Preface to the JOT issue on 17th European Conference on Modelling Foundations and Applications (ECMFA 2021)

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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 17th edition (ECMFA 2021). The papers selected for publication and presentation are presented and briefly described, as well as the details about the keynote talk by Prof. Jean-Marc Jézéquel. 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.

In its 16th edition, ECMFA introduced two major successful innovations that have been maintained in the current 17th ECMFA edition to strengthen the scope of the community and to foster the quality of its contributions.

- First, the International Conference on Model Transformations (ICMT) joined forces with ECMFA, merging both into one single event that unites all aspects related to Model-Based Engineering (MBE).
- Second, a two-phase submission and review process was introduced, with two possible submission periods (October and February). Authors of papers not accepted in the first phase were invited to re-submit improved versions of their work in the second submission phase that also welcomed fresh submissions.

Due to the COVID-19 pandemic and its associated restrictions, the steering and organizing committee decided to celebrate the conference virtually in June 2021.

2. Submission and review process

2.1. Types of submissions

ECMFA solicits 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.

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

2.2. Topics of interest

Topics of interest included, but were not limited to:

- Foundations of MBE;
- Application of MBE methods, tools, and techniques to specific domains, e.g., automotive, cyber-physical systems, robotics, Artificial Intelligence or IoT;
- Successful use of MBE in connection with other disciplines and approaches, such as Artificial Intelligence, Blockchain, or Open Source;
- Educational aspects of MBE;
- Tools and initiatives for the successful adoption of MBE in industry.

2.3. Review criteria and process

All submissions have been peer-reviewed by 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 deadlines: October 11, 2020, or February 21, 2021.

Papers submitted to the first round of review could be accepted-as-is, accepted with minor revisions, undergo major revisions (and be re-submitted in the second round), or rejected. Recommendations for papers submitted in the second round are for accept, minor revisions, or reject.

Papers accepted at any of the two rounds with minor revisions were given around one month to complete the revisions. 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. Papers not accepted in the first round could be resubmitted in the second one, indicating how the authors had improved the paper to address the reviewers' criticisms.

3. Accepted papers

In the first round, ECMFA received 16 submissions. Five were given a minor revision, seven a major revision, and four were rejected. All 5 minor revisions were successfully addressed by the authors and the program committee agreed to accept the papers. With respect to the 7 major revisions, only 4 of them were re-submitted to the second round and reviewed again.

In the second round, ECMFA received 16 abstracts, of which 4 were withdrawn, making it 12 new papers. These new papers, plus the 4 re-submitted ones constituted a total of 16 papers submitted to the second round. Two of the re-submitted papers were accepted and two rejected, and 9 of the new papers were rejected and 3 accepted after a minor revision.

In summary, from received 32 papers, 10 were accepted, resulting in an acceptance rate of 31%.

The list of accepted papers is as follows:

- Addressing the trade off between smells and quality in model refactoring. Angela Barriga, Lorenzo Bettini, Ludovico Iovino, Adrian Rutle, Rogardt Heldal.
- Uncertainty management with extra-functional qualities in multi-artefact co-evolution. Francesco Basciani, Davide Di Ruscio, Ludovico Iovino, Alfonso Pierantonio.
- Towards a Generic Method for Articulating Design Uncertainty. Mouna Dhaouadi, Kate M. B. Spencer, Megan H. Varnum, Alicia M. Grubb, Michalis Famelis.
- Automatic Generation of Configuration Files: an Experience Report from the Railway Domain. Enxhi Ferko, Alessio Bucaioni, Jan Carlson, Zulqarnain Haider.
- Clustering Natural Language Test Case Instructions as Input for Deriving Automotive Testing DSLs. Katharina Juhnke, Alexander Nikic, Matthias Tichy.
- Adapting TDL to Provide Testing Support for Executable DSLs. Faezeh Khorram, Erwan Bousse, Jean-Marie Mottu, Gerson Sunyé.
- Co-evolution of Metamodel and Generators: Higher-order Templating to the Rescue. Tiziano Lombardi, Vittorio Cortellessa, Alfonso Pierantonio.
- Modeling Objects with Uncertain Behaviors. Paula Muñoz, Priyanka Karkhanis, Mark van den Brand, Antonio Vallecillo.
- Fixing Multiple Type Errors in Model Transformations with Alternative Oracles to Test Cases. Zahra Varaminybahnemiry, Jessie Galasso, Houari Sahraoui.
- Automating Model Transformations for Railway Systems Engineering. Nils Weidmann, Shubhangi Salunkhe, Anthony Anjorin, Enes Yigitbas, Gregor Engels.

