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Knowledge-Based Management: The Creative Power of Tacit Knowledge in the “Age of New Normal”

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Abstract

Contrary to managerial habits expressed by the statement of an objective or a demand for immediate solutions defined a priori according to a deterministic paradigm, the COVID-19 pandemic crisis induced a reversal of thought and the transition to a constructivist paradigm. This approach, which integrates hazards uncertainty (the path is made by walking), promotes an identification of problems independent of any anticipation of solutions. Thus, it leads to a Knowledge-Based Management without a representation of a predefined world. Organizations become sociotechnical systems, which are condemned to a permanent transformation. The cooperation and the mobility become dominant ways of work, which rests on a permanent personal and collective learning. Beyond the information processed in the digital information systems, the creative power of the tacit knowledge, which is in each individual's brain, cannot be ignored. Decision-makers are confronted to unknown situations, and managers placed in hybrid (face-to-face and remote) working modes have to pass from a posture of authority and of control to a posture of incitation, of support, and of accompaniment. The models that are introduced in this chapter result from a constructivist and sociotechnical vision of knowledge management. They emphasize the role of tacit knowledge in the “age of new normal.”

Keywords: tacit knowledge, age of new normal, knowledge-based management, constructivism, sociotechnical approach, semi-open mode

1. Introduction

In a world troubled by the increasingly rapid use of new ubiquitous digital technologies, the organization has transformed itself into a constantly renewed sociotechnical system. This transformation was spurred in 2020 by the COVID-19 pandemic, so organizations are facing rapid structural changes and accelerating decision-making processes in a world marked by the unknown and uncertainty.

The hierarchical organization closed on its local borders has become an enlarged, borderless organization, open and adaptive under the control of an unpredictable environment that creates uncertainty and doubt. A constructivist attitude (the path is made by walking) replaces a deterministic attitude strongly rooted in our educational modes. Regardless of their roles and hierarchical

positions, actors are faced with new situations that increase their scope of action and responsibilities. They become decision-makers. Managers facing uncertainty and the unknown must change their working methods; they enter in the age of new normal. Resuming the presentation by Maria Koutsovoulou, 2021 [1], we can say that they must manage with agility and be able to count on a strong and involved team that requires a high degree of confidence and agility at all levels: between the manager and his employees, but also between employees between them. Beyond the information processed in digital information systems, the role of tacit knowledge, which is inside the brain of each individual, cannot be ignored.

The concepts presented in this chapter stem from our vision of “knowledge-based management” [2] and “Three Postulates that Change the Paradigm of Knowledge Management” [3]. They collect essential information and provide an infrastructure for innovative technologies deployment within organizations that should help managers change their working methods in the age of new normal.

In Section 2, the chapter raises a reflection on COVID-19, the digital transformation, and the “age of new normal.” Then, in Section 3, the chapter describes the background theories and assumptions. We suggest a model that attempts to describe the process of transforming data into information, and information into tacit knowledge. In addition, we present the concept of commensurability of interpretative frameworks, the creative power of tacit knowledge, the constructivist approach of knowledge management, and we state three fundamental postulates about knowledge within organizations. In Section 4, the chapter presents a Managerial and sociotechnical approach of knowledge management. We present a sociotechnical approach of organization, and we present our definition of knowledge management that overcomes most definitions recognized by knowledge management researchers and practitioners. Next, in Section 5, the chapter focuses on infrastructure for innovative technologies deployment. After presenting SECI model, Japanese concept of *Ba*, single-loop learning, and double-loop learning, we introduce the notion of “semi-open mode of operation.” Finally, we present the implementation of a “Semi-Open Infrastructure Model” in the case of the deployment of knowledge-based systems (KBSs) in a large industrial enterprise, at a time when these technologies had just been developed in universities and laboratories.

2. Age of new normal

During ICIKS’ 2021 Conference¹, Professor Tung BUI,² Keynote Speaker made a presentation untitled “Decision Paradigm and Support in the Age of New Normal.”

This presentation made me aware of the effects of digital transformation and the outbreak of COVID-19 pandemic on how decision-makers make decisions.

In his talk, Tung Bui pointed out the role of uncertainty that is constantly growing. Notably, considering the diversification of massive information sources that go beyond the organization boundaries, he listed four levels of uncertainty faced by decision-makers: increased difficulty in distinguishing real news from fake news; difficulty in identifying possible courses of action following a complex and often ambiguous decision; increased difficulty in estimating the probability

¹ International Conference on Information and Knowledge Systems.

