Key Features of Subject-Oriented Modeling and Organizational Deployment Tools

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Abstract. Subject-oriented Business Process Management (S-BPM) has been used in organizational and workflow development projects for several years. While the methodological support for the development process is important, the success of a project taking the subject-driven approach to organizational deployment also depends on the tool. The tool requires a set of key features, in particular an appropriate level of abstraction for behavior modeling, the representation of work-relevant relations among stakeholders, and the straightforward execution of business process specifications for participatory organization design. In this paper we analyze Metasonic, the most prominent tool for S-BPM, with respect to effective organizational change and interactive workflow design support. Metasonic integrates various BPM modeling constructs, and is suitable for the construction of stakeholder-oriented models and the subsequent deployment of business processes. However, the underlying organizational development activities should become more transparent when utilizing the tool features.

1 Introduction

Subject-oriented Business Process Management (S-BPM) has been practiced now for some years. It is developed continuously, both from a methodological, and tool-support perspective (Buchwald et al., 2010, Fleischmann et al., 2011). Overall, it allows for interactive structural flexibility of organizations, (re-)organizing internal procedures as well as arranging networks of organizations, based on business process specifications.

Various concepts have been proposed for organizational change management and learning (cf. Heftberger et al., 2004). The findings reveal two key elements: (i) the representation of (task) knowledge (according to individual mental models), and (ii) on its communication along collective reflection and processing. Hence, knowledge about work and its organization needs to be located, elicited, acquired, and explored (cf. Nonaka et al., 1999, Davenport, 1998, Senge, 1990) before being deployed in organizational settings.

Since individual learning has to be considered both, the starting and reflection point of Organizational Learning (OL) processes, stakeholders play an important role for triggering and performing those processes. Ideally, they should be drivers and controllers of change processes. However, there are few studies about stakeholder

needs, and socio-methodological or –technological capabilities required for OL. When Herrmann has tried to qualify employees by letting them develop parts of business processes individually, he used a semi-formal workflow modeling language and a respective support tool (Herrmann, 2000). It allows stakeholders describing their particular view on work situations and tasks by means of a diagrammatic language, including individual procedures for task accomplishment.

S-BPM aims one step further: It not only should allow stakeholders describing work procedures in a diagrammatic way, but also executing their specifications in a non-distractive way (Fleischmann, 2010). However, it has still to be investigated, in how far S-BPM tool support facilitates organizational deployment in this way, since stakeholders have to explicate their mental models of task accomplishment (cf. Rouse, 2006). These models form relevant context when envisioning changes and designing organizations, and need to be shared, once being explicated (cf. Mehandijev et al., 2010). Consequently, we will follow an OL framework to investigate the effectiveness of key features of the S-BPM suite Metasonic (www.metasonic.de) concerning subject-oriented business process modelling and deployment.

We introduce the OL framework in section 2 and identify respective features categories. In section 3 we detail and reflect existing tool support. Section 4 concludes the paper, wrapping up the results and sketching future developments.

2   Deriving Requirements for Tool Support from Organizational Learning Design

In this section we describe how stakeholders trigger learning processes when they re-think and (re-)design their work (section 2.1) before developing stakeholder requirements for tool support (section 2.2).

2.1   Stakeholder-Centred Organizational Learning

For intertwining individual knowledge creation and organizational learning processes we follow the experiential learning cycle as detailed in Stary (2011) based on Heftberger et al. (2004). As shown in figure 1 (left side) individual knowledge creation serves as input to organizational learning processes. Individuals observe stimuli and their consequences from the environment. These observations are assessed partly consciously, partly unconsciously. On the basis of these assessments individuals form abstract concepts to react to the stimuli in a reflected way (termed *design*). The developed concepts are implemented in actual work situations. Recurrent observation and perception of the concepts in terms of effectiveness lead to iterations of the individual activities.

