
Editorial

Hong Zhou

Saint Joseph College
West Hartford, CT 06117, USA
E-mail: hzhou@sjc.edu

Biographical notes: Hong Zhou is an Assistant Professor of Computer Science at Saint Joseph College, Connecticut, USA. He received both his MS in Computer Science (2001) and his PhD in Scientific Computing (2004) from the University of Southern Mississippi, USA. Dr. Zhou's research interests include bioinformatics, Multi-Agent Systems (MAS), data management and digital image processing.

In the history of programming and software engineering, Object-Oriented Programming (OOP) and therefore Object-Oriented Software Engineering (OOSE) revolutionised the way software is designed, developed, used, reused and maintained. Since then other software engineering paradigms such as Component-Oriented Software Engineering (COSE), Agent-Oriented Software Engineering (AOSE), Aspect-Oriented Software Development (AOSD) and Service-Oriented Software Engineering (SOSE) have emerged as successors of OOSE. The emergence of these new paradigms is mainly driven by the internet-based applications where the complexity and requirements have dramatically increased and the development cost must be reduced. In these later paradigms, a software system is decomposed into logical components, agents, aspects (concerns) or services which communicate with each other via well-defined protocols or interfaces. This creates a higher level of abstraction than OOSE and therefore can simplify the process of system design.

In AOSE, the core unit is the software agent, which is defined to be intelligent, autonomous, adaptable and probably mobile. The goal of AOSE is to develop functional and robust Multi-Agent Systems (MAS) that usually work across a network. Because of the attractive features of the software agent, the developed MAS claims to possess quality properties such as adaptability, intelligence, autonomy and/or mobility. Though AOSE has shown promise as a successful extension to OOSE, one must be cautious regarding AOSE's potential to take off like OOSE because the applications of AOSE to real-world problems are still limited. Nevertheless, the AOSE paradigm fits well with distributed computing applications and is realising its potential in web applications, such as electronic commerce (e-commerce) or electronic business (e-business).

MASeB'2007, the *2nd International Workshop on (Multi-)Agent Systems in E-Business: Concepts, Technologies and Applications*, was organised within the framework of WI/IAT/GrC/BIBM 2007 conferences, and was focused on topics of MAS for e-business. This special issue is initiated by MASeB'2007 and contains several thoroughly revised articles from MASeB'2007. These articles highlighted how

MAS could be applied in various e-businesses. The article 'The design and implementation of an agent-based auction service' (Dobriceanu *et al.*) presented a MAS for open and flexible service oriented automated auctions. The implementation and experimental results showed the potential for future industrial applications. The authors (Vokřínek *et al.*) of the article 'The RBVO Formation Protocol' proposed a protocol for establishing cooperation in a Virtual Organisation (VO). VO is a new approach to business cooperation and its formation is based on negotiation among distributed participants. The authors implemented the VO formation protocol with an agent system which has been utilised in real industrial cases. In 'An agent-oriented mobile payment system secured using a biometrics approach', Lu *et al.* developed a mobile two-dimensional barcode reader and a mobile biometric identification (iris recognition) system. The authors then discussed how their agent-oriented system design could promote fraud protection in mobile payments.

Several authors who attended MASEB'2007 submitted a different paper from what they submitted for MASEB'2007. Also, there are several submissions from authors who are interested in this special issue. All submissions, including those from MASEB'2007, went through a blind peer review process, and only those articles of significant value were accepted. It is important to point out that there are several articles that are not closely related to the theme of this special issue; they are accepted because they were considered valuable by the majority of the reviewers. In 'Adaptability in an agent-based virtual organisation' (Ganzha *et al.*), the behaviours of an agent depend on the modules they consist of. By addition, removal or replacement of function modules, the function and behaviour of an agent and the agent system could be controlled accordingly and thus realise adaptability. Devi *et al.* designed a decision support system for electronic purchasing (e-purchasing) in order to get results that could better match the buyers' preferences in their article. 'IDSS: an intelligent decision support system for e-purchasing using CBR and CF'. The intelligence of their support system is achieved mostly by the cooperation of two software agents: Search Agent and Recommender Agent. In 'Support for virtual organisation creation – partners' profiles and competency management', Hodik *et al.* furthered their contribution to VO creation by identifying terms and issues relating to VO partners' profiles and competency management. In addition, they discussed the application of MAS in VO creation.

While there are some frameworks supporting AOSE, Ahmad and Rahimi argued in their article 'Motivation for a new formal framework for agent-oriented software engineering' that currently available frameworks and formal languages do not support some aspects of agent-based system analysis and development. They were motivated to develop a new formal framework that could comprehensively model MAS. Another group of authors (Hachicha *et al.*) presented an approach for modelling mobile agents – software agents with mobility. Their approach is materialised by a UML profile, as detailed in their article 'MA-UML: a conceptual approach for mobile agents' modelling'. In 'Advanced separation of concerns in agent-oriented design patterns', Silva *et al.* took a dare move to demonstrate that aspect-oriented solutions for mediation patterns improve the separation of pattern-related concerns. They also presented their Agent Pattern Specification (APS), a social pattern description technique. And finally, Nguyen and co-authors boldly combined component-oriented, agent-oriented, and service-oriented computing together by presenting their 'A development framework for component-based agent-oriented business services'.

The articles of this special issue go beyond its original theme. They bring us designs and applications of MAS in e-business, and they present us with architectural perspectives of AOSE and corresponding new strategies. They serve as a mark of the long progressing journey of AOSE towards its maturity. If the day comes true when AOSE becomes an accepted and popular software engineering paradigm in industrial sectors, this special issue will then be memorable.

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