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PROCESS-BASED KNOWLEDGE MANAGEMENT: EXPERIENCES WITH TWO PROJECTS

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ABSTRACT

This paper is concerned with two projects in the field of process-oriented knowledge management, InfoAtlas and PROMOTE. In the InfoAtlas project the feasibility of our approach for process-oriented knowledge management was shown, in PROMOTE this approach is currently being extended for building a methodology and a product integrated in the framework of business process management. For both projects conceptual and implementational issues are discussed.

1. PROCESS-ORIENTED KNOWLEDGE MANAGEMENT

The department of knowledge engineering at the University of Vienna is currently undertaking several projects in the field of process-oriented knowledge management (see also [ABECKER et al. 2000], [GOESMANN, FÖCKER, STRIEMER 1998], [GOESMANN, HOFFMANN 2000]). Two of them, InfoAtlas and PROMOTE are discussed in this paper. In the InfoAtlas project the feasibility of our approach was shown, in PROMOTE a methodology and a web-based software integrated in the business processes (BPs) are currently developed.

Our approach for process-oriented knowledge management can be summarised by the following points:

- Knowledge management is only successful if it is integrated into the daily activities of the employees, i.e. the BPs. Process-oriented knowledge management therefore means developing solutions with BPs as basis.
- Currently a lot of methodologies and concepts are being built for introducing knowledge management in a company. For being successful we think it is indispensable to link knowledge management with business process management (see [KARAGIANNIS 1995], [KARAGIANNIS, JUNGINGER, STROBL 1996]) from the strategic decision to the evaluation phase. Such a methodology is currently being developed within the PROMOTE project.
- The basic elements (or activities) of knowledge management like knowledge acquisition, -identification, -generation, -distribution etc. (see [PROBST, RAUB, ROMHARDT 1998]) can be

described as knowledge process models. These models cannot only be used for documentation purposes however can also be executed like BPs. Therefore such a model-based view of knowledge management (see also [ALLWEYER 1998]) enhances the possibilities of analysing knowledge activities.

2. THE INFOATLAS PROJECT

In this section a short overview about the InfoAtlas project [TELESKO, KARAGIANNIS 2000] is given. Section 2.1 deals with basic issues of the project, section 2.2 describes the conceptual model and in section 2.3 implementation details are given.

2.1 InfoAtlas – Basic issues

The InfoAtlas project deals with the management of information systems (IS). The project was realised with a large customer in the health sector in Austria. This customer has about 14.000 employees and runs about twenty hospitals. The information technology (IT)-infrastructure is highly heterogeneous with basically two types of IT-systems:

- Basic systems: Here medical and administrative systems can be distinguished. Basic systems are widely used IS with permanent data bases (e.g. hospital information system).
- Sub systems: In contrast to basic systems, sub systems are locally used in departments. A central management of data is also missing. An example for a sub system may be a data base generated by a medical specialist containing patient data for a certain time period.

For the purpose of realising a knowledge management solution, the sub systems are of primary interest because they contain information which can only be accessed by a limited number of employees. In several discussions with the top management of the customer the following weaknesses of the existing IT-infrastructure concerning the use of knowledge could be identified:

- No integrated management of IS is supported at the customers' sites.
- Employees can create and run their own IS which are not documented and can not be accessed by other employees. Yet, the management has a vital interest in distributing information from sub systems to a larger group of employees.

In this context the following basic knowledge management problems arise:

- Employees - especially the medical staff - take all the knowledge with them (e.g. empirical data from patients) when they leave the customer.
- Scientific work is often realised in a redundant way because a scientist does not know much about the colleagues' work and projects.
- The management wants to provide answers to questions like „In which IS is employee-relevant information stored?“. However answering questions like this is only possible if there exists a complete overview about all the basic- and sub systems.
- There exists a widely heterogeneous IS-infrastructure, i.e. all types like stand-alone-, client-server- and host systems are used. This impedes the search for relevant information.

Within the InfoAtlas project a customised knowledge management solution to improve the actual situation was developed. The software was tested in three departments of the customer to gain enough experiences.

2.2 InfoAtlas – Conceptual model

In Figure 1 the conceptual model of InfoAtlas is depicted. In the following subsections the elements are described in detail.

