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Joost-Pieter Katoen · Rom Langerak
Arend Rensink (Eds.)

ModelEd, TestEd, TrustEd

Essays Dedicated to Ed Brinksma
on the Occasion of His 60th Birthday

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Cover illustration: The drawing on the front cover depicts (an abstract version of) a Lotus flower. Ed Brinksma is most well-known for the development of the LOTOS specification language and used a similar figure in one of his papers to indicate several equivalences for LOTOS. Used with permission.

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Ed Brinkma

Foreword

This Festschrift is a birthday salute to Ed Brinksma, who recently celebrated his 60th birthday. It contains contributions by a number of Ed's colleagues, former PhD students, and researchers with whom Ed has been collaborating intensively. Ed has been very active in academic research; about 12 years ago he became Director of the Embedded Systems Institute followed by many years as Rector of the University of Twente, a job he fulfilled until the end of 2016 with full devotion and great enthusiasm.

The Festschrift is a tribute to the various seminal contributions of Ed Brinksma. Ed studied mathematics at the Rijksuniversiteit Groningen and completed his studies in the field of mathematical logics under the supervision of Johan van Benthem, one of the contributors to this Festschrift. In 1982, he took up an assistant professorship at the University of Twente, those days called the Technische Hogeschool Twente. It seems Twente is the right place for Ed, as he is still employed at this university! In 1988, Ed received a doctoral degree from Twente for his dissertation entitled "On the Design of Extended LOTOS," which he completed under the supervision of Chris Vissers. As a 34-year-old researcher he got a full professorship in Twente in 1991; those days Ed was one of the youngest professors (if not the youngest) in computer science in The Netherlands.

Ed's research is in the field of formal methods, or as he likes to phrase it, applied mathematics in computer science. In his research philosophy, formal methods research is based on a carefully balanced interaction between foundational aspects on the one hand, and software tool support and applications on the other. His research reflects this. Ed is perhaps most well-known for his work on the modelling formalism LOTOS (language of the temporal ordering of events), the only process algebra that made it into an international standard (in 1989) for describing communication protocols and distributed systems.

Ed recognized that a language in itself is insufficient. Together with Chris Vissers, Pippo Scollo, and Marten van Sinderen, he developed various specification techniques — in current jargon one would nowadays probably call them "patterns" — to assist the design process of distributed systems. The so-called constraint-oriented specification style is a prominent example of such pattern. He complemented this with a vision on transformational design that he developed for, amongst others, interface refinement, decomposition of processes into distributed ones, and the transformational design of cache coherency protocols.

Ed has been one of the pioneers of systematic and rigorous testing of implementations of (distributed) systems. His identification of the so-called canonical tester and the accompanying test derivation algorithms constitute the basis for modern model-based testing and have been important inputs to the ISO standard on testing. Together with Jan Tretmans, one of his first PhD students, he developed this further. Jan's contribution to this Festschrift gives a nice account of how this approach today has evolved into a practical one.

Another area that Ed pioneered has been the integration of performance and reliability aspects into formal methods. In the mid-1990s, he equipped process algebras with probabilities and time; later he developed algorithms for timed automata enriched with prices. His early aim, the full integration of performance and reliability analysis into a single framework, has formed the basis of current flourishing research areas such as probabilistic model checking. Quantitative extensions of modelling formalisms and semantic models are still an active area of research. Various contributions in this Festschrift give a good indication of what has been achieved so far.

Other topics Ed intensively considered are true concurrency semantics, first for LOTOS, and later for the sake of simplifying the verification. Later, he became increasingly interested in modelling where the central question is where good and adequate models come from. The contribution of Bernhard Steffen and his co-authors to this Festschrift shows how learning can be applied to synthesize such models in a semi-automated manner. A fascinating development on this topic can be witnessed in the last few decades.

It is worth mentioning that Ed played a decisive role in establishing international conferences in the field of formal methods. He has been one of the key players in the establishment of the conference series Formal Description Techniques (FORTE) and Protocol Specification, Verification, and Testing (PSTV). He also took the initiative to set up the first meetings on formal testing, resulting in the International Workshop on Protocol Test Systems (IWPTS), and actively stimulated the birth of the conference series on Quantitative Evaluation of Systems (QEST). FORTE and QEST still exist; IWPTS has been the trendsetter for various other workshops and conferences in testing. In 1995, together with Rance Cleaveland, Kim Guldstrand Larsen, and Bernhard Steffen, Ed took the initiative to launch the TACAS (Tools and Algorithms for the Construction and Analysis of Systems) workshop. This European counterpart to the (at that time) US-dominated CAV conference has over the years evolved into one of the most prominent conferences on formal verification and tools.

Ed's vision of science, something he discusses in an extremely passionate manner and with extensive (and lengthy) motivation, has inspired many of his pupils and fellow researchers. In particular, his search for simplicity — in his inauguration speech in 1991, Ed summarized this as, “the development of formal methods makes no sense when this is not accompanied by a dedicated effort to present ideas in a crystal clear and simple manner”¹ — has always been a key element in his view.

Besides being our example of an excellent researcher, inspiring mentor, and a great boss, Ed first and foremost is our friend. We could have filled yet another book with anecdotes about trips – do you still remember Crete, Aalborg, Beijing, and Australia, Ed? Just to mention a few – and stories about Lotosphere dinners, entertaining evenings (nights?) in bars and restaurants. Thanks for all the wonderful times, and thanks for being a great friend and colleague. Ed, many congratulations on your 60th birthday! Have a good one.

¹ De ontwikkeling van formele methoden is zinloos wanneer deze niet wordt begeleid door gerichte inspanning om de presentatie van de ideeën zo helder en eenvoudig mogelijk te houden.

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August 2017

Joost-Pieter Katoen
Rom Langerak
Arend Rensink

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