A Metamodelling Perspective on the Users of a Service-Oriented Hydrology System

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Summary

- ## Human Aspects of Service-Oriented Systems
  - ○ Migration to Services
  - ○ Organization Change Metamodel

- ## Human Aspects of Distributed Hydrology Systems
  - ○ The CyberWater Project
    - • Wireless sensor network
    - • ArcGIS services for monitoring and early warning

User Modelling

Purpose

- Access security based on roles
- Manage preferences
- Organization structure
- Assign business process activities

Examples

- General User Modelling Ontology (GUMO)
- UserML mark-up language
- INCITS 359-2012 Standard

Problems

- the user model evolution
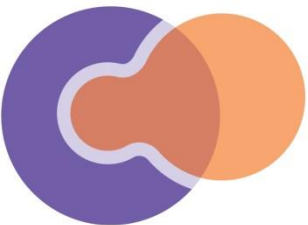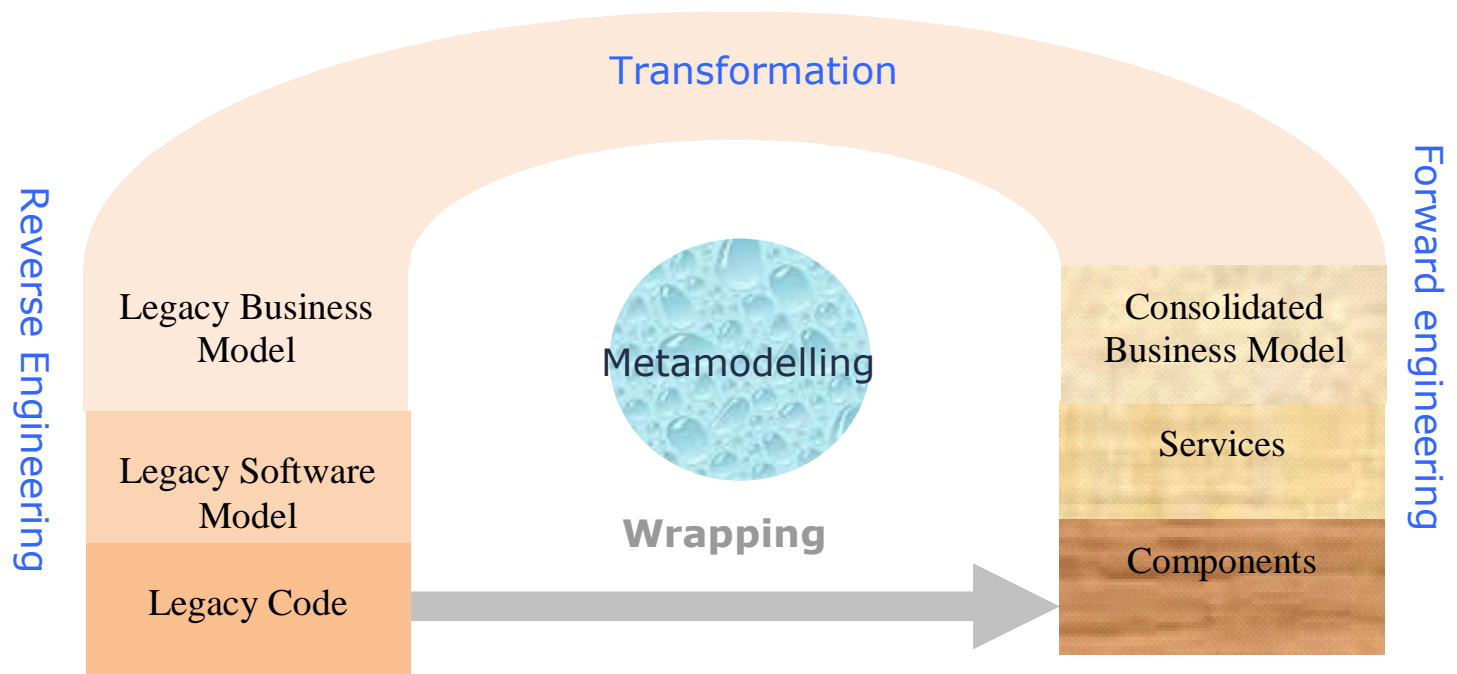- the security and privacy challenges