² Professor Tung Bui holds the distinguished professorship of global business endowed by the Matson Navigation Company at the University of Hawaii at Manoa. His current research interests focus on effective use of IT in large organizations, information literacy, digital transformation, sustainable development, and in collaborative technology, including group decision and negotiation support systems and crisis management.

of decision-making results of a chosen action; and unexpected emergence of new actors—allies or enemies, humans or bots—throughout the decision-making process. Furthermore, he notes some characteristics specific to the behavior of decision-makers in this world in crisis: unprepared, illusion of objectivity (bias), fear of the unknown, denial of truth, ignorance, fear of being criticized. Professor Tung BUI insisted on the evolution of the world that was changing and forced to put in place new normality, which he called “the age of new normal.”

Moreover, in their book “Covid-19 the Big Reset,” Schwab, K., & Malleret, T. ([4], p. 166) foresee a series of long and complex changes and adaptations. They note that “*some industry leaders and executives may be tempted to equate the reset with a reboot, hoping to return to the old normal and restore what worked in the past: traditions, proven procedures and familiar ways of doing things - in short, a return to the status quo.*” However, in a constantly changing world with an uncertain future, visibility is reduced, and beyond the short term, there is only uncertainty and unknown: agility and confidence become new modalities.

It reminded me of my own experience when, in 1978, I was responsible for introducing a crucial innovation, called “Computer-aided Design,” into a large French industrial company. Faced with techniques and applications modalities unknown at the time, I imagined a new way of leading based on agility and confidence so that I could rely on a strong and involved team. That’s how we put in place an infrastructure called “Semi-Opened Infrastructure for innovative technologies deployment.” Today, this new managerial attitude seems to me well adapted to the “age of the new normality” as defined by Professor Tung Bui and the suggestions of Maria Koutsovoulou and Schwab, K., & Malleret, T. [1, 4]. The infrastructure for innovative technologies deployment is described in Section 5 of this chapter.

3. Background theories and assumptions

The theories and assumptions presented in this section are, for some parts, excerpts from two chapters published by IntechOpen: “Toward Knowledge-Based Management” [2] and “Three postulates that change the paradigm of knowledge management” [3].

3.1 Creation of tacit knowledge

Our vision on creation of tacit knowledge is based on the theories of Shigehisa Tsuchiya concerning organizational learning [5]. Professor Tsuchiya drawing on the concepts suggested by Polanyi of “tacit knowledge” [6], “sense-giving,” and “sense-reading” [7], added the concept of “interpretative framework,” which from our perspective can be considered a mental model as defined by Jones *et al.* [8]³. Polanyi defined the “sense-giving” and “sense-reading” as follows: “*Both the way we endow our own utterance with meaning and our attribution of meaning to the utterances of others are acts of tacit knowing*” (p. 301). Tsuchiya observed there exists a clear distinction among terms “datum,” “information,” and “knowledge” that are often used interchangeably ([5], p. 88). He explained that when data are sense-given through interpretative framework, it becomes information, and when information is sense-read through interpretative framework, it becomes knowledge. We can say that tacit knowledge that resides in our brain results from the sense given to data

³ “Mental models are personal, internal representations of external reality that people use to Interact with the world around them... They provide the mechanism through which new information is filtered and stored.” (Abstract)

Figure 1.
Process of transformation from a set of Data to tacit knowledge.

that we perceive among the information, which are transmitted to us. These data are filtered by our interpretative frameworks. Following our own interpretation of this point of view, **Figure 1** shows the process of transformation from a set of data to information and tacit knowledge. Let us describe this process.

At phase 1, we have to consider the relationship between data and information. This phase must be thought as a basic process where data are discrete raw elements perceived, gathered, and filtered by a person. A transmitter P_1 , acting in specific context and situation at time T_0 . P_1 has preexisting interpretative frameworks, previous tacit knowledge, and intentions⁴. During an information creation phase, P_1 has direct access to a set of data outside himself. Then, P_1 according to a sense-reading process—that depends on his preexisting interpretative frameworks activated depending of his context, his situation, and his intentions, filters some of these data that take sense for him. At the same time, a sense-giving process using P_1 's previous tacit knowledge enables P_1 to aggregate, supplement, and organize selected data into information I (P_1T_0). Once created, this information becomes a static object independent from P_1 and time. It is this information that is passed on by the individuals or by means of the digital information system (DIS) where it is stored, treated, and transmitted as a stream of digital data. During this process, P_1 's preexisting interpretative frameworks are not changing; previous tacit knowledge can be reorganized and modified into new tacit knowledge.

