

# Semantic Knowledge Model and Architecture for Agents in Discrete Environments



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**Agent Technology Roadmap:** Current MAS  
 – lack of Internal Agent Knowledge Model,  
 lack of interconnection with semantic web  
 results (knowledge model representations)  
 and commercial standards

## MAS Standards: FIPA, MASIF

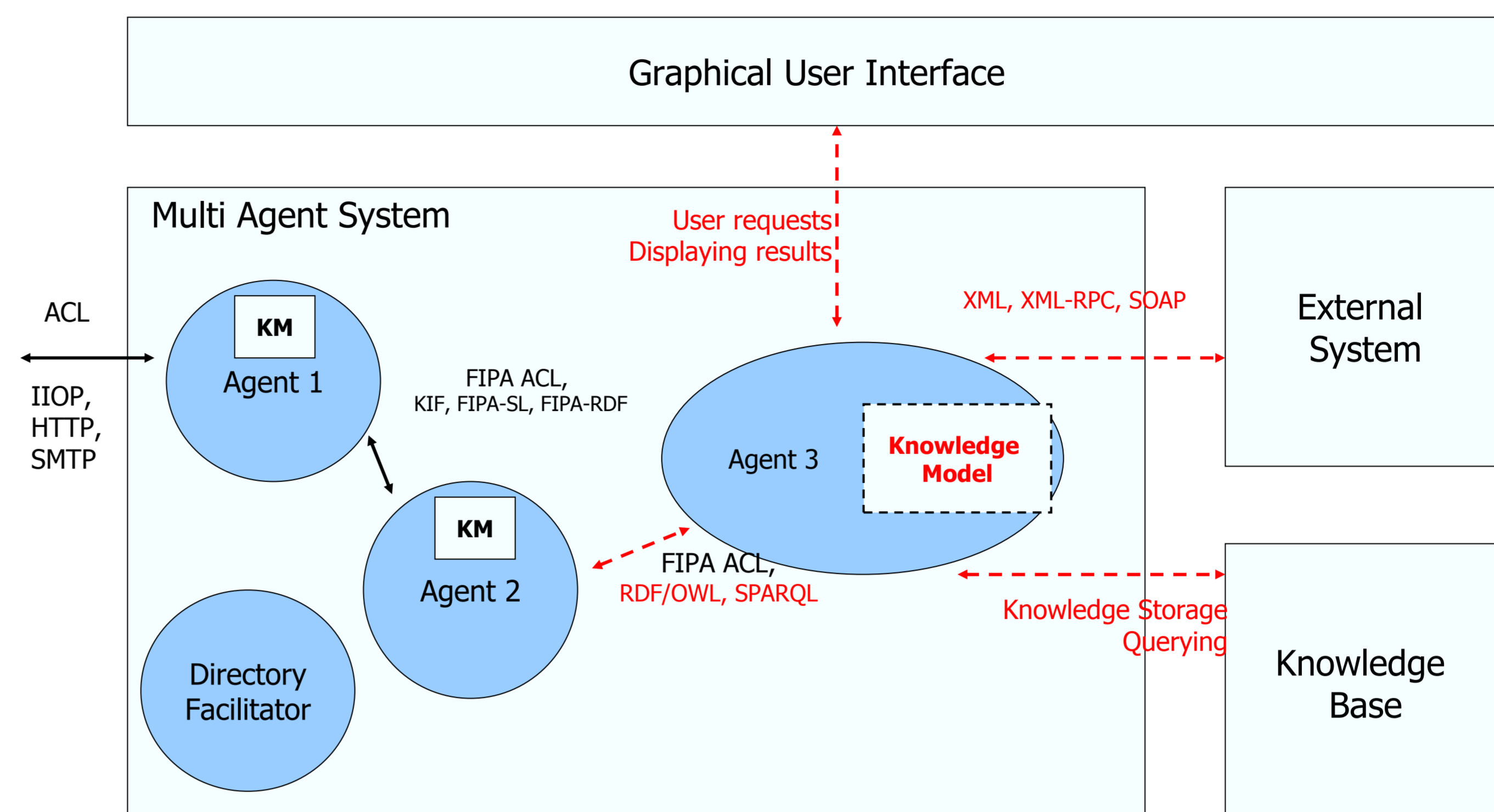
- Agent communication, agent platforms
- No standards for internal agent knowledge model with available implementations

## JADE Agent System

- Support for ontologies based on FIPA-SL
- No Query engine, No Storage, No Inference

## Ontologies in Semantic Web

- Knowledge Representation
- OWL-DL - Description Logic compatible
- Query and Storage Engines available
  - RDF, OWL, SPARQL based



