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Engineering Multi-Agent Systems

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Revised Selected Papers

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Preface

The engineering of multi-agent systems (MAS) is a complex activity: Such systems consist of multiple autonomous and heterogeneous agents, and their proper functioning depends on the effective interaction between these agents. While MAS have been used to some extent in industry, we feel that a wider adoption is hindered by the fact that the underlying engineering techniques are not as mature as those in mainstream software and systems engineering. Numerous challenges have to be addressed, including:

Design and software engineering: how to effectively *design* agents and their interactions?
Implementation: how to *implement* multi-agent coordination or organizations *efficiently*?
Verification: how to *formally verify* (un-) desired properties of individual agents and MAS?

We believe that these challenges can be tackled more effectively when considered within the discipline of MAS engineering. As an example, design artefacts (e.g., agents or MAS models) can be used to support and assist with debugging and testing. Other examples are the following: (1) the development of agent-oriented programming languages that result in programs that are more readily verifiable, (2) the use of declarative techniques that span design and implementation.

The International Workshop on Engineering Multi-Agent Systems (EMAS) is meant to be an ideal venue for papers that relate to all aspects of agent and MAS engineering. EMAS was created in 2013 as a merger of three separate workshops (with overlapping communities) that focused on software engineering aspects (AOSE), programming aspects (ProMAS), and the application of declarative techniques to design, programming, and verification (DALT).

The EMAS workshop series[1] explicitly pursues three goals:

To progress and further develop the understanding of how to engineer multi-agent systems.
To bring together the communities that are concerned with different aspects of engineering MAS, and by doing so, allow for better interchange of ideas between the communities, thus exploiting the synergies discussed above.
To provide a venue for workshop papers that report on experiences and lessons

[1] `http://emas.in.tu-clausthal.de`

learned from innovative applications of MAS, and have these lessons influence further research in the field.

To guide the authors in preparing their submissions and to establish a consistent set of expectations in the review process, all authors were asked to self-identify their papers with one or more of the categories (adapted from the ICSE 2014 guidelines[2]) listed below. In this way, we hope to foster the diversity of approaches for addressing challenges in engineering MAS.

Analytical: A paper in which the main contribution relies on new mathematical theory or algorithms. Examples include new logics and semantics for agent programming languages, algorithms for agent reasoning, algorithms for the efficient implementation of MAS languages.
Empirical: A paper in which the main contribution is the empirical study of an MAS engineering technology or phenomenon. This includes studies of the use of (existing or novel) MAS engineering techniques in practice, such as (industrial) experience reports, controlled experiments, and case studies, using qualitative and/or quantitative data analysis. This also concerns empirical evaluations of algorithms and performance of MAS platforms.
Technological: A paper in which the main contribution is of a technological nature. This includes novel tools, environments, testbeds, modeling languages, infrastructures, and other technologies.
Methodological: A paper in which the main contribution is a coherent system of broad principles and practices to interpret or solve a problem. This includes novel requirements elicitation methods, process models, design methods, development approaches, programming paradigms, and other methodologies.

EMAS 2014 received 41 submissions. Each paper was reviewed by three reviewers, and we accepted 22 papers for presentation at the workshop. These were distributed across the paper categories as follows: technological: 17; methodological: 14; analytical: 6; empirical: 4. The authors of accepted papers were invited to submit a revised version of their paper for the Springer LNAI proceedings, which underwent another round of reviewing. The result is this volume, containing 21 regular papers and an additional paper from one of the invited speakers at the workshop.

The EMAS 2014 chairs would like to acknowledge the great review work done by members of the Program Committee. Reviews were in general detailed (and, we hope, useful to the authors), and were followed by extensive discussion among Program Committee members and chairs to finally decide on the acceptance of the papers.

[2] `http://2014.icse-conferences.org/research`

We hope the reader of this volume finds the papers useful to get an idea about this exciting area.

October 2014

Fabiano Dalpiaz
Jürgen Dix
M. Birna van Riemsdijk

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