# KM-PEB: An Online Experience Base on Knowledge Management Technology

Klaus-Dieter Althoff[1], Wolfgang Müller[1], Markus Nick[1] & Björn Snoek[2]

[1]Fraunhofer Institute for Experimental Software Engineering, Sauerwiesen 6, D-67661 Kaiserslautern, Germany
[2]tec:inno GmbH, Sauerwiesen 2, D-67661 Kaiserslautern, Germany
{althoff,mueller,nick}@iese.fhg.de, snoek@tecinno.com

**Abstract**: We present a framework for assessing knowledge management (KM) technology that has been validated by using more than twenty well-known tools. Based on a commercial case-based reasoning (CBR) tool, the technology descriptions have been made available in the KM-PEB experience base over the World Wide Web. KM researchers as well as KM tool developers and/or users can search for similar descriptions and/or contribute their own ones. We think that the KM and CBR communities can benefit very much from each other, and we hope that this paper - and its underlying application KM-PEB - supports the (already started) collaboration of these communities in a constructive way.

## 1 Introduction

Knowledge Management (KM) has its roots in very different areas of research (Knowledge Engineering, Information Systems, Data Mining, Classification, Information Retrieval, Economics, Software Engineering, etc.). This causes strong complications for the comparison of different kinds of approaches. Thus, a descriptive framework is needed that is general enough to describe most of the existing approaches and sufficiently detailed to still be informative.

In this paper such a framework for categorizing and comparing KM technologies[1] will be described. It has been validated with more than twenty well-known tools in KM.

The framework is the foundation for an application that serves as an experience base for KM technology descriptions. This application, called Knowledge Management Product Experience Base (KM-PEB), is publicly available and, therefore, accessible on the World Wide Web[2]. For the implementation, Fraunhofer IESE's INTERESTS (INTElligent REtrieval and STorage System) tool was used, which is based on

[1] By technology we mean a technique, method, or tool. A technique is a basic algorithm or a set of steps for achieving some task, a method is an organized approach based on some technique (Basili et al. 1994). A tool offers automated support for a technique and/or method.

[2] http://demolab.iese.fhg.de:8080/KM-PEB

a commercial case-based reasoning (CBR) tool[3] and provides a good way to deal with continuously growing experience bases.

This is an important fact because in the initial development phase the amount of technology descriptions within the experience base is - of course - rather small, but the application is designed for being used and filled in the future.

Possible users can be anyone interested in KM. Users who provide their own developments of KM technology will benefit as much from KM-PEB as persons who need decision support for a KM tool or just want to make a state-of-the-art study. Therefore, the application is designed with an interface for adding and maintaining descriptions of KM technology.

To some degree KM-PEB continues the tradition of the CBR-PEB[4] application (Bartsch-Spörl et al. 1997, Althoff et al. 1999), a publicly available experience base on CBR tools and applications. The ongoing measurement and evaluation program of CBR-PEB (Nick et al. 1999) is connected to KM-PEB through a rollout. However, the underlying ontology is completely new (Snoek 1999). It has been developed based on IESE's methodology for building experience bases (Tautz 2000).

We believe that KM is not only an interesting application domain for CBR technology, but that KM methods are also helpful in CBR research and application development. In addition, CBR can be viewed (and used) as a strategy for organizational learning and KM (Althoff et al. 2000a). This creates a complicated interplay between the fields of CBR and KM, which will further increase in its complexity. One reason is the increased use of approaches like textual CBR or the combination of CBR with data mining techniques. Another reason is the already ongoing "merger" of these communities (Bomarius 1999, Schmidt & Vollrath 1999, Aha et al. 1999, Althoff & Müller 2000, Weber 2000). Therefore, we hope that this paper - and its underlying application KM-PEB - supports the collaboration of the CBR and KM communities in a constructive way.

From a CBR point of view we present an interesting application that is also of some public interest. Our experience base applications rest upon the experience factory concept (Basili et al. 1994, Bomarius et al. 1998), an approach for organizational learning from experience. This approach is refined and implemented using CBR (Althoff et al. 2000a). Already in 1997 it was argued that experience factory and CBR should (and can) be combined (Althoff & Wilke 1997, Tautz & Althoff 1997). The interesting complementarities of experience factory and CBR, which can be exploited in various ways (Althoff 1998, Althoff et al. 1998), is a very good example for the complicated interplay between KM and CBR. Common issues of KM and CBR include the acquisition, modeling, and reuse of knowledge, learning from experience, evaluation and maintenance of knowledge, as well as issues like return on investment and management of all knowledge related processes and tasks.

