

# A Prototype for Supporting Novices in Collaborative Business Process Modeling Using a Tablet Device

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**Abstract.** Business process modeling is a decisive task as process models prepare the ground for business transformation and process improvement initiatives. However, modeling projects fall short of their initial aim when process participants are not involved in the act of model creation. The employees' individual process knowledge has been recognized as a crucial success factor to define high-quality process models that reflect a company's working procedures correctly. This paper introduces a prototype supporting collaborative modeling of business processes on tablet devices aimed at process modeling novices.

## 1 Introduction and Problem Statement

In today's fast-changing markets, companies are struggling to keep pace with constantly changing customer requirements [1]. New technologies (e.g. Web 2.0) lead to a high market-transparency, providing consumers with up-to-date information on product reviews, prices and alternative offers [2]. To face these challenges, companies are increasingly performing business transformation and business process improvement projects [3]. In this context, business process modeling is a decisive task. Process models do not only prepare the ground for process redesign initiatives but also foster the communication about working procedures amongst others [4]. However, enterprises encounter several obstacles during process modeling.

At first, process modeling is usually believed to be the responsibility of a few specialists only, rather than being recognized as an organizational task. If these specialists lack skills in translating staff comments and workshop documentations into proper process models, modeling initiatives will inevitably fall short of their initial aim [5]. We need to keep in mind that the process of model creation is highly subjective (cf. [6]). Second, employees' tacit process knowledge is essential to design process models that reflect a company's real working procedures (cf. [7]). Employees, having explicit knowledge of how business processes are executed on a daily basis, need to be involved in modeling projects [5]. This is especially relevant for inter-organizational business processes as companies tend to have isolated views only on processes within their own organization (cf. [8]). Thus, a collaborative (cf. [9]) and subject-oriented (cf. [10]) modeling approach, that integrates the process participants in model creation, is required. Instead of a specialist modeling a process end-to-end from an outsider's perspective, employees capture their specific work tasks as corresponding partial models [10]. As tablet devices are gradually adopted in the business

world, they can support collaborative business process modeling (CBPM). They can be easily shared within the workforce and thus help to consolidate employees' isolated views on a business process into one integrated process model [9], [11].

The aim of the paper is to introduce a prototype for CBPM using a tablet device. The prototype allows to collaboratively design process models using an intuitive user interface that is easily comprehensible even by process modeling novices. It supports the user to capture process-related knowledge (e.g. activities to be performed, roles etc.) in an intuitive way without requiring in-depth knowledge of specific modeling guidelines. However, all captured information can be automatically transformed and exported as BPMN (Business Process Model and Notation [12]) models.

The contribution of this research is twofold: at first, we introduce a concept supporting process modeling novices in transforming their tacit process knowledge into explicit models, a central success factor in modeling initiatives (cf. [5]). Second, we provide a prototype to foster collaborative and subject-oriented process modeling.

Our research follows the design science research methodology proposed by Peffers et al. [13]. This section describes the problem and motivates the context. In the next section, the objectives and the design of the artifact (prototype) are presented. A first demonstration of the prototype is described in section 3. Section 4 highlights the significance of the research. The paper is rounded off with a conclusion and an outlook.

## 2 Design of the Artifact

Several requirements derived from the problem statement and backed by literature arose on the prototype, a tablet application for process modeling by novice users:

(I) The first requirement of novice users visualizing business processes without having advanced knowledge in process modeling is an easy-to-understand user interface (UI) (cf. [14]). A process participant without any previous process modeling experience should be able to capture the main steps of his or her daily work without the help of a modeling specialist. Besides a well-designed UI, the modeling notation used by the prototype should be subject-oriented and easy to understand.

(II) The second requirement represents the prototype's support of CBPM (cf. [9], [15]). The user should be able to gather process information on her/his own, by interacting with coworkers on the same tablet, or by interacting with other users on different tablets. The information gathered by all users needs to be consolidated in a central database and made available to everyone involved in the modeling initiative.

(III) While the modeling approach is subject-oriented, process models are usually required to display the control flow using standard notations (e.g. BPMN) to comply with company regulations (cf. [16]). Thus, transforming the gathered process activities into BPMN syntax and exporting it in a standardized way is the third requirement.

(IV) The fourth requirement concerns the actual organizational use of the process model (cf. [5]). The prototype should enable process experts to adjust the BPMN model to fit the company's modeling rules and integrate it into the process repository.

With the implementation of our prototype, we developed an approach for fulfilling the presented requirements. A major challenge for tablet applications is to provide a slim and easy to use UI and simultaneously deliver a wide range of functionality [11]. Consequently, it is necessary to build on a modeling notation that is suitable for the

restricted modeling knowledge of novice users (requirement I). In that context, BPMN has emerged as a widely accepted industry standard. According to Recker [14], the existing amount of BPMN elements offers a huge diversification, which challenges novices to use it in the right way. As a result, we only picked the mostly used BPMN elements to be supported by our prototype: *start*, *end*, *activity*, *gateway*, *control flow*, *lane*, and *message flow*. We redesigned the selected elements to simplify them and to provide an easy-to-understand UI for unexperienced users (see Fig. 1). Users can name the current activity, attach a detailed description, and select internal or external preceding and succeeding activities. The number of possible predecessors and successors depends on the chosen connector. The description enables the user to include additional information (e.g. rules, input or output documents).

