Practical insights into collaborative drafting of organizational processes using an enhanced wiki environment

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Abstract. Business process modeling cannot be seen isolated from the larger context – business process design, engineering and management. We consider business process modeling and the closely related development of graphical representations of process models as a social activity by nature. In this paper we present findings from a series of cross-industry in-depth interviews of experts in the domain of business process design and engineering which was found to strongly support this assumption and offers new insights into the collaborative practice of process modeling. We used an activity-theoretic perspective to identify concepts related to the social nature of process modeling which subsequently was used to develop a conceptual model of the collaborative process modeling domain. The conceptual domain model served as a basis to deduce a generic set of recommendations that can be used as a starting point to create software environments that effectively facilitate collaboration of the different parties involved in process modeling. We conclude with a case-study that illustrates the development and use of a process modeling wiki environment to support the collaborative drafting of administrative and educational processes at the Vienna University of Economics and Business.

Introduction

Business process modeling cannot be seen isolated from the larger context – business process design, engineering and management. We consider business process modeling and the closely related development of graphical representations of process models as a social activity by nature. Enterprises and any other organization type employ some kind of business process management that can be considered both as a management approach encompassing all activities related to the design, implementation, execution and administration of business processes (Kettinger et al., 1997; Aalst et al., 2004; Rosemann et al. 2008). In this paper process modeling is understood as a set of actions targeted at the creation of a process model. A model is understood as a description of a real-world process. We present findings from a series of cross-industry in-depth interviews of experts in the domain of business process design and engineering which was found to strongly support the above assumptions and offers new insights into the collaborative practice of process modeling. We used an activity-theoretic perspective to identify concepts related to the social nature of process modeling and derive recommendations for designing appropriate modeling environments.

Conceptualizing process modeling as a social activity

To describe process modeling as a social activity an activity-theoretic

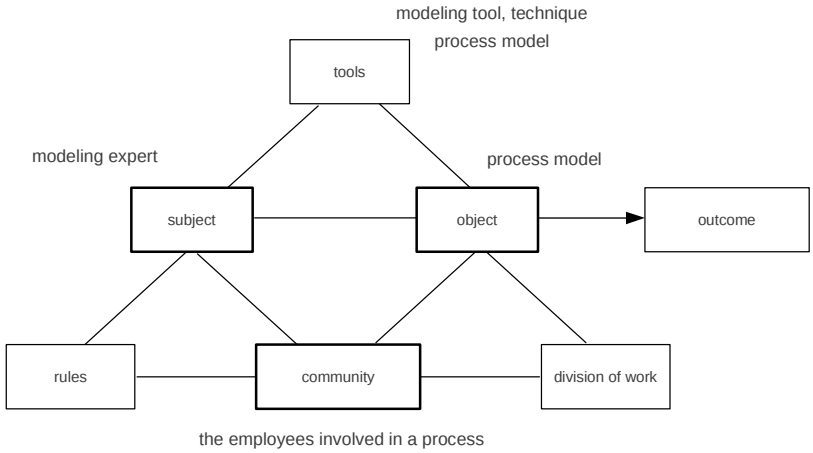

Figure 1: conceptualization of process modeling as an activity system

perspective is applied. Activity theory (AT) is an approach that has gained increasing interest in the research field of computer-supported collaboration (Engeström, 2007). It has been applied to analyze and describe various domains

from an analytical and conceptual viewpoint targeted at an understanding of the basic determinants of collaborative work. E.g. health care (Engeström, 1996; Kuutti, 1992), software design (Fjeld et al., 2002; Barthelmess and Anderson, 2002), learning (Engeström, 2001). As the early concepts of activity theory are sufficiently elaborated in the CSCW literature this paper refers to later re-interpretations of activity theory e.g. Engeström (1981, 2007), Kuutti (1991, 1992), Nardi (1996) and Bardram (1997), Fjeld (2002) and Collis (2004) which explicitly discuss the adoption of activity theory in the area of information systems research.

According to AT an activity is the main unit of analysis that in contrast to individual and isolated concrete actions covers as well the social aspects of individual actions (figure 1).