Increased problems for distributed systems that crosscut geographical and institutional boundaries

Human Aspects of Service-Oriented Systems

The modernization perspective

- Migration to Service-Oriented Architecture

Human Aspects of Service-Oriented Systems

The metamodelling perspective

- Defining a modelling language
- Implementing tools
  - Model editor
  - Model Interpreter

The Generic Modeling Environment
Institute for Software Integrated Systems
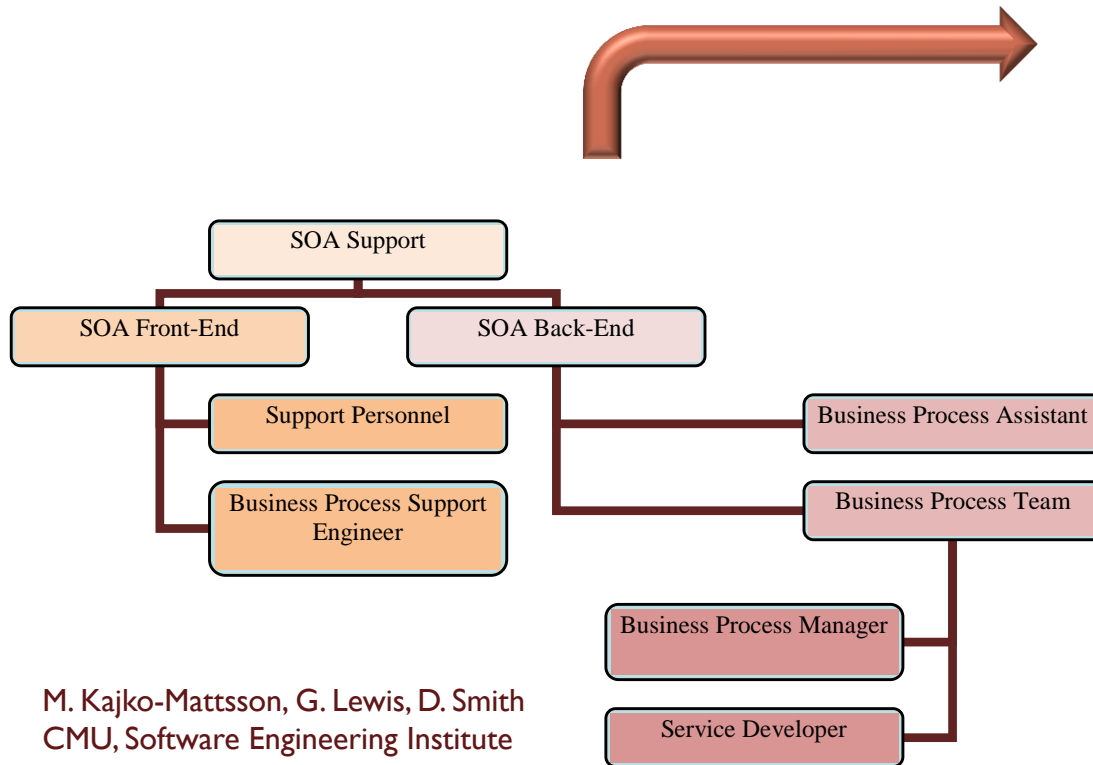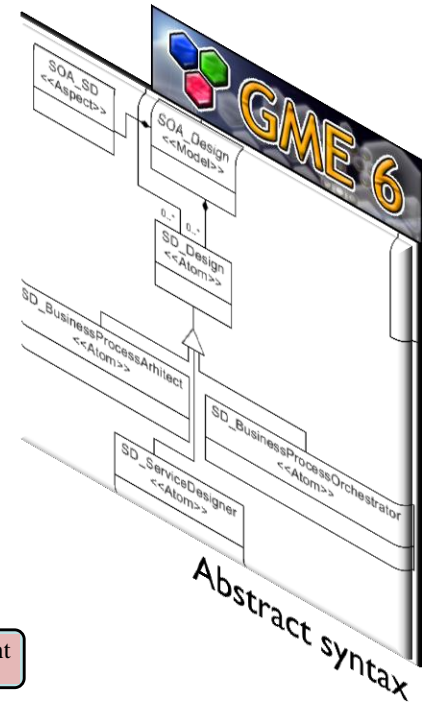Vanderbilt University

