A Generic Core Knowledge Management Process: Locating Crucial Knowledge

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Abstract. In the Knowledge Society, the enterprise increasingly develops its activities in a planetary space. The hierarchical Enterprise locked up on its local borders is transformed into an Extended Enterprise without borders, opened and adaptable. In this context, the actors are confronted with new situations that increase their initiatives and responsibilities, whatever their roles and their hierarchical positions are. For their missions, through the Enterprise's Information and Knowledge System, beyond relevant information, they must access to knowledge and individual and collective skills widely distributed in the planetary space of their organization. In such context, the challenge is to well identify and locate "crucial knowledge" that is a set of knowledge, which is essential for the enterprise. This article presents GAMETH®, a specific approach that fits with the "Locating Core KM Process" that constitutes one of the operating elements of the Model for General Knowledge Management within the Enterprise (MGKME).

Keywords: Activity analysis, Crucial Knowledge, GAMETH®, Locating Core KM Process, Interpretative Framework, MGKME, Sensitive process.

1 Introduction

« What makes knowledge valuable to organizations is ultimately to make better the decisions and actions taken on the basis of knowledge [1]. » In the Knowledge Society that is taking place, the enterprise increasingly develops its activities in a planetary space. The hierarchical Enterprise locked up on its local borders is transformed into an Extended Enterprise without borders, opened and adaptable. In such conditions, the range of autonomy of action is increasing for more and more individuals, whatever are their hierarchical levels and roles: they are placed in situations that need to take decisions. They become decision-makers who use and

produce more and more knowledge as a basis for their efficiency. By this very fact, Extended Enterprises are more and more concerned with Knowledge Management as a key factor for improving their decision making processes. Notably, they need to locate and identify essential knowledge to capitalize on. Thomas A. Stewart pointed out this issue as early as 1991 [2]. Since that time, Companies launched numerous KM initiatives. Later on, the same author notices the fatal effect of KM initiatives that were not subjected to advisability studies. Stewart states [3] "*One flaw in knowledge management is that it often neglects to ask what knowledge to manage and to what end* (p.117)." This raises the problem of identifying which knowledge justifies a KM initiative. To deal with this issue, we developed a Global Analysis Methodology so-called GAMETH®, with the aim of identifying and locating "crucial knowledge".

In this article, after having set out the background theories and assumptions, we describe GAMETH®. Finally, we present lessons learned from two case studies.

2. Background Theories and Assumptions

In this section, after having describe the concept of "crucial knowledge", we introduce the basic foundations of GAMETH®.

2.1 The concept of "crucial knowledge"

Crucial knowledge supplies essential resources that are used by an enterprise's support and value-adding processes. Support and Value-adding processes derive from the value chain described by Porter [4] who identifies nine value-adding activities that he classifies into two main categories. The "*primary activities*" are: 1) in-bound logistics, 2) operations, 3) out-bound logistics, 4) marketing & sales, and 5) Services. The "*support activities*" are: 1) business infrastructure, 2) human resource management, 3) technological development, and 4) supplies.

Support and Value-adding processes represent the organizational context for which knowledge is essential factors of performance. It is in this context that is implanted a KM initiative. We should consider KM activities in order to identify knowledge that is essential factor to enable support and value-adding processes to achieve their goals efficiently. This knowledge will be crucial depending of a multi criteria analysis [5]. Notably, knowledge will be "crucial knowledge" depending of its degree of vulnerability, and its impact on the objectives and the durability of the firm.

For example, such is the case for knowledge characterized as follow: knowledge is rare, specific and unique, imperfectly diffused, non- substitutable, difficult to pass down; the cost to develop or purchase that knowledge is very high and the period required getting it is long; and possible loss of that knowledge can cause an unacceptable risk for the strategy and life durability of the firm, by weakening its core competencies, endangering the performances of its business units and reducing its market share. Crucial knowledge can be tacit or explicit as defined by Polanyi [6].

2.2 The GAMETH®'s Foundations

A Brief History of GAMETH®

GAMETH® is one of the results of the CORPUS project initiated and led from 1991 to 1995 into the Framatome Group[1]. The scope of CORPUS was to elaborate a set of concepts, methods and tools aimed at contributing to capitalizing on company's knowledge assets [7].

