An Empirical Review of the Connection between Model Viewer Characteristics and the Comprehension of Conceptual Process Models (Extended Abstract)[1]

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Abstract: Understanding conceptual models of business domains is a key skill for practitioners tasked with systems analysis and design. Research in this field predominantly uses experiments with specific user proxy cohorts to examine factors that explain how well different types of conceptual models can be comprehended by model viewers. However, the results from these studies are difficult to compare. One key difficulty rests in the unsystematic and fluctuating consideration of model viewer characteristics (MVCs) to date. In this paper, we review MVCs used in prominent prior studies on conceptual model comprehension. We then design an empirical review of the influence of MVCs through a global, cross-sectional experimental study in which over 500 student and practitioner users were asked to answer comprehension questions about a prominent type of conceptual model - BPMN process models. As an experimental treatment, we used good versus bad layout in order to increase the variance of performance. Our results show MVC to be a multi-dimensional construct. Moreover, process model comprehension is related in different ways to different traits of the MVC construct. Based on these findings, we offer guidance for experimental designs in this area of research and provide implications for the study of MVCs..

Keywords: Conceptual Modeling, Process Models, Model Viewer Characteristics.

1 Introduction

The complexity of contemporary information systems draws much attention to how their analysis and design can be supported by appropriate methods and tools. Efforts are spent on new techniques that support the modeling of system requirements and, increasingly, on how these techniques actually aid the analysis and design process. Of special interest in this stream are studies that focus on conceptual models as an aid to facilitate the comprehension of certain domain facts that relate to an information system, which will contribute to better design decisions and eventually a better system. Therefore, investigating the factors that influence the way people make sense of conceptual models is instrumental in improving the analysis and design of information systems in terms of their effectiveness and efficiency. Not surprisingly, conceptual modeling remains an

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active field of study, with contributions regularly occurring in the field's main journals. Studies that discuss the comprehension of various modeling artifacts acknowledge model viewer characteristics (MVCs) as a factor of influence. Various aspects of MVCs have been discussed in the literature, partially relating to theoretical knowledge, duration of practice, education, or familiarity. We observe, however, that MVCs are hardly considered prominently in research on the comprehension of conceptual models.

2 Findings

To examine the role of MVCs and the measurement thereof in explaining how well users understand conceptual models, several options exist. Our specific objective was to evaluate measures of MVCs and their impact on individuals' understanding of conceptual models. To that end, an experiment appears to be the best choice, also because it is congruent to past research in this area.

We set out to empirically examine how modeling expertise relates to model comprehension performance and, based on the results, develop and explore a multi-dimensional profile of modeling expertise. We find that layout plays a significant role for both comprehension performance as well as completion time. The position of a participant (student versus practitioner), by contrast, can only explain differences in completion time. As for the five MVCs, we observe that Familiarity, Intensity, and Knowledge can be used to explain performance differences. Education as well as Duration were not significant in this context. With respect to completion time, none of the MVCs appears to be a good predictor.

Our results affirm our contention that experiments in conceptual modeling literature would benefit from a more developed understanding of which MVCs need to be included in experimental designs. Our research is a first empirical exploration of this area and we hope future studies will further extend these ideas. Two avenues are particularly important in this regard. First, the development of a more sound theoretical basis to conceptualize MVCs and ideally also other elements of conceptual modeling pragmatics - the study of the contexts in which conceptual models are used. Second, the execution of more rigorous and systematic measurement development work to operationalize MVC as the multi-dimensional construct we found it to be. Third, prior studies should be replicated with MVCs being explicitly integrated into the data analysis. We hope that other colleagues will join us in these endeavors.