The paper is structured as follows. We will briefly describe the approach we took to develop our framework for assessing KM technology. We will introduce the framework with its subparts in detail. Then we will present the application of the framework for the analysis of 21 well-known KM tools. We also present a typical use

---

[3] CBR-Works from tec:inno

[4] http://demolab.iese.fhg.de:8080

case of the KM-PEB system that was implemented based on the framework. Finally, some conclusions are drawn.

## 2 Approach

The main steps in the KM-PEB project have been (1) the development of the descriptive framework for technology in KM and organizational learning, (2) the description of selected tools based on the framework, and (3) the technical implementation of an experience base that makes the technology descriptions available over the World Wide Web (WWW). In particular, the following tasks had to be carried out:

- Identification, analysis, and structuring of relevant literature (e.g., Goodall 1999).
- Interviews with available experts and detailed study of theoretical literature.
- Development of the basic framework structure (cf. Section 3).
- Selection of typical KM tools from different classes of KM technology.
- Information acquisition and analysis as well as description of selected KM tools.
- Elicitation of detailed information on the selected tools including the tool vendors.
- Incremental improvement of the descriptive framework using the tool descriptions.
- Implementation of an experience base that includes the tool descriptions and that enables similarity based retrieval of KM technology descriptions over the WWW.
- Going online, adding online help and an interface for the acquisition of new KM technology descriptions.
- Collecting feedback.
- A step currently being carried out: Public announcement of KM-PEB and setting-up of a measurement and evaluation program (Nick et al. 1999).

## 3 Framework

Applying the above approach resulted in a comprehensive framework for KM technology, which now will be introduced. It consists of seven main components (Fig. 1) that are adapted from Probst and Romhardt (1998). In the following we will introduce them and present the more detailed attribute level for each of the components.

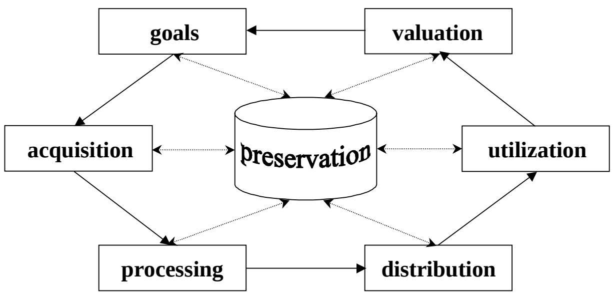


**Fig. 1.** The underlying knowledge management framework

## 3.1 Knowledge Management Components of the Framework

### 3.1.1 Knowledge Goals

The goals of a KM technology are subject of this framework component. The goals describe on which level what kind of ability will be built. Goals exist on different levels of abstraction, for instance, vague company guidelines or concrete task-oriented goals.

### 3.1.2 Knowledge Acquisition

This component addresses the systematic collection of knowledge. Therefore, it is first wise to identify the knowledge already existing in the enterprise, which, on the other hand, makes the existence of knowledge transparency essential. To know what the state of affairs is - relating to the available knowledge in the enterprise - knowledge maps and other similar procedures are helpful.

Because of the worldwide knowledge explosion and fragmentation, companies are not able to generate the entire know-how for the enterprise's success by themselves. Therefore, the knowledge has to be gathered using different means of procurement. Some of them will now be shortly summarized.

One idea is the acquisition of knowledge from other companies in the form of alliances and takeovers. Another way to get knowledge is the inclusion of stakeholders, a group in the environment of the enterprise with special interest in its activity. Stakeholders (e.g., customers in key positions) can be involved in the development process.

Another type of acquisition is the purchase of knowledge from external knowledge carriers like specialists. For this, a time limit on employment is possible. Out-sourcing is a further possibility to handle this kind of acquisition.

Finally, an enterprise can buy knowledge products (e.g., CD-ROM, patents, software, etc.). However, in this case one must consider that the enterprise perhaps does not have the required capabilities to effectively use these knowledge sources.

### 3.1.3 Knowledge Processing

Here the focus of interest is the generation of new abilities and products, better ideas, and efficient processes. Knowledge processing contains all management efforts that lead to the conscious production of abilities that do not yet exist internally or, further on, to the creation of abilities that do not yet exist internally or externally.