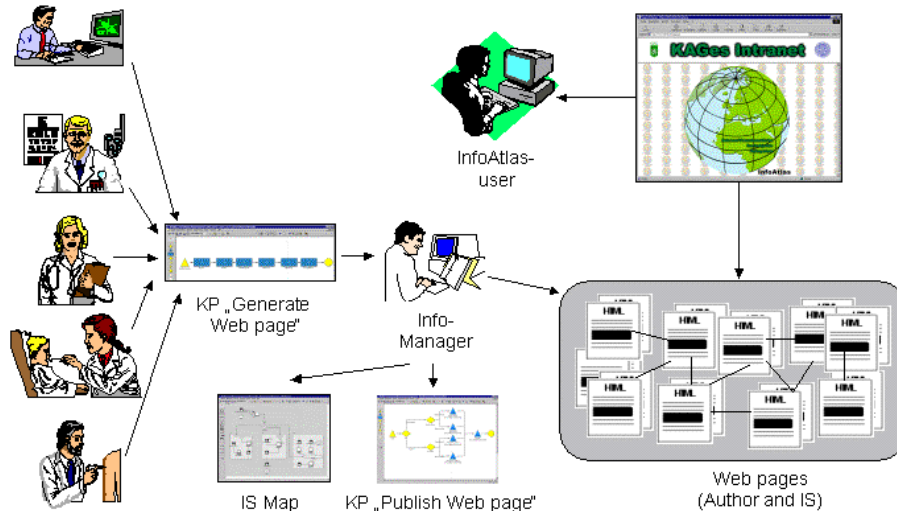


Figure 1: InfoAtlas conceptual model

2.2.1 The IS map

The starting point for understanding the InfoAtlas is the so-called IS map. In an IS map all the IS of a company together with the necessary infrastructure (e.g. network equipment, servers and computers, databases etc.) can be described. Initially the IS map may be empty or only filled with the basic systems which can be accessed by most of the employees and are well known. Knowledge management is related to psychological and motivational factors. Why should employees share their knowledge with colleagues? The main idea in the InfoAtlas project concerning these aspects is to use web pages to be distributed in the Intranet as an incentive to get the information for filling later the IS map. All kind of employees (e.g. doctors and administrative personnel) are encouraged to describe themselves and their work by means of a webpage. This includes also the description of IS they create, access and maintain. Over the time this will help the info manager - the person finally checking the content of the web pages and maintaining the InfoAtlas database - to „fill“ the IS map with additional IS. In particular a web page of an employee is composed by the following information: his/her name, his/her picture, name and address of the department, position, field of work, research area, projects, publications. The detailed information to be inserted and the actions of publishing the web page are determined by the so-called knowledge processes (KPs) „Generate web page“ and “Publish web page”.

2.2.2 KP modelling

KP modelling deals with the representation of acquisition, search & retrieval and maintenance of domain knowledge. A KP describes how specific knowledge in a company is generated, retrieved and maintained. In the InfoAtlas project the acquisition task is supported with KPs. The KP “Generate web page” describes the steps when creating the content of author- or IS-web pages. For an author web page the attributes name, picture, research area etc. have to be specified. In the KP “Publish web page” the publishing process, i.e. bringing a local webpage to the intranet is modelled.

2.2.3 InfoAtlas retrieval

During the creation of author- and IS-web pages the employees specify author-related information as well as IS-meta data. The customer in the project has defined a hierarchy of search objects (e.g. employee, process, hospital, patient etc.). When using the web interface the employees can mark the adequate entries of this classification tree thus assigning an employee with a certain IS and its meta-data. Once the web pages are created automatically, employees can use the InfoAtlas retrieval. Access to the web pages is realised with full-text search, for the database the structure is provided by the classification tree and the content is given by the author- and IS-web pages.

2.3 InfoAtlas – Implementation

An overview about the InfoAtlas implementation is shown in Figure 2. For the InfoAtlas project the business process management toolkit ADONIS® ([JUNGINGER, KÜHN, STROBL 2000]) was used. An ADONIS® application library is developed for a specific project and consists of several model types. In the InfoAtlas project the modelling methods knowledge processes, classification tree and IS map have been customised.

