Bringing Multi-Agent Systems into human organizations: application to an Information Multi-Agent System

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Plan

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3. AMOMCASYS: Adaptable MOdeling Method for Complex Administrative SYStems

5. CIASCOTEWA: Cooperative Information Agent Systems for Cooperative Technological Watch

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Industrial and Social Context

- Current Administrative systems:
  - from bureaucracy to a more process centred organisation [Schael]

"more holonic"
[Koestler 69]
Characterisation of Holonic Systems

[Koestler 69]

autonomy - co-operation balance

Cognition

Reaction

objective communication

stability
Application context

- Technological watch department of a large company (SOLVAY S.A.)

- Users of the technological watch department

- Have a coherence in a group of distributed users

- Use of Multi-Agent Systems
Proposition of AMOMCASYS

- Comparison of several methods (MERISE, OMT, (UML), SADT, OSSAD, CISAD, MKSM)
- Conclusion: No method fulfills all our needs => integration of pertinent parts of these methods

- **AMOMCASYS**: Adaptable MOdeling Method for Complex Administrative SYStems
  - Methodology: evolutionary approach, integrating the actors in the stages of analysis, modeling and specification
  - Organization: holonic organization, based on exchanges of documents
  - Representation: accessible models of data, dataflow, processing and a dynamic model
  - Co-operation: use of the dynamic model and of a simulator
Steps of AMOMCASYS

Analysis

Modelling

Dynamic Modelling & Simulation

Design

A. Analysis
B. Modelling
C. Design

Actors of the department

Analysts
Modeller
Designer
Pages of the AMOMCASYS workbench

1. Presentation page
2. Activities-Roles matrix
3. Data model
4. Data flow model
5. Processing model
6. Dynamic model
CIASCOTEWA

- **Cooperative Information Agent System for COoperative TEchnological WAteh**

- **Why?**
  - Economical issue of technological watch
  - Allow a group to search information, without redundancies

- **How?**
  - Dedicated an information multi-agent system to each actor of the technological watch department
Cooperative working of agents and users
CIASCOTEWA Architecture

CIASTEWA

C: Coordinator Agent
IR: Information Responsible Agent
R: Request Agent
S: Search Engine Agent
It: Interface Agent

Internet

: communication links between CIASTEWA agents
communication links between CIASTEWA agents
CIASCOTEWA Design

- Reuse of a methodology that we have built in HOMASCOW project (Holonic Multi Agent System for helping COoperative Work)
  - First, design individual competences of the different agents
  - Secondly, design of cooperative working of the CIASCOTEWA agents
### Individual general specification

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Social</th>
<th>Environmental</th>
<th>Personal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Representational</strong></td>
<td>Representation of the group (of the roles)</td>
<td>Representation of the world</td>
<td>Representation of itself, of its capacities</td>
</tr>
<tr>
<td><strong>Organisational</strong></td>
<td>Planning control, meta-planning</td>
<td>Auto-communication, Auto-action</td>
<td>Auto-modification, learning</td>
</tr>
<tr>
<td><strong>Interaction</strong></td>
<td>Description of the society in its performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Productive</strong></td>
<td>Management, coordination, negotiation</td>
<td>Preservation of resources, defense and maintenance of territory</td>
<td>Self-preservation, repair, maintenance</td>
</tr>
<tr>
<td><strong>Conservative</strong></td>
<td>Preservation of the society, the relations, the network of contacts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**For co-operative behaviour:** reusing of AMOMCASYS
Cooperative specification

Use of the MAGIQUE platform
Inform user that other users have received the result

encourage cooperation
Some components

agent

data

skills

interaction

gui

util

actors.xml

requests.xml

searchEngines.xml

results.xml

agent-config.xml
Perspective: Automatic deployment

- Static description of a MAS by XML File (XML Schema)

```xml
<?xml version="1.0" encoding="ISO-8859-1" ?>
- <mas>
  - <agent>
    - <name>bossAdam</name>
    - <role>Coordinator</role>
    - <socialKnowledge/>
    - <environmentalKnowledge/>
    - <personalKnowledge/>
    - <skillList>
      - <skill>agent.CoordinatorSkill</skill>
    </skillList>
  </agent>
  + <agent>
  + <agent>
</mas>
```
Perspectives for Cooperation

- Objective: identify groups of actors having same interests centres to encourage them to cooperate
  - Use of the Kohonen algorithm that regroups elements according to their distance from a null vector \([\text{Kohonen 91}]\)
  - Definition of an interest distance from the keywords used in the requests
Conclusion

- We use AMOMCASYS method to integrate an agents organization into a human organization
  - Future:
    - use of UML diagrams or A-UML in addition of AMOMCASYS

- Integration of users in the setup of the project is important

- Other project: proposition of a third part application from the CIASCOTEWA, with notion of security
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Thank you for your attention...

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