An important role is the kind of representation that the approaches will use or the tools they will support. Relationships or other associations will aid the knowledge to evolve. The question of representation is also of interest here, because for some reason it could be useful to separate the structural representation (like characterizations and relationships) from the content of knowledge.

This leads to the question of whether the knowledge structure is a crucial factor for the evolving knowledge. With the support of a useful representation a tool could, for example, analyze the knowledge structure and change it in different ways to generate new knowledge. The kind of changing reaches from adopting and aggregating relations or other associations up to restructuring the knowledge items themselves, which can also be seen as part of the whole knowledge structure.

Another way to process new knowledge is to create it explicitly. Two main classes can be regarded for an individual: Ad-hoc processing and systematic processing.

The ad-hoc processing of knowledge can be seen as an act of creation that seems to be chaotic, whereas the systematic processing of knowledge describes problem solving as a structured process in several steps.

For collective knowledge creation processing, it is also necessary to create complementary abilities in the group and to define meaningful and realistic group goals. There must be an atmosphere of confidence based on communication intensity. Furthermore, in a group it is possible (and wise) to do a post-mortem analysis after a finished project and to write it down (as lessons learned) for later use in other projects or for other groups.

### 3.1.4 Knowledge Preservation

For later use, the storage of knowledge is a very important part of a knowledge based system. To preserve experience, information and documents require management efforts to select the knowledge that is worth preserving.

In an enterprise, every day a mass of knowledge normally arises in the form of minutes, letters, presentations given at different locations, etc. The difficulty is (see also knowledge utilization) to select between the knowledge that is worth preserving and the one that is not. The main rule for this decision is the question of whether the regarded knowledge will be used by its potential users. Otherwise, it would decrease trust in the quality of the system.

Knowledge preservation is a permanent process, which must be supported by continuous updating. Old systems are "dead systems", because omitting training leads to the unlearning of the knowledge that was developed with great effort.

It is important at this point already to restructure or repackage the knowledge. But different from knowledge processing, here it is important for the effectiveness of giving response. Also, conscious forgetting leads to a faster system and is, therefore, an important factor for knowledge base efficiency.

### 3.1.5 Knowledge Distribution

In order to utilize isolated knowledge for the whole enterprise, distribution is essential. The main question in this case is: Who should know (or be able to do) what (and to which extent) and how should knowledge be distributed?

It is neither possible nor meaningful for everybody to know everything. The economical principle demands a useful control of the scope of knowledge distribution. Dividing knowledge into several fields is a first step in reaching this goal.

During a time when our world gets smaller through growing networks, the creation of virtual working groups is of increasing importance for knowledge distribution. Here, the people in different parts of the world are able to work together on the same projects. The creation of expert groups, in particular, benefits from this possibility, because in most cases experts are spread far apart throughout the world.

The activity in the case of publishing can be passive, that is, the people themselves have to get the knowledge if they want it. Otherwise, they get it automatically, without their own help. The informing activity is passive if the people were not informed of new knowledge, so they have to look for new knowledge themselves. In the case of active informing, the system tells the people about the existence of new knowledge.

### 3.1.6 Knowledge Utilization

One main purpose of the KM is placed here. The bare existence of knowledge (what the components described up to now guarantee) is not enough. Many constraints restrict the use of knowledge in the daily routine. The first problem is the dislike of people to use outside knowledge, because it is seen as an unnatural act to do so. The next borderline is the keeping of well-tried experiences, regardless of their quality, as a kind of security mechanism to avoid foreign infiltration.

In the face of these problems, the enterprise must guarantee that expensive and strategically important knowledge will be used every day. All effort is in vain if the potential users are not convinced of the system's usefulness and, thus, do not use the system.

So, one central question is whether the regarded approaches do support the motivation of people to use the offer of KM. Or, if the approaches do not provide this feature, it is interesting whether other (maybe additional) tools, which do this, can be integrated in the approach.

The next point of interest in utilization is the basic ability of choosing the right knowledge with the system. This question is close to the above-discussed representation of the knowledge. Could, for example, different knowledge items be merged together to be used as an integrated whole?

Another question depends on the ability to check out knowledge before it is used to avoid inconsistencies and conflicts with other potential users. Also, other models like transactions are possible to keep the knowledge base consistent.

### 3.1.7 Knowledge Valuation

One of the biggest difficulties in KM is the measurement and valuation of organizational KM. Until now there is no decisive breakthrough. Unfortunately, knowledge managers cannot fall back onto a large amount of well-tried instruments as, for example, finance managers can do. Most often, knowledge and abilities cannot lead back to a measurement dimension and/or the cost of measurement would be unjustifiable high. Yet the field of knowledge valuation offers high potential.

