Part 1

A Systemic Approach to the Organization Based on Knowledge Management and its Tools

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Theoretical Anchoring of Knowledge

Resource theory views knowledge as a strategic asset [GRA 91, BAR 91]. Knowledge resources, which are distributed throughout the organization and are difficult to identify and imitate, are likely to offer a long-lasting competitive edge if used properly [KOG 92, NON 95]. Hence, knowledge appears to be a crucial resource for the organization which needs to be maintained and developed.

Information technology (IT) – for example Internet, Intranet, data warehouses, document management, databases and Groupware – offers improved possibilities to better manage knowledge [ROB 00].

In this chapter, we present the general framework of the research and precisely define what it is that we understand by "knowledge".

First, it is imperative to draw the distinction between the various concepts – data, information, know-how, skill and knowledge – because numerous authors present them as being interlinked but differentiated, while others treat them as being the same thing.

Then, given that learning is a means of acquiring and developing knowledge, and that it is inconceivable to study knowledge without making reference to learning, the second section of the chapter is given over to how to make the transition from individual learning to organizational learning.

Then, in the next few sections, we shall examine the main activities making up the process of knowledge management, the tools supporting knowledge management and the human groups that constitute vectors for the development of knowledge.

Finally, the last section of this chapter will deal with the concept of culture, its presence within organizations in a variety of forms and its connection with knowledge management.

1.1. Individual knowledge and skills

The development of individual knowledge takes place in accordance with the following continuum: data → information → knowledge → skill [PES 06].
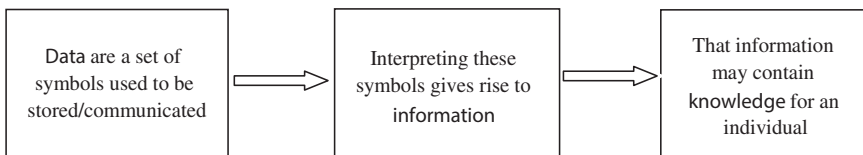
1.1.1. *Data*

According to the Larousse dictionary, "data is a conventional representation of a piece of information". In this definition, there is no intention or agenda inherent in data[1], which are codified in accordance with a convention, a natural language or a computer language. For example, when a transmitter uses a convention which the receiver does not understand, the message cannot be understood. According to Prax [PRA 00, PRA 07], data are discrete and objective facts resulting from an acquisition: a measurement taken by a natural or manmade instrument. They may be qualitative or quantitative and serve as the basis for reasoning or for other treatment processes.

1.1.2. *Information*

Larousse states that "information is any event, any fact, any judgment brought to the attention of a particular audience, of varying sizes, in the form of images, texts, discourse or sounds". Information is a piece of data emitted by a transmitter, which makes a difference in that it can be interpreted and used by a receiver [BEN 08]. Indeed, for there to be information, the signal must be perceived and understood. The signal can also generate knowledge or help move forward in the solving of a problem [MAR 09]. In summary, "information is a difference which makes a difference" [BAT 08]. It is a means to construct knowledge, which is essentially linked to human action [NON 95].

Figure 1.1 illustrates the relations between the concepts of "data", "information" and "knowledge".

Figure 1.1. *Data – information – knowledge*

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1 Therefore, data are objective by nature.

1.1.3. *Knowledge*

According to Larousse, "knowledge is what is acquired through study or practice". Various definitions of knowledge have been put forward in the literature published hitherto. The most representative of these are presented in Table 1.1.

Authors	Definitions
Nonaka [NON 94]	Information is a medium necessary for the creation and formalization of knowledge, but information and knowledge are two representations which differ by virtue of where they are located: information is embedded in a message, whereas knowledge exists in human memory. All externalized knowledge becomes information, and all information, when it is interpreted and integrated by a human being, becomes knowledge. All the knowledge held by the individual can be used to help interpret the information received.
Davenport *et al.* [DAV 98b]	Knowledge is information combined with experience, context, interpretation and reflection.
Alavi and Leidner [ALA 01]	On the one hand, knowledge is personalized information, linked to facts, procedures, concepts, interpretations, ideas, observations and judgments. On the other hand, it is the result of a cognitive process.
Carlile [CAR 02a]	Knowledge is a resource which is both critical and difficult to manage. At once, it may be a source of and a barrier to innovation.

Table 1.1. *The various definitions of knowledge*

In the domain of knowledge management, numerous authors agree that knowledge is different from data, information and skill [BOH 94, VAN 97, FAH 98, PRA 00]. Indeed, knowledge is a more complex notion, in that it simultaneously expresses that which is known and the capacity to make use of that information: *savoir-faire* (or "know-how").

Knowledge is a set of schemas – that is dynamic cognitive structures pertaining to concepts, entities or events. These schemas, which are used by the individual to efficiently interpret information, guide the search for, acquisition of and processing

of information. They also condition behavior in response to that information. Thus, schemas provide a ready-made system of knowledge. Knowledge is made up of routines which we are able to execute and rules of use indicating when and how to use those routines. More specifically, we can distinguish two types of knowledge: explicit knowledge and tacit knowledge:

– Knowledge, be it explicit or formalized, can be transmitted without loss of integrity through written or oral discourse. For instance, formalized knowledge is the knowledge contained in books or delivered by educational systems. It may just as well be a blueprint or a procedural manual as the content of a database. This codified knowledge can be described and specified in terms of content and intellectual property [COW 97]. It can also be sequential, digital and rationality based, according to Nonaka and Takeuchi [NON 95].

– Tacit knowledge, which is difficult or even impossible to express in a discourse, is not communicated through language. Usually acquired through practice, tacit knowledge often corresponds to contextual situations, to values and implicit standards. This practical knowledge exists at individual level (as an individual's *savoir-faire*) and collective level (e.g. the routines used in the organization and arising from repeated practice). The essential characteristic of tacit knowledge is that it is difficult to pass on, because it is hard to separate the knowledge from the knowledge holder and from its use context. It is acquired through imitation and/or experimentation in a certain context. As specified by Nonaka [NON 94], tacit knowledge includes cognitive elements, schemas, beliefs and mental models defining our view of things and technical elements corresponding *savoir-faire* anchored in specific contexts of action. Polanyi [POL 67] explains that tacit knowledge is personal, closely linked to a given context and, therefore, difficult to transfer.

In Polanyi's view, the tacit and explicit dimensions coexist within any piece of knowledge. The tacit knowledge forms the background which is indispensable to define the structure necessary for the development and interpretation of the explicit knowledge.

This duality (tacit and explicit), introduced by Polanyi [POL 67], has been drawn upon by many authors in discussing the more or less communicable nature of knowledge. For example, Nonaka [NON 91] proposed a dynamic model of the conversion of knowledge from a tacit to an explicit form, and vice versa, known as the "knowledge spiral". Hildreth and Kimble [HIL 02], for their part, note that these two forms of knowledge should not be viewed in opposition to one another, but rather that it is preferable to envisage knowledge with its dual nature. For Nonaka [NON 94], the conversion of tacit knowledge into explicit knowledge and vice versa is necessary for the process of knowledge creation.

1.1.4. *Skill*

There have been many books published on skill which sometimes confuse skill with knowledge.

We can distinguish two categories of works on this topic: those given over to the identification of categories of skills and those devoted to the description of the processes of skill acquisition.

1.1.4.1. *Categories of skills*

Katz [KAT 74] distinguishes three types of skills:

– conceptual skills (analyzing, understanding, acting systematically) – that is knowledge, or "*savoir*";

– technical skills (methods, processes, procedures, specialist techniques) – that is know-how, or "*savoir-faire*";

– human skills in intra- and interpersonal relations – that is existential knowledge, or "*savoir-être*".

In Dejoux's view [DEJ 01], three categories of skills coexist:

– declarative skills;

– procedural skills such as *savoir-faire*;

– diversification skills or judgment skills.

