Dimitris Karagiannis
Ulrich Reimer (Eds.)

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Practical Aspects of Knowledge Management

5th International Conference, PAKM 2004
Vienna, Austria, December 2004
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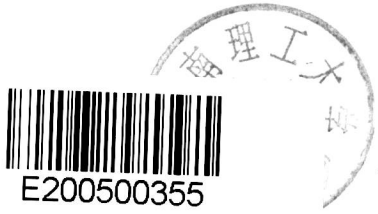

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Lecture Notes in Artificial Intelligence 3336

Edited by J. G. Carbonell and J. Siekmann

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Preface

This book contains the papers presented at the 5th International Conference on Practical Aspects of Knowledge Management organized by the Department of Knowledge Management, Institute of Computer Science and Business Informatics, University of Vienna. The event took place on December 02–03, 2004 in Vienna.

The PAKM conference series offers a communication forum and meeting ground for practitioners and researchers engaged in developing and deploying advanced business solutions for the management of knowledge and intellectual capital. Contributions pursuing integrated approaches which consider organizational, technological and cultural issues of knowledge management have been elected for presentation. PAKM is a forum for people to share their views, to exchange ideas, to develop new insights, and to envision completely new kinds of solutions for knowledge management problems.

The accepted papers are of high quality and are not too specialized so that the main issues can be understood by someone outside the respective field. This is crucial for an interdisciplinary exchange of ideas. Like its predecessors, PAKM 2004 featured two invited talks.

It is a real joy seeing the visibility of the conference increase and noting that knowledge management researchers and practitioners from all over the world submitted papers. This year, 163 papers and case studies were submitted, from which 48 were accepted.

Many people were involved in setting up PAKM 2004. We would like to express our warm thanks to everybody who contributed to making it a success. First of all, this includes all the authors who submitted a paper to the review process, and the members of the program committee who made all the efforts to select the best papers and to ensure a high-quality program. Special thanks go to Prof. Dr. Hermann Krallmann and Prof. Dr. Dimitris Plexousakis for giving the keynote talks.

Most of the organizational work was done by Michaela Schein, reliable and industrious as always. She also managed the local organization. Our thanks also include the session chairs for their support in running a smooth conference, and all the participants who made the event possible in the first place.

Our wish is that all participants found it worthwhile to attend PAKM 2004 and returned home with many new ideas and valuable contacts.

Vienna, December 2, 2004

Dimitris Karagiannis
Ulrich Reimer

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Table of Contents

The KMDL Knowledge Management Approach: Integrating Knowledge Conversions and Business Process Modeling

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Abstract. This paper shows the KMDL Knowledge Management Approach which is based on the SECI and *ba* model by Nonaka and Takeuchi and the KMDL Knowledge modeling language. The approach illustrates the creation of knowledge with the focus on the knowledge conversions by Nonaka and Takeuchi. Furthermore, it emphasizes the quality of knowledge being embodied in persons and creates a personalization and socialization strategy which integrates business process modeling, skill management and the selection of knowledge management systems. The paper describes the theoretical foundations of the approach and practical effects which have been seen in the use of this approach.

1 Introduction

Knowledge management clearly has become more and more important since the beginning of the early nineties. Companies expect an improvement of the innovation capability and a significant increase in process efficiency. Globalization, increasing competition, more dynamic markets and shorter cycles in product development and innovation increase the need for a better adaptation to those environmental factors. These factors establish the need for a consequent adaptation of all business processes to existing and future market needs.

Knowledge processes are executed parallel but also linked to normal business processes in a ladder like structure. The knowledge processes are only slightly structured. Detecting, modeling, analyzing and finally optimizing those processes should be the long-term aim of a process-oriented knowledge management approach.

Knowledge and business processes are integrated and should be evaluated as a whole [1]. Business processes can be modeled and analyzed via the existing business process modeling methods. Furthermore, there are numerous approaches which take into consideration the knowledge within the company or the organization [21, 22]. Mapping static, explicit knowledge can only contribute little to a broad and integrated process-oriented knowledge management approach. Modeling the business processes and the processes of knowledge creation can ensure an effective and reasonable process-spanning knowledge flow.

The described problems and challenges have been the motivation to develop the knowledge modeling language KMDL (Knowledge Modeling Description Language)

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[2] in order to model knowledge-intensive business processes with the KMDL-based software tool K-Modeler. The tool implementing the language in an early version has been integrated into an approach which is based on the knowledge management philosophies of Nonaka, Takeuchi and Konno. The definition of the term knowledge is based on the very ideas of Nonaka and Takeuchi [18]. The knowledge is bound to a person, it is indeed personal knowledge. This so called tacit knowledge cannot be expressed by formal methods. It is based in the employee's occupation, the proficiencies of each employee and his ideals, values and experiences. It is possible to analyze and model this knowledge through KMDL even if it is not directly used in the operational business process.