As the knowledge goals are differentiated into strategical, tactical, and operative goals, the same is true for valuation. At the point of valuation, abstract knowledge goals like "we will become a learning enterprise" will take revenge, because there is no useful measurement for them. Only if the measurement and valuation of central aspects of KM will, in the future, become easier and gain more acceptance, will the cycle of KM be closed.

Valuation is also important for providing feedback on the knowledge base's effectiveness. Many aspects can be regarded for reaching this goal: Is it possible to analyze the system behavior? Do log files exist that generate utilization profiles? Can feedback (maybe from other subroutines logged) be used to increase efficiency by restructuring? Is it possible to qualify knowledge items using analyzable flags?

### 3.2 Framework Attributes for the Knowledge Management Components

Altogether the above-described seven KM components and the general aspects part are represented using 54 attributes with different value ranges. We will now introduce them using some kind of meta-attributes:
**Type.** This specifies the type of an attribute. Possible types are Boolean, symbol, ordered symbol, symbol-set, ordered symbol-set, text, and taxonomy.
**Possible Values.** Depends on the respective type.
**Cardinality.** Defines how many values can be chosen in parallel.
**Possibility to use "not applicable".** In some cases, an attribute could be left empty because of its insignificance, even though it is important in other cases.
**Assessment.** Some attributes directly influence the quality of a tool. If this is so, one can describe it in more detail under this point.
**Dependencies.** Describes how a given attribute influences other attributes, if at all.
**Effects.** The other case is that a given attribute (and thus its value) influences other attributes.

**Table 1.** Overview of the framework

| Component | No | Framework attributes | Type | # predefined values | Cardinality | Usage of not applicable | Assessment[5] | Dependencies (Attr. No.) | Effects (Attr. No.) |
|---|---|---|---|---|---|---|---|---|---|
| General aspects | 1 | Kind of approach | s | 3 | 3 | no | - | - | - |
| | 2 | Developed for what goal | s | 3 | 3 | no | - | - | - |
| | 3 | Purpose of the system | t | 13 | * | no | - | - | - |
| | 4 | Subject of knowledge | t | 4 | * | no | - | - | - |
| | 5 | Main orientation | s | 2 | 1 | no | - | - | 17 |
| | 6 | Degree of formalization | os | 3 | 3 | no | - | - | - |
| | 7 | Flexibility of configuration | os | 4 | 1 | yes | left to right | - | - |
| | 8 | Customizable configuration | b | 2 | 1 | no | yes is best | - | - |
| | 9 | Scalability of configuration | t | 4 | 1 | yes | left to right | - | - |
| | 10 | On which platform could it run | t | 24 | * | no | most | - | - |
| | 11 | Supported databases | t | 20 | * | yes | most | - | - |
| | 12 | Single- or multi-user | os | 3 | 1 | no | left to right | - | 44 |
| | 13 | Supported network and transfer protocols | t | 23 | * | yes | - | - | - |
| | 14 | Used by enterprises in practice | te | 0 | * | no | most | - | - |
| | 15 | Supported file formats | t | 13 | * | no | most | - | - |
| | 16 | Highlights | te | 0 | * | no | - | - | - |
| Goals | 17 | Kinds of goals | os | 3 | * | no | - | 5 | - |
| | 18 | Incomplete specification | t | 3 | 1 | yes | left to right | - | - |

