

Process-orientation in knowledge management: Using graphical models for knowledge exchange

- academic track -

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Abstract. This paper highlights ideas and experiences of an approach to increase process awareness among employees. The documentation of business processes is used for integrating a process perspective in learning and training and in knowledge management activities. A front-end information system was developed to address the needs of e-learning and knowledge management and tested in three European insurance companies. Two further studies allowed a detailed analysis of knowledge exchange with process models. Graphical representation of processes proved to be valuable for introductory knowledge acquisition.

Process-orientation in knowledge management

The shift from structure- to process-organisation since the 1980ies can be regarded as a paradigm shift in corporate theory and practice. Kuhn (1973) formulated the paradigm shift with respect to scientific progress. Providing a framework for the dependence of action on cognitive states, his theory can easily be transferred to business. Here, as well as in any area of human social life, development is marked by a change in terminology and in the underlying ontological background. The shift from structure- to process-orientation in organisations implies ontological modifications accompanied by cultural transformation, and this can not remain restricted to higher management levels. Active participation of any employee is required to realise fundamental changes in corporate organisation and effectiveness.

Nevertheless, in many companies, the management of business processes (BPM) still remains in the hands of only a few people in central departments, and is often marked by a more or less sudden push and a following decline in activity, especially if process documentation is undergone to obtain an ISO certification. BPM activities will not show the desired effects without a solution for continuous optimisation of business processes that covers three levels: technical, organisational and human. Only if an organisation manages to establish a process-oriented mind-set among all members it can transform itself into an enterprise where success is determined by flow characteristics of crucial process chains.

Cultural transformation should be reflected in every working day life. Since culture instantiates itself in language, symbols and artifacts, those are expected to monitor the idea of flow in a process organisation. Nevertheless most corporate artifacts are still text-based, including those that transmit procedural knowledge among employees. Knowledge exchange, even if mediated by documents or artifacts, shapes the individual's view of corporate concerns and is therefore of high relevance for corporate culture.

Although during the last few years there have emerged several approaches to integrate process orientation and knowledge management, psychological factors, especially those of representational notations of corporate documents still seem to be disregarded. Lehner (2000) distinguishes four types of existing approaches: Knowledge process reengineering (KPR), knowledge-based reengineering, reengineering of specific knowledge processes, and

reengineering of business processes with special consideration of KM criteria and requirements.

In this contribution we provide an approach that differs from those mentioned by providing a genuinely psychological perspective onto the use of process documentation for knowledge management concerns. Any action relevant for business objectives is considered part of a process chain and can, therefore, be described and documented as such. Using a graphical representation that is common in BPM is expected to facilitate learning and knowledge exchange among all employees.

Empirical investigation included a field study in three European insurance companies and two controlled experiments. The basic idea was to adapt a business process management software for learning and training issues, for continuous performance support at the work place, and for knowledge exchange in experience management systems. Using process-oriented artefacts for these concerns was expected to foster a process view among all employees.

Documentation of business processes for learning and training

During the 2-years project ADVISOR – ADVanced Instruction technologies for Services Organisations – that was co-funded by the European Commission, a front-end information system was developed that is based on the Business Process Management toolkit ADONIS[®]. The basic idea of ADVISOR was to extend the functionality of ADONIS[®] in order to create a corporate environment for process oriented e-learning and information. The ADONIS[®]-ADVISOR solution was meant to enrich process models with target group specific content and to produce a multi-media learning environment for process knowledge. Individual learning should be transformed into corporate learning by

- integrating learning activities into the business processes;
- making process orientation a salient corporate value;
- providing information in a meaningful context;
- enabling people to self-guide their learning and to focus on information that is relevant to their personal contribution to the execution of business processes.

The project included development of software components and a trial phase with accompanying evaluation measures. Evaluation was based on questionnaires and interviews. Three European insurance companies participated in the consortium for testing the solution in application areas: Cesce (Spain), Gothaer SchadensService Center (Germany), and Irish Life (Ireland).

Learning and Training of new employees/new work processes

Fluctuation or rotation of personnel requires a flexible and efficient way of training new employees or new processes. The learning environment ADVISOR was designed to enable process-focused self-guided learning. It included process models, descriptions of process elements, comments, screenshots of applications, an introductory tutorial, a glossary and a few quizzes (see figure 1).

