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COLLABORATIVE PROCESS MODELLING - TOOL ANALYSIS AND DESIGN IMPLICATIONS

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Abstract

Business process modelling is an integral component of Business Process Management and is, by nature, a collaborative act that involves many stakeholders. Process modelling initiatives, while not able dependent on technology, are often supported by one or more dedicated commercial software tools. However, while a broad range of process modelling aspects have been researched, little is known about how to support modelling with collaborative tools. Accordingly, we aim to elicit a better understanding of the nature of collaborative process modelling and its support in modelling tools. Our study is based on the assumption that tool designers hold certain conceptions about how people use modelling tools and that such conceptions become inscribed in the tools. By analysing and classifying a sample of modelling tools, with regards to their collaborative features for supporting the modelling task, we aim to elicit an understanding of the collaborative aspects of process modelling. Our study finds only very fragmented collaborative functionality across our tool selection and builds on these findings to suggest a high-level architecture for collaborative support in process modelling tools.

Keywords: Collaborative Business Process Modelling, Modelling Tools, Tool Analysis, Collaborative Architecture.
1 Introduction

Business Process Management (BPM) is an approach for managing, transforming and improving organisational operations (Hammer 2010). It is thus being of key interest to organisations wanting to stay competitive in today’s fast changing markets. An integral component of BPM is conceptual modelling, which aims to graphically represent the core processes within the organisation such that they can be analysed, improved and managed. The task of creating these models must be accomplished in a collaborative manner (Rittgen 2009), because different stakeholders are usually involved in the task. For example, domain experts hold the knowledge of the organisational domain, which is the object of modelling, and external consultants often work together with the respective business process department. Given the time and communication required, a significant amount of resources is invested to support process modelling in organisations. Despite the resource investment, however, it is likely that the stakeholders will encounter the same well-known problems experienced by other work groups, in particular the difficulties in effectively combining and reconciling their knowledge and interpretations into one model (Dean, Orwig et al. 1994; Pendergast, Aytes et al. 1999; Dean, Orwig et al. 2000; Rittgen 2009), which may negatively impact the quality of produced models, and thus the potential of process improvements.

Consequently, collaboration in process modelling, and respective tool support, is an important research topic in the context of BPM. However, while significant focus has been placed on research concerning process modelling, such as modelling grammars, and methods, little is known about the modelling activity itself, i.e. how people model, what the nature of the modelling task is and how to support people with collaborative tools in their modelling endeavours. Few studies to date have investigated collaborative process modelling, and those studies have exclusively been based on prototype implementations of tools and experimental research (e.g. Rittgen 2009, 2010). Given the abundance of research in the BPM field, our understanding of process modelling in practice, the nature and anatomy of process modelling tasks and how tools can suitably support the collaboration in process modelling is surprisingly limited. At the same time however, the model quality is an outcome of how the modelling is undertaken, with model quality yielding high impact on the success and impact of BPM initiatives. To this end, we aim to take a first step towards understanding how process modelling evolves in practice.

As such, our study is based on an analysis of existing commercial software products, which have a strong focus on the process modelling component. Our main aim is to learn about the collaborative nature of business process modelling by analysing how commercially available tools support modelling in practice. Our research design is grounded in the concept of technology inscription, which has its roots in the Social Construction of Technology (SCOT) (Bijker et al. 1989). The theory poses that social interests and conceptions, by way of design, become inscribed in material or technical artefacts (Akrich 1994; Callon 1991). Hence, we assume that existing process modelling tools contain their designers’ understanding of process modelling as a task, and of how to support the required collaborative practices. By way of tool analysis and classification, we develop an initial understanding of collaborative process modelling tasks as understood by tool designers, and derive a high-level architecture for supporting the collaborative aspects of process modelling.