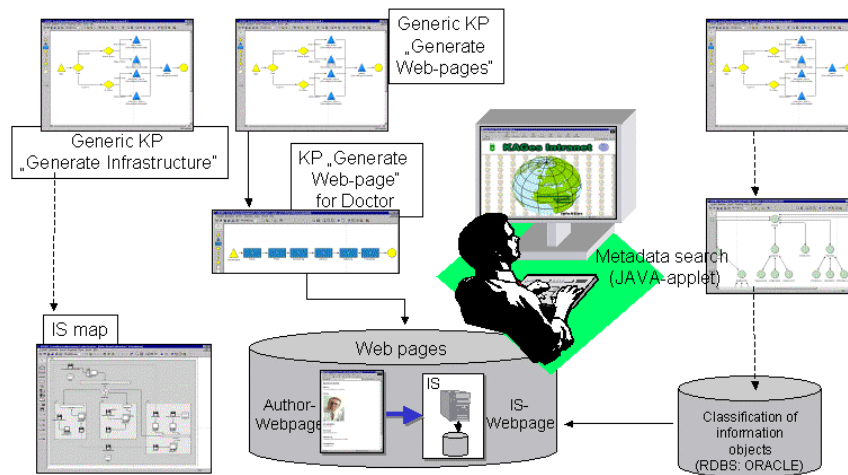


Figure 2: InfoAtlas implementation

The execution of the KPs - the generation of the web pages - is realised via the ADONIS® export component.

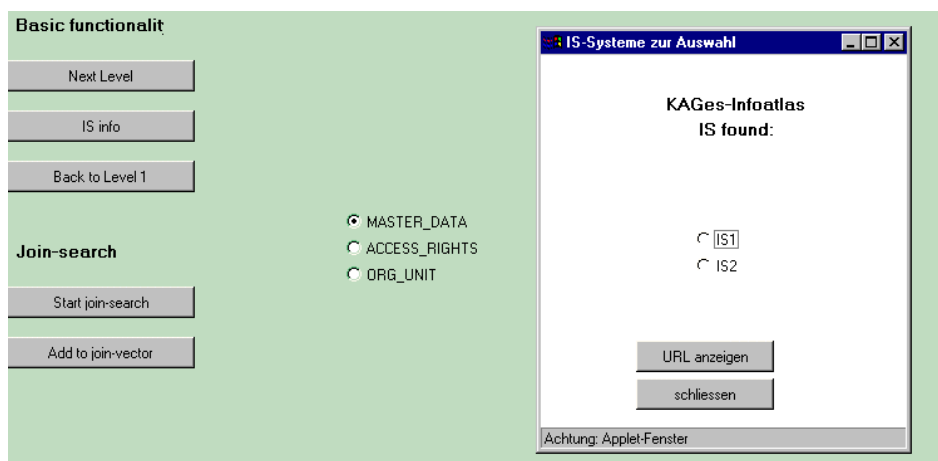


Figure 3: Example for InfoAtlas retrieval

The respective information of the web pages according to the hierarchy of the classification objects are stored in a Oracle database. Information retrieval is realised via a user-friendly JAVA interface. An example is given in Figure 3, showing the result of the meta data search for the object “Master_data”.

3. THE PROMOTE PROJECT

In section 3.1 the basic issues of the PROMOTE project are explained. Section 3.2 describes the conceptual model, section 3.3 shows the PROMOTE approach for an example, the credit application process and section 3.4 gives an overview about the PROMOTE[®] implementation.

3.1 PROMOTE – Basic issues

PROMOTE (see [KARAGIANNIS, TELESKO 2000], [TELESKO, KARAGIANNIS, WOITSCH 2001]) is a EU project dealing with knowledge management and running in the IST programme, nr. IST-1999-11658 (Start: March 2000, End: August 2002). The overall goal of the project is to develop an integrated framework for process-oriented knowledge management, to validate it by developing a product named PROMOTE[®] and to test it with end-user companies from the financial and insurance sector. The project partners are BOC, an Austrian software and consulting company with expertise in business process management and knowledge management, FIDUCIA, the largest computing centre service of the co-operatively organized bankers’ syndicate in Germany and INTERAMERICAN (Greece), a big insurance company.

3.2 PROMOTE - Conceptual model

Our basic approach for process-oriented knowledge management is shown in Figure 4. As example the search for relevant knowledge is given.

