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# Graph Transformation

8th International Conference, ICGT 2015  
Held as Part of STAF 2015  
L'Aquila, Italy, July 21–23, 2015  
Proceedings

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# Foreword

Software Technologies: Applications and Foundations (STAF) is a federation of a number of leading conferences on software technologies. It provides a loose umbrella organization for practical software technologies conferences, supported by a Steering Committee that provides continuity. The STAF federated event runs annually; the conferences that participate can vary from year to year, but all focus on practical and foundational advances in software technology. The conferences address all aspects of software technology, from object-oriented design, testing, mathematical approaches to modeling and verification, model transformation, graph transformation, model-driven engineering, aspect-oriented development, and tools.

STAF 2015 was held at the University of L'Aquila, Italy, during July 20–24, 2015, and hosted four conferences (ICMT 2015, ECMFA 2015, ICGT 2015 and TAP 2015), a long-running transformation tools contest (TTC 2015), seven workshops affiliated with the conferences, a doctoral symposium, and a project showcase (for the first time). The event featured six internationally renowned keynote speakers, a tutorial, and welcomed participants from around the globe.

This was the first scientific event in computer science after the earthquake that occurred in 2009 and affected L'Aquila. It is a small, and yet big step toward the grand achievement of restoring some form of normality in this place and its people.

The STAF Organizing Committee thanks all participants for submitting and attending, the program chairs and Steering Committee members for the individual conferences, the keynote speakers for their thoughtful, insightful, and engaging talks, the University of L'Aquila, Comune dell'Aquila, the local Department of Human Science, and CEA LIST for their support: *Grazie a tutti!*

July 2015

Alfonso Pierantonio

# Preface

ICGT 2015 was the 8th International Conference on Graph Transformation held during July 21–23, 2015, in L’Aquila (Italy). The conference was affiliated with STAF (Software Technologies: Applications and Foundations) and it took place under the auspices of the European Association of Theoretical Computer Science (EATCS), the European Association of Software Science and Technology (EASST), and the IFIP Working Group 1.3, Foundations of Systems Specification.

ICGT 2015 continued the series of conferences previously held in Barcelona (Spain) in 2002, Rome (Italy) in 2004, Natal (Brazil) in 2006, Leicester (UK) in 2008, Enschede (The Netherlands) in 2010, Bremen (Germany) in 2012, and York (UK) in 2014, following a series of six International Workshops on Graph Grammars and Their Application to Computer Science from 1978 to 1998 in Europe and in the USA.

Dynamic structures are a major cause of complexity when it comes to modeling and reasoning about systems. They occur in software architectures, configurations of artifacts such as code or models, pointer structures, databases, networks, etc. As interrelated elements, which may be added, removed, or may change state, they form a fundamental modeling paradigm as well as a means to formalize and analyze systems. Applications include architectural reconfigurations, model transformations, refactoring, and the evolution of a wide range of artifacts, where change can happen either at design or at run time. Dynamic structures occur also as part of semantic domains or computational models for formal modeling languages.

Based on the observation that all these approaches rely on very similar notions of graphs and graph transformations, the theory and applications of graphs, graph grammars, and graph transformation systems have been studied in our community for more than 40 years. The conference aims at fostering interaction within this community as well as attracting researchers from other areas to join us, either in contributing to the theory of graph transformation or by applying graph transformations to already known or novel areas, such as self-adaptive systems, overlay structures in cloud or P2P computing, advanced computational models for DNA computing, etc.

This year, the conference offered two tracks for research focusing on foundations and on applications. For the proceedings, 18 papers were selected following a thorough reviewing process (11 long papers on foundations, four long papers on applications, and three short papers on tool presentations). The proceedings are structured in three sections corresponding to the different paper categories.

In addition to the presentation of these papers, the conference program included an invited talk, given by Gerti Kappel, as well as one joint session with ICMT 2015, the 8th International Conference on Model Transformation.

We are grateful to the University of L’Aquila and the STAF Conference for hosting ICGT 2015, and would like to thank the invited speaker, the authors of all submitted papers, the members of the Program Committee, as well as the additional reviewers.

Special thanks go to Detlef Plump, the organizer of the 6th International Workshop on Graph Computation Models (GCM 2015), a satellite workshop related to ICGT 2015, affiliated with the STAF Conference.

We are also grateful to Thomas Buchmann for his support as publicity chair. Finally, we would like to acknowledge the excellent support throughout the publishing process by Alfred Hofmann and his team at Springer, the assistance provided by the STAF publication managers Louis Rose and Javier Troya, and the helpful use of the Easy-Chair conference management system.

July 2015

Francesco Parisi-Presicce  
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# From Software Modeling to System Modeling – Transforming the Change (Keynote)

Gerti Kappel

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**Abstract.** Model-driven software engineering has gained momentum in academia as well as in industry for improving the development of evolving software by providing appropriate abstraction mechanisms in terms of software models and transformations thereof. With the rise of cyber-physical systems in general, and cyber-physical production systems in particular, the interplay between several engineering disciplines, such as software engineering, mechanical engineering and electrical engineering, becomes a must. Thus, a shift from pure software models to system models has to take place to develop the full potential of model-driven engineering for the whole production domain. System Models are also essential to raise the level of flexibility of production systems even further in order to better react to changing requirements, since systems are no longer designed to be, but they have to be designed to evolve. In this talk, we will present ongoing work of applying and further developing model-driven techniques, such as consistency management and co-evolution support, for the production domain.

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