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# Roughing up processes the wiki way— knowledge communities in the context of work and learning processes

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## **Roughing up Processes the Wiki Way – Knowledge Communities in the Context of Work and Learning Processes**

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**Abstract:** This article deals with the potential of knowledge communities for process-oriented learning and working. Linear structures are often inappropriate for knowledge intensive tasks requiring non-linear, dynamic, social interaction, but community work mostly lacks the guiding thread needed by learners. We ask how the benefits of knowledge management can be brought to process-oriented learning. Requirements for an IT-support are developed and the prototype of a concept using the Wiki-approach is presented.

**Keywords:** Co-operative knowledge generation, knowledge communities, knowledge-intensive processes, work processes, knowledge processes, process-oriented knowledge structures, Wiki  
**Category:** H.5.3

### **1 Introduction**

In a process-oriented E-learning environment like Fraunhofer ISST's "APO-Pilot" learning content is structured in a linear context of work processes consisting of learning material, links and assigned tutors. As learning more and more takes place in the process of work APO-Pilot makes use of knowledge management techniques within the single processes and process steps [Fuchs-Kittowski, 2003] to support learning while working. For example, discussions can be attached to a process step in order to encourage the learners and workers to exchange knowledge in a community-like fashion.

Now, two major problems have emerged in utilising APO-Pilot in real work processes. The first, more direct one is a lack of critical mass in most of the single process steps necessary to make a community discussion fruitful. But this is actually an implication of the second, more profound problem: Since discussions and, hence, "micro-communities" do not cross process frontiers, thematically related discussions connected to different process steps are torn apart and thus cannot stipulate each

other. Especially meta-discussions about methods, community or critique will virtually never occur.

This becomes fatal when it comes to knowledge intensive tasks. Here, processes are *non-linear*, *dynamic* and *socially embedded* (see [Brown, 1989]). Especially, the order of process steps cannot be set-up in advance, and on the other hand enabling learners to autonomously choose and negotiate processes is maybe *the* single most important teaching goal in any knowledge intensive subject.

Knowledge management on the other hand provides methods for an organisation to work with complex knowledge (see e.g. [Probst, 1999]). The problems of communities we found in case studies (see [Fuhr, 2003]) are well-known: chaotic structure, and quite close to that, growth and size. How can education benefit from the blessings of knowledge management without discarding linear contexts like a process structure so that learners are given a guideline to navigate through the web structure of complex knowledge? (see also [Bettoni, 2001])

Wiki<sup>1</sup> is a technology mimicking a web structure that can be viewed dually as a content management system and a collection of linked discussion forums. Since a Wiki consists only of nodes and rapid links, it can easily be docked to another structure. At Fraunhofer ISST we connected a Wiki to the APO-Pilot E-learning tool to explore the synergies of the two extremes.

In chapter 2 we shortly describe the requirements arising from the desired combination. Then we present the Wiki approach and argue that it meets the knowledge management part of these postulates (chapter 3). As a process-oriented E-learning tool and knowledge base we chose Fraunhofer ISST's APO-Pilot, which is sketched in 4.1. The other parts of the prototype shown in chapter 4 are the PmWiki (4.2) and the interface (4.3). We conclude with chapter 5, a summary of our findings.

## 2 Linking Knowledge Communities and Process-oriented E-learning

In addition to a process-oriented supply of knowledge a knowledge community tool meeting the following requirements must be created:

1. Context-related (process-oriented) access to the knowledge of the community. The individual situation, i.e. the actually worked-on subprocess or task provides the context on the basis of which available information is interpreted. This context in turn can be used to enable the creation of a process-specific perspective of the knowledge community. This serves to determine the context-specific relevance of the components of the network.
2. Co-operative generation and preservation of knowledge in the community without a constriction of the social, self-organised knowledge regeneration process of the community by given process-structures. This basically means an extension of the community knowledge can also be operated in a process-

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<sup>1</sup> The Software "WikiWikiWeb" was developed by Ward Cunningham in 1995. [Wiki] describes its history, structure and use. An overview of currently available implementations can be found in [WikiEngines].

spanning way, making an (unequivocal) allocation to individual process-steps unnecessary.

