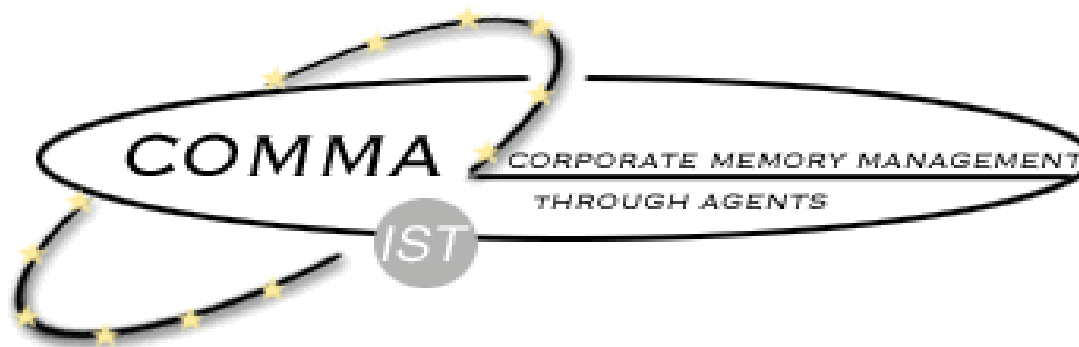


A Multi-Agents Platform for a Corporate Web Semantic



A Multi-Agents Platform for a Corporate Web Semantic

- ▶ Corporate memory materialization in CoMMA
 - ▼ Objectives & Overall Approach
 - ▼ Use of RDF(S) to build a corporate semantic web
- ▶ CoMMA MAS architecture overview
- ▶ Handling distribution of annotations
 - ▼ Allocating new annotation
 - ▼ Distributed query-solving

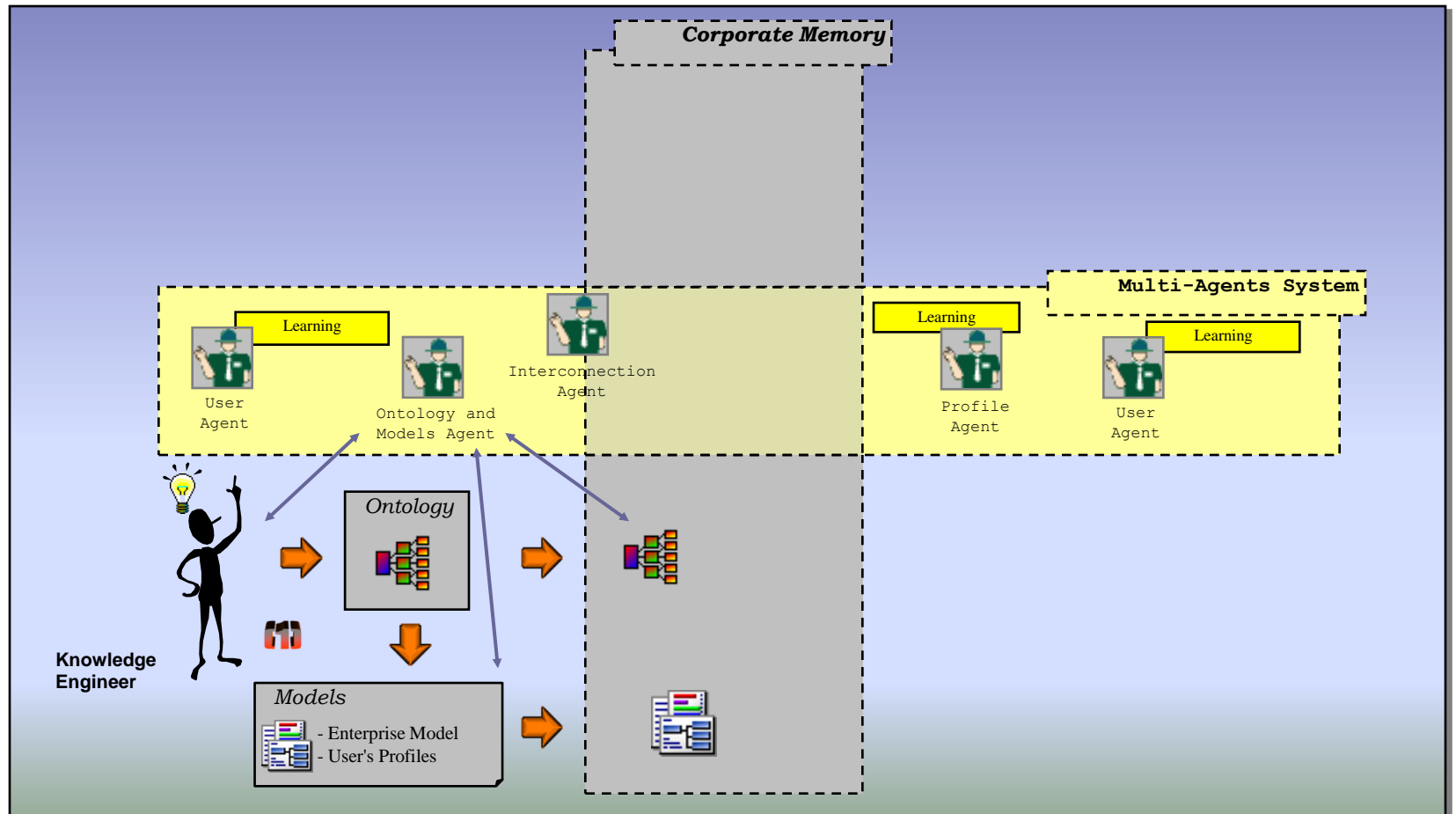
- ▶ **CoMMA**: European project : Provide a corporate memory management framework.
Started February 2000 - Ended February 2002
- ▶ **2 application & trial scenarios**
 - ▼ Assist new employee integration
 - ▼ Support technology monitoring activities