[5] "Left to right" means that the rightmost value in the attribute's value range is the best value for a KM tool (a special instance is "yes is best"). "Most" means the more values are filled in the better the tool is. "-" means nothing can be stated without further context information.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Acquisition | 19 | Kinds of sources | t | 16 | * | no | most | - | 20,29 |
| | 20 | Tolerance of incomplete data | b | 2 | 1 | yes | yes is best | 19 | - |
| | 21 | Acquisition methods | t | 7 | * | no | left to right | - | - |
| | 22 | Connection | b | 2 | 1 | no | yes is best | - | - |
| Processing | 23 | Knowledge representation | t | 16 | * | no | - | - | 26,27 |
| | 24 | (Re)package the knowledge structure | t | 6 | 1 | no | left to right | - | - |
| | 25 | Evolve knowledge items | t | 4 | 1 | yes | left to right | - | - |
| | 26 | Coexistence of knowledge items | t | 4 | 1 | yes | left to right | 23 | - |
| | 27 | Forget unimportant knowledge items | b | 2 | 1 | yes | yes is best | 23 | - |
| Preservation | 28 | Separation of items/structure/other knowledge | t | 7 | * | no | left to right | - | - |
| | 29 | Administrative information | b | 2 | 1 | no | yes is best | 19 | - |
| | 30 | Status of knowledge items | t | 4 | 1 | yes | left to right | - | - |
| | 31 | Self-analyzing technical infrastructure | t | 6 | 1 | no | left to right | - | - |
| | 32 | Recording of new knowledge | b | 2 | 1 | yes | yes is best | - | - |
| | 33 | Tolerance of inconsistent knowledge | b | 2 | 1 | yes | yes is best | - | - |
| | 34 | (Re)packaging the system structure | t | 5 | 1 | yes | left to right | - | - |
| | 35 | Forget knowledge items | t | 5 | 1 | yes | left to right | - | - |
| Distribution | 36 | Adressability of target groups/persons | os | 4 | 1 | yes | left to right | - | - |
| | 37 | Publishing | os | 3 | 1 | yes | - | - | 38,39 |
| | 38 | Retrieval mechanism | t | 18 | * | yes | - | 37 | - |
| | 39 | Browsing | te | 0 | * | no | most | 37 | - |
| | 40 | Informing | os | 3 | 1 | yes | left to right | - | - |
| | 41 | Personal environment | b | 2 | 1 | yes | yes is best | - | - |
| | 42 | Context sensitive | b | 2 | 1 | yes | yes is best | - | - |
| Utilization | 43 | Selecting/choosing possible | b | 2 | 1 | yes | yes is best | - | - |
| | 44 | Avoiding inconsistence | t | 7 | * | yes | yes is best | 12 | - |
| | 45 | Composing of knowledge items | b | 2 | 1 | yes | yes is best | - | - |
| | 46 | Modifying knowledge items | b | 2 | 1 | yes | yes is best | - | - |
| | 47 | Merging of several knowledge items | b | 2 | 1 | yes | yes is best | - | - |
| | 48 | Modifying the system | b | 2 | 1 | yes | yes is best | - | - |
| | 49 | Support for employee motivation | b | 2 | 1 | yes | yes is best | - | - |
| Valuation | 50 | Examine the system structure | t | 4 | 1 | yes | yes is best | - | - |
| | 51 | Evaluation | t | 4 | 1 | yes | yes is best | - | - |
| | 52 | Feedback possible | t | 4 | 1 | yes | yes is best | - | 53,54 |
| | 53 | Analyzing feedback | t | 4 | 1 | yes | yes is best | 52 | - |
| | 54 | Qualifying | t | 4 | 1 | yes | yes is best | 52 | - |

**Legend**:
b=boolean os=ordered symbol s=symbol
t=taxonomy te=text

## 4 Applying the Framework

The application of the framework was twofold. First the framework was applied to analyze 21 KM tools. For these tools, Table 2 displays a subset of 24 of the 54 attributes presented in Table 1. The full tool descriptions can be retrieved from KM-PEB or in Snoek (1999).

Second, the framework was used for the ontology development for KM-PEB, that is, the KM components are implemented as concepts using the attributes shown in Table

1 and the values partially shown in Table 2. A simple usage scenario is given below (see also Fig. 2-4).