To this end, we derive and define collaborative evaluation criteria for reviewing collaborative modelling tools and apply the criteria to evaluate a selection of relevant modelling tools, with a strong focus on their feature sets for supporting collaborative modelling. Based on this analysis we propose our architecture for supporting the collaborative aspects of business process modelling, which is based on the interplay of three main dimensions: modelling roles & workflow, awareness creation, and communication support. Our findings aim to give directions for further research. They further present implications for tool design with regards to supporting collaborative activities in the process modelling act.
2 Research Background

2.1 Business Process Modelling

Conceptual modelling is an approach for visually representing selected phenomena in a certain domain for the purpose of designing an information system (Wand et al. 1995). Process modelling distinguishes itself from the ‘traditional’ conceptual modelling (e.g., data modelling), by focusing on phenomena enacted by humans rather than machines (Curtis et al. 1992). Here, the modelling task is a matter of capturing, in a correct and fitting way, the workplace activities and their relationships as performed by human actors. In practice, business process modelling (or process modelling) is among the highest ranked purposes for which conceptual modelling is undertaken (Davies et al. 2006). However, research on the act of process modelling, i.e. the modelling task itself, is very limited. The most elaborate area of process modelling research in Information Systems is concerned with modelling grammars (languages, techniques or paradigm). Accordingly, existing research in the field often proposes new grammars or evaluates and improves existing grammars. For example, in her review of business process modelling, Aguilar-Savén (2004) describes prominent modelling grammars and analyses their strengths and weaknesses from a user and modeller perspective. Existing research on process modelling tools and methods draws a similarly colourful picture: For example, Georgakopoulos et al. (1995) give an overview of workflow management methodologies and software products, while Giaglis (2001) presents a taxonomy for evaluating process modelling grammars, based on the work by Curtis (1992).

Much of the past research on process modelling is normative in nature (Moody 2005), as many works “propose new artefacts [e.g., grammars, tools, or methods], make claims on benefits and performance, and advocate adoption in practice based on an illustrative example” (Recker 2008, p. 44). Perhaps this is why some authors in the field have lamented the relatively small number of empirical and theoretical studies on process modelling (e.g. Eikebrokk et al. 2008; Indulska et al. 2009).

2.2 Collaborative Process Modelling

While a range of works in the BPM field propose novel modelling methods or grammars that allow for describing ‘collaborative processes’ (Ryu and Yücesan 2007), i.e. business processes that are inherently characterised by a high degree of collaboration, collaboration in the modelling task itself remains widely unaddressed. This situation is all the more remarkable given that, in diversified and globally acting companies, processes, more often than not, span geographic and organisational boundaries and so does the modelling thereof, carried out by teams of people in diverse, often inter-organisational teams, working collaboratively towards creating a model, having to rely on tools. Group work challenges become even more aggravated in virtual contexts, where groups work geographically distributed and have to draw on ICT for collaboration (e.g. Riemer & Klein 2008).

Process modelling increasingly occurs in distributed (e.g., cross-organisational, cross-geographical) contexts, thus presenting modellers (with different background, interpretations, knowledge, and skills) with various challenges (Adamides and Karacapilidis 2006). Therefore, the study of the collaborative nature of process modelling warrants researchers’ attention.

While, to the best of our knowledge, no rigorous research exists that portrays the anatomy and collaborative nature of business process modelling as a task in practice, some research on tool support for modelling tasks exist, which we adopt as a starting point for our study. For example, (Pendergast, Aytes et al. 1999) created a prototype process drawing tool and investigated matters of awareness needs in the modelling process. Other authors have investigated the involvement of different people in a typical modelling workflow (Dean, et al. 1994), derived normative guidelines for tool use in joint modelling (Dori, et al. 2004) or developed and tested certain tools for joint modelling (Meire et al. 2007, Rittgen 2009, 2010). We will draw on some of these studies in our later discussion.
3 Tool Review: Criteria and tool selection

3.1 Criteria Genesis

In order to select, classify and analyse business process modelling tools, we develop a set of criteria that describes and distinguishes modelling tools with regards to their core focus, i.e. the modelling of business processes, as well as the collaboration aspects. Our list of evaluation criteria (see table 1) was derived through a combination of literature analysis, scenario analysis and bottom-up criteria identification (the latter being carried out concurrent to the actual classification process).

