

Preface to the JOT issue on the 19th European Conference on Modelling Foundations and Applications (ECMFA 2023)

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ABSTRACT In this preface, the editors present an overview of the topics and scope of the European Conference on Modelling Foundations and Applications (ECMFA) and describe the editorial and reviewing process for its 19th edition (ECMFA 2023). The papers selected for publication and presentation are overviewed, and the details about the keynote talk by Andrzej Wąsowski, professor in the IT University in Copenhagen, are given. Finally, the ECMFA committees are acknowledged.

KEYWORDS Model-based engineering, modelling foundations, modelling applications.

1. Introduction: About ECMFA

The European Conference on Modelling Foundations and Applications (ECMFA) is the premier European forum dedicated to advancing the state of knowledge and fostering the application of all aspects of Model-based Engineering (MBE) and related approaches.

Model-based Engineering addresses the design, analysis, and development of software and systems relying on exploiting high-level models and computer-based automation to achieve significant boosts in both productivity and quality.

This year ECMFA have relied on two independent rounds of reviewing, starting in November and February respectively. Authors of papers not accepted directly, had the opportunity to submit revised versions of their papers, which are reviewed again. This intended to improve the success rate and guarantee the quality of the published papers. This is fully aligned with the decision made in previous years of publishing the ECMFA accepted papers in a platinum open-access journal, namely, the JOT journal (<http://www.jot.fm/>), which is indexed by different organizations, including Scopus, DBLP, and Scientific

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Commons.

2. Submission and review process

ECMFA solicited two types of papers presenting original research on all aspects of model-based engineering:

- Foundation Papers, dealing with modeling foundations, such as metamodeling, model transformations, model validation, verification and testing, model engineering methods and tools, and related aspects.
- Application Papers, dealing with the application of modeling techniques, including experience reports on the use of MBE methods and tools, industrial case studies, or successful applications of MBE practices in industry or in public administration, with significant modeling lessons learned. All applications must have been done in real contexts and at least one of the authors of the paper must be from the company or administration where the application took place.

No simultaneous submission to other publication outlets (either a conference or a journal) was allowed.

2.1. Topics of interest

Topics of interest included, but were not limited to:

- Foundations of MBE, including model transformations, domain-specific languages, verification and validation approaches, etc.
- Novel paradigms, formalisms, applications, approaches, frameworks, or processes for model-based engineering such as low-code/no-code development, digital twins, etc.
- Interplay between MBE with and for AI-based systems.
- Application of MBE methods, tools, and techniques to specific domains, e.g., automotive, aerospace, cyber-physical systems, robotics, Artificial Intelligence or IoT.
- Successful use of MBE in connection with other disciplines and approaches, such as Artificial Intelligence, Blockchain, DevOps, or Open Source, Safety Assurance.
- Educational aspects of MBE.
- Tools and initiatives for the successful adoption of MBE in industry.

2.2. Review criteria and process

All submissions have been peer-reviewed by at least three members of the Program Committee, who assessed them in terms of their novelty, significance, technical quality, rigor, and suitability for the conference.

Contributions could be submitted to any of the two submission rounds in December 2022 and February 2023, respectively. In both rounds, the each submitted paper could be recommended by the Program Committee to be accepted as is, accepted with minor revisions, to undergo major revisions or to be rejected.

Papers accepted at any of the two rounds with major or minor revisions were given about five weeks to perform the revisions and re-submit. The same reviewers assessed how well the revision requests have been addressed by the authors, and whether the final paper maintained or improved the level of contribution of the original submission. Revisions that significantly lessened the contribution of the work or that failed to adequately address the reviewers' original concerns resulted in the paper's rejection.

3. Accepted papers

In the first round, ECMFA received 10 submissions. Two were given a minor revision, six a major revision, and two were rejected. All the minor revisions were successfully addressed by the authors and the program committee agreed to accept the papers. Of the major revisions, 3 successfully addressed the concerns posed by the reviewers.

