Dimensions of Organizational Coordination

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Abstract
It is hard, if not impossible, to assume anything about agents’ behavior in a society with heterogeneous agents from different sources. Organizations are used to control and guide the agents’ actions such that the global objectives of the society are achieved. We decoule how agents can be supported to achieve organizational objectives and constraints into reasoning processes by combining two alternative agent reasoning and multilevel regulation. We show how agents can use an organizational specification to achieve organizational objectives by delegating and coordinating their activities with other agents in the society, using the GOAL agent programming language and the OperA organizational model.

1. Motivation
We consider Open Societies
• Accessible by anyone
• No control over the agents entering it
• Not possible to ensure completion of global objectives
• Hard to assume any kind of agent behavior.

We model the scenario using the OperA model [1], which proposes an expressive way for defining open organizations distinguishing explicitly between the organizational aims, and the agents who act in it.

Social structure

Interaction structure

Organizations
• Often used in multi-agent systems for controlling agents entering a society.
• A more or less abstract description of what is expected of the agents in the society.
• Enforce certain objectives are achieved
• Contains predefined boundaries that should not be violated.

Organizations

Question: How can agents in an organization coordinate their organizational objectives in order to complete them as efficiently as possible?

2. Organizational Modeling
We model the scenario using the OperA model [1], which proposes an expressive way for defining open organizations distinguishing explicitly between the organizational aims, and the agents who act in it.

3. Dimensions
• Agents are assumed to be able to understand and reason about an organization, e.g. by:
  → Making them organization-aware.
  → Using organizational artifacts [5, 6].
  → Using a middleware [6].
  → The organization expects that agents playing such role adheres to its norms and attempts to achieve its objectives.
  → Can agents deviate from expectations?
  → If so, how are they monitored and sanctioned?

1. Motivation

We consider Open Societies

2. Organizational Modeling

3. Dimensions

4. Organizational Reasoning

Option consideration and organizational deliberation: An objective is an option when the agent is expecting a role responsible for the objective, and the objective is active. The agent simply commits to the injuredLocated objective, once it is an option.

Delegation: The agent will delegate blockingFanRemoved to another agent.

Dependency coordination: The agent has completed an objective, which was delegated from another agent, and should inform that agent.

Same objective: The agent is committed to injuredLocated and will inform other agents responsible for the same objective about its progress.

4. Organizational Reasoning

5. Guiding Agents

The following code-samples [based on the GOAL agent programming syntax [2]] allow agents to perform organizational reasoning.

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6. Conclusion

• Enables both the agent and the middleware approach.
  → If nothing is disclosed, the middleware can mostly provide “step-by-step” guidance.
  → If the agent discloses everything, a middleware will resemble an organization-aware agent.
  → The ultimate way of bringing the control back to the agents is to allow them to reason about the organization themselves.
  → Our building blocks allow this, either by letting agents disclose their beliefs to a middleware, or by integrating the building blocks in the agents.

References