In the first step we described a hypothetical modelling situation and derived a set of criteria (in terms of tool functionality) that each tool should ideally possesses to cope well with the requirements of the scenario. In doing so, we used the criteria for collaboration support as derived in (Riemer 2009). This activity led to the identification of an initial set of criteria, with which we then classified the tools. Concurrent to this classification process, we added new criteria, whenever we identified a feature (e.g. in the tool itself or its documentation materials) that was not in the list but added meaningfully to our project. Already classified tools were reclassified whenever this occurred. This was particularly necessary in order to derive criteria (i.e. in terms of tool features) that are specific to collaborative activities in process modelling, as generic collaboration features need to be reinterpreted for the modelling context. At the same time, we excluded tools from our list if they did not meet minimum requirements for process modelling and collaboration support (see section 3.5). The following scenario, which we used for criteria identification, is useful to set the scene for the remainder of our analysis; the criteria are described in subsequent sub sections.

“A geographically distributed team needs to jointly model a business process. In order to do so, they need to discuss, design and document a business process model in a collaborative manner. Therefore want to use a commonly known modelling notation (e.g. BPMN) with template support. The people in the team will assume different roles throughout the process, with someone being in charge of the modelling, while others deliver information or review the model. A specific workflow for process creation allows each of the team members to contribute according to their respective role. Throughout the process, team members need to communicate with each other in order to explain changes and coordinate the joint modelling. They also need to agree on terms and definitions. While modelling, it is paramount that people stay informed of changes made by other team members, including time, author and types of changes made. Such changes might lead to modelling conflicts, which need to be handled. To receive feedback team members want to present models to external stakeholders as read-only versions.”

3.2 Process Modelling Criteria

For a modelling tool to be considered, it had to support one (or more) of the following, most commonly used, process modelling notations: 1) Event-Driven Process Chains (EPC), 2) Business Process Modelling and Notation (BPMN), 3) Unified Modelling Language (UML) or 4) Integrated Definition (IDEF).

The general support of process modelling is captured by criteria such as asynchronous, concurrent and synchronous modelling, next to template support, framework support, phase management and the presence of a correctness checker. Asynchronous modelling is the most common situation in model creation, where a process model is started by one user, stored on the hard drive or in a repository and another user continues the modelling at a different time, possibly from a different location. In contrast, synchronous modelling is done when the members of the modelling team are designing the model at the same time and working on the same object together. They do not necessarily need to be co-located but can see any changes made in real time. In concurrent modelling it is sufficient if each modeller can model their part separately and commit the changes to the shared model. Templates and a correctness checker are important for collaborative modelling, as they facilitate consistent modelling between sev-
eral modelling teams and foster the correctness of the business process models. If frameworks (e.g. Archimate TOGAF or Zachman framework) are supported, they help the modellers with a common understanding of the modelling context. Furthermore, phase management helps to clarify the roles and responsibilities within defined steps of the modelling process, which benefits role-based coordination among team members.