## Used Technology

- RDF, OWL, SPARQL
- XML, XML-RPC
- Java, MAS

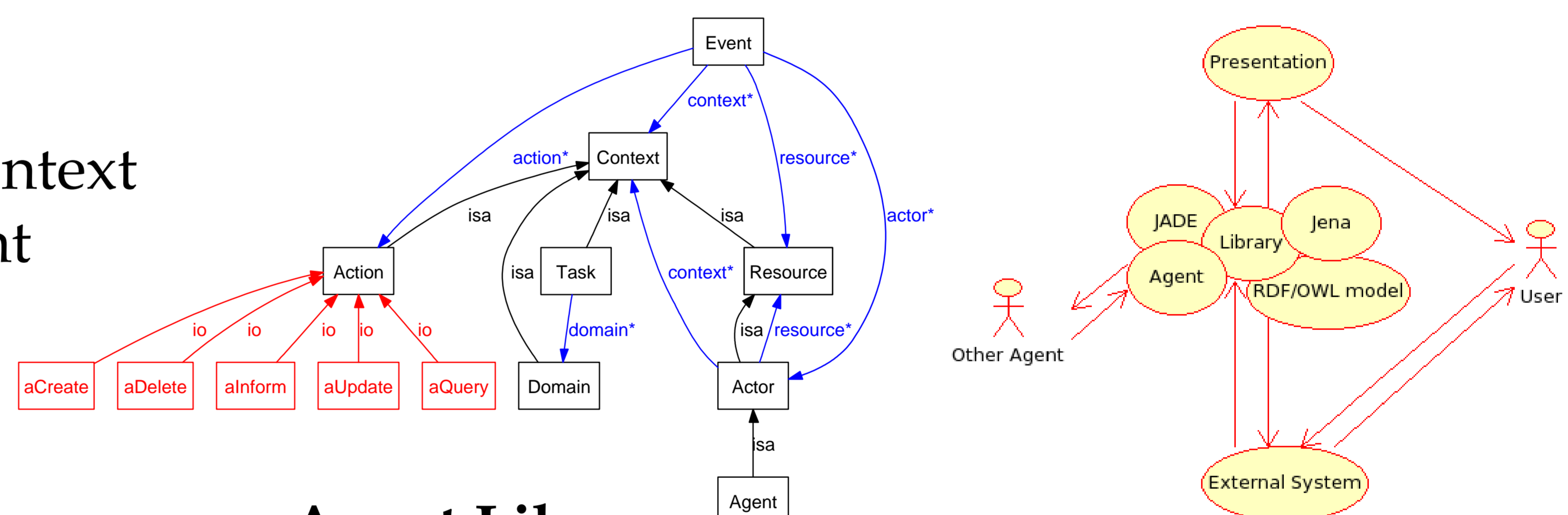
## Used Tools

- JADE
- Jena
- Protégé



## Agent Knowledge Model

- Events, Resources, Actions, Actors, Context
- Applicable in any discrete environment where actors need to be modeled
- Described by Description Logic (compatible with OWL-DL), Graph Representation
- Actor Context updating function/algorithm (Actor Environment State)
- Resources updating function/algorithm (result of fulfilled actor goals)



## Agent Library

- Support for OWL based Agent Knowledge Model
- Support for XML-RPC connection to receive event and send plain XML
- Support for Presentation of Ontological Knowledge (RDF/OWL => plain XML + XSL => HTML)
- Support for agent communication using FIPA ACL with OWL and SPARQL as content languages
- JADE and Jena Integration
- Available on JADE official website to MAS community (years 2005 – 2006: 735 downloads)

## Software Development Methodology

- **Knowledge Modeling:** Extending Model with Protégé Editor following CommonKADS models
  - Organizational or Environment Model
  - Task Model
  - Agent or Actor Model

## Results

- Ontology in Protégé exportable to OWL
- Concrete Algorithms actors' context and resources updating
- **System Design:**
  - UML Diagrams for concrete Domain
  - Use Case, Sequence and Class Diagram

description & value		community & developers		JADE board	application & business	papers & resources	news
faq	mailing lists	add-ons & 3rd party sw		bugs & suggestions	to do list	source code	
<b>sections</b>							
<ul style="list-style-type: none"> <li>• faq</li> <li>• mailing lists</li> <li>• bugs &amp; suggestions</li> <li>• to do list</li> <li>• source code (NEW!)</li> </ul>							
	AgentOWL	?	Jan 2005	tested with JADE version 3.2	PhD student at Institute of Informatics SAS, Bratislava, Slovak Republic.		