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INTER-ORGANIZATIONAL KNOWLEDGE MANAGEMENT WITH INTERNET APPLICATIONS

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ABSTRACT

Learning processes do not occur only within, but also between enterprises. There is, therefore, a need for inter-organizational in addition to intra-organizational knowledge management. Since much of the communication and interaction among organizations takes place on the internet, it is logical to use internet applications to support the relating knowledge management tasks. The paper derives the requirements for such software based on the process-oriented view of the interaction among enterprises. As an example, a specific set of internet applications and products, hosted knowledge management services, is examined in more detail.

1. INTRODUCTION

Inter-organizational learning has been described from different points of view. Some authors [e.g., Büchel et al., 1997; Comfort, 1994] focus on the cultural aspects and the different stages of inter-organizational co-operation. Others [e.g., Baum, Ingram, 2000; Westerbarkey, 2001] point out the strategic structural aspects of organizational networking. Yet others [e.g., Sproull, Kiesler, 1995; Scott, 1996] emphazise the strengths and limitations of IT facilitation from a technological point of view. This paper stresses the functional aspect of knowledge management (KM) as it describes the link between knowledge and business processes. Furthermore, success criteria for knowledge processes are derived and operationalized to allow an evaluation of KM software products. Internet-based hosted KM services serve as a specific example.

2. LEARNING PROCESSES BETWEEN ORGANIZATIONS

Let knowledge management be defined as the control of the organizational problem solution and adaptation capacity through a goal-directed development and utilization of the organizational knowledge base.

Frequently, KM is restricted to an intra-organizational perspective. This view is too restrictive. Learning processes take place also between interacting organizations and within collaborative structures, e.g., project teams or communities of interest. In this case, the learning process is extended to with the transfer of relevant knowledge into the involved organizations and with the subsequent use of this knowledge.

E-business can be defined as the support and integration of business processes through Internet technology at all steps of the value chain or the creation of new internet-based business opportunities. E-business is here of special relevance, because its models and applications can lend learning processes among enterprises a new quality, esp. if it reflects a strategy for inter-organizational KM. This requires both, an adequate organizational environment as well as support from information technology. In an organization, KM processes support directly the business processes which can deliver input for KM. The knowledge goals [cf. Probst et al., 1998] should result from the concrete needs of respective business processes. These needs arise from enterprise goals and the respective business model. Business and KM processes are mapped to transaction systems and applications at the information system (IS) level. ISs make use of the technical infrastructure (figure1).

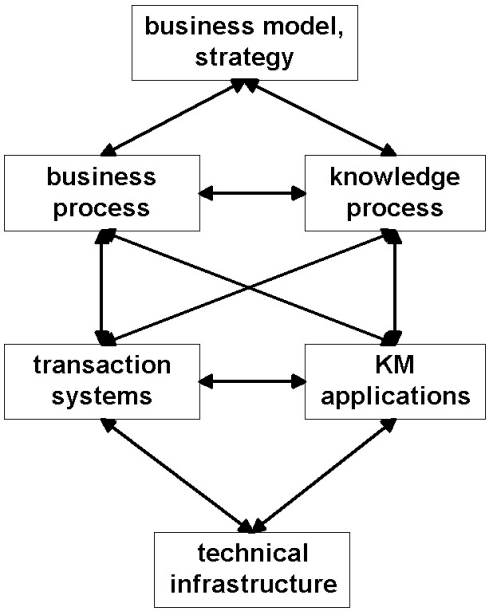

Figure 1: *Integration of business and knowledge processes*

KM discards, therefore, the nimbus of a lofty philosophy and serves directly the related business processes. A further advantage vis-á-vis general frameworks for KM is, that now KM processes can be exactly modeled as support processes related to the business processes. Finally, this enables the derivation of specific demands on KM applications and underlying technology.

The speech act principle [Medina-Mora et al., 1992] is well suited for the modeling of inter-organizational processes. This type of process modeling emphasizes the communication and interaction between two actors, in our case different organizations or representatives of these organizations, which is missing in *process modeling languages* such as event driven process chains [Becker et al., 1996], Promet BPR [Hess, 1996], Petri Nets [Langner et al., 1997] or Funsoft Nets [Gruhn, Kampmann, 1996]. Therefore, the speech act principle can be characterized as a *workflow modeling language* that provides constructs to represent the assignment of an organizational actor to a process task. FlowMark, WIDE, Statecharts or Trigger [cf. Lei, Singh, 1997] were developed in context of specific workflow products. They use linear task flows and are therefore well suited for the representation of document-based workflows but are less suited for the representation of communication. In contrast to that a speech act process consist of a closed cycle of four generic tasks which are assigned to the two communicating actors by definition. The use of this modeling approach does not, however, automatically mandate the use of workflow technology at the implementation level. Another advantage of the speech act method is its simple and generic structure, which leads to the

propagation of the derived success criteria from the primary processes to the secondary and the lower level processes. A complete business process always consists of a loop of four successive speech acts: preparation, negotiation, performance, and acceptance. Each of these speech acts can be specified by means of secondary processes. The resulting model is very clear and formally correct because it is based on strict modeling guidelines. It can be used to model both, business and knowledge processes. Tools like the Action Workflow Analyser [Action, 2000] provide an environment for modeling, simulation, and integration of a speech act model with an accompanying data model.