<table>
<thead>
<tr>
<th>Process Modelling Criteria</th>
<th>Collaboration Criteria</th>
<th>Technical Criteria</th>
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<tbody>
<tr>
<td>Process Modelling Notations</td>
<td>Commenting and Annotations</td>
<td>Export</td>
</tr>
<tr>
<td>EPC</td>
<td>Model Comparison</td>
<td>File: Own</td>
</tr>
<tr>
<td>BPMN</td>
<td>Links: Processes</td>
<td>File: PDF</td>
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<td>IDEF</td>
<td>Links: Files</td>
<td>File: XPDL</td>
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<tr>
<td>UML</td>
<td>Links: Web Resources</td>
<td>File: PPT</td>
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<tr>
<td>Support for Process Modelling</td>
<td>Chat Functionality</td>
<td>File: HTML</td>
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<td>Asynchronous Modelling</td>
<td>Glossary Support</td>
<td>File: Word/RTF</td>
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<tr>
<td>Concurrent Modelling</td>
<td>Discussion Board</td>
<td>File: XLS</td>
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<td>Synchronous Modelling</td>
<td>Member List</td>
<td>Graphic: BMP</td>
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<td>Templates definable</td>
<td>Comments: Element Level</td>
<td>Graphic: JPEG</td>
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<tr>
<td>Framework support</td>
<td>Comments: Process Level</td>
<td>Graphic: PNG</td>
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<tr>
<td>Phase Management</td>
<td>User and Roles Management</td>
<td>Import</td>
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<td>Correctness Checker</td>
<td>User Management</td>
<td>File: Own</td>
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<td>Roles Management</td>
<td>Architecture</td>
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<td>Support of Task Sharing</td>
<td>Client/Server</td>
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<td>Workspace Awareness</td>
<td>Desktop-based</td>
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<td>Repository and Conflict Management</td>
<td>Web-based</td>
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<td>Repository Remote</td>
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<td></td>
<td>Version Control</td>
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</tbody>
</table>

Table 1. Evaluation Criteria

3.3 Collaboration Criteria

The commenting and annotations criteria (see table 1) includes support for commenting on a process and/or elements thereof. While the latter directly clarifies a certain element within a business process model, the first explains the purpose of the entire model. In order to compare any changes made to a model by another team member, the comparison feature is important. The way this is technically realised can differ from visual comparison to detailed change reports, but the feature enables the modelling team to find and understand differences in an efficient manner. For supporting the modelling in sub teams, links within models can be set to other processes or sub processes. That way, sub teams can share their modelling work by focussing on different parts of the overall process. Moreover, links to files and web resources can be set for further documentation. Chat functionality allows team members to quickly coordinate their actions while modelling, and discussion boards and member lists enable them to share ideas in an asynchronous manner. A glossary helps support consistency in the terms used during business process modelling.

Not every employee has the same competencies and duties. User and role management transfers this idea to modelling tools. As mentioned above, effective modelling requires a modelling team with certain skills and roles. Roles clarify responsibilities, support internal workflows and allow access control. The difference between a user and a role is that a role is not necessarily linked to a certain set of user rights. The role of someone within the modelling team is therefore independent of his user rights although the role “model owner” may still have the most rights. Some roles like the model expert, the so-called facilitator, are required to ensure model quality (den Hengst 2005). Especially in bigger teams, where coordination becomes a challenge, a task management feature is helpful to keep track of work packages that are distributed to the team members. Workspace awareness like automatic E-Mail notification, if changes to the models occur, enhances the communication and efficiency between the team members.
In the criteria cluster *repository and conflict management* the presence of a repository is evaluated, which can either be installed on the local workstation or as a remote resource. A repository is an administrated directory for storage and documentation of digital objects. Usually version control is incorporated into the repository system; it helps to keep track of the changes made to a business process model and supports the users in conflict solving.

### 3.4 Technical Criteria

By including technical criteria we aim to provide a richer description of the analysed tools. Moreover, *architectural aspects* have a bearing on the nature of collaboration. For example, while client/server architectures require the participants to install a certain software component on their local computers, a web-based architecture might facilitate inclusion of a wider circle of modelling partners. Moreover, the *export feature* supports the modeller by allowing the model to be independent of a particular tool for the purpose of exchange with a wider audience. The export and import criteria therefore cover different file formats, and can be used for exporting and importing process models. This may be for distributing the model to others, working with it in other tools, for reporting or any other reason.

