



Workflow Knowledge Selection within an Enterprise for Quality of Service Improvement

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Abstract: In Enterprises, knowledge is used in the execution of tasks in workflows for users. This knowledge is held by employees involved in the workflow. With the instability of employees, quality of service is not always guaranteed. However, due to competitiveness, Enterprises are forced to improve their quality of service to satisfy their customers. This requirement leads to the definition of an approach to build a knowledge base used to achieve a given level of satisfaction. This knowledge base to be used by employees shall contain the most important knowledge because it is not all knowledge of employees working in the workflow that will be kept. This raises a problem of selection of knowledge. The knowledge management in an enterprise is the keystone for its success, and knowledge and information are becoming more important in today's business practice. In this paper, we address the question of choosing knowledge necessary to develop a knowledge base within an enterprise. It is important to select the most valuable knowledge for future use. We first present the three natures of knowledge in an enterprise and show that these three natures of knowledge can be represented uniquely as a knowledge model. From this model, we define some rules to develop a knowledge base. By using the resulting knowledge base in daily work, enterprises will improve their productivity and quality of service, and their workflows in order to deal with the competitive pressure of the network economy.

Keywords: Knowledge management, knowledge sharing, knowledge base, Quality of service, Customer Satisfaction, Business Process Modelling.

I. INTRODUCTION

Every organization gains new experience day by day that may be useful in the future and therefore should be protected. Project reports, meeting minutes, letters or presentations emerge from a variety of places. Every day customers come up with complaints and problems but also with ideas and praise. It is impossible to keep track of all these organizational events [1, 13, 14]. In many cases, the unexpected departure of an employee leaves a painful hole because of insufficient documentation during the time of employment. As documentation means work and money, an investment that rarely pays in the short run and rarely brings a reward to the writer, we need rules to select knowledge. It makes no sense to document everything. We cannot and should not keep everything. The challenge lies in the selection between protection-worthy and not-protection-worthy knowledge entities. We have to transfer valuable data, information and skills into organizational systems in which they can be used by the whole company.

The preservation of knowledge is an important building block within the concept of knowledge management [12, 13, 14]. The value of the organizational memory is today particularly underestimated in the process of reorganization. The special importance of a knowledge base has been stressed by many management thinkers in the last years, but

in most management concepts the conscious handling of the organization's past plays secondary role [1, 2]. In general, we can describe knowledge base as a system of knowledge and capabilities that preserves and stores perceptions, actions and experiences over time and secures the possibility of recall for the future [13]. The knowledge base is the crucial point of reference for new experiences: without memory, learning is impossible [12, 13]. The dismissal of employees unwilling to change may break a blockade but always at the price of losing personal know-how and expertise. Many companies made the bitter experience that through lean management and the unavoidable discharges and outsourcing activities valuable know-how left an enterprise and had to be bought back by hiring expensive external consultants. The loss of certain critical knowledge may reduce the performance of entire company departments [14].

In The literature on business process and workflow modeling, various models have been defined which integrate the knowledge aspects in different levels of abstraction [1, 8, 9, 10]. The defined models deal with the knowledge elicitation from the design state to the workflow execution. However, these models do not present how the knowledge used has been selected. There are three natures of knowledge in an organization: tacit knowledge, explicit knowledge and cultural knowledge [13, 14]. In this paper, we present an approach to develop a knowledge base encapsulating these three natures of knowledge. Develop a knowledge base

requires a good representation of knowledge and rules for selecting the most valuable knowledge for future use.

The rest of the paper is organized as follows: section 2 presents the nature of knowledge in an enterprise, section 3 deals with the development approach of a knowledge base, section 4 concludes the paper and opens avenues for future works.

II. NATURE OF KNOWLEDGE IN ENTERPRISES

In order to manage knowledge, we need to understand the nature of knowledge in organizations. It is helpful to distinguish between three categories of organizational knowledge: tacit knowledge, explicit knowledge, and cultural knowledge.

