A Tool for Natural Language Oriented Business Process Modeling

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Abstract Process modeling techniques play an important role to capture information about business procedures. This paper suggests two novel methods for business process modeling. The first method allows generating process models from process descriptions created with controlled natural language. This method is based on a parser for natural language and is supported by sentence templates and an autocomplete function. The second method suggests a collaborative setting, which allows discovering process models through user interactions. Both methods have been implemented in a prototype. The aim of this paper is to show new possibilities for process modeling through the combination of the two methods.

Keywords: BPM, business process modeling, natural language processing, bottom up approach, collaborative modeling

1 Introduction

Today organizations have to adapt and improve their business processes more often and on short notice. Thus, there is a need for effective and efficient methods for business process management. The documentation and modelling of existing processes is an important part in this context; but in many cases the results of process modeling projects (with current methods) do not fully comply with the expectations of the parties involved.

2 Approach

To demonstrate new process modeling possibilities, two methods have been developed and implemented within a protoype. The presented tool is an ASP.NET MVC web application executed in a web browser. In addition, there is a Ms Office-App available to have an integration into Office products, which are often used to present or describe process models. The prototype will be available at http://bpm.caporale.eu soon.

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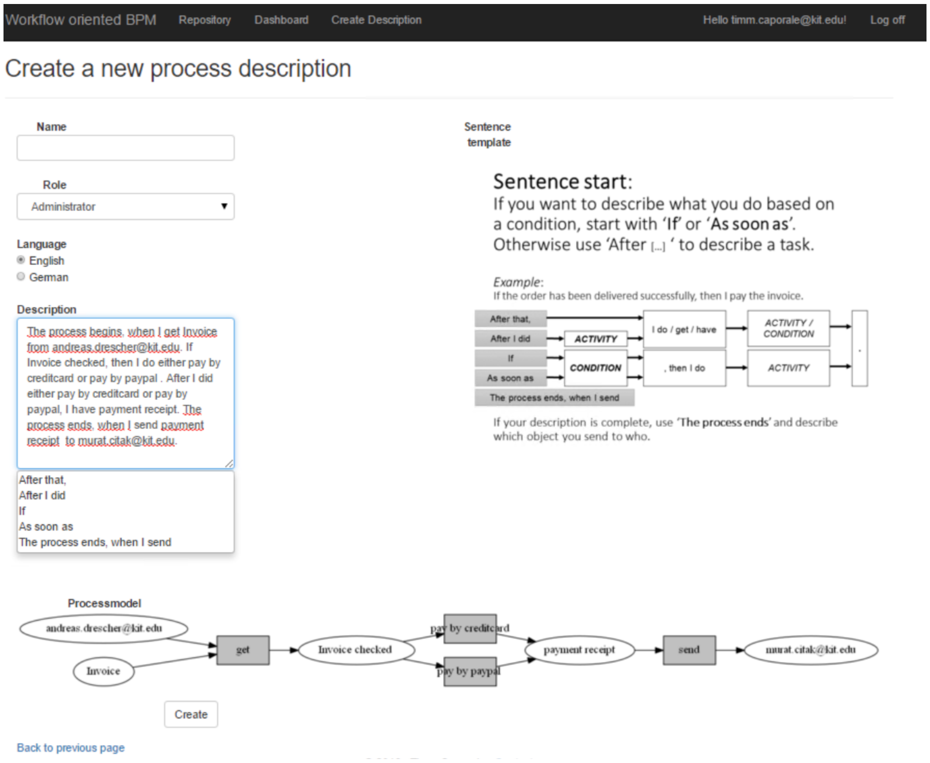
2.1 Generating Process Models from Natural Language

The first method presented in this paper, is an approach of generating process models from natural language text. Instead of analyzing descriptions of business tasks and then generating the process model (related approaches are presented in e.g. [2,5]), process modelers should use pre-defined templates to describe their business tasks in controlled natural language.

The method is based on so-called sentence templates. Sentence templates are often used to describe requirements for software development projects. They can be considered as a support technique, which helps the user formulating understandable sentences. With the help of these templates, the modelers are able to describe their business tasks in controlled natural language, which will be automatically transformed into a process model. For each basic workflow control-flow pattern (Sequence, Alternative, Parallel Split, Synchronization and Simple Merge), a sentence template has been defined for the German and English language. An example can be found in e.g. [4].



