Report from the 1st International Workshop on Collaborative Modelling in MDE (COMMitMDE 2016)

Sébastien Gérard, CEA, LIST (France) - sebastien.gerard@cea.fr
Dimitrios S. Kolovos, University of York (UK) - dimitris.kolovos@york.ac.uk
Ivano Malavolta, Vrije Universiteit Amsterdam (The Netherlands) - i.malavolta@vu.nl
Henry Muccini, University of L'Aquila (Italy) - henry.muccini@univaq.it

DOI: 10.1145/3041765.3041773
http://doi.acm.org/10.1145/3041765.3041773

ABSTRACT

COMMitMDE was the 1st international workshop on Collaborative Modelling in MDE, held on the 4th of October 2016 as a satellite event of the 19th International Conference on Model Driven Engineering Languages and Systems (MoDELS 2016), St. Malo, France. The goal of the workshop was to bring together researchers and practitioners in order to investigate (i) the potential impact of collaborative software engineering methods and principles into Model-Driven Engineering (MDE) practices and (ii) how MDE methods and techniques can support collaborative software engineering activities.

The 1st COMMitMDE workshop provided a forum to discuss the state of research and practice on collaborative MDE, to create new synergies between tool vendors, researchers, and practitioners, to inform the community about the new means for collaborative MDE, and to reflect on the needs and research gaps in the collaborative MDE area.

1. INTRODUCTION

A *collaborative* Model-Driven Engineering (MDE) approach is a method or technique in which: (i) models are first-class artefacts that drive both the software development activities and the other model-based tasks in the context of a software engineering process; (ii) at least one repository exists for managing the persistence of the models; (iii) at least one modelling tool [1] exists for allowing each stakeholder involved in the modelling activities to create, edit, and delete models; (iv) at least one communication means exists for allowing involved stakeholders to be aware of what the other stakeholders collaborating with them are doing (e.g., chat, social network, wiki, asynchronous messaging system, issue tracker); (v) at least one collaboration means exists for allowing involved stakeholders to work on the modelling artifacts collaboratively (e.g., model versioning systems, model merging mechanisms, systems for model conflict management and visualization).

The COMMitMDE workshop had the dual role of investigating the potential impact of collaborative SE methods and principles [2] into MDE practices, as well as MDE support to collaborative SE. More specifically, the objective of this workshop was to bring together experts in model-driven and collaborative software engineering in order to give evidence on the ongoing research and development on this topic. Such a high-level objective can be decomposed into the following details action points:

▷ Report on the state of research and practice on collaborative MDE;
▷ Create links among tool vendors, researchers, and practitioners;
▷ Identify needs and gaps in the collaborative MDE community;
▷ Inform the community about new means for collaborative MDE.

COMMitMDE 2016 solicited *regular research papers* with a maximum length of 10 pages proposing and discussing research results or industrial experiences related to collaborative MDSE, as well as *tool demonstration papers* with a maximum length of 4 pages presenting interesting tools supporting collaborative MDSE. In its first edition the COMMitMDE workshop received eleven submissions, of which five papers were accepted for publication and presentation during the workshop. Four invited speakers gave invited talks on selected topics of interest for the audience of the workshop. Overall, the workshop was attended by 38 attendees. The proceedings of the workshop are available on-line through the CEUR Workshop Proceedings series [3]. The COMMitMDE 2016 website is available on-line[1].

The program of the workshop comprised a full day of activities, which were split into four sessions, summarized below.

2. SESSION 1 SUMMARY

The first session comprised two invited talks.

In their presentation titled *Collaborative Model-Driven Software Engineering: a Systematic Mapping Study*, Di Ruscio and Franzago reported on ongoing work that, by looking at the literature on Collaborative Software Engineering, creates a *taxonomy for Collaborative Model-driven Software Engineering*. Three dimensions are identified: model management (the infrastructure for managing the lifecycle of the models), communication (supporting the involved stakeholders to be aware of the activities of the other stakeholders), and collaboration (allowing involved stakeholders to work on the modelling artifacts collaboratively). Each dimension comprises a multitude of parameters that have been elicited by and populated through systematic analysis of a set of primary studies. The speakers also provided a comprehensive picture of the state of the art on collaborative MDE.

In his presentation titled *Framework to Model Collaboratively*, Syriani defined the requirements for *multi-view* collaborative modeling and reported on the AToMPM collaborative MDE framework. Collaborative MDE, in Syriani's view, refers to collaboration on the same modeling artifact, on different parts of the same artifact, or on distinct artifacts that are part of the whole system. Therefore, a collaborative MDE framework needs to provide multi-view, multi-user, and multi-paradigm support. While focusing on multi-view modeling, Syriani identifies four different collaboration scenarios: multi-user single-view, multi-view (of the same model) single-model, multi-view multi-model, and single-view multi-model. In the second part of the talk, a multi-tenant, multi-user, cloud-based collaborative MDSE tool named AToMPM was presented.

[1] `http://cs.gssi.infn.it/commitmde2016`

3. SESSION 2 SUMMARY

Session 2 included three peer-reviewed articles.