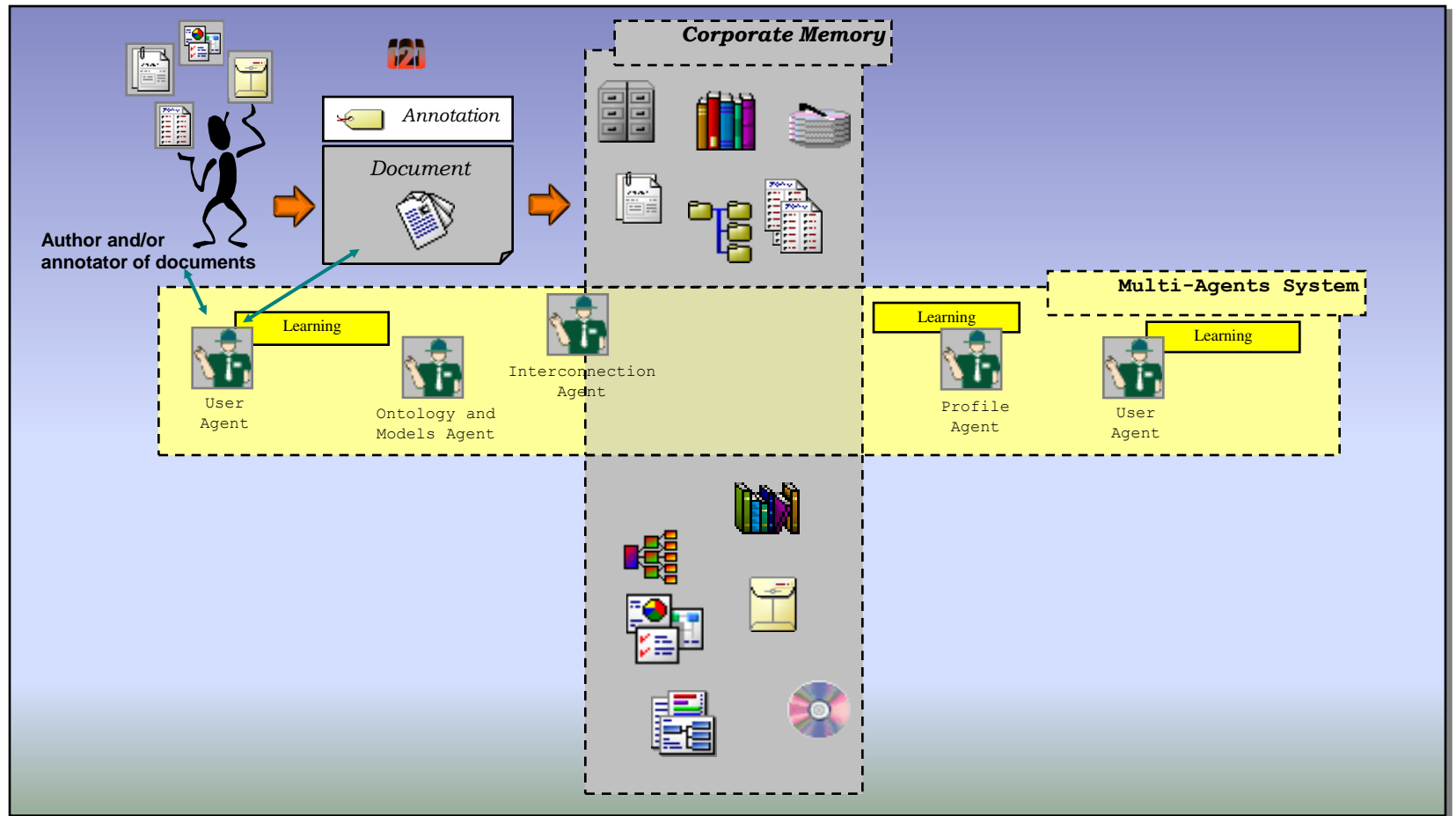
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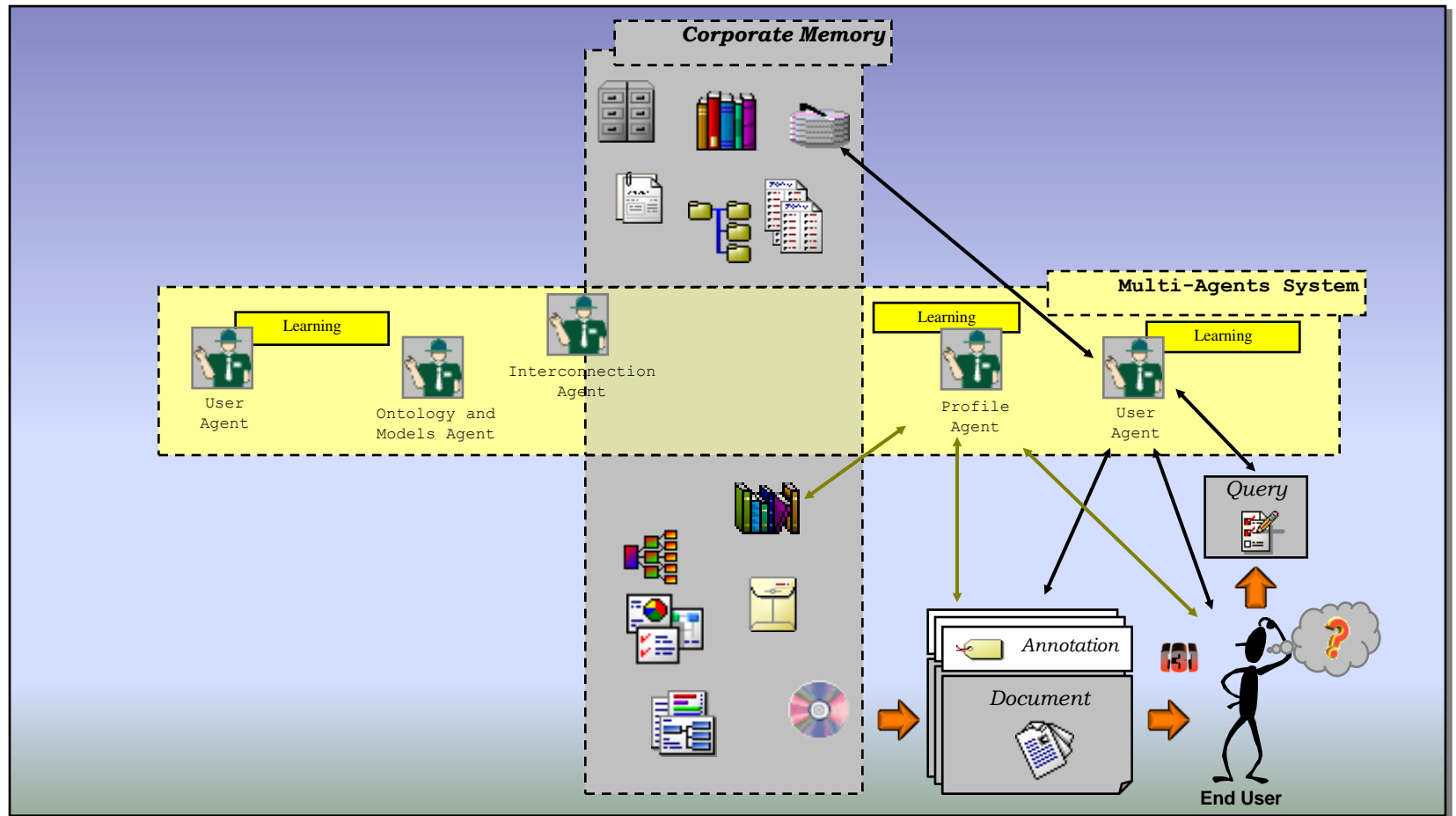
- ▶ **Positioning & Approach**

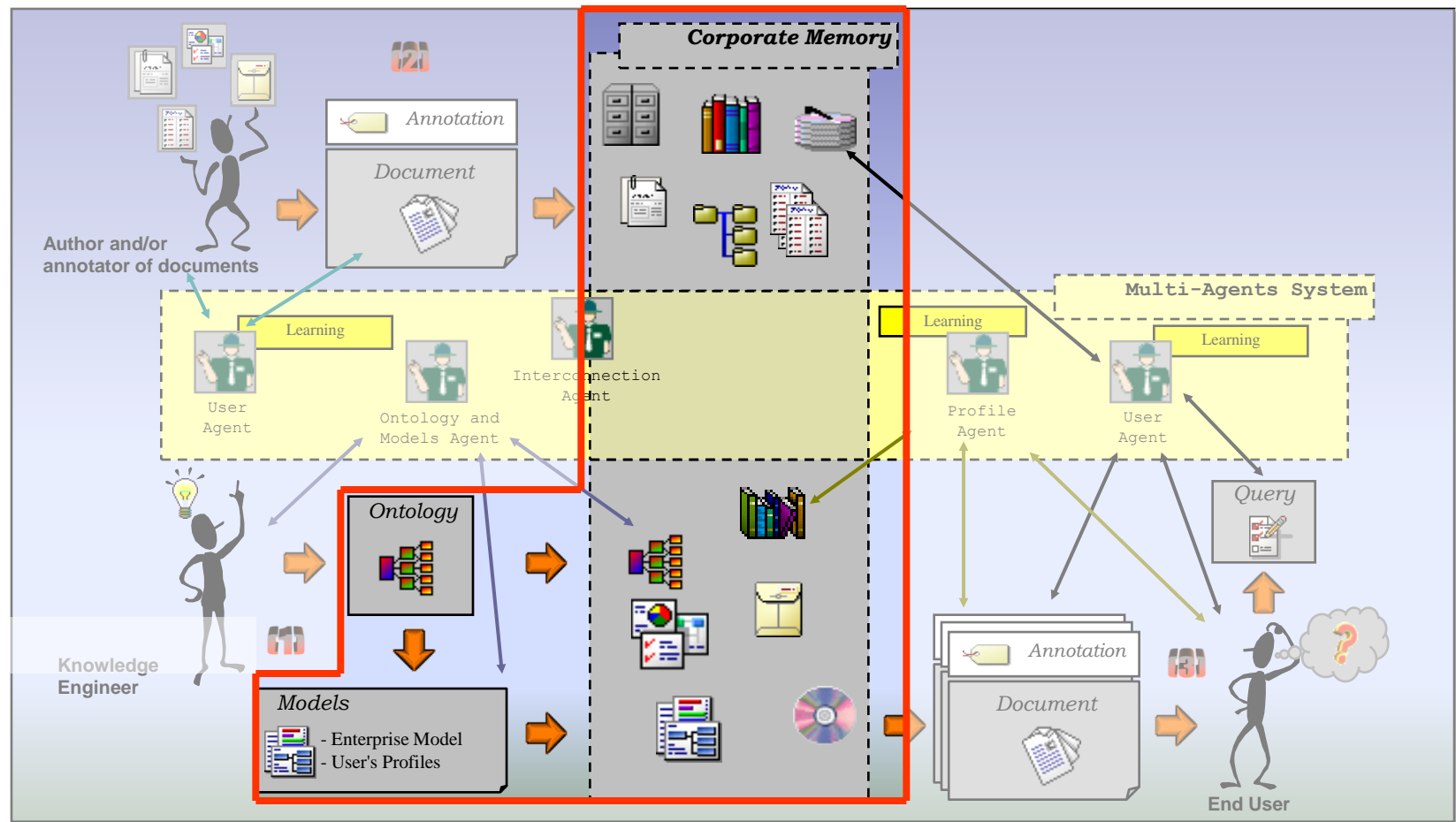
- ▼ Corporate memories as *heterogeneous and distributed* information landscapes
 - ▼ Stakeholders are a *heterogeneous and distributed* population
 - ▼ Exploitation of corporate memory involves *heterogeneous and distributed* tasks

<u>CM Materialization</u>	<u>CM Exploitation</u>
XML: Web standard, Structure, Extend, Validation, Transform	Multi-Agent System: Modularity, Distributed, Collaboration, Sem. M.P.
RDF(S) & K. Eng.: Annotation, Schemas	Machine Learning: Adaptability







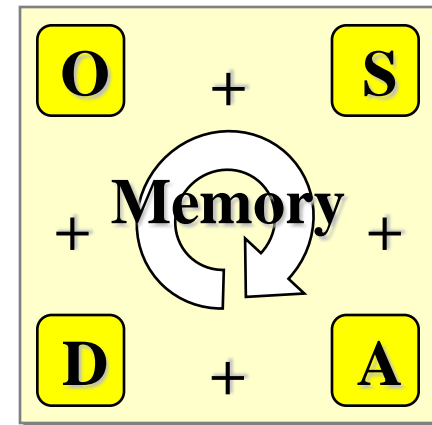


▶ RDF : Resource Description Framework

- ▼ Describe Web resources
- ▼ RDF Schema (to formalize the ontology)

