

## Founding Editors

Gerhard Goos

*Karlsruhe Institute of Technology, Karlsruhe, Germany*

Juris Hartmanis

*Cornell University, Ithaca, NY, USA*


## Editorial Board Members

Elisa Bertino

*Purdue University, West Lafayette, IN, USA*

Wen Gao

*Peking University, Beijing, China*

Bernhard Steffen 

*TU Dortmund University, Dortmund, Germany*

Gerhard Woeginger 

*RWTH Aachen, Aachen, Germany*

Moti Yung

*Columbia University, New York, NY, USA*

More information about this subseries at <http://www.springer.com/series/7408>

Loek Cleophas · Mieke Massink (Eds.)

# Software Engineering and Formal Methods

SEFM 2020 Collocated Workshops

ASYDE, CIFMA, and CoSim-CPS

Amsterdam, The Netherlands, September 14–15, 2020

Revised Selected Papers

*Editors*

Loek Cleophas   
Eindhoven University of Technology  
Eindhoven, The Netherlands

Mieke Massink   
CNR-ISTI  
Pisa, Italy

ISSN 0302-9743                      ISSN 1611-3349 (electronic)  
Lecture Notes in Computer Science  
ISBN 978-3-030-67219-5              ISBN 978-3-030-67220-1 (eBook)  
<https://doi.org/10.1007/978-3-030-67220-1>

LNCS Sublibrary: SL2 – Programming and Software Engineering

© Springer Nature Switzerland AG 2021

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG  
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

# Preface

This volume contains the selected and revised versions of papers that have been presented at three international workshops co-located with the 18th edition of the International Conference on Software Engineering and Formal Methods (SEFM 2020). Because of the COVID-19 pandemic, both the conference and the workshops were held virtually. They were hosted by the Centre for Mathematics and Informatics (CWI) in Amsterdam, The Netherlands, and took place on September 14–17, 2020.

The SEFM 2020 international conference offered a virtual interactive platform for leading researchers and practitioners from academia, industry, and government to advance the state of the art in formal methods, to facilitate their uptake in the software industry, and to encourage their integration within practical software engineering methods and tools.

The work presented at the three international workshops focused on emerging areas of software engineering, software technologies, model-driven engineering, and formal methods and on interdisciplinary topics on the border of software and cognition. In particular, the contributions that are collected in this volume have been selected from the presentations at the following workshops:

- **ASYDE 2020** – Second International Workshop on Automated and verifiable Software sYstem DEvelopment. Organised by: Marco Autili, University of L’Aquila, Italy; Federico Ciccozzi, Mälardalen University, Västerås, Sweden; Francesco Gallo, University of L’Aquila, Italy; Marjan Sirjani, Mälardalen University, Västerås, Sweden. The ASYDE workshop series is the result of a follow-up action, thanks to the work of the Steering Committee members, bringing together and consolidating the following previous events: OrChor’14, SCFI’15, SCART’15, VeryComp’16. The review procedure consisted of a single round of peer review, single blind, with 3 reviews per submission.
- **CIFMA 2020** – Second International Workshop on Cognition: Interdisciplinary Foundations, Models and Applications. Organised by: Pierluigi Graziani, University of Urbino, Italy; Pedro Quaresma, University of Coimbra, Portugal. The review procedure consisted of two rounds of peer review, single blind, with 4 reviews per submission.
- **CoSim-CPS 2020** – Fourth International Workshop on Formal Co-Simulation of Cyber-Physical Systems. Organised by: Cinzia Bernardeschi, University of Pisa, Italy; Cláudio Gomes, Aarhus University, Denmark; Paolo Masci, National Institute of Aerospace (NIA), USA; and Peter Gorm Larsen, Aarhus University, Denmark. The review procedure consisted of a single round of peer review, single blind, with 3 reviews per submission.

We are grateful to all organisers of the workshops at SEFM 2020 for their selection of interesting topics and presentations, despite the difficult circumstances due to the pandemic. We would also like to thank the members of the respective Programme

Committees and reviewers for their thorough and careful reviews, for organising the programme for each workshop, and for making the compilation of this volume possible.

We thank all authors of contributions and all attendees of the workshops, as well as the Keynote Speakers for adapting their excellent presentations and discussions to the new virtual setting. Special thanks go to the hosting institution CWI in Amsterdam, its organising team, and, in particular, the general chairs of the SEFM 2020 conference, Frank de Boer and Antonio Cerone, for their incredible work to make this event possible under the continuously changing circumstances and uncertainties created by the pandemic.