At the beginning, CORPUS deliverable was a complementary approach to manage the advisability phase of an information project with the aim of integrating knowledge capitalization functionalities into the specifications. As an example, for a quotation improvement project, this approach leads to highlighting a problem that we had decided to call "*knowledge traceability*", that is a generic problem based on the following needs: the need to refer to earlier facts, the need to refer to analogous cases, the need to ask questions about earlier choices, and the need to rely on experience feedback. Beyond a system that helps to prepare quotations, the solution implemented the functionality necessary for *"knowledge traceability"* (pp.144-145).

Later on, we have considered that this approach could be generalized, and since 1997, it has been consolidated as a Global Analysis Methodology, the so-called GAMETH®.

The postulates

GAMETH® rests on three postulates described hereafter.

Knowledge is not an object

Knowledge exists in the interaction between an interpretative Framework (incorporated within the head of an individual, or embedded into an artifact), and data. This postulate comes from the assumption emphasized by Tsuchiya [8] concerning knowledge creation ability. He emphases how organizational knowledge is created through dialogue, and highlighted how "commensurability" of the interpretative frameworks of the organization's members is indispensable for an organization to create organizational knowledge for decision and action. Here, commensurability is the common space of the interpretative frameworks (e.g. cognitive models or mental models) of each member. Tsuchiya states, *"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, to share individual's knowledge, members' interpretative frameworks commensurability is indispensable."* (p. 89).

In other words, knowledge that we use to understand a situation, solve a problem and act, results from the sense given, through our interpretative frameworks, to data that we perceive among the information transmitted to us. Consequently, explicit knowledge, codified, stored, and processed in digital information system, is not more than information. We call it "Information source of knowledge for someone". We consider this information as knowledge when members having a large commensurability of their interpretative frameworks commonly understand it. For example, such is the case for members having the same technical or scientific

[1] French Nuclear Power Plant Company, first transformed into Framatome ANP, then integrated into AREVA Group in September 2001.

education, or members having the same business culture. In these cases, codified knowledge makes the same sense for each member.

Company's knowledge includes two main categories of knowledge

Within a company, knowledge consists of two main categories. On the one hand, explicit knowledge includes all tangible elements (we call it "know-how") and, on the other hand, tacit knowledge [6], includes intangible elements (we call it "skills"). The tangible elements take the shape of formalized and codified knowledge in a physical format (databases, procedures, plans, models, algorithms, and analysis and synthesis documents), or are embedded in automated management systems, in conception and production systems, and in products. The intangible elements are inherent to the individuals who bear them, either as collective knowledge - the "routines" that are non-written individual or collective action procedures [9], or personal knowledge (skills, crafts, "job secrets", historical and contextual knowledge of environment, clients, competitors, technologies, and socio-economic factors).

Knowledge is linked to the action

From a business perspective, knowledge is essential for the functioning of support, and value-adding processes [4]. Activities contributing to these processes use and create knowledge. Thus, the actions finalize the company's knowledge. This point takes into account the context and the situation, which allow using and creating knowledge. In particular, we must analyze the role of the decision-makers involved with these activities in order to achieve the company's missions. Therefore, knowledge is linked to their decisions, their actions, and their relations with the surrounding systems (people and artifacts).

3. The GAMETH® Description

GAMETH® fits with the "Locating Core KM Process" that constitutes one of the operating elements of the Model for General Knowledge Management within the Enterprise (MGKME) developed by Grundstein [10], [11], [12]. The generic KM processes answer the problem of capitalizing on company's knowledge defined in the following way [7]: "*Capitalizing on company's knowledge means considering certain knowledge used and produced by the company as a storehouse of riches and drawing from these riches interest that contributes to increasing the company's capital*" (p. 141).

Several problems co-exist. They are recurring problems for a company. These problems constitute a general problematic that has been organized in five categories. Each of these categories contains sub-processes aimed to contribute a solution to the set of overall problems (see Figure 1).

The Locating Core KM Process deals with the location of Crucial Knowledge, that is, Knowledge (explicit or tacit) that is essential for decision-making processes and for the progress of the support and value-adding processes [4]. It is necessary to identify it, to locate this knowledge, to characterize it, to make cartographies of it, to estimate its economic value, and to classify it. Thus, GAMETH® provides the elements that lead to identifying the problems, clarifying the needs for knowledge,

identifying and locating potential crucial knowledge, specifying the value-based assessment of this knowledge, and finally, determining "crucial knowledge".