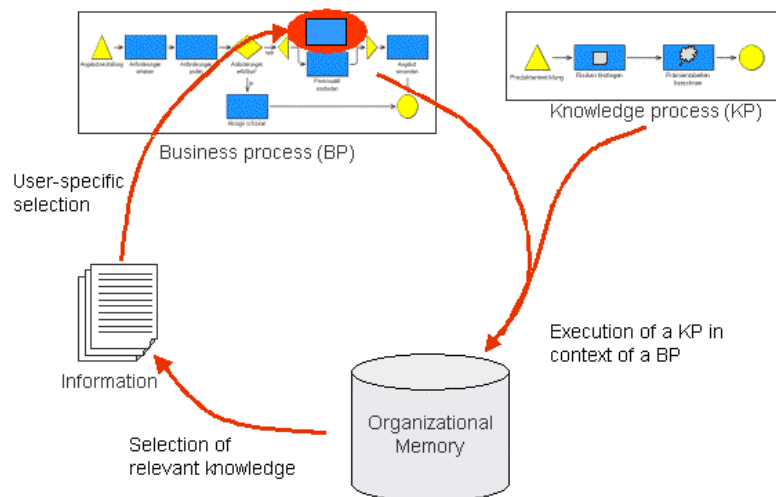


Figure 4: PROMOTE – conceptual model (shown for search)

The starting point are the BPs. They serve as “anchors” in our model. We are aware that certain activities in these BPs have a knowledge-intensive character (KITs). We claim that knowledge activities (e.g. searching, storing information etc.) related to these KITs can be modelled in a language similar to BPs. We call these constructs knowledge processes (KPs). The relations between a KIT in a BP and certain KPs can be stored in a database. Therefore it can be retrieved which person performs a specific activity in a BP and which activities are supported with a KP. The next step is the execution of a KP. Because of the context knowledge previously gained it is possible to provide user-specific or

group-specific support. In technical terms, the execution of KPs means the launch of specifically tailored programs where it is possible for example to search for relevant information. The result are information items, e.g. URLs, documents, names of experts to call when dealing with a certain problem. The last step (user-specific selection) is concerned with integrating the notion of learning. The end-user may give feedback related to the result of the previous selection procedure (e.g. preferred documents or topics). This will further help to improve the quality of the execution of the respective KIT.

3.3 Example: The Credit application process

The Business Process Management Systems (BPMS)-methodology is a framework specifically tailored for projects in the business process management area. When performing process-oriented knowledge management it is obvious to adapt these steps for knowledge management needs leading to the PROMOTE-methodology (see Figure 5).

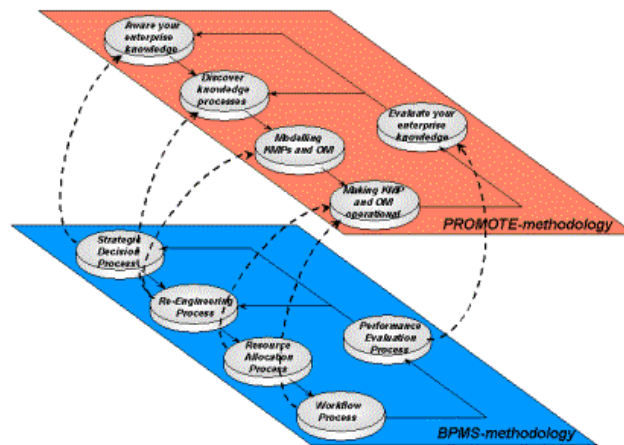


Figure 5: BPMS and PROMOTE-methodologies

In this section the respective steps of the PROMOTE-methodology are explained and shown for the “credit application” example.

3.3.1 Step 1 – Aware your enterprise knowledge

In this phase the company defines knowledge goals depending on general strategic decisions about challenges and opportunities of the company. Then it will be decided which knowledge management strategy will be pursued. For our credit application scenario possible targets could be to raise the proportion of private credits within a certain period of time or a reduction of credit losses, thus defining the credit policy in a company. A necessary precondition for reaching the knowledge goals is a competent assessment of credit risks. This implies that the assessment of credits is a core competence which has to be secured against losses in various ways (e.g. by hiring the right persons, storing past cases in a database etc.).

3.3.2 Step 2 – Discover KPs

The strategy of a company determines the “set” of BPs necessary to fulfill the goals. According to the idea of process-oriented knowledge management, BPs are the ideal constructs to analyse knowledge-intensive tasks, knowledge flows and knowledge structures.