At phase 2, we have to consider the relationship between information and tacit knowledge. This phase is in rupture with the first one, it presupposes that information already exists whatever are time and context in which it was created.

Later, after phase 1, at time T_n , when receiver P_2 perceives the information I (P_1T_0) during a reception, self-reflection, and observation phase, this information

⁴ In that case, intention is built up in the brain of a person under the influence: on the one hand, of the context and the situation in which the person finds himself, and on the other hand, the information she receives and the spontaneous activation of previous tacit knowledge more or less clear such as her intuition, emotions, beliefs and previous representations.

I (P_1T_0) is captured by P_2 , who is in different context and situation than P_1 who elaborates it. P_2 has his own intentions. Then, P_2 according to a sense-reading process interprets this information I (P_1T_0), filtering data through his preexisting interpretative frameworks activated depending of his context, his situation, and his intentions. At the same time, a sense-giving process that uses P_2 's previous knowledge operates and engenders new tacit knowledge.

3.2 Commensurability of interpretative frameworks

Professor Tsuchiya [5] emphasizes how organizational knowledge is created through dialog. Let us quote him: *“It is important to clearly distinguish between sharing information and sharing knowledge. Information becomes knowledge only when it is sense-read through the interpretative framework of the receiver. Any information inconsistent with his interpretative framework is not perceived in most cases. Therefore, commensurability⁵ of interpretative frameworks of members is indispensable for individual knowledge to be shared.”* (p. 89) He highlighted that “commensurability” of the interpretative frameworks of the organizations members is indispensable for an organization to create organizational knowledge for decision and action.

During the process of transformation described Section 3.1, knowledge created can be very different from one person to another when the commensurability of their interpretative frameworks is small. There are large risks that the same information takes different senses for each of them and consequently generates different tacit knowledge in their brain. Unlike the information, knowledge is dynamic. Once constructed, knowledge cannot be considered as an object independent from the person who built it or the individual who appropriates it to make a decision and to act.

However, one must take into account that interpretative frameworks evolve in a dynamic way: they are not rigid frameworks. Especially, when considering that, as time is going on, contexts and situations evolve. Thus, the contribution of scientific results, techniques and new methods, the influence of young generations, the impact of identity crisis and multiple cultures, modify the interpretative frameworks, and create a gap between individuals' commensurability of interpretative frameworks. It is what happens considering the impact of COVID-19 crisis.

3.3. Creative power of tacit knowledge

The creative power of tacit knowledge appeared in the doctoral thesis of Professor André Niel. His thought, which remained in the form of unfinished documents, is reflected in his book [9]. In particular, he analyzes the “field of the creative relationship” between people. It shows how the energy that occurs in the field of relationship can be transformed into combat energy, into creative energy, or (if nothing happens) into the self-destructive energy of mental anguish, depending on the nature of people and modes of communication that can, or cannot, establish themselves among themselves. Having known him well and having led creative groups with him to experiment with the “field of creative relationship,” we had the opportunity to measure the creative power of tacit knowledge in the exchanges between people in this field of relationship.

The tacit knowledge of an individual affects his behavior. The behavior of an individual is triggered by information, which, in a given context and situation, is interpreted through its interpretative frameworks and transformed into tacit knowledge that makes him act in the form of interactions and exchanges of knowledge with other individuals and the digital information system.

⁵ Here, commensurability is the common space of the whole interpretative frameworks of each member.

3.4. Constructivist approach of knowledge-based management

3.4.1. Two visions of knowledge within organizations

Knowledge Management discipline has followed developments strongly rooted in two contradictory and complementary visions: the positivist vision and the constructivist vision. Based on Georg Von Krogh and Johan Roos [10], and Caroline Sargis-Roussel [11], let us see the characteristics of these visions as described by Caroline Sargis-Roussel.

Characteristics of the positivist vision

1. Knowledge is seen as a representation of a predefined world. This implies that reality, whether objects, events, or states, lies outside the subject of knowledge and is given objectively for everyone.
2. Knowledge is universal: two cognitive systems should lead to the same representation of the same object or event; Cognition (the ability to know) is seen as information processing and rule-based symbol manipulation.
3. The positivist approach considers that the key task of the brain (or any other cognitive system) is to represent or model reality as accurately as possible.
4. For positivists, knowledge is explicit, can be encoded and stored, and easily transmitted to others.

