Lecture Notes in Artificial Intelligence 3451

Edited by J. G. Carbonell and J. Siekmann

Subseries of Lecture Notes in Computer Science

Marie-Pierre Gleizes Andrea Omicini
Franco Zambonelli (Eds.)

Engineering Societies in the Agents World V

5th International Workshop, ESAW 2004
Toulouse, France, October 20-22, 2004
Revised Selected and Invited Papers

Springer

Series Editors

Jaime G. Carbonell, Carnegie Mellon University, Pittsburgh, PA, USA
Jörg Siekmann, University of Saarland, Saarbrücken, Germany

Volume Editors

Marie-Pierre Gleizes
Université Paul Sabatier
IRIT, Institut de Recherche en Informatique de Toulouse
118, Route de Narbonne, 31062 Toulouse Cédex, France
E-mail: Marie-Pierre.Gleizes@irit.fr

Andrea Omicini
Università di Bologna a Cesena
DEIS, Dipartimento di Elettronica, Informatica e Sistemistica
Via Venezia 52, 47023 Cesena, Italy
E-mail: andrea.omicini@unibo.it

Franco Zambonelli
Università di Modena e Reggio Emilia
DISMI, Dipartimento di Scienze e Metodi dell'Ingegneria
Via Allegri 13, 42100 Reggio Emilia, Italy
E-mail: franco.zambonelli@unimore.it

Library of Congress Control Number: 2005928542

CR Subject Classification (1998): I.2.11, I.2, C.2.4, D.1.3, D.2.2, D.2.7, D.2.11, I.6

ISSN 0302-9743
ISBN-10 3-540-27330-1 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-27330-1 Springer Berlin Heidelberg New York

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 11423355 06/3142 5 4 3 2 1 0

Preface

The first workshop "Engineering Societies in the Agents World" (ESAW) was held in August 2000, in conjunction with the 14th European Conference on Artificial Intelligence (ECAI 2000) in Berlin. It was launched by a group of researchers who thought that the design and development of MASs (multi-agent systems) not only needed adequate theoretical foundations but also a call for new techniques, methodologies and infrastructures to develop MASs as artificial societies. The second ESAW was co-located with the European Agent Summer School (ACAI 2001) in Prague, and mostly focused on logics and languages, middleware, infrastructures and applications. In Madrid, the third ESAW concentrated on models and methodologies and took place with the "Cooperative Information Agents" workshop (CIA 2002). The fourth ESAW in London was the first one that ran as a stand-alone event: apart from the usual works on methodologies and models, it also stressed the issues of applications and multidisciplinary models. Based on the success of previous ESAWs, and also given that the difficult challenges in the construction of artificial societies are not yet fully addressed, the fifth ESAW workshop was organized in the same spirit as its predecessors.

In particular, ESAW 2004 took place at the IRIT laboratory of the Université "Paul Sabatier" (Toulouse, France), at the end of October 2004. It was not co-located with any other scientific event, in the same way as ESAW 2003. ESAW 2004 remained committed to the use of the notion of MASs as the seeds for animated, constructive and highly interdisciplinary discussions about technologies, methodologies and tools for the engineering of complex distributed systems. The widespread interest in these topics, as well as the effectiveness of ESAW as a well-established research forum, are witnessed by both the high number of submissions received (46 papers from 20 countries) and by the good participation (46 researchers from 14 countries).

This fifth workshop mainly focused on effective and methodical development of complex software systems in terms of multi-agent societies, as well as on novel approaches to software modelling and engineering to support the successful deployment of software systems made up of massive numbers of autonomous components. While designers should be enabled to control and predict the behavior of their systems, we should also allow emergent global system properties and discovered functionality to become commonplace in the theory and practice of MASs. It is very likely that such innovations will exploit lessons from a variety of different scientific disciplines, such as sociology, economics, organization science, modern thermodynamics, and biology. This is the main reason why the presentations in this workshop covered a number of these domains.

