



INRIA
SOPHIA ANTIPOLIS

Managing enterprise
applications as dynamic
resources in corporate semantic
webs

an application scenario for
semantic web services.

*Fabien Gandon, Moussa Lo, Olivier Corby,
Rose Dieng-Kuntz*

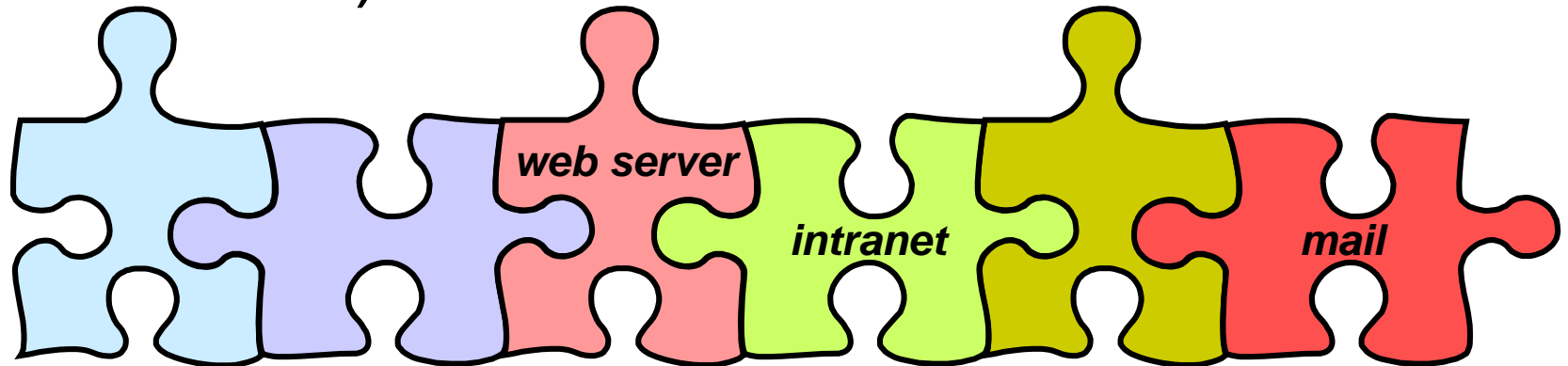
ACACIA in short...

- Objectives: Offer **methodological** and **software support** (i.e. models, methods and tools) for construction, management and diffusion of **corporate memories**.
- Corporate memory : **Explicit** and **persistent** materialization of crucial **knowledge** and **information** of an organization to **ease access, sharing** and **reuse** by the members of the organization in **individual** and **collective tasks**.
- Corporate memories as **corporate semantic webs**



Corporate web & intranet

- Past and Current work on Corporate Memories (10 minutes)
- Current and future work with Semantic WS (10 minutes)

