Chapter XIII

Autonomous Agents Adopting Organizational Rules

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ABSTRACT

This chapter discusses how autonomous agents can adopt organizational rules into their reasoning process. Agents in an organization need to coordinate their actions in order to reach the organizational goals. Organizational models specify the desired behaviour in terms of roles, relations, norms, and interactions. We have developed a method to translate norms into event-processing rules of the agents. We propose a modular reasoning model that includes the organizational rules explicitly. Since the agents are autonomous, they will have their own reasoning rules next to the organizational rules. The modular approach allows for meta-reasoning about these rules. We show that this stimulates bottom-up dynamics in the organization.

INTRODUCTION

Organizations benefit from autonomous decisions by their participants. This is visible in human organizations. Not only the formal organizational structure but also the informal circuit of communication and interaction between actors determines the success of an organization. In human organizations a participant’s contribution is evaluated based on the organizational requirements as well as the extra achievements. Someone who takes initiative and builds up a personal network is often higher valued than
someone who sticks to the official rules and does not do anything extra. The capability to act and make decisions in unexpected situations is usually perceived as a positive characteristic of human actors.

How does the observation that organizations benefit from participants’ initiatives translate to multi-agent coordination based on organizational theory? Every organization is created for a specific objective. The organizational model describes the desired global behaviour using abstract concepts such as roles, relations and norms. Its specification is meant to guarantee certain requirements, for example, about the information flow. However, since the agent is assumed to be an autonomous entity, decision making is a local process of the agent. Therefore, it is important to maintain agent autonomy within the multi-agent coordination model. The organizational rules should guide the choices of the agent, but the organization cannot control the agent’s decision-making process.

In this research, we investigate how to make agents aware of organizational rules. At the same time we allow them to take initiatives besides the formal structure. We propose a modular approach with which agents can adopt organizational rules into their reasoning model. The reasoning model separates the organizational rules from the actual decision-making process. This way, the agent’s decision-making process can be defined separately from the coordination mechanism.

At the same time, the modular approach allows for meta-reasoning about different behavioural rules, which makes the agent independent from the organizational structure. The agent is not limited in its decision-making. It knows how to follow the organizational norms and it is able to take other initiatives. Therefore, the model guarantees agent autonomy.

The chapter is structured as follows. First we discuss related work on agent organizations. We motivate our choice to use the OperA model to describe organizations and we give an example of the use of OperA. Next, we describe a reasoning model with which an agent can adopt organizational constraints to its decision making and we show how the organizational rules are adopted by the agent. Then we discuss how the agent and the organization come together. We investigate bottom-up dynamics in organizations using the autonomy of agents and we give examples. Finally, we conclude the chapter.

**BACKGROUND: AGENTS AND ORGANIZATIONS**

In our research we use human organizations as inspiration. From this point of view, we consider an organization as a description of roles, relations and interactions to achieve certain coordination. We assume that the agents fulfilling organizational roles are autonomous entities; they have control over their internal state and their behaviour (Jennings, 2000). This implies that the organizational model specifies behavioural guidelines for the agents to assure desired features such as task coordination or information flow. The agents should follow those guidelines, but they are not forced to do so by definition. Researchers in multi-agent systems have introduced the organizational metaphor to achieve coordination between autonomous agents. Organizational models specify coordination mechanisms between agents in abstract concepts, such as roles, relations and norms.

In this section we discuss related work on organizational models. We describe how different approaches allow agents to take up organizational tasks and we describe the consequences for the agents’ autonomy.
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