In their presentation, titled *Deriving Effective Permissions for Modeling Artifacts from Fine-grained Access Control Rules*, Debreceni et al. presented a fine-grained (i.e. model-element level) rule-based access control approach for collaborative modelling, and a framework for resolution of conflicts between access control rules. The approach and the conflict resolution process were demonstrated through a case-study involving a modelling language for system integrators of offshore wind turbine controllers, developed in the context of the MONDO EC FP7 project (`http://mondo-project.eu`).

In the second presentation, titled *Approaching Collaborative Modeling as an Uncertainty Reduction Process*, Eramo et al. proposed a model-based approach to represent, manage and manipulate conflicting model versions in a collaborative manner. Their paper proposed to represent the combined solution space of all model versions as a unified model that accommodates uncertainty. The authors then defined a process to manage and eventually eliminate uncertainty in this unified model by selecting the desired model elements and relationships. The benefits were demonstrated through a motivating example involving business models.

In the last presentation of the session, titled *Engineering Process Transformation to Manage (In)consistency*, David et al. proposed an approach for managing inconsistency based on explicitly modeled linguistic and ontological properties. The authors argued that to fully understand the reasons behind inconsistency and its impact on the overall design, it should be investigated in the context of the process(es) it emerges in. In this direction, the authors proposed a language for modeling processes and properties of the engineered system. Characteristics of inconsistencies were identified in terms of process models and properties, and a method for optimal selection of management techniques was presented and demonstrated on a case study of a real mechatronic system.

4. SESSION 3 SUMMARY

Three talks were given within the third session including one keynote and two regular papers.

The keynote, titled *Scaling up MDE to support large geographically distributed teams - an experience report* and given by Vinay Kulkarni, reported on the author's experiences with applying model-driven engineering principles in Tata for more than 20 years. One important issue Tata was facing was related to ensuring the consistency between the various sub-models of the global system model. A lot of stakeholders, with different concerns, are involved in the development process. To cope with these issues, Tata defined a component abstraction to support the notions of private and public workspaces, and a protocol for synchronizing them.

In the second presentation, titled *Towards Inconsistency Tolerance by Quantification of Semantic Inconsistencies*, David et al. presented an analysis framework to quantify semantic inconsistencies. The rationale behind this approach is that it is more efficient to tolerate temporary inconsistency then to solve it later. The question that arises is: does the inconsistency need to be resolved immediately, or is it more suitable to delay it? The paper outlines a formal framework for managing inconsistencies that are raised when co-engineering is involved in developing a system.

The last paper of the session, titled *A model-driven approach for the development of CSCL tools that considers pedagogical usability* and authored by Molina Díaz et al. discusses the issues related to the development of collaborative tool design, and especially graphical modeling tools. The authors present a model-driven approach for the development of collaborative graphical modeling tools. The main novelty of this work is in the integration that has been carried out in order to obtain a method that considers technological factors as well as those about pedagogical usability.

5. SESSION 4 SUMMARY

The fourth session comprised an invited talk and a discussion session.

In his invited talk, titled *MDE Collaboration: Temporality and Ergonomy in the Cloud, the GenMyModel Solution*, Aranega presented the principles and characteristics of the GenMyModel project. Effort on collaborative modeling in GenMyModel started in 2014 with a strong focus on conflict management and change awareness. A tool demo demonstrated the results and challenges in concurrent and non-concurrent modeling, and the GenMyModel support to change awareness. Issues such as secure access and modifications, performance due to network latencies and server loads, and costs were discussed as well.

The discussion section mostly focused on the following questions.

Q1: what characterizes and distinguishes COMMitMDE from other MDE workshops and communities? Collaboration is orthogonal to many existing communities, being domain- and technology-independent. The Models and Evolution (ME), Flexible MDE (FlexMDE), and Globalization of Modeling (GEMOCS) workshops, among others, cover topics related to collaborative MDE. Still, COMMitMDE considers collaboration as a first class concern and provides a holistic view on it.

Q2: which topics should next editions of COMMitMDE give priority to? Challenges, issues, and potentials for a holistic view on collaborative MDE will be the main theme for the next edition. Industrial reports and talks from MDE tool vendors, MDE practitioners, and MDE projects will be sought.

Q3: who needs collaboration? Different stakeholders require collaborative modeling, including MDE experts collaborating on the definition of new metamodels, teams of practitioners collaborating on the realization of models, and quality assurance teams collaborating on the testing, verification, and validation of model-based specifications.

Q4: where do we stand? Many components of collaborative MDE have been presented and discussed in the literature, such as model synchronization, differencing, and versioning, and conflict resolution. Still, a clear assessment of where we stand is currently missing. Empirical studies are required to understand industrial needs, existing tool support and ongoing initiatives.

6. REFERENCES

[1] Marco Brambilla, Jordi Cabot, and Manuel Wimmer. *Model-driven software engineering in practice*, volume 1. Morgan & Claypool Publishers, 2012.

[2] Ivan Mistrík, John Grundy, André van der Hoek, and Jim Whitehead, editors. *Collaborative Software Engineering.* Springer Berlin Heidelberg, 2010.

[3] Henry Muccini, Ivano Malavolta, Sebastien Gerard, and Dimitris Kolovos. Proc. of the 1st International Workshop on Collaborative Modelling in MDE (COMMitMDE), On-line: http://ceur-ws.org/Vol-1717/, 2016.