A. *Tacit Knowledge*

In organizations, tacit knowledge is the personal knowledge used by members to perform their work and to make sense of their worlds. It is learned through extended periods of experiencing and doing a task, during which the individual develops a feel for a capacity to make intuitive judgments about the successful execution of the activity. Examples of tacit knowledge at work would be the technician who can tell the health of a machine from the hum it generates, or the bank manager who develops a gut feeling that a client would be a bad credit risk after a short conversation with the customer. Since tacit knowledge is experiential and contextualized, it cannot be easily codified, written down or reduced to rules and recipes.

Despite it being difficult to articulate, tacit knowledge can be and is regularly transferred and shared. Tacit knowledge can be learned through observation and imitation. Thus, apprentices learn their craft by following and copying their masters; professionals acquire expertise and norms through periods of internship; and new employees are immersed in on-the-job training. Professional reflects on what they know during the practice itself (for example, when they encounter an unusual case) as well as afterwards (for example, in a postmortem), and in doing so test and refine their own tacit knowledge. Tacit knowledge can also be shared. Although not completely expressible in words or symbols, tacit knowledge may be alluded to or revealed through rich modes of discourse that include the use of analogies, metaphors or models, and through the communal sharing of stories. Storytelling provides channels for tacit learning because narratives dramatize and contextualize knowledge-rich episodes, allowing the listener to replay and relive as much of the original experience as possible.

B. *Explicit Knowledge*

Explicit knowledge is knowledge that is expressed formally using a system of symbols, and can therefore be easily communicated or diffused. Explicit knowledge may be object-based or rule-based. Object-based knowledge may be found in artifacts such as products, patents, software code, computer databases, technical drawings, tools, prototypes, photographs, voice recordings, films, and so on. Knowledge is object-based when it is represented using strings of symbols (words, numbers, formulas), or is embodied in physical entities (equipment, models, substances). Explicit knowledge is rule-based when the knowledge is codified into rules, routines, or operating procedures. A substantial part of

an organization's operational knowledge about how to do things is contained in its rules, routines and procedures. Although all organizations operate with standard procedures, each organization would have developed its own repertoire of routines, based on its experience and the specific environment it functions in.

Gandhi in [13] discusses an organization's explicit knowledge that takes the form of intellectual assets, which he defines as "the codified, tangible, or physical descriptions of specific knowledge to which an enterprise can assert ownership rights. Any knowledge that becomes defined, usually by being written down or entered into a computer qualifies as an intellectual asset and can be protected.

Explicit knowledge codified as intellectual assets are valuable to the organization because they add to the organization's observable and tradable stocks of knowledge. More over, because they have been committed to media, ideas may be communicated more easily. Explicit knowledge serves a number of important purposes in an organization. First, they encode past learning in artifacts and rules. Second, explicit knowledge facilitates coordination between disparate activities and functions in the organization. Third, exercising explicit knowledge signifies technical skill and procedural rationality, and so helps the organization to present a self-image of competence, legitimacy and accountability. Since explicit knowledge has been codified, it remains with the organization even after its inventors or authors leave the organization.

C. *Cultural Knowledge*

An organization's cultural knowledge consists of the beliefs it holds to be true based on experience, observation, reflection about itself and its environment. Over time, an organization develops shared beliefs about the nature of its main business, core capabilities, markets, competitors, and so on. These beliefs then form the criteria for judging and selecting alternatives and new ideas, and for evaluating projects and proposals. In this way an organization uses its cultural knowledge to answer questions such as "What kind of an organization are we?" "What knowledge would be valuable to the organization?" and "What knowledge would be worth pursuing?" The answers in turn depend on shared assumptions and beliefs about what business the organization is in, what are its core competencies, and how it wants to grow over time. Thus, cultural knowledge includes the shared assumptions and beliefs that are used to describe and explain reality, as well as the criteria and expectations that are used to assign value and significance to new information.