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**Figure 1** Tool Selection Process

### 3.5 Tool Selection Process

The selection process of the tools is summarised in Figure 1. The initial list of process modelling tools was derived from online sources\(^1\) and existing research (e.g. Paz and Framinan 2008); this list comprised 49 tools. The tools were classified using the initial set of classification criteria. In the next step, we excluded from the list those tools that did not have their focus on supporting process modelling (e.g. those with a focus on process controlling). This sampling is appropriate as our intention is to learn about modelling as a task, as inscribed in the products. The remaining list of thirty-three tools was further analysed with regards to collaborative features. In this step, we excluded all those tools that did not show any significant support for collaborative modelling, as these were not suitable to contribute to the main aim of our study, i.e. to learn about collaborative modelling. As a result, twenty tools remained for which we asked the developers or vendors for a test version or guest login, to perform an in-depth analysis and full classification. Consequently, eleven tools remained for which we performed a full classification and, hence, gained a qualitative understanding of their approaches for supporting collaborative modelling. Table 2 shows the full classification for the eleven tools; it also provides for illustration purposes an example (SILVERRUN BPM) of those tools, which we excluded in the second sampling step, as they did not show significant support for collaborative modelling. Given the page limitation, for the purpose of illustration and discussion we select seven tools on this

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\(^{1}\) We used the following lists for guidance: [http://www.bpms.info/index.php/Table/BPA/](http://www.bpms.info/index.php/Table/BPA/) and [http://www.bpiresearch.com/Resources/Product_Watchlist/product_watchlist.htm](http://www.bpiresearch.com/Resources/Product_Watchlist/product_watchlist.htm)
paper, which we describe in more detail below. Together, these tools provide an overview of the state-of-the-art of collaborative features in our tool sample.

4 Tool Evaluation

4.1 Collaborative process modelling support

Overall, the support for collaborative modelling tasks, across our sample of tools, was surprisingly low and rather fragmented. No product stands out that provides adequate collaboration support with a wide range of features or good integration with the actual modelling editor. This is particularly true when comparing our tool sample with the feature sets and implementations in dedicated collaboration systems and other editors for collaborative work, e.g. for collaborative writing (Riemer 2009). While no tool provides comprehensive support, each of the seven tools discussed in the following sub section provides some interesting features or follows a particular approach to facilitating collaboration in process modelling. Hence, while we did not find a good stand-alone collaborative modelling tool among those established BPM solutions in the market, if we consider all tools in our samples taken together we begin to see a potential architecture for a collaborative process modelling suite. In the following, we provide detailed accounts of each of the seven tools, before we discuss how the list of fragmented features, taken together and expanded upon, might serve as a basis for future developments towards collaborative modelling support. Summarised evaluation results are shown in Table 2.

4.2 Overview of selected products and their collaborative support

The philosophy of ARIS regarding collaborative process modelling is a role-based modelling approach, where each user can access a central model repository in order to participate in the modelling process. To this end, ARIS Business Designer incorporates a change management module. Proposals for change and improvement can be made for all objects and models. Each user can directly enter their proposal with or without consulting the process manager. An improvement manager can then review the proposals and set priorities, status and persons responsible for implementing the measure. If changes are accepted, the assigned modeller will receive a modelling task in his task list. Moreover, ARIS provides functionality for displaying models on a website for sharing with relevant stakeholders, while a (public) web-based discussion board is open to all modellers, but mainly for general discussions. With the WYSIWYG report builder a modeller can report about progress and send reports to colleagues for approval or commenting.

CA ERwin Process Modeller provides a Visual Diagram Compare function, which aims to support conflict resolution, when modelling in parallel. To view differences, a colour shade is assigned to any altered diagram objects. It is possible to only show substantial changes, so that pure visual changes (e.g. repositioning of elements) are not shown. Furthermore, ERwin supports scripts with configurable criteria that can be used to find changes in the provided change list. Automatic generation of change and conflict reports furthermore complement the feature. All in all, these features support the coordination of concurrent modelling and provide awareness for changes made by other users.

In IBM WebSphere Business Modeller Advanced, the modelling group is supported by a BPM phase management functionality. A predefined set of roles allows task sharing between a leader, an architect or senior business analyst and a publisher. The publisher role is especially needed if a publishing server is used. In that case the person is in charge of moderating the discussions and managing the content on the server. The publishing server displays projects using a process portal and handles comments that reviewers can enter as feedback.

2 It is not our intention to provide a representative market overview of collaborative support in modelling tools, but rather to learn from the tools regarding how tool designers conceive of modelling as a collaborative task.

