

Editorial: Where Theory and Practice Meet

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The idea for compiling a special issue on the topic of *Semantic Foundations of Engineering Design Languages* originates from a workshop on the same topic, which was held in conjunction with ETAPS 2002 in Grenoble, France, and was organised by G. Lüttgen, F. Maraninchi and M. Mendler. This successful workshop explored the interaction between theory and application of formal methods as they meet in the semantics of design and specification languages for embedded systems that are employed in engineering practice today. It was felt that the exciting developments taking place in this area deserve to be documented for a wider audience.

Engineering design languages, in contrast to general-purpose programming languages, are typically domain-specific and enforce well-defined and uniform design styles. This makes the use of these languages sufficiently restricted to reap the benefits of formal semantics at the tool level rather than in the well-known fashion of individual modelling case studies. At the same time these languages are no longer, or have never been, academic toys but have industrial strength applications. This calls for professional support in formal validation, incremental code generation, or component models, that can only be based on rigorous formal semantics. Yet, traditionally, there has been a gap. It arises in industrial practice when the development of such languages is mainly driven by pragmatic considerations that sacrifice semantic coherence for a rich combination of features. It also arises in academic research when it is exclusively carried out in the framework of abstract calculi and logics that lack practical relevance. This gap is beginning to close.

This special issue reports on several recent trends in the semantics of engineering design languages that aim at making theory and practice more relevant to each other. It includes six peer-reviewed articles, which are naturally structured here into two tracks:

- **Semantic Models.** This first track presents a broad set of semantic models related to engineering design languages. S. Gay and R. Nagarajan investigate a categorical semantics of dataflow programs, which sheds light onto the nature of synchronous dataflow programming. J.W. Janneck develops a component model of computation based on actor semantics, thereby supporting the foundations of component-based design and programming. K. Lermer, C.J. Fidge and I.J. Hayes introduce a timing semantics for dealing with execution time constraints in real-time validation.
- **Specification and Design Languages.** This second track explores formalisations of the semantics of three industrial-strength engineering languages. V. Bos and J. Kleijn provide an operational semantics of a redesigned version of the language χ for specifying and analysing industrial systems. M. Fränzle, J. Niehaus, A. Metzner and W. Damm present a semantics for the distributed execution of the visual design language *STATEMATE*, which facilitates distributed code generation and supports rapid prototyping. Finally, M.J.C. Gordon validates the semantics of the property specification language *PSL*, which is a successor to the temporal logic Sugar, via a deep embedding within the HOL theorem prover.

We wish to thank the many authors who responded to our call for contributions. The high number of submissions that were received testifies to the timeliness of this special issue. As a consequence, a tough selection process had to be applied through which the six articles printed here passed with excellence. Mainly for size limitations a number of other excellent submissions could not be considered in this issue; it is planned that these will be published in another issue of this journal in the near future. We are grateful to the editor-in-chief Prof. C.B. Jones and to the associate editor Dr. D.J. Cooke for making these collections possible and for their continuous support throughout. Last, but not least, we sincerely thank the many reviewers for their timely responses and in-depth reports which also have contributed to the quality of this issue.