ORGANIZATIONAL MEMORY SYSTEM FOR BUSINESS PROCESS MANAGEMENT

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ABSTRACT

Despite more than one decade of immense investments and intensive research on the topic, the track record of information technology (IT) implementation and intended improvements of business processes still remains disappointing for many companies. This paper describes main problems of managing IT-based process improvements and examines how an organizational memory system (OMS) may help to overcome them. The emphasis of the paper is on the design goals of the OMS. With Documentation, Integration and Utilization basic functions of an OMS for supporting IT-based improvements of business processes are outlined.

1 INTRODUCTION

Business processes have established themselves as an object of organizational measure arrangements [Scheer, A.-W. 1997]. This has already been applied to management concepts of the younger past like Business Process Engineering or Total Quality Management. Current business concepts like Electronic Business, Customer Relationship Management or Supply Chain Management move the business processes more into the center of organizational efforts [Scheer, A.-W.; Erbach, F. & Thomas, O. 2000].

Companies have invested a lot of money in the improvement of their IT-infrastructure during the past years. But innovations in the field of information and communication technology do not inevitably lead to an improvement of the business processes. For a long time there could not be observed a connection between IT-investments and business success especially on the administrative and service sector as well as in the not-producing areas of industrial enterprises. The expectations on the IT-investments can quite often not be fulfilled.

Managers essentially put down this fact to a lack of methods and tools concerning the IT-management. More decisive today for the often already existing or reasonable to find technology however, is the knowledge of the economic potentials and the organizational sequence of efforts on the employment of technology.

Concerning the E-Commerce it is e. g. not enough to make an online-order form accessible for the customer. Not until the processes of the material stream of products have been changed according to the new standards and the new organizational sequence of resources in the “back office” have been reorganized respectively, Electronic Commerce can be successful beyond pure efficiency effects. The knowledge of business sequences is in this way becoming a critical resource and the management of process knowledge a central challenge of the E-Business sector.

Within the scope of the project “Developing a Computer-based Organizational Handbook for IT-based Process Improvements” the goal traced is to design a computer-based Organizational Handbook, which is meant as a help to efficiently organize the knowledge of the IT-sector and support the IT-based improvement of business processes. As a solution concept serves the idea of the Organizational Memory (OM), which can be pragmatically considered as a medium to learn things from the past for the future.

The central functions of the OM to be pointed out in this respect are the documentation, integration and utilization of knowledge. The prototype of the Organizational Memory System (OMS) which has been developed by the Institute for Information Systems at

the Saarland University, Saarbruecken, can be understood as a package of basic technologies like modeling, data base and retrieval technologies that are used to support the functions of the OM.
Relevant knowledge of the field of application, meaning all types of knowledge and contents, can be collected, integrated and made applicable for future business decisions through this technology.
The presented work originates from the research project "Developing a computer-based organizational handbook for IT-based process improvement", which is funded by the German Research Foundation (Project Id. Sche 185/20-1). Concerned Research Areas are Organizational Learning, Business Process Management and Knowledge Management, in particular Organizational Memory Systems.

2 PROBLEMS OF IT-MANAGEMENT

Despite more than one decade of immense investments, research and practical experiences, the track record of IT implementation and intended improvements of business processes still remains disappointing. The following problems are principally responsible for the lack of IT success:

IT infrastructure is not transparent

As an effect of the enormous investments in IT, a very high IT density can be diagnosed for the majority of companies. Unfortunately, the implementation of new IT took place too often without taking the already existing IT and business processes structures into consideration. This is caused to a substantial amount by the insufficiency of methods and tools for IT management. Their development did not keep pace with the rapid evolution of IT [Brynjolfsson, E. & Seidmann, A. 1997]. The result is far too often a heterogeneous and badly documented IT environment that does not show an uniform business strategy.
Thus, the potential of Information Technology to act as an enabler of business process improvements remains unexhausted to a large extent. Besides, the business scenario can be even worse. Due to the permanent implementation of new IT, whose effects are not clearly defined, the IT system might become more and more complicated and difficult to master. So it is a well-known phenomenon that a lack of transparency is used to put through egoistic interests.