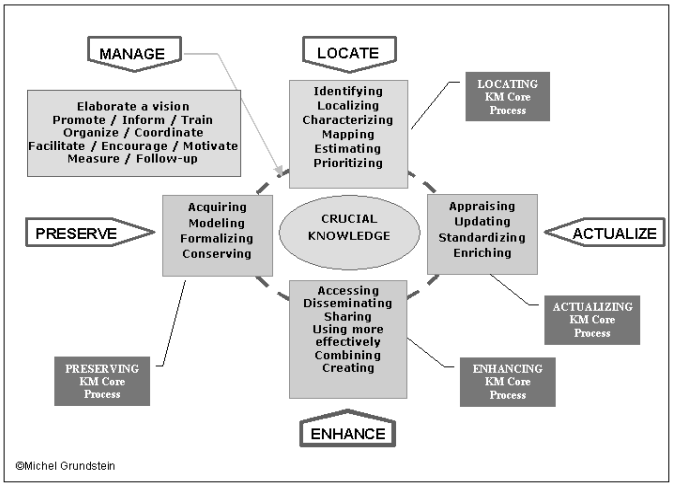

Figure 1: The Generic Core KM Processes

The approach consists of three main phases conformed to three guiding principles described in the following section.

3.1 The GAMETH® 's Main Phases

In short, GAMETH® approach consists of three main phases gathering the following steps:

Phase 1: Definition Study

The first phase, called "Definition study", aims at constructing the problem space. During this phase we specify the project context, define the domain and the limits of the intervention and determine the process, which is to be subjected to an in-depth analysis. The phase includes four steps: (i) Defining the domain and specifying the context of the operation; (ii) Delimiting operational processes, production processes and organizational entities (operational units, functional services, partners, clients) dealing with the production of goods and services; (iii) Modeling the domain of intervention (functional and structural models of the organizational entities, communication network model); and (iv) Determining sensitive processes.

Phase 2: Identification of the Crucial Knowledge

The second phase, called "Identification of the Crucial Knowledge", aims at distinguishing the problems that weaken the critical activities, i.e. the activities that might endanger the sensitive processes. The phase includes five steps: (i) Modeling sensitive processes; (ii) Assessing the risks to which the sensitive processes are exposed, and determining the critical activities for these processes; (iii) Identifying the constraints and malfunctions that weigh down on these activities; (iv)

Distinguishing the determining problems; (v) Locating and characterizing the crucial knowledge.

Phase 3: Determination of the Axis of a Knowledge Management Initiative

The third phase, entitled "Determination of the Axis of a Knowledge Management Initiative", is intended to define, localize and characterize the knowledge to be capitalized. It aims at answering the question: Who utilizes which knowledge during what phase in the sensitive process cycle? The phase includes five steps: (i) Clarifying the knowledge requirements for the resolution of the determining problems; (ii) Localizing and characterizing this knowledge; (iii) Assessing the value of this knowledge and determining the crucial knowledge; (iv) Outlining a project for the improvement of the decision-making and value-adding processes; (v) Determining the axes of a knowledge management initiative.

The approach is finalized by the company's strategic orientation, and the deliverable is an Advisability Analysis Report.

A typical schedule is presented on the figure 2. In this figure, the term "stakeholder", as defined by Roy and Bouyssou [5], refers to "*individuals or groups of individuals who, because of their value system, directly or indirectly influence the decisions, either at first degree because of their intervention or at second degree by the manner in which they use the action of other individuals*".