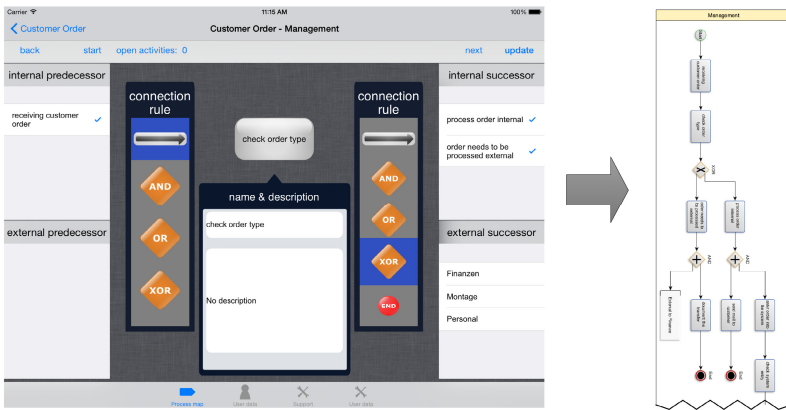
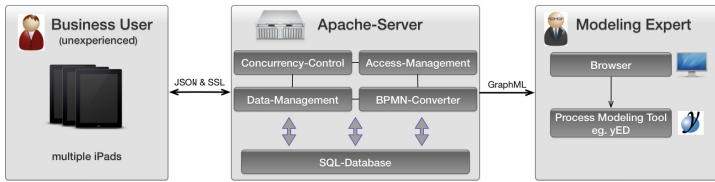


Fig. 1. Screenshot of the prototype and example export to BPMN via GraphML

Requirement II is the support of collaborative modeling. We achieve this by a client-server-architecture of the prototype that consists of three components (see Fig. 2): (1) A tablet application written in objective-C for use on iOS devices, (2) a PHP backend-server to manage the central database including user/role access and synchronize data on different devices, and (3) an export interface to convert the collected data into a BPMN model using GraphML as an exchange format. The architecture offers the possibility to work simultaneously on process models. To avoid concurrency conflicts, we prevent access to already opened processes temporarily, ensuring that only one user can edit a specific lane at a time. As users model their own view on the process only, lanes in the resulting process model are determined by the role of the user in the access management database (e.g. a user in the marketing department can only model a process in the marketing lane). To offer cross-system compatibility, we chose the open format *GraphML* (graphml.graphdrawing.org) for exporting the model as it provides the possibility to create models in BPMN notation (requirement III). The export is performed on the server and transforms the captured activities and dependencies stored in the database into proper BPMN syntax. The user can trigger the creation of an export file for each process lane on the tablet device when the lane is modeled completely (= has no



**Fig. 2.** Architecture of the prototype

undefined activities or ‘dead ends’). The modeling expert can then download the file(s) from the server and view, edit, or combine the BPMN models (one lane per file) with the free software *yED* ([www.yworks.com/en/products/yfiles/yed](http://www.yworks.com/en/products/yfiles/yed)) (requirement IV).

### 3 Demonstration

Following Peffers et al., the use of the artifact is to be demonstrated before its evaluation [13]. At first, feedback from four Master’s students proved that the artifact is fully functional and can be used for CBPM. As a next step, we demonstrated the artifact to three independent experts from different industries: The head of process and quality management of a German direct bank, the head of HR of an international power engineering company, and the head of process and quality management of a German financial services provider. The feedback we received from these three demonstrations was positive and provided us with helpful insights about the individual needs and wants from the practitioner’s side. All three pointed out that the idea of integrating the workforce into the process modeling activities would be beneficial for correctness of the derived process models as well as helping to keep the process models up-to-date. Additionally, the ‘fun’ aspect of using a tablet was seen as a good way to motivate employees to engage in process modeling activities, which is usually seen as ‘imposition’. However, some minor limitations of our prototype were seen as challenging for modeling very complex business processes. As a final step of the demonstration the prototype was presented at a conference for practitioners in the banking industry in front of an audience of approx. 30 professionals on the management and executive level. The discussion afterwards was positive and the feedback went along with the three interviews before. The idea of involving the individual employees on the operational level in process modeling was seen as very promising.

### 4 Significance of the Research

Our prototype is highly significant for research as well as for practice. At first, we provide a subject-oriented modeling approach which supports the transfer of employees’ individual process knowledge into a corresponding process model building on an easy-to-use UI. Novices in process modeling may thus participate in modeling projects providing their valuable in-depth knowledge on working procedures (cf. [5]). In addition, our approach contributes to current research on how to support modelers during the process model creation (cf. [6]). Further, by using a tablet device, practitioners profit from the advantages of mobile solutions as these can be shared among employees.

A user then captures those parts of the holistic process (s)he is responsible for. This helps to gather models representing the actual working procedures.

## 5 Conclusion and Outlook

This paper presents a prototype for CBPM using a mobile tablet device. The usability of the prototype was demonstrated in expert interviews and a live presentation at a practitioner conference in the banking industry. The positive feedback received so far encourages us to develop the prototype further. In a next step, the prototype will be evaluated in a real world context by using it in modeling projects at companies of different size and branch. The insights gained will serve as base for refining the prototype to better match practitioners' specific needs. More information about the prototype can be found at: <http://www-be.uni-regensburg.de/Projekte/BPMN-Tool.html.en>

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