**Table 2.** Overview of knowledge management tools covered

| | General | | Goal setting | Acquisition | | | Processing | | | | | Distribution | | | | | Utilization | | | | Valuation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Knowledge management tools** | **Main orientation** | **Degree of formalization** | **Incomplete specification** | **Tolerance of incompleteness** | **Acquisition** | **Connection** | **Knowledge representation** | **(Re)package the knowledge** | **Evolve knowledge items** | **Coexistence of knowl. items** | **Forget unimportant k. items** | **Publishing** | **# Retrieval mechanisms** | **Browsing** | **Informing** | **Personal environment** | **Selecting/choosing possible** | **Modifying knowledge items** | **Modifying the system** | **Motivational support** | **Examine system structure** | **Evaluation** | **Feedback possible** | **Analyzing feedback** |
| Perspecta | pd | sf | y | y | a | y | s | y | n | na | n | ps | 1 | n | ps | y | y | n | n | y | y | n | n | n |
| Agentware | pd | nf | y | y | a | n | o | y | n | y | n | n | 1 | y | ap | y | y | y | n | y | y | y | y | y |
| grapevine | pr | sf | n | y | a | n | ss | n | y | y | n | ap | 1 | y | ap | y | y | n | n | y | n | n | y | n |
| KnowMan | pd | f | n | n | m | n | us | y | y | y | y | ps | 2 | n | ap | n | n | n | n | y | y | y | n | n |
| Semiomap | pd | f | na | na | a | y | o | y | n | y | n | ps | 1 | y | ps | n | y | n | n | n | y | n | n | n |
| Knowledge Server | pd | sf | ? | ? | m | n | al | y | n | y | n | ap | 2 | y | ap | y | ? | y | n | y | n | y | y | n |
| Categoric Alert | pr | sf | na | na | a | n | s | n | n | na | n | ac | 0 | n | ac | n | n | n | y | y | n | y | n | n |
| Beehive | pr | nf | na | na | m | n | ss | n | n | na | n | ac | 1 | n | ac | y | n | n | n | y | n | y | n | n |
| Solution Series | pd | nf | y | y | m | n | o | n | n | na | n | ps | ? | y | ps | y | y | n | n | y | n | n | n | n |
| RetrievalWare | pd | nf | y | y | a | n | s | n | n | na | n | ps | 1 | y | ap | ap | y | y | n | n | n | n | n | n |
| Concept Explorer | pd | sf | y | y | a | n | us | y | n | na | n | ac | 0 | y | ps | n | y | n | n | y | n | n | n | n |
| KA2 Knowl. Agent | pd | nf | na | na | a | n | s | y | n | na | y | ap | 1 | y | ap | y | y | n | n | n | y | n | n | n |
| Knowledge X | pd | sf | n | y | ? | y | o | y | n | na | n | ac | 1 | y | ac | ? | y | n | y | y | n | n | y | n |
| k-Commerce | pd | al | y | y | m | n | o | n | n | y | n | ps | 1 | n | ps | n | y | ? | ? | n | n | n | y | ? |
| HyperKnowledge | pr | nf | n | n | m | n | s | n | n | na | n | ps | 2 | y | ps | n | y | y | n | n | n | n | n | n |
| Dataw.II KM-Suite | pd | sf | y | ? | ? | y | ss | n | n | ? | n | us | 1 | y | ap | ? | y | y | n | y | n | y | n | n |
| Kate SoftwareSuite | pd | sf | y | y | A | N | al | y | y | y | n | ps | 1 | ? | ps | y | y | y | n | n | y | n | y | n |
| Eule 2 | pr | f | na | na | M | N | s | y | n | y | n | ps | 1 | y | ac | y | n | y | n | y | n | y | y | n |
| Cognos | pd | sf | ? | y | ? | n | ? | n | n | y | n | ps | 1 | y | ps | y | y | ? | n | n | n | y | ? | ? |
| KnowledgeBroker | pd | sf | n | y | m | n | ? | y | n | y | n | ps | 1 | y | ps | n | ? | y | y | y | n | n | n | n |
| Interests | pd | sf | y | y | m | y | sf | n | n | y | n | ps | 1 | y | ps | y | y | y | y | n | y | n | n | n |

**Legend**:

| | | |
|---|---|---|
| a=automatic | na=not applicable | s=structured |
| ac=active | nf=non-formal | sf=semi-formal |
| al=all | o=other | ss=semi-structured |
| ap=active & passive | pd=product-oriented | us=unstructured |
| f=formal | pr=process-oriented | y=yes |
| m=manual | ps=passive | ?=undefined |
| n=no/none | | |

Let us assume one wants to find some KM tool with specific knowledge distribution features as described in the screen shot in Fig. 2. KM-PEB then presents the ten most similar tools in its case base sorted by similarity (see Fig. 3). Simply clicking on the case number (see Fig. 3) then presents the respective tool (case) in more detail.

Fig. 4 presents the knowledge distribution details of the most similar case/tool as presented in Fig. 3.