▶ Approach :

- ▼ Ontology in RDFS (O'CoMMA)
- ▼ Description the Situation in RDF:
 - User Profiles
 - Organization model



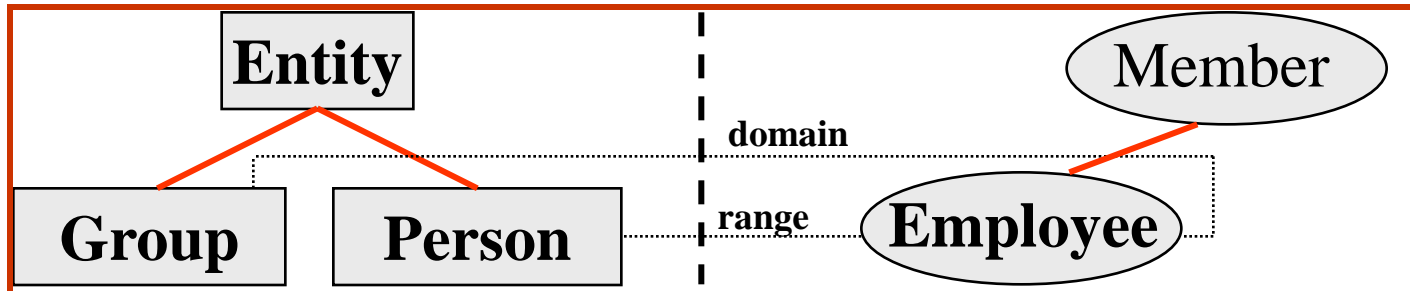
- ▼ Annotations in RDF describing Documents
- ▼ Toward a corporate semantic web
- ▼ Annotated world for agents (quickly intelligent)

Ontology in RDFS

```

<rdfs:Class rdf:ID='Entity' />
<rdfs:Class rdf:ID='Group' >
  <rdfs:subClassOf rdf:resource='#Entity' />
</rdfs:Class> ...
<rdf:Property rdf:ID='Employee' >
  <rdfs:subPropertyOf rdf:resource='#Member' />
  <rdfs:domain rdf:resource='#Group' />
  <rdfs:range rdf:resource='#Person' />
</rdf:Property> ...
  
```

Ontology hierarchy



RDF

annotation

```

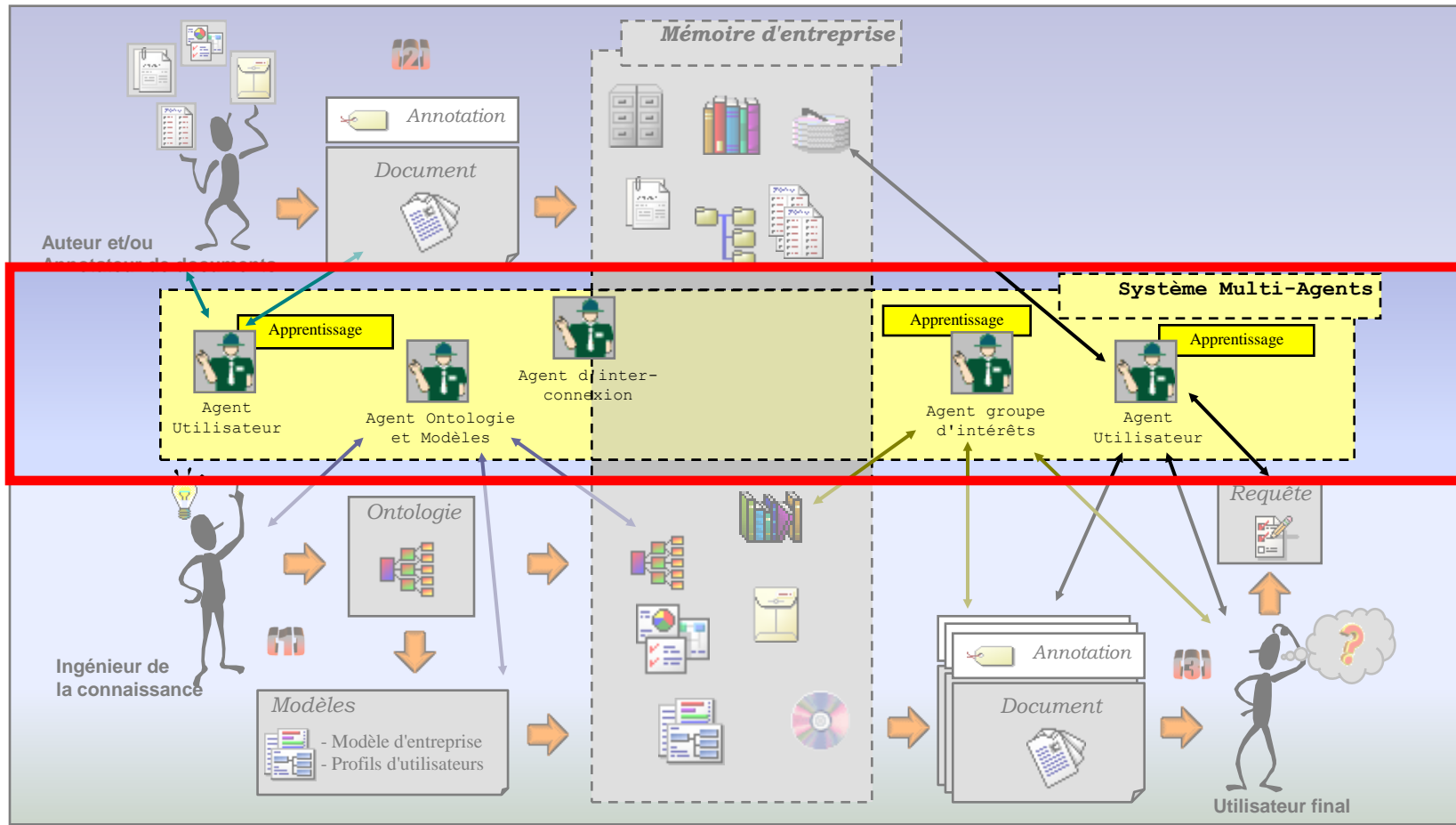
<CoMMA:Group rdf:about="http://www-sop.inria.fr/acacia/">
  <CoMMA:Employee>
    <CoMMA:Person rdf:about="http://www.inria.fr/~fab/" />
  </CoMMA:Employee>
</CoMMA:Group >
  
```

Annotation

triplet and graph

(Acacia, Employee, Fabien)





▶ **CoMMA** is an heterogeneous multi-agents information system

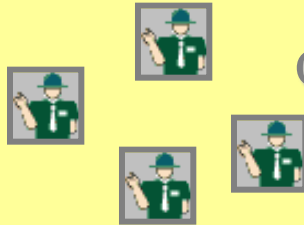
- ▼ Several types of agents
- ▼ Deal with duality of information *distribution*:
 - *i.e.* scattered data, information & knowledge
 - *i.e.* diffuse captured information and knowledge
- ▼ Agent paradigm adequacy:
 - Collaboration → Global Capitalization
 - Autonomy & Individuality → Local Adaptation

▶ **From Macroscopic to Microscopic**

- ▼ Functional analysis for high level functions: societies
- ▼ Society internal functional analysis: roles
- ▼ in // scenario and use-cases analysis: interactions



Ontology and Model Society



Ontologist Agents



Annotations Society

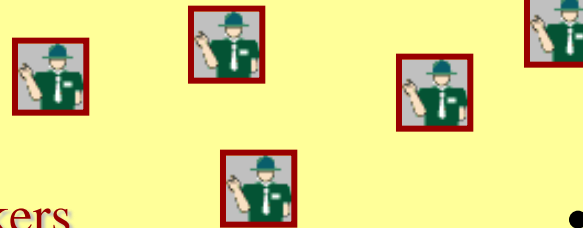
Archivists



Mediators



Interconnection Society



Federated Matchmakers



Users' society



Interface Controllers



Profile Managers

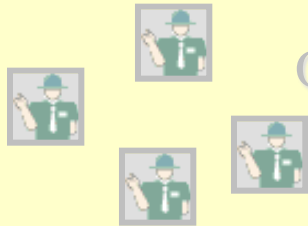


Profiles Archivists

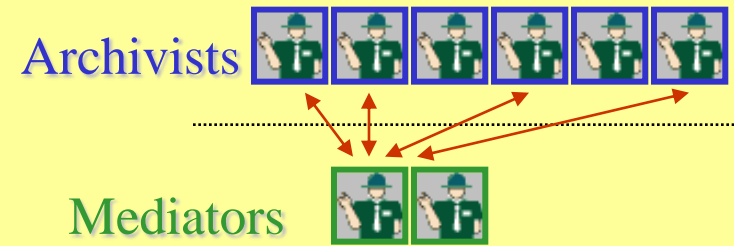
**CoMMA Society
Sub-societies
and Roles**



