Preface

Over the past three decades, software engineers have derived a progressively better understanding of the characteristics of complexity in software. It is now widely recognized that *interaction* is probably the most important single characteristic of complex software. Software architectures that contain many dynamically interacting components, each with their own thread of control, and engaging in complex coordination protocols, are typically orders of magnitude more complex to correctly and efficiently engineer than those that simply compute a function of some input through a single thread of control.

Unfortunately, it turns out that many (if not most) real-world applications have precisely these characteristics. As a consequence, a major research topic in computer science over at least the past two decades has been the development of tools and techniques to model, understand, and implement systems in which interaction is the norm. Indeed, many researchers now believe that in future, computation itself will be understood chiefly as a process of interaction.

Since the 1980s, software agents and multi-agent systems have grown into what is now one of the most active areas of research and development activity in computing generally. There are many reasons for the current intensity of interest, but certainly one of the most important is that the concept of an agent as an autonomous system, capable of interacting with other agents in order to satisfy its design objectives, is a natural one for software designers. Just as we can understand many systems as being composed of essentially passive objects, which have state, and upon which we can perform operations, so we can understand many others as being made up of interacting, semi-autonomous agents.

This recognition has led to the growth of interest in agents as a new paradigm for software engineering. The AOSE 2001 workshop sought to examine the credentials of agent-based approaches as a software engineering paradigm, and to gain an insight into what agent-oriented software engineering will look like. AOSE 2001, building on the success of AOSE 2000 (Lecture Notes in Computer Science, Volume 1957, Springer-Verlag), was held at the Autonomous Agents conference in Montreal, Canada, in May 2001. Some 33 papers were submitted to AOSE 2001, following a call for papers on all aspects of agent oriented software engineering, and particularly the following:

- Methodologies for agent-oriented analysis and design
- Relationship of AOSE to other SE paradigms (e.g., OO)
- UML and agent systems
- Agent-oriented requirements analysis and specification
- Refinement and synthesis techniques for agent-based specifications
- Verification and validation techniques for agent-based systems
- Software development environments and CASE tools for AOSE
- Standard APIs for agent programming
- Formal methods for agent-oriented systems, including specification and verification logics

- Engineering large-scale agent systems
- Experiences with field-tested agent systems
- Best practice in agent-oriented development
- Market and other economic models in agent systems engineering
- Practical coordination and cooperation frameworks for agent systems

The present volume contains revised versions of the 14 papers presented at AOSE 2001, together with 5 invited contributions, by Federico Bergenti et al., Jürgen Lind, Morris Sloman, Wamberto Vasconcelos et al., and Eric Yu. It is structured into five parts, reflecting the main issues that arose at the event. We believe this volume reflects the state of the art in the field very well, and hope it will stimulate further exciting development.

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M.J. Wooldridge
G. Weiß
P. Ciancarini

Organizing Committee

Michael Wooldridge (chair)
University of Liverpool, UK
email: M.J.Wooldridge@csc.liv.ac.uk

Paolo Ciancarini (co-chair)
University of Bologna, Italy
email: ciancarini@cs.unibo.it

Gerhard Weiss (co-chair)
Technical University of Munich, Germany
email: weissg@in.tum.de

Program Committee

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