Le Boterf [LEB 01, LEB 02] is at the junction between these two schools of thought, adopting a process-oriented vision and describing the components of skill. In his view, skill is the mobilization or activation of multiple pieces of knowledge, in a given situation and context. This leads him to distinguish six categories of knowledge:

– theoretical knowledge: the ability to understand and to interpret;

– procedural knowledge: knowing how to proceed;

– procedural know-how: knowing what to do and how to operate;

– experience-based know-how: knowing what must be done and how to operate;

– social know-how: knowing how to behave and how to conduct oneself;

– cognitive know-how: knowing how to handle information, how to reason; being able to verbalize what we are doing and to learn.

1.1.4.2. *Skill: a process*

Numerous authors consider skill to be a process. Table 1.2 presents some of the contributions pertaining to this view of skill.

| Authors	Definitions
Samurçay and Pastré [SAM 95]	Skill, as the subject's relation with working situations, explains the performance observed by describing the organization of knowledge constructed at work and for the purpose of work.
Cabin [CAB 99]	Skill is latent and is only exercised in a given situation. It is not a state or a possessed piece of knowledge but, instead, is a dynamic process which results from the interaction between several types of *savoirs*: knowledge, *savoir-faire*, *savoir-être* and cognitive functions.
de Terssac [DET 96]	Skill is an intermediary notion which allows us to think about the relations between the work and the knowledge held by individuals.
Prax [PRA 00]	Skill results from the concrete application of knowledge to a particular situation. This requires there to be an evaluative framework and a third-party evaluator.
Le Boterf [LEB 01, LEB 02]	Skill is the mobilization or activation of multiple pieces of knowledge, in a given situation and context.
Beyou [BEY 03]	Skill is the ability to effectively employ knowledge in a given context to produce successful action.

Table 1.2. *Skill viewed as a process*

Thus, skills are:

– finalized: they have a purpose or objective;

– operational: they are effective, which is to say they are employed for specific tasks;

– learnt: they are acquired by various methods and in various forms (training, practice in an activity, etc.).

The concept of knowledge is usually considered to be one of the components of skill. Indeed, knowledge sits between information and skill [PES 06]. In the view of these authors, skills are the final link in a chain, beginning with data, which give rise to information, which produce knowledge, which is integrated into skills (Figure 1.2).

Data → Information → Knowledge → Skill
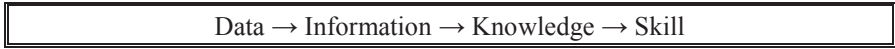
Figure 1.2. *Links between data, information, knowledge and skill*

Individual skills are the abilities to combine and use the knowledge and *savoir-faire* acquired to deal with situations at work and obtain the expected results. Aptitude, which primarily pertains to people (qualities and capabilities, whether or not they are used), does not necessarily translate into skills. Potential is the set of acquired skills which would enable a person to adapt to new contexts and new situations. The development of individual skills is aimed at the acquisition of *savoir-faire*, knowledge and professional behavior, by an organized, gradual advancement, to enable someone to slowly deal with new professional situations [SAM 95]. In an organization, individual skills can be specified by using a referential framework of the positions involved in the company.

1.2. From individual learning to organizational learning

Individual learning is the basis for the development of collective skills, and the behavior of individuals can influence the effects of learning in the organization [ARG 78]. In addition, individual learning serves as the foundation for organizational learning which, in turn, feeds into further individual learning [ARG 96]. We shall now go on to analyze individual learning and organizational learning in turn.

1.2.1. *Individual learning*

Individual learning is an individual's ability to carry out a task under the influence of the interactions with its environment. Researchers began by focusing on the individual aspects of knowledge and learning, before turning their attention to the organizational dimensions of these phenomena.

The study of individual learning has given rise, first, to a variety of pedagogical approaches and, second, to the conception of different learning styles.

1.2.1.1. *Pedagogical approaches*

The pedagogical approaches arise from work in psychology and pertain to individual learning from the viewpoint of trainers or teachers. We can distinguish three types of pedagogical approaches: the behaviorist approach [SKI 74], the cognitivist approach and the constructivist approach [PIA 79].

1.2.1.1.1. Behaviorism

This approach places emphasis on the external factors in learning: rewards, sociocultural factors, language and the socioeconomic environment [SKI 74]. Impossible to observe, individual mental models may be influenced by the outside world by training and by positive reinforcement (rewards) or negative reinforcement (punishments). The environment is the key element in determining and accounting for human behavior. The individual and his/her own personal representative model are not known to external observers, but they are of crucial importance in knowledge acquisition.

1.2.1.1.2. Cognitivism[2]

This approach reconsiders the above-mentioned environmentalist idea, enriching it with internal factors such as intellectual abilities and personal outlooks. Leading to a modification of the mental structures as experience is gained, learning occurs in different ways, both by sudden understanding (the penny drops) and by the activity of memorization. Given that acquisitions do not necessarily entail the actual emergence of new behaviors, learning takes place when there is acquisition of knowledge giving rise to potential behaviors. Thus, learning lies in the potential for certain behaviors.

1.2.1.1.3. Constructivism

This approach, which was developed in response to behaviorism, emphasizes independent discovery and the importance of trial and error in the act of learning [PIA 79].

The construction of knowledge takes place by action and explanation of the learners' ideas. The individual does not simply receive data as a passive addressee;

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2 Unlike behaviorism, cognitivism aims to open the "black box" – that is the set of phenomena which take place between the stimulation of the subject by the environment and the organism's observable response. Cognitive psychology was born in the 1950s, around the same time as artificial intelligence (AI). Indeed, once the principle of studying the contents of the black box was accepted, concepts needed to be developed to describe what occurred. The beginnings of computer science saw the development of a conceptual arsenal with which to think about cognition: the notion of information and that of information processing. Extract from Wikipedia.

instead s/he selects and assimilates the data s/he wants to learn about. Following this pedagogical train of thought, learning is not the result of the imprints that sensory stimulations leave in the learner's mind, nor is it the result of conditioning by the environment. Instead, it arises from the learner's activity, whether his/her capacity for action is actual or symbolic, matricial or verbal. This capacity for action of the subject, which arises from personal mental representations, is the result of a dynamic process of finding a balance between the subject and his/her environment. This process may take the form of assimilation or accommodation of the intellectual structures. According to this view, learning is a process of knowledge creation by transformation of one's experience. When faced with a new situation, the subject tries to maintain a balance by integrating that situation into his/her existing mental models (assimilation). When assimilation is not enough to understand the situation, "accommodation" involves the altering of those existing cognitive representations to accommodate the new experience. This process is comparable to the mechanisms of exploitation and exploration identified by March [MAR 91] in organizations.

1.2.1.2. *Learning styles*

The learning process constitutes a cycle which connects thought and action, involving two forms of knowledge acquisition linked to thought and two modes of transformation of the experience linked to action. The four stages in the cycle, in fact, represent the aptitudes required to learn and to solve problems. Thus, four learning styles, based on the pedagogical approaches seen earlier, were defined by Kolb [KOL 84]: assimilation, accommodation, divergence and convergence.

1.2.1.2.1. Assimilation

Assimilation is a learning style characterized by two abilities: reflective observation and abstract conceptualization. The individual tends toward inductive reasoning and tends to have an interest in ideas, abstract concepts, analysis and logic. The strengths of somebody with this learning style are the ability to create theoretical models and learn from his/her mistakes. Weaknesses are a disinterest in realistic solutions and application of theories, the tendency toward reverie and indifference to other people.

1.2.1.2.2. Accommodation

Accommodation is a learning style characterized by active experimentation and concrete experience. In this case, the individual likes doing things, making plans and designing experiments. Strengths associated with such people are their ability to act and react as a function of the facts. Weaknesses are not only impatience and activism but also – because of their perhaps immoderate taste for action – a tendency to do things pointlessly.

1.2.1.2.3. Divergence

Divergence is a learning style characterized by concrete experience and reflective observation. In this case, the individual likes imagining things and approaching concrete situations from a multitude of perspectives. Their strengths are their ability to understand multiple points of view and recognize the possibilities for action in a given context. The main weaknesses of this learning style lie in the difficulty in making decisions, a tendency to become emotionally invested and to ignore or deny conflicts.

