

Second Working Session on a Common Architecture/Infrastructure for Modelling Tools for Teaching

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Abstract. Many academic modelling tools have accumulated significant technical debt and lack of the nowadays quality standards. Following on from the success of the 1st working session on a common architecture/infrastructure for modelling tools for teaching, held at MODELS'23, which produced a comprehensive catalogue of requirements for modelling tools for teaching to be published in SoSyM, we propose a 2nd working session to focus on designs and implementations delivering on these requirements. The session will have a short programme of presentations, but will prioritise discussion and consensus-forming to work towards community-owned assets as the foundations for modelling tools for teaching.

1 Motivation

Modelling is an important activity in software development and it is important that students learn the relevant skills. Modelling relies on dedicated tools and these can be complex to install, configure, and use – distracting students from learning key modelling concepts and creating accidental complexity for teachers. To address these challenges, we believe that modelling tools specifically aimed at use in teaching (MTTs) are required.

Furthermore, many academic modelling tools developed in the past 20 years have accumulated significant technical debt. As a result, it is often difficult to maintain them even without adding new features, especially on modern operating systems and platforms. In addition, there is an increasing demand by users – and in particular by students – for online collaboration support when modelling. As a result, many academic teams are currently moving their tools to modern architectures. This requires a significant investment of resources, which can even be prohibitive for smaller teams.

1.1 Objectives

The purpose of this working session is to engage in productive discussions regarding the necessary infrastructure for modelling tools that are primarily intended for educational purposes. In the previous edition of this workshop at MODELS 2023 we focused on gathering the requirements of MTTs, i.e., the features that such tools should offer. We created a report (to appear in SoSyM soon) that presents the findings of this first edition, which includes the modelling-related and teaching-related functionality expected from MTTs, as well as recommendations of how MTTs should integrate with already existing tooling for teaching. In this second edition of the workshop we intend to explore the various challenges that may arise during the development and implementation of these requirements, and discuss strategies for overcoming these obstacles. In particular, we want to focus on sketching a common architecture for MTTs, as well as a set of reusable components for an ecosystem of MTTs.

1.2 Intended Audience

This working session aims at attracting participants who have been or are currently developing “academic” modelling tools, i.e., tools that are used for teaching purposes in either undergraduate or graduate computer science classes. Rather than following a typical workshop format, we do not intend to solicit written contributions and publish workshop proceedings. Anyone interested in the topic can attend. We are planning to send targeted invitations to the participants of last year’s edition of the workshop (approx. 25 researchers), and also to all research groups we know of that are (or have been) working on developing modelling tools. This includes for example:

- AtoMPM (Vangheluwe et al., Antwerp, Université de Montreal)
- Epsilon (Page/Kolovos, McMaster University/York University)
- MetaDepth (DeLara, University of Madrid)
- GeMoC (Combemale, University of Rennes)
- Melanie (Atkinson/Kühne, University of Mannheim, University of Wellington)
- Papyrus (Melanie Bats, Obeo)
- USE (Lars Hamann, University of Bremen, University of Malaga)
- Enzō (VanDerStorm, University of Groningen)
- WebGME (Karsai, Vanderbilt University)
- Picto Web (Kolovos, York University)
- MAR (Cuadrado, Universidad de Murcia)
- UMPLE (Lethbridge, University of Ottawa)
- ATLANMod (Tisi/Bourse, Nantes)
- Xtext/Langium (Dietrich, TypeFox)
- MPS (Vaclav Pechm, JetBrains)
- Gentleman (Syriani, Montreal)
- Freon (Warmer/Kleppe, Netherlands)

1.3 Topics of interest

We envision organising discussion groups around the following topics:

- Feedback on requirements by new participants
- Common architecture and/or patterns for integrating MTTs and related services
- Library of reusable components for MTTs (e.g., for graphical editors, for automated grading support, for collaboration support, etc.)
- Library of teaching materials, and how to provide them in an open format
- How to build up a community platform.

1.4 Relevance

Developing stable and usable modelling tools in an academic setting requires significant development effort and investment. Unfortunately, this effort is usually accompanied by too little reward in terms of academic certification. As mentioned in the introduction of this section, many academic modelling tools have accumulated significant technical debt, and several research groups are working on moving to a distributed system architecture with frontends, backends and modelling language services. It would be highly beneficial if these individual research teams could find ways to collaborate and combine their efforts.

