



Proceedings of the
4th International Workshop on
Multi-Paradigm Modeling
(MPM 2010)

Preface

Vasco Amaral, Hans Vangheluwe, Cécile Hardebolle, László Lengyel

4 pages

Preface

Vasco Amaral¹, Hans Vangheluwe^{2,3}, Cécile Hardebolle⁴, László Lengyel⁵

Universidade Nova de Lisboa, Portugal, vasco.amaral@di.fct.unl.pt ¹

University of Antwerp, Belgium, hans.vangheluwe@ua.ac.be ²

McGill University, Montréal, Québec, Canada, hv@cs.mcgill.ca³

Supélec, France, cecile.hardebolle@supelec.fr⁴

Budapest University of Technology and Economics, Hungary, lengyel@aut.bme.hu⁵

Multi-Paradigm Modelling (MPM) is a research field focused on solving the challenge of combining, coupling, and integrating rigorous models of some reality, at different levels of abstraction and views, using adequate modelling formalisms and semantic domains, with the goal to simulate (for optimization) or realize systems that may be physical, software or a combination of both. Ultimately this research should lead to a unified discipline with supporting tools and clear systematic approaches. The key challenges are finding adequate Model Abstractions, Multi-formalism modelling, Model Transformation and the application of MPM techniques and tools to Complex Systems. MPM theories/methods/technologies have been successfully applied in the field of software architectures, control system design, model integrated computing, and tool interoperability.

This volume of ECEASST presents the contributions of the 4th Workshop on Multi-Paradigm Modeling 2010 held as a satellite event of MoDELS 2010 in Oslo, Norway. Confirming the tendency of previous editions, the workshop has experienced a steady growth. More than 40 people have participated in this workshop. Reflecting the nature of MPM, the audience was composed of researchers from diverse fields of research ranging from theoretical Computer Science to domain-experts (cybernetics, mechanical engineering, embedded systems, . . .). This variety led to productive cross-disciplinary discussions. This years workshop had 18 submissions. The review process counted with 3 to 5 reviewers per paper. Eight contributions were accepted as full papers with a presentation time of 20 minutes and five were considered short papers with 15 minutes presentations. From the reviews, both the high quality of the contributions and the progress made during the last year in MPM research were visible. The papers presented at the workshop approached a wide range of topics within MPMs concerns as we will summarize in the next page.

Megamodelling - The topic of Megamodels (or macromodels) first introduced by Favre and Bzivin is surveyed in the paper by Hebig, Seibel and Giese that proposes a its core definition.

Transformations The work by Asztalos, Syriani, Wimmer and Kessentini (one of the two best papers award) focused on the issue of transformation rule composition. The authors discuss the possibility of generating a single transformation derived from a chain of transformations in the context of PIM and PSM models when model evolution occurs. An example application presented is the transformation of UML models into EJB 2.0 and then to EJB 3.0. There was also in this workshop a work by Aranega, V., Etien, A., Dekeyser, that highlights the limitations of the traceability mechanism of QVT through different scenarios.

Model Debugging - The paper by T. Levendovsky presents a novel way to develop model transformations in an interactive fashion, where the modeller is able to select the model elements for the transformation, pause the transformation engine at run-time, analyse its results, and even change the matched patterns for the further transformation steps. This technique can be very useful for refactoring operations and application of design patterns.

Verification and Optimization - The paper by Kerzhner and Paredis (one of the two best papers award) presents a discussion on how to verify and optimize design alternatives with respect to system Engineering design requirements. This is achieved by means of automated generation of analyses from formal models expressed in OMG SysUML on the system engineering models. The approach is demonstrated on the design of a hydraulic subsystem. Another paper, by Herold, presents an approach for checking architectural compliance of different kinds of artefacts created in the development of component-based systems. For that purpose, the authors use first order logic in their approach. A case study on Checking Architectural Layers for the purpose of quality assurance is presented. Yet another work in this topic by Astalos et. al. outlines a possible approach for verifying automatically declarative descriptions of Graph Rewriting-based Model Transformations. Finally, a paper by Straeten, presents a strategy for specifying semantics of a DSM through properties expressed already in the used DSL.

Multi-Formalism Composition/Integration - Braatz and Brandt discuss a possible technique for integrating heterogenous DSMLs by means of rule-based transformations. Examples of a visual DSML for IT and a DSML for firewall configurations are presented.

Model Evolution - Motivated by the problem of both Model and Metamodel evolution and the need of migrating instance models Meyers, Wimmer, Cichetti and Sprinkle discuss a new technique to guide the user in solving migration issues in a step-wise manner by means of in-place transformations.

Practical Case Studies - The paper by Zellag and Vangheluwe presents a DSL for the purpose of modelling and simulation of multitier systems. By using graph transformations the instance models in the referred DSL are translated into Queuing Petri Nets(QPNs) models which can be analysed and simulated by the SimQPN tool simulator.

Acknowledgements: This workshop would not been possible without the help of many people. Therefore, we would like to thank the Steering and Program Committee for helping with our organizational work, CITI at FCT/UNL Lisbon for the financial support, and the Organizers of MoDELS 2010. We are also indebted to Gabi Taentzer, and ECEASST for making this volume possible. Last, but not least, we would like thank the authors and the participants of the workshop for the contributions to the event and the field.

MPM 2010 Program Committee

- Antonio Vallecillo, Universidad de Málaga
- Bernhard Westfechtel, University of Bayreuth
- Bruno Barroca, Universidade Nova de Lisboa
- Cécile Hardebolle, Supélec
- Chris Paredis, Georgia Tech
- Christophe Jacquet, Supélec
- Didier Buchs, University of Geneva
- Dirk Deridder, Free University of Brussels
- Esther Guerra, Universidad Carlos III de Madrid
- Eugene Syriani, McGill University
- Franck Fleurey, SINTEF
- Frdric Boulanger, Supélec
- Gabriela Nicolescu, Polytechnique Montral
- Gergely Mezei, Budapest University of Technology and Economics
- Hans Vangheluwe, McGill University and University of Antwerp
- Hessam Sarjoughian, Arizona State University
- Holger Giese, Hasso-Plattner-Institut
- Jeff Gray, University of Alabama
- Jeroen Voeten, Eindhoven University of Technology
- Jonathan Sprinkle, University of Arizona
- Jos Luis Martín, Universidad Complutense de Madrid
- Juan de Lara, Universidad Autonoma de Madrid
- Laurent Safa, Silver Egg Technology
- László Lengyel, Budapest University of Technology and Economics
- Levi Lúcio, University of Luxembourg
- Luís Pedro, DAuriol Assets
- Mamadou K. Traoré, FR Sciences et Technologies
- Manuel Wimmer, Vienna University of Technology
- Mark Minas, University of the Federal Armed Forces
- Martin Toerngren, KTH Royal Institute of Technology
- Matteo Risoldi, University of Geneva
- Mirko Conrad, The MathWorks
- Peter Bunus, Linkoping University

- Pieter van Gorp, Eindhoven University of Technology
- Reiko Heckel, University of Leicester
- Stefan Van Baelen, K.U. Leuven
- Steve Hostettler, University of Geneva
- Thomas Feng, Oracle
- Thomas Kühne, Victoria University of Wellington
- Vasco Amaral, Universidade Nova de Lisboa