According to Kuutti (1992) an activity is motivated by the transformation of an object into a meaningful outcome. In terms of process modeling the model and it's concrete descriptions are such *objects* that are acted upon by a respective *subject*. A meaningful outcome in terms of process modeling is a valid model that describes the real-world process or the *community's* shared perception of the real-world process. Bardram (1997) characterizes “human work as the collaborative production of artifacts; each made with the purpose of mediating a certain activity.” Artifacts are continuously modified and adapted to changing conditions of work. Therefore, the collective experience of a community is “crystallized” into the artifact (Nardi, 1999). Mediating artifacts play an important role in AT. They form the relations between the three fundamental constituents of an activity: Subject-object, subject-community and community-object.

The practice of collaboration in process modeling

In the following we will refer to the above concepts in the light of empirical data gathered through in-depth interviews with twelve experts in the field. The experts represent a broad range regarding the industry and role in process modeling. All interviews except two were audio-taped and transcribed. As the interviews were conducted recently this summary of findings has to be seen as preliminary. However we were able to identify main concepts prevalent throughout the interview data.

Reaching a shared perception of a real-world process is usually not a trivial task. That is why process modeling in practice is performed in a collaborative manner. Especially, modeling activities that are performed in the course of a process introduction or improvement effort are usually embedded in a respective project structure. The application of project management methods to non-routine tasks in organizations is a common practice. Also a certain awareness for the need

of stakeholder involvement in decisions generally can be presupposed. All the interviewees reported to involve stakeholders into the modeling process. However, the methods used vary in multiple ways. A general tendency found is that the community that has a stake in a process is generally large. Hence, for elicitation of knowledge and feedback collection small groups are preferred over large groups. Large groups were reported to be only the exception to the rule and were formed only in kick-off workshops where the objectives, motivates and scope of a process (re-)design effort were presented to a larger audience. Three of the interviewees reported that such social events led to an improved awareness of colleagues involved in the same process. Also it was found that communities that were once formed in the course of such projects continue to exist, lower social interaction barriers and help establish a communication structure in follow-up activities such as model maintenance and application of minor model adaptations.

Minor model adaptations are – according to our findings – handled in a direct way between the responsible for process model maintenance and the respective process responsible. This is only restricted if organizational or legal issues do not allow or constrain such adaptations. In about half of the interviews it was stated that processes and process documentation has to show a certain stability over time. This is due to the fact that organizations usually store and maintain process model descriptions for purposes such as quality management, compliance management and corporate governance which contradicts the often propagated need for rapid adjustment of processes and models. Four of the interviewees explicitly stated that such minor changes are handled through rigid workflow mechanisms. Direct manipulation of models descriptions through employees involved in the process is not reported in any case. Though, process model descriptions are reported to be publicly available to all employees. The latter findings closely relate to the concept of rules in Activity Theory where the subject-community relation is mediated by explicit and implicit norms, conventions, and social relations (Kuutti, 1991).

The concept of roles that define the responsibilities and tasks community member holds is mentioned by all of the interviewees. Hence there is not a strong differentiation of roles in process modeling activities. Rather, a simple distinction between the facilitator or modeling expert and the participant or process expert is made. This distinction is for example suggested by Renger et al. (2008). A broader perspective on roles in socio-technical systems is given in Jahnke et al. (2005).

A central tenet that has been stated throughout the interviews is that the formal description or explication of a process model is done by a dedicated expert or small group of experts without the involvement of stakeholders. This is usually done before and after knowledge elicitation and feedback collection activities. This is due to two reasons. First, sound modeling expertise is mostly concentrated on external personnel or very few experts in large organizations. Even if

employees have received a training on modeling it does not mean that they are able or willing to act as the architect of a process. Second, it is found that process model creation is an activity which is not anchored in the job profile of regular employees and generally is not asked by the management to be done regularly.

Regarding the representational style of a process models practice reveals that textual descriptions either unstructured or structured in the form of tables, lists and forms are equally used with graphical representations. An exemplary statements from an expert is presented below.

