

Preface

Ten years ago, researchers in multi-agent systems became more and more aware that agent systems consist of more than only agents. The series of workshops on Environments for Multi-Agent Systems (E4MAS 2004-2006) emerged from this awareness. One of the primary outcomes of this endeavor was a principled understanding that the agent environment should be considered as a primary design abstraction, equally important as the agents.

At AAMAS 2014 in Paris, researchers in the E4MAS domain organized a workshop on *E4MAS – 10 Years Later* with the following aims: (1) to reflect on the past 10 years of research and engineering on agent environments for multi-agent systems; (2) to investigate to what extent the challenges identified a decade ago have been tackled; (3) to outline challenges for future research on a short and longer term.

This book reports the results of the workshop and subsequent efforts. We start with a roadmap paper that consolidates knowledge from past research and from these insights defines a path for future research in the field. The roadmap focusses on three particularly relevant topics of modern software intensive systems from the viewpoint of agent environments for multi-agent systems: the large scale of systems, the openness of systems to deal with parts that enter and leave the system dynamically, and humans in the loop that interact with the system.

After the roadmap follow 13 contributions that span a wide variety of topics grouped in four parts. The first part presents three papers on the connection between agents, environments, and humans. The second part contains a set of interesting papers on environments for complex and stigmergic systems. The third part presents four papers on virtual and simulated environments. Finally, the fourth part concludes with two papers on open agent environments and interoperability. All papers presented in this volume were carefully reviewed.

We are grateful to all those who contributed to the successful organization of E4MAS 2014, in particular, the Program Committee, the AAMAS Committee, and the local organizers. We hope that the papers of this volume will stimulate further research in agent environments for multi-agent systems and contribute to enhancing engineering practice.

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