In the design phase stakeholders express their (role-)specific view onto information structures, work settings, critical situations, or business processes according to their task assignments and individual experiences. Hereby, an organizational learning step might be initiated. The resulting information structure or workflow specification can be embedded into actual work situations (*implement*). Interactive artefacts executing specifications, such as the S-BPM suite, enable hands-on-experience for task accomplishment. Stakeholders observe, in particular when interactive artefacts are

used, possible effects the executed tasks have on their work and the organization. In case the results meet individual expectations or individual demands for change (*assess*), the concerned process serves as input for the learning process on the organizational level. If further process refinements or modifications are required the cycle starts again (*re-design*).
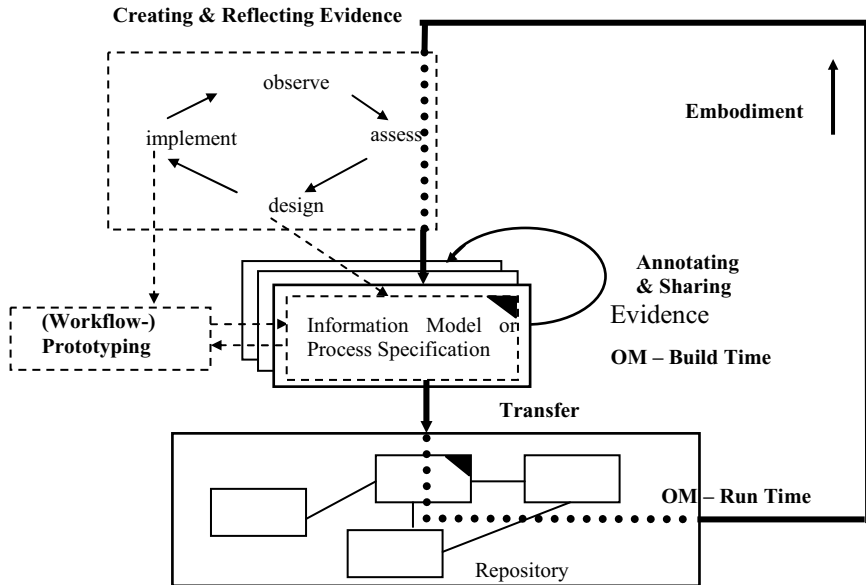

Fig. 1. The operational frame of reference for stakeholder-centred OL (see also Stary, 2011)

Figure 1 shows the fundamental structure, activities, components, and relationships not only on the individual, but also on the organizational level. The trigger to OL is creating evidence, i.e. information a stakeholder considers being of relevance for further organizational development with respect to his/her role and consequently, the organization. Once modelled, the evidence can be refined, modified or enriched through sharing different perspectives until a decision is made how to proceed on the organizational level.

The directed link from the individualized business information or process model refers to the entire Organizational Memory (OM), since all previous entries of the OM might be affected. The links between the information / business process model and (workflow) prototyping mean that experiences gained from using any interactive artefact are likely to influence the adaptation of content or business processes specifications, and vice versa, modified information structures and processes are likely to result in an alternative accomplishment of tasks. The organizational learning cycle might be iterated as soon as stakeholders have embodied the newly acquired and specified knowledge on the level of the overall organization.

2.2   Requirements for Tool Support

OL can be considered as a swinging pendulum between individuals and affected members of an organization, providing and exchanging individual or group perspectives on created information (structures). A learning step is considered complete (see also figure 1), once a modified information or business process model represents a commonly agreed basis for task accomplishment, and becomes effective on the organizational level through embodiment by its stakeholders.