Create a new process description

Name

Role: Administrator ▾

Language
● English
○ German

Description

The process begins, when I get Invoice from andreas.drescher@kit.edu. If Invoice checked, then I do either pay by creditcard or pay by paypal . After I did either pay by creditcard or pay by paypal, I have payment receipt. The process ends, when I send payment receipt to murat.citak@kit.edu.

Sentence template

Sentence start:
If you want to describe what you do based on a condition, start with 'If' or '**As soon as**'. Otherwise use 'After [...] ' to describe a task.

Example:
If the order has been delivered successfully, then I pay the invoice.

If your description is complete, use '**The process ends**' and describe which object you send to who.

Figure 1. Screenshot of the web application

Descriptions that have been constructed using the sentence templates are automatically analyzed by the tool. For this purpose, the approach of [3] has been applied, which uses the ANTLR parser generator (http://www.antlr.org) to create a text-parser for the controlled natural language. ANTLR needs a grammar in customized extended Backus-Naur-Form. An excerpt of the grammar was published in [4] section 3.2. The text parser constructs an Abstract Syntax Tree (AST), where places, transitions and the control flow of a Petri Net can be identified. The process model that is generated from the AST is currently a Petri Net but can be transformed into other languages such as BPMN easily.

When a process modeler uses the tool, he will see a text-box on the left and the sentence templates on the right side of the tool. Synchronously to typing in the natural language text, a process model is generated at the bottom side of the tool and the sentence template is dynamically adjusted to the current context. In addition a recommender suggests possible formulations with respect to the current parser's state similar to an auto-completion function under the text-box (Fig. 1).

2.2 Workflow oriented business process modeling

The second method addresses the modeling process itself. Most of the existing modeling approaches aim to extract the process knowledge of an organization through e.g. expert interviews or workshops, which can be considered as a top down approach. In contrast, the method presented is a bottom up techniques for process discovery. The advantage of this method is to bring process modeling activities closer to the knowledge carriers. Assuming, that the tool for generating process models from natural language text can be used by knowledge carriers successfully, the following adaptions will lead to a novel collaborative setting.

The first adaption is, that the user only describes his own activities and has to provide information about the precondition and postcondition. A related approach is [1]. Information about the precondition can be formulated in natural language as well and include information about objects and persons. An example for a precondition in natural language is: *"As soon as I get a KPI-report (Ms Excel Document) from my colleague Linda (linda@example.com) I start with this process called KPI-report analysis."* Out of this sentence the text parser extracts information about the object 'KPI-report', the person Linda 'linda.example@example.com' and the process name 'KPI-report analysis'. An example of a postcondition is: *"Finally, I send the result of my KPI-analysis (Ms Word Document) to my boss (boss@example.com)."* Out of this sentence the parser extracts information about the object KPI-analysis and about the boss.

Whenever the user describes a process using the tool containing such preconditions or postconditions, the system will execute a workflow, which will inform the mentioned persons by e-mail. The e-mails will include information about the just created process and ask the receiver to provide more information to the system by clicking on a specially generated link within the e-mail. Clicking on the link will trigger a validation workflow on server-side and create a new process description for the new user that has been addressed within the e-mail.

When knowledge carriers use this collaborative approach and describe their own activities, the system will store many process models with connections between them. As this structures are similar to event logs, process mining techniques are applicable to discover more general process models.

3 Conclusion and Outlook

The presented tool combines a method for generating process models from natural language with a workflow oriented collaborative setting and shows new possibilities for process modeling.

As an outlook we assume, that the workflow oriented approach for business process modeling has several advantages. First, the fact that every knowledge carrier will only describe his own activities and will not make any assumptions about activities from other people could possibly reduce misunderstandings, which occur with other techniques when a process modeler has to understand the peoples' tasks. Second, the bottom up approach could be a new technique for discovering undescribed and unmentioned processes throughout the organization. It even even represents a new approach on Adaptive Case Management. Last, it is reasonable, that the e-mails send by the workflow tool could possibly cause a chain reaction for a new way of collaborative business process modeling.

The next steps include a first evaluation to get feedback about the described methods and improve the underlying modules and user interface.

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