1.2.1.2.4. Convergence

Convergence is a learning style which is characterized by abstract conceptualization and active experimentation. In this case, the individual likes applying ideas to concrete situations, finding the right solution, reasoning in a hypothetical-deductive manner, focusing on objects and technique. Strengths for these people are their ability to concentrate their efforts on solving a problem and establishing a plan of action. Their weaknesses lie in their overly hasty choice of a solution, which may lead to the incorrect solution of the problem and a tendency to focus too much on techniques.

1.2.1.3. *Learning loops and conscious states*

In addition to this presentation of the process of individual learning, it is helpful to tie in the concept of levels of learning loops (single-loop and double-loop learning, etc.) and that of conscious states [PRA 97].

The first-level (primary) loop leads to the solution of a problem without the established rules being challenged. The secondary loop comes into play when, in order to solve a problem, it is necessary to critically re-examine the usual structures and rules. A tertiary loop is involved when the very way in which the structures and rules are developed needs to be re-examined. Another aspect of the learning process pertains to the individual's conscious state regarding his/her own knowledge. At the first level, the individual is not aware (conscious) of his/her state of ignorance. In the professional and organizational context, therefore, there is an initial condition which is absolutely crucial in order to begin the learning process: the individuals must not feel threatened by revealing their own state of ignorance. By becoming aware of that state of ignorance, they are then able to engage in the learning process. At the end of the learning process, the individual is conscious of the knowledge that has been acquired. Hence, as the acquired knowledge is activated, s/he will achieve greater dexterity and efficiency and adopt automatic behaviors in carrying out the activity.

1.2.2. *Organizational learning*

The notion of organizational learning, introduced by Simon in the 1950s, has been the subject of numerous publications – often mutually contradictory. According to one view, organizations do not "think" and do not "learn": it is the individuals who learn [MAR 75, SIM 91]. In the view of other researchers, individuals learn individually, but their learning reflects their social context. Thus, organizational learning is more than just the sum of the individual learning [CAR 03]. Teece and Pisano [TEE 94] note that learning is essentially a social process. The internal context influences behavior, cognition, interpersonal processes and group dynamics.

In the eyes of Cyert and March [CYE 63], organizational routines are at the heart of collective learning in organizations; they are a manifestation of the organization's memory which guides the behavior of the individuals and groups within that organization. The process of learning is preserved in the organization's structures, norms and values, which influence individual learning [FIO 85].

In order for there to be organizational learning, there must be at least two individuals, two groups and two organizations. Each person/group transforms the knowledge in his/her own domain of specialty, but at the same time, at the boundaries between them, they are all involved in a process of collective transformation of the knowledge. The upshot of this is that, at the heart of organizational learning, we find relations between actors, differences in knowledge between the actors and the effectiveness of the knowledge situated at the boundaries between the domains of specialization. Therefore, the boundary objects can facilitate organizational learning by reducing rigidity and preventing specialized skills from being restricted to only one person/group [CAR 03].

At organizational level, it is more fitting to speak of "knowledge in the organization" rather than "the organization's knowledge" [MAR 99]. Not everybody in an organization knows the same things. Indeed, there is shared, common knowledge and knowledge specific to one person or to a group of people. Each individual holds specific knowledge which is the fruit of his/her experience, history and intelligence. The use of that knowledge and its evolution take place within the social community that is the organization. This collection of individual knowledge – either private or shared – constitutes the organization's knowledge, which is, therefore, both distributed and diverse. This process of transition from individual knowledge to organizational knowledge is possible by way of dialog, discussion, exchange of experience and observation [NON 95].

Numerous definitions of organizational learning have been put forward in the literature published hitherto. The most representative of these are presented in Table 1.3.

Authors	Definitions
Lave [LAV 93]	It is a creative and collective interpretation of past experiences.
Charreire-Petit [CHA 95]	It is the process whereby old data (knowledge or *savoir*, practices, procedures and representations) are combined with new data and implemented collectively into actions or preparation for future actions. This combination may necessitate the reorganizing, reforming, inclusion or renunciation of practices and/or the principles underlying those practices.
Miller [MIL 96]	It is the acquisition of new knowledge by the actors, who are entirely able and willing to apply that knowledge when making decisions or to use it to influence other members of the organization.
Stata [STA 96]	It is the process by which individuals acquire new knowledge and new understandings and, consequently, modify their behavior and their actions.
Carlile and Rebentisch [CAR 03]	It is a social process involving numerous actors possessing the same knowledge and having conflicting interests. Organizational learning cannot be analyzed as the aggregation of individual learnings.

Table 1.3. *The main definitions of organizational learning*

Analysis of the definitions of organizational learning leads us to summarize them in the following definition, which we shall adopt in our subsequent discussions throughout this book. Organizational learning is a social process which necessarily involves actors who have differing (or conflicting) points of view and interests, whose activities (acquisition–collection, memorization–storage and combination–processing) pertain to a resource (data–information–knowledge–skill). We are deliberately omitting the dimension of the performance expected of effective organizational learning, because this topic is not discussed in this book. On the basis of this brief definition, we feel it is important, in light of our topic here, to touch on the following concepts: organizational memory and the learning organization.

1.2.2.1. *Organizational memory*

Organizational memory [3] is a set of explicit and tacit pieces of knowledge [POL 67], a collective cognitive map of sorts [ARG 78, WEI 79]. The truth of this concept arises from the fact that a large number of organizations have become aware that the knowledge held by their employees is an intangible asset, constituting immaterial capital which lends them a very substantial competitive advantage. The literature on knowledge management varies with regard to this concept of organizational memory in terms of content: information [WAL 91], knowledge [STE 95] and skills [NON 95].

However, analysis of the most significant contributions on this subject leads us to distinguish three types of organizational memory: declarative memory (knowing *what*), procedural memory (knowing *how*) and judgmental memory (knowing *why*). For organizational learning to take place, the organizational memory needs to be extended and updated to support working practices; it needs to be continually reorganized to integrate new information and new concerns [GIR 95].

1.2.2.2. *The learning organization*

An organization learns if, by its processing of information, the range of its potential behaviors is altered. Thereby, it increases the probability that its future actions will lead to an improved performance [HUB 91, HUB 98]. The work of C. Argyris [ARG 95] particularly emphasizes the idea that the effective organizations of the future will be those which are capable of developing their faculty for adaptation, thanks to their ability to learn. The development of learning organizations seems a necessity for modern society. In the author's view, it is crucial to gain control of the defensive routines which stand in the way of change and learning. For Argyris, the organization becomes a learning organization when it helps its members to modify their way of thinking and to learn by constructive reasoning. The employees need to be able to solve not only routing problems linked to "single-loop" learning but also more complex problems when they are faced with working situations they have not encountered before, linked to "double-loop" learning. The process of modification of the routines commits the organization "to learn how to learn" and, thus, to increase its ability to carry out organizational enquiries in order to eliminate the mistakes and inconsistencies which usually occur when the organization/environment system is changed.

Various definitions of the learning organization have been put forward in the literature published hitherto. The main definitions are presented in Table 1.4.

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3 Also known as collective memory.

Authors	Definitions
Senge [SEN 90, SEN 91]	The learning organization focuses its efforts on the quality of the individuals' thinking, on their shared visions, on their aptitude for reflection, on team-based learning and on the understanding of the complex problems of business life.
Garvin [GAR 93]	The learning organization has a skill to create, acquire and transfer knowledge and to modify its behavior as a function of new knowledge and visions.
Senge *et al.* [SEN 00]	The learning organization is able to develop and use its knowledge to carry out the changes necessary for its long-term survival.

Table 1.4. *Main definitions of the learning organization*

Only the first of these definitions explicitly mentions individuals and human groups. The second definition is centered on the process of organizational learning. The third mentions the aims of the learning organization. Instead of contradicting one another, these three definitions are mutually complementary.

In this book, we shall not touch on the aims of the learning organization but focus only on the conditions of its existence and the processes characteristic of it.