Transforming individually elicited knowledge to become effective on the organizational level comprises several activities, with respect to modelling and deployment (cf. Chen et al., 2003):

- *Expressing work knowledge.* Basically, all created evidence, either in form of information structures or business process specifications, needs to be documented by its proposer(s) or a facilitator. It can then become available in an OM accessible to all stakeholders. Once stored, other stakeholders can express individual concerns and formulate additional inputs.
- *Experience process specifications.* Executing specifications helps visualizing and experiencing proposed changes in a straight-forward way. It also might initiate and focus discussions, leading to further modifications. Upon agreement novel content and/or processes can become effective on the organizational level.
- *Embody novel structures into the organization.* In order to become operative, process specifications need to be implemented in daily business. Behaviour specifications need to be integrated in the operation of the organization. They are embodied in individual work practices within the context of business processes.

All addressed bundles of activities need to be supported by a business process modelling and deployment tool.

3   Tool Support

In this section we revisit the S-BPM approach and its major support suite Metasonic (see also Fleischmann et al., 2011) by discussing each of the derived categories of requirements:

- Creating models from an individual stakeholder perspective, in order to allow individually expressing work knowledge (section 3.1)
- Ensuring automated execution, in order to support immediate experience of specifications, and to adjust individual inputs to existing behaviour sequences, leading to different (interactive) variants for task accomplishment (section 3.2)
- Keeping the history of individual and organizational developments, in order to embody the finally accepted variant into the organization (section 3.2).

3.1   Expressing Work Knowledge via Process Modeling

Business process models are assumed to facilitate the transfer of knowledge between individuals or groups with different attitudes and presuppositions, as they are

boundary objects (Brown et al., 1998). According to their involvement in accomplishing work tasks, different stakeholders can be represented in a business-process model. For managing change business process models help different stakeholders and groups of an organization developing and propagating a common interpretation of accomplishing tasks. As such, they can be considered as trigger and enabler for individual and organizational learning processes.

In order to allow the various stakeholders and management to participate in OL processes through work process modelling and deployment S-BPM provides a notation and specification features that

- are capable of describing the organization of work from the perspective of each involved actor or role - in S-BPM stakeholders are represented by so called subjects and vice versa, since subjects are the active elements in sentences of all natural languages. Consequently, subjects are abstractions of concrete roles, agents or actors.
- focus on the interaction of subjects – in S-BPM task-relevant communication is described by messages exchanged between subjects.
- enforce the adjustment of subject behaviour specifications to create a complete representation of a business process – in S-BPM the behaviour specifications of all subjects involved to accomplish a certain task have to be transparent and mutually tuned.
- integrate business object representations into the flow of work – in S-BPM these objects are addressed and detailed in terms of their structure when messages are exchanged between subjects (see for instance, vacation request in figure 4).
- enable the seamless execution of business process specifications ensuring the direct interactive experience of work process models (see section 3.2)

For organizational development both levels need to be addressed by a tool, the individual and (cross-)organizational one, in order to get a complete understanding of the business processes and their anticipated advancement.

In figure 2 a sample subject-oriented model is shown. The screenshot contains the subjects involved in a process handling vacation requests of employees, and the
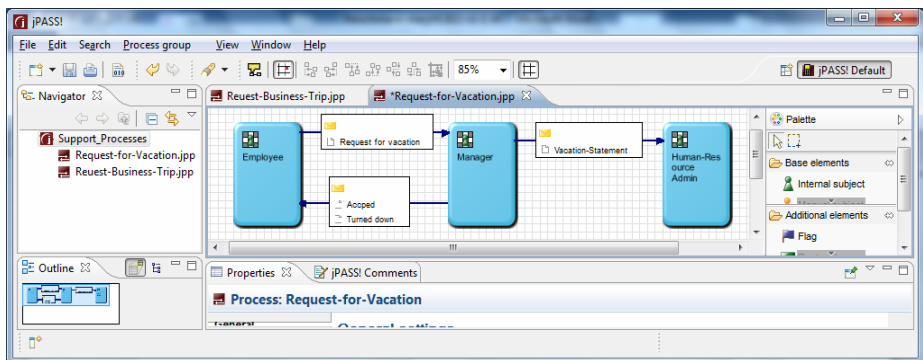

Fig. 2. Sample subject constellation

message types exchanged between these subjects. In that example three stakeholders ('Employee', 'Manager', 'Human Resource Admin') coordinate their work by exchanging messages.