Characteristics of the constructivist vision

1. Knowledge resides in ourselves. It is closely linked to our senses and past experiences.
2. Knowledge is not universal, we are driven to create the one world for ourselves.
3. Cognition (the ability to know) is considered an act of construction or creation rather than an act of representation.
4. The constructivist approach considers the cognitive system to work when knowledge enables effective actions.
5. For constructivists, some knowledge is explicit, but others may be tacit, highly personal, not easily expressed, and therefore difficult to share with others. Tacit knowledge involves talents, dexterity as well as skills characterized by perception and intuition.

3.4.2. Our constructivist point of view

From our constructivist point of view, knowledge is intrinsically linked to individuals and their experiences. The constructivist knowledge-based management [2] centered on the human highlights the difficulty of formulating and then storing tacit knowledge embodied by individuals. Rather, it encourages exchanges and interactions between individuals using, often informally, the creative power of their tacit knowledge. Emphasis is placed on the quality of the relationship between partners to create value.

3.5. Three fundamental postulates about knowledge within organizations

Our observations and experiments within the industry led us to set forth three postulates about knowledge within organizations: (1) Knowledge is not an object; (2) Knowledge is linked to the action, and (3) Knowledge used and created in organizations includes two main categories of knowledge. We define these postulates hereafter.

3.5.1. First postulate: Knowledge is not an object

Considering Subsection 3.1, we can postulate that knowledge is not an object that can be processed independently of the person who has to act. Consequently, formalized and codified knowledge that is independent from individual is not more than data or information. Data or Information can only be assimilated to knowledge when the interpretative frameworks of participants have a large commensurability. In that case, participants commonly understand data or information in the same way. Furthermore, taking back the Haeckel formulation [12], we must discern the knowledge of knower and the codification of that knowledge (p. 295).

Thus, knowledge cannot be considered as if it was data or information. The conditions and limits under which knowledge can be managed as data or information are as follows: Knowledge is explicit, stable, and well defined, recognized by a specific homogeneous population; Knowledge is “apparently” independent of people and situations; Knowledge is dissociated from action and can be thought of as an object.

Exception cases:

Knowledge is highly complex and/or has a very high degree of specialization.

3.5.2. Second postulate: Knowledge is linked to the action

Within organizations, activities contributing to value-added processes, and support processes, defined by Porter [13], use and create knowledge. Knowledge is depending of the context and the situation that allow using and creating this knowledge. Knowledge is partially characterized by the aim of the activities. In particular, the role of the stakeholder, involved with these activities, must be taken into account; knowledge is linked to their decisions, their actions, and their relationships with the surrounding systems (people and artifacts).

3.5.3. Third postulate: Knowledge used and created in organizations includes two main categories of knowledge

Within an organization, knowledge consists of, on the one hand, “know-how” (explicit knowledge comprising all tangible elements), (on the other hand, “skills” (tacit knowledge defined by Polanyi [6]), which comprises intangible elements.

The tangible elements take the shape of formalized knowledge in a physical format (databases, procedures, plans, models, algorithms, and analysis and synthesis documents) or are embedded into automated management systems (conception and production systems) and in products.

The intangible elements are inherent to the individuals, either as collective knowledge (“routines”—the logic of individual or collective actions defined by Nelson and Winter [14]), or as personal knowledge: skills, tricks, trade secrets, knowledge of history and decision-making contexts; and environmental knowledge (customers, competitors, technologies, socioeconomic influences).

4. Managerial and sociotechnical approach of knowledge management

Relying on the three postulates mentioned in Subsection 3.5, it appears that Knowledge Management addresses activities, which utilize and create knowledge more than knowledge itself. With regard to this question, since 2001, our group of research⁶ has adopted a Managerial and Sociotechnical approach based on a knowledge constructivist point of view.

4.1 Sociotechnical approach of organization

The sociotechnical approach of organization is to consider the organization as a system consisting of a social system interacting with a technical system. The following reflections are essentially based on the book “Knowledge Management in the Sociotechnical World.” In this book, Elayne Coakes [15] states that the term “sociotechnical” is commonly used in systems studies, particularly in the design of organizations. Based on numerous writings, some dating back to 1920, she says that the best incarnation of this paradigm is found in the work of Fred Emery and Eric Trist at the Tavistock Institute, London, and in the study of Trist and Bamford (1951) in which the researchers identified the need for a sociotechnical approach to develop a social system appropriate for the establishment of a new technical system. Elayne Coakes defines the term “Sociotechnical” as *“The study of the relationships and interrelationships between the social and technical parts of any system.”* (p. 5) Thus, this term describes a broader view of the role of technology in an organization: *“technology should be considered, discussed and developed not only as a technical artifact but in the light of the social environment in which it is exploited.”* (p. 4). She suggests that *“Knowledge management from a socio-technical perspective requires managing the organization through continuous change and a continuous learning process supported by appropriate technologies.”* (p. 10).

