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Egidio Astesiano (Ed.)

# Fundamental Approaches to Software Engineering

First International Conference, FASE'98
Held as Part of the Joint European Conferences
on Theory and Practice of Software, ETAPS'98
Lisbon, Portugal, March 28 – April 4, 1998
Proceedings

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# Foreword

The European conference situation in the general area of software science has long been considered unsatisfactory. A fairly large number of small and medium-sized conferences and workshops take place on an irregular basis, competing for high-quality contributions and for enough attendees to make them financially viable. Discussions aiming at a consolidation have been underway since at least 1992, with concrete planning beginning in summer 1994 and culminating in a public meeting at TAPSOFT'95 in Aarhus.

On the basis of a broad consensus, it was decided to establish a single annual federated spring conference in the slot that was then occupied by TAPSOFT and CAAP/ESOP/CC, comprising a number of existing and new conferences and covering a spectrum from theory to practice. ETAPS'98, the first instance of the European Joint Conferences on Theory and Practice of Software, is taking place this year in Lisbon. It comprises five conferences (FoSSaCS, FASE, ESOP, CC, TACAS), four workshops (ACoS, VISUAL, WADT, CMCS), seven invited lectures, and nine tutorials.

The events that comprise ETAPS address various aspects of the system development process, including specification, design, implementation, analysis and improvement. The languages, methodologies and tools which support these activities are all well within its scope. Different blends of theory and practice are represented, with an inclination towards theory with a practical motivation on one hand and soundly-based practice on the other. Many of the issues involved in software design apply to systems in general, including hardware systems, and the emphasis on software is not intended to be exclusive.

ETAPS is a natural development from its predecessors. It is a loose confederation in which each event retains its own identity, with a separate programme committee and independent proceedings. Its format is open-ended, allowing it to grow and evolve as time goes by. Contributed talks and system demonstrations are in synchronized parallel sessions, with invited lectures in plenary sessions. Two of the invited lectures are reserved for "unifying" talks on topics of interest to the whole range of ETAPS attendees. The aim of cramming all this activity into a single one-week meeting is to create a strong magnet for academic and industrial researchers working on topics within its scope, giving them the opportunity to learn about research in related areas, and thereby to foster new and existing links between work in areas that have hitherto been addressed in separate meetings.

ETAPS'98 has been superbly organized by José Luis Fiadeiro and his team at the Department of Informatics of the University of Lisbon. The ETAPS steering committee has put considerable energy into planning for ETAPS'98 and its successors. Its current membership is:

Gyimothy (Szeged), Chris Hankin (London), Stefan Jähnichen (Berlin), Uwe Kastens (Paderborn), Paul Klint (Amsterdam), Kai Koskimies (Tampere), Tom Maibaum (London), Hanne Riis Nielson (Aarhus), Fernando Orejas (Barcelona), Don Sannella (Edinburgh, chair), Bernhard Steffen (Dortmund), Doaitse Swierstra (Utrecht), Wolfgang Thomas (Kiel)

Other people were influential in the early stages of planning, including Peter Mosses (Aarhus) and Reinhard Wilhelm (Saarbrücken). ETAPS'98 has received generous sponsorship from:

Portugal Telecom
TAP Air Portugal
the Luso-American Development Foundation
the British Council
the EU programme "Training and Mobility of Researchers"
the University of Lisbon
the European Association for Theoretical Computer Science
the European Association for Programming Languages and Systems
the Gulbenkian Foundation

I would like to express my sincere gratitude to all of these people and organizations, and to José in particular, as well as to Springer-Verlag for agreeing to publish the ETAPS proceedings.

Edinburgh, January 1998

Donald Sannella
ETAPS Steering Committee chairman

## Preface

Within the ETAPS'98 event, the Conference on Fundamental Approaches to Software Engineering (FASE), aims at providing a forum where rigorous methods for the software production process, bridging the gap between theory and practice, are presented, compared and discussed.
While keeping the acronym, FASE'98 replaces the conference on Formal Aspects/Approaches to Software Engineering, which took place within most editions of TAPSOFT. The new name of FASE has been chosen to mark a significant shift of emphasis towards approaches to SE, which are "fundamental" more than "formal", i.e. address basic issues by means of rigorous, but not necessarily formal, methods; in particular, the integration of formal and informal methods are encouraged, as well as reports on industrial experiences and experimental studies on the application of formal methods.

