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AOSE'09 – AAMAS (Budapest, 11 May 2009)

GORMAS: An Organizational-Oriented Methodological Guideline for Open MAS

Organization-oriented Methodologies

- Design open multi-agent systems
- Focus on organizational aspects of the society: organizations, norms, roles…
- Relevant MAS Methodologies: AGR, Tropos, OperA (based on E-Institutions), PASSI, SODA, INGENIAS
- **Critical needs:**
  - Characterization of the Virtual Organization:
    - structure + environment + participation of external entities
  - Usage of design patterns
  - Integration of MAS and SOA techniques
  - Integration in a complete MAS development process

Objectives

- MAS design based on:
  - Organization Theory
  - Service-Oriented approach

- Integration with THOMAS proposal
  - Multi-agent framework for development of **Virtual Organizations** with a service-based approach

GORMAS

Guidelines for ORganizational Multi-Agent Systems

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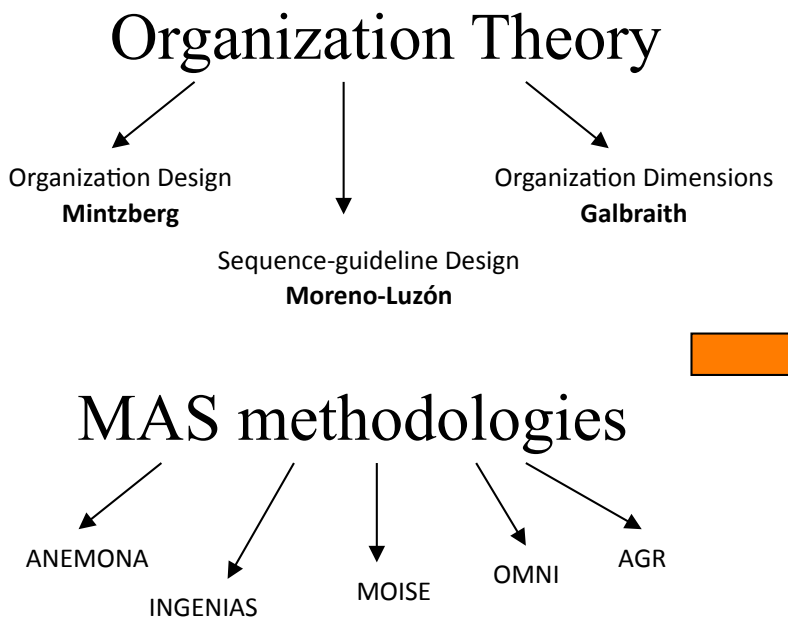
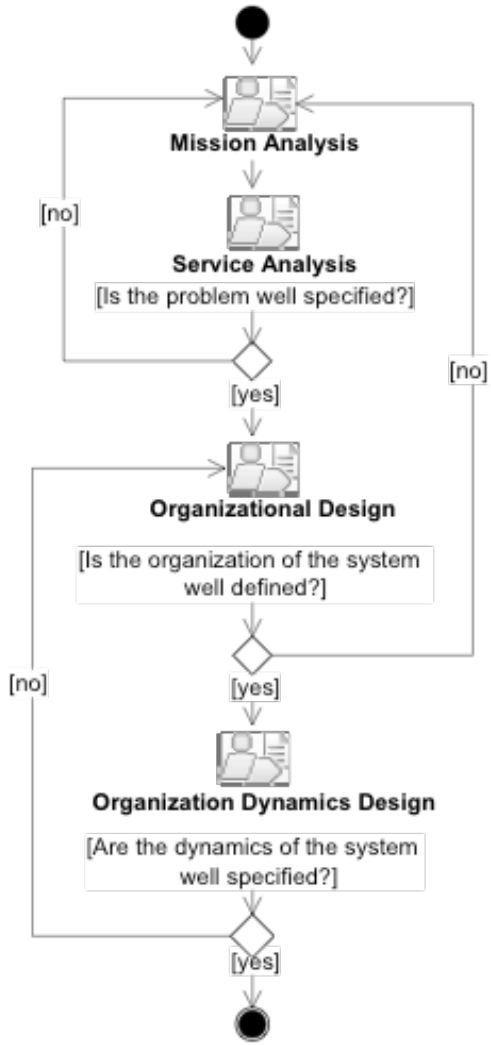


GORMAS

- **Requirement Analysis**
  - **Mission Analysis**
  - **Service Analysis**
- **Design**
  - **Organizational Design**
  - **Organization Dynamics Design**



