Anyone can use Models: Potentials, Requirements and Support for Non-Expert Model Interaction

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ABSTRACT

Models play an important role in modern organizations. They are used to coordinate the interplay of stakeholders, inform the design of software systems and are even used for controlling purposes. While these models affect multiple people within an organization their creation and usage is limited to a few experts. This is due to the common belief that non-expert modelers are not capable of performing modeling tasks or working with models without the help of experts. With this paper the authors argue that people are capable of interacting with models when they are given the right means to do so. The authors shed light onto the potential benefits of non-expert model interaction by conducting multiple case studies and describing suitable tool support for non-expert modelers.

Keywords: E-Collaboration, European Union, New Working Environments, Research Funding, United States

INTRODUCTION

In modeling research and practice, it has been recognized that model creation and manipulation benefits from stakeholder involvement — such integration is considered to be essential when processes are documented, improved or newly designed (e.g. Herrmann, 2009; Schmidt, 1997; Suchman, 1995). Based on the insight that “users are experts and (...) designers (...) are technical consultants” (Schuler & Namioka, 1993), there are many approaches of participatory modeling, actively involving stakeholders. However, most approaches only allow users to inform the design of processes and leave the modeling work to experts. As a consequence, the interaction of users with models is limited to co-located situations guided or facilitated by experts. While this guidance is helpful in many ways, it is also time-consuming to schedule and conduct such workshops, as both experts and stakeholders need to be coordinated and need to cooperate in workshops. If stakeholders could actively engage in modeling tasks, this would allow them to prepare models for these workshops or adapting them to their needs. Limiting contributions by stakeholders to modeling workshops potentially reduces commitment to the process and also negatively affects the accuracy of the models (Prilla & Nolte, 2012).
due to two reasons: First, it slows down adaptations to models that capture changes happening in the real world. Second, it adds an extra loop of interpretation into modeling, as experts ask stakeholders and add their understanding of what they say about a process to a model. This also results in models being perceived as artifacts of experts with no implications on actual work (Prilla, 2010).

There is also a problem in model usage: Although models are tools for the documentation, analysis, design and improvement of processes, they are almost exclusively used by a small group of modeling experts and managers. Other members of the organization oftentimes are neither aware of models nor able to access them (see Prilla, 2010; Wand & Weber, 2002 for further descriptions of this problem). Furthermore modeling tools are difficult to use for non-expert modelers, which also limits active stakeholder involvement. So despite more user interaction with models being desirable, there are not many insights into whether and how non-modeling experts can use or manipulate models in a self-regulated, that is, non-guided way. However, our own experiences with e.g. participatory modeling workshops (see the section on Participatory modeling in practice) showed us that people are willing and capable of engaging more actively into model interaction than commonly supported. In this paper, we describe a stream of research motivated by these experiences. It investigates the question to what extent non-modeling experts can interact with process models and how this interaction can be supported by tools and interfaces.

In the remainder of this paper, we will analyze existing literature according to non-expert interaction with models, leading to four research questions (RQs). Based upon our previous experiences with participatory modeling we strive to answer these questions in three studies we conducted. Results of these studies lead to insights on non-expert model interaction and the description of prototypical modeling tools and interfaces we are currently developing to support this interaction.

**RELATED WORK AND DESCRIPTION OF DOMAIN**

At this stage, it is necessary to be explicit about the central terms used in this paper. First, by non-expert interaction with models we refer to actions of creating, referring to, using and manipulating models by a group of users who are neither experienced nor explicitly trained to work with process models. The term ‘non-expert’ thus only applies to the modeling skills of this group, not to their expertise in other domains. Second, we differentiate between using a model for certain purposes and creating or manipulating it. By using a model, we mean activities such as referring to it during communication or sharing knowledge with the help of a model. In contrast, activities of creating or manipulating models always lead to changes and will be subsumed by the term ‘modeling’ throughout this paper. Thus, despite this differentiation, this paper covers both of these activities and subsumes them by the term “interaction with models”.

This section will provide an overview of existing approaches of such interaction, covering stakeholder involvement into modeling, approaches of non-experts directly interacting with models and non-experts collaborating on models and showing challenges and gaps in these approaches and derive research questions.

**Participatory and Collaborative Modeling: Stages of Stakeholder Involvement**

Participatory and collaborative modeling approaches have been a focus of interest in various domains due to early criticism pointing out that without stakeholder participation models do not represent real processes (e.g. Schmidt, 1997; Suchman, 1995). As a result, there are multiple approaches of participatory model usage and design in fields such as process management (Dennis, Hayes, & Daniels Jr, 1999; Herrmann, 2009), system dynamics (e.g. Rouwette, Vennix, & Thijssen, 2000) and others (e.g. Dean, D.; Orwig, R.; Lee, J.; Vogel, 1994). All of these
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