Figure2 shows a model at a high abstraction level. Each speech act of the primary, not further specified business process is supported by secondary knowledge processes. These are defined by the phases monitoring, evaluation, acquisition, and storage. An example specification is given for knowledge acquisition: the phases retrieval, processing, distribution, and utilization define this tertiary knowledge process. The actors of support processes do not need to correspond with the actors of the primary business process (here "Org. A" and "Org. B") in each case. Relevant market knowledge in the *preparation* phase of a contract *negotiation* can, for example, be acquired through a database of "Org. C".

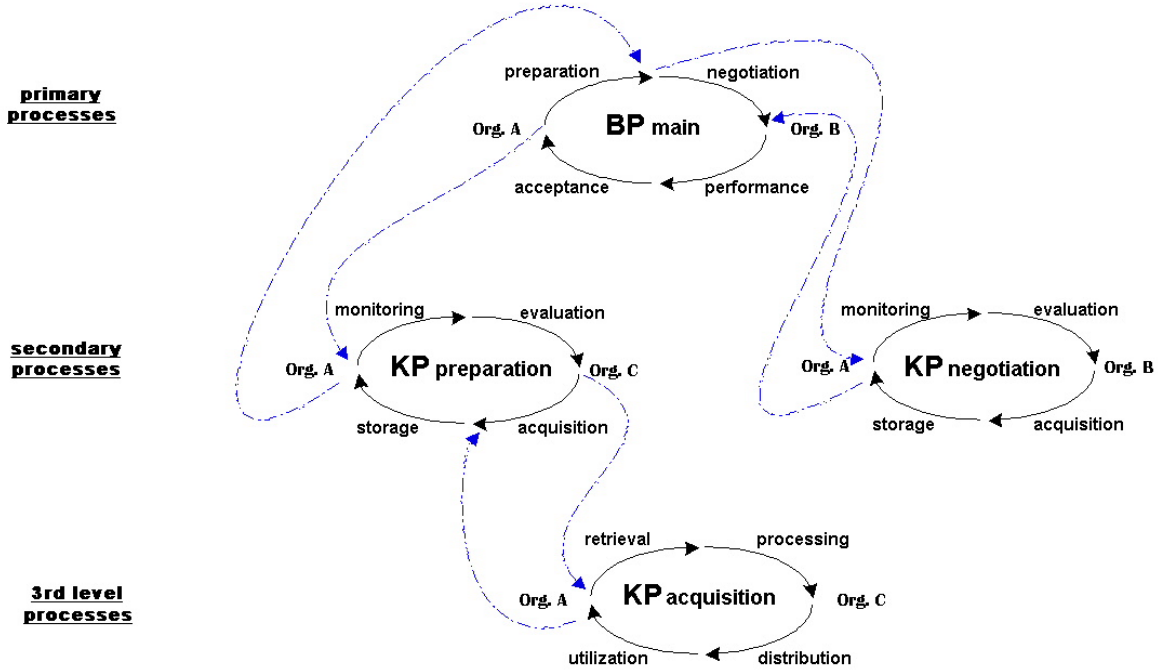

Figure 2: *Knowledge processes directly support business processes*

Secondary knowledge processes run parallel to the primary business process. They are called "secondary" processes because they directly support the speech acts of the business process. Between them and the lower level knowledge processes, a hierarchical order exists. Business processes can be specified in the same way. [Medina-Mora et al., 1992] and [Lei, Singh, 1997] deliver a detailed description on how a loop might be part of another loop, trigger another loop, or resolve another loop and which types of connectors are used.

In the inter-organizational context, we identify six different types of knowledge. *Co-operational knowledge* is necessary to efficiently interact with other organizations (e.g., knowledge about the corporate culture of the partner organization and how to cope with it). *Technical knowledge* relates to patents, specifications, and knowledge about procedures. *Process knowledge* is knowledge about business processes (e.g., knowledge about transactions using a B2B platform). *Competition knowledge* concerns products, competitors, and markets of an enterprise (e.g., knowledge about own strengths and weaknesses in a competitive environment). *Value chain knowledge* focuses on suppliers, customers, and distribution channels (e.g., knowledge to support an multi channel sourcing strategy). *Strategy knowledge* comprises the legal, demographic, macroecomonical, cultural, ecological, and other factors of organizational activities (e.g., the legal background of selling drugs over the internet in different countries).