1.3. Knowledge management

The literature, whether academic or professional, defines knowledge management as a process aimed at managing the different phases in the lifecycle of knowledge [CHA 00b, BOU 03, BEC 10, DAL 11]. It involves a set of devices (organizational, incitational, procedural and technological) intended to facilitate the acquisition, conservation and exchange of knowledge (tacit and explicit) between individuals and groups within and outside of the organization [BOU 00].

As Table 1.5 illustrates, the literature has provided numerous definitions for knowledge management.

Authors	Definitions
Hamilton [HAM 98]	A process of creation, transfer and use of knowledge with the aim of improving the organization's yield.
Davenport and Prusak [DAV 98a]	A process composed of the following activities: generation, coding and transfer of knowledge.
Prax [PRA 00]	A process of creation, enrichment, capitalization and validation of knowledge and know-how involving all the actors in the organization, the aim of which is collective performance and the long-term survival of the company.
Ermine [ERM 03]	A process comprising the following activities: capitalization, sharing and creation.
Baile and Lancini [BAI 02a]	An organizational process facilitating the acquisition, structuring, integration and dissemination of actors' knowledge throughout the organization, with the aim of providing a work aid and improving the organization's effectiveness.
Grundstein [GRU 04]	A process designed to amplify the use and creation of knowledge within an organization, with two complementary and strongly interlinked aims: one pertaining to the organization's heritage and one pertaining to sustainable innovation; aims which are underpinned by their economic, human, social and cultural dimensions.

Table 1.5. *The main definitions of knowledge management*

To summarize these definitions, we feel it is useful to return to the concise definition of organizational learning given earlier: "Organizational learning is a social process which necessarily involves actors, possibly in conflict, whose activities (acquisition–collection, memorization–storage and combination–processing) pertain to a resource (data–information–knowledge–skill)".

Like organizational learning, knowledge management is a process. Its social dimension is less prominent, and its activities more precise and presented as necessary to achieve better performance. It arises from this that knowledge management involves deliberate and structured organizational learning. In this book, we consider knowledge management to be a process made up of five interdependent activities, functioning in a loop (acquisition, storage, transfer, application and creation of new knowledge). This iterative nature of the knowledge management process is not new, as Carlile and Rebentisch [CAR 03] and Carlile [CAR 04] mentioned in their work on the knowledge transformation cycle. In their view, the

evolving nature of knowledge means that it must be transformed whenever it is used, because the situations encountered are always new, and it is not enough to draw on past experience to overcome knowledge barriers, which constitute obstacles to the sharing of knowledge between individuals and groups of individuals. However, if it proves necessary to employ a common language and lexicon, the common knowledge used often needs to be transformed in order to facilitate the sharing and evaluation of knowledge at the boundaries [CAR 04].

1.3.1. *Knowledge acquisition*

The phase of acquisition or collection of knowledge corresponds to the development of new content or the replacement of existing content in the organization's explicit and tacit knowledge. This collection or acquisition of new knowledge corresponds to a phenomenon of organizational learning which develops on the basis of the knowledge available in the organization (by experimentation, imitation, observation and research). Hence, this learning is rooted in collaborative social interactions, or in individual cognitive processes, given that the knowledge sought may be held by individuals or incorporated in processes and/or artifacts [CAR 03]. The process of knowledge seeking can be described in terms of research [MAR 58, CYE 63] and knowledge acquisition [HUB 91].

Knowledge research involves identifying the knowledge that is likely to satisfy a need or help solve a problem. In order to do this, two iterative tasks need to be completed. The first is to determine the useful sources of knowledge, and the second is to evaluate those sources and determine their relevance for performing the task in question. These two iterative efforts take place in two overlapping spaces: the search space and the solution space. The shape and size of the former is constantly evolving, as newly acquired knowledge opens up new avenues of research and shuts other ones down. The shape and size of the solution space varies as a function of the size of the search space and the requirements to be satisfied. The relation between these two spaces is defined by the process of evaluation of the relevance of the knowledge discovered [CAR 03]. An existing piece of knowledge is useful only when it is sought by individuals, who use it to create value. The search for knowledge, therefore, is motivated by value creation and conditioned by the characteristics of the individuals and groups involved in the action.

1.3.2. *Knowledge storage*

Once acquired, knowledge needs to be preserved. Both at individual and collective levels, it is necessary to preserve it in memory in order to use it afterward. First, storage consists of gathering and preserving, in a use state, the knowledge

acquired or created by the organization; second, it involves preventing the loss of knowledge due to forgetting, to turnover or to incorrect identification of the relevant knowledge in the organization. For individuals, knowledge is stored in their memory. At the collective level, knowledge storage refers, by analogy, to the idea of organizational memory. Organizational knowledge is distributed, between different individuals within the organization [WAL 91].

Whether intentional or otherwise, knowledge storage is a process that leads to the accumulation of knowledge. The knowledge accumulated can be contained in files or documents, incorporated in tasks and artifacts or materialized in the experience of individual members of a practice community or a professional group. The nature of the activities and routines of the individuals and groups are crucial factors for the knowledge to be stored. The proliferation of new phenomena provides opportunities to modify or increase the stores of accumulated knowledge. Whether stored intentionally or otherwise, the knowledge is a source of competitive advantage if it can be reused to improve the organization's efficacy or reduce the cost of research, transfer and/or transformation of knowledge. On the other hand, without new phenomena, there are no (or very few) opportunities to acquire new knowledge, because activities can take place on the basis of the knowledge already acquired.

The accumulation of knowledge is linked to the learning curve [ARG 90]. However, in a dynamic environment, the new addition can render obsolete the knowledge stored in the current cycle of activity. Knowledge storage may, therefore, be an obstacle to innovation. Meanwhile, in a stable environment, with little novelty, knowledge storage may be passive and random and may overlook important facts. In addition, knowledge may be stored inadequately, causing it to be forgotten or unavailable, in spite of its potential usefulness and relevance for future applications and decisions [CAR 03].

1.3.3. *Knowledge transfer*

One of the major objectives of knowledge management is to handle the transfer of knowledge between various sources and addressees, at different levels: between individuals, between individuals and groups, between groups of individuals, between groups of individuals and the organization and between organizations [BEN 11, BEN 12]. This process of communication of knowledge can take place through informal channels (spontaneous discussion, informal meeting, etc.), formal channels (training session and formal meetings), personal channels (individual learning from a teacher or in a group) and impersonal channels (use of databases).

Knowledge transfer is a function of the type of knowledge to be transmitted, the nature of the sources and addressees and the context of dissemination, the

organizational culture, which may be more or less oriented toward communication and sharing, and incentive systems toward the dissemination of the knowledge. Recognized as more difficult, the dissemination of tacit knowledge requires first an element of explanation by the knowledge holder and second an element of learning, imitation and interiorization by the receiver of the knowledge. Another obstacle to the dissemination of the knowledge is at the source of the transfer process and relates to the identification and localization of knowledge in organizations [HUB 91, HUB 01].

The transfer of knowledge between organizational actors, between groups of organizational actors or between organizational units contributes to the integration of the knowledge [ARG 00, CAR 03]. Knowledge transfer is an iterative process comprising three stages: acquisition, storage and research. The iterative nature of the process arises from the link between knowledge storage and research. Hence, knowledge transfer may have a positive or negative effect at each cycle [CAR 03]. If the new requirement for a solution matches the firm's past activities, then the firm's stored knowledge can be reused. On the other hand, if the new requirement falls outside the field of the firm's past activities, the firm's stored knowledge may become an obstacle and a source of inflexibility. Consequently, the amount of novelty introduced between the moments of storage and of searching for knowledge is a challenge for the integration of knowledge.

1.3.4. *Knowledge application*

The activities of acquisition, storage and dissemination of knowledge do not necessarily yield an improvement in the organization's performances. Only the application of that knowledge into action can deliver some kind of improvement. However, there is often a significant gap between what organizations know and what they do. There may be several reasons that explain why acquired knowledge is not used:

– lack of confidence in the source of the knowledge;

– lack of time to use the new knowledge (it is preferable to use old practices which are tried and tested);

– risk aversion (transposition of knowledge to a different situation to that which led to it entails a risk of error).