3. A possibility to (loosely) associate knowledge components. The process-spanning construction of the community's knowledge leads to a situation where the relevance of knowledge components that are not directly linked with a process-step does not automatically become clear. This missing reference to the work process (context) may lead to a diffuse structure disabling the user to orient and find his or her way in the knowledge community. Thus, the context (i.e., reference to the individual operations in the work process) of any component in the community must be retraceable.

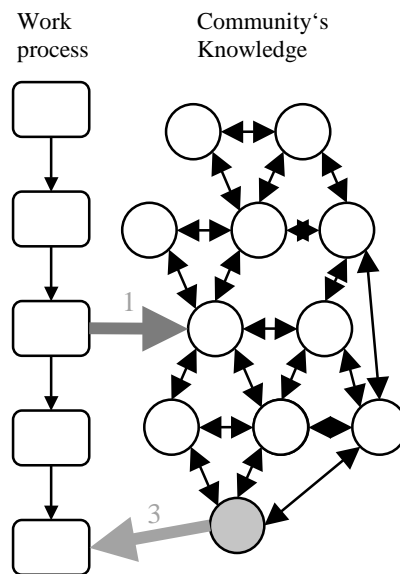


Figure 1: *Linking Knowledge Communities and process-oriented E-learning*

### 3 The Wiki Approach

A WikiWikiWeb or “Wiki” is an open author system for a conjoined construction and maintenance of websites. Links to further Wiki-sites and information can be gathered and filed here. Wiki-software offers a fast and simple way to draft and edit websites online. This means that all the Wiki pages can be commented, edited, added and even deleted by all users. New pages can be drafted easily and linked with existing pages. A Wikiweb is characterised by a simple interaction and easy-to-use navigation on the sites. The boundaries between the (active) author and the (passive) user of contents are removed. In a short time, this leads to a huge “chaotic” building of networked Wiki-sites.

Wikis have a very low utility threshold due to their flexible structure and a realisation of the easiest possible way of use [Huhmann, 2002]. The possibility of central access for all the users or limited user groups makes the Wikiweb an ideal

choice when it comes to running projects, drafting documentations, a conjoined production of concepts or discussion boards. It is a technology for building up online-communities and co-operation and communication platforms. Regarding knowledge management, the Wikiweb particularly offers a potential of knowledge development. The provided knowledge can be modified and extended on the spot and thus gives rise to an integrated, interdisciplinary and co-operative knowledge base.

Considering the particular features, a Wiki may be applicable in many different scenarios: as a content management system, discussion board or for other forms of group-ware support. With the help of a Wiki, newly acquired knowledge can easily be gathered and integrated into a context with the present knowledge base by the user. The particular advantage of the Wiki-approach in comparison with other ways of co-operative knowledge generation and exchange is the focus on the *process* as well as the *result* of communication.

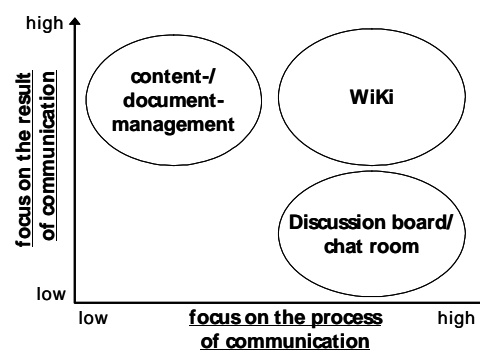


Figure 2: Communication-oriented classification

Content and document management systems focus on the exchange of results of a co-operation. Processes of communication and discussions creating or extending a result are limited to annotations. Discussion boards focus predominantly on the process of co-operation of the participants. Thus, opinions can be exchanged creating a common sense. The result of the discussion is mostly contained implicitly in the corresponding contributions and must be extracted and condensed afterwards.