All knowledge types have in common that they place different demands on the knowledge transfer depending on the degree to which they can be made explicit [Nonaka, Takeuchi, 1995]. Explicit knowledge can be represented without large losses and fuzziness in a system of signs and rules (e.g., the natural language). The acquisition of technical knowledge, for example, stored in patent databases is comparatively simple and predictable. Implicit knowledge is that part of tacit knowledge (experiences, intuition, routine, skill, values) which cannot be at all or not sufficiently well represented in a system of signs and rules. Therefore, it is difficult and time-consuming to acquire, but it is also difficult for competitors to imitate it. This type of knowledge can constitute a decisive competitive advantage. Its acquisition is comparatively costly, e.g., by means of collaboration in joint ventures (institutional) or communities of practice (informal). It appears at the first glance that it can be simply acquired by means of mergers & acquisitions. However, this approach can lead to a number of problems concerning, e.g., flexibility, increase of leadership complexity, culture, costs, financing, integration risks, refusal or exodus of knowledge carriers, concentration on core competencies.

It is also possible to describe the co-operation meta-process of inter-organizational learning using the speech act principle. Actors are two economically and legally independent organizations. The first phase, preparation, includes the determination of co-operation goals and the search for co-operation partners. In the second phase, negotiation, the involved organizations close a co-operation agreement. The third phase, performance, is organized into three successive steps. First of all, the co-operating organizations generate a joint perspective with regard to the co-operation goal (1st step of learning). Then, a temporal, inter-organizational knowledge base is formed (2nd step of learning, cf. section 3). Finally, this knowledge base becomes reconfigured in line with the co-operation progress (3rd step of learning). The last speech act of the meta-process is acceptance. The co-operation goal is reached and the new knowledge must be transferred into the originating organizations. There, it must be stored and made accessible (4th step of learning).

3. STRATEGIC AND ORGANIZATIONAL SUPPORT OF INTER-ORGANIZATIONAL KNOWLEDGE MANAGEMENT

The effectiveness of inter-organizational learning is mainly influenced by the organizational environment of a co-operation effort and the strategic context of the co-operation. This can be illustrated by the following three examples. It will become obvious that a general decision in favor of one single form of co-operation does not make sense. The suitability of any form of co-operation is always subject to the particular situation since the knowledge goals result from the actual needs of individual business processes, which in turn are based on the business model and corporate goals.

The exchange of implicit knowledge, especially values and standards, is possible through a creation of a common perspective (1st step of learning). This forces an exchange of attitudes and opinions which also enforces an internal learning process among the partners. If new organizational divisions are created, joint ventures for example, in which members of all participating partners are working together, it will be of prime importance to transfer, save, and utilize the newly created knowledge back in all participating organizations. Centralized concepts of organization facilitate the transfer of explicit knowledge while decentralized structures assist in the transfer of tacit knowledge. It is advisable to let the predominance of one type of knowledge transfer be dependent on the individual stages of the life-cycle of a joint venture.

In a virtual organization, however, no strong interaction takes place due the concentration on complementary core competencies of each co-operation partner. Local co-operational knowledge is set up and explicit knowledge (about markets, customers etc.) is exchanged. A transfer of implicit knowledge barely occurs. On the other hand, a virtual organization proves to be a strongly flexible competitor as new explicit and implicit knowledge can very quickly be obtained by the entrance of a new partner into the network. However, this meta-organizational knowledge base exists only temporarily and is just to a limited extent accessible to the member organizations due to its fragmentation. Hence, a virtual organization with sufficient competence in co-operation shows a strong capability in solving new problems. It can quickly adapt to a changing environment.

Communities of practice (CoP) or communities of interest (CoI) can exist in various ways: inter- or intra-organizational, informal or institutionalized, supported by Internet technology or by personal interaction and communication. Their particular relevance for KM results from the common objective or context on which a CoP/CoI is based. Informational losses are limited, high motivation of all participants is guaranteed, a common terminology and perspective as well as a comparatively efficient and problem-oriented communication is possible. Furthermore, a common understanding of implicit context across the organizations is guaranteed. The transfer of knowledge from the inter-organizational knowledge base into the knowledge bases of individual organizations is very effective as all members of the community normally act as gatekeepers in their own basic organization.