Shortage of experiences and principles in managing IT

Making decisions about IT investments and implementations is a complex and very knowledge-intensive task. At least this statement is true theoretically. By contrast, practical studies have shown that decision makers in the IT area act surprisingly emotional, simplifying and conservative [Keen, P.G. 1981].
A first reason for this way of deciding may be the fact that the business effects of IT investments are very difficult to measure. Particularly quantitative effects are hardly to find out. Being aware of this problem, IT decision makers obviously tend to use very simple rules and heuristics rather than high-sophisticated mathematical methods [Brynjolfsson, E. 1993]
A second argument can be derived directly from the above-mentioned problem of understanding IT. As a result of badly documented and little-transparent IT structures, there could not be collected any knowledge about the effects of IT implementations, in terms of "time-tested principles" could be collected [Brynjolfsson, E. 1993]. Furthermore, the already known and in other management areas well-tried principles are possibly not usable for IT decisions and would have disastrous consequences.

IT knowledge and competences are decentralised

Typically, the competences for the IT-oriented design of business processes are not assigned to one single organizational level but spread over several business levels of planning, controlling and execution. First of all, IT decisions are made on the level of operative workers who perform business processes e. g. as users of an ERP system. Secondly, a Head of Department in his role as a business process owner responsibly plans and controls activities, e. g. by using monitoring and business planning systems. Last but not least, the executive management as well as the information management is responsible for strategic planning of the IT infrastructure, using e. g. Management Information Systems. All these different actors, their knowledge, responsibilities, goals as well as the systems they use have to be integrated and coordinated in order to reach the objective of a holistic improvement management [Scheer, A.-W. 1998].
In addition to the vertical distribution of IT knowledge over several business levels, the intensified decentralization of the information management raises certain problems. Nowadays, the great majority of "information managers" sit in line departments. Only a small number of persons is still assigned to a central information management department. The consequence is that today a great number of persons in the enterprise are responsible for IT decisions. Due to the still progressive globalisation, those decision makers are often worldwide distributed. This leads to a substantial problem of knowledge localisation and coordination. IT competences are little transparent, feasibility studies as well as cost-efficiency analysis are done redundantly and contradictory decisions are made. This strategy wastes time and money.

In the last ten years many commentators have drawn attention to the general organizational impacts of IT: frameworks for managing IT-based organizational changes have been developed [e. g. Scheer, A.-W. 1998, Grover, V. et al. 1993], and the key effects of certain types of IT have been examined, e. g. of CSCW applications and ERP systems. In more recent years, a growing body of research has focused on the practical problems described above. But so far neither

methods nor tools, which suitably solve each of the outlined problems, are available [Brynjolfsson, E. & Seidmann, A. 1997]. Nonetheless, there are already a number of systems dealing with certain aspects of these problems.

These OMS approaches demonstrate in the first place, that it is technically feasible to model and capture a large set of business processes, and secondly, that it is also practicable to model and capture certain types of design decisions including their Pros and Cons. In addition, it is clear that such OMS can be very useful to researchers, managers and consultants, i. e. decision makers who are concerned with process design [Malone, T.W. et al. 1998]. Therefore our research does not deal with the question whether it is useful to have a repository of IT-expertise, but the principle focus is rather on how such a repository can be designed and implemented in order to meet the specific requirements of the domain. The main requirements are to integrate each owner of IT-based process knowledge within the company, and to support the whole life cycle of continuous business improvement. These two requirements lead to further possibilities for research.

3 THREE MAIN FUNCTIONS FOR MANAGING IT-EXPERTISE

To meet the above-mentioned requirements the following OMS functions have been developed: Documentation, Integration and Utilization of Knowledge.

Documentation of Knowledge

The critical success factors of an OMS are knowledge identification and capturing [Abecker, A. et al. 1998]. The design of the OMS functionality for the identification and capturing of knowledge depends on the OMS domain and must take into consideration the respective organizational structures. In business reality there are several reasons, which demand the recording of organizational measures. Therefore the Computer-based Handbook is at first intended to be an efficient tool to solve existing documentation problems of a company (Documentation of Knowledge). The proposed documentation concept rests upon the thesis that all IT-based process improvements can be described by a finite number of so-called “operators”. It is thus possible to define a construction set containing basic elements through which every “building project” can be accomplished.