Table 2  Summarised Evaluation

4We were able to obtain test versions and fully classify eleven tools that matched our criteria (see section 3.5). SILVERRUN BPM is provided as an example of tools excluded from our analysis due to lack of collaboration support.
**iGrafx Process Modeller 2011** also provides *phase management*, called the ‘document approval process flow’. Every repository in the so-called Process Central module has a reviewer group, an approval group and an endorsement group. Within the review cycle users can *review and annotate the models*. In the approval cycle users approve the current model and in the endorsement cycle the users certify their understanding of and agreement with the model.

The **Team Review Tools in Sparx Systems Enterprise Architect** support the team in *posting and responding to comments linked with process elements*. Via the resource management module the *allocation of tasks* with different effort weights is possible. It is possible to define searches for changes, which supports collaborative modelling by enabling different roles to *receive change reports* as soon as something particular has changed and reaction is needed. Also, Enterprise Architect has a comprehensive and powerful *differencing utility*, which allows comparison of a model branch with a base-line model. If there are conflicting versions, *automatic conflict solving* is offered for simple cases and manual conflict solving otherwise.

**Signavio Process Editor** is web-based; a strength is the *sharing of models*. Besides normal invitations for registered users, it is also possible to grant read-only access to diagrams for external stakeholders or to *embed models into web-based systems* like websites or wikis. This feature allows a larger number of contributors to be involved in reviewing and commenting on a model. Workspace awareness is created by offering *automatic notification E-Mails* if a predefined model changes. Alongside the normal version comments, visual previews are shown to the user while they can browse through the distinct versions. Discussions are facilitated based on the version comments.

**BONAPART Collaborative** is the second web-based tool and the only one that offers *chat functionality*. Furthermore it offers a *predefined approval process* for releasing new process versions. Within this *internal workflow* certain process release states can be set. These can also be altered by read-only users, who are then able to perform final reviews without needing editing rights. The visual display is embedded in a normal Internet browser format so that clients do not have to install the product before using it.

## 5 Discussion

Drawing from the above descriptions, against the background of a social construction of technology perspective, tool designers perceive modelling as predominantly asynchronous; i.e. no product allows to model synchronously on the same object. Moreover, the tool descriptions above show that no product provides comprehensive, integrated support for collaborative business process modelling. However, each of the seven tools exhibits some features that are relevant and useful in the context of joint process modelling initiatives. Taken together, these features allow us to work towards an architecture for supporting collaborative process modelling. To this end, we group the features into three dimensions, *viz.*, modelling roles & workflow, awareness creation, and communicative support, which we outline in the following sub sections.

### 5.1 Workflow, role models and task distribution

Several tools feature the differentiation of roles with regards to particular responsibilities in the modelling process, as well as a predefined modelling workflow. Hence, modelling is seen as an act of coordinating various stakeholders working on the same set of models over time, i.e. in a certain sequence. Our analysis suggests that tool designers view a central repository as an important feature for facilitating collaborative process modelling. Models are held centrally and are made accessible to the modelling team. The repository is then complemented by role management and a (predefined) workflow, which is meant to facilitate effective coordination of the collaborative modelling process. The need for role differentiation is recognised in the literature as well; (Dean, et al. 1994) have shown that the involvement of knowledgeable individuals in different stages in the workflow fosters model completeness and quality.
5.2 Awareness creation and conflict resolution

A workflow and role model will only be the basis for facilitating collaboration on the actual object of attention, i.e. the model. What is further needed is support for coordinating changes to models or parts thereof. Thus, tools need to facilitate awareness for what various stakeholders (roles) change in order to allow others to review changes, make comments and agree or disagree with the changes. Pendergast et al. (1999) found a similar requirement - they conclude that awareness with regards to what has been altered in a model is a key factor for efficient convergence to a single model solution. Some of the above products display certain features in this respect, such as notification features, change reports, as well as differing functionality or dedicated conflict resolution support (which allows models to deal with the side effects of otherwise uncoordinated, concurrent modelling). However, no tool provides holistic and comprehensive awareness support. We conclude that awareness features help to stay on top of changes by other users in concurrent modelling situations.