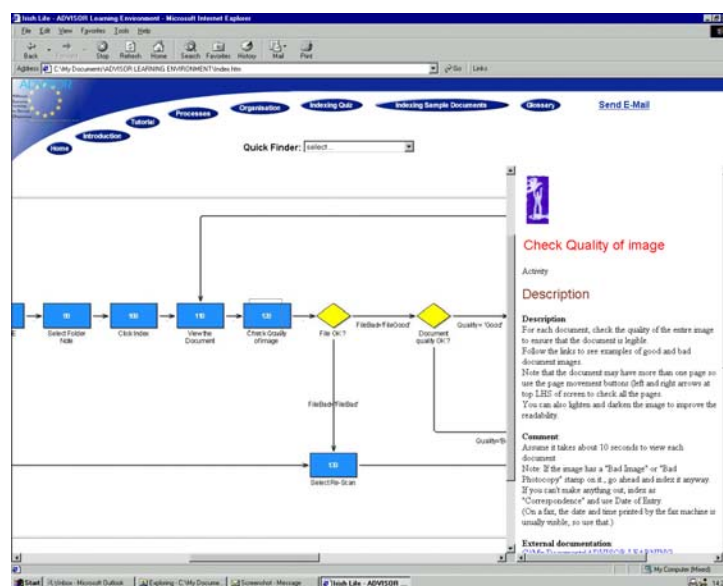


Figure 1: Screenshot of an ADVISOR environment for learning and information.

Results show that the information environment provides a very valuable resource for introductory training of new employees. The system does not only facilitate individual learning, but makes the learning process both for the learner and for the expert more efficient. Experienced tutors estimated that, on the average, training time was reduced from two months to two weeks per person. This can partly be attributed to a more precise communication which

results from the use of a common point of reference: the process documentation. Learners are better able to ask precise questions and understand the answers, and instructors use the terminology of a common documentation. This leads to a more efficient and standardised introduction of new team members to the work processes.

As well, trainees appreciate the existence of the process documentation due to two reasons: First, they are enabled to make learning to a certain part independent of the availability of personal instructors and second, adaptation to the corporate environment is facilitated because of the transparency of process-orientation as a corporate value and the provision of adequate information. What is important to consider, if process documentation is used for introductory learning, is that

- an existing process documentation might require fundamental adaptation to the needs of the target group for learning and
- the electronic system should not be considered as a substitution for personal instruction, but as an instrument to make the entire learning process more efficient and satisfying.

Performance support

ADONIS[®]-ADVISOR allows easy and fast generation of an online documentation of processes. All employees in the trial department of a German insurance company were provided with the documentation at their work place to support them in their daily work. Evaluation results are not as satisfying as for the introductory learning scenario: Employees did not make use of the online documentation frequently. Two possible reasons were identified: (a) Finding information in the documentation was not considered fast enough for the specific requirements in the trial department (a call centre). (b) The information provided was not always up-to-date, so that employees got very cautious and reluctant to rely on the system. These findings allow the following conclusions: First, information needs to be always up-to-date, otherwise the company risks very high drop-out rates. Second, an efficient search function is essential to support navigation if the information environment is very complex. An important difference to the learning and training scenario was that an adaptation of existing process documentation of the BPM was not required. Therefore, the manpower to adapt BPM models to user needs is much less for continuous support of experienced

employees. Figure 2 shows the interview results concerning the benefit of the ADVISOR information environment.