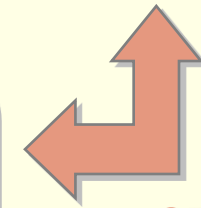
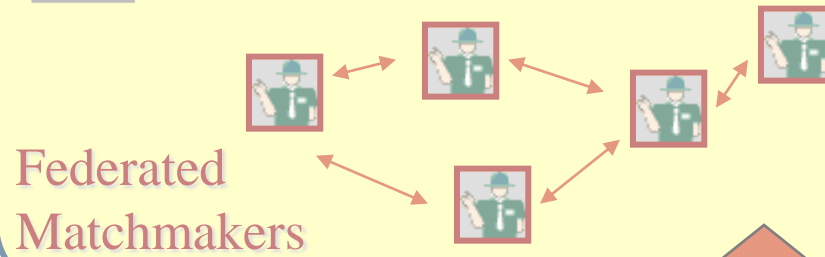
Ontology and Model Society



Annotations Society



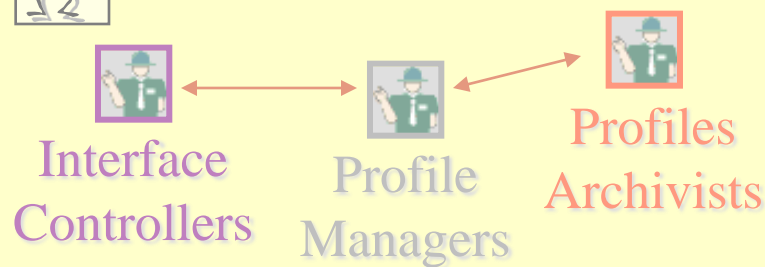
Interconnection Society



ontology



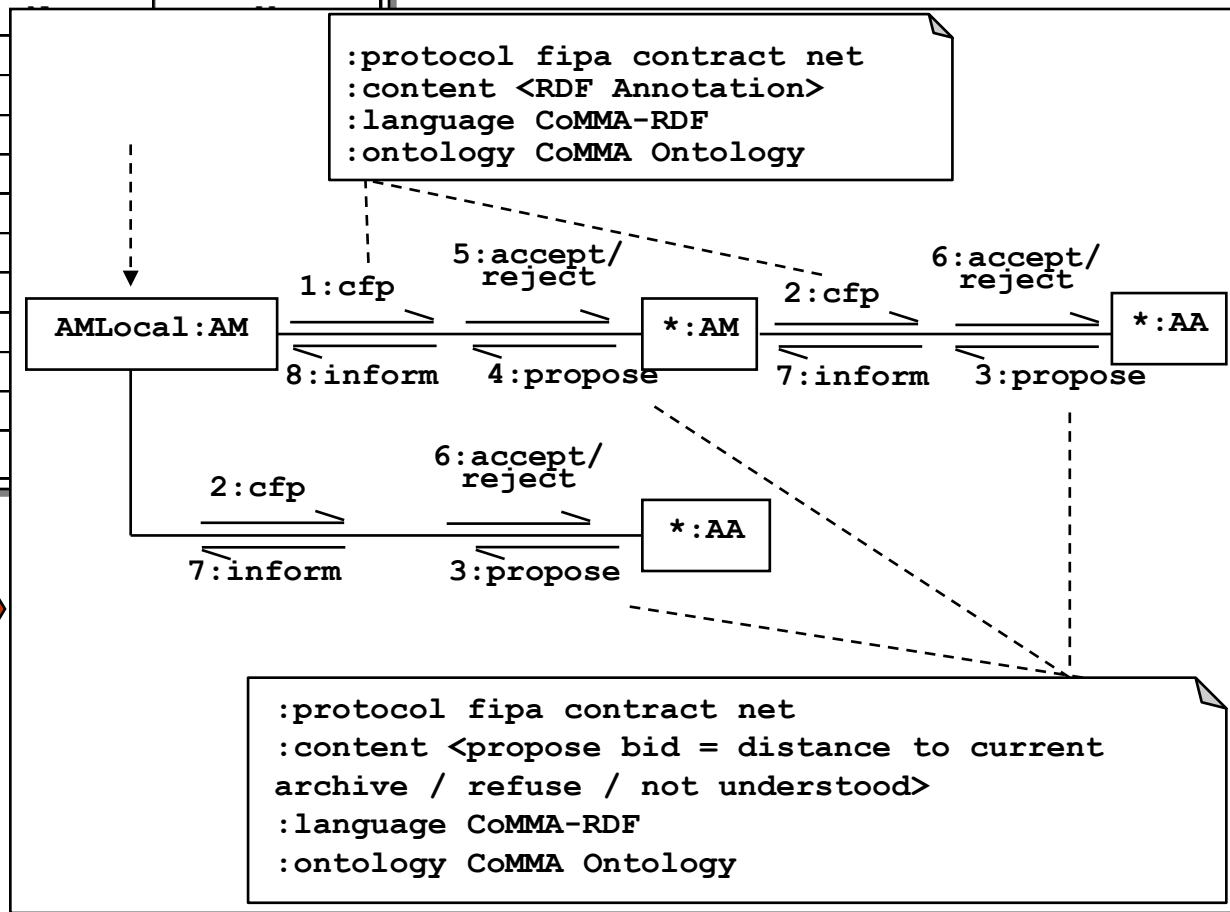
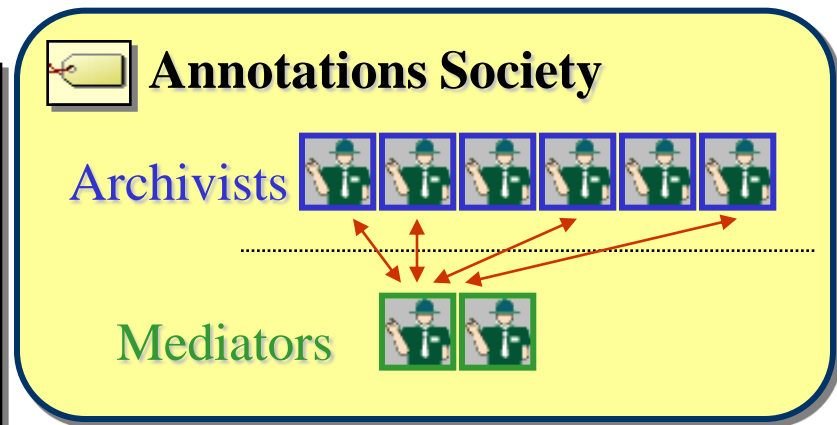
Users' society



Roles
Interaction
specifications

Zooming on the annotation society

	Annotation Archivist	Annotation Mediator
Reactive	N	N
Complex Mental State	N	N
Graceful Degradation	Y	Y
Temporally continuity	Y	Y
Autonomy		
Goal-oriented	N	Y
Collaborative	Y	Y
Flexible		
Proactive		
Personality		
Communication		
Adaptability		
Learning		
Customizable		
Mobility		
Visual representation		
Veracity		
Benevolence		
Rationality		