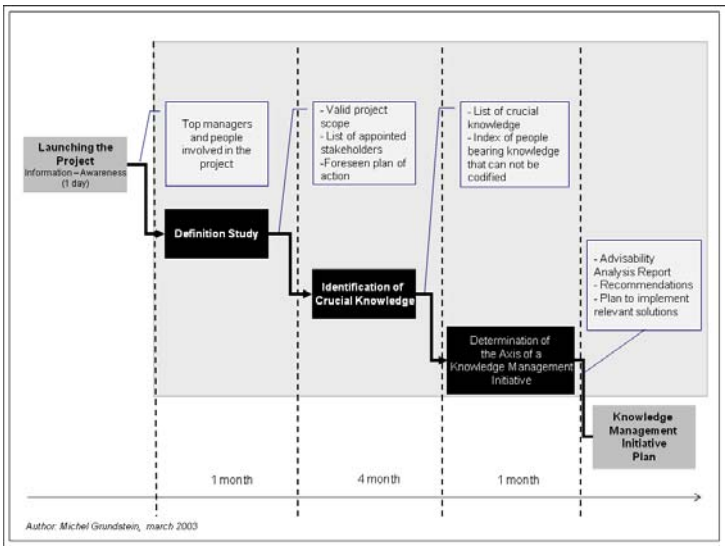

Figure. 2. Typical GAMETH Project Schedule

3.2 The GAMETH®'s Guiding Principles

GAMETH® brings three main principles with respect to the modeling of the company, the knowledge analysis method and the process modeling approach.

The Modeling of the Company

From the point of view of knowledge that she utilizes and creates, Company can be represented as a set of activities that make up the processes that are necessary to

achieve the company's mission. The SADT method [14] inspires the activity model, presented in Figure 3. However, there are two differences. First, it distinguishes two inputs: (i) the material transformed into a product by the activity; (ii) the data that inform on the status of this material and this product. Second, it includes the notions of produced knowledge and used knowledge.

Each activity focuses on the objective to reach. It transforms material into a product. It receives the data required for its well functioning and supplies the data for the functioning of other activities. It consumes financial resources and techniques. The activities use and produce specific knowledge (expertise and skills). They are subjected to constraints. These constraints can either be external to the activity (imposed conditions such as costs, time, quality, specifications to be respected, technical financial resources, human resources, and uncertainties related to delivery and the quality of the input materials), or internal to the activity, resulting from the limits of the admissible scope of the activity (zone of autonomy). The activities can lead to malfunction, that is the gap between the expected and the obtained results. Malfunction is a symptom of either internal sources (directives, procedures, processes, particular action logic that may be maladapted to the situation), or external sources (inadequate materials, unreliable data, badly adapted resources and insufficient or erroneous knowledge). Malfunction can also result from intellectual activities related to the production of knowledge, technological activities related to the production process or purely administrative activities.

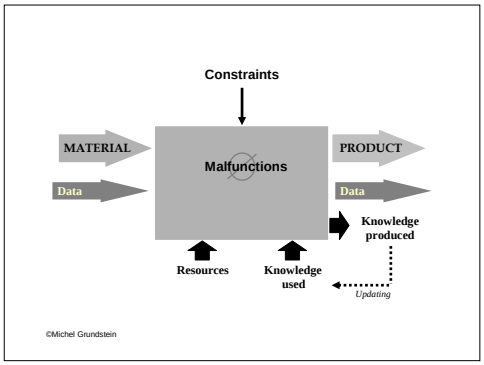

Figure 3. Knowledge-Based Model of a Business Activity

The Knowledge Analysis Method

The knowledge analysis method focuses on the so-called "sensitive processes". A sensitive process is a process, which represents the important issues, which are collectively acknowledged. These issues concern weaknesses in the process presenting a risk of not being able to meet the cost or time objectives, the required quality for the goods or services produced, obstacles to get over, challenges difficult to reach, goods and services that are strategic assets of the company. Creativity sessions, built upon the knowledge held by the responsible persons within the intervention domain, engender determining "sensitive processes". We describe the analysis method hereafter.

The problems and constraints can weaken the activities and may even endanger the process to which they are supposed to contribute. Therefore, the sensitive processes

are submitted to a risk assessment. This assessment helps to determine the "critical activities". The problems related to these activities are called "determining problems". The relaxation of organizational constraints can lead to a rapid removal of these problems. The identification of the remaining determining problems leads to the identification of the knowledge that is required for their resolution. This knowledge can be qualified as "crucial knowledge" depending on its actual value.

Thus, the GAMETH® Framework does not involve a strategic analysis of the business objectives. It rather suggests focusing on the analysis of the knowledge that is relevant for the activities and insures efficiency of processes in concordance with the business missions.

The Process Modeling Approach

Besides the advantages of the process modeling approach highlighted by Kruchten [15], in the GAMETH® Framework the process modeling approach follows constructivist logic. In order to distinguish potential crucial knowledge, the process modeling approach bases on the observation that processes, formalized through numerous procedures that prescribe action rules and operational modes, often differ from how these processes are perceived in actual world. Additionally, we observe that actors are often well aware of their part of the process, but ignorant with respect to the overall process in which this part has to operate.