In comparison to that, Wikis permit discussion *and* simultaneous work on the conjoined result. The afore-mentioned requirements for a tool supporting a co-operative generation of knowledge are widely complied with by the characteristics of a Wiki. Moreover, a co-operative production of content is realised very efficiently by removing the distinction between author and reader or knowing and learning person.

The major importance of a conscious and active benefit of other people's knowledge has already been dealt with in the beginning. In addition to that, building up a strong companionship with the help of the establishment of Communities of Practice was called for. Again, the Wiki can meet these requirements by creating a feeling of co-operation with other experts due to the immediate visibility of the members' individual participation and the removal of a superior controlling authority.

## 4 Prototype Realisation

In this chapter we will introduce a tool meeting and implementing all the requirements, especially the integration of knowledge networks into process-oriented knowledge structures. Therefore, an interface facilitating process-, and thus context-specific views on the knowledge network was drafted and implemented. This integration concept is founded on the idea of including the process structure in the development of the knowledge network as a design criterion rather than detaching it. An important clue about the information supply extracted from the network is the assumption that the user is situated within a familiar process when knowledge gaps occur. Involving the individual situation of the user creates the context in which he/she interprets the supplied information. This context can in turn be used for setting up a process-specific perspective of the knowledge network permitting a context-specific rating of the network components. On one side, this supports the community in the process of co-operative problem solving. On the other, it supports the documentation of the solution, i.e. the result of the process.

This implementation consists of three independent components: First, the APO-Pilot functions as a process-oriented, E-learning tool and knowledge base. Second, the PmWiki serves as the Community-Support-System. In addition to that, an interface according to the above-mentioned concept was implemented between the two.

### 4.1 Process-oriented Knowledge Base – APO-Pilot

Working in knowledge-intensive work processes necessitates a tying of knowledge to the activities in the work processes. With the APO-Pilot a tool accompanying the work processes was implemented that consistently follows the aspect of process-orientation. The APO-Pilot supports the process of generating knowledge in the work process and facilitates the flow-back of new knowledge acquired by applying available resources, reflecting the work process, and making practical experiences.

The APO-Pilot facilitates a process-oriented navigation through the modelled work processes of a company. Working as an assistant without an active control, it visualises the run of the process in form of EPCs (event-process-chains [Scheer, 1998]) and supports the structuring of the work process. Besides the supply of knowledge supporting the run of the process, every process, process-step and activity is provided with different knowledge carriers helping the employee cope with his/her task. These sources of knowledge, commonly distributed in different IT systems and independent from work processes, are now integrated and structured in a uniform, process-oriented view. Every process-step and every operation will be provided with documents or other adequate materials (e.g. from the intranet; domain Library). People appropriate as competence carriers (experts etc.) are suggested with on-hand means at communication (mail, telephone, video etc.) in the domain People. In the discussion domain, discussion boards are supplied for exchanging experiences, perspectives and options as well as trouble shooting.

