Chapter 17

Towards a Multi-Agent-Based Tool for the Analysis of the Social Production and Management Processes in an Urban Ecosystem:
An Approach Based on the Integration of Organizational, Regulatory, Communication and Physical Artifacts in the JaCaMo Framework

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ABSTRACT

The SJVG-MAS Project addresses, in an interdisciplinary approach, the development of MAS-based tools for the simulation of the social production and management processes observed in urban ecosystems, adopting as case study the social vegetable garden project conducted at the San Jerónimo Park (Seville/Spain), headed by the confederation "Ecologistas en Acción." The authors aim at the analysis of the current reality of the SJVG project, allowing discussions on the adopted social management pro-

cesses, and also for investigating how possible changes in the social organization (e.g., roles assumed by the agents in the organization, actions, behaviors, (in)formal interaction/communication protocols, regulation norms), especially from the point of view of the agent's participation in the decision making processes, may transform this reality, from the social, environmental and economic point of view, then contributing for the sustainability of the project. The MAS was conceived as a multi-dimensional BDI-like agent social system, involving the development of five components: the agents' population, the system's organization, the system's environment, the set of interactions executed among agents playing organizational roles (e.g., communication protocols for reaching agreements) and the normative policy structure (internal regulation established by SJVG community). The aim of this chapter is to discuss the problems faced and to present the solution found for the modeling of SJVG social organization using JaCAMo framework. The chapter shows the integration of the considered dimensions, discussing the adopted methodology, which may be applied in several other contexts.

1. INTRODUCTION

A Multiagent System (MAS) is a set of computational intelligent, autonomous, capable of communicating and coordinating, pro-active and situated entities, perceiving its environment through sensors and acting on it using actuators (Wooldridge, 2002; Weiss, 1999; Russell & Norvig, 2010; Padgham & Winikoff, 2004).

The SJVG-MAS Project[1](Santos et al., 2011; Santos, et al., 2012; Rodrigues, et al., 2013a; Santos, et al., 2013a; Santos et al., 2013b) addresses, in an interdisciplinary approach, the development of MAS-based tools for the simulation of the social production and management processes observed in urban ecosystems (Dimuro, 2009, 2010; Dimuro & Jerez, 2010a, 2010b, 2011)—a joint effort for interrelating knowledge, seeking collective interpretations, adopting as case study the current tendency of (re)approaching the countryside to the city through urban vegetable gardens. In particular, we are focusing the social vegetable garden project conducted at the San Jerónimo Park (Seville/Spain), headed by the confederation "Ecologistas en Acción" (EA)[2].

The San Jerónimo Vegetable Garden (SJVG) is an urban vegetable garden maintained by its own users. The harvest is ecological, the production is only for self-consumption, but people can exchange products and services. Then, the SJVG's social organization is characterized for allowing and promoting a lot of interactions and social exchanges between the participants. Nevertheless, the behaviors, interactions and communications are regulated by norms established by the community in assembly, under the supervision and coordination of the EA.

The general objective of the SJVG-MAS Project is to develop a MAS-based simulation tool for the analysis of the current reality of the SJVG project, allowing discussions on the adopted social management processes, and also for investigating how possible changes in the social organization (e.g., roles assumed by the agents in the organization, actions, behaviors, (in)formal interaction/communication protocols, regulation norms), especially from the point of view of the agent's participation in the decision making processes, may transform this reality, from the social, environmental and economic point of view, then contributing for the sustainability of the project.

Among the agent models commonly used in agent-based simulation of decision processes in complex environments, there are the ones of an intentional nature, whose behaviors can be explained by attributing certain mental attitudes to the agents, such as knowledge, beliefs, desires, intentions, obligations, commitments. See, e.g., the discussion presented in (Subagdja et al., 2009).

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