Next issue (October 2004): “Software Process Technologies” (The full schedule of UPGRADE is available at our website)

2 From the Editors’ Desk
Worth To Be Mentioned
The Editorial Team of UPGRADE communicates that (1) Pliroforiki, journal published by the Cyprus CEPIS society CCS, has joined UPENET, and (2) a Call for Contributions for our MOSAIC section has been released.

A World of Agents

Guest Editors: Pedro Cuesta-Morales, Zahia Guessoum, Juan-Carlos González-Moreno, and Juan Pavón-Mestras

Joint monograph with Novática*

3 Presentation
Agent Technologies at Work – Pedro Cuesta-Morales, Zahia Guessoum, Juan-Carlos González-Moreno, and Juan Pavin-Mestras
The authors describe trends and challenges that will need to be addressed over the next 10 years in order to progress in the field of Agent Technologies.

11 Open Directions in Agent-Oriented Software Engineering – Franco Zambonelli and Andrea Omicini
This paper identifies key open research directions in the development process of Agent-Oriented Software Engineering (AOSE.)

15 Verification and Validation Techniques for Multi-Agent Systems – Rubén Fuentes- Fernández, Jorge J. Gómez-Sanz, and Juan Pavón-Mestras
This article gives an overview of, and presents some of the new methods used in, Multi-Agent Systems verification and validation.

20 Applying the Tropos Methodology for Analysing Web Services Requirements and Reasoning about Qualities of Services – Marco Aiello and Paolo Giorgini
This article gives an overview of, and presents some of the new methods used in, Multi-Agent Systems verification and validation.

27 Developing a Multi-Agent System Using MaSE and JADE – Pedro Cuesta-Morales, Alma-Maria Gómez-Rodríguez, and Francisco J. Rodríguez-Martínez
An example of how to develop a Multi-Agent System using currently available methods and tools is described in this paper.

33 Engineering Multi-Agent Systems as Electronic Institutions – Carles Sierra, Juan A. Rodríguez-Aguilar, Pablo Noriega Blanco-Vigil, Josep-Lluís Arcos-Rosell, and Marc Esteve-Vivancos

This paper introduces an integrated development environment that supports the engineering of a particular type of distributed systems, namely multi-agent systems, ‘as electronic institutions’.

40 The Baghera Multiagent Learning Environment: An Educational Community of Artificial and Human Agents – Sylvie Pesty and Carine Webber
The authors present a practical application of an agent-based architecture, which has been developed using the methodological framework defined by case-based reasoning systems.

51 An Agent-Based Architecture for Developing Internet-Based Applications – Jesús García-Herrero, Javier Carbó-Rubiera, and José M. Molina-López
This paper presents an agent-oriented integration framework that uses Web technology and Aspect Object Model to integrate applications based on different component models.

56 Integration and Reuse Based on Web Technology and Aspect Object Model – Yauheni Veryha and Eckhard Kruse
This paper presents a useful object-oriented integration framework that uses Web technology and Aspect Object Model to integrate applications based on different component models.

61 News & Events: News from CEPIS, ECDL, and EUCIP; QoIS 2004 (Fifth International Workshop on Quality of Future Internet Services)

UPENET (UPGRADE European NETwork)

63 From Pro Dialog (Poland):
Large-Scale Software Development in a Multinational Software Corporation – Jacek Czerwiak and Wojciech Spiewak
This paper shows a process of code management based on the software integrity inspection process performed in R&D departments of a large company.

68 From Novática (Spain):
How will we computer professionals earn a living? (And why don’t you teach for free?) – Ricardo Galli-Granada
In this article the author, a university lecturer in Computer Science, takes an unorthodox look at the computer profession and responds to sharp questions posed by an opponent of free software / open source.

* This monograph will be also published in Spanish (full issue printed; summary, abstracts and some articles online) by Novática (Spain) and the Italian IT portal Tecnoteca at <http://www.tecnoteca.it>.
Presentation

Agent Technologies at Work

Pedro Cuesta-Morales, Zahia Guessoum, Juan-Carlos González-Moreno, and Juan Pavón-Mestras

1 Introduction: The Agent Paradigm
During the last decade, Agent-Oriented Software Engineering (AOSE) has attracted the attention of a large community of researchers from many different fields, including artificial intelligence and distributed systems. This interest has been motivated by the potential benefits of the agent paradigm, which needs to be integrated in software engineering practices in order to be applicable in the software industry as a whole.

Although there are many definitions of the agent concept (see, for instance, those included in Michael Wooldridge’s book “An Introduction to Multiagent Systems”, John Wiley & Sons, 2002), most of them identify their distributed nature, autonomy, sociability (hence the term Multi-Agent System, MAS, as agents normally collaborate within organizations to achieve common goals), adaptability to the environment, and even mobility through a network of computer resources. Agents have been applied with different purposes and in different environments: for personal assistants, to providing support for collaborative work, for trading and negotiation in e-markets, in huge social simulation systems, for web information systems, for e-games, etc.