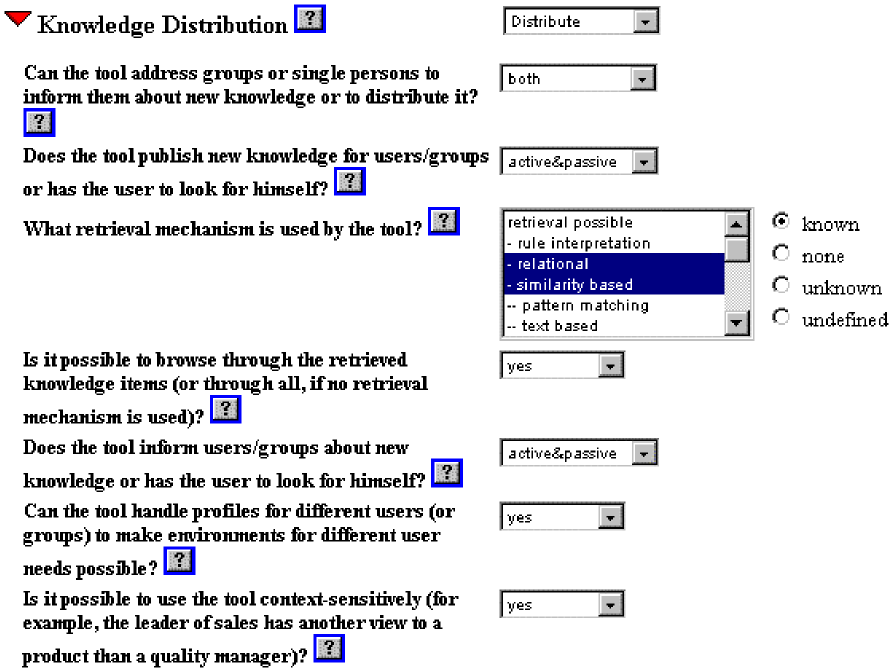


**Fig. 2.** Querying KM-PEB (focus on knowledge distribution features)

| Ser. No. | Similarity | Approach Nr. | Short title |
|---|---|---|---|
| 1 | 0.284286 | 13 | KA2 KnowledgeAgent |
| 2 | 0.251429 | 7 | Intraspect Knowledge Server 2.0 |
| 3 | 0.225 | 18 | KATE Software Suite |
| 4 | 0.214286 | 3 | Autonomy Knowledge Server |
| 5 | 0.198571 | 5 | KnowMan |
| 6 | 0.194286 | 19 | EULE2 |
| 7 | 0.182857 | 4 | grapeVINE |
| 8 | 0.18 | 17 | Dataware II KM Suite |
| 9 | 0.157143 | 20 | INTERESTS |
| 10 | 0.154286 | 11 | RetrievalWare |

**Fig. 3.** Result for the query specified in Fig. 2

| | |
|---|---|
| **Addressability of target groups/persons** | persons |
| **Publishing** | active&passive |
| **Retrieval mechanism** | • other |
| **Detailed information about retrieval mechanism** | knowledge mapping |
| **Browsing** | true |
| **Detailed information about browsing** | ? |
| **Informing** | active&passive |
| **Personal environment** | true |
| **Context sensitive** | true |

**Fig. 4.** Information included in the most similar KM tool of the query result presented in Fig. 3

## 5 Conclusion

Given the contrary goals of the different kinds of knowledge management (KM) technology[6], it is obvious that even the best framework would not allow to produce something like a ranking list. With the described framework, we have tried to create a basis for describing KM technology as adequately as possible. Since we viewed the assessment as developing a technology experience base (i.e., a case-based reasoning application), we could use our methodology (Tautz 2000, Althoff et al. 1999) to come up with acceptable results (also through involving the technology providers).

Of course, there probably is some KM technology that is missing because it is perhaps on the borderline of this research field, not published yet, and/or was just overlooked. Furthermore, it is a fact that science is continuously evolving. This justifies the imperfection of the framework and requires being prepared for continuous improvement (e.g., of the value ranges) to capture the whole variety of KM and its connected approaches.

Especially the implemented application of this framework makes this expenditure a rewarding job, because the interested people can fill, use, and update this experience base with little administrative support by IESE.

We hope that this work can be a little step for KM on the long way of becoming a mature research field, and we also hope that more and more researchers, developers, and users will contribute descriptions of their KM techniques, methods, and tools. We also believe that case-based reasoning will be of increasing importance for KM both from a tool perspective as well as from a more method-oriented one.

---

[6] By technology we mean techniques, methods, and tools (see footnote in Section 1).

## 6 References


Aha, D.W., Becerra-Fernandez, I., Maurer, F., and Muñoz-Avila, H. (Eds.) (1999). *Exploring Synergies of Knowledge Management and Case-Based Reasoning: Papers from the AAAI 1999 Workshop* (Technical Report WS-99-10). Menlo Park, CA: AAAI Press.