4. SUPPORT OF INTER-ORGANIZATIONAL KNOWLEDGE MANAGEMENT BY INTERNET APPLICATIONS

KM applications support the speech acts of the knowledge process. These applications consist of components which are implementations of one or several relevant KM methods. They are realized by appropriate information technologies. Internet-based applications for inter-organizational KM can be grouped based on two criteria: the (main) source of information content (internal or external) and who manages the application (user organization or third party).

Company portals focus on internal information and are managed by or for, in the case of outsourcing, the individual user organization. Examples are enterprise information portals (EIP) and enterprise knowledge portals (EKP). Most of the EIP are based on work roles. They offer personalized functions, content, and representations and an authorization concept for data access. Data originate from personal experience, group projects, and larger intra- or inter-organizational areas. EKP offer, in addition, functions like tool-based virtual project spaces for spatially distributed teams, yellow pages, content publishing with manual as well as automatic indexing, and calendar functions for individuals and workgroups. Functions that protocol knowledge contribution and use for the purposes of knowledge evaluation and incentives control are very rudimentary in most of the standard packages. Many of the above requirements are realized, for example, in the modular product myLivelink of Open Text Corp.

General and industry portals focus on information that is external to an organization. These are search catalogs like yahoo.com, entrance portals like t-online.de, hosts of online databases like STN, as well as process portals, and Web applications. Process portals integrate all steps of a business complex, e.g., selection, contracting, and closing of an insurance policy over the Internet. Web applications make process knowledge available in form of interactive checklists or calculators to create a business plan, to calculate the break even point, or to plan a marketing campaign. But there are no personalized functions and no storage of knowledge objects on the supplier's host.

CoI and CoP have been explained in the preceding section. They are either run within one (large) organization or they are accessible to various organizations. In the latter case, they contain mainly external information and are usually run by a neutral third party to entice participation from many different, perhaps even competing organizations.

Hosted KM services are offered by application service providers. These applications can exist on their own or be a component of horizontal or vertical B2B platforms. They possess the following features:

a) A third party offers the application in form of an infrastructural service without interfering in the knowledge acquisition and transfer itself.

b) They are based on the communication and interaction of their users, not alone on the simple access to data.

c) They enable personalized functions. Data related to individuals and groups is stored on the host of the service supplier. The same applies to knowledge objects in form of documents or other files.

d) They enable the acquisition of external knowledge objects.

e) They are based on Internet technology.

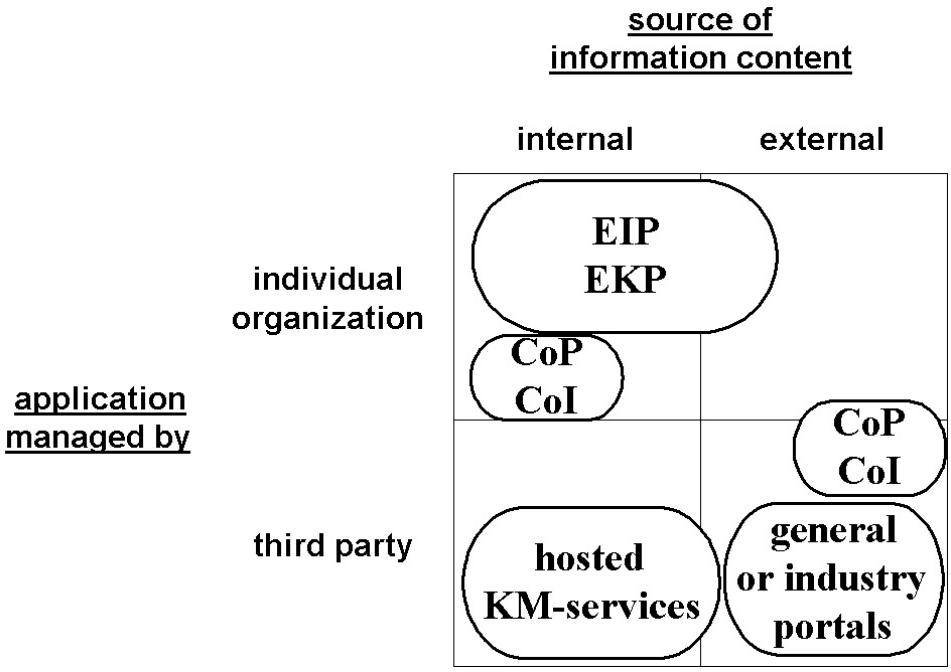

Figure 3: *Internet-based, intra- and inter-organizational KM applications*

We concentrate on hosted KM services in the rest of the paper. Six types of such services are differentiated in table 1.