5.3 Communication and discussion

Our analysis reveals that some designers appear to acknowledge, through their design, that modelling is a communication-intensive task. Some tools allow commenting on changes by others, facilitating a simple form of text-based discussion, although most tools do not provide any means for targeted discussions about certain elements, parts or areas of a process model. Generally, communication features do not exceed commenting or communication similar to simple discussion boards. We see this finding as problematic since recent research has stressed the necessity to facilitate communication; Dori et al. (2004) stress the need for multi-way communication among team members during modelling, while Rittgen (2009, 2010) stresses the discussion and negotiation character of modelling in his studies on the prototype implementation of the COllaborative Modelling Architecture (COMA) tool. We have identified BONAPART Collaborative as the only tool to offer some form of synchronous communication via chat.

5.4 Towards an architecture for collaboration support in process modelling

The above three feature areas will only be truly effective if they are intertwined and applied in conjunction, i.e. bearing on each other. Communication should tie in with the workflow and role-based responsibilities; different roles need different kinds of awareness throughout the stages of the modelling process, while roles should have an influence on how discussions evolve. While we have identified the importance of these three dimensions, their interplay, as well as specific applications and integration with existing products, needs to be the focus of future research. We acknowledge that our model only represents a high-level outline of an architecture, which requires further development.

Figure 2 presents a sketch of the proposed architecture. First, it shows that role management is intimately related to the process development workflow. This role concept would not only incorporate access rights, but also determine responsibilities in different stages of the workflow. The second concept, communication, supplements the role concept by supporting dispersed teams, which have to rely on asynchronous modelling and have a high need for communication and coordination support. The third concept, awareness, further supports these needs. The awareness functionalities clarify who (which role) did what (e.g. model changes), when (time), and where (concrete model).

Each of these concepts is interdependent; it relies on and strengthens the others. If, for example, a modeller releases a new model, the awareness concept should notify the respective role in charge of reviewing the model of any changes by using the communication functions. The reviewer might comment the changes, which would then be communicated to the modeller and the role for approving the final model.
6 Conclusion and outlook

In this paper, we analysed business process modelling products with the aim to elicit an understanding of the collaborative nature of process modelling tasks, in particular their tool-based support. We found surprisingly little support in existing modelling tools and only fragmented support for the various aspects of joint process modelling. However, an overall analysis and a combination of learning across the tools presented in this paper, allowed us to identify three relevant dimensions for supporting collaborative modelling. We have extended our findings to propose an initial, high-level architecture for tool support of collaborative process modelling.

Our study needs to be viewed in light of its limitations. So far, our findings are based on our interpretations of commercial process modelling tools. In doing so, we aimed to derive from the tools the collective view of tool designers regarding collaborative support, as inscribed in the artefacts. The obvious next step in our study will be to complement our tool analysis with a survey of tool designers/vendors. That way we will be able to triangulate our findings with the actual views held by designers and vendors regarding collaborative modelling, tool support, as well as future directions. Moreover, we will further complement our work with analyses of tool support in other areas of collaborative conceptual work, e.g. collaborative writing.

In light of this, we note that we did not find any support for real-time, synchronous modelling in existing tools. Further research is needed to investigate whether this finding reflects actual needs of modelers or only a particular stage in the evolution of process modelling tools. This aspects needs to be seen in particular against the emergence and later disappearance of the SAP Gravity synchronous modelling prototype implementation (Elliott 2009). All in all, collaborative support for joint business process modelling appears to be in its infancy, which offers abundant opportunities for Information Systems researchers. Foundational research is needed to better understand the nature and anatomy of process modelling as a task in practice, as well as applied and design-oriented research aiming at eliciting a more holistic understanding for the needs and means of collaboration support in process modelling endeavours. We see this study as an initial step in this direction.

References


