12th International Conference on Model-Based Software and Systems Engineering (MODELSWARD 2024)

Rome, Italy
21-23 February 2024

Editors:

Francisco José Domínguez Mayo
Luís Ferreira Pires
Edwin Seidewitz

ISBN: 978-1-7138-9753-8

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2024) by SCITEPRESS – Science and Technology Publications, Lda.
All rights reserved.

Printed with permission by Curran Associates, Inc. (2025)

For permission requests, please contact SCITEPRESS – Science and Technology Publications, Lda. at the address below.

SCITEPRESS – Science and Technology Publications, Lda.
Avenida de S. Francisco Xavier, Lote 7 Cv. C,
2900-616 Setúbal, Portugal

Phone: +351 265 520 185
Fax: +351 265520 186

info@scitepress.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

CONTENTS

INVITED SPEAKERS

KEYNOTE SPEAKERS

The Role of Models at the Heart of the Digital Transformation 5
Francis Bordeleau

The Secret Recipe to the Perfect Low-Code Platform 7
Jordi Cabot

Model Execution: From a Retrospective on Code Generation to a Perspective on Model Compilation 9
Federico Ciccozzi

PAPERS

FULL PAPERS

The Lifecycle of Data Clumps: A Longitudinal Case Study in Open-Source Projects 15
Nils Baumgartner and Elke Pulvermüller

System Architects Are not Alone Anymore: Automatic System Modeling with AI 27
Ludovic Apvrille and Bastien Sultan

Fault Tree Reliability Analysis via Squarefree Polynomials 39
Milan Lopuhaä-Zwakenberg

An Analysis and Simulation Framework for Systems with Classification Components 50
Francesco Bedini, Tino Jungebloud, Ralph Maschotta and Armin Zimmermann

Kant: A Domain-Specific Language for Modeling Security Protocols 62
C. Braghin, M. Lilli, E. Riccobene K. Notari and Marian Baba

Large Language Models in Enterprise Modeling: Case Study and Experiences 74
Leon Görgen, Eric Müller, Marcus Triller, Benjamin Nast and Kurt Sandkuhl

SHORT PAPERS

DecSup: An Architecture Description Language for Specifying and Simulating the Decision Support System Architectures 89
Mert Ozkaya, Mehmet Alp Kose and Egehan Asal

A Model-Based Framework for News Content Analysis 99
Fazle Rabbi, Bahareh Fatemi, Yngve Lamo and Andreas L. Opdahl

Concept of Automated Testing of Interactions with a Domain-Specific Modeling Framework with a Combination of Class and Syntax Diagrams 108
Vanessa Tietz and Bjoern Annighoefer

Model-Based Assessment of Conformance to Acknowledged Security-Related Software Architecture Good Practices 117
Monica Buitrago, Isabelle Borne and Jérémy Buisson

Comparative Evaluation of NLP Approaches for Requirements Formalisation
Shekoufeh Kolahdouz Rahimi, Kevin Lano, Sobhan Yassipour Tehrani, Chenghua Lin, Yiqi Liu and Muhammad Aminu Umar 125

Torque not Work, Representing Kinds of Quantities
Steve McKeever 133

MDE-Based Graphical Tool for Modeling Data Provenance According to the W3C PROV Standard
Marcos Alves Vieira and Sergio T. Carvalho 141

Coding by Design: GPT-4 Empowers Agile Model Driven Development
Ahmed R. Sadik, Sebastian Brulin and Markus Olhofer 149

Virtual61850: A Model-Driven Tool to Support the Design and Validation of Virtualized Controllers in Power Industry
Nadine Kabbara, Timothe Grisot and Jerome Cantenot 157

Defining KPIs for Executable DSLs: A Manufacturing System Case Study
Hiba Ajabri, Jean-Marie Mottu and Erwan Bousse 169

Multi-Dimensional Process Analysis of Software Development Projects
Thanh Nguyen, Saimir Bala and Jan Mendling 179