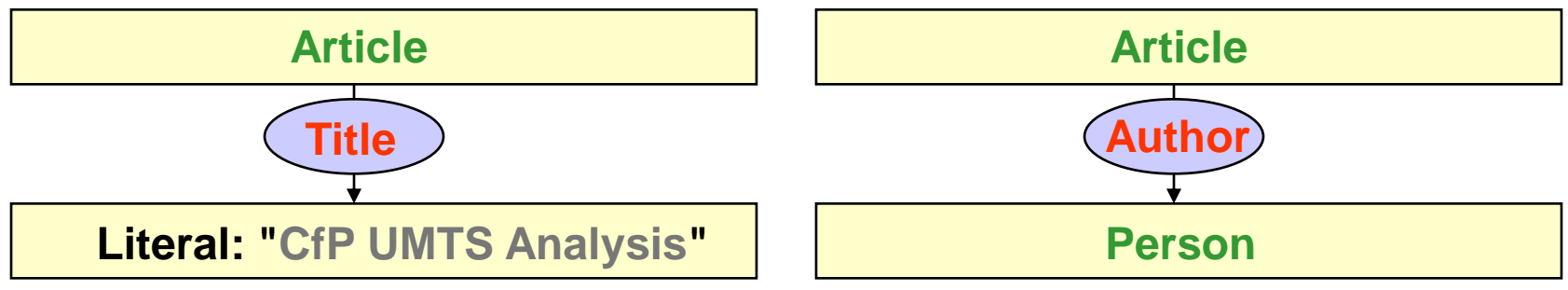


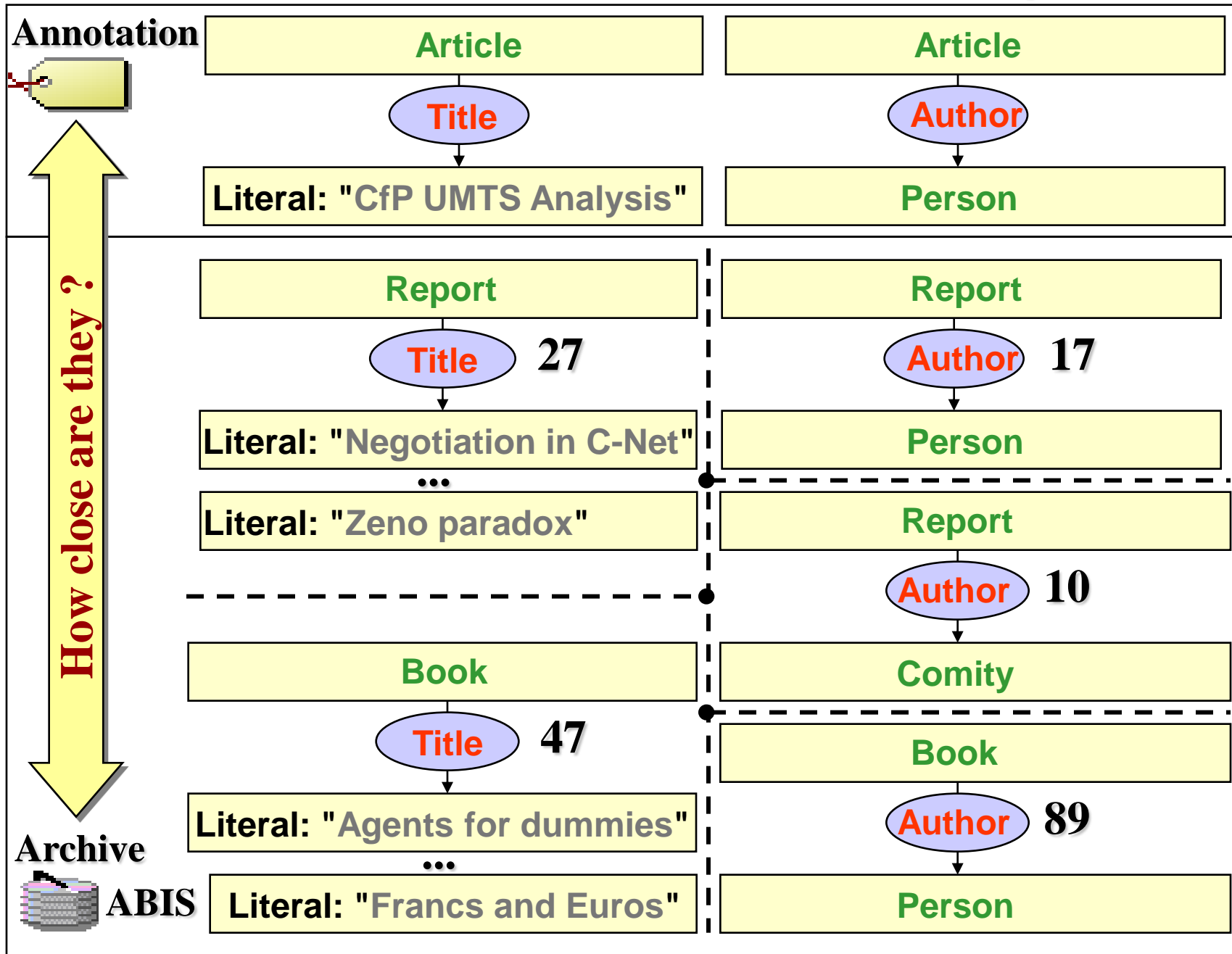
Scenarios and use cases to derive interactions and protocols spec. →

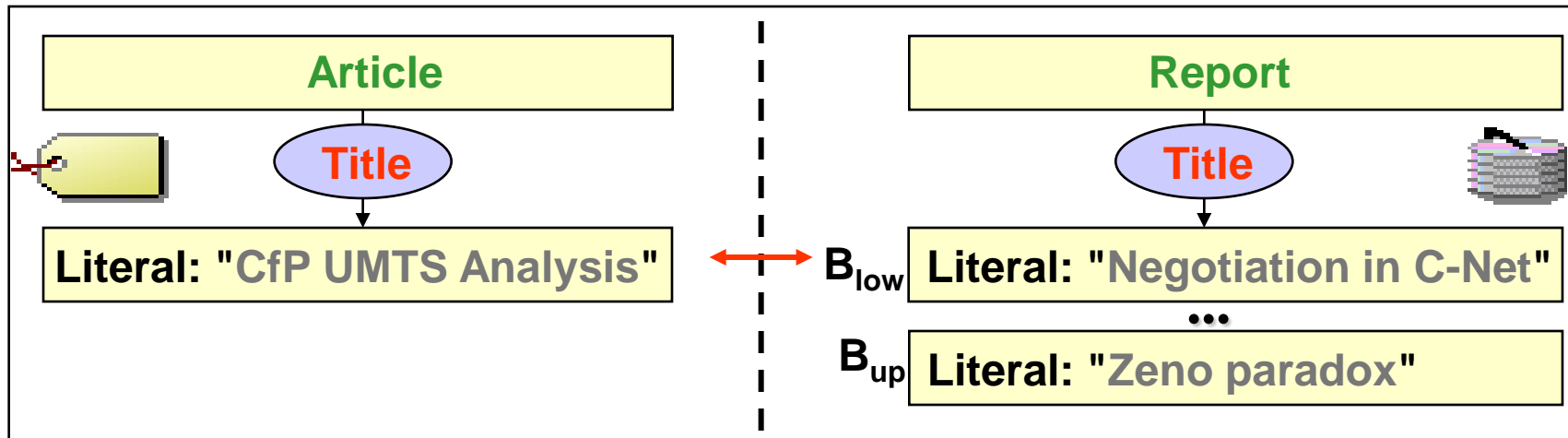
▶ C-Net : Annotation allocation

- ▶ AM - AA discuss best place to archive
- ▶ Contract-net (CfP, Proposal, Accept/Reject)
- ▶ Allocation criteria: pseudo-semantic measure