In PROMOTE critical BPs are analysed with the business process management toolkit ADONIS®. For our credit application scenario (see the modelled process in Figure 6) the following questions can be raised:

- Which kinds of knowledge exist for the credit application process?
- What are the KITs in this process?
- What kinds of knowledge flows exist?
- What are the factors influencing the allocation of a credit? (see [SCHMIDT-VON STEIN 1994], [WILBERT 1996])

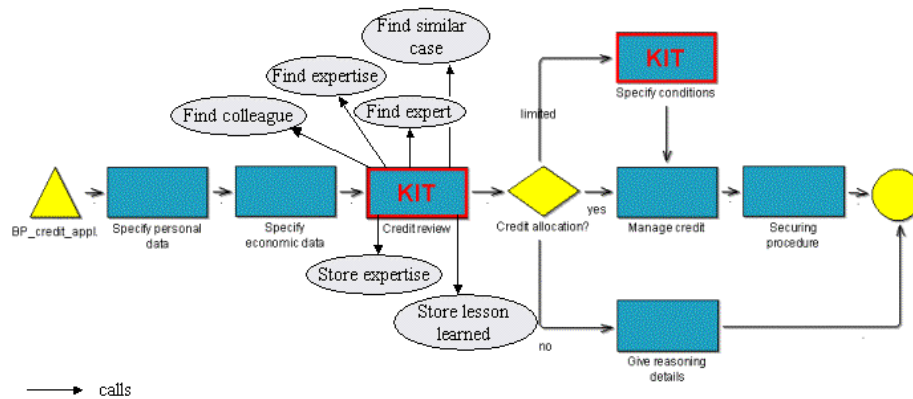


Figure 6: Business process „Credit application“

3.3.3 Step 3 – Modelling KPs and OM

This step is concerned with developing models for knowledge support integrated in the BPs. For the credit application process the following steps seem appropriate:

- Defining the KITs where knowledge support is necessary
- Modelling KPs
- Defining knowledge structures

The KIT “Credit review” can be supported with the KPs drawn in ellipses in Figure 6. In Figure 7 the KP “Find expert” is modelled by using the PROMOTE®-knowledge process application library.

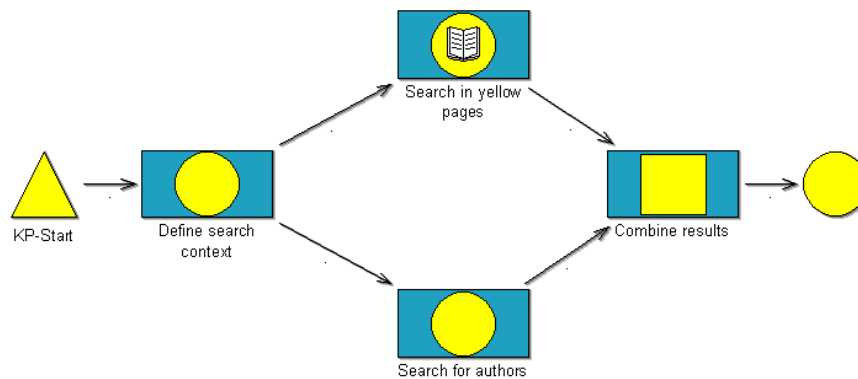


Figure 7: Knowledge process „Find expert“

In this phase it is also possible to define knowledge structures for the organisational memory (OM). Within PROMOTE several knowledge structures have been defined, an example is the “Topic Map”-structure (see Figure 8). Topic Maps (see [WIDHALM, MÜCK 2001]) are used for defining terms and their interrelationships.

3.3.4 Step 4 – Making KPs and OM operational

This step is concerned with the execution of KPs and OM. Similar to business process management where BPs can be executed in a workflow system or realised with standard software, KPs can be linked for example with applets providing knowledge support.

In Figure 8 the interface for the executed KP “Find expert” is depicted. The Topic Map “Risks” is used as a metastructure for organising documents which can be used for supporting a specific activity.

