

# **Special issue on Holonic Multi-Agent Systems**

## **of the International Journal of Agent-Oriented Software Engineering**

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Complex Systems are characterized by a large number of entities in interaction, exhibiting emergent behaviors. Nobel Laureate Herbert Simon states:

*"Empirically a large proportion of the complex systems we observe in nature exhibit hierarchic structure. On theoretical grounds we could expect complex systems to be hierarchies in a world in which complexity had to evolve from simplicity."* Simon (1996)

This asseveration about real-world Complex Systems raises the question, if nature has selected this path, should scientists trying to model Complex Systems privilege it too? In 1967 Arthur Koestler coined the term holon as an attempt to conciliate holistic and reductionist visions of the world. A holon represents a part-whole construct that can be seen as a component of a higher level system or as whole composed of other holons as substructures. This concept has proved to be successful in number of industrial domains such as manufacturing, real-time control, supply chain management, resource allocation, production planning/scheduling, air traffic, ....

Multi-Agent Systems (MAS) also stand out as a paradigm for the design of Complex Systems. Indeed, this paradigm proposes new strategies for the analysis, modelling and implementation of such systems. Its elementary constituents are called "agents", i.e. software entities which exhibit autonomous and flexible behaviours. Holonic Multi-Agent Systems (HMAS) descend from the adoption of both the MAS and the holon concepts in a novel approach. In HMAS, agents are looked at under a recursive or composed perspective thus providing a novel paradigm for managing, modelling and supporting complex systems.

In this special issue we are interested in these hierarchical structures applied to the analysis and modelling of Complex Systems. More precisely, we explore the requirements and consequences of modelling complex systems using holonic multi-agent approaches.

The aim of this special issue is to review on HMAS and to compare MAS and HMAS and to bring some light on what problems need a hierarchical structure (in the Simon sense) to be solved. Eventually, we aim to refine these solutions by studying which models, platforms and languages are fitted for HMAS.

To summarize, specific topics of interest include (but are not limited to):

- Theoretical differences and similarities between the concept of holons and agents
- Holonic multi-agent organization
- Standardization issues, communication and interactions models
- Methodologies and frameworks for modelling HMAS,
- Platforms and Languages
- Applications and tools for implementation/simulation of HMAS
- Formal approaches for HMAS

Authors are invited to submit research contributions or critiques of practical experience. Papers (in English) should not exceed 20 pages in IJAOSE format<sup>1</sup>. All papers are refereed through a double review for publication in the International Journal of Agent-Oriented Software Engineering (IJAOSE).

## **IMPORTANT DATES**

- \* Deadline for submissions: ~~December 1, 2009~~ – **December 15, 2009**
- \* Notifications: March 1, 2010
- \* Deadline for revisions: May 1, 2010
- \* Publication: Begin 2011

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<sup>1</sup> Details are available at the address: <http://www.inderscience.com/mapper.php?id=31>