From the above it is clear that the knowledge of an enterprise remains heavily dependent on the knowledge of people and their presence in the enterprise. From Now, knowledge engineering and artificial intelligence technologies, information and communication, provide the tools to better formalize know-how, favor greater distribution of consolidated knowledge, cause unstructured digital information exchanges (text, voice, images) and enable the sharing of tacit and cultural knowledge through collaborative work that requires more a unity of place. However, know-how is difficult to locate and is not always easily formalized unless there is a knowledge model that takes into account all these kinds of Enterprise knowledge. For a better understanding and in order to better represent Enterprise knowledge, [13] combined these three kinds of knowledge into two categories according to the diagram below:

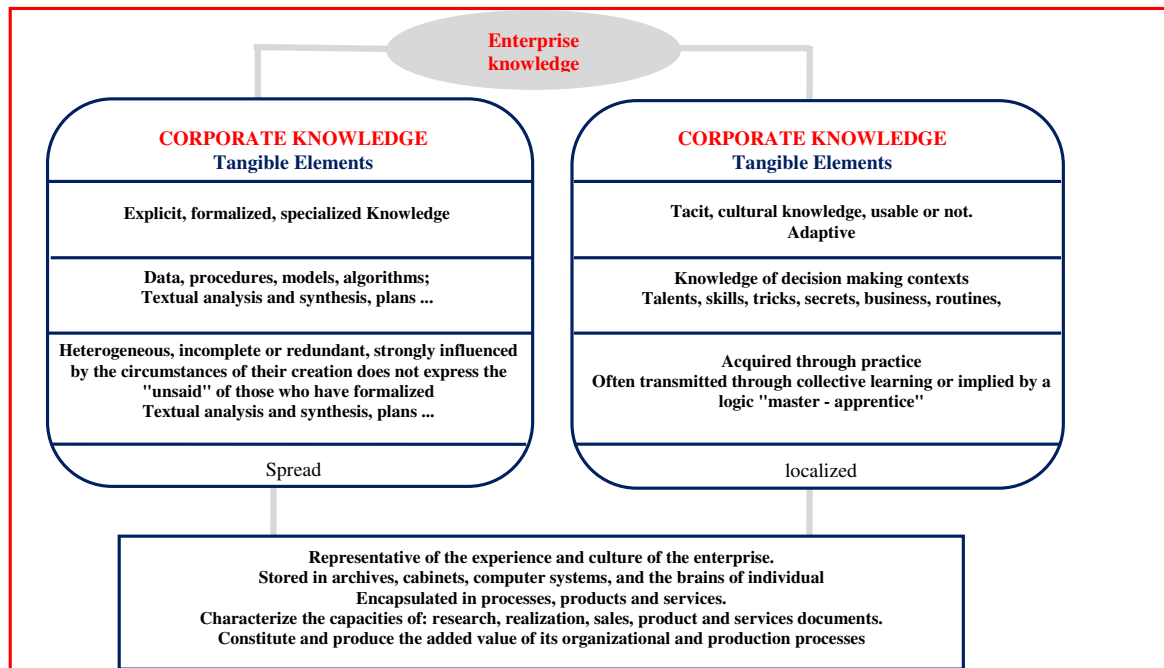


Figure 1: The two categories of knowledge in enterprise

This view focuses on the knowledge of an enterprise and highlights the importance of tacit and cultural knowledge. It shows the importance of encouraging: on the one hand, the exchange and sharing of knowledge particularly in privileging interactions between people; on the other hand, the transformation of knowledge into explicit knowledge and thus expand the field of knowledge that may be explicitly formalized in an enterprise.

III. KNOWLEDGE BASE

We define a knowledge base as a set of knowledge that can be modeled in order to improve the quality of service in an organization. The development of a knowledge base follows two principles: knowledge extraction and knowledge acquisition. Knowledge extraction is a process to transform personal knowledge of experts in a given domain of organization in the form of organized and structured information, knowledge that can be made available and usable by the organization. The acquisition of knowledge, the reverse process of transforming, through learning, information and knowledge available to the organization in the form structured knowledge and need by staff in the form of new skills. Modeling organization knowledge is the element that links these two processes and thus allows having a unique type of knowledge in the base. The knowledge model is defined to serve as input to the acquisition of knowledge in the knowledge base. We propose in the next section our knowledge model that shall be used to develop a knowledge base within an enterprise.