In the second round, ECMFA received 19 submissions. One paper was directly accepted, three were given a minor revision, nine a major revision and six were rejected. All the minor revisions were successfully addressed by the authors and the program committee agreed to accept the papers. Of the major revisions, 5 successfully addressed the concerns posed by the reviewers.

In summary, from received 29 papers, 14 were accepted resulting in an acceptance rate of 48%. The list of accepted papers is as follows:

- Jan Oliver Ringert, Bernhard Rumpe and Max Stachon. On Implementing Open World Semantic Differencing for

Class Diagrams

- Josselin Enet, Erwan Bousse, Massimo Tisi and Gerson Sunyé. Protocol-Based Interactive Debugging for Domain-Specific Languages
- Florian Sihler, Matthias Tichy and Jakob Pietron. One-Way Model Transformations in the Context of the Technology-Roadmapping Tool IRIS
- Tiago Amorim, Alexander Boll, Ferry Bachmann, Timo Kehrer, Andreas Vogelsang and Hartmut Pohlheim. Simulink bus usage in practice: an empirical study
- Ryan Languay, Nika Prairie and Jörg Kienzle. Concern-Oriented Use Cases Tim Kräuter, Harald König, Adrian Rutle, Yngve Lamo and Patrick Stünkel. Towards behavioral consistency in multi-modeling
- Ionut Predoia, Dimitris Kolovos, Matthias Lenk and Antonio García-Domínguez. Streamlining the Development of Hybrid Graphical-Textual Model Editors for Domain-Specific Languages
- Sam Procter. The OSATE Slicer: Graph-Based Reachability for Architectural Models Achim Lindt, Bernhard Rumpe, Max Stachon and Sebastian Stüber. CDMerge: Semantically Sound Merging of Class Diagrams for Software Component Integration
- Jan Willem Wittler, Timur Sağlam and Thomas Kühn. Evaluating Model Differencing for the Consistency Preservation of State-based Views
- Iván Alfonso, Abel Gómez, Silvia Doñate, Kelly Garcés, Harold Castro and Jordi Cabot. A model-based framework for IoT systems in wastewater treatment plants
- Rubén Campos-López, Esther Guerra, Juan De Lara, Alessandro Colantoni and Antonio Garmendia. Model-Driven Engineering for Augmented Reality
- Edvin Herac, Wesley K. G. Assunção, Luciano Marchezan, Rainer Haas and Alexander Egyed. A flexible operation-based infrastructure for collaborative model-driven engineering
- Fadwa Rekik, Saadia Dhouib and Quang-Duy Nguyen. Bridging the Gap between SysML and OPC UA Information Models for Industry 4.0

4. Keynote by Andrzej Wąsowski

Andrzej Wąsowski, professor in the IT University in Copenhagen delivered on Friday, July 28, 2023, the keynote talk entitled “How I lost my faith (in language technology research)? There and back again.”.

4.1. Abstract

Modeling and language engineering have hardly ever been as successful as today. Whatever software domain you zoom into, you will find plenty external and internal modeling languages. Everybody is doing (multi-)modeling all the time. At the same time modeling has never been as invisible as it is today. Modeling is not a buzzword. Being a modeling-expert means not much, when everybody is a modeling expert.

In this talk, I will zoom in into two groups of modeling languages: reactive programming languages including behavior

trees and state machines (as used in robotics) and probabilistic programming languages (as used in data science). While looking at these examples closely, I want to answer three questions: Concretely how and by whom are these modeling languages engineered? Why and how should people be taught language engineering in 2023? And, finally, how can one be a modeling researcher in 2023?

4.2. Biography

Andrzej is a software engineering researcher, interested in software quality and safety. His goal is to help engineers build better systems, and to diagnose their weaknesses. This ranges from design, model driven engineering of software systems, design of languages, to bug finding, testing, static analysis, and verification. He studies actual systems in order to understand what quality problems can be addressed. He also designs new technologies, including modeling languages, code generators, or analysis and verification tools to improve quality of software. His recent interests are in AI and robotics, considering classical properties like safety and reliability, but also newer challenges like privacy.