GORMAS

Guidelines for ORganizational Multi-Agent Systems

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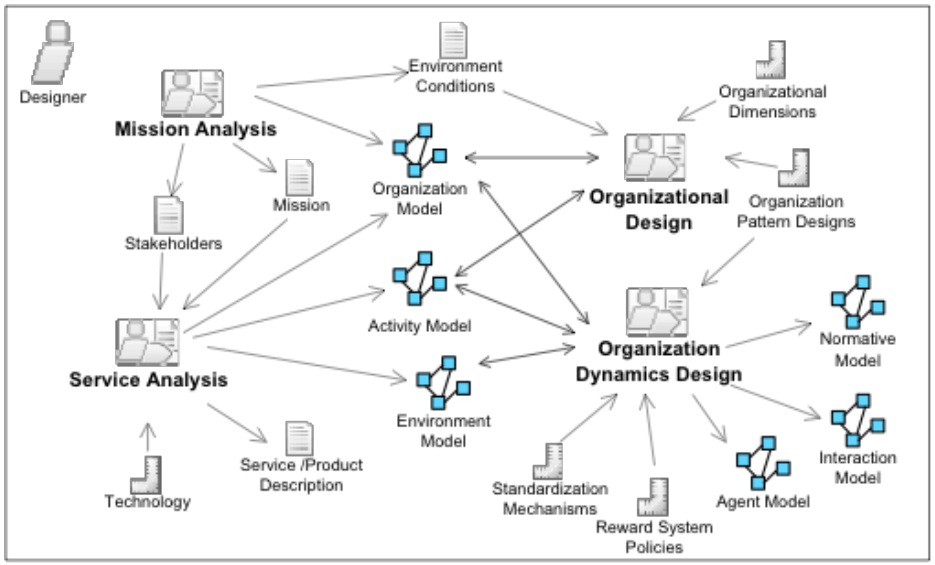
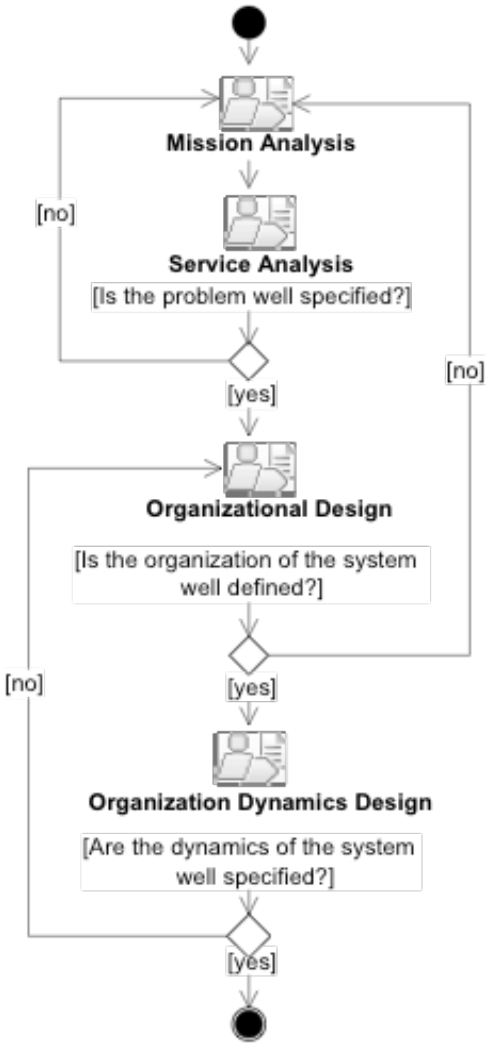
- Based on a **human organizational guideline**
- **Iterative process for designing Virtual Organizations**
  - System main goals & stakeholders
  - Offered/Required products and services
  - System Structure
  - Information and decision processes
  - Control mechanisms
  - Dynamics of open system
  - Reward system
- **Guidelines and documents**
  - GORMAS Meta-model Diagrams
  - Design patterns



GORMAS

Methodology Steps



- **A) Mission Analysis**
  - Identify services/products, stakeholders, environment conditions
- **B) Service Analysis**
  - Describe services offered by organization (SOA approach)
  - Identify Non Functional Requirements & roles
- **C) Organizational Design**
  - Analyse organizational dimensions
  - Apply design patterns
- **D) Organization Dynamics Design**
  - Design Information-Decision Processes, Open Dynamics, Control Policies & Reward System