The following different themes were addressed during the three-day meeting:

- *Agent-Oriented Software Engineering.* The presentations of this session concerned methodologies, and discussed requirements analysis, specification, design and deployment phases.
- *Negotiation.* This session covered different mechanisms to enable agents to negotiate and to solve conflicts. The different mechanisms presented were based on biological metaphors, social welfare, and Activity Theory.
- *Large-Scale Multi-agent Systems.* The papers of this session focused on communication in large systems, semantics, and physical accessibility.
- *Roles.* Presentations in this session concentrated on the notion of role in a MAS: in particular, on the notion of role as used in the context of the argumentation process, and during conversation protocols.
- *Organizations.* This is one of the main topics in societies of agents, and was discussed in the context of a normative framework and of virtual knowledge communities.
- *Social Aspects.* This session drew a parallel between human and artificial societies by studying on the one hand the social power theory and on the other hand the role of sanctions in a society.
- *Simulation.* This session elaborated on the issues of simulation by using MASs, focusing on challenges such as the development process and the calibration of parameters in a simulation system.
- *Cooperation.* This session covered one of the most traditional topics in MAS research, that is, cooperation.

Two invited presentations tried to bridge between artificial and natural societies, such as human or animal societies. The first invited talk was given by Vincent Chevrier, who is an assistant professor at the Université Henri Poincaré of Nancy (France) and a researcher at LORIA in the MAIA team. He proposed methodological principles for the design of MASs drawing from the mechanisms observed in natural systems such as stigmergy or resource access.

Pablo Noriega expounded the other invited presentation concerning e-institutions. He is a senior researcher at Anáhuac University, Mexico City (Mexico), as well as a visiting researcher at the Institut d'Investigació en Intelligència Artificial (IIIA) in Barcelona (Spain). He elaborated on how interaction conventions for agents — human or software agents — can be used to engineer complex open systems by using commitments.

Furthermore, discussions during the meeting emphasized the need for tools to design large-scale systems and open systems. From the debate, two main acceptations of the term "openness" clearly emerged: a MAS is open either when agents can be dynamically added or removed, or when the MAS can take into account the perturbations coming from the MAS environment.

The original contributions, the slides of the presentations, as well as more information about the workshop are available online at the ESAW 2004 website (`http://www.irit.fr/ESAW04`). This postproceedings (ESAW 2004: LNAI 3451) continues the series published by Springer (ESAW 2000: LNAI 1972, ESAW 2001: LNAI 2203, ESAW 2002: LNAI 2577, and ESAW 2003: LNAI 3071).

This volume contains revised, reworked and extended versions of selected papers from ESAW 2004, and also includes the contribution of one of the two invited speakers.

The ESAW 2004 organization would have not been possible without the financial help of:

- Agentlink III
- ARTAL Technologies, Labège, France
- ILOG, Paris, France
- IRIT, Toulouse, France
- Université Paul Sabatier, Toulouse, France
- Whitestein, Switzerland

as well as the scientific support of the Alma Mater Studiorum, Università di Bologna in Cesena, the Università di Modena e Reggio Emilia, and all the members of the Program Committee. Our thanks also go to Alfred Hofmann and all of his Springer crew for their essential role during the realization of the postproceedings. We also want to thank the local organizers who created a studious and convivial ambiance during the workshop.

The next ESAW workshop will take place in Turkey supported by the Ege University of Izmir during the fall of 2005, with Oguz Dikenelli, Marie-Pierre Gleizes and Alessandro Ricci as the chairs and organizers. We expect that the next ESAW workshop will keep up its tradition of innovation and stimulating scientific debate, and also that more applications and demonstrations of running systems will further prove the feasibility and usefulness of the mechanisms and methods recommended by agent researchers.

