Chapter I
The Role of Organization in Agent Systems

Virginia Dignum
Utrecht University, The Netherlands

ABSTRACT

Agent Organization can be understood from two perspectives: organization as a process and organization as an entity. That is, organization is considered both as the process of organizing a set of individuals, or as an entity in itself, with its own requirements and objectives. In fact, agent organizations demand the integration of both perspectives and rely for a great extent on the notion of openness and heterogeneity of MAS. Practical applications of agents to organizational modeling are being widely developed, however, formal theories are needed to describe interaction and organizational structure. Furthermore, it is necessary to get a closer look at the applicability of insights and theories from organization sciences to the development of agent organizations. In this chapter, current approaches to agent organizations are discussed. Agent Organizations bring concepts and solutions from sociology and organizational theory into agent research, integrating organizational and individual perspectives, and aim at the dynamic adaptation of models to organizational and environmental changes, both of which are impacted by the notion of openness and heterogeneity. The chapter also presents a promising application of agent organizations to the area of human-agent teams.
INTRODUCTION

The main topic of this book is Agent Organization. Since their coming out in the 80’s, Multi-Agent Systems (MAS) have often been defined as organizations or societies of agents, i.e. as a set of agents that interact together to coordinate their behavior and often cooperate to achieve some collective goal (Ferber et al., 2003). The term agent organization has become common-place within the MAS community, but is used to mean different, often incompatible, issues. In short, one class of views takes organization as the process of organizing a set of individuals, whereas the other sees organization as an entity in itself, with its own requirements and objectives. These differences are for a great part due to the diverse world views and backgrounds of different research fields, namely Sociology and Organization Theory (OT) on the one hand, and distributed Artificial Intelligence (AI) on the other hand. From a sociologic perspective, agent organization is specified independently from its participants and relates the structure of a system to its externally observable global behavior. The artificial intelligence view on MAS is mostly directed to the study of the mental state of individual agents and their relation to the overall behavior. As it is often the case in such situations, such differences can lead to a fragile sense of understanding causing interpretation and integration problems when trying to compare, merge or analyze different models and frameworks. Without attempting to merge different views into one general whole, this book presents a comprehensive overview of the different perspectives, such that the reader will be able to better understand and judge the differences.

The stance in this chapter, and in the rest of this book is that agent organizations demand the integration of organizational and individual perspectives, the dynamic adaptation of models to organizational and environmental changes, and rely for a great extent on the notion of openness and heterogeneity of MAS. Practical applications of agents to organizational modeling are being widely developed but formal theories are needed to describe interaction and organizational structure. Furthermore, it is necessary to get a closer look at the applicability of insights and theories from organization sciences to the development of agent organizations. All these issues are becoming increasingly recognized and researched within the MAS community, as can be seen by the growing number of publications and workshops on the subject, of which COIN1 (International Workshop Series on Coordination, Organization, Institutions and Norms in MAS) is the most known example.

A first main issue to be discussed in this chapter is dialectic: is agent organization synonym with organization of agents? Such a question identifies a possible difference of perspective between the entity, an agent organization, and a process, the act of organizing agents. It also illustrates the two perspectives: that of agent-centric MAS and that of organization-centric MAS, as proposed by (Ferber et al., 2003). From an organizational perspective, the main function of an individual agent is the enactment of a role that contributes to the global aims of the organization. That is, organizational goals determine agent roles and interaction norms. Agents are then seen as the actors that perform role(s) described by the organization design. However, the very notion of agent autonomy refers to the ability of individual agents to determine their own actions, plans and believes. From the agent’s perspective, its own capabilities and aims determine the reasons and the specific way an agent will enact its role(s), and the behavior of individual agents is motivated from their own goals and capabilities (Weigand & Dignum, 2004).

Agent organization models will play a critical role in the development of larger and more complex MAS. As systems grow to include hundreds or thousands of agents, it is necessary to move from an agent-centric view of coordination and control to an organization-centric one. The overall problem of analyzing the social, economic and technological dimensions of agent organizations, and the co-evolution
Related Content

**Designing ECAs to Improve Robustness of Human-Machine Dialogue**

**Impact on Learner Experience: A Qualitative Case Study Exploring Online MBA Problem-Based Learning Courses**
J. Heather Welzant (2009). *International Journal of Agent Technologies and Systems* (pp. 29-44). [www.igi-global.com/article/impact-learner-experience/3870?camid=4v1a](www.igi-global.com/article/impact-learner-experience/3870?camid=4v1a)

**Evolution and Mutation in Push Technologies: Social Concerns Resulting from the Effects of Memes on Intelligent Agents**

**Norms of Behaviour and Their Identification and Verification in Open Multi-Agent Societies**