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/TR/1999/PR-rdf-schema-19990303#"
  xmlns:CoMMA="http://www.inria.fr/acacia/comma#">
  <CoMMA:Article rdf:about="http://intranet/reports/R3029">
    <CoMMA:Title>CfP UMTS Analysis</CoMMA:Title>
    <CoMMA:Author>
      <CoMMA:Person rdf:about="http://www.mycorp.com/~fab" />
    </CoMMA: Author >
  </CoMMA:Article>
</rdf:RDF>
```







Classic lexicographical distance: (⇒ pseudo semantic)

$$\text{Abscissa}(\text{Lit}_X) = \sum_{i=0..s} \frac{C_{x,i}}{\text{Max}_L} \in [0, \text{Max}_L[\quad ; \quad \text{Lit}_X = C_{x,1} \dots C_{x,s}$$

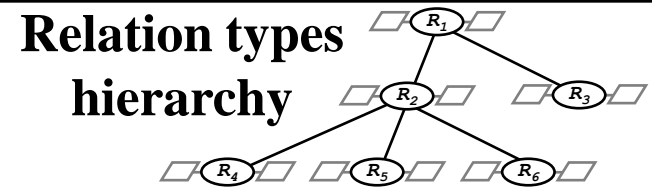
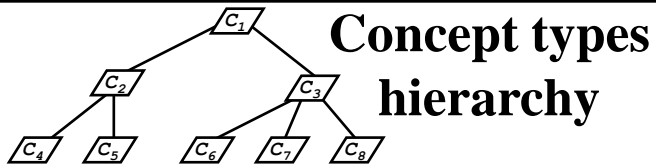
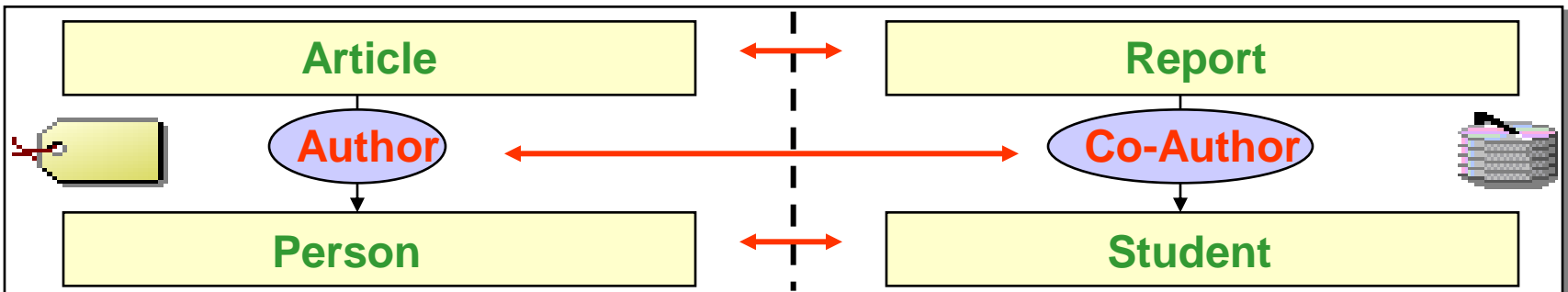
$$\text{Dist}_L(\text{Lit}_A, \text{Lit}_B) = | \text{Abscissa}(\text{Lit}_B) - \text{Abscissa}(\text{Lit}_A) |$$

Distance to a literal interval: (⇒ pseudo distance)

$$\text{Dist}_I(\text{Lit}_X, [B_{\text{low}}, B_{\text{up}}])$$

if $\text{Lit}_X \in [B_{\text{low}}, B_{\text{up}}]$ *then* = 0

else = $\text{Min}(\text{Dist}_L(\text{Lit}_X, B_{\text{low}}), \text{Dist}_L(\text{Lit}_X, B_{\text{up}}))$



Distance from Type₁ to Type₂ through least common super-type

$$\text{Dist}_H(\text{Type}_1, \text{Type}_2) = \text{SPath}(\text{Type}_1, \text{LCST}) + \text{SPath}(\text{Type}_2, \text{LCST})$$

SPath(.): number of edges through **generalisation links**

LCST: least common super-type

$$\text{Dist}_{TL}(\text{Type}_1, \text{Lit}_X)$$

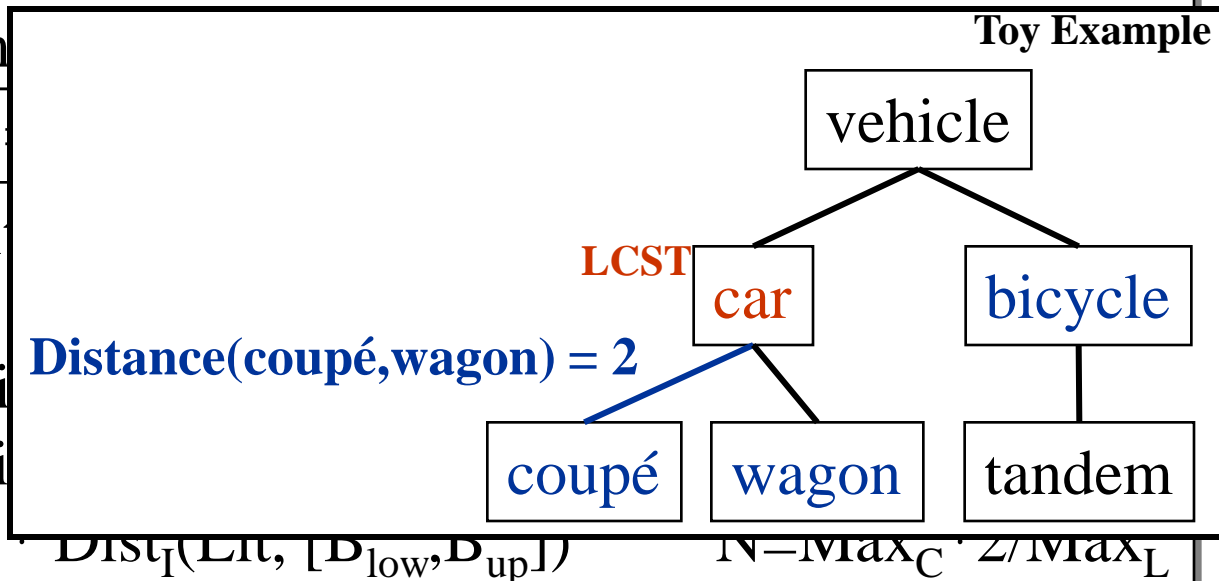
Triple-triple: condition

$$\text{Dist}_{TFABIS}(\text{Triple}_A, \text{Triple}_B)$$

$$\text{Dist}_{Ci} = W_C * \text{Dist}_{Ci}$$

or $W_C * \text{Dist}_{Ci}$

or $W_L * N$



Annotation  ↔  ABIS

$$\text{Dist}_{\text{AABIS}}(\text{Triple}, \text{ABIS}) = \text{Min}(\text{Dist}_{\text{TFABIS}}(\text{Triple}, \text{Triple}_i) \mid \text{Triplet}_i \in \text{ABIS})$$

$$\text{Dist}_{\text{AABIS}}(\text{An}_X, \text{ABIS}) = \sum_{\text{Triple}_j \in \text{An}_X} \text{Dist}_{\text{TABIS}}(\text{Triple}_j, \text{ABIS})$$

$$\text{Dist}_{\text{ACAP}}(\text{An}_X, \text{CAP}) = \sum_{\text{Triple}_j \in \text{An}_X} \text{Dist}_{\text{TCAP}}(\text{Triple}_j, \text{CAP})$$