GME 6

Modelling Paradigms developed with GME

- **Organization Structure** – with classical concepts from the organization charts

- **SOA Roles** - a role framework for the modernization target style, i.e. SOA

- **Organization Change** - the necessary changes regarding the human resource management

The SOA Roles Metamodel

Abstract syntax

SOA Support

SOA Front-End

SOA Back-End

Support Personnel

Business Process Assistant

Business Process Support Engineer

Business Process Team

Business Process Manager

Service Developer

M. Kajko-Mattsson, G. Lewis, D. Smith
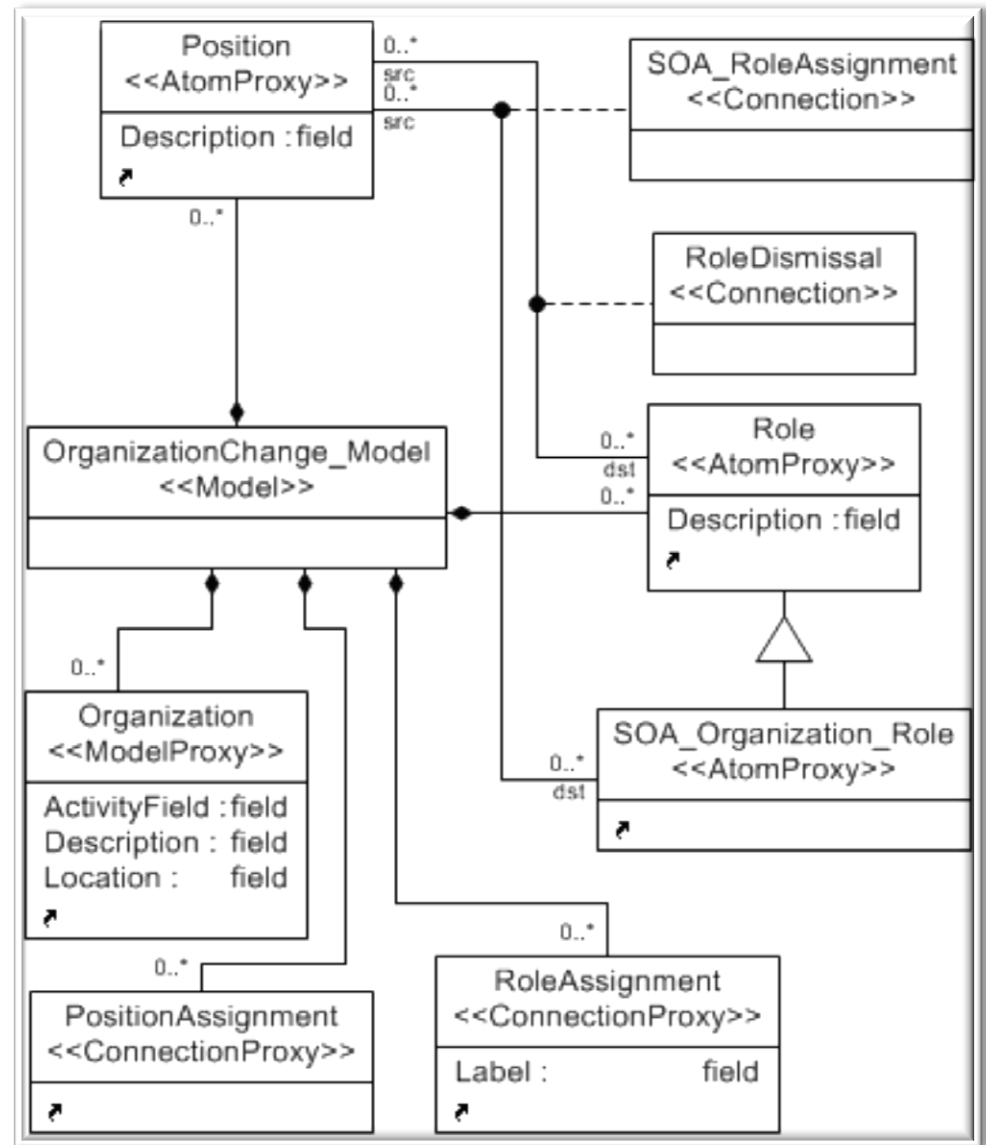CMU, Software Engineering Institute

The Organization Change Metamodel

Transition from the legacy to the modernized system

- roles
- organizational units

Views

- transformations
- new SOA roles

Distributed Hydrology Systems

From islander approaches towards integration

