

Status Quo and Future Prospects in Data, Process, and Software Modeling – (Extended Abstract)

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Abstract: Models are humans' key instruments for managing complexity in description, development, and analysis. This applies to all scientific and engineering disciplines, and in particular to the development of software and data-intensive systems. Many methods and terminologies have become established leading to an increased need for a comprehensive and cross-sectional analysis of the past, present, and future of modeling research. The paper presented here was published in SoSyM and aims to shed light on how different modeling disciplines emerged and what characterizes them. We focus on software, data, and process modeling and report on an analysis of the research approaches, goals, and visions pursued in each, as well as the methods used. This analysis is based on the results of a survey conducted in these communities, on a bibliometric study, and on interviews with a prominent representative of each of these communities. In addition, we identify starting points for further collaboration.

Keywords: Research Communities, Software Engineering, Software Modeling, Data Modeling, Process Modeling, Information Systems

1 The paper's content

Motivation. In November 2018, 36 researchers from 15 countries met for a “Dagstuhl Seminar” at the Leibniz Center for Informatics (Wadern, Germany) with the title “Next Generation Domain-Specific Conceptual Modeling: Principles and Methods.”⁵ The focus was on domain-specific methods, as these are assumed to be more tailored to the needs of the particular user group or community and are less burdened with foundational and cross-community issues.

However, already on the first day, it became clear that even within this narrow scope, discussions about terminology, methods, and fundamentals had to be held. The participants came from different sub-disciplines of informatics in which modeling has an important position, e.g., software and systems engineering, database engineering, and business informatics. This led to a surprising broad variety of different views on, e.g., the term “conceptual modeling” and the notion of a “model”.

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⁵ www.dagstuhl.de/de/programm/kalender/semhp/?semnr=18471

Contribution. Our goal was to get insights into the various modeling communities, their topics and visions, and the foundations, methods, and terminologies they use. We have limited ourselves to looking at only three communities in more detail, namely *Software Modeling*, *Data Modeling*, and *Process Modeling*. At a first glance there seems to be little exchange between these communities, although they overlap slightly. They publish in different outlets (i.e., conferences and journals) and attend at different conferences, however, some topics are reoccurring in these communities. This makes it difficult, for example, for researchers, and especially, PhD students, to spread their work as widely as possible or to switch between communities during their careers. Motivated by these first insights we aimed to contribute to the improvement of this situation by conducting a systematic analysis of the state of the modeling research across and within the three modeling communities of data, process, and software modeling. With the study reported in [Mi24], we aimed to provide answers to the following questions:

Research Questions: Which were, are, or will be the main research topics and application areas? Which are the main foundations? Which are the main methodologies? Are there differences between research and practice with respect to research topics and application areas? What does modeling have to achieve to increase its importance in 10 years' time?

Exchange across communities and between research and industry: How often do researchers publish in different communities? What are the community-specific and the community-spanning research topics? How much cooperation do researchers want across modeling communities? What is the state of cooperation between practice and research and what do they expect from each other?

In formulating these questions, we have taken into account aspects of the *past*, the *present*, and the *future*. We used a mixed method approach that combined qualitative methods, e.g., interviews, and quantitative methods, e.g., data analysis, to respond to these questions.

References

- [Mi24] Michael, J. et al.: Quo vadis modeling? findings of a community survey, an ad-hoc bibliometric analysis, and expert interviews on data, process, and software modeling. *Software and Systems Modeling* 23 (1), pp. 7–28, 2024.