2 Theoretical Foundation of the Approach

2.1 Definition of Knowledge, the SECI Model and *ba*

Nonaka and Takeuchi's thoughts and ideas are not only influenced by Japanese tradition but strongly by Michael Polanyi. Polanyi [20] defined the idea of a tacit knowledge embodied as personal knowledge. Therefore, Nonaka and Takeuchi distinguish between two types of knowledge: the tacit and the explicit knowledge. Tacit knowledge is personal knowledge which consists of mental models, beliefs and perspectives which cannot be easily articulated or shared. Explicit knowledge is formal, codified, systematic, articulated in writing/numbers, easy to communicate and shared; it is transmittable in a formal language and can be stored in databases or libraries [12].

The tacit knowledge is the more interesting knowledge when looking at knowledge-intensive business processes as we will see later. But yet, there are ways and possibilities to convert and combine tacit and explicit knowledge. Nonaka and Takeuchi mention four types of knowledge-conversions in the so called SECI model, the socialization, the externalization, the combination and the internalization.

The socialization is a conversion from tacit knowledge to tacit knowledge. Often it is done by sharing experience, just like apprentices of a craftsman learn their skills by watching a knowledge-worker can learn his needed abilities through on-the-job training. Even if possible, the socialization can be done without speaking or writing a single word.

The externalization is a conversion from tacit to explicit knowledge. By using metaphors, analogies or models one can express his tacit knowledge in a manner which can be understood by others. It is the essence of tacit knowledge which can then be handed over in a written form, yet it can be very difficult to externalize tacit knowledge, often it is simply impossible.

The combination is the conversion from explicit to explicit knowledge. Different kinds of explicit knowledge can be combined through media like telephone, mail, word processing by reconfiguring, categorizing and adding new information and context to the knowledge.

The internalization is the conversion from explicit to tacit knowledge. It is very close related to learning-by-doing. Experiences made through socialization, externalization or combination are internalized and put into one's own knowledge framework, they can become know-how or mental models and according to this, very important knowledge assets. It is very helpful it the explicit knowledge is in a written form like documents, handbooks or stories.

Those conversions are done regularly in everybody's daily life. Yet the idea is often neglected, because the conversions are bound to a place and depend on certain conditions and requirements. The idea has been adopted by Takeuchi and Konno [19]. The concept of *ba* creates the idea of this place. The *ba* is a shared location or place where relations can evolve. The place can be either physical (including bureau, shared workroom, mall) or virtual (email or teleconferences) or even mental (shared values, ideas, or ideals). The *ba* restrains itself from the ordinary human interaction by being a place of knowledge creation. Knowledge is bound to the *ba*, if it is dislodged from the *ba*, it simply becomes information. The *ba* is the framework where knowledge becomes the resource for creativity.

The model by Nonaka, Takeuchi and Konno establishes a logical framework which can be used to take a look at tacit and explicit knowledge, the conversions between those kinds of knowledge and therefore the creation of knowledge and the conditions and requirements for conversion to happen (the *ba*). It will serve as the basic framework for modeling a dynamic process of knowledge creation within the author's approach.

2.2 Definition of Knowledge-Intensive Business Processes

Several definitions of knowledge-intensive business processes have evolved. Remus first of all distinguishes four types of knowledge-oriented processes. A knowledge-intensive process is super-ordinate to the other processes in order to distinguish them from normal business processes [3]. The knowledge-intensive business process is a process which relies very much on knowledge like research and development processes. Remus defines two more processes which rely on knowledge [22]. The knowledge-process which is a process combining different knowledge activities like creating and distributing knowledge, for example the content management process and finally the knowledge-management process which tries to improve knowledge processes. The knowledge-intensive business process is subject to the definition of knowledge-intensive processes within this paper.

The literature defines several factors which are fundamental to knowledge-intensive business processes. In knowledge-intensive processes, knowledge contributes significantly to the values added within the process. The process has got many innovative and creative parts [5]. People within the process have a large scope of decision freedom, they can decide autonomous. The event flow of knowledge-intensive business processes is not clear form the very beginning, it can evolve during the process [3]. Many participants of the process have got different knowledge from different domains at different levels [11]. Like the flow, even the tasks within the process do not have to be clearly defined. A high level of communication between individuals is often part of the knowledge-intensive process. Knowledge which is part of the process has often a very short life-time [5], it is outdated very often, even though, it is more often very time-intensive to build up this knowledge [23]. Knowledge-intensive business processes often do not cover structured working rules and often lack metrics for evaluating the success of the process [4]. The IT-support for knowledge-intensive business processes is often not very sophisticated because it heavily relies on socialization and informal exchange [14]. A knowledge-intensive process should be a core process of the company and it should produce or add new knowledge to the organiza-

tion's knowledge base [15]. A last criterion focuses on the very high costs which are often generated by knowledge-intensive processes.