Cycle-Accurate Virtual Prototyping with Multiplicity
Daniela Genius and Ludovic Apvrille 187

Jabuti CE: A Tool for Specifying Smart Contracts in the Domain of Enterprise Application Integration
Mailson Teles-Borges, Jose Bocanegra, Eldair F. Dornelles, Sandro Sawicki, Antonia M. Reina-Quintero, Carlos Molina-Jimenez, Fabricia Roos-Frantz and Rafael Z. Frantz 195

Qualitative Reasoning and Design Space Exploration
Baptiste Gueuziec, Jean-Pierre Gallois and Frédéric Boulanger 203

Constructive Assertions with Abstract Models
Yoonsik Cheon 211

Single-Sourcing for Desktop and Web Applications with EMF Parsley
Lorenzo Bettini 219

AI-Based Recognition of Sketched Class Diagrams
Thomas Buchmann and Jonas Fraas 227

On Augmenting Scenario-Based Modeling with Generative AI
David Harel, Guy Katz, Assaf Marron and Smadar Szekely 235

Model-Driven Methodology for Developing Chatbots Based on Microservice Architecture
Adel Vahdati and Raman Ramsin 247

Using Personalised Authentication Flows to Address Issues with Traditional Authentication Methods
Jack Holden and Deniz Cetinkaya 255

A Tool for Modeling and Tailoring Hybrid Software Processes
Andrés Wallberg, Daniel González, Luis Silvestre and María Cecilia Bastarrica 264

Automatic Generation of Models from Their Metamodels Using Multilayer Perceptron Network
Karima Berramla, El Abbassia Deba and Abou El Hassene Benyamina 272

MBSE to Support Engineering of Trustworthy AI-Based Critical Systems
Afef Awadid, Boris Robert and Benoît Langlois 280

Towards a Domain Model for Learning and Teaching
Oleg Shvets, Kristina Murtazin, Martijn Meeter and Gunnar Piho 288

Collaborative Computing Paradigms: A Software Systems Architecture for Dynamic IoT Environments
Prashant G. Joshi and Bharat M. Deshpande 297

WORKSHOP ON MODEL-BASED SYSTEM ENGINEERING AND ARTIFICIAL INTELLIGENCE

FULL PAPERS

On the Formal Robustness Evaluation for AI-based Industrial Systems
Mohamed Ibn Khedher, Afef Awadid, Augustin Lemesle and Zakaria Chihani 311

AI Systems Trustworthiness Assessment: State of the Art
Afef Awadid, Kahina Amokrane-Ferka, Henri Sohier, Juliette Mattioli, Faouzi Adjed, Martin Gonzalez and Souhaiel Khalfaoui 322

Bringing Systems Engineering Models to Large Language Models: An Integration of OPM with an LLM for Design Assistants
Ramón María García Alarcia, Pietro Russo, Alfredo Renga and Alessandro Golkar 334

SHORT PAPERS

MBSE-Enhanced LSTM Framework for Satellite System Reliability and Failure Prediction
M. Amin Alandihallaj, Mahya Ramezani and Andreas M. Hein 349

AI Engineering for Trust by Design
André Meyer-Vitali 357

Compliance by Design for Cyber-Physical Energy Systems: The Role of Model-Based Systems Engineering in Complying with the EU AI Act
Dominik Vereno, Katharina Polanec and Christian Neureiter 365

Facilitating User-Centric Model-Based Systems Engineering Using Generative AI
Elias Bader, Dominik Vereno and Christian Neureiter 371

On the Artificial Reasoning with Chess: A CBR vs PBR View
Zahira Ghalem, Karima Berramla, Thouraya Bouabana-Tebibel and Djamel Eddine Zegour 378

On Some Artificial Intelligence Methods in the V-Model of Model-Based Systems Engineering
Stephan Rudolph 386

AUTHOR INDEX 395