Service	Product	URL
Virtual project spaces	eRoom	http://www.eroom.com/
Tools for knowledge administration and distribution	PowerSearch	http://www.powersearch.com/
Know-how and service mediators	smarterwork	http://www.smarterwork.com/
Messaging, conferencing and casting tools	evoke	http://www.evoke.com/
Web-PDAs	manager-office	http://office.manager-magazin.de/
Web-filesystems	Xdrive	http://www.xdrive.com/

Table 1: *Types of hosted KM services*

Customers of these services may be private or professional persons, informal groups, project teams, or organizations of different size. The financing of the service supplier can result from advertising, settlement honorarium, host-oriented licensing per user, or OEM-oriented integration for ERP-, ASP-, ISP-, or market place supplier. The different services require only a Web-browser or an additional software.

5. DERIVING REQUIREMENTS FOR INTERNET-BASED KM APPLICATIONS

5.1. Criteria for successful knowledge processes

Specific requirements can be derived from a process-oriented evaluation of inter-organizational interaction. All KM processes which directly support business processes always consist of the following speech acts: monitoring, evaluation, acquisition, and storage. As shown in figure1, all of these can further be specified in

greater detail. Consequently, the requirements on IT at the highest level will equally hold for speech acts at lower levels.

Preparation in the context of inter-organizational KM refers to the monitoring of prospective knowledge objects, their identification, classification, and matching with respect to a particular knowledge goal. The aim is to gather meta-knowledge about knowledge objects, knowledge carriers, and the context of objects. Hence, in order to examine the request for and the supply of knowledge and its relevance, intensive *communication* and *interaction* is necessary. This way, individual knowledge can be detected and collective processes of argumentation can be initiated.

Negotiation with respect to KM refers to the evaluation of identified knowledge carriers and objects with regards to content, confidence, and economic efficiency. This requires, above all, that a certain degree of *transparency* is ensured by a commonly accessible and commonly comprehensive system.

Performance in the context of KM comprises the acquisition of necessary knowledge. From the inter-organizational perspective of e-business, this requires a wide-ranging *integration* of knowledge carriers and objects with the help of Internet technology. Retrieval, processing, distribution, and utilization of knowledge (third-level knowledge process) become much more efficient, because gaps between media, applications, and data structures can be eliminated. From the organizational perspective, this will also enable the integration of (organizational) individual operations, goals, and capabilities in the (virtual) organization by structural and non-structural co-ordination while simultaneously allowing for a great number of degrees of freedom at the subsystem level.

Acceptance in the context of KM refers to the storage of the acquired knowledge objects in the “home” organization. The evaluated and acquired knowledge will be preserved, maintained, and made accessible for current and future needs. This requires an efficient *representation* of different types of knowledge while keeping losses of information at a minimum.

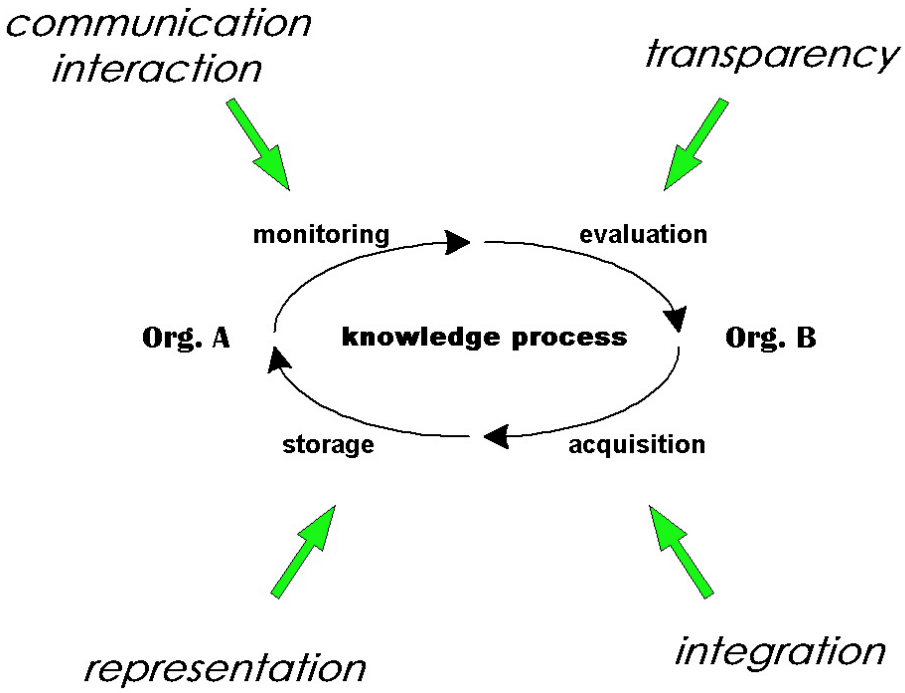

Figure 4: *Success criteria of the knowledge process*

The mentioned success criteria primarily support the efficiency of knowledge processes. Transparency, for example, is a prime prerequisite for the evaluation of knowledge objects that are to be acquired. The requirements on IT can be derived from these success criteria. The effectiveness of KM should be measured with respect to the goals of the supported business processes. Better knowledge processes should lead to

better business processes with respect to costs, quality, processing time, time to market, or customer loyalty. The suggested success criteria are explained in more detail in the following subsections.