Althoff, K.-D. (1998). Case-Based Reasoning and Experimental Software Engineering. *Invited Talk at the 4th European Workshop on Case-Based Reasoning (EWCBR98), Dublin*, September 23-25. Available at http://demolab.iese.fhg.de:8080/Publications/ewcbr98/

Althoff, K.-D., Birk, A., Gresse von Wangenheim, C. & Tautz, C. (1998). Case-based reasoning for experimental software engineering. In M. Lenz, B. Bartsch-Spörl, H.-D. Burkhard, S. Wess. (eds*.), Case-Based Reasoning Technology*. Springer Verlag, 235-254.

Althoff, K.-D., Bomarius, F. & Tautz, C. (2000a). Using a Case-Based Reasoning Strategy to Build Learning Software Organizations. Accepted for the IEEE Journal on Intelligent Systems, special issue on KM and Knowledge Distribution over the Internet.

Althoff, K.-D. & Müller, W. (2000). *Proc. of the Second International Workshop on Learning Software Organizations*. Fraunhofer IESE, Kaiserslautern, Germany.

Althoff, K.-D., Nick, M. & Tautz, C. (1999). CBR-PEB: A Tool for Implementing Reuse Concepts of the Experience Factory for CBR-System Development. In Proc. 7th German Conference on Knowledge-Based Systems (XPS'99) Workshop on Case-Based Reasoning (GWCBR'99); CBR-PEB is publicly accessible via http://demolab.iese.fhg.de:8080/.

Althoff, K.-D. & Wilke, W. (1997). Potential uses of case-based reasoning in experienced based construction of software systems and business process support. In R. Bergmann & W. Wilke (eds.), Proc. 5th German Workshop on Case-Based Reasoning, LSA-97-01E, 31–38. Centre for Learning Systems and Applications, University of Kaiserslautern, March 1997.

Bartsch-Spörl, B., Althoff, K.-D. & Meissonnier, A. (1997). Learning From and Reasoning About Case-Based Reasoning Systems. In: P. Mertens & H. Voss (eds*.), Proc. of the 4th German Conference on Knowledge-Based Systems*, infix Verlag, Germany

Basili, V.R., Caldiera, G. & Rombach, H.D. (1994). Experience Factory. In J. J. Marciniak, editor, *Encyclopedia of Software Engineering*, vol. 1, 469–476. John Wiley & Sons, 1994.

Bomarius, F. (1999). *Proc. of the First International Workshop on Learning Software Organizations*. Fraunhofer IESE, Kaiserslautern, Germany.

Bomarius, F., Althoff, K.-D. & Müller, W. (1998). Knowledge Management for Learning Software Organizations. *Software Process - Improvement & Practice 4*, 89-93, printed 1999.

Goodall, A. (ed.) (1999). Survey of Knowledge Management Tools - Part I & II, volume 8. *Intelligence in Industry, January & February* 1999

Nick, M., Althoff, K.-D. & Tautz, C. (1999). Facilitating the Practical Evaluation of Organizational Memories Using the Goal-Question-Metric Technique. *Proc. Twelfth Workshop on Knowledge Acquisition, Modeling and Management (KAW'99),* Banff, Oct. 16-21.

Probst, G. & Romhardt (1998). The components of knowledge management - a practical approach (in German). URL: www.cck.uni-kl.de/wmk/papers/public/Bausteine/.

Schmidt, S. & Vollrath, I. (eds.) (1999). Challenges for Case-Based Reasoning - Proc. of the ICCBR'99 Workshops. LSA-Report LSA-99-03E, University of Kaiserslautern, Germany.

Snoek, B. (1999). *Knowledge Management and Organizational Learning*. Diploma Thesis, University of Kaiserslautern, Germany. http://demolab.iese.fhg.de:8080/KM-PEB/km-ol.pdf

Tautz, C. (2000). *Customizing Software Engineering Experience Management Systems to Organizational Needs*. PhD thesis, University of Kaiserslautern, Germany. to appear.

Tautz, C. & Althoff, K.-D. (1997). Using case-based reasoning for reusing software knowledge. *Proc. 2nd International Conference on Case-Based Reasoning*, Providence, RI, July 1997. Springer Verlag.

Weber, R. (2000). Call for Papers for AAAI-00 Workshop on Intelligent Lessons Learned Systems. http://www.aic.nrl.navy.mil/AAAI00-ILLS-Workshop.