A common classification scheme of agents is the weak and strong notion of agency. In the weak notion of agency, agents have their own will (autonomy), they are able to interact with each other (social ability), they respond to stimuli (reactivity), and they take the initiative (pro-activity). In the strong notion of agency, in addition to the characteristics displayed by the weak notion of agency, agents can also move around (mobility), they are truthful (veracity), they do what they’re told (benevolence), and they will perform in an optimal manner to achieve goals (rationality). Due to the fact that existing agents have more in common with software than with intelligence, they will be referred to as software agents or agents in this context.

2 Bringing Agent Technology to Market
Successfully bringing agent technology to market requires techniques that reduce the perceived risk inherent in any new technology, by presenting the new technology as an incremental extension of known and trusted methods, and by providing explicit engineering tools to support proven methods of technology deployment. Applied to agents, these insights imply an approach that:
• introduces agents as an extension of active objects: an agent is an object that can say “go” (flexible autonomy as the ability to initiate action without external invocation) and “no” (flexible autonomy as the ability to refuse or modify an external request);
• promotes the use of standard representations for methods and tools to support the analysis, specification, and design of agent software.

As pointed out by some of the articles appearing in this monograph, until recently developing a MAS has been more of an art than a structured discipline. We can currently we can find tools able to produce complete MAS from a specification, libraries of components that deal with concrete MAS issues (distributed planning, reasoning, learning), and theories that describe MAS behaviour and properties. Knowing all of them requires a great effort. There are surveys which facilitate the task, but it is hard to give an overall view of what software, theories, methodologies exist, and how they are applied to MAS development.

3 What Is This Monograph about?

Having into account all the above, we have selected a set of papers that address some of the most important aspects and issues of this promising field.

To begin with, Michael Luck’s and Peter McBurney’s paper “Challenges for Agent Technology Moving towards 2010” gives us an answer to the question about how Agent Technology is evolving and summarises the current state-of-the-art in this field, identifying trends and challenges that will need to be addressed over the next 10 years in order to progress in the field and reap the benefits. Similarly, but in this case specifically oriented towards the MAS developing process and methodologies, the paper by Franco Zambonelli and Andrea Omicini “Open Directions in Agent-Oriented Software Engineering”, aims to identify key open research directions in the development process of AOSE. Also related with the development process is the contribution from Rubén Fuentes-Fernández, Jorge J. Gómez-Sanz, and Juan Pavón-Mestras “Verification and Validation Techniques for Multi-Agent Systems”, which gives an overview of, and presents some of the new methods used in, MAS verification and validation. Following the same line of argument, the work by Marco Aiello and Paolo Giorgini “Applying the Tropos Methodology for Analysing Web Services Requirements and Reasoning about Qualities”, proposes the use of the agent-oriented methodology Tropos for the analysis of web service requirements, and describes how it can be used to model quality of service requirements.

An example of how to develop a MAS using currently available methods and tools is presented by the contribution from Pedro Cuesta-Morales, Alma-María Gómez-Rodríguez, and Francisco J. Rodríguez-Martínez “Developing a Multi-Agent System Using MaSE and JADE”. The paper “Engineering Multi-Agent Systems as Electronic Institutions” by Carles Sierra, Juan A. Rodriguez-Aguilar, Pablo Noriega Blanco-Vigil, Josep-Lluís Arcos-Rosell and Marc Esteva-Vivancos introduces an integrated development environment that supports the engineering of a particular type of distributed systems, namely multi-agent systems, as electronic institutions.

The monograph closes with some articles related to the development of practical and real MAS systems. The first one, “The Baghera Multiagent Learning Environment: An Educational Community of Artificial and Human Agents”, by Sylvie Pesty and Carine Webber, focuses on the multiagent learning environment named Baghera, built on a two-level multiagent architecture. The second, “Management of a Surveillance Camera System Using Software Agents”, by Jesús García-Herrero, Javier Carbó-Rubiera and José M. Molina-López, shows a MAS system that applies data mining techniques to learn, from real situations, how to extract knowledge from the environment in order to detect conflictive situations in a distributed surveillance camera system, and to improve the cooperation between cameras. The last article, “An Agent-Based Architecture for Developing Internet-Based Applications”, by Juan M. Corchado-Rodríguez, Rosalía Laza-Fidalgo and Luis F. Castillo-Ossa, presents a practical application of an-agent based architecture, which has been developed using the methodological framework defined by case-based reasoning systems.

Let us finally express our thanks to all the authors for their valuable collaboration and also to the editors of UPGRADE and Novática for the opportunity they have given us to guest-edit this monograph, with the hope that its contents will be both interesting and useful to readers of the two journals.

Translation by Steve Turpin
Useful References about MAS

For those interested in obtaining more detailed information about Multi-Agent Systems and Agent Technologies the following sources complement the references provided by the authors of the papers included in this issue.

**Books**

**Events**
- CIA (Cooperative Information Agents Workshops): <http://www.dfki.de/~klusch/IWS-CIA-home.html>.

**Journals**

**Web Sites**
- AgentLink: <http://www.agentlink.org/>.
- ASM (Agentes y Sistemas Multiagentes): <http://agentes.ei.uvigo.es/> (in Spanish.)
- ISOA (Ingeniería de Agentes Orientada a Objetos): <http://ma.ei.uvigo.es/> (in Spanish.)
- UMBC AgentWeb: <http://agents.umbc.edu/>.