In order for the application of knowledge to be effective, knowledge gleaned from different sources needs to be integrated. The diversity of the knowledge needing to be integrated means that this integration is a complex – and, therefore, necessarily iterative – task. According to Carlile and Rebentisch [CAR 03], the complexity of knowledge integration increases with the number of dependencies

between the groups or specialized domains in question. When the repetition of the knowledge integration cycle is accompanied by a change in circumstances, the activity of knowledge integration becomes even more complex. Indeed, not only must we integrate the knowledge held by different partners in different domains of specialty, but also we must first determine what the relevant knowledge is to deal with the new needs and by whom that knowledge is held. The integration of knowledge is, therefore, no longer a simple knowledge transfer but an iterative task that includes the establishment of agreements and consensus between interdependent groups. The intensity and number of dependencies between the different knowledge sources, therefore, appears to be a challenge for the integration of knowledge.

In the case where the context of integration of knowledge is stable, the language, methods and artifacts common to the different knowledge sources are defined through repetitive interactions, facilitating fluid communication between the different partners [LAW 67, GAL 73]. In a constantly changing and competitive environment, the high degree of novelty causes strong dependencies and differences between the different knowledge sources. It then becomes necessary to transform this knowledge. However, the dependencies and differences caused by a high degree of novelty lead to new constraints, which constitute obstacles to the transformation of the knowledge. In their activity of knowledge integration, therefore, organizations need to understand what is new and, at the same time, change their existing knowledge to facilitate the creation of new knowledge, necessitating the contribution of multiple domains of specialization [CAR 02a, CAR 03].

1.3.5. *Creation of new knowledge*

The efficiency of implementation of the aforementioned four activities (collection, storage, transfer and application) often engenders a new activity recently studied in the literature: the creation of new knowledge. Knowledge creation allows the organization to survive and deal with the competition by innovation. Creating new knowledge is a significant challenge for organizations [CAR 03, BEN 09a]. The creation of new knowledge disturbs the existing relations between the domains of specialization, which means that the dependency relations between the domains of specialization and the groups of individuals holding the knowledge in those domains need to be renegotiated. This requires time and effort to define a new language, new methods, and new artifacts shared by the different groups contributing to the creation of a product or service.

The acquisition, storage, transfer and iterative use of knowledge and the creation of new knowledge constitute a perpetual cycle of linked activities. Thus, the knowledge management process can be represented diagrammatically by the knowledge management cycle (Figure 1.3).
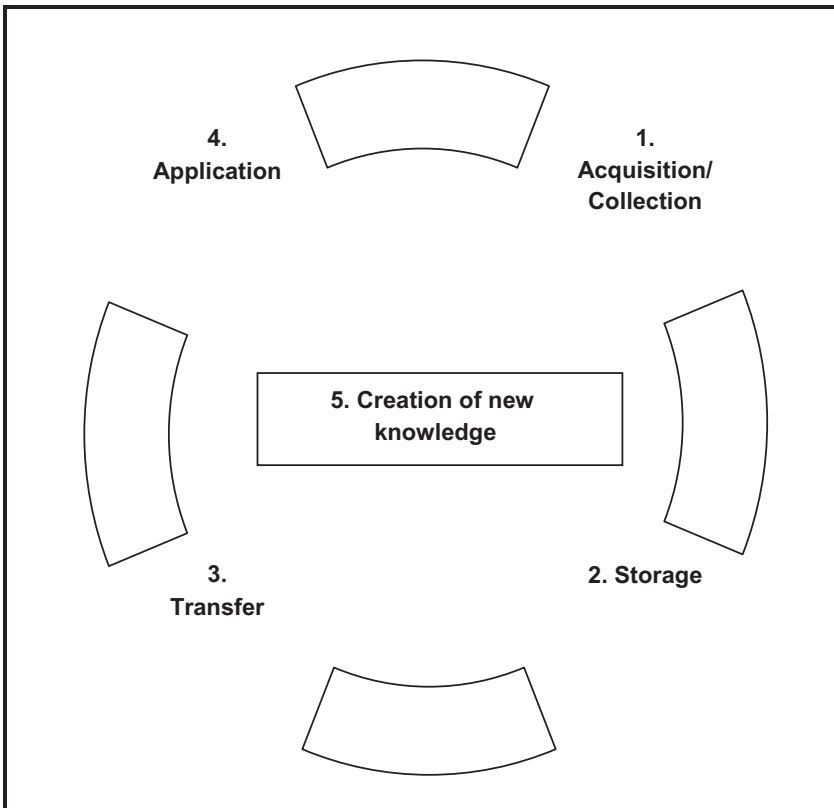
Figure 1.3. *The knowledge management cycle*

In summary, knowledge management refers, first, to the idea of a process in which the number of activities can vary as a function of the organizations and, second, to the operationalization of those processes with resources and tools which fit into a fair balance between the organizational and the technological aspects [DAV 98a]. In the views of these authors, any knowledge-management project must combine a technical infrastructure based on information and communication technology (ICT) and a human infrastructure based on a network of interacting individuals.

We can conclude from these that in order to establish effective knowledge management, it is necessary to:

– identify, compile, save, integrate and create knowledge that is pertinent for the organization;

– facilitate real and virtual exchanges between individuals by integrating the logic of the knowledge transformation cycle [CAR 03, CAR 04];

– implement knowledge management at individual level and at collective and organizational levels.

On the basis of these considerations about the nature of knowledge, which is firmly rooted in the individual as a subject, we can deduce that knowledge management notably involves management of the conditions in which the knowledge can be created, formalized, exchanged and validated.

With the aim of continually improving the process of knowledge management, organizations are increasingly turning to ICT to support the activities involved in this process [ROB 00]. The increasing role of ICT in knowledge management has resulted in the development of knowledge management systems (KMS). Section 1.4 is devoted to the presentation of KMS.

1.4. Knowledge management systems

The different components of KMS are known [BEN 15a]. It is the technological infrastructure, the social structure of the organization and the managerial system governing it. KMS includes one facet corresponding to the exchange of information and/or data between the human operator and the technological infrastructure. A second facet of KMS corresponds to the social interactions which are created via the computer platform by way of exchanges of information, points of view, interpretations, *savoir-faire*, etc.

Thus, there are similarities between KMSs and information systems (IS), such as both include a computer platform and involve human subjects who interact with the system.

1.4.1. *Information systems*

The concept of an IS has been the subject of numerous definitions put forward by researchers and professionals. We can subdivide these definitions into two categories, depending on whether or not they integrate the human factor (the users of the IS).

Apart from fully automated systems which support certain industrial processes, human actors play a critical role in the operation of ISs. In addition, we focus solely on the definitions of an IS which take the human factor into account. Table 1.6 gives a few representative examples of those definitions.

The first [DAV 85] and the second definitions [HIR 95], which do not take account of the organization, are not appropriate for the issue discussed in this book. The same is true of the third definition. Indeed, the third definition [REI 00] does not include the information processing, while the second [HIR 95] includes neither the processing nor the transformation of the information. We shall work on the basis of the fourth definition [MAR 09] but specify that – in this definition – the word "representations" implicitly includes the concept of knowledge and meanings, which is not so with the second definition [HIR 95] which explicitly mentions interpretation and meanings.

Authors	Definitions
Davis *et al.* [DAV 85]	An integrated user–machine system which produces information to assist human beings in the functions of execution, management and decision-making.
Hirschheim *et al.* [HIR 95]	A set of social interactions aimed at creating, exchanging and interpreting meanings.
Reix [REI 00]	An organized set of resources: hardware, software, personal, data, procedures enabling us to acquire, process, store and communicate information within organizations.
Marciniak and Rowe [MAR 09]	A system of social actors who memorize and transform representations by using IT and operating methods.

Table 1.6. *The main definitions of an IS*

1.4.2. *The characteristics of a knowledge management system*

KMS are IS devoted to the management of the knowledge resource. These systems are designed to facilitate the activities of acquisition, storage, transfer, use and creation of knowledge. A KMS is composed of a computer-based infrastructure and a sociotechnical system made up of people (users) interacting via the computer platform.