"The world is divided [with regard to representational styles of process models]. Our process knowledge portal supports two views. I can see a process both textual and graphical. We have run reports [on the usage of representational styles]. Which reveals a 50 to 50 distribution, who uses what. Personally I prefer diagrams, colleagues prefer tabular representations, because they can use it like a checklist. I prefer to see the big picture, they like to read textual descriptions behind the activities." (E09)

The findings from interviews imply that the usage of a representational style both in the creation and reading of a process description is strongly related with individual preferences, modeling skills and organizational conventions. We found that process model representations are used in two ways – both as a mediating artifact to support communication and argumentation and as the central object modeling activities are directed at (see also Herrmann, 1997). We consider the dichotomous nature of model descriptions and the material artifacts representing them a specific characteristic of design and modeling activities.

Regarding the role of software tools a somehow indifferent attitude can be found in the answers from experts. All experts claimed that software plays only a minor role in collaborative modeling although all of them state at the same time that they use tools to support the model creation and description and a repository where process model descriptions are stored, managed and are made publicly available. We trace this indifferent attitude back to the fact that a majority of the interviewees had at the same time stated a preference towards face-to-face and co-located modeling sessions over distributed modeling. One of the experts explicitly said that he would also get along with paper and pencil for process modeling.

AT incorporates the concept of historicity which refers to the fact that artifacts that mediate an activity reflect the past experiences of a community sharing an object. We found strong evidence for this concept in the interview data. Both software tools and modeling notations were repeatedly reported to be adapted to the specific needs of the organization over time. This also applies to organizational conventions regarding process model maintenance.

To summarize the above empirical findings we outline a set of six recommendations for designing software that supports the whole or parts of the modeling activities. The recommendations given above are not meant to be

complete but can be seen as a starting point for developing a more comprehensive set of guidelines.

R1: Consider the fact that process modeling is always part of a larger context – e.g. process improvement, requirements elicitation for system development, ..
R2: Consider the need for close (face-to-face, synchronous) collaboration in the design phase of process modeling
R3: Support the shift from initial process model creation activities to long-term process model maintenance
R3: Provide means to use diverse representation styles for describing a process
R4: Support the continuous adaption of process modeling techniques and tools to situational needs
R5: Provide mechanisms that allow the interaction with process models for a broad community and at the same time ensure the stability of process models
R6: Consider the dichotomous nature of process models being the object of modeling and a mediating artifact for reaching shared understanding at the same time

Table 1: six recommendations for software support in collaborative process modeling

Case-study of an enhanced wiki environment

Since 2008 we are developing and experimenting with a wiki environment to support the collaborative development of process models. The reason for choosing a wiki environment are manifold and are motivated basically by our findings from the collaboration practice in business process modeling. Hence, the extension of the wiki environment towards a fully fledged modeling environment has to be seen as an iterative process that was accompanied by empirical evaluation and data analysis.

The wiki environment already provided features like form based input of structured data, definition of workflows for handling changes and approval of content objects but has been extended with a drawing editor that supports multiple process modeling notations and a basic verification mechanism. Later an awareness mechanism (called activity indicator) was integrated that allowed users to be aware of other users' edit operations in a process model page. Finally we integrated a feature that supports concurrent users in the semi-automatic resolution of conflicting model changes.

During the last year a group of students in a graduate course was asked to draft both educational processes and administrative processes at the Vienna University of Economics and Business. As these students personally are or were involved in

the processes they were asked to model we expected an intrinsic motivation to explicate the personal knowledge in the form a process model description. To summarize the students created a total of 37 models on 4 levels of abstraction. In total we invited 35 people (students, administration staff and scientific staff) to participate in the wiki where only about 12 students actually were involved in model development. First experiences reveal that the wiki meets most of the recommendations outline the previous section. Though we have yet gained first promising experiences we are currently planning to involve a larger audience into the wiki and to more closely investigate the perceived quality of models evolving from a wiki environment.

Conclusion

We have conceptualized process modeling as a social activity using an activity-theoretic approach. Through a series of in-depth expert interviews we challenged this conceptual model and gained insights into the collaborative practice of process modeling. Both the theoretic approach and the empirical data led us to suggest a set of recommendations for the design of adequate modeling environments. A case-study of a wiki-environment and it's application to collaboratively model educational and administrative processes provided valuable feedback on the applicability of the recommendations for software design. Though, we are planning a larger scale case-study with a larger audience over a longer period of time to develop the recommendations into a set of applicable guidelines.

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