Andrzej have worked with systems in multiple domains: robotics (ROS), safety critical embedded systems (such as an electric engine safety controller for an elevator), operating system kernels (Linux, Free BSD, eCos), and business software (such as an open source ERP system Open for Business). He has spent a lot of time researching software systems that are produced in families of similar products - the so called software product lines. He is very interested in work with Open Source communities and with industrial partners.

5. Committees

Following the ECMFA tradition, ECMFA 2022 had two Program co-chairs. They were:

- Steffen Zschaler, King’s College London (UK)
- Jesús Sánchez Cuadrado, Universidad de Murcia (Spain)

Despite the European nature of the conference, the Program Committee of ECMFA 2023 was composed of 36 international MBE experts from both academia and industry:

- Gabriele Taentzer, Philipps-Universität Marburg
- Matthias Tichy, Ulm University
- Dimitris Kolovos, University of York
- Davide Di Ruscio, Università degli Studi dell’Aquila
- Mehrnoosh Askarpour, McMaster University
- Adrian Rutle, Western Norway University of Applied Sciences
- Benoit Combemale, University of Rennes 1 & Inria
- Manuel Wimmer, Johannes Kepler University Linz
- Juha-Pekka Tolvanen, MetaCase
- Joost Noppen, British Telecom
- Gregor Engels, Paderborn University
- Athanasios Zolotas, Liverpool John Moores University
- Joel Greenyer, FHDW Hannover
- Bran Selic, Malina Software Corp.

- Alessandra Bagnato, Softeam
- Bernhard Rumpe, RWTH Aachen University
- Vadim Zaytsev, Universiteit Twente
- Mark van den Brand, Eindhoven University of Technology
- Esther Guerra, Universidad Autónoma de Madrid
- Antonio Vallecillo, University of Malaga
- Sebastien Gerard, CEA, LIST
- Andy Schürr, TU Darmstadt
- Lola Burgueño, University of Malaga
- Jeff Gray, University of Alabama
- Antonio Cicchetti, Mälardalen University
- Ludovico Iovino, Gran Sasso Science Institute, L’Aquila
- Alfonso Pierantonio, Università degli Studi dell’Aquila
- Javier Troya, Universidad de Malaga
- Shaukat Ali, Simula Research Laboratory
- Thomas Kuehne, Victoria University of Wellington
- Zinovy Diskin, McMaster University
- Federico Ciccozzi, Mälardalen University
- Daniel Varro, Linköping University / McGill University
- Jörg Kienzle, McGill University
- Haiyan Zhao, Peking University
- Richard Paige, McMaster University

Ten additional sub-reviewers helped with the papers during the reviewing process:

- Mauricio Verano Merino
- Robbert Jongeling
- Sebastian Gottschalk
- Felix Steinfurth
- Alexander Hellwig
- Istvan David
- Malvina Latifaj
- Lars Fritsche
- Sabine Sint
- Ion Barosan

About the authors

Jesús Sánchez Cuadrado is a Ramón y Cajal researcher at the Languages and Systems Department of the University of Murcia, where he leads the Models & Languages Lab (<https://models-lab.github.io/>). His research is focused on Model Driven Engineering (MDE) topics, notably model transformation languages, meta-modelling and domain specific languages, and lately in the application of Machine Learning techniques to software modelling. On these topics, he has published several articles in journals and peer-reviewed conferences, and developed several open source tools. You can contact the author at jescuc@um.es or visit <http://sanchezcuadrado.es>.

Steffen Zschaler is a Reader in Software Engineering at King’s College London, where he also leads MDENet, the expert network on model-driven engineering¹. His research ranges from the foundations of MDE using graph transformations to applications to the principled development of simulations. You

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