Table 1.7, which is adapted from Alavi and Leidner [ALA 01], shows that the potential contributions of IT to the processes of knowledge management are extremely varied.

Actual use of a KMS involves two voluntary actions on the user's part [MON 08]: first, consultation of the system to look for useful knowledge and, second, deliberate capitalization upon the new knowledge through the support tool. However, the existence of KMS does not guarantee the success of a knowledge-management

strategy implemented by an organization. It is in the use of the KMS and of the influencing factors imposed by the organizational context that the success of knowledge management resides.

Knowledge management process	Knowledge creation	Knowledge storage	Knowledge dissemination	Knowledge application
Tools making up KMS	- Data mining tools - Learning tools - Intelligent agents - Discussion forums - Groupware tools	- Electronic dashboards - Knowledge warehouses - Databases - EDM: electronic data management tools	- Electronic dashboards - Discussion forums - Knowledge warehouses	- Expert systems - Flow management systems - Computer applications
Roles of KMS	- Combination of new knowledge sources - Learning	- Support of individual and organizational memory - Access to inter-group knowledge	- More extensive internal network - More available communication channels - Quicker access to knowledge sources	- Knowledge applicable in multiple situations - Quicker application of new knowledge through workflow automation
Communication Technology Platform Technological – Groupware – Intranet				

Table 1.7. *The functions of KMS depending on the activities of the process of knowledge management [ALA 01]*

Numerous works have been produced on the determining factors of the adoption of KMS [LAN 01, LAN 03, BEN 14], the reuse of knowledge [MAR 01, WAT 06], the factors facilitating contribution behaviors in a KMS [BOU 04a, BOC 05, BEN 10a], the dynamics of insertion of those systems in organizations [ORL 00] and the identification of the structural conditions favoring knowledge management [JOS 02]. The reasons for actors' unwillingness to share via KMS arise mainly from the problems of adhesion to the voluntary capitalization of knowledge [ALA 01], to the formalization of the knowledge and to its reuse [MAR 01, WAT 06]. Indeed, individuals capitalize upon knowledge for themselves but are reticent to capitalize upon it for others' benefit. In order to deal with the problem of sharing, numerous authors have highlighted the necessity of instituting a culture of sharing and an

atmosphere of trust in the company [GUR 99, DET 04, GRU 04, KIN 07b, BEC 10, ANA 11, WIE 13, VAN 14]. This problem is linked to individual or subjective factors [MAR 01, LAN 01, LAN 03] based on a give-and-take logic [BOU 00], on opportunistic attitudes [FUL 04] and on organization factors [MAR 01]. In this regard, Hansen *et al.* [HAN 99] distinguish two types of knowledge-management strategies: those which are based on the human (social) network and those which use a KMS. For his part, DeFélix [DEF 02] notes that knowledge management is still a matter of context and actors. This observation demonstrates the need to take better account of the human factor – that is the characteristics of the users, their behaviors, their needs and their requirements. Indeed, IT offers quicker access to more extensive and richer knowledge sources, but the effort of appropriation and assimilation of that knowledge falls to the user of the KMS. The development of knowledge management cannot be reduced to a problem of use of ICT: it requires strict collaboration within the organization, notably involving the board of directors, the heads of human resources, the department heads and the IT department, who must all be motivated by the desire to greatly alter the organizational and cultural practices [REI 04]. In other words, the problems linked to knowledge management and to the use of its tools can only be dealt with by the development of cooperative relations between the actors in the organizations. Indeed, only such cooperation can facilitate the passage of knowledge from individual level to organizational level. By transposing, to the field of knowledge, the analytical results found by Argyris and Schön [ARG 96], showing that "individual learning serves as the foundation for organizational learning which, in turn, feeds into further individual learning", we can say that individual knowledge serves as the foundation for organizational knowledge, which, in turn, feeds into further individual knowledge, which enables the individual to create new knowledge. Nonaka [NON 94] highlighted the complementarity between these two levels of learning and knowledge and stressed the importance of socialization and of exchanges between individuals in order to facilitate the passage from one level to the other. Such socialization and exchanges do exist, regardless of their importance, in any working relationship.

1.5. Communities, teams and knowledge management

The areas of management pertaining to teamwork and knowledge are increasingly close together. The fact that knowledge is a critical resource for the organization to obtain a lasting competitive edge highlights the role of the mechanisms of coordination to integrate the specialized knowledge of the different actors within the organization [GRA 96a]. Nonaka and Takeuchi [NON 95] stress the importance of teamwork in the conversion of tacit individual knowledge into organizational knowledge. The most commonly cited fora for the development of knowledge in organizations are communities and teams [BEN 07, BEN 10a, BEN 15b].

However, there is a wide variety of communities and teams working within an organization, and academic and professional literature on these concepts is rich. In the next part of this chapter, we discuss the most representative of these contributions and illustrate the links between these notions and knowledge.

1.5.1. *Communities*

A community is a group of people who share something: a product, a resource, an obligation, a debt, etc. Although there are many different types of communities, we generally speak of human communities, in the historical or sociological sense. The use of the term "community" generally carries with it the notion of sharing common values. The literature distinguishes several types of communities: professional communities, communities of practice and virtual communities.

1.5.1.1. *Professional communities*

Professional communities formally or informally bring together people of the same profession, whether or not they belong to the same organization. They may constitute a space for collective intelligence, innovation and collective knowledge creation which is not restricted to the jurisdictional boundaries of an organization or a production unity. Often, these communities are organized into professional associations, such as the AFITEP or PMI (for project managers and directors), ASLOG (for logisticians) and CIGREF (for company directors of ISs).

1.5.1.2. *Communities of practice*

Communities of practice are groups of people who share a concern, a set of problems or a passion for a subject, and who extend their knowledge and expertise in that domain by regularly interacting with one another [WEN 02, DAM 05]. In spite of its clarity, this definition covers groups of very variable size, lifespan, homogeneity, location, degree of intentionalization and formalization [WEN 02]. Given so broad a definition, it is difficult to qualify a particular group as a community of practice, and it is sometimes easy to get lost in the jungle of examples described in the literature, ranging from the professional community to the members of a department. Wenger [WEN 98b] distinguishes three aspects which can be used to characterize a community of practice: the mutual commitment of the members, the existence of a common goal and the production of a shared repertoire. *Mutual commitment* involves a relationship between the participants of helping one another, which is necessary for the sharing of knowledge about practice. The *common goal* involves a more or less precise objective. The *shared repertoire* includes physical media such as files or forms and less tangible elements such as gestures, words or protocols.

A group whose cohesion is not based on the combination of these three dimensions would obviously be excluded from the category "community of practice". However, as Chanal [CHA 00a] notes, these dimensions are not sufficient to enable us to clearly distinguish a community of practice. Indeed, a project team is founded on the same mechanisms. Wenger and Snyder [WEN 00] also give us some reference points in the form of a "counter-relief" definition of what a community of practice is *not*. First of all, a community of practice is not a working group or a project team, because in these two structures, the members are appointed by the management, whereas "belonging to a community of practice is self-appointed". In addition, the agenda and the subjects dealt with by communities of practice are defined not by the management but by the members of the community. Next, the lifespan of a community of practice is indeterminate. The identity aspect, according to Wenger [WEN 98b], differentiates a community of practice from a business network. If the network is at the origin of the community, it is simply "*burnt kindling*" [WEN 98a, WEN 98b, GON 01]. Despite the various attempts made by the founders of the concept, it also seems there is a danger of confusing communities of practice with professional communities [VAA 02]. This type of group is distinguished, operationally, both by its size and by the way in which it operates or the diversity of its members. Finally, while communities of practice may be supported by the development of technological tools [VAA 00, WEN 03], they must not be confused with virtual communities, which arise from purely electronic interactions [RHE 93].