In addition, Kenneth C. Laudon and Jane P. Laudon [16] consider that *“adopting a socio-technical perspective avoids a purely technological approach to information systems”* (p. 27).

Opposing the technological approach to the managerial and sociotechnical approach will not be representative of a reality that is much more complex. They are not necessarily exclusive. If the technological approach is to be regarded as essentially based on information, communication, and artificial intelligence technologies, the fact that these technologies are primarily used to manage the organization must also be taken into account.

4.2 Definition of knowledge management

Within our group of research, we define Knowledge Management as follows [17]: *“Knowledge Management is the management of the activities and the processes that enhance the utilization and the creation of knowledge within an organization, according to two strongly interlinked goals, and their underlying economic and strategic dimensions, organization dimensions, socio-cultural dimensions, and technological dimensions: (1) a patrimony goal, and (2) a sustainable innovation goal.”* (p. 980). The patrimony goal is a static goal. It is involved with the preservation of knowledge, their reuse, and their actualization. The sustainable innovation goal is more dynamic. It is involved with creation and integration of knowledge at the organizational level.

Our definition of Knowledge Management highlights the economic and strategic dimension of Knowledge Management. She is focused on managerial and

⁶ SIGECAD Research Group created in 1998, which domain topics are Information System, Knowledge Management and Decision Aid.

organizational problems linked to sociotechnical environment and organization's value-added processes. She leads to integrate the whole dimensions that should be involved in the Knowledge-Based Management within Organizations [2].

4.3 Outcome

When considering all the various themes discussed in this chapter, it appears that tacit knowledge is a knowledge that is created unconsciously, at any moment, within our brains. This knowledge plays a key role in the interactions between people and digital information systems in the exchange of information necessary for ongoing decision-making related to their activities. For example, we believe that an individual's behavior is triggered by information that, in a given context and situation, is interpreted through its interpretative framework and becomes tacit knowledge that makes it act in the form of interactions with other individuals and the digital information system.

Moreover, our constructivist and sociotechnical approach and the distinction we make between data, information, and knowledge led us to develop a model called “Organizational Information and Knowledge System (OIKS)” [2, 18]. This model is a local subset of the organization's sociotechnical system (individuals interacting between themselves, with machines, and with the system itself). In this model, individuals and their interactions with the digital information system are represented. It has become a reference in our thought patterns.

In the following Section 5, considering all the various themes discussed in this chapter, we study an example of *ad hoc* infrastructures that can be used in the age of new normal described Section 2.

5. Infrastructure for innovative technologies deployment (SopIM)

Relevant infrastructures for innovative technologies deployment must be set up according to the specific context and situation of each company. SopIM is an example of “*ad hoc* infrastructures” that is adapted to the “Age of New Normal” characteristics described into Section 2. This infrastructure is inspired by: the SECI spiral of conversion of knowledge (Subsection 5.1); the Japanese concept of *Ba* (Subsection 5.2); and *Single-Loop Learning* and *Double-Loop Learning* defined in the Argyris & Schön's organizational learning theory (Subsection 5.3). **Figure 2** shows the SECI Model and the Concept of *Ba*.

5.1 SECI model

The well-known SECI spiral of conversion Model, (acronym for socialization, externalization, combination, and internalization) was introduced by Nonaka and Takeuchi [19]. It describes how organizations create and utilize knowledge. The SECI Model includes: two forms of knowledge (tacit knowledge and explicit knowledge); a cycle in spiral of conversion of knowledge; three levels of social aggregation (individual, group, organization).

Let us describe the four modes of the spiral of conversion.

1. From tacit knowledge to tacit knowledge, it is the *socialization mode* where the tacit knowledge of some (especially that of the master) is transmitted directly to others (especially to the apprentice) in the form of tacit knowledge, through observation, imitation, and practice. During this process, none of the protagonists explains his art to make it directly accessible to all. This knowledge cannot therefore be exploited at the collective level of the company.

Figure 2.
SECI model and concept of *Ba*.

2. From tacit knowledge to explicit knowledge, it is *the externalization mode* where the individual tries to explain his art and convert his experience into explicit knowledge.
3. From the explicit knowledge to the explicit knowledge, it is *the combination mode* where the individual combines various elements of explicit knowledge to constitute new, explicit knowledge as well.
4. From explicit knowledge to tacit knowledge, it is *the interiorization mode* where, little by little, the explicit knowledge disseminated in the organization is assimilated by the staff. This new knowledge complements the amount of the knowledge available to the individual. It is internalized and becomes an integral part of each one. Explicit knowledge becomes tacit.