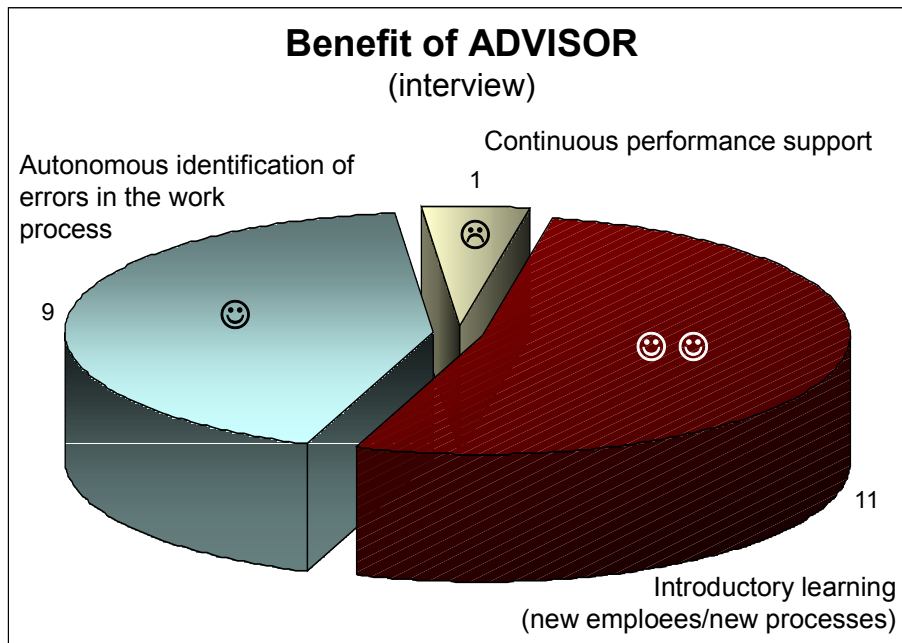


Figure 2: Perceived benefit of the ADVISOR environment for learning and information.

Process-perspective in knowledge exchange

Documented business processes provide a valuable source of expertise for an organisation. But employees' knowledge is not limited to the routine processes that are captured in BPM. Much of such background knowledge refers to procedures as well, but to those that are not directly part of defined business processes. Why not exploit the graphical process representation of BPM for the creation of experience management systems (EMS; e.g. Holz, Könnecker et al. (2001) or Lindvall, Frey et al. (2001)) as part of knowledge management measures? If process-orientation is considered an important value in an organisation, it shall be salient in corporate documents. ADONIS[®]-ADVISO provides a technical solution for using process models for company wide information. Extending the idea of the ADVISOR project, it was investigated which benefit the BPM software with its graphical notation

provides for knowledge exchange. As representational modes for comparison served (a) plain text and (b) text with included graphics (flow charts). Since externalisation and acquisition of knowledge are considered basic processes of the knowledge management spiral according to Nonaka and Takeuchi (1995), the perspectives of the author of process models is considered as well as the point of view of the learner who uses the process oriented navigation environment for knowledge acquisition.

Since a detailed analysis of single influence factors was not possible at the work places in any user company, the two perspectives were investigated in two in-house studies at University of Heidelberg.

Process modelling – the author’s perspective

The modelling of business processes is common in BPM teams. Extending the modelling activities to decentralised EMS, though, requires that people without previous experience in flow charting use the graphical representation for expressing their knowledge. A thorough analysis of difficulties in the application of the representational system (Suthers, 1999) is required. Process modelling was analysed focussing on

- acceptance measures concerning the representational system,
- problems in the modelling process and
- the quality of resulting models.

28 students of University of Heidelberg without previous knowledge in process modelling participated in the study. Subjects received a one hour introduction into the software before starting the task.

The close analysis of the author’s perspective shows that people without any previous knowledge of graphical process modelling – after a 1-hour introduction – do not perceive any major difficulties in handling the modelling task. Nevertheless, they do not adhere to the process logic consistently. Benefits of the flow charts are perceived mainly in the economy of presenting information in a structured, task-oriented way. The multi-level structure gives an overview and allows, at the same time, to zoom-in according to individual interests. These benefits, though, might turn into disadvantages, depending on the author’s modelling competence. Described as difficult was adapting the models to the perspectives of a potential learner and to decide upon the level of granularity that was required. If graphical

representation shall be used in a decentralised manner, the quality of models should be reviewed before (internal) publishing. It seems advisable to provide potential authors with a training in applying the graphical notation beforehand.

Figure 3 gives an overview over the perceived advantages and disadvantages of a graphical process representation of content.