Accordingly, the principle aim in designing an OMS is to create a well-defined number of operators that can be used as a basis for the systematic documentation of IT-based process improvements. Due to the complexity of the system “enterprise”, the operators are not derived from a real-world scenario but from an enterprise model [Scheer, A.-W.; Habermann, F. & Thomas, O. 2001]. All objects of the enterprise model as well as their relationships are to be analyzed. The enterprise models used in this analysis have been created by means of the ARIS methodology, in particular by the method of event-driven process chains [Scheer, A.-W. 1994, Scheer, A.-W. 1998].

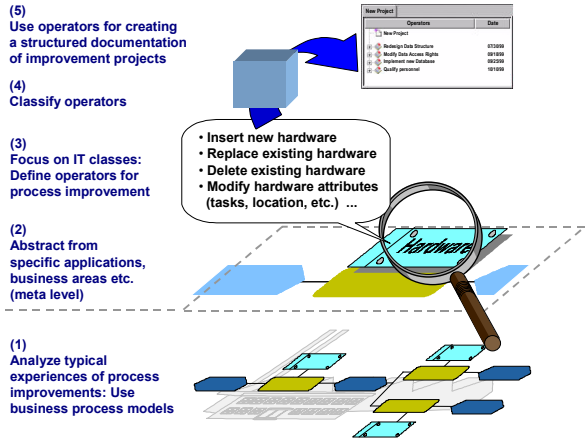

Fig. 1 Deriving operators from the meta level

Various levels of abstraction need to be examined in order to create these operators. It is first necessary to abstract from a certain type of business in order to develop all relevant operators. This means that the operators are initially derived from the meta level. Basically, the operators are “Insert”, “Delete”, and “Modify” actions on objects, attributes and attribute values, which belong to the respective model system. Typical operators at the meta level are e. g. “Delete information object”, “Insert function” and “Modify attribute of organizational unit from value (old) to value (new)”. The elements of the enterprise meta model are italicized, the operators “Delete”, “Insert” and “Modify” express the intended changes. Figure 1 illustrates the relationship between application (i. e. type) level and meta level from which the operators are originally derived.

Figure 2 illustrates a prototypical implementation of the outlined documentation approach.

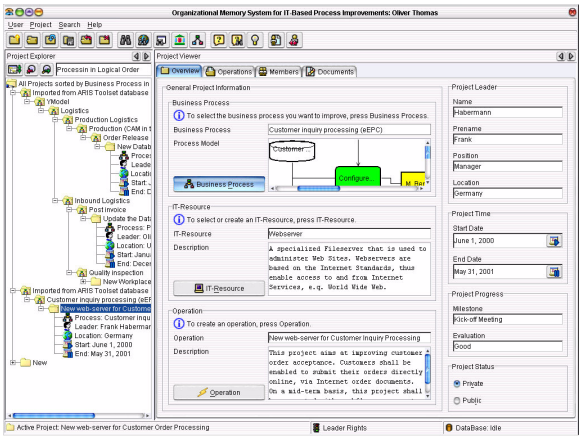

Fig. 2 Documentation of IT-Based Process Improvements

Integration of Knowledge

The OMS also needs a function to describe complex associations between the different elements of the knowledge base. Additionally, different types (stages) of knowledge should be illustrated. For instance, all past process improvements that focused primarily on the IT qualification of the personnel could be linked. Thus, a company, that has already documented its knowledge about business processes, e. g. in the course of workflow management or the introduction of an ERP system, could connect this knowledge about processes. Thus the function "Knowledge Integration" concerns the creation of a network between the documented measures of the "Organizational Knowledge-Cache-Memory". They can combine according to different criteria to an "Organizational Knowledge-Map". Useful network criteria are e. g. targets, reasons and temporal aspects of process improvements (Integration of Knowledge).
The description of logical relations between the stored knowledge components is the realm of the second OMS main function. The process improvements and improvement processes which have already been modeled by means of documentation, represent the nods of the organizational mind map. The Mind Mapper is by now used to identify and describe links between those elements. Thus, the Mind Mapper is a tool for enterprise modeling from a knowledge perspective.
Figure 3 presents a sketch for the prototypical implementation of the Mind Mapper.