5.2 Communication, Interaction

Implicit knowledge cannot be expressed by a system of signs and rules by definition. Hence, internet technology needs to support those processes that are useful for the creation and distribution of tacit knowledge. These are the processes of communication, interaction, co-ordination, and co-operation. The direct connection between KM processes and business processes as well as the exchange of context and information is enabled by the organizationally unbounded communication between two or more actors. Interaction leads to the development of implicit capabilities and experiences.

Quite frequently, work-sharing processes only turn to be efficient when supported by internet technology because in this case intensive co-ordination can be well supported. On one hand, Internet-supported co-operation can lead to the creation of co-operation knowledge and, on the other hand, to the start of inter-organizational learning as discussed in section 2.

5.3 Transparency

Transparency is necessary at all levels of the model in figure1. This requires a clear business model at the top-level as well as a strategy with precisely defined business segments, critical success factors, and core competencies communicated throughout the whole organization. Thereby, the intra- and inter-organizational knowledge can implicitly be evaluated by its relevance to individuals and the whole organization. Process and knowledge goals can be derived from the business model and then clearly communicated.

Information technology can significantly contribute to transparency at the following levels of the model. Business processes become transparent in the whole value chain by methods of eCRM and eSCM. Pricing processes gain transparency due to solutions such as electronic auctions. Multi-sourcing processes become transparent due to solutions such as recycling networks and industry platforms. Methods such as web farming [Hackathorn, 1999] or lessons learned also contribute to the transparency of knowledge processes, because they facilitate the identification and evaluation of knowledge carriers and objects.

At the level of transaction systems in e-business, standardized and supra-organizational product catalogues, EDI-standards, and data and process reference models contribute to enhanced transparency and therefore to more efficient operations. As far as KM applications are concerned, concepts such as yellow pages and methods like text mining or web log mining increase the transparency of business and knowledge processes.

Among basic Internet technologies enhancing transparency, the extensible markup language (XML), “intelligent” agents, and various technologies for retrieval and indexing deserve to be mentioned.

5.4 Integration

Integration in the context of KM means the overcoming of previously incompatible interfaces. Therefore, it concerns inter-cultural as well as IT integration at the intra- and inter-organizational level. A very loose integration among applications can be achieved, for example, through the utilization of a web-browser as a universal client. Integration on the desktop is supported by the growing together of fax, e-mail, SMS, and voice-mail in the unified messaging context. Applications like groupware, joint editing, and simultaneous engineering enable the integration of synchronous and asynchronous collaboration. Remote access through laptops and mobile telephones using standards like GPS and WAP or UMTS for mobile Internet applications lead to an integration with respect to mobility.

An integration of communication culture among enterprises is supported by CoP or CoI. This effect is enforced by the commonly shared context in the community and the gatekeeper function of its users. The integration of ERP and Internet minimizes gaps between media connecting intra- with inter-organizational

processes and enables the integration of processes, which require intensive work-sharing and strong co-ordination. The B2B co-operation and/or integration of business and knowledge processes are assisted by hosted KM services like virtual project spaces.

Integration in the e-business context focuses on the bridging of previously incompatible interfaces on all levels of the model in figure1. At the process level, an inter-organizational integration of business and knowledge processes is required. At the application level, an integration of transaction systems and KM applications has to take place. Middleware integrates the technical infrastructure of the involved organizations.