1.5 Context

The proposed MTT workshop would be the second edition of this kind. The first one was held at MODELS 2023 in Sweden last year. We have reported on the results of this first edition with a report that contains a catalogue of requirements on future MTTs (to be published in SoSyM). We have also included in this report some quantitative data from an international survey conducted after the workshop that offers some evidence to help prioritise different requirements.

The feedback we got from our first workshop clearly shows that the MODELS community also thinks that developing the next generation of MTTs should be a community effort, and thinking about a common architecture and reusable components for MTTs is the natural next step.

1.6 Need

Modelling is a crucial aspect in many different software fields and beyond. It enables designers and engineers to efficiently explore the design space, and provides stakeholders with suitable representations of the system under study. Models are crucial in helping all involved parties understand, analyze, and design complex (software) systems. In fact, modelling is often considered to be the foundation of software development. However, there is an increasing difficulty of teaching modelling due to the challenge of creating tools that are necessary for the process. Challenges exist both on the academic side – where tools are often of lower

maturity and robustness – and the industrial side – where tools quickly become highly complex themselves, creating additional complexity for the learner.

We believe that it is of utmost importance for the modelling community to have a thorough and comprehensive discussion about what these tools should look like, what specific requirements they need to satisfy to be fully functional and useful, and how to effectively and efficiently reduce the accidental complexity that currently plagues the existing tools. Such a discussion should involve not only experts in the field but also stakeholders such as educators and researchers, in order to ensure that the outcome of the workshop intended as a “tool manifesto” are technically sound and “effective”.

This is the first time we are proposing such a workshop. However, the topic often emerged during other workshops or seminars (e.g., the Winter Modelling Meeting), so we concluded it needs a dedicated venue with a more systematic and prepared discussion. The outcome of the workshop will be reported in a position paper to be submitted to, e.g., the “expert voice” column in the SoSyM Journal.

2 Organization

2.1 Details on the Organizers

Jörg Kienzle is a contracted researcher at ITIS Software, University of Málaga, and a professor at the School of Computer Science at McGill University in Montreal, Canada, where he leads the Software Composition and Reuse (SCORE) lab. He is one of the developers of the TouchCORE modelling tool, which is currently being extended to support automated grading and interactive modelling assistance. He has organized over 30 workshops related to modelling and separation of concerns, and has been PC chair of MODELS and Modularity.

Steffen Zschaler is a Reader in Software Engineering at King’s College London and director of MDENet⁴, an international network on MDE funded by EPSRC in the UK. As part of MDENet, he has led on the development of the MDENet Education Platform⁵ – an online playground-based platform for teaching modelling. He has been the co-founder of several workshop series and co-chair of the PC for ECMFA 2023.

2.2 Workshop Program Committee

Since there will be no paper presentations or published proceedings, there is no need for a program committee. However, several individuals who have been involved in modelling tool development and have a position on the matter will be invited to ensure that the community is adequately represented.

⁴ www.mde-network.org

⁵ <https://mdenet-ep.sites.er.kcl.ac.uk/>

2.3 Merge: Yes**3 Workshop Format****3.1 Planned Deadlines**

Since we will not solicit any papers, there are no deadlines before the workshop. However, we will ask participants who are planning to attend the workshop to read the report of the last edition of the MTT workshop that presents an overview of the requirements for MTTs in advance. Participants (especially newcomers that did not attend the MODELS 2023 edition) that have feedback on the report or want to contribute additional requirements can let us know in advance, and we will allocate time for a short feedback presentation / discussion in the morning session.

3.2 Intended Paper Format

We will not solicit any papers.

3.3 Evaluation Process

We don't need to evaluate any papers.

3.4 Intended Publication of Accepted Papers

There will be no proceedings.

3.5 Intended Workshop Format

As mentioned already, rather than following a typical workshop format, we are not intending to solicit written contributions and publish workshop proceedings. Anyone interested in the topic can attend, and we are planning to send targeted invitations to all research groups we know of that are (or have been) working on developing modelling tools. We will ask the research groups to tell us in advance whether they are going to send a representative to the working session. We will ask the representatives that are attending to prepare a brief 5-10 minute presentation on the architecture of their modelling tool, as well as a short position statement on what kind of reusable components they could contribute or would be useful for them. These presentations will be held in the first morning session, which will allow us to prioritise the discussions sessions for the rest of the day.

3.6 Expected Number of Participants

We expect to have 25 participants.

3.7 Required Equipment

A projector and a whiteboard. Ideally, flipchart paper, post-its, and pens for flexible collaboration during the discussions.