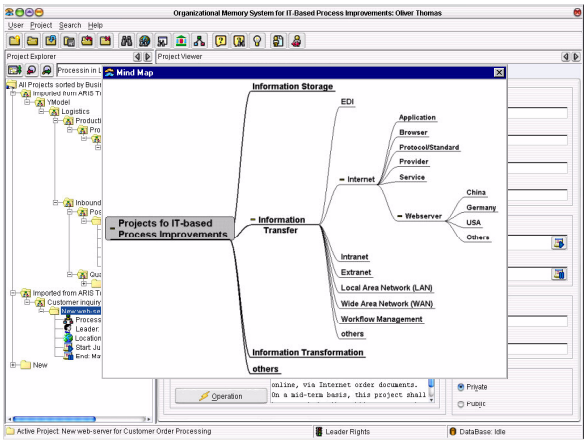

Fig. 3 Mind Mapper User Interface

The "Organizational Knowledge-Map" has to be easily searched for and navigated. Search and navigation are essential conditions to make the documented and connected contents of the Computer-based Organizational-Handbook applicable as a starting point for the development of new measures for the process improvement.
Examples for network dimensions between improvement processes are the improvement process owner, the times and costs of the improvement processes and the tools that were used to support the improvement processes, for instance a certain business engineering framework like ARIS or Rational Rose.
According to the selected network dimension, e. g. goal, cause, and time, certain links between the documented process improvements are created. As displayed by the symbols, each process improvement as well as each link can be described by appropriate knowledge documents.

Utilization of Knowledge

The documented and linked knowledge contents of the OMS should be used as the starting point for creating new improvement projects. But what are the pre-requisites that have to be fulfilled before an already-documented improvement can be used as a basis for the management of new improvement projects? Within this working field, we examine whether it is possible to use past improvement projects as patterns for the generation of new business improvements and how this can effectively be undertaken.
First of all, it is necessary for the OMS to offer a function for locating a well-suited reference model within the knowledge base. For this, the search and navigation functions of the OMS need to be designed adequately. If a new idea or a particular reason for an IT-based process improvement occurs, an OMS function should be available in order to search for similar process improvements. If it locates past process improvements which have similar criteria to the planned improvement initiative, the related improvement processes can be used as templates for the creation of the new improvement work schedule. Ideally, it should be possible to reduce the number of templates to one.
Furthermore, the OMS should also offer a function for checking the relevance of components of the reference model for the new improvement project. This will be done by means of pre-defined configuration questions. Responses to these questions will either activate or deactivate the part of the model to which the question refers.
Basically, it is not feasible to create an entirely new improvement project merely through activating and deactivating parts of the reference model. In most cases it is necessary to completelymodel certain parts starting from scratch. For this it is necessary that the OMS offers a function, which allows the user to model improvement project structures. We have already introduced this feature in relation with the documentation function. The documentation function will not only be used for modeling but also for describing a planned improvement process.

4 CONCLUSION

The presented paper deals with the problems of organizing IT-based business processes. From interviews with practitioners as well as from theoretic research we know, for example, that the decentralization that has taken place in the course of the last years causes a lot of those problems. For instance, a manager from a

multinational German company reported that they wasted a lot of time and money while introducing a SAP R/3 module for their purchasing processes because they did not know that half a year ago the same procedure has taken place in their North American branch.
Studying this example as well as the other problems mentioned above, we have drawn the conclusion that a tool for managing IT-knowledge particularly, for managing knowledge of the process impacts of IT has to be created. Thus, we outlined the basic functions of an OMS that can be used as such an instrument. The main design goal was to develop the functions in order to support the whole cycle of continuous process improvement, i. e. to meet the organizational requirements of the domain.
However, we believe that our concept of a model-based OMS is suitable for the domain of IT-based process improvements and hope that this research will provide instruments that help people who are concerned with managing IT to better understand the organizational impacts of IT implementation. Thus, the OMS would really be a tool for IT-based process improvements.

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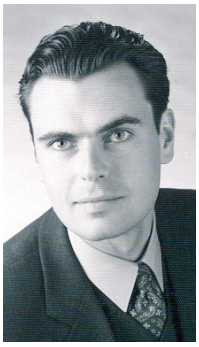
BIOGRAPHY:



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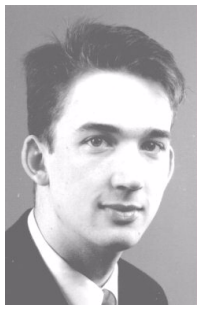

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