A. Knowledge Model

In [11], a goal oriented approach- for the definition of a business process requirement model, integrating their level of importance and constraints inherent to these requirements. The level of importance of a goal is the credit which the user associates to this goal. Constraints are non-functional

requirements related to what this goal must satisfy. The approach that was proposed revolves around four main activities: requirement elicitation, selection of different goals, transformation of requirements into knowledge bits and finally the development of the requirement model.

However, the proposed knowledge model needs to be reviewed according to the concerns outlined in the previous section. That is why the new model will put a strong link between the importance associated to knowledge and experience level of its author that is who emits or has knowledge. Moreover, according to [11], it is the author of knowledge who defines its degree of relevance while this degree of relevance should be deduced from other knowledge components. For this, we define knowledge as a tuple

$\langle k, Ag, Ex, \psi, \omega, \lambda, \delta, v \rangle$ where:

k is the name of the knowledge

Ag is the name of the agent who expressed the knowledge

ψ the context in which the goal is defined

ω is the goal

λ the business rule

δ execution constraints

v the level of importance of the goal

[a] Agent: The experience of the agent who expresses knowledge is used for the evaluation of knowledge. The more experienced the agent is, the more you give credit to the knowledge and hence the degree of importance of the goal of that knowledge is closely linked to the experience of the agent.

[b] Context: The context is the application scope of knowledge or the domain in which knowledge is defined or applied.

[c] Constraints: Constraints refer to the non-functional expectations which could undermine the application of knowledge. They represent the state of the environment in which the task shall run.

[d] Goal: Several studies focused on the concept of goal defined it as an objective that the future system must satisfy [6, 7, 8]. Given the varied nature of goals, categorizations have been proposed: functional goals vs. non-functional goals, goals vs. goals and service vs system goals etc. In this paper, we retain the functional goals which are goals that are most representative of a domain.

[i] **Definition (functional goal):** A functional goal defines

a potential task that the system can run, it expresses what the user of the system wishes to do by its execution [11].

[a] Business Rule: A business rule gives the description of knowledge in the context that it should apply. It helps to organize a management process in order to achieve the goal [4, 11].

The business rules have an impact on both the external environment (the organization), and the internal environment

(the system) [3, 5, 6]. They are of type: scheduling rule, triggering rule, or static constraint. A scheduling rule is a law in the domain that describes the order in which goals must be achieved for a given object instance. The triggering rule and the static constraints have the same semantics as in [4, 5].

[b] Degree of importance of knowledge: The degree of importance of knowledge translates the credit associated to this knowledge. It is of type: very important and essential, important and indispensable, essential, important, necessary, in bonus [5, 11]. It is possible to choose a numerical value to express the importance level of knowledge. This degree is closely related to the credit that is Associated to the Depository of Knowledge.

B. Development approach of knowledge base

In the following figure, we present our approach to develop a knowledge base according to 5 rules: the modeling, the reference, the preservation, the valorisation and the updating.