Carlile and Østerlund [CAR 05] base their work on those of Lave and Wenger [LAV 91], Brown and Duguid [BRO 91] and Wenger [WEN 98a, WEN 98b], to distinguish the knowledge shared between communities of practice from the knowledge shared within a community of practice and to identify the practices that facilitate knowledge-sharing between communities of practice and those which facilitate knowledge-sharing within a community of practice. In particular, these authors discuss the problem of knowledge-sharing within a community of practice and between several communities of practice by associating it with the use of boundary objects [CAR 02a, CAR 04], and of boundary practices and processes [WEN 98a, WEN 98b], of inter-community fora, translators and knowledge brokers [BRO 98].

1.5.1.3. *Virtual communities*

Virtual communities are sociocultural groups that emerge from the network when a sufficient number of individuals participate in public discussions over a sufficiently long time, being sufficiently motivated for webs of human relations to be woven in cyberspace [RHE 93]. This definition confirms the existence of a virtual space and the idea that virtual communities, which have arisen from the Internet and its increasingly widespread use, constitute entirely separate social facts

(e.g. "*chats*" and online discussion forums). Virtual communities distributed across the whole planet are the result of electronic social interactions whose members are freed from the constraints of time and space [JOS 04].

1.5.2. *Teams*

A team brings together a set of people whose tasks are mutually interdependent, who have a common objective which necessitates a certain amount of collaboration between them and sharing the responsibility for their results [COH 97]. That team may be permanent or temporary.

1.5.2.1. *Permanent working teams*

A permanent working team may be a service or a department with the objective of managing operations and ensuring the fulfillment of one part of the organization's mission. The duty of a department, in the organization of a company, is to manage a set of processes, a resource, a function or a "business unit". Depending on the complexity, the reactivity needed and the criticality of the tasks needing to be performed, KMS may be used in permanent teams. Such is the case, for instance, with certain customer-contact centers or "helpdesks" for computer users.

1.5.2.2. *Temporary working teams*

There are various categories of temporary teams, but the most commonplace is the project team.

A project can be defined as a specific, new action, of limited duration, which methodically and progressively lays the foundations for a future reality. A project is a complex system of contributors, resources and actions set up to provide a response to a request made in order to satisfy a need [AFI 92]. The activity of project management includes two subactivities. First, there is the task of project leading, which consists of coordinating the various subprojects and the different stakeholders, reporting to those stakeholders on the overall progress of the project and communicating with them about the milestones reached and the resources being mobilized. Second, there is the task of internal management of the project (project supervision). Generally, there is one project manager and one or more project supervisors in the case of complex projects which are divided into subprojects. On the other hand, with reasonably-sized projects, the project leading and project supervision are done by the same person: the project manager.

The project is run by a project manager, whose hierarchical level and title depend on the importance of the project. Assisted by a team, this leader is responsible for the proper execution of the project in accordance with the wishes of

the client (internal or external). For large-scale projects, there are often two interacting authorities: the project leader (PL), representing the client, and the project supervisor (PS), representing the internal or external engineers.

The project management provides the PL and the PS with all the necessary elements to make directional decisions in good time. The purpose of these decisions is to respect the elements of the project brief, in terms of content, quality, time and cost. Thus, project management is mainly to do with making informed projections and predictions and involves a technical, contractual and commercial understanding of the project and a relevant IS. The project team includes a certain number of people of different levels and different professions, with the aim of making a goal (material or immaterial) a reality.

Project teams constitute an interesting area of study when looking at cooperative relations between individuals in the context of knowledge management. First, there is a time limitation on the dynamics of the relations between individuals – all the more so because the turnover rate of contributors may be quite high. This means that knowledge transfer takes place rapidly, whether or not it is supported by tools. Second, the interdependence between the members of a project team is accentuated because of the time constraint. In addition, the actors have different skills. The combination of these last two elements necessitates strong cooperation and intensive communication between the members of a project team. Finally, as the project involves at least a certain amount of innovation, it is often the case that new knowledge is developed even in the course of the action. In addition, Carlile and Rebentisch [CAR 03] and Carlile [CAR 04] note the existence of knowledge barriers – constituting obstacles to the sharing of knowledge – between the different groups making up a project team and belonging to different areas of specialty.

The management of these barriers requires the creation of common knowledge, shared between these different groups. That shared knowledge may result from:

– a simple knowledge transfer when the conditions are stable;

– the creation of common interpretations when something new comes to light;

– the transformation of the different actors' specific knowledge in case of a major novelty.

The power relations between the different actors may have negative consequences on knowledge creation in a project team. These power relations manifest themselves when, at a given time, an actor or group of actors belonging to the project team holding more power than the others imposes their point of view. These powerful actors thus often tend to reuse their past knowledge instead of updating it. Power relations also become apparent over time when the choices made at the earliest

stages of the project are imposed during the later stages without taking account of the constraints inherent to those stages.

1.6. Knowledge management and cultures

A survey of 431 European and American organizations shows that culture – be it national, organizational or professional – is the most important determining factor in knowledge management [RUG 98]. Cultural barriers can constitute a major obstacle for effective knowledge management [MCC 04, ANA 11, WIE 13, VAN 14]. Consequently, culture is both important and problematic for knowledge management. The predisposition and willingness of the organizational actors to participate meaningfully in knowledge creation and to share their knowledge with other organizational actors is a crucial factor for the effectiveness of knowledge management, which is heavily influenced by the cultural origins. According to King [KIN 06], culture and knowledge management exert reciprocal influences on one another.

Numerous definitions of culture have been put forward in the existing literature. One of the most general of these is that given by Hofstede [HOF 80], which holds that "culture is a collective mental programming specific to a group of individuals". In spite of their difference, these definitions emphasize the fact that culture consists of a set of values, knowledge, techniques, means of expression and communication shared by a collective or a population. One of the characteristics of the culture of a community is its language, which may be a regional dialect, a national language, or a professional lexicon. Culture comes into play at different levels of a society, company, profession, social class, country, region or religion. That is why we speak of company culture, judicial culture, English culture or Muslim culture. Whatever the community we take as a reference, culture is acquired by education, training and social learning within the community.

Over the past two decades, researchers and professionals have turned their interest to organizational culture and subcultures of the different communities of which an organization is composed. The advantage of studying the impacts of culture relates to the different strategies and tactics deployed by organizations to manage rare resources: pooling of resources, joint ventures, merger/acquisitions and knowledge management [WEI 03].

In addition, we frequently see the concept of culture emerge in the literature on knowledge management, by way of the terms "culture of knowledge sharing" or "knowledge culture" [KIN 07b]. Similarly, there are many references to organizational culture, national culture and organizational climate in the literature on knowledge management [ARD 06, BOC 05, DEL 02, LAN 04, LOP 04, ORD 04, PAR 04].

Three culture profiles have been identified in the literature on organizations: national culture, organizational culture and professional culture.

1.6.1. *National culture*

While culturalist approaches have been the subject of numerous developments, the work of G. Hofstede and P. d'Iribarne is often cited in the literature on international cultural management. A forerunner in the domain of managerial implications of national cultures, Geert Hofstede listed four dimensions which can be used for classification of cultures: hierarchical distance, degree of masculinity, degree of individualism and attitude to uncertainty. On the basis of the principle that the behaviors which characterize a national social system are necessarily replicated within an organization, this author shows that Latin regions such as Latin America and Arab countries are characterized by a long hierarchical distance. On the other hand, English-speaking and Nordic countries such as the Netherlands, the United Kingdom, Sweden and Norway are characterized by a short hierarchical distance, and other countries, such as the USA, Japan and France, have a medium hierarchical distance. The hierarchical distance can be used to understand the relations between the supervisor and his/her subordinates in an organization. It enables us to define certain behaviors to be adopted in the face of the hierarchy or with foreign interlocutors.

The attitude in the face of uncertainty serves as an indicator to help us understand certain behaviors and attitudes toward risk-taking, innovations and foreigners. Countries such as France, for example, which are characterized by low comfort with uncertainty, show significant resistance to change and are, therefore, strongly attached to the drawing up of a long-term plan. In these countries, we also note that the activities linked to risk-prevention, such as the insurance market, are highly developed in comparison to other cultures.