Two of these papers (Ferko et al. 2021; Weidmann et al. 2021) belong to the Applications category. First, Ferko et al. (Ferko et al. 2021) present an experience report of a Software Product Line (SPL) engineering experiment at Bomdardier Railway Transportation. Then, Weidmann et al. (Weidmann et al. 2021) introduce a bidirectional transformation approach between SysML and Event-B models for the purposes of supporting verification of railway models at DB Netz AG, a railway infrastructure manager that operates large parts of the German railway system.

As for the eight foundations papers, Barriga et al. (Barriga et al. 2021) build on top of PARMOREL, a reinforcement learning-based framework for automatically refactoring models. They extend PARMOREL to support smells detection and selective refactoring based on quality characteristics. Muñoz et al. (noz et al. 2021) present an approach to model the behavior of complex systems and their associated uncertainties in UML and OCL. They also present how these specifications can be used to analyze and simulate systems. Basciani et al. (Basciani et al. 2021) propose an approach to migrate both models and model-to-model transformations in response to a metamodel evolution based on the notion of information loss. Dhaouadi et al. (Dhaouadi et al. 2021) discuss DRUIDE, a language and workflow for articulating design time uncertainty. Khorram et al. (Khorram et al. 2021) introduce a fully generic testing approach for any given executable domain specific language (xDSL) by extending the existing Test Description Language (TDL). Lombardi et al. (Lombardi et al. 2021) put forward a novel technique to make template-based code generators re-

silient to changes due to metamodel evolution. A tool named Hotello is introduced for the specification of meta-templates. Varaminybahnemiry et al. (Varaminybahnemiry et al. 2021) present an approach to automatically fix type errors in model transformations. The approach aims at correcting the errors when neither predefined patches nor behavior-safe guards such as test suites are available by exploring the space of possible patches using an evolutionary algorithm. Juhnke et al. (Juhnke et al. 2021) introduce a clustering approach to automatically cluster highly similar domain-specific instructions, which can be useful for the derivation of test cases in the automotive domain.

4. Keynote by Jean-Marc Jézéquel

Jean-Marc Jézéquel delivered on Tuesday, June 22, 2021, the keynote talk entitled "A Tale of Taming Variability with MDE".

4.1. Abstract

Finding better ways to handle software complexity (both inherent and accidental) is the holy grail for a significant part of the software engineering community, and especially for the Model driven Engineering (MDE) one. To that purpose, plenty of techniques have been proposed, leading to a succession of trends in model based software development paradigms in the last decades. While these trends seem to pop out from nowhere, we claim that most of them actually stem from trying to get a better grasp on the variability of software. We revisit the history of MDE trying to identify the main aspect of variability they wanted to address when they were introduced. We conclude on what are the variability challenges of our time, including variability of data leading to machine learning of models.

4.2. Biography

Jean-Marc Jézéquel is a Professor at the University of Rennes and a member of the DiverSE team at IRISA/Inria. From 2012 to 2020 he was Director of IRISA, one of the largest public research lab in Informatics in France. In 2016 he received the Silver Medal from CNRS and in 2020 the IEEE/ACM MODELS career award.

His interests include model driven software engineering for software product lines, and specifically component based, dynamically adaptable systems with quality of service constraints, including security, reliability, performance, timeliness etc. He is the author of 4 books and of more than 300 publications in international journals and conferences. He was a member of the steering committees of the AOSD and MODELS conference series. He is currently Associate Editor in Chief of IEEE Computer and of the Journal on Software and System Modeling, as well as member of the editorial boards of the Journal on Software and Systems, and the Journal of Object Technology. He received an engineering degree from Telecom Bretagne in 1986, and a Ph.D. degree in Computer Science from the University of Rennes, France, in 1989.