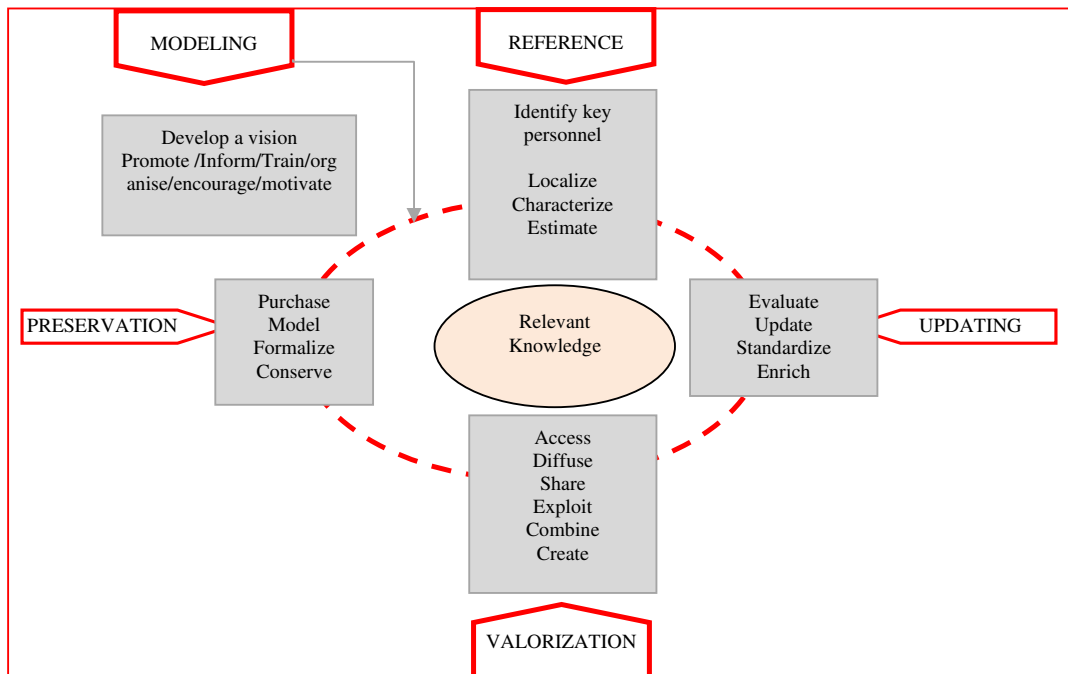


Figure 2: development process of a knowledge base

Rule 1 (Modeling): The first thing in our approach is to define a knowledge model for representing different types of knowledge found in an enterprise. In our case, we use the model proposed in the previous section to represent knowledge.

Rule 2 (Reference): Identify key personnel of the organization whom we shall call experts in the organization. These personnel are designated according to their experience and confidence. They must first identify relevant knowledge that is to say knowledge (explicit knowledge) and know-how (tacit knowledge and cultural) that are necessary for decision making and conduct of essential processes which constitute core activities in the Enterprise: they have to identify, locate, characterize and format depending on the knowledge model i.e. for a knowledge, adapt it to the knowledge model representation to make it exploitable. This refers to assign a name, evaluate its depository, give its execution context,

define its goal, business rules, execution constraints and deduce its degree of importance. The knowledge base must contain only knowledge that the degree of relevance or importance is beyond a certain threshold defined by the hierarchy of the organization. This last selection constraint should be highly respected by experts so as to retain only useful and usable knowledge in the Knowledge base.

Rule 3 (Preservation): When knowledge is explicit, it must be purchased from those having it, formatted according to the knowledge model, when knowledge is not explicit, it is necessary to encourage knowledge transfer of type “master – Apprentice” and networks of communication between people in order to format them.

Rule 4 (Valorization): Expert must then place the knowledge base at the service of development and expansion of the enterprise that is to say making it available under certain rules of confidentiality and security, exploit it,

combine knowledge and create new ones.

Rule 5 (Updating): When feedbacks of experiences, experts must evaluate them, enrich them, format and update the knowledge base.

IV. CONCLUSION

We have shown in this paper the process of developing a knowledge base within an enterprise. A knowledge base is a set of knowledge necessary to optimize the execution of tasks in order to improve the quality of service. The model representation of knowledge should help identify the three knowledge types that are tacit knowledge, explicit knowledge and cultural knowledge. The identification of knowledge is done by a group of experienced personnel called experts of the organization. The team must format all knowledge proposed according to the representation model and deduce a level of importance; this level of importance is closely linked to other components of the knowledge and particularly to experience of the one who expresses knowledge. Experience is seen as the number of times that the proposed knowledge was used to solve tasks instead of the agent in the organization. The knowledge selected for the knowledge base is that which the degree of importance or relevance is above a certain threshold which can vary from one organization to another depending on the objectives. We believe that this process of developing a knowledge base can be used by organizations to improve their knowledge and then their quality of service.

However, the next step in this work, which is in progress, addresses the selection that occurs after the development of the knowledge base, aiming at selecting the relevant knowledge out of a knowledge base for a given task.

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