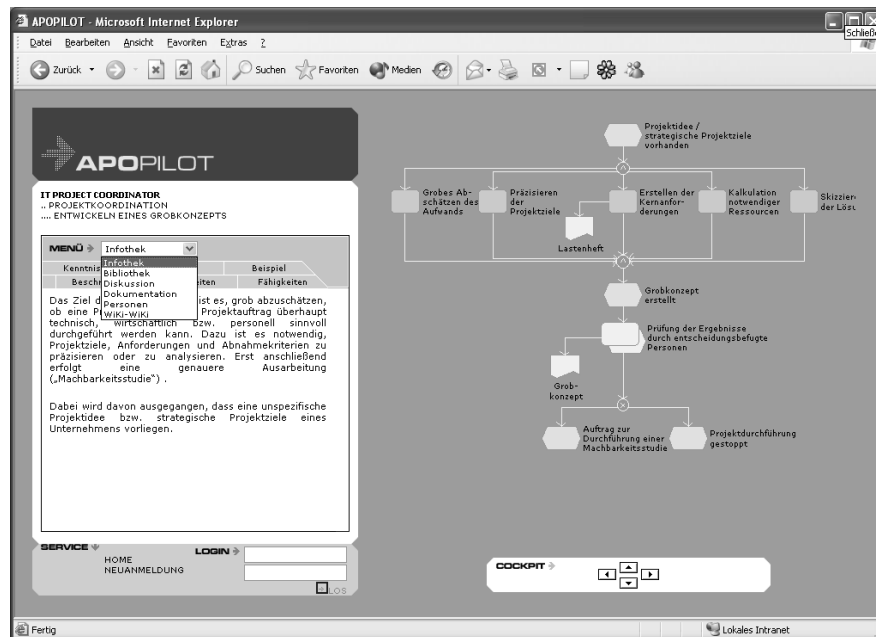


Figure 3: APO-Pilot

## 4.2 Co-operative Generation of Knowledge – PmWiki

In realising the Wiki for the APO-Pilot the PmWiki by Patrick R. Michaud [PmWiki] was utilised. The PmWiki is a small Wiki developed in PHP necessitating adaptations regarding content and layout. The reasons for choosing the PmWiki are the usability of the software based on GNU Public License and the simple adaptability because of the PHP implementation.

Moreover, the PmWiki shows a number of unusual features (concerning Wikis) that turn out to be rather useful in combination with the APO-Pilot. Among these is the possibility to pool documents and provide them with a right of access.

## 4.3 Function of the Interface

The APO-Pilot, as an example for a knowledge base structured by processes, supplies every process-step or activity with a (process- or activity-related) access to the Wiki as the community's knowledge network. Starting from the current process, in this case "developing a concept outline", the corresponding Wiki-site can be immediately addressed or else, the entire Wiki may be searched for a specific term (e.g. "to do list", see figure 4).



Figure 4: Access site of the Wiki

The direct call of the Wiki leads to the call of the correlating process-specific interface-document in a separate browser window. This Wiki-site can thus be edited, new sites can be created, or the Wiki can be “navigated” through (see figure 5).

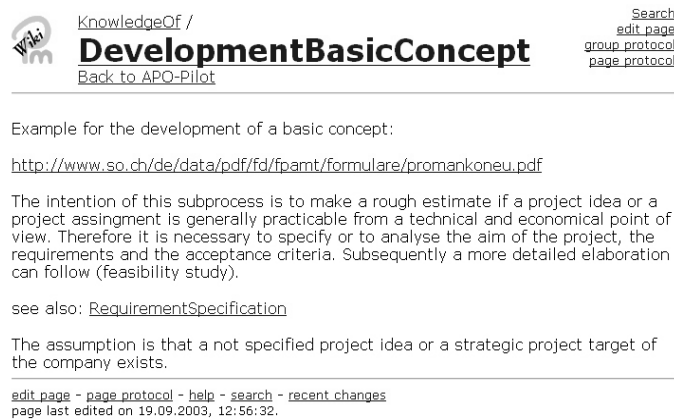


Figure 5: Interface site

Looking for a search key, all the sites of the Wiki are searched. With the help of distance classes and distance class-depending frequency of reference of the chosen process-step the hits will be screened, evaluated and presented according to their process-specific relevance (see figure 6).