Cyberinfrastructures

- Large scale data
- Earth observation
- Sensor networks
- Advanced visualization capabilities
- Geographical information portals

Human Aspects of Hydrology Systems

- Spatial Data Interest Communities

- Legally Mandated Organizations

- water management organizations
- water utility companies
- local and county administration units
- main water users
- industrial players
- emergency county inspectorates
- simple citizens
- non-governmental organizations
- insurance companies
- planning authorities
- risk modellers

The CyberWater Project

Integrated Water Management

- Infrastructure for Spatial Information in the European Community (INSPIRE)

Accidental river pollution

- Decision support
- Early warning

"Romanian Waters" National Administration

- 11 river basin authorities

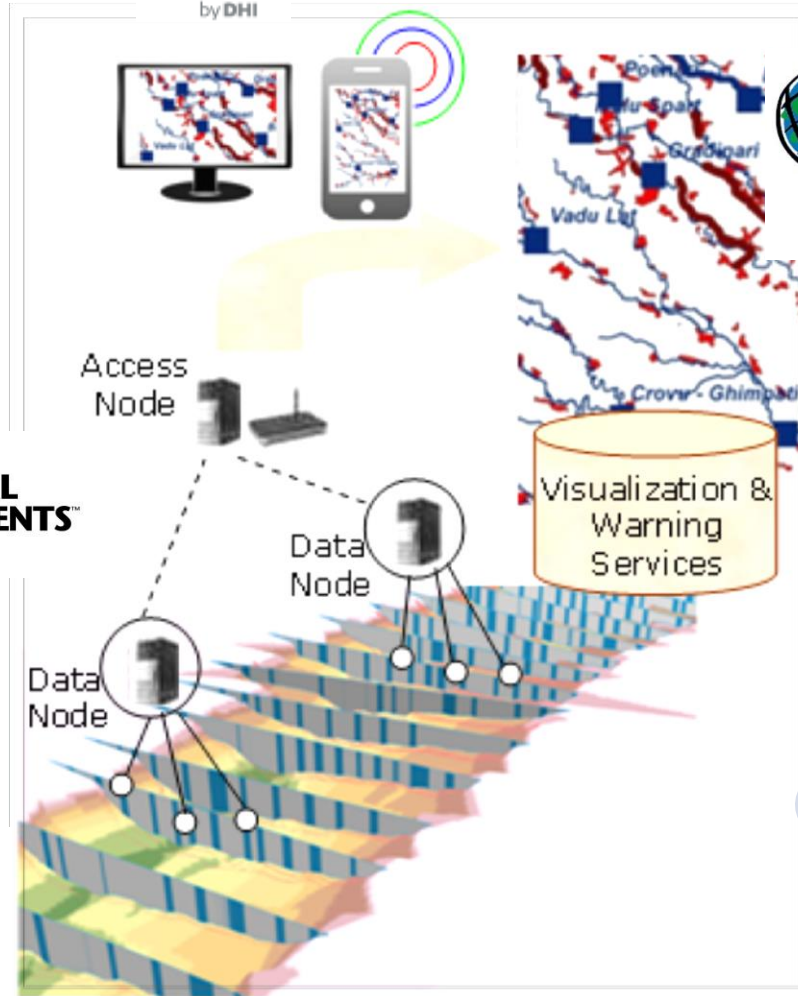University of Iowa, Hydroscience & Engineering