November 2020

Loek Cleophas  
Mieke Massink

# Contents

## ASYDE 2020

Model Translation from Papyrus-RT into the $\text{nuXmv}$ Model Checker. . . . .	3
<i>Sneha Sahu, Ruth Schorr, Inmaculada Medina-Bulo, and Matthias Wagner</i>	
Modeling and Verification of Temporal Constraints for Web Service Composition. . . . .	21
<i>Maya Souilah Benabdelhafid, Houda Boubaker, and Mahmoud Boufaida</i>	
Modeling Attack-Defense Trees' Countermeasures Using Continuous Time Markov Chains. . . . .	30
<i>Karim Lounis and Samir Ouchani</i>	
Automated Validation of State-Based Client-Centric Isolation with $\text{TLA}^+$ . . .	43
<i>Tim Soethout, Tijds van der Storm, and Jurgen J. Vinju</i>	
Code Coverage Aware Test Generation Using Constraint Solver. . . . .	58
<i>Krystof Sykora, Bestoun S. Ahmed, and Miroslav Bures</i>	
From Requirements to Verifiable Executable Models Using Rebeca . . . . .	67
<i>Marjan Sirjani, Luciana Provenzano, Sara Abbaspour Asadollah, and Mahshid Helali Moghadam</i>	

## CIFMA 2020

A Pragmatic Model of Justification for Social Epistemology. . . . .	89
<i>Raffaella Giovagnoli</i>	
Personal Identity and False Memories . . . . .	100
<i>Danil Razeev</i>	
Against the Illusory Will Hypothesis: A Reinterpretation of the Test Results from Daniel Wegner and Thalia Wheatley's <i>I Spy</i> Experiment . . . . .	108
<i>Robert Reimer</i>	
Understanding Responses of Individuals with ASD in Syllogistic and Decision-Making Tasks: A Formal Study. . . . .	118
<i>Torben Braüner, Aishwarya Ghosh, and Sujata Ghosh</i>	

Symbolic and Statistical Theories of Cognition: Towards Integrated Artificial Intelligence . . . . .	129
<i>Yoshihiro Maruyama</i>	
An Interdisciplinary Model for Graphical Representation . . . . .	147
<i>G. Antonio Pierro, Alexandre Bergel, Roberto Tonelli, and Stéphane Ducasse</i>	
Information Retrieval from Semantic Memory: BRDL-Based Knowledge Representation and Maude-Based Computer Emulation . . . . .	159
<i>Antonio Cerone and Diana Murzagaliyeva</i>	
A Multi-Agent Depth Bounded Boolean Logic . . . . .	176
<i>Giorgio Cignarale and Giuseppe Primiero</i>	
The Intensional Structure of Epistemic Convictions . . . . .	192
<i>Reinhard Kahle</i>	
Short-Circuiting the Definition of Mathematical Knowledge for an Artificial General Intelligence . . . . .	201
<i>Samuel Allen Alexander</i>	
Reasoning About Ignorance and Beliefs . . . . .	214
<i>Alessandro Aldini, Pierluigi Graziani, and Mirko Tagliaferri</i>	
<b>CoSIM-CPS 2020</b>	
A Case Study on Formally Validating Motion Rules for Autonomous Cars . . . . .	233
<i>Mario Henrique Cruz Torres, Jean-Pierre Giacalone, and Joelle Abou Faysal</i>	
Modelling Train Driver Behaviour in Railway Co-simulations . . . . .	249
<i>Tomas Hotzel Escardo, Ken Pierce, David Golightly, and Roberto Palacin</i>	
Cross-level Co-simulation and Verification of an Automatic Transmission Control on Embedded Processor . . . . .	263
<i>Cinzia Bernardeschi, Andrea Domenici, Maurizio Palmieri, Sergio Saponara, Tanguy Sassolas, Arief Wicaksana, and Lilia Zaourar</i>	
A Semantic-Aware, Accurate and Efficient API for (Co-)Simulation of CPS . . . . .	280
<i>Giovanni Liboni and Julien Deantoni</i>	
An FMI-Based Initialization Plugin for INTO-CPS Maestro 2 . . . . .	295
<i>Simon Thrane Hansen, Casper Thule, and Cláudio Gomes</i>	



**Introducing Regression Tests and Upgrades to the INTO-CPS Application . . . 311**  
*Prasad Talasila, Armine Sanjari, Kristoffer Villadsen, Casper Thule,  
 Peter Gorm Larsen, and Hugo Daniel Macedo*

**Cosimulation-Based Control Synthesis . . . . . 318**  
*Adrien Le Coënt, Julien Alexandre dit Sandretto,  
 and Alexandre Chapoutot*

**Author Index . . . . . 335**