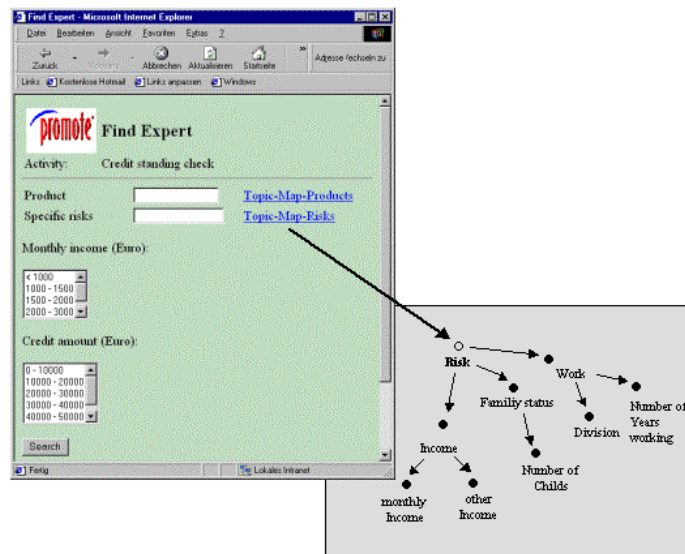


Figure 8: Interface for executed KP “Find expert”

3.3.5 Step 5 – Evaluate your enterprise knowledge

Evaluation will take place in the PROMOTE project in various dimensions (technical, organisational, socio-psychological etc.). Let us have a look at a possible technical evaluation concerning KPs. The daily usage of the PROMOTE[®] system produces audit trails like number of queries, ranking of keywords, number of experts consulted with the percentage of satisfying answers. This information gives a real picture about the actual knowledge situation in a company. When comparing this information with the modelled KPs, this will give hints for improving them, e.g. by adding new activities, exchanging experts with a bad performance.

3.4 PROMOTE[®] implementation

In this section the PROMOTE[®] software architecture (see Figure 9) and the implementation strategy are described.

The knowledge model database contains the various models realised with the PROMOTE[®] model editor. Within the editor, models are generated which define the flow of information, the structure of information, the interest of users and their access rights. This model editor enables the administrator of

the knowledge management system (knowledge manager) to manage the whole knowledge portal and the functionalities of the system by defining knowledge models.

The next step consists in exporting the knowledge models to the run-time component of PROMOTE[®], the PROMOTE[®] engine. This engine interprets the models and co-ordinates the knowledge management system. Via adaptors the engine has access to various knowledge sources like Lotus Notes[®] databases, HTML files etc. The PROMOTE[®] modules component contains a collection of tools and meta-tools for knowledge management purposes (e.g. search engine, yellow page system etc.).

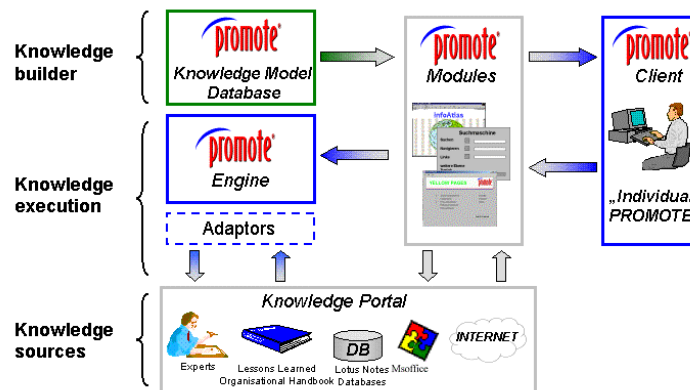


Figure 9: PROMOTE[®] software architecture

One of the main targets of the PROMOTE[®] system is to provide a personalised portal for end-users. The PROMOTE[®] client is an individualised workplace for the user. The client is a web-based application that gives both access to the system, the user to connect to the knowledge portal and the administrator to connect to the model information.

4. SUMMARY AND OUTLOOK

In this paper an overview about the projects InfoAtlas and PROMOTE has been given. In both projects a new approach for process-oriented knowledge management has been realised. The cornerstones of this approach can be summarised like follows: For realising a successful knowledge management solution is it absolutely necessary to tightly integrate knowledge management with business processes. This is in our opinion the best way to provide relevant and contextual knowledge when executing tasks. In PROMOTE this has been realised in two ways:

- A methodology for introducing process-oriented knowledge management fully integrated with the existing BPMS-methodology was developed.
- A software solution for knowledge management is currently being built which enables the modelling of knowledge activities like searching, archiving, distributing etc. (called knowledge processes) and the call of such knowledge processes via knowledge-intensive tasks of a business process thus providing context-sensitive, relevant knowledge for activities where it is required.

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