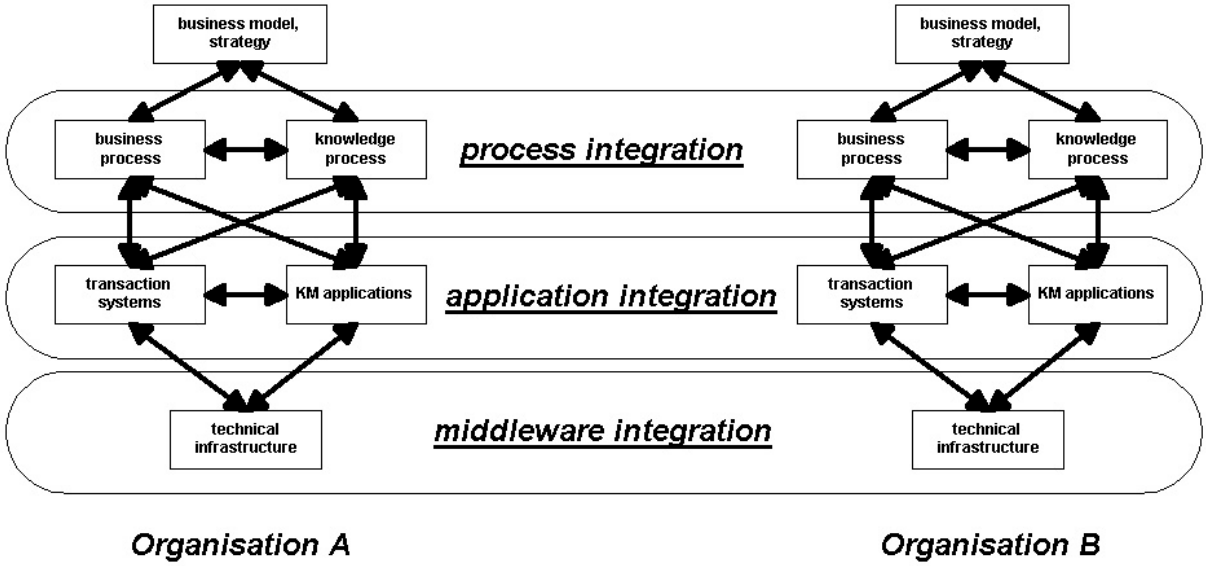

Figure 5: *Inter-organizational integration of business and knowledge processes*

5.5 Representation

Carriers of knowledge can be individuals, groups (departments, project teams, graduates from the same school), or entire organizations. The stored knowledge can exist in a codified form or in cognitive models. Knowledge is found in organizational structures, its processes and rules, as well as in the organizational culture and its standards. In addition, static knowledge is retrievable through systems and documents like patent registrations, databases, product descriptions, or organizational handbooks.

Efficient knowledge transfer among knowledge carriers over a spatial or temporal distance needs an explication of the knowledge in a system of signs and rules. Examples of such a system are the natural language, flowcharts, construction drawings, or process models. Losses and fuzziness in the process of codification are to be minimized as far as possible but cannot be completely eliminated in most cases.

The preservation and storage of this knowledge require its representation in a system of signs and rules. This can be realized, e.g., by means of databases, semantic networks, ontologies, frames, predicate or propositional logic, or hypertext. This enables later use of information in syntax, semantics, and context.

6. COMPARATIVE EVALUATION OF HOSTED KM APPLICATIONS

The success criteria derived from knowledge processes are now specified in form of a checklist of desired functions that a KM application should support.

- Moderated discussions, synchronous
- Moderated discussions, asynchronous
- List and chart functions for visualization and aggregation
- Information about active members in the project space
- Execution and analysis of polls
- Communication in open or closed context groups
- Access control for each group and, where appropriate, each session
- Online preparation, initiation, and settlement of the interaction process
- Support of several languages
- Moderator controls the privileges of the members as well as the types of interaction and presentation
- Communication based on voice
- Communication based on textual chat
- Communication based on mail
- Interaction based on joint editing of documents

Table 2: *Speech act: monitoring; success criteria: communication, interaction*

- Context- or project-oriented, joint view on the knowledge base
- Context- or project-oriented, joint view on the workspace
- Customization of a project workspace, its content and its tools
- Generation of indexed profiles of the involved persons
- Controlled privileges for information retrieval
- Access to the knowledge of experts in topic-related collections irrespective of the data structure
- Intermediation between supply and demand of knowledge or services in separated topic areas
- Quality control of experts/suppliers by means of online tests and human examiner
- Assistance for presentations, broadcasting of events and distribution of reports
- Assistance for inquiries and polls
- Assistance for balancing of time tables
- Assistance for joint web-browsing
- Assistance for document-based conferences
- Exchange and evaluation of bookmarks, contact or e-mail addresses, dates, and documents in topic-related collections
- File sharing with other people by means of e-mail and download via hyperlink

Table 3: *Speech act: evaluation; success criterion: transparency*

- Drag and drop file sharing
- Tools to administrate a hierarchy of project spaces
- Routing of knowledge objects
- Storage, organization, and access to bookmarks, documents, e-mail addresses and files of any kind in the respective context
- Secure and personalized workspaces for the administration and handling of projects for all participants
- Integration of spoken word, text, charts, URLs, and whiteboard functions
- Integration of fixed and mobile communication
- Assistance in process integration
- Integration of different functions based on the WWW
- Simple import and export of data (e.g. addresses, dates etc. from/into different applications)
- Subscription of specific content
- Integration of personal with group information
- Integration of virtual file systems with local ones
- Integration of synchronous and asynchronous communication
- Cultural integration in the space of interaction by means of joint co-operation rules