The process modeling approach comprises formalization, with the stakeholders, of objectives relative to sensitive processes. The approach consists of the co-construction of the process' representation, utilizing the partial knowledge that stakeholders have acquired through the activities that they are supposed to perform. This approach is using a computer and a video projector. The representation of the process is outlined according to the progress of the work, and is shown on a screen in real time. Throughout the analysis, the problems encountered provide the possibilities for the identification of information and communication relations between actors, not recorded in documents, and the identification of the knowledge required for the resolution of these problems. The advantage of this constructivist approach is that it stimulates collective engagement, which is primordial for a successful outcome of a knowledge management initiative.

4. Application Examples

We applied GAMETH® in different contexts, following the typical schedule presented on figure 2. Hereafter we describe some case studies, and lessons we learned.

The first example comes from the French Institute of Petroleum (IFP). The second example comes from the French National Center for Scientific Research (CNRS) Engineering Sciences Department (SPI).

The IFP has applied the GAMETH® Framework in order to set up a pragmatic approach to the capitalization of knowledge within the context of a research and development project. The initiative has been taken by the Quality Direction and was carried out as part of a five-month internship within a M.Sc. program (Research Master) ending in June 2002. The objective of the research was to facilitate the identification of potential crucial knowledge through a selection of the documents,

which would contain possibly valuable future assets as part of the final steps of a project. The application at the IFP showed the compatibility of the GAMETH® approach with the ISO 9004 (December 2000) recommendations. Furthermore, the alignment of the knowledge management discourse with the quality management discourse has turned out to be a key factor in the success of the project.

Within the French National Center for Scientific Research (CNRS), the SPI department intended to launch a project in order to capitalize its internal information as well as the information produced by its attached research laboratories. The GAMETH® approach has been applied during a M.Sc research internship (Master research) ending in June 2003. The objective of the study was to facilitate the decision-making process through the identification of potential crucial knowledge (both tangible and tacit) required for the well functioning of a sensitive process within the SPI: the recruitment of engineers and technical personnel (IT). The main objective was to identify the critical activities and knowledge to be capitalized within the process. The application at the CNRS showed that, from a methodological viewpoint, the GAMETH® approach should be limited to one single process and involve at most 10 individual actors in order to be feasible within a six-month period.

Here are some lessons learned:

- The essential conditions for a successful implementation are: (i) include an initiation phase to familiarize the actors with the concepts of knowledge management; (ii) assure the involvement of (an important part of) the management, which is normal in any quality assessment approach; (iii) make sure that the GAMETH® approach is implemented by an individual familiar with the Enterprise.
- The analysis of the results leads to a reasoned and shared vision of the sensitive process by the stakeholders of this process. This emphasizes also the impact of the process being analyzed on different levels of the organizational activities. Several problems result in fact from the interrelation of processes.

5. Conclusions and Future Trends

In the Knowledge Society, Enterprises are concerned with Knowledge Management (KM) as a key factor for improving their efficiency and competitiveness. In this article, referring to the Model for General Knowledge Management within the Enterprise (MGKME), we focused on one of the operating elements suggested by this model: the “Locating Core KM Process” involved by the problem of capitalizing on company’s knowledge. To deal with this issue, we presented the Global Analysis Methodology so-called GAMETH®, and briefly described two case studies.

The case studies showed the relevance of GAMETH® leading to the construction of a “problem space”, to the identification of stakeholders, and to the clarification of knowledge requirements. Because of the constructivist approach logic, the involved actors contribute to the clarification of the problem and the elaboration of the solution. The approach crystallizes a learning process marked by the engagement of

the stakeholders to learn together to articulate the problems and to develop the solutions. In this way, the approach acts as a catalyst of change.

However, the applications of GAMETH® are limited to projects that involve no more than 10 to 20 stakeholders. To overcome these limits, Inès Saad in her thesis [15], presented a generalized method to make GAMETH® usable for any complex project. This method is based on "decision support system" theories. It was conceived and validated in the PSA Peugeot Citroen French Company.

In the future, we will carry on new applications of GAMETH®, and extending its field to organizations and complex projects following the way opened by Ines Saad's thesis.

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