The degree of individualism is highly important in understanding incentive systems. Thus, the Japanese, who are characterized by a collectivist culture, move as a group and are determined that the interests of the group should always prevail over individuals' interests. Therefore, the members of a collectivist culture will be more loyal to their company than those of an individualist culture.

The criticisms leveled at the work of G. Hofstede [HOF 80, HOF 90] essentially relate to the legitimacy of the method of identification of these four dimensions, whether they are equally important from country to country [HAM 97] and the hypothesis that IBM employees can be taken to be representative of the population of a country [CHO 94, HUN 81]. In spite of these criticisms, Hofstede's work

exhibits the advantage of providing elements of a panoramic vision of the different cultures.

Trompenaars [TRO 98] also presents a classification of cultures with seven behavioral dimensions. His work can be used as an analytical framework which compliments that of Hofstede. His classification allows a high degree of operationalization of international consultancy firms specializing in inter-cultural issues. In the view of this author, universalist cultures favor rules over relations, unlike particularist cultures. Certain cultures value the statuses given by their institutions: diplomas from a certain school, the age, the genre, etc. It is highly important to pay attention to that aspect when one comes from a culture which values results. Emotions and expressions are also determined by the culture. Certain cultures value public expression of feelings, while others condemn it; as such, expression is thought to be indicative of a lack of self-control. If one comes from a rather emotive culture, such as Italian culture, it is important to avoid looking ridiculous in the eyes of an interlocutor from a culture that disapproves of displays of emotion.

While according to G. Hofstede culture works like mental software which shapes the psychological structures from which the behaviors arise, in P. d'Iribarne's view, it arises from the sedimentation, over a long period of time, of national traditions which govern the ways of acting: honor in France, consensus in the Netherlands and contract in the United States [IRI 89, IRI 00, IRI 98]. The work of P. d'Iribarne has also been the target of some criticisms, such as the transposition of conclusions drawn from the observations of one case study to other companies [CAZ 00], overestimation of the consistency and rationality of national sets, with the author boiling down local peculiarities in ways of operating to a single logic. As is stressed by Chanlat [CHA 90], "more or less homogeneous, there are often companies within a company; above all, a company is marked, regardless of its size, by its complexity and its greater or lesser degree of cohesion". Similar to the studies carried out on cultural phenomena by other researchers, the limitation common to the works by Hofstede and d'Iribarne arises from the fact that they, like everybody, are prisoners of their own representations, as the view taken of the various cultures cannot be uncoupled from the cultural context.

National culture plays a crucial role in knowledge management, as is demonstrated by numerous studies which have looked at the impact of national culture of the implementation of this process in modern organizations [KIN 07b]. These studies have focused both on the links between actors' national cultures and the communication between those actors and on the influence of national culture on the methods of organization and management [KWO 09].

1.6.2. *Organizational culture*

Introduced by Pettigrew in 1979, the expression "organizational culture" is not subscribed to by everyone today, although the majority of authors agree as to its universality, its historical determination, its social construct and its establishment. Despite the wide variety of definitions for this concept put forward in the literature (see Table 1.8), the functionalist definition given by Schein [SCH 85, SCH 92, SCH 96, SCH 04a, SCH 04b] has attracted a consensus from a wide proportion of researchers such as Bélanger [BÉL 94], Calori and Sarnin [CAL 91], Levin [LEV 00] and de Montigny [DEM 06]. The fact that a consensus has been constructed around Schein's definition also appears to reflect the fact that researchers in organizational sciences have a preference for a functionalist approach to organizational culture.

Schein's definition has its roots in the basic hypotheses which many authors refer to by the terms "values", "norms" or "behavioral rules". Schein [SCH 04b] himself explains that the difference arises from the fact that "over time, values, norms and rules can be taken to be acquired, and therefore, transformed into fundamental hypotheses, which thus become non-negotiable". The members of a group thus come to be certain that their way of perceiving, thinking and feeling is the right way [SCH 04b]. Thus, outsiders who do not accept these suppositions are believed to be crazy or from another planet.

Authors	Definitions
Bate [BAT 84]	Organizational culture is a series of beliefs and hypotheses that are relatively widespread within the organization and are considered to be part of that organization by its members.
Schein [SCH 85, SCH 92, SCH 96, SCH 04a, SCH 04b]	Organizational culture is a set of basic hypotheses from which a group has learned that it is capable of solving problems of adaptation – both external and internal – and which has worked sufficiently well to be considered to be valid and be passed on to new arrivals as the correct way of perceiving, thinking and feeling in any relation to these problems.
Thévenet [THÉ 86]	Organizational culture includes anything which unifies the organization's practices, setting it apart from the others.
Bourdon [BOU 04a]	Organizational culture produces a system of rules and standards which guide individuals' behaviors.
de Montigny [DEM 06]	Organizational culture is a set of premises shared by the different members of the organization.

Table 1.8. *The main definitions of organizational culture*

In the view of King [KIN 07b], who refers to the integrationist approach to organizational culture put forward by Schein [SCH 85, SCH 92, SCH 04b], there exists only one culture within an organization: a culture made up of artifacts, values and basic hypotheses. The author identifies various levels of organizational culture likely to influence knowledge management in the organization. Thus, he distinguishes the organizational climate, the organizational subcultures, the unit cultures and the team climate:

– *Organizational climate* reflects a contextual situation at a given moment in time; it is linked to the individuals' behavior at that moment. The organizational culture includes multiple different organizational climates. Trust [HIN 03], openness and reasonable tolerance of failure [LEO 98] are important positive aspects of the organizational climate;

– *Organizational culture* can be considered to be a mixture of *subcultures*, each with its own basic hypotheses, its own values and its own artifacts. This is not incompatible with the integrationist view of organizational culture advanced by Schein. Organizational subcultures reflect the organization's structure, the professional occupations, the "ethical" values, the technologies used or the rank within the hierarchy;

– *Unit cultures* are specifically linked to the activity of an organizational unit, such as a department or a service. For example, the accounting department may have a departmental culture which is heavily impregnated by legal aspects. Organizational subcultures are generally different from unit cultures, because they do not refer to one particular unit, and generally transcend the boundaries of the organizational units;

– The *team climate*: a team is an organizational device that brings together the diverse specialized knowledge of multiple individuals in order to achieve a common goal [COO 01]. Often, a team is focused on a single objective and is short-lived; so, we use the term "team *climate*" rather than "team *culture*". If all the members of a team belong to the same organization, then the team climate, in part, reflects the organizational climate and culture.

1.6.3. *Professional culture*

The concepts of "occupation" and "profession" have been defined by multiple authors. Dubar and Tripier [DUB 03] define an occupation as representing simultaneously a job, a position and a set of people carrying out the same activity. Descolonges [DES 96], focusing closely on the issues of an occupation, ties together the concepts of work, oeuvre and action. According to Osty [OST 02], an occupation is a profession which also pertains to the construction of a common framework of judgement and a collective of belonging identifiable by its behavioral norms,

its values or its representations. For Bucher and Strauss [BUC 92], Dieng *et al.* [DIE 00] and Osty [OST 02], a profession is a relatively homogeneous community whose members share an identity, values, definitions of the tasks and interests. Thus, the actors belonging to the same professional community are likely to present common behavioral norms and are linked by a certain amount of cognition peculiar to their profession [MON 08].

Practices, professional culture, identity, communities and groups of actors in the same profession have been studied in sociology of professions. They are all entities that are indicative of the "professional representations" uniting the ideas shared by the individuals about a given occupation [BLI 99]. Thus, Kwong and Levitt [KWO 09] analyzed the impact of national culture on the difference in decision-making when faced with an ethical problem, based on three samples of healthcare professionals in Saudi Arabia, Egypt and the United States. Between those healthcare professionals, the differences linked to national culture do not appear to play a significant role in terms of decision-making. This phenomenon can be explained by the narrowing of the cultural gap and a similarity of the models of thought, caused by a significant appropriation of their professional culture – particularly because of the standardization of medical training.

Certain authors have demonstrated that individuals' behaviors in the sharing and gathering of knowledge can be influenced by professional characteristics [MON 08].