sub-type \Rightarrow Dist = 0

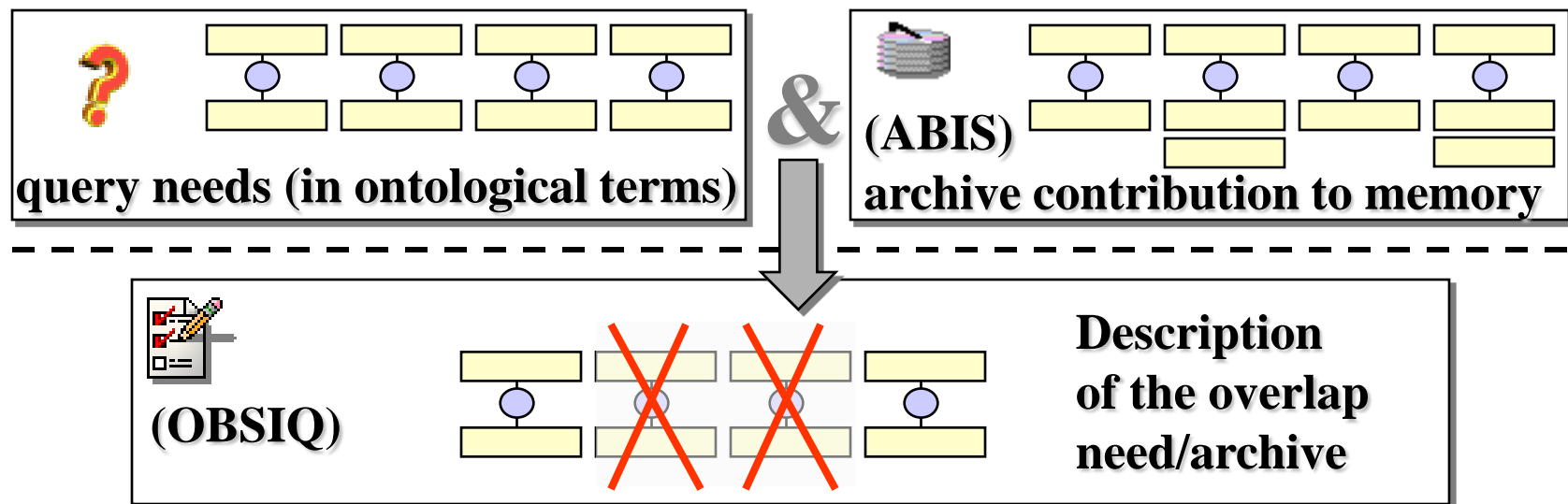
$$\text{Dist}(\text{An}_X, \text{AA}_Y) = \text{Dist}_{\text{AABIS}}(\text{An}_X, \text{ABIS}_Y) + \text{Dist}_{\text{ACAP}}(\text{An}_X, \text{CAP}_Y)$$

Allocation criteria:

- ▼ Winner = Archivist with the smallest distance
- ▼ Effect: cluster annotations having close semantic contribution → specialise the archives
- ▼ One use: specialisation improve query solving and respect knowledge distribution

▶ Fragmentation and distributed queries

- ▶ Co-operatively solve a query (multi-stage Query-Ref)
- ▶ AM decomposes submitted query into sub-queries
- ▶ Allocation of sub-query based on ABIS

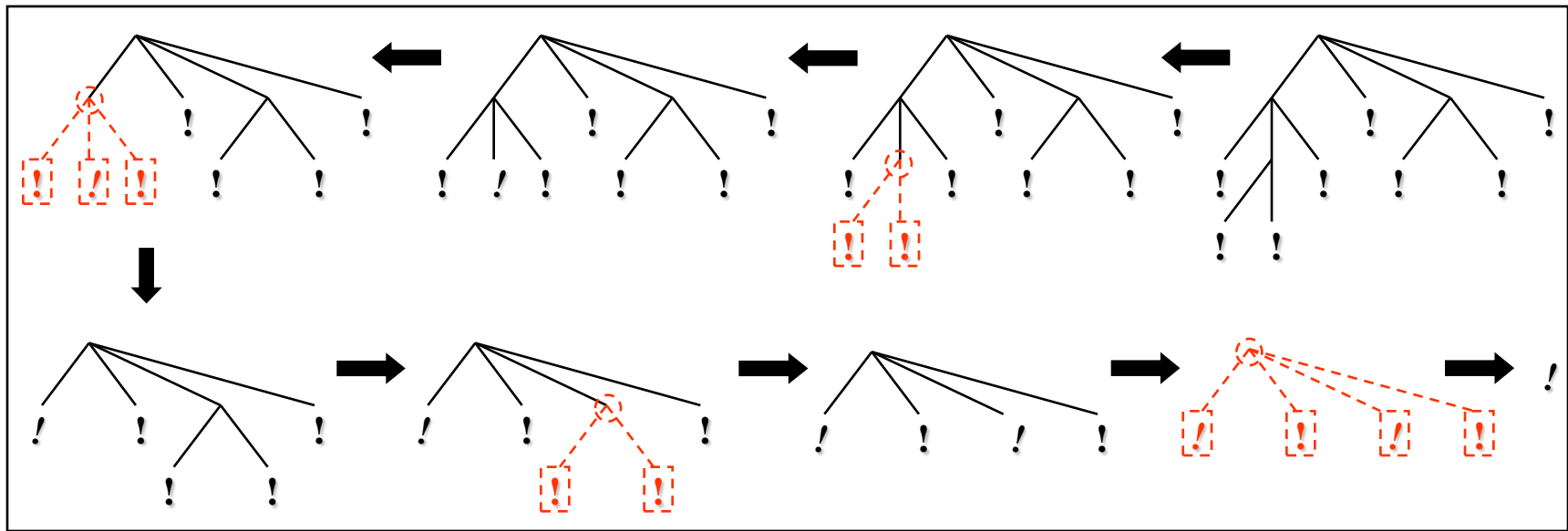
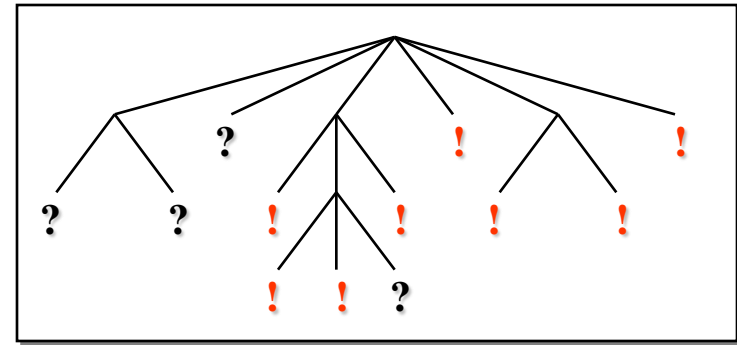


▶ Overlap description

- ▶ Refines service description of Archivists
- ▶ Target multicast communications in query-solving
- ▶ Exploit archive specialisation obtained by the distribution of annotations

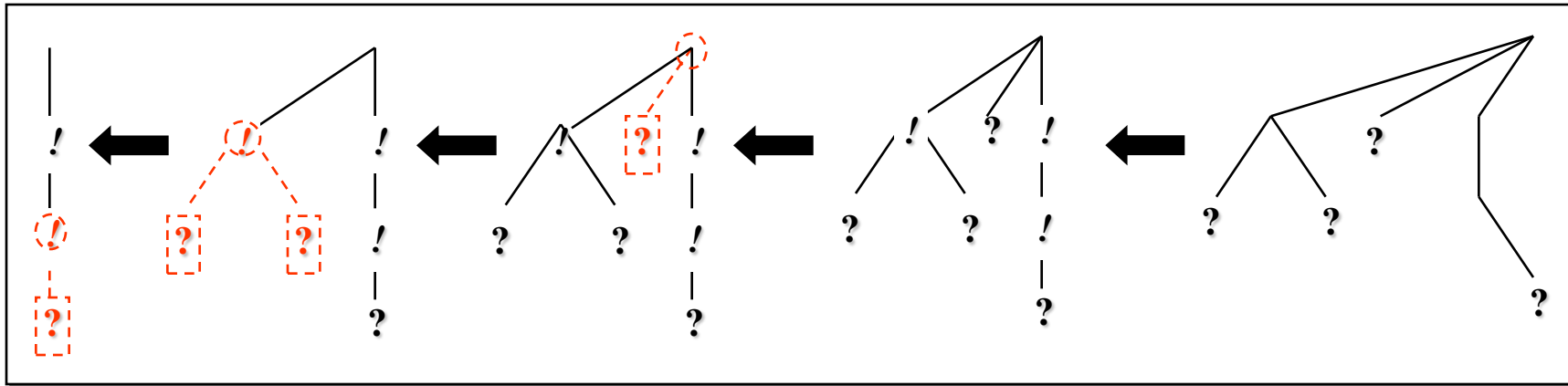
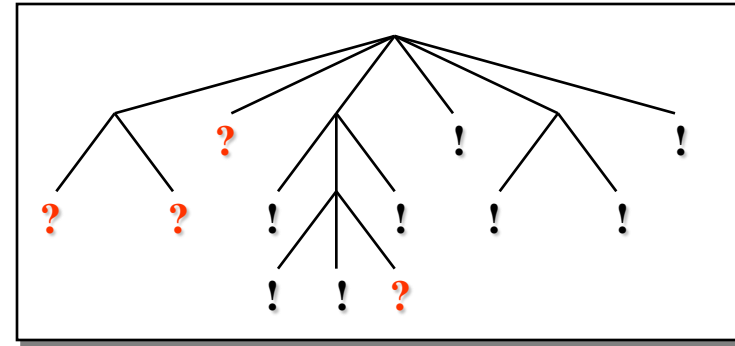
▶ Solving / Decomposition

- ▶ AM simplifies + decomposes → sub-queries to AA
- ▶ Bottom-up constraints solving
- ▶ Top-down question solving
- ▶ URI as cut/joint points




Solving / Decomposition

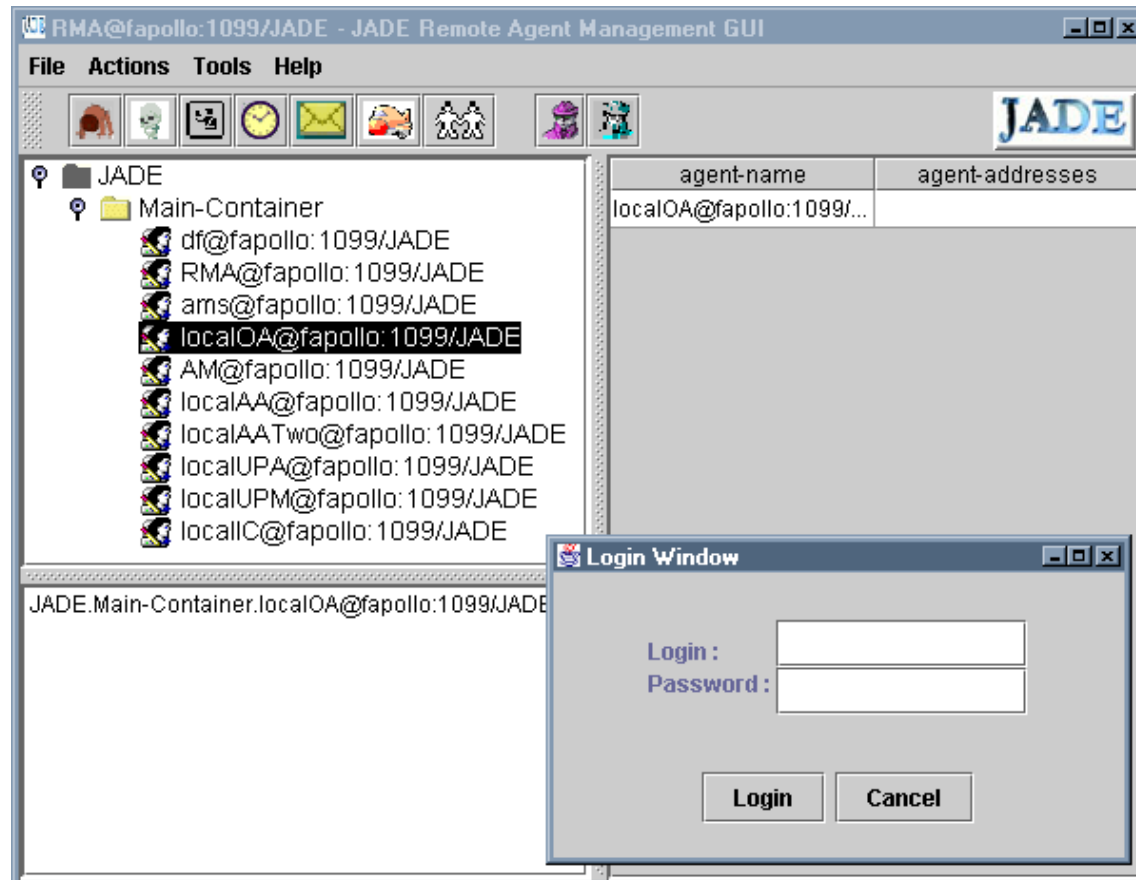
- AM simplifies + decomposes → sub-queries to AA
- Bottom-up constraints solving
- Top-down question solving
- URI as cut/joint points



Solving / Merging

- AM merges partial results
- AM solves cross-references

- ▶ System implementation () & trial:
 - ☹ Ergonomics problems and complexity
 - ☹ Large scale real evaluation
 - 😊 Working system *i.e.* proof of concept
 - 😊 Usability and Usefulness recognized
 - 😊 Developer appreciation of Agent-Onto coupling
 - 😊 Industrial interest in the dvp^{nt} of the prototype
- ▶ Focused criticisms:
 - ▼ **pseudo**-semantic distance; literal analysis
 - ▼ **over** specialisation; fine tuning, other criteria
 - ▼ decomposition improvements (existential qualification, constraint focal point and heuristics)
- ▶ Results ∈ PhD to be defended in October
