knowledge and know-how involved in a profession) by peers, recognized for their competence in the field. These "reviewers" are often co-opted by the contributors themselves as able to validate the knowledge, which does not detract from the legitimacy obtained.

Once the process of legitimization has been completed, the system content can be established as the state of the art of the profession (or part of the profession) in the organization.

Without the change created by legitimization, the knowledge contained in the system is only recognized as that of a closed community (or even jealous of its knowledge) and, in any case, it leads to this, as has often been seen in knowledge communities that are not legitimized by external perspectives.

1.7.2.4. *Approval*

The main objective, at this stage of project development, is approval by the decision-making authorities, which will lead to the deployment and sharing of the knowledge management system in the organization. It is a more classic stage in project management, but it has some specific characteristics.

Explicitation and presentation of the system to the entire steering committee normally leads to an understanding of the approach, which until now has been (in general) only informal, as well as a reaction and discussion of the content. These discussions allow a new understanding of the objectives and an awareness of possible action on the whole knowledge capital. The expected consequences are essentially a decision to deploy or deepen the reflection. In the same way, they allow progress in managerial awareness on this type of problem.

Without the change linked to this managerial awareness, the system, even though valid and legitimate, will not be used by the recipients, because it will not seem to correspond to a "natural" strategy of the organization.

1.8. Overview

A KM plan implemented in a company must necessarily result in the implementation of processes. The processes that can be identified as "managing knowledge" are countless. We could even say (and some people do not deprive themselves of it!) that any process in the company is a KM process.

In this respect, it is very difficult to defend a KM strategy, to set up an appropriate organization and to have coherent management tools. We must therefore have a vision of reference that allows us to put things in their place and act. The strong assumption underlying all the proposals and examples in this book, that KM is the management of the company's knowledge capital, provides a filter that makes the task easier. A process is included in the KM repository if its added value to the knowledge capital can be identified (and evaluated). In concrete terms, we can already see whether it uses the knowledge corpus and whether it enriches it in one way or another.

The daisy model is a proposal to provide a unifying framework and to build a KM process repository to implement and manage in a company. For a number of these processes, there is nothing new, except perhaps a different perspective on their purpose and management. For others, these are truly innovative processes, which require an often unusual implementation and always on a significant time scale.

Operationally, in the company, this knowledge-based approach results in a loop of continuous progress, called the virtuous cycle of knowledge. This cycle consists of four main steps: analysis, organization, sharing and evolution of a knowledge corpus. It makes it possible to define a reference frame of KM processes necessary for the implementation of a complete KM program in the company.

The MASK method is an operational method based on a formal theory of knowledge, a structured methodology and a set of tools. With its four components, it respects the principles set out in this chapter and therefore provides an example of illustrating the virtuous cycle of knowledge, on a (non-exhaustive) set of crucial subjects in a KM approach. This example of illustrating the virtuous cycle of knowledge will provide many of the case studies presented in this book.