For Ikujiro Nonaka and Hirotaka Takeuchi, explicit knowledge can be easily expressed in documents but is less likely to lead to a major innovation than tacit knowledge, that is, knowledge acquired through experience and difficult to express, that are at the source of the innovation process.

5.2 Japanese concept of *Ba*

To describe the concept of *Ba*, we will express our own understanding by paraphrasing Nonaka and Konno [20]: *Ba* is a shared space for emerging relationships and interactions between knowledge stakeholders. This space can be physical (e.g., office, dispersed business space), virtual (e.g., e-mail, teleconference), mental (e.g., shared experience and, ideas), or any combination of them. It can be a network of persons who share common objectives; a place would allow achieving the synthesis of the rationality and of the intuition as a wellspring of new knowledge; a place where would take place a shared knowledge creation; a

platform that would allow individual and collective knowledge to progress. So, participating in a *Ba* stimulates the involvement of an individual, a group, an organization by giving them the possibility to transcend the borders and the limits of their own perspectives (p.40). Later on, Nonaka, Toyama, and Konno modified the name of the different type of *Ba* ([21], pp. 16–17). Hereafter, we briefly describe the four types of *Ba*.

1. The *Originating Ba* is a place where individuals share feelings, emotions, experiences, and mental models. It is the primary *Ba* from which the knowledge creation begins and represents the socialization phase. Physical, face-to-face experiences are the key to conversion and transfer of tacit knowledge.
2. The *Dialoguing Ba* (previously *Interacting Ba*) is a place where tacit knowledge is made explicit, thus it represents the externalization process. Through dialog, individuals’ mental models and skills are converted into common terms and concepts. Two processes operate in concert: individuals share the mental model of others, but also reflect and analyze their own mental model. Dialog is the key for such conversions. The extensive use of metaphors is one of the conversion skills required.
3. The *Systemizing Ba* (previously *Cyber Ba*) is a place of interaction in a virtual world instead of real space and time; and it represents the combination phase. The combination of explicit knowledge is most efficiently supported in collaborative environments utilizing information technologies. The use of online networks, groupware, documentations, and database enhances this conversion process.
4. The *Exercising Ba* is a space that facilitates the conversion of explicit knowledge to tacit knowledge. It supports the internalization phase. Thus, the internalization of knowledge is enhanced continuously by the use of formal knowledge (explicit) in real life or simulated applications.

5.3 Single-loop learning and double-loop learning

In their theory of organizational learning, Argyris and Schön [22] distinguish two organizational models characterized by guiding values, strategies for action, and the consequences they induce. They define two learning loops: single-loop learning and double-loop learning. These models are described below.

The Single-Loop Learning model leads to a “single loop” limited learning organizational system. In this system, the guiding values that define the rules of conduct are as follows: to achieve the objective set, which presupposes unilateral control of the situation; to maximize gains and minimize losses, to eliminate negative feelings, adopt what is considered rational conduct. This strategy is characteristic of reasoning that implements defensive routines. In this type of organization, when a gap is perceived between the results of the actions undertaken and the objectives set, the only possible answer is to consider a new action without questioning the logic underlying, that is, without changing policy choices and guiding values.

The double-loop learning refers to the ability to question and, if necessary, modify guiding values. In this system, the guiding values that define the rules of conduct are as follows: making informed choices; having valid information; monitoring implementation to identify and correct errors. The individual must be able not only to solve routine problems (simple loop learning), but also to act

effectively when confronted with embarrassing or even threatening situations. The resulting constructive reasoning leads the individual to follow an action strategy, which leads him to defend his positions, to make assessments, and to issue attributions by systematically seeking to illustrate his remarks, to compare his reasoning, and to test the validity of his assessments and assignments. These new action strategies have the effect of reducing defensive routines at all levels, interrupting self-fulfilling and self-justifying processes as well as cascading errors. The organization then becomes a system in which dual-loop learning can take place in a sustainable way.

According to Argyris and Schön, in order for an organization to become capable of learning in a “double loop,” it is first necessary for actors to become aware of the gap between the strategy they are planning and the strategy they are actually implementing. They must then acquire a new set of guiding values: having valid information, making informed choices, and monitoring their implementation to identify and correct errors.

