AORTA: Adding Organizational Reasoning to Agents

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1. Motivation

We consider agents in open societies

- Limited control of the agents in the society.
- Makes it difficult to:
  → assume any kind of agent behavior.
  → ensure completion of global objectives.

Using organizations as regulation

- Organizations regulate agents entering a society.
- An abstract description of the expectations of agents in the society.
- Contains predefined boundaries that should not be violated.

We propose AORTA as a way to make agents organization-aware [6]. The AORTA system integrates organizational reasoning into existing agent platforms, and works with different organizational models.

Reasoning in AORTA is based on an organizational metamodel

- An organizational model is an explicit representation of an organization.
- Often based on roles and objectives
  → Roles abstract implementation details away from expectations.
  → Objectives define the desired outcome.
- AORTA supports different organizational models (e.g. OpenA, 'MoSe')

2. Adding Organizational Reasoning to Agents

- AORTA provides organizational reasoning capabilities to agents.
- AORTA agents are enriched with an organizational reasoning component (ORC).
- The ORC divides organizational reasoning into:
  → organizational option generation (I can enact the role).
  → organizational action deliberation (I enact the role), and
  → organizational coordination (I inform others about my role).

3. Operational Semantics

- AORTA is formalized using structural operational semantics [8]
  → Reasoning formulas query the mental state.
  → Actions alter the mental state.
  → Reasoning rules ρ → ρ execute actions.
  → Applicable when MS ⊨ ρ
  → Transition function: T(μ, MS) = MS'

4. Evaluation

- Scenario implemented in Blocks World for Teams [2]
- Evaluated using Jason + AORTA [6]
- Using a simple, linear strategy
  1. Check for incoming organizational messages (Check)
  2. Check for external events (Ext)
  3. Consider options (Opt)
  4. Execute actions (Act)
  5. Perform organizational coordination (Coord)

5. Conclusion

Now

- AORTA provides agents with organizational reasoning capabilities.
- Integrates with BDI agents.
- Independent from the organization.
- Integrated into the Jason agent platform.
- Organization is decentralized.
- Removes need for "gatekeepers".
- Needs synchronisation of organizational beliefs.
- Can prove hard to regulate.

Future

- Integration with other agent platforms.
- Model checking organization-aware agents.
- Support for norms and normative multi-agent systems.
- Centralization of certain aspects
  → Extract organization into a shared component, an AORTA organization.
  → Using artifacts or a middleware.

References