http://cyberwater.cs.pub.ro

CyberWater

Prototype Cyberinfrastructure-based System for Decision-Making Support in Water Resources Management
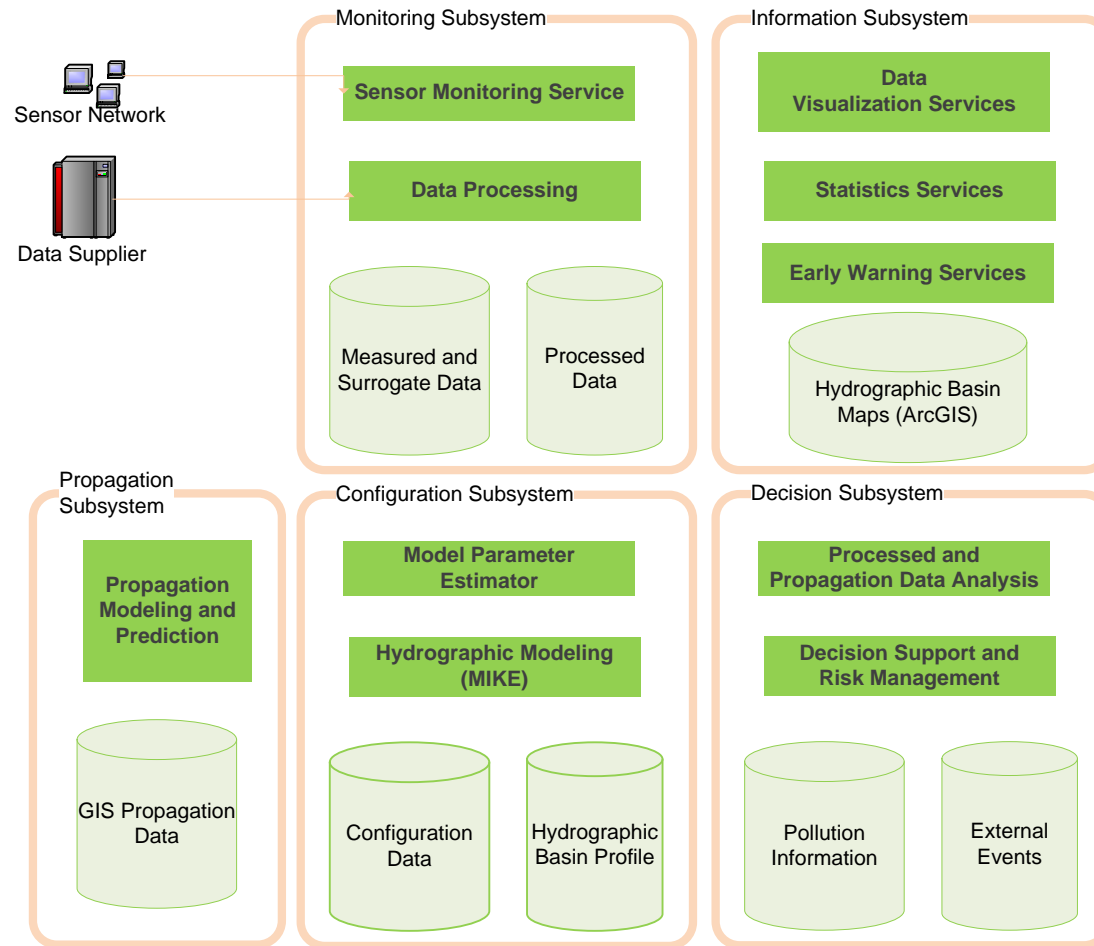
The CyberWater Prototype