Subjects execute three different types of activities: (i) Subjects send messages to other subjects, (ii) subjects receive messages from other subjects, and (iii) subjects execute some internal actions not visible externally. These activities are done in an order agreed between the stakeholders representing the various subjects. Figure 3 shows the behavior description of the subject 'Employee', sending messages to other subjects (i), and receiving messages from other subjects (ii), after filling in the vacation request form (iii).
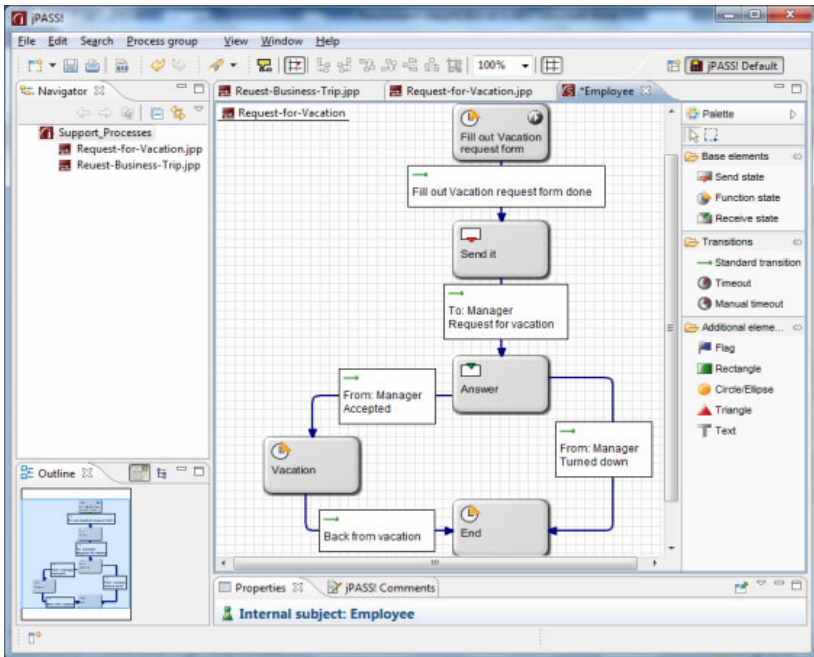

Fig. 3. Sample subject behavior ('Employee')

When an employee files a request for vacation, the request needs to be sent to the manager for approval. As S-BPM integrates the communication-oriented perspective with the (traditional) function-oriented one, both, message exchanges, *and* individual task activities need to be represented. In the example, sending the request refers to a typical send state, whereas receiving the answer is a typical receive state (explanation of symbols see right tool box in the screen shot of figure 3). In contrast, being on vacation is a function state in S-BPM. Of particular importance are the start and the end state ('Filling out vacation request form' and 'End' in the example), as they set the scope of the behavior description for a certain subject.

Depending on the content of the receive state 'Answer', different procedures lead to process completion, either to 'Vacation' or to 'End'. Finally, a behavior

specification is enriched with state transitions, such as 'from manager accepted', in order to understand the trigger for the next state.

In the course of modeling messages need to be detailed, as they contain all task-relevant data, and thus, constitute business objects. In figure 4 the data structure of a vacation request is displayed. It is composed of properties detailing the request in terms of name, dates, and type of vacation.

Fig. 4. Sample message details

However, (re-)thinking organizations in terms of communicating actors accomplishing tasks is not sufficient for deployment. It requires the recognition of an organization as a network of communicating actors – each actor is directly or indirectly connected to all others. Hence, lines of communications need to be defined for representing task accomplishment once different subjects are involved in a business process. A specification is considered complete and reflects the organizational perspective, once all involved subjects have been represented and their interfaces allow a coherent flow of interaction for task accomplishment.

