A Semiotic Approach for Multiagent Systems
Situational Development

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Summary

1. Motivation and Goal
2. MAS Semiotic Taxonomy
3. Example of Usage
4. Current and Further Work
Motivation
Organization Centered & Agent Centered MAS

- Organization centered MAS approach
  - Leading concept: “Agent Organization”
  - Sociological & organizational vision for modeling MAS

- Agent centered MAS approach
  - Leading concept: “Agent”
  - Agent architecture and agent’s “internal” knowledge
    [Lemaitre; Excelente 1998]
Motivation

How can we develop Organization Centered MAS combining advantages from AOSE Methods and Agent Organization Models

... considering that some Agent Organization models are not currently incorporated into AOSE methods

[Giorgini; Henderson-Sellers, 2005]
MAS Semiotic Taxonomy

Goal

First step towards combining AOSE methods & Agent Organization models providing:

- set of categories to identify MAS development aspects
  - AOSE Methods
  - Agent Organization Models

- foundation for building MAS method fragments’ repository to create MAS methods on demand
MAS Semiotic Taxonomy Utilization Context

AOSE Methods
Agent Organization Models

MAS Project Situation
MAS Situational Method Assembling Mechanism

MAS Situational Method

Method Fragment Representation & Categorization

Method Repository

MAS Semiotic Taxonomy

Pragmatic Level
Syntactic Level
Semantic Level
Empirical Level
Social Level

Method Fragment Selection

Methods & Models as Method Fragment
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MAS Semiotic Taxonomy
Big Picture

MAS Semiotic Taxonomy

Social Level

Semantic Level

Empirical Level

Pragmatic Level

Syntactic Level

Semiotic Concepts

[Stamper 1996]

AOSE Methods & Agent Organization Models concepts

Situational Method Engineering concepts

[Harmsen1997]
MAS Semiotic Taxonomy

Semiotic Concepts

Semiotic Ladder

Semantic Level (meaning)

Social Level (culture)

Pragmatic Level (usage)

Empirical Level (coding)

Human Information Functions

Social World – beliefs, commitments, law, culture,
Pragmatics – intentions, communication, conversations, negotiations, …
Semantics – meanings, propositions, validity, truth, signification, denotations, …

The IT Platform

Syntactic – formal structure, language, logic, data, records, deduction, software, files, …
Empirics – pattern, variety, noise, entropy, channel capacity, redundancy, efficiency, codes, …

Physical World – signals, traces, physical distinctions, hardware, component density, speed, economics, …

Stamper 1996
MAS Semiotic Taxonomy
AOSE Methods and AO Models concepts

Goal Oriented Analysis. Use Case based Analysis

UML
AUML

Platform:
Jack
Jade
Jason

Agent Architecture: Reactive Deliberative Hybrid

Organizational Dimension: Structure Functions Norms Interactions

Open MAS Closed MAS

Agent Centered MAS Organization Centered MAS

Agent Centered MAS
Organization Centered MAS

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MAS Semiotic Taxonomy
Situational Method Engineering concepts

Validation Degree
Linear develop.
Iterative develop.

Reuse Degree
Fragment Source

Utilization Degree
Method Process

Experimental develop.
Analytical develop.

[Harmsen1997]
MAS Semiotic Taxonomy
Pragmatic Level

MAS development aspects classified according to usage and intention

Pragmatic Level

Agent Discipline
role, goal, policy, capability

Group Discipline
organization structure, norms, functions, interactions

Analysis Style
goal-oriented, use case

MAS Approach
agent, organization centered

MAS Nature
open MAS, closed MAS

Agent Architecture
deliberative, hybrid, reactive

Fragment Source
Gaia, Tropos, MOISE+, PASSI, OperA,...
Example of Usage
Navigation Tree for a MAS Method Repository

Five levels
Semiotic Taxonomy
Sub-categories
Description
Method Fragments

Example:
- Social Level
- Pragmatic Level
- MAS Semiotic Taxonomy
- Semiotic Taxonomy
- Pragmatic Level > MAS Approach > Organization Centered MAS

Method Fragments:
- MMF Troops Base Method
- MMF PASSI Base Method
- Organization Centered MAS

Description:
Organization Centered MAS category classifies method fragments that consider the group and organization as leading concept, instead of the agent.
Current & Further Work

✓ A Semiotic Taxonomy enabling method fragments categorization in a MAS Method Repository
  ▪ implemented as a SPEM Category
  ▪ used as Navigation Tree for browsing method fragments

✓ A MAS situational reuse mechanism involving a semiotic criteria
References


References