Looking at these criteria, we can classify many processes, for example software development processes [17] or public administration processes as knowledge-intensive processes. The very vague and unstructured flows of knowledge cannot be modeled by conventional modeling tools. Important elements like the representation of tacit knowledge or the creation of knowledge through conversions cannot be modeled [7].

2.3 Knowledge Strategy

Hansen et al. have established the idea of the knowledge strategy [13]. They distinguish between two main strategies which are often combined but are in general two poles for knowledge management approaches. The *codification strategy* tries to track the knowledge of the employees or other stakeholders with interviews or analogue techniques and to save this knowledge by electronic means and measures within databases. By retrieving from those databases, knowledge can be used again and again within new processes and situations. According to the definition by Nonaka and Takeuchi, this so called "knowledge" is indeed just information. This approach is far more an information management approach than a real knowledge management approach. The focus is on documenting situational knowledge from projects in order to reuse this knowledge like lessons-learned or best-practice documents over and over again (the so called people-to-documents approach).

The are within the focus of this strategy. A successful strategy for knowledge management of knowledge-intensive processes should focus on a combined personalization and socialization strategy.

Looking at the previous paragraph, we can see that knowledge-intensive business processes deal very much with creating and using tacit knowledge from many participants. An integrated approach should focus first of all on the *ba*-concept of places or processes where knowledge is created, the difference between tacit and explicit knowledge and focus on the factors of knowledge-intensive processes which are very much driven and fulfilled by the SECI knowledge conversions. Furthermore, the general strategy should be a combination of personalization and socialization, we should be able to identify tacit knowledge bound to persons as well as identifying processes within the organization creating knowledge and supporting the creation by appropriate (knowledge management) solutions or practices. The three types of knowledge processes according to Remus should be supported, if it is possible to model and support knowledge-intensive processes, the subordinate processes can be modeled, too. Our approach to fulfill those requirements is the KMDL. second strategy is the *personalization strategy*, which focuses on tacit knowledge. This knowledge is bound to several experts within the process or company. The strategy tries to identify the experts and to connect or visualize them through methods like yellow pages or knowledge maps. The communication between experts should be improved. The codification strategy does not seem to be appropriate for knowledge-intensive processes; the personalization strategy can be suitable if it is expanded by some more elements which is sometimes called *socialization strategy* [6].

This strategy focuses on the exchange and creation of knowledge within groups. Knowledge is a social product made within an environment [24]. The settings of the environment and the organization.

3 The Knowledge Modeling Description Language

The elements and mechanisms have been discussed in several other publications and the literature [9, 10]; we will therefore only discuss the core elements which are basis to the mentioned practical benefits in the third section of this paper.

3.1 Objects

The actual implementation of the KMDL consists of six objects: information, task, role, role requirement, knowledge object and person. The relation of those objects can be seen in Figure 1.

The information object is used in a process like any other information or explicit knowledge. Information can be externalized easily. It can be saved to disk or written down in documents.

The task object is the core element of the process model. A task is defined in this context as an object within the business process having input and output and being a single step within the whole superior process. Knowledge-intensive processes often process a lot of information, the input and outputs of the task therefore are information objects.

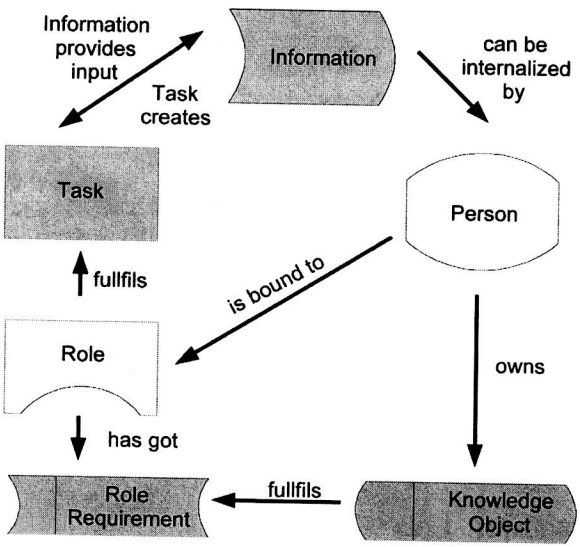

Fig. 1. Objects of KMDL

The role object is bound to tasks and roles execute the tasks. Roles can be taken and assigned to several persons. This provides the possibility to model the whole functional and personal company structure.