Subjects in one process can communicate with subjects in other processes. In case subjects communicate with subjects involved in other processes, the subjects of the other processes are called external subjects. External subjects represent a process connected to the considered process.

3.2 Executing Models Enabling Interactive Deployment

Once process models can be executed, e.g., using a workflow system, subject-oriented process specifications can directly be experienced. They serve for reflection and negotiation among stakeholders in the course of change management. As it happens before actual changes are going to be implemented variants can be tested without effecting implementation, transformation, or development costs.

Up to now, only an abstract process model with subjects has been described. In addition to modeling, Metasonic allows for interactive deployment. In a next step it requires assigning concrete stakeholders to the identified subjects. Figure 5

exemplifies such an assignment: It is either Christian Stary or Albert Fleischmann who could execute the behavior of subject employee.

Once concrete stakeholders have been assigned they can follow the flow of work, as the modeling language and the corresponding representation scheme allow executing specifications without further transformation(s). The individual perspective of each stakeholder remains visible in the course of execution, however, embedded into the (required) organizational runtime context (i.e. the behavior of other involved stakeholders like 'Manager' and 'Human Resource Admin' for 'Employee'). Consequently, each involved stakeholder can interact with the workflow component of the Metasonic suite as if accomplishing a certain work task in daily business.
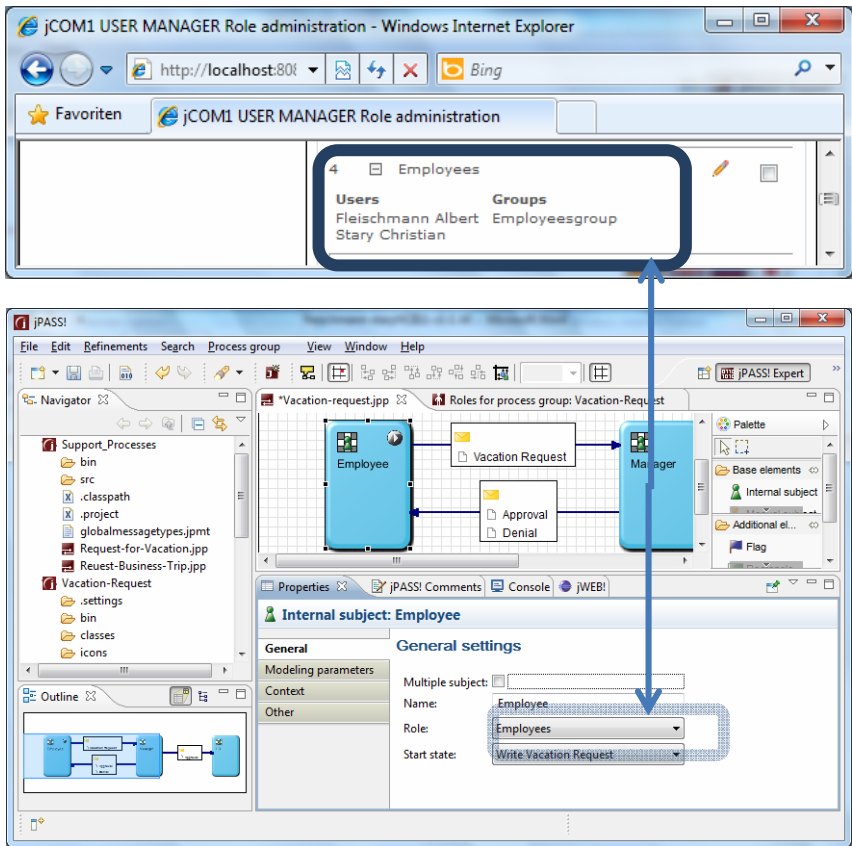

Fig. 5. Sample assignment of subjects to actual stakeholders

The swimlane view given in figure 6 allows tracing the execution according to the interaction perspective of all involved parties or systems. In this way, the organizational perspective is captured by the tool. Each swimlane corresponds to a single subject, such as to 'Employee', 'Manager', and 'Human Resource Admin'.

