

A Proposal for an Organizational MAS Methodology

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ABSTRACT

Several approaches for analyzing and designing open multi-agent systems focusing on organizational concepts have been proposed recently, such as new Gaia [5], OperA [2], E-Institutions [3] (see [1] for a deeper survey). Some approaches offer good software tools and processes for system analysis and design, but do not take into account social norms. Others are mainly focused on analysis, whereas design and implementation phases lack or are redirected to agent-oriented methodologies (which do not cover organizational concepts)[1]. Moreover, most of the proposed methods only deal with groups but do not consider other topological designs (ex. hierarchies, matrix, markets). To sum up, we have observed that there is not any actual methodology that offers a complete method for analyzing, designing and implementing open multi-agent systems.

This research tries to tackle some of those problems, facing the following five main goals. (i) To develop specific guidelines for system analysis and modeling. Organization Theory [4] has identified several types of human organizations characterized by specific roles and norms. But there still is not any guideline available for matching a specific problem domain with its most suitable organization structure. Therefore, this research aims to define precise guidelines by means of MAS meta-models described by a specific organizational structure that implies certain roles, relationships and norms. In this way, once an organization structure is selected for a specific problem (using our guidelines), then a MAS meta-model related to that structure is assigned. This meta-model provides the intrinsic roles, relationships and rules needed for the system, making analysis work easier to designers. Next, this MAS meta-model is instantiated for the final application, filling it with those elements that specifically depend on the problem. (ii) To propose new services for publishing the organization, for accepting and rejecting agents into the system and for controlling agent behavior. More specifically, a *help-desk assistant* service that represents an organization and informs of the most relevant

features of this organization; and an *organizational-manager service* that controls the execution of the organization and determines the conditions for an agent to be accepted inside the society are proposed. (iii) To define an ontology that describes in a meaningful and verifiable semantic all relevant aspects of the system organization. Thus other agent developing groups would be able to know about the organization and which requirements for external agents are demanded, so then being able to develop new participants. (iv) To extend an actual MAS organizational-oriented methodology with all methods, techniques and ontologies proposed in this research, in order to get better analysis, design and implementation phases. An finally (v) to validate our work in one real domain at least. Concretely, a real example in Technology Management Center field will be used, in which several clients demand some services previously contracted with an Exploitation Center.

Categories and Subject Descriptors

I.2.11 [Distributed Artificial Intelligence]: Multiagent systems; D.2.1 [Software Engineering]: Requirements/Specifications—*methodologies*

General Terms

Design

Keywords

Open multi-agent systems, methodologies

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