February 2005

Marie-Pierre Gleizes
Andrea Omicini
Franco Zambonelli

Organization

ESAW 2004 Workshop Organizers

Marie-Pierre Gleizes	IRIT, Université Paul Sabatier, Toulouse (France)
Andrea Omicini	DEIS, Alma Mater Studiorum, Università di Bologna a Cesena (Italy)
Franco Zambonelli	Department of Computer Science, Università degli Studi di Modena e Reggio Emilia (Italy)

ESAW 2004 Local Organizing Committee

Marie-Pierre Gleizes	(Local Chair)
Carole Bernon	IRIT,
Valérie Camps	Institut de Recherche en Informatique de Toulouse,
Jean-Pierre Georgé	Université Paul Sabatier,
Davy Capera	Toulouse (France)
Jean-Pierre Mano	

ESAW 2004 Program Committee

Alexander Artikis	Department of Electrical & Electronic Engineering, Imperial College London (UK)
Federico Bergenti	Dipartimento Ingegneria dell'Informazione, Università degli Studi di Parma (Italy)
Carole Bernon	IRIT, Université Paul Sabatier, Toulouse (France)
Olivier Boissier	Ecole Nationale Supérieure des Mines de Saint-Etienne (France)
Monique Calisti	Whitestein Technologies (France/Switzerland)
Jacques Calmet	University of Karlsruhe (Germany)
Cristiano Castelfranchi	Institute of Cognitive Sciences and Technology, CNR (Italy)
Luca Cernuzzi	Universidad Católica de Asuncion (Paraguay)
Paolo Ciancarini	DSI, Alma Mater Studiorum, Università di Bologna (Italy)
Helder Coelho	Department of Informatics of the Faculty of Sciences, University of Lisbon (Portugal)
R. Scott Cost	Department of Computer Science and Electrical Engineering, University of Maryland Baltimore County (USA)
Paul Davidsson	Department of Software Engineering & Computer Science, Blekinge Institute of Technology (Sweden)
Rino Falcone	Institute of Cognitive Sciences and Technology, CNR (Italy)

Stephan Flake	C-LAB, Cooperative Computing & Communication Lab (Germany)
Zahia Guessoum	LIP6, Paris (France)
Andrew Jones	Department of Computer Science, King's College London (UK)
Anthony Karageorgos	University of Thessaly (Greece)
Paul Kearney	Intelligent Agents, BT Exact (UK)
Barbara Dunin-Kęplicz	Institute of Computer Science of the Polish Academy of Sciences, Warsaw (Poland)
Yannis Labrou	Fujitsu Laboratories of America (USA)
Lyndon C. Lee	Intelligent Agents, BT Exact (UK)
Michael Luck	Department of Electronics & Computer Science, University of Southampton (UK)
Peter McBurney	University of Liverpool (UK)
Pablo Noriega	Spanish Scientific Research Council, Campus Universitat Autónoma de Barcelona (Spain)
Eugenio Oliveira	Department of Computer and Electrical Engineering, University of Porto (Portugal)
Sascha Ossowski	Universidad Rey Juan Carlos, Madrid (Spain)
H. Van Dyke Parunak	Altarum Institute, Ann Arbor, MI (USA)
Paolo Petta	Austrian Research Institute for Artificial Intelligence, Vienna (Austria)
Gauthier Picard	IRIT, Université Paul Sabatier, Toulouse (France)
Jeremy Pitt	Department of Electrical & Electronic Engineering, Imperial College London (UK)
Omer Rana	Department of Computer Science, University of Cardiff (UK)
Alessandro Ricci	DEIS, Alma Mater Studiorum, Università di Bologna a Cesena (Italy)
Ken Satoh	National Institute of Informatics, Tokyo (Japan)
Onn Shehory	IBM Haifa Research Laboratories (Israel)
Christophe Sibertin-Blanc	IRIT, Université Paul Sabatier, Toulouse (France)
Munindar Singh	Department of Computer Science, North Carolina State University (USA)
Kostas Stathis	Department of Computer Science, City University, London (UK)
Robert Tolksdorf	Institut für Informatik, Freie Universität Berlin (Germany)
Anand Tripathi	University of Minnesota (USA)
Paola Turci	Università degli Studi di Parma (Italy)
José M. Vidal	Department of Computer Science & Engineering, University of South Carolina (USA)

Table of Contents

Roles, Organizations and Institutions for Agents

Social Issues in Multi-agent Systems

Cooperation and Collective Behaviours in Agent Societies

Methodologies and Platforms for Agent-Oriented Engineering

Agent-Oriented Simulation

Models for Multi-agent Systems