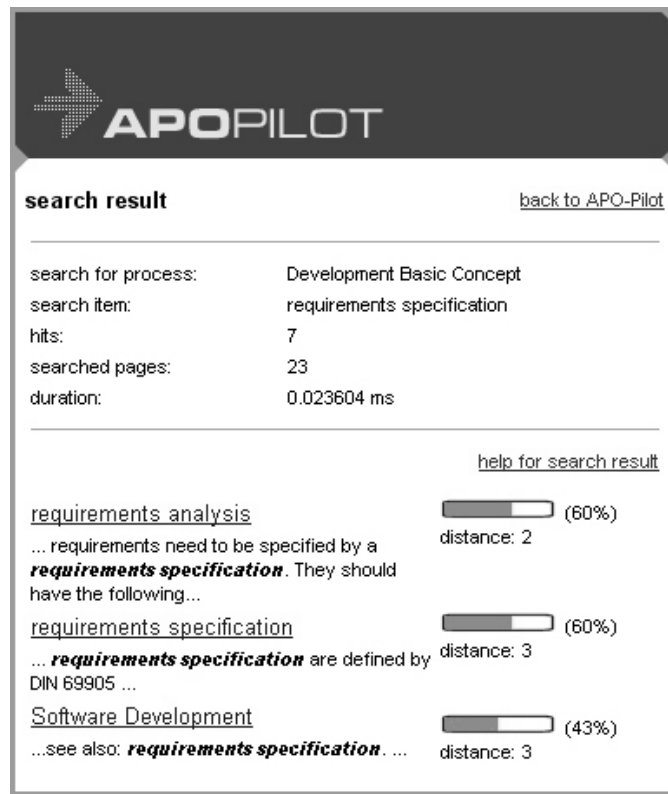


Figure 6: Process-related result

Besides the relevance, graphically expressed by a green bar as well as in percentage, the result also contains features of the correlating distance class. Furthermore, the name of the site and the context of the search key are presented. Clicking the name of the site, the Wiki is opened in the corresponding place. The head of the site shows general information on the result of the query, particularly the process the query was conducted for – a query with the same search key for another process could have lead to a completely different result. In addition to that, a tool helping to explain the query result can be called.

The return to the APO-Pilot is possible from every Wiki-site. If the current site is an interface-site, the corresponding process-step will be opened in the APO-Pilot. In case of finding no matching site, all those process-steps with the shortest referential distance compared to the chosen Wiki-site are determined. Simultaneously, the user is provided with a facility to return to the APO-Pilot (see figure 7).

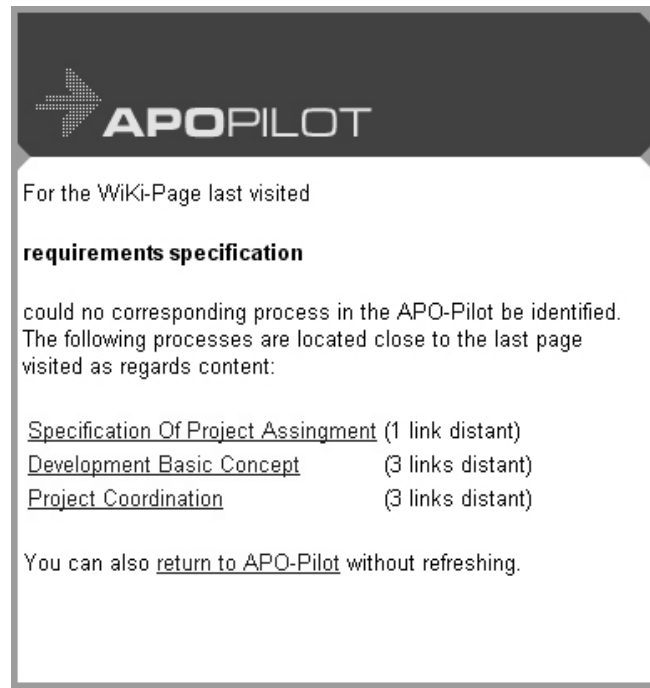


Figure 7: Return to the process model

## 5 Conclusion

Learning while working requires information technology that integrates E-learning and knowledge management. In this paper we presented a process-driven model to link individual learning processes to the community 'knowledge', allowing a process-based access by a Wiki. It became clear that the Wiki-approach can highly contribute to disseminating knowledge by creating a platform for Communities of Practice that facilitates process-spanning exchange of knowledge. With the prototype implementation of a Wiki in the APO-Pilot, we managed to develop a tool for a co-operative generation of knowledge in learning and working processes. The prototype pointed out synergies in combining knowledge communities and process-oriented knowledge and learning structures.

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