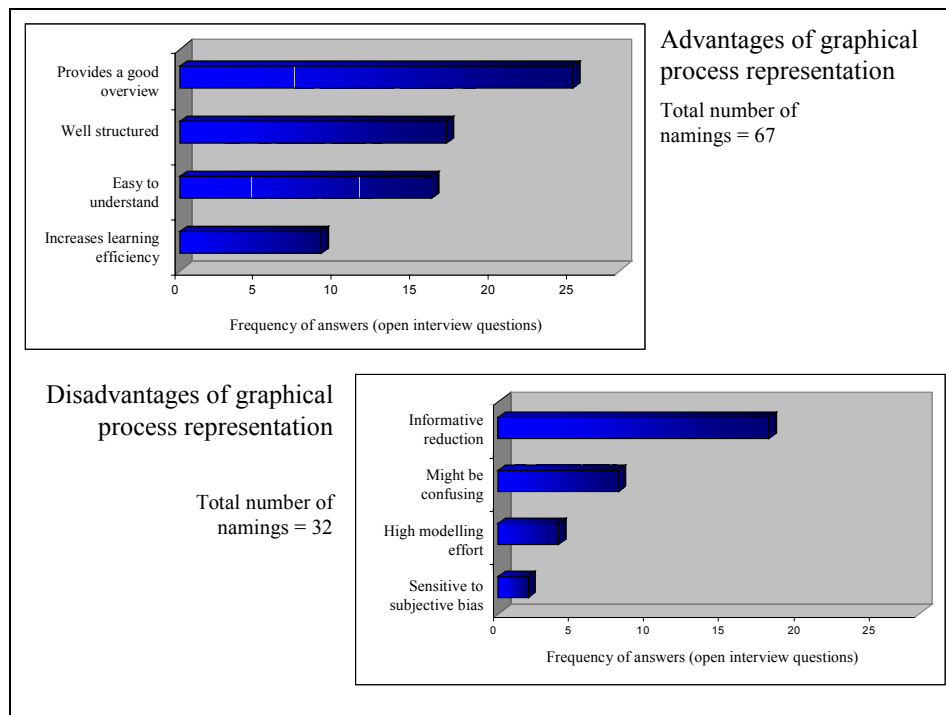


Figure 3: Perceived advantages and disadvantages of graphical process representation.

Process models for knowledge acquisition – the learner’s perspective

In a second experiment, the benefit of graphical process models was investigated by varying the mode of presentation. A graphics-oriented navigation environment was compared with plain text and text with integrated graphics. All three modes were presented as html pages. The content was always the same. 30 students from the Universities of Heidelberg and Mannheim participated. They used the described material to get an overview over the content that was new to all of them. Analysis included

- acceptance of the learning material and
- perceived and objective learning effects.

Considering the learning effects, assessment focused on short-term effects without follow-up-studies.

Results show that there was no difference in learning effects between experimental conditions. What did differ, though, was people's judgement concerning the learning material: The navigation environment was evaluated more positively than text, with or without graphics.

These findings lead to the conclusion that a process-oriented navigation environment does not lead to better learning effects by itself, but that the better acceptance might foster learning activities. This is especially important in self-responsible learning.

Summary and Outlook

This paper reflects a psychological approach to the realisation of process-orientation in knowledge management. It differs from former attempts to integrate BPM and KM insofar as not only business or KM processes are taken into account, but graphical process modelling is used for documenting action in general and for decentralised knowledge exchange.

All in all, the process-oriented graphical representation of information addresses important requirements of work-integrated learning and knowledge exchange: It allows a fast overview and adaptive zooming, and assures task-orientation by presenting information as a flow of action.

The graphical representation of BPM provides valuable benefits for knowledge acquisition and exchange, especially when learning occurs under restricted time conditions, and learners need to adopt an overview of the content quickly. Introductory learning is supported by an alignment of concepts and terminology in newcomers and experienced employees. This facilitates communication and reduces the expert's time effort.

The benefits of process modelling and business process management are made use of in the project PROMOTE which will be finished in August 2002. Here, the BPM software ADONIS® is extended to address further KM requirements. Trial companies of the project consortium are the Greek company Interamerican and the German IT-service provider Fiducia AG. ADONIS®-PROMOTE will support the management of KM processes and a knowledge portal for employees.

Literature

Holz, H., A. Könnicker, et al. (2001). Task-specific knowledge management in a process-centred SEE. Advances in learning software organizations. Third international Workshop LSO 2001. K.-D. Althoff, R. L. Feldmann and W. Müller. Berlin/Heidelberg, Springer: 163-177.

Kuhn, T. S. (1973). The structure of scientific revolutions. Chicago, University of Chicago Press.

Lehner, F. (2000). Organizational memory. München, Carl Hanser.

Lindvall, M., M. Frey, et al. (2001). Lessons learned about structuring and describing experience for three experience bases. Advances in learning software organizations. Third international Workshop LSO 2001. K.-D. Althoff, R. L. Feldmann and W. Müller. Berlin/Heidelberg, Springer: 106-119.

Nonaka, I. and H. Takeuchi (1995). The knowledge-creating company: How Japanese companies create the dynamics of innovation. New York, Oxford, Oxford University Press.

Suthers, D. D. (1999). Effects of alternative representations of evidential relations on collaborative learning discourse. 3rd Conference on Computer Supported Collaborative Learning, Stanford, USA.