GORMAS

- **GORMAS:** Organizational-Oriented methodological guideline for designing Virtual Organizations
  - Graphical development tool
    - **emfGormas**: generates final code to the THOMAS framework
  - Agent Platform
    - **THOMAS:** provides a service-oriented execution framework for supporting the development of open MAS

emfGORMAS

EMFGormas: Graphical Tool for GORMAS in Eclipse

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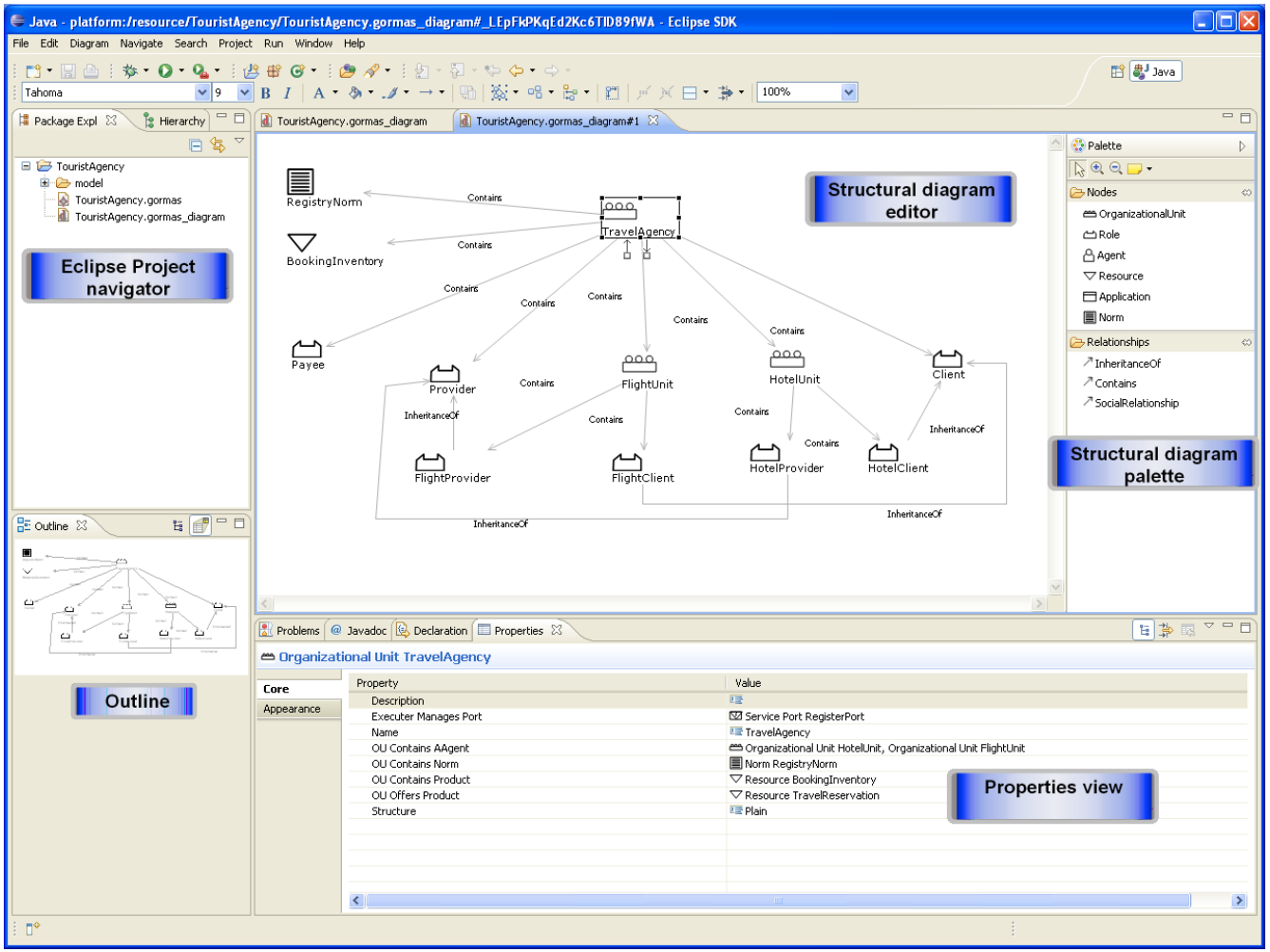
http://users.dsic.upv.es/grupos/ia/sma/tools/EMFGormas/index.html



GORMAS - Summary

Organizational-Oriented methodological guideline for designing Virtual Organizations

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- Integration of **Organization Theory** for detailing **Virtual Organization Model** and defining normative & reward system
- Selection process for a **suitable structure** of the organization
  - Usage of several design patterns: hierarchy, congregation, federation, team…
- Iterative method for generating **diagrams** of the Virtual Organization Model
- Integration in a complete MAS development process
- Description of system functionality from a **Service-Oriented perspective**
  - Services offered by the organization
  - Services required that have to be supplied by external agents in a regulated way
- **Dynamic evolution** of the open MAS considered in analysis & design phases

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Thanks!