Table 4: *Speech act: acquisition; success criterion: integration*

- Storage and administration of topic-related collections irrespective of the data structure
- Sharing of a collection with a definable group; control of the membership
- Support of any data structure
- Web compatibility of different data/document structures
- Assistance for structure transformations
- Documented sessions
- Manual indexing of knowledge objects
- Automatic indexing of knowledge objects
- Archiving and indexing of discussions and polls
- Version management for all documents
- Annotation and evaluation of all documents
- Meta-tags for each knowledge object to allow easier processing or classification by other applications
- Generation of document-related knowledge cards
- Generation of knowledge cards related to individuals, groups, or the whole organization

Table 5: *Speech act: storage; success criterion: representation*

A specific KM application can be examined with these checklists to determine which of the functions are supported by it. The product eRoom is examined in table2 as an example.

Service	Virtual project spaces
Product	eRoom: The Digital Workplace for eBusiness
Supplier	eRoom Technology Inc., Cambridge, USA
URL	http://www.eroom.com/
Addressees	See “Finance”
Finance	Host-oriented licensing per user, service and support included, or OEM-oriented integration for ERP-, ASP-, ISP- or market place suppliers
Additional software	eRoom Release 4.2 or higher for all common operating systems
Communication/ interaction	Moderated synchronous and asynchronous discussions; extensive list and chart functions; information about active members in the project space; execution and analysis of polls; communication in open or closed context groups; access control for each group; online preparation, initiation, and settlement of the interaction process; communication based on mail; no relevance of language
Transparency	Joint view on the knowledge base and project workspace; controlled privileges for information retrieval; customization of a project workspace, its content, and its tools; generation of indexed profiles of involved persons; access to the knowledge of experts in topic-related collections irrespective of the data structure; intermediation between supply and demand of knowledge or services in separated topic areas; assistance for inquiries and polls; exchange and evaluation of bookmarks, contact or e-mail addresses, dates, and documents in topic-related collections
Integration	Drag and drop file sharing; tools to administrate a hierarchy of project spaces; routing of knowledge objects; storage, organization, and access to bookmarks, documents, e-mail addresses, and files of any kind in the respective context; secure and personalized workspaces for administration and handling of projects for all participants; integration of different functions based on the WWW
Representation	Archiving and indexing of discussions and polls; version management for all documents; annotation of all documents; meta-tags for each knowledge object to allow easier processing or classification by other applications; generation of individual knowledge cards

Table 6: *Examination of a KM application with respect to its functionality*

A representative example of each type of the other hosted KM applications has been examined in a similar way. Each function in the list is assigned the same importance. In a specific problem context, the functions can be assigned different weights. An approximate count of coverage of the check list has been performed for each success criterion. Based on this count, each product has been assigned for each criterion to one of three categories: "very good", “partial", or "insufficient" support. The result of this evaluation is given in table3.

Product	***Service***	***A***	***B***	***C***	***D***
eRoom	Virtual project spaces	■	▒	▒	▒
PowerSearch	Knowledge administration and distribution	▒	■	▒	▒
smarterwork	Know-how and service mediators	▒	■	▒	
Evoke	Messaging, conferencing, casting tools	■	■	▒	▒
manager-office	Web-PDAs	▒	▒	▒	
Xdrive	Web-filesystems			▒	

A: Communication, Interaction B: Transparency

C: Integration D: Explicitness, Representation

■ : very good support ▒ : partial support □ : insufficient support

100 % – 71 % 70 % – 31 % 30 % - 0 %

Table 7: *Evaluation of hosted KM applications*

An organization considering the use of hosted KM applications can use the above evaluation approach as a first step in selecting the right services for its specific needs.

7. CONCLUSIONS

We have derived success criteria for knowledge processes. These criteria automatically apply to software products that are supposed to support these knowledge processes. The general and somewhat abstract criteria have been operationalized through lists of very specific criteria that can be implemented or identified as functions of a specific software. Thus, the lists can be used by software developers as a development goal or by user organizations to evaluate existing products in light of their needs. A set of products for hosted KM services has been evaluated for demonstration purposes using these criteria. An organization considering the use of such products should perform the evaluation using its specific weights or preferences for the functions in checklists. The developed criteria and functions apply to other groups of software products for KM as well, since they have been derived from the general model of a knowledge process that applies to any knowledge task.

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