Logical Methods in Computer Science
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PREFACE

This special issue contains six extended versions of papers presented at the 16th International Conference on Graph Transformation (ICGT 2023), held in Leicester, UK, on 19–20 July 2023. The conference was part of STAF 2023 (Software Technologies: Applications and Foundations) and was held under the auspices of the European Association for Theoretical Computer Science (EATCS), the European Association of Software Science and Technology (EASST), and the IFIP Working Group 1.3, Foundations of Systems Specification.

The ICGT series aims to foster the exchange and collaboration of researchers from diverse backgrounds working with graphs and graph transformation, either by contributing to their theoretical foundations or by applying established formalisms to classical or novel domains. The series serves as a well-established scientific publication outlet as well as a platform to promote inter- and intra-disciplinary research and to stimulate new ideas.

Graphs and graph-like structures are widely used as a formalism for specification and modelling across all areas of computer science, as well as in many fields of computational research and engineering. Relevant examples include software architectures, pointer structures, state-space and control/data-flow graphs, UML and other domain-specific models, network layouts, cyber-physical system topologies, quantum computing, and molecular structures. These graphs often undergo dynamic changes, such as reconfiguration, evolution, and other behaviours, which can be captured through rule-based graph manipulation. As such, graphs and graph transformation constitute a fundamental and universal modelling paradigm, enabling formal reasoning and analysis, ranging from verifying properties of interest to uncovering entirely new insights.

The papers in this special issue were selected from the highest-ranked contributions presented at ICGT 2023, which were themselves chosen through a competitive peer-review process that accepted 14 full papers and two short papers from an initial 29 submissions. Compared to the papers published in the conference proceedings, the papers in this issue have been extended with full proofs, case studies, and additional results. Their topics reflect the broad scope of ICGT 2023, including theoretical approaches to graph transformation, logic and verification, model transformation, and applications of graph transformation in emerging domains.

The six papers selected for this special issue underwent an additional rigorous review process, in accordance with LMCS standards:

- *Advanced Model Consistency Restoration with Higher-Order Short-Cut Rules* by Lars Fritsche, Jens Kosiol, Alexander Lauer, Adrian Möller, and Andy Schürr (`https://doi.org/10.46298/lmcs-20(3:25)2024`);

All articles have already been published in the regular issues of Logical Methods in Computer Science.

- *Formalising the Double-Pushout Approach to Graph Transformation* by Robert Söldner and Detlef Plump (https://doi.org/10.46298/lmcs-20(4:3)2024);

- *A higher-order transformation approach to the formalization and analysis of BPMN using graph transformation systems* by Tim Kräuter, Adrian Rutle, Harald König, and Yngve Lamo (https://doi.org/10.46298/lmcs-20(4:4)2024);

- *Termination of Graph Transformation Systems Using Weighted Subgraph Counting* by Roy Overbeek and Jörg Endrullis (https://doi.org/10.46298/lmcs-20(4:12)2024);

- *Moving a Derivation Along a Derivation Preserves the Spine in Adhesive Categories* by Hans-Jörg Kreowski, Aaron Lye, and Aljoscha Windhorst (https://doi.org/10.46298/lmcs-21(2:4)2025);

- *A Monoidal View on Fixpoint Checks* by Paolo Baldan, Richard Eggert, Barbara König, Timo Matt, Tommaso Padoan (https://doi.org/10.46298/lmcs-21(3:5)2025).

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Guest Editors of the ICGT'23 Special Issue