

Preface

The International Conference on Rigorous State-Based Methods (ABZ 2023) was an international forum for the cross-fertilization of related state-based and machine-based formal methods, mainly Abstract StateMachines (ASM), Alloy, B, TLA +, VDM and Z. Rigorous state-based methods share common conceptual foundations and are widely used in both academia and industry for the design and analysis of hardware and software systems. The acronym ABZ was invented at the first conference, held in London in 2008, where the ASM, B and Z conference series merged into a single event. The second ABZ 2010 conference was held in Orford (Canada), where the Alloy community joined the event; ABZ 2012 was held in Pisa (Italy), which saw the inclusion of the VDM community (but not in the title); ABZ 2014 was held in Toulouse (France), which brought the inclusion of the TLA + community into the ABZ conference series. Lastly, the ABZ 2016 conference was held in Linz, Austria and ABZ 2018 in Southampton, UK. In 2018 the steering committee decided to retain the (well-known) acronym ABZ and add the subtitle ‘International Conference on Rigorous State-Based Methods’ to make more explicit the intention to include all state-based formal methods. Two successive ABZ events have been organized in Ulm (Germany) and these were the two first virtual ABZ events.

Since 2014 in Toulouse, each ABZ asked for the application of formal specifications on industrial case studies. This year, we extend the previous areas (aerospace, medical equipment, rails, automotive) with the HMI domain. The ABZ 2023 case study introduces a safety critical interactive system called AMAN (Arrival MANager), which is a partly autonomous scheduler of landing sequences of aircraft in airports. This interactive system interleaves Air Traffic Controller’s activities with automation in AMAN. While some AMAN systems are currently deployed in airports, we consider here only a subset of functions which represent a challenge in modelling and verification. The ABZ 2023 case study is provided by José C. Campos and Philippe Palanque, who have interacted with authors of submissions for the case study and did a great job while managing the review process of the five submissions in five different modelling languages, namely B, Event-B, ASM, Alloy and Statecharts. They accepted four of those submissions for presentation at ABZ 2023 and inclusion in the proceedings. As usual, a special issue will be organized in a Springer journal for a larger audience and inviting other replies to the ABZ 2023 case study. José and Phil answered almost a hundred questions and gave clarifying explanations, for which we would like to thank them. The objective of these case studies is to provide an opportunity to demonstrate the applicability of the ABZ methods to real examples and also to allow a better comparison of them. You should visit the link <https://abz-conf.org/case-studies/> which collects the past case studies with solutions. ABZ 2023 received 47 submissions from 22 countries around the world. The selection process was rigorous, where each paper received at least four reviews. The program committee, after careful discussions, decided to accept 8 full research papers, 3 journal-first papers, 5 short research papers and 2 industry papers. The acceptance ratio

of those papers was 18 accepted out of 38 which is 46%. Four case study papers were accepted and selected by a separate sub-committee; the acceptance rate was 80%. One research paper of one of the four keynote speakers is also included in the proceedings. All accepted papers cover broad research areas in both theoretical systems and practical aspects of state-based methods. A doctoral symposium was organized and PhD students had to submit a short paper presenting their PhD topics; those 4 submissions were evaluated by a separate PC committee including the two chairs of ABZ; the review of the four submitted PhD contributions was conducted by Silvia Bonfanti and Guillaume Dupont. Thanks Silvia and Guillaume for your contribution to the programme of ABZ 2023! The conference was held on May 30 – June 2, 2023 in Nancy, France and the venue was the LORIA laboratory, a joint structure of CNRS, Inria and the University of Lorraine.

We are honored that all four distinguished guests as keynote speakers have agreed to give their keynotes this year. Marieke Huisman, University of Twente, The Netherlands, gave a talk entitled ‘VerCors & Alpinist: verification of optimised GPU programs’; Véronique Cortier, LORIA CNRS, Inria and Université de Lorraine, France, gave a talk entitled ‘Formal verification of electronic voting systems’; André Platzer, Karlsruhe Institute of Technology, Germany and Carnegie Mellon University, USA, gave a talk entitled ‘Refinements in Hybrid Dynamical Systems Logic’; finally, Burkhart Wolff, University Paris Saclay and Laboratoire des Méthodes Formelles (LMF), France, gave a talk entitled ‘Using Deep Ontologies in Formal Software Engineering’.

The EasyChair conference management system was set up for ABZ 2023, supporting submission, review and volume editing processes. We acknowledge it is an outstanding tool for the academic community. We would like to thank all the authors who submitted their work to ABZ 2023. We are grateful to the program committee members and external reviewers for their high-quality reviews and discussions. Finally, we wish to thank the Organizing Committee members for their continuous support. When writing the preface, we have also to mention the continuous support and assistance of Springer and the publishing team managed by Ronan Nugent. Finally, we would like to thank our sponsors:

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For readers of these proceedings, we hope these papers are interesting and they inspire ideas for future research.

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