The FASE'98 Programme Committee members are

Egidio Astesiano (Italy, chair)
Michel Bidoit (France)
Dan Craigen (Canada)
Hartmut Ehrig (Germany)
Carlo Ghezzi (Italy)
Heinrich Hussmann (Germany)
Cliff Jones (UK)
Tom Maibaum (UK)
Fernando Orejas (Spain)
Gérard Renardel de Lavalette (The Netherlands)
Doug Smith (USA)
Jeannette Wing (USA)
Martin Wirsing (Germany)
Zhou Chao Chen (Macau)

Out of 59 submissions, in order to comply with the intended spirit and the novelty of ETAPS as an event of federated conferences, after some discussion within the PC, three rerouted to ESOP and two to FoSSACS. Then, after a rigorous refereeing process, followed by an intensive, ten-days-long, electronic selection meeting, 18 were selected for presentation and are included in this volume,which also includes two invited papers and three presentations of demos.

The first invited paper is by Kent Beck, one of the two invited speakers on behalf of the overall ETAPS'98 (the other being Amir Pnueli). His contribution is a much shortened version of a manifesto he had in mind on what he calls Extreme Programming, a discipline of software development emphasizing "productivity, flexibility, informality, teamwork and limited use of technology outside programming". Following the author's rather dialectical wishes, I welcome its inclusion in these proceedings, because, first of all, a much broader and more dialectical view of the software production process is very well in the spirit

of the new FASE, as it is also witnessed by the paper of Cliff Jones, the specific FASE invited speaker. Moreover, the debate this inclusion (and the talk, I am sure) will undoubtedly generate will have the benefit of helping the new, but obviously still much overlooked, nature of FASE emerge. Indeed, as anticipated, the other invited paper by Cliff Jones, with the significant title "Some Mistakes I Have Made and What I Have Learned from Them", intends "to argue that some formal methods research is going in a direction which has little chance of making an impact on computing practice" and strongly emphasizes the somewhat obvious (but not to all) fact "that for formal methods to be used they must be usable by engineers". In the spirit of this talk, and concerning the current contributions, let me add my feeling that, while we have already made a move toward more viable directions, there is still a long way to go and I pass the witness to the future chairpersons of FASE with the wish they pursue with more success the change in attitude and results.

I acknowledge the extremely efficient cooperation of the PC during the refereeing and selection process and of the other referees, as listed. I also want to express my conviction, after many experiences, that well-run electronic meetings (here it was by Web plus email), are very effective in allowing a much more rigorous and well motivated selection than by old-fashioned meetings.

Also I cannot forget to mention the efficiency, fairness and adherence to the principles of ETAPS of Don Sannella, the Coordinator of the Steering Committee. Moreover, being guilty for having proposed him and convinced him to accept such a frightening burden, it is a relaxing pleasure to witness day after day the skill and diplomacy of the organizer José Luis Fiadeiro in driving the whole event so smoothly, notwithstanding the intrinsic difficulties of the practical matters and those added by the strong personalities involved.

In all matters concerning the handling of the Web and the interface with the authors and the publisher I have been invaluably supported by my colleague and friend Gianna Reggio, helped by our secretary Elisabetta Ferrando; I will keep forever the nice memory of Gianna's unlimited cooperation in a difficult period of my life.

Genova, January 1998

Egidio Astesiano
FASE PC chairman

## External Referees

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D. Bert
G. Castagna
C. Choppy
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T. Dimitrakos
A. Durand
O. Fricke
R. Geisler
R. Groenboom
R. Heckel
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S. Kromodimoeljo
U. Lechner
A. Lopes
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B. Werner
E. Zucca

We apologise if, inadvertently, we have omitted a referee from the above list. To the best of our knowledge the list is accurate.

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### Contributed Papers