5. Committees

Following the ECMFA tradition, ECMFA 2021 had two Program co-chairs. They were:

- Loli Burgueño, Open University of Catalonia, Spain
- Martin Gogolla, University of Bremen, Germany

Despite the European nature of the conference, the Program Committee of ECMFA 2021 was composed of 51 MBE experts from both academia and industry, from all over the world (see Fig. 1 for their geographical location):

- Silvia Abrahão, Universitat Politecnica de Valencia
- Shaukat Ali, Simula Research Lab
- Vasco Amaral, Universidade Nova de Lisboa
- Alessandra Bagnato, Softeam
- Nelly Bencomo, Aston University
- Marco Brambilla, Politecnico di Milano
- Jean-Michel Bruel, IRIT
- Eric Cariou, LIUPPA and Universite de Pau
- Carlos Cetina, Universidad San Jorge
- Antonio Cicchetti, Mälardalen University
- Federico Ciccozzi, Mälardalen University
- Robert Clarisó, Universitat Oberta de Catalunya
- Toni Clark, Aston University
- Benoît Combemale, University of Toulouse
- Davide Di Ruscio, University of L'Aquila
- Zinovy Diskin, McMaster Univ. and Univ. of Waterloo
- Gregor Engels, University of Paderborn
- Sébastien Gérard, CEA LIST
- Sudipto Ghosh, Colorado State University
- Jeff Gray, University of Alabama
- Joel Greenyer, Leibniz Universität Hannover
- Esther Guerra, Universidad Autónoma of Madrid
- Øystein Haugen, Ostfold University College and SINTEF
- Zhenjiang Hu, Peking University
- Gerti Kappel, TU Wien
- Jörg Kienzle, McGill University
- Sahar Kokaly, University of Toronto
- Dimitris Kolovos, University of York
- Thomas Kühne, Victoria University of Wellington
- Thomas Kühn, Karlsruhe Institute of Technology
- Ralf Lämmel, Universität Koblenz-Landau
- Richard Paige, McMaster University
- Alfonso Pierantonio, University of L'Aquila
- Fiona Polack, Keele University
- Arend Rensink, University of Twente
- Bernhard Rumpe, RWTH Aachen University
- Adrian Rutle, Western Norway Univ. of Applied Sciences
- Jesús Sanchez Cuadrado, Universidad de Murcia
- Andy Schürr, Darmstadt University of Technology
- Bran Selic, Malina Software Corp.
- Gabriele Taentzer, Philipps-Universität Marburg
- Matthias Tichy, University of Ulm
- Juha-Pekka Tolvanen, MetaCase
- Javier Troya, University of Seville
- Antonio Vallecillo, University of Malaga
- Mark van den Brand, Eindhoven Univ. of Technology
- Dániel Varró, McGill University / Budapest Univ. of Technology and Economics
- Manuel Wimmer, JKU Linz
- Vadim Zaytsev, Raincode Labs