Moreover, the swimlane presentation of a process execution allows controlling the execution of a process, and analyzing the timeline for potential improvements. Consequently, a business process can be re-designed with respect to its effectiveness and efficiency before coming into operation. Of particular interest is the recognition of bottlenecks, which become visible through specific communication patterns.
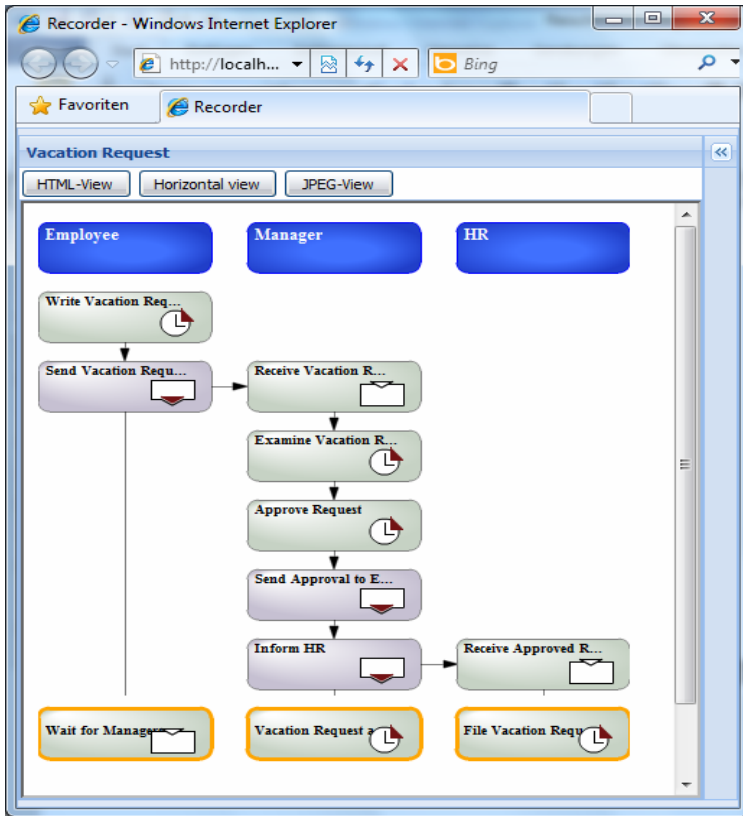

Fig. 6. Ensuring the organizational perspective

As each version can be stored separately, and re-executed at any time, Metasonic also provides some kind of OM. However, it would help to store (other) stakeholder inputs, such as annotations in text form, together with each variant of a process model according to the structure of the OL framework. Such a memory would allow tracing each organizational learning step, still focusing on process specifications when negotiating changes on the organizational level (cf. Stary, 2011).

4   Conclusion

Although Subject-oriented Business Process Modeling (S-BPM) has been used in organizational and workflow development projects for several years, its capabilities

have not been explored accordingly. We have reviewed the methodological support for the development process, and the respective tool support when taking the subject-driven approach to organizational deployment.

The requirements for tool support, such as the appropriate level of task description for stakeholders, have been derived from an organizational learning framework. Metasonic, the most prominent tool for S-BPM and participatory organizational development, has been revisited with respect to a number of specific features required to achieve organizational change including workflow support.

While supporting the integration of communication-oriented modeling concepts with function-oriented ones, tool support needs to be more specific in each step of organizational development for stakeholders. On one hand, the various phases in organizational development should frame the individual modeling and deployment activities. On the other hand, active support of collective reflection when developing alternatives and reflecting proposed changes could comprise annotations of models, e.g., to capture comments from stakeholders. We envision some kind of OL-wizard to guide stakeholders in modeling, reflecting, and deploying alternative ways of task accomplishment.

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