5.3.1 Remarks

Single- or double-loop learning defined in the theory of learning organization developed by Argyris & Schön highlights the potential of Knowledge Management to foster the “change of order 2” defined by Watzlawick, P., Weakland, J., & Fisch, R. [23].

We note that single-loop learning generates a cycle identical to the Deming PDCA (Plane, Do, Check, Act) cycle [24]. These cycles, which are indispensable from the point of view of quality, are not conducive to innovation. The Management principles specific to Knowledge Management should lead to a balanced dialogic between the two learning processes defined by Argyris and Schön, a balance leading to quality insurance without prejudice to innovation. The articulation of the Deming PDCA cycle and Argyris and Schön single- and double-loop learning is presented in **Figure 3**.

Figure 3.
Deming PDCA cycle and Argyris and Schön single- and double-loop learning.

5.4 Semi-open mode of operation

The semi-open mode of operation is based on the doctoral thesis of Professor André Niel. His thought, which remained in the form of unfinished documents, is reflected in his book [9]. In particular, he analyzes the “field of the creative relationship” between people. It shows how the energy that occurs in this relationship can be transformed into combat energy, into creative energy, or (if nothing happens) into the self-destructive energy of mental anguish, depending on the nature of people and the mode of communication that can or cannot establish themselves among themselves. Having known him well and having led creative groups with him to experiment with the “field of creative relationship,” we had the opportunity to measure the creative power of tacit knowledge in the exchanges between people in this field of relationship.

Figure 4 shows the semi-opened mode of operation. This typical mode of operation may be thought as a concrete application of the concept of *Ba* and the Single-Loop Learning and Double-Loop Learning theory defined in the Argyris & Schön’s organizational learning [22]. Let us describe Figure 4.

Considering the *Field (working spaces)* characterized by a specific context, where people are confronted with constantly evolving situations, one can observe two reasoning loops: (1) a deductive reasoning loop that characterizes the analytic approach of operational and business units in the Creative Relations Area; and (2) an inductive reasoning loop that characterizes the systemic approach of an Overall Perception Area.

The *Semi-opened Platform*, which is a neutral space that favors the interactions, is an evolution and progress space where people interact following these two ways of reasoning. It is what Edgar Morin and Le Moigne, 1999) [25] call Dialogic Principle that “combines two principles or notions that must be mutually exclusive, but that are integral parts of the same reality” (p. 264). In the Overall Perception Area, inductive reasoning is involved inducing partial models of action, processes, and techniques. In the Creative Relations Area, people interactions, in deep analysis, and knowledge sharing, engender symbiosis of ideas. The issue is to transcend the deductive rationality of operational units by sharing models of action, processes and techniques induced by the inductive rationality of a multidisciplinary group.

Figure 4.
Semi-opened mode of operation.

That makes people transcending their own interpretative frameworks and constructing collective representations.

5.5 Semi-opened infrastructure model (SopIM)’s description

The Semi-opened Infrastructure was launched to support deployment of new innovative technologies within large French Company, at a time when these technologies had just been developed in universities and laboratories. At first, in 1978, it was dedicated to introduce Computer-Aided Design. Then, under another format, it became the organizational learning structure created and led from 1983 to 1995 in order to introduce the concepts and technologies of Artificial Intelligence and to develop and deploy applications of Knowledge-Based Systems. As an example, we will cite the case of Knowledge-Based Systems (KBS) deployment. In that last case, the aim of the Semi-opened Infrastructure was to encourage the individual and collective apprenticeship, to favor knowledge acquisition, to leverage emergence of new products, and to implement computer applications using artificial intelligence technologies. It is this format that is described hereafter.

We needed to implement poorly known, fuzzy and uncertain emerging computer technologies. We were faced to unknown, uncertainty and doubt. I imagined a new way of leading based on agility and confidence so that I could rely on a strong and involved team with a high degree of trust at all levels: between the manager and his employees, but also between the employees between them. In that case, we used the “Semi-open mode of operation” (Figure 4) and Semi-opened Infrastructure Model (SopIM) was implemented (Figure 5). This typical infrastructure may be thought as a concrete application of SECI model, concept of *Ba* (Figure 2), and the *Single-Loop Learning* and *Double-Loop Learning* defined by Argyris & Schön (Figure 3).

To develop, the “semi-open mode of operation” requires the presence of a “Leadership Space,” place of multidisciplinary group, and the existence of an “Evolution and Progress Space,” place of contacts and field of multiple cultures where the potentialities and creativities of the actors are exercised (Figure 5).

Figure 5.
Semi-opened infrastructure model (SopIM).

These spaces are described below.

