Influence Factors of Understanding Business Process Models

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Abstract. The increasing utilization of business process models both in business analysis and information systems development raises several issues regarding quality measures. In this context, this paper discusses understandability as a particular quality aspect and its connection with personal, model, and content related factors. We use an online survey to explore the ability of the model reader to draw correct conclusions from a set of process models. For the first group of the participants we used models with abstract activity labels (e.g. A, B, C) while the second group received the same models with illustrative labels such as "check credit limit". The results suggest that all three categories indeed have an impact on the understandability.

1 Introduction

Even though workflow and process modeling have been used extensively over the past 30 years, we know surprisingly little about the act of modeling and which factors contribute to a "good" process model in terms of human understandability. This observation contrasts with the large body of knowledge that is available for the formal analysis and verification of desirable properties, in particular for Petri nets. To guarantee a certain degree of design quality of the model artifact in a wider sense, several authors propose guidelines for the act of modeling [1, 2] but yet with little impact on modeling practice. Clearly, an empirical research agenda is required for acquiring new insights into quality [3] and usage aspects [4] of process modeling.

Following this line of argument, a recent empirical study provides evidence that larger, real-world process models tend to have more formal flaws (such as deadlocks) than smaller models [5, 6]. One obvious hypothesis related to this phenomenon would be that human modelers lose track of the interrelations of large and complex models due to their limited cognitive capabilities [7], and then introduce errors that they would not insert in a small model. There are other factors beyond size that presumably affect the understandability of a process model such as the degrees of sequentiality, concurrency, or structuredness [8].

Validating such hypothetical relationships empirically would not only represent a major step forward towards understanding quality of process models beyond verification, but also provide a sound theoretical basis for defining guidelines for process modeling in general.

Since only little research has been conducted on quality aspects of process models so far [3,9], we approach this area with an experimental design focusing on the understandability of process models (*not* of process modeling languages). By having a online questionnaire filled out, we aim to gain insight into empirical connections between personal and model characteristics and the ability of a person to understand a process model properly. In particular, we want to find out how the textual content of the activity labels might influence understandability. Figures 1 and 2 show two process model variants that were included in the questionnaire.

Our contribution related to process model understandability is twofold. First, we operationalize understandability and identify three categories of factors, i.e. personal, structural, and textual, that potentially influence model understandability. Second, we present the findings from an experiment that tested the relative importance of these factors. Indeed, all three categories appear to be relevant according to a logistic regression model for the experiment data. Against this background, the remainder of the paper is structured as follows. In Section 2 we discuss related work and identify a lack of empirically validated insight on the understandability of process models. Then, Section 3 introduces the research design, in particular, the conceptualization of the questionnaire and the data that we gather. In Section 4 we present the results of the statistical analysis. Section 5 concludes the paper, discusses limitations of the findings, and identifies open questions that need to be addressed by future research.

2   Related Work on Understandability

There are basically three streams of research related to our work in the conceptual modeling area: top-down quality frameworks, bottom-up metrics related to quality aspects, and empirical surveys related to modeling techniques.

One prominent *top-down quality framework* is the SEQUAL framework [10,11]. It builds on semiotic theory and defines several quality aspects based on relationships between a model, a body of knowledge, a domain, a modeling language, and the activities of learning, taking action, and modeling. In essence, syntactic quality relates to model and modeling language; semantic quality to model, domain, and knowledge; and pragmatic quality relates to model and modeling and its ability to enable learning and action. Although the framework does not provide an operational definition of how to determine the various degrees of quality, it has been found useful for business process modeling in experiments [12].

The Guidelines of Modeling (GoM) [2] define an alternative quality framework that is inspired by general accounting principles. The guidelines include the six principles of correctness, clarity, relevance, comparability, economic efficiency, and systematic design. This framework was operationalized for Event-driven