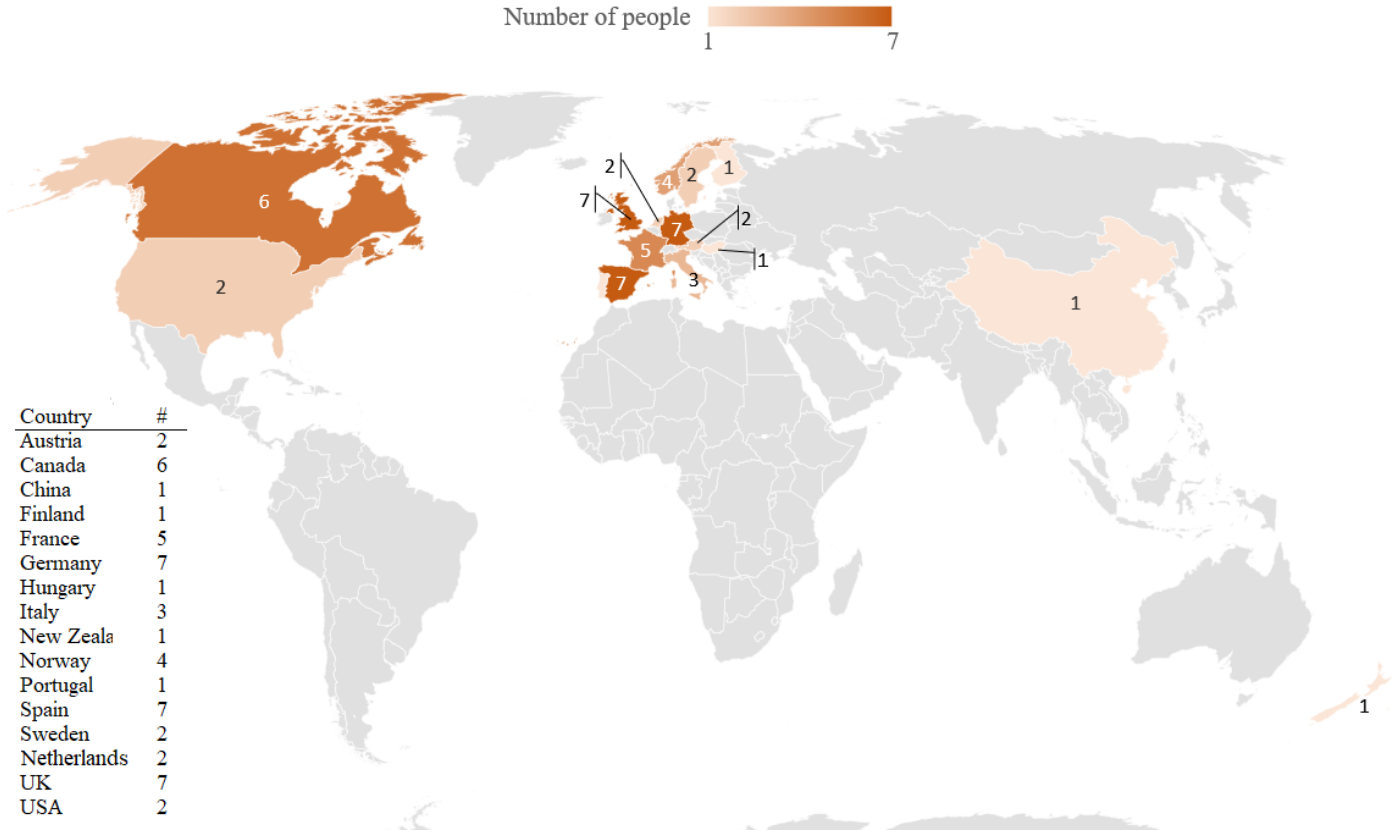

Figure 1 Country of origin of the PC members

– Athanasios Zolotas, University of York
– Steffen Zschaler, King's College London

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

– Mehrnoosh Askarpour, McMaster University
– Malte Heithoff, RWTH Aachen University
– Louis Wachtmeister, RWTH Aachen University

6. Acknowledgments

We would like to thank the organizing committee, especially to the General Chair Adrian Rutle (Western Norway University of Applied Sciences, Norway), for providing us with all the necessary resources and support to organize ECMFA 2021. Thanks to the JOT EiC Alfonso Pierantonio (University of L'Aquila) for all his help with the publication process. Thanks to all those who trusted ECMFA and submitted papers, regardless of whether they were accepted or not, and particularly to the presenters of the accepted papers. Many thanks to the reviewers and the members of the Program Committee, for their timely and accurate reviews and for their helpful suggestions for improving the selected papers. We also thank our keynote speaker Jean-Marc Jézéquel for accepting our invitation to give such an interesting talk. Last but not least, thanks to the Steering Committee, in particular to Antonio Vallecillo and Richard Paige, for their help and support to our decisions in this very particular edition of the conference due to COVID-19. We miss social and intellectual interaction during the coffee breaks and the social events like the conference dinner.

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Loli Burgueño is a researcher and lecturer at the Open University of Catalonia, in Barcelona, Spain. She graduated in Computer Science and Engineering from the University of Málaga in 2011, earned her master's degree in Software Engineering and Artificial Intelligence in 2012 and graduated from her PhD in 2016. Her research interests in Model-Driven Engineering include the performance, scalability and testing of model transformations, the modeling of uncertainty in software models for its use in the Industry 4.0 and the integration of Artificial Intelligence techniques into modeling tools and processes. She is an active member of the modeling community and has co-chaired and organized numerous events at conferences such as MODELS, STAF and ICSOC. She is a member of the SoSyM editorial board. Contact her at lburguenoc@uoc.edu.

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