- ▶ Take home message: "looking for Post Doc." 😊



The screenshot shows a web browser window titled "CoMMA Home Page". The main content area features the "CoMMA HOME" logo in a serif font. A left-hand navigation menu contains several buttons: "Home", "Ontology", "Look for information" (with a sub-menu containing "New query" and "Previous query..."), "Add information" (with a sub-menu containing "New indexation" and "Previous indexation..."), "Comments", "Any problem ?" (with sub-buttons "Contact us" and "About CoMMA"), and "Quit". At the bottom, there are two sections: "Profile" with an "Edit user profile" button, and "Registration" with buttons for "Register to a COI", "Register as new comer", and "Register to a news gro...".

CoMMA Home Page

CoMMA HOME

Home

Ontology

Look for information

New query

Previous query...

Add information

New indexation

Previous indexation...

Comments

Any problem ?

Contact us

About CoMMA

Quit

Profile

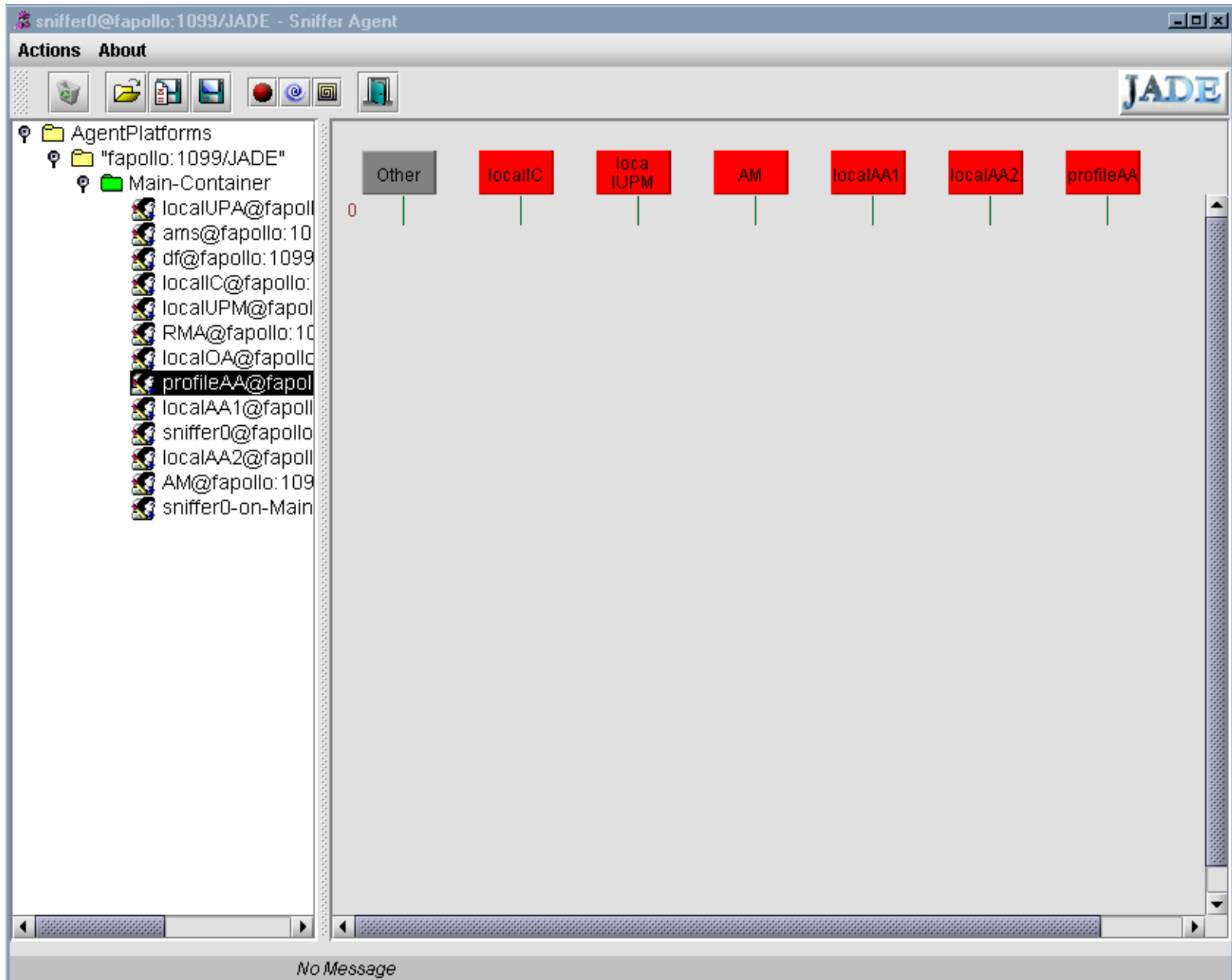
Registration

Edit user profile

Register to a COI

Register as new comer

Register to a news gro...

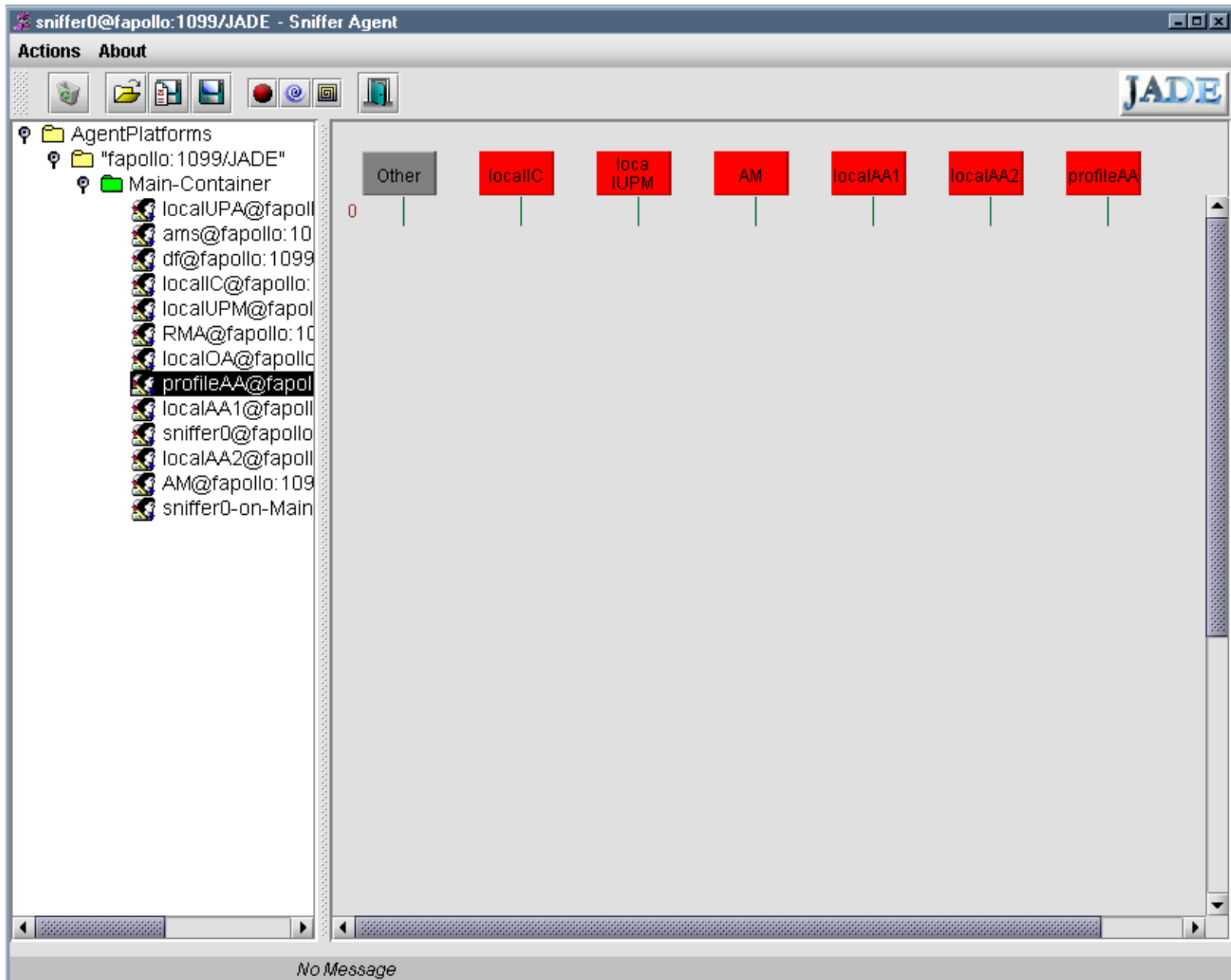


The screenshot shows a web browser window titled "CoMMA Home Page". The main content area is titled "CoMMA HOME" and is currently empty. On the left side, there is a vertical navigation menu with the following items:

- Home
- Ontology
- Look for information
 - New query
 - Previous query...
- Add information
 - New indexation
 - Previous indexation...
- Comments
- Any problem ?
 - Contact us
 - About CoMMA
- Quit

At the bottom of the page, there are two sections:

- Profile**: Edit user profile
- Registration**: Register to a COI, Register as new comer, Register to a news gro...



Num	Rank	Document url	Type	Required Properties
1	1	http://www-sop.inria.fr/acacia/personnel/Fabien.Gandon/research/pakm2000/pakm2000.pdf	Article	CreatedBy: <i>Employee</i> <i>FamilyName:</i> : GANDON
	11	http://www-sop.inria.fr/acacia/personnel/Fabien.Gandon/	Engineer	CreationDate: 2000
	11	http://www-sop.inria.fr/acacia/personnel/Fabien.Gandon/	WebPage	Title: <i>Presentation of advantages of XML and</i>

Thank you !