5.5.1 Leadership space

The Leadership Space was a Multidisciplinary Group in charge to deploy knowledge-based systems over the whole company. It gathered engineers, organizers, and sociologists accustomed to doing inductive reasoning.

By comparison with the SECI model and the concept of *Ba*, which are described **Figure 2**, the Leadership Space is an example of the Originating-*Ba*, where face-to-face experiences are the key to transfer of tacit knowledge between people, who complement each other.

5.5.2 Evolution and progress space

The Evolution and Progress Space is a place that was a physical room situated at Headquarter where P1 and P4 came in order to work and learn in interaction with the Multidisciplinary Group. P1 and P4 practicing deductive reasoning had to work and learn with the Multidisciplinary Group practicing an inductive reasoning. So people were interacting following dialogic principle. Learning was effective, and interpretative frameworks of P1 and P4 were evolving. Arrows show: (1) how P1 and P4 evolved in the Evolution and Progress Space; (2) how P1 and P4 disseminated their new knowledge in their own unit, and how organizational learning was deployed.

The Evolution and Progress Space has proved to be a place of contacts, a field of multiple cultures, where the potentialities and creativity of each knowledge owner have been capitalized. The Evolution and Progress Space is an example of the Dialoguing-*Ba* and the Systemizing-*Ba* where all phenomena, described in Subsection 5.2, appeared in practical terms.

5.5.3 Working space

The Working Space represents a Core Competence operational unit A and a Core Competence operational unit B. Individual P1 and P4 are accustomed to deductive reasoning. They are employees whose roles are to communicate on knowledge-based systems and to implement applications in their own unit.

The Working Space is an example of the Exercising-*Ba* where P1 and P4, who worked and learned in the Evolution and Progress space with the multidisciplinary group, transmit their new knowledge (concepts, tools, and methods of the innovative technologies) to the members of their own unit. There is a transfer of explicit knowledge and a continuous conversion of this knowledge to tacit knowledge by its use in the real life and implemented applications.

6. Conclusions

In a world disrupted by the increasingly rapid use of new ubiquitous digital technologies, speed-up in 2020 by the COVID-19 pandemic, organization has transformed itself into a constantly renewed sociotechnical system confronted with unknown and uncertainty.

In this chapter, we presented background theories and practical results of our industrial experience, consolidated by our academic research. After presenting the notion of “Age of new normal,” we emphasized the role of tacit knowledge, notably its creative power in the field of relationship between individuals.

Oriented by our constructivist and sociotechnical approach of knowledge management, and our three fundamental postulates, we presented our definition of Knowledge Management that goes beyond most definitions recognized by knowledge management researchers and practitioners.

Then, the chapter focused on infrastructures for innovative technologies deployment, and we presented the model of infrastructures adapted to the characteristics of the “Age of new normal,” which we named Semi-Open Infrastructure Model (SopIM). An application case is described that shows how, faced to unknown, uncertainty and doubt, we can find a way of leading based on agility and confidence so that we can rely on a strong and involved team with a high degree of trust at all levels: between the manager and his employees, but also between the employees between them.

In the “Age of new normal” constantly renewed, organizations are condemned to a permanent transformation. Cooperation and mobility become dominant ways of work, which rests on a permanent personal and collective learning. Beyond the information processed in the digital information systems, the creative power of the tacit knowledge, which is in each individual’s brain, cannot be ignored. From our point of view, a constructivist attitude will improve the deterministic attitude strongly anchored in our modes of education. In the future, Managers and decision-makers will need to be aware of the role of interpretive frameworks and the creative power of tacit knowledge. Some of them, hoping to return to the old normal and restore what worked in the past, will have to transcend their perspectives. The borders and the limits of their interpretative frameworks will evolve. Managers and decision-makers will be encouraged to move from an attitude of command and control to an attitude of encouragement, animation, support, and accompaniment. Depending on their context and situation, they will need to imagine relevant infrastructures. In specific cases, Semi-Open Infrastructure Model (SopIM), which is already implemented into some companies—notably digital field and start-up companies—will be liable to help organizations to imagine structures adapted to their context and situation.

Researchers in the analytics and digital field should pay attention to the role of tacit knowledge and interpretative frameworks and measure the possible consequences of their work according to the domain and the context of their applications. To this end, we could develop researches on the rules insuring the relevance of information, taking into account the role of interpretative frameworks and tacit knowledge of users.

To conclude, this chapter retraces and completes our road toward Semi-Open Infrastructure Model (SopIM). We hope that it will bring a set of fruitful reflections to those who will be faced to the “Age of new mode.”

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