Wireless sensor network

REST

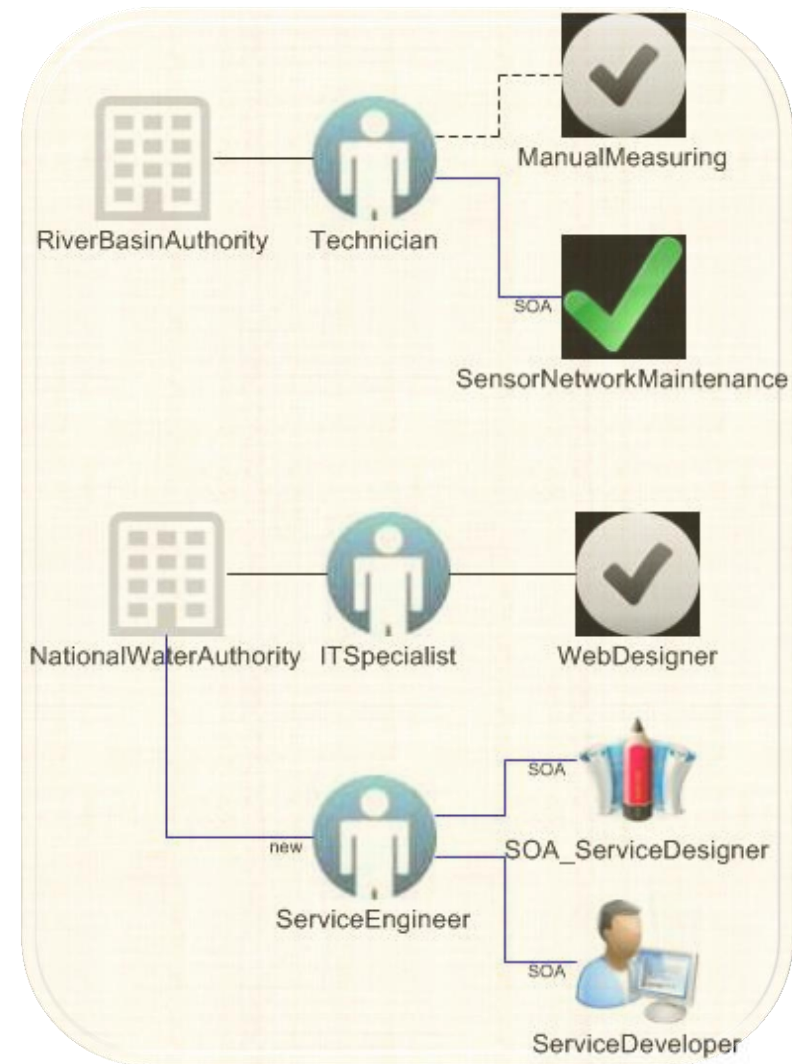**Esri Cloud environment**

The CyberWater Architecture

The CyberWater User Model

- Changes in multiple institutions

From manual measurements to sensor-based acquisition

- SOA roles

Conclusion

- Migration to services ⟶ the user model evolution

- Specific modelling languages ⟶ needed for organization changes

- Validation ⟶ integrated water management system

- Difficulties ⟶ human aspect changes in multiple institutions