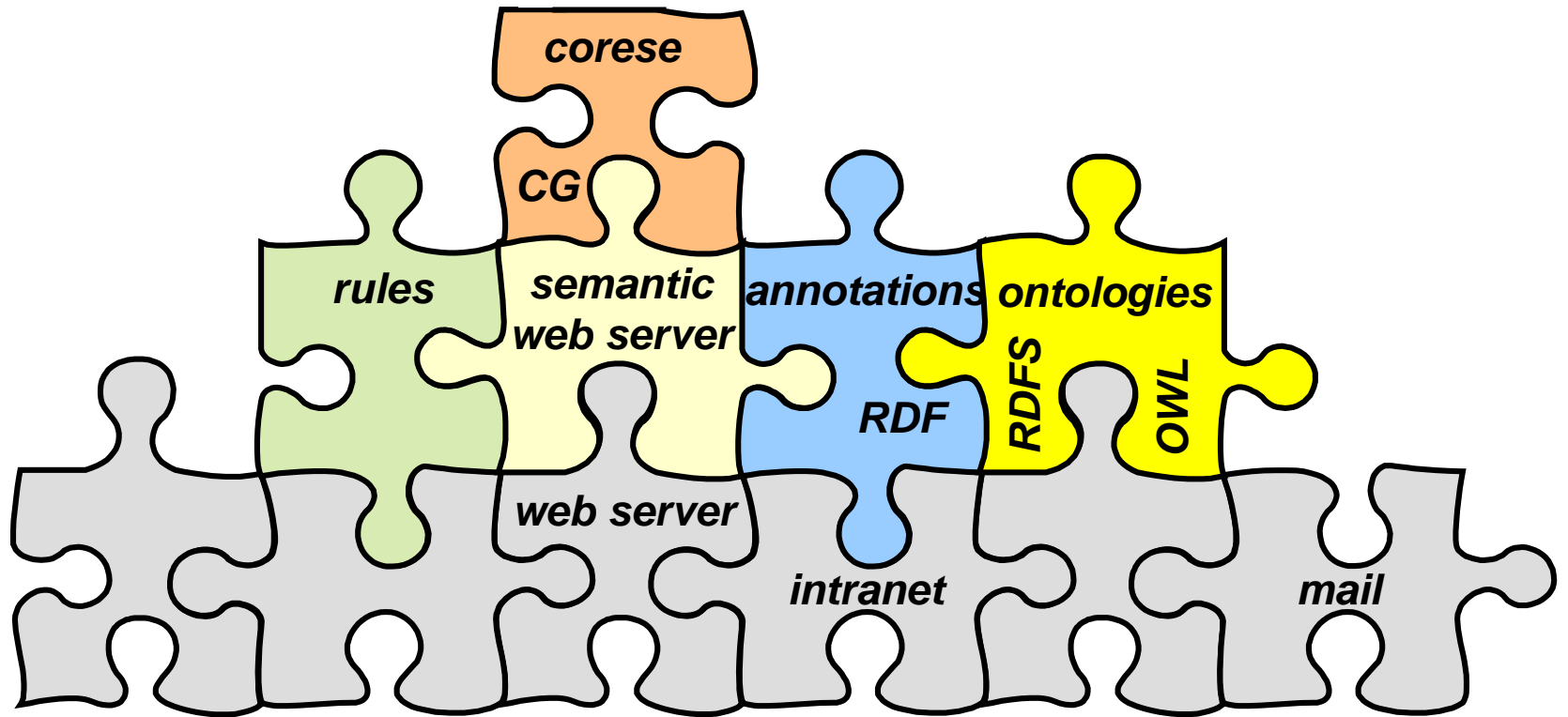


Corporate semantic Web

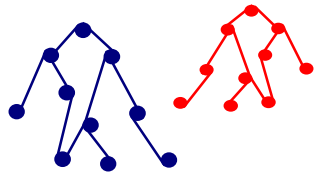
- **Resources**: persons, documents (XML, HTML...), services, software, hardware, etc.
- **Ontologies**: describing the conceptual vocabulary shared by the organisation communities
- **Semantic annotations**: on these resources (e.g. persons' **skills**, document **contents**, characteristics of services/software/hardware), using the vocabulary defined in the ontologies
- Diffusion on the **intranet / corporate web**.



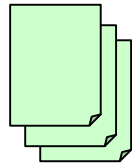
Corporate semantic web



CORESE semantic search engine

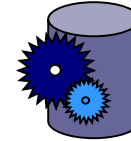


Ontologies



Documents

```
<accident>
  <date> 19 Mai 2000 </date>
  <description>
    <facteur>le facteur
  </description>
</accident>
```



Legacy sys.



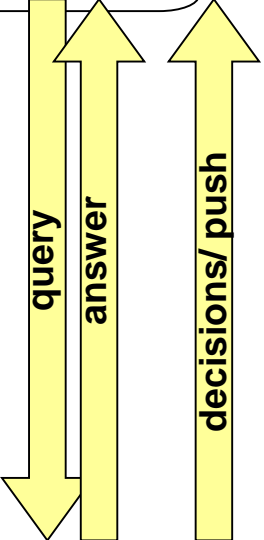
Users

```
<rdf:Class rdf:ID="thing"/>
<rdf:Class rdf:ID="person">
  <rdf:subClassOf
    rdf:resource="#thing"/>
</rdf:Class>
```

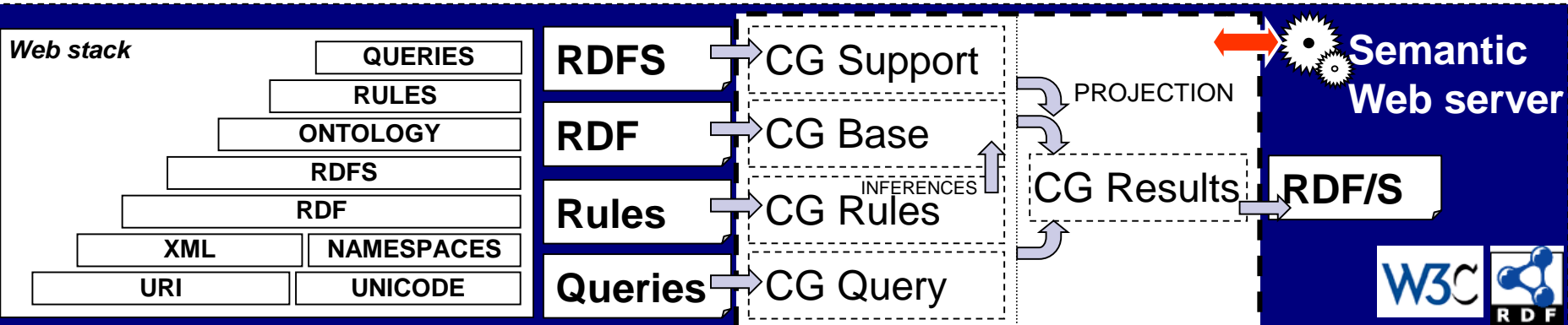
Schemata in RDFS

```
<ns:article rdf:about="http://intranet/articles/ecai.doc">
  <ns:title>MAS and Corporate Semantic Web</ns:title>
  <ns:author>
    <ns:person rdf:about="http://intranet/employee/id109" />
  </ns:author>
</ns:article>
```

Annotations in RDF formed by instances of schemata in RDFS



CORESE



Typical query on a memory

Find the **documents** about **Java** and return the **titles** and the **authors** :

```
select ?doc c:title ?person where
```

```
?doc      rdf:type      c:Document
```

```
?doc      c:concern     ?topic
```

```
?topic    rdf:type      c:Java
```

```
?doc      c:title       ?title
```

```
?title    ~           "web"
```

```
?doc      c:author     ?person
```

Request language

- Data and type operators: = <= ~ != ...
- XML Schema Datatypes : number, boolean, string, date, etc.
- Natural language: `xml:lang="en-us"`
- Boolean expressions `and / or`
- Query the Schema
- Negation of arc, optional arc, paths, approximation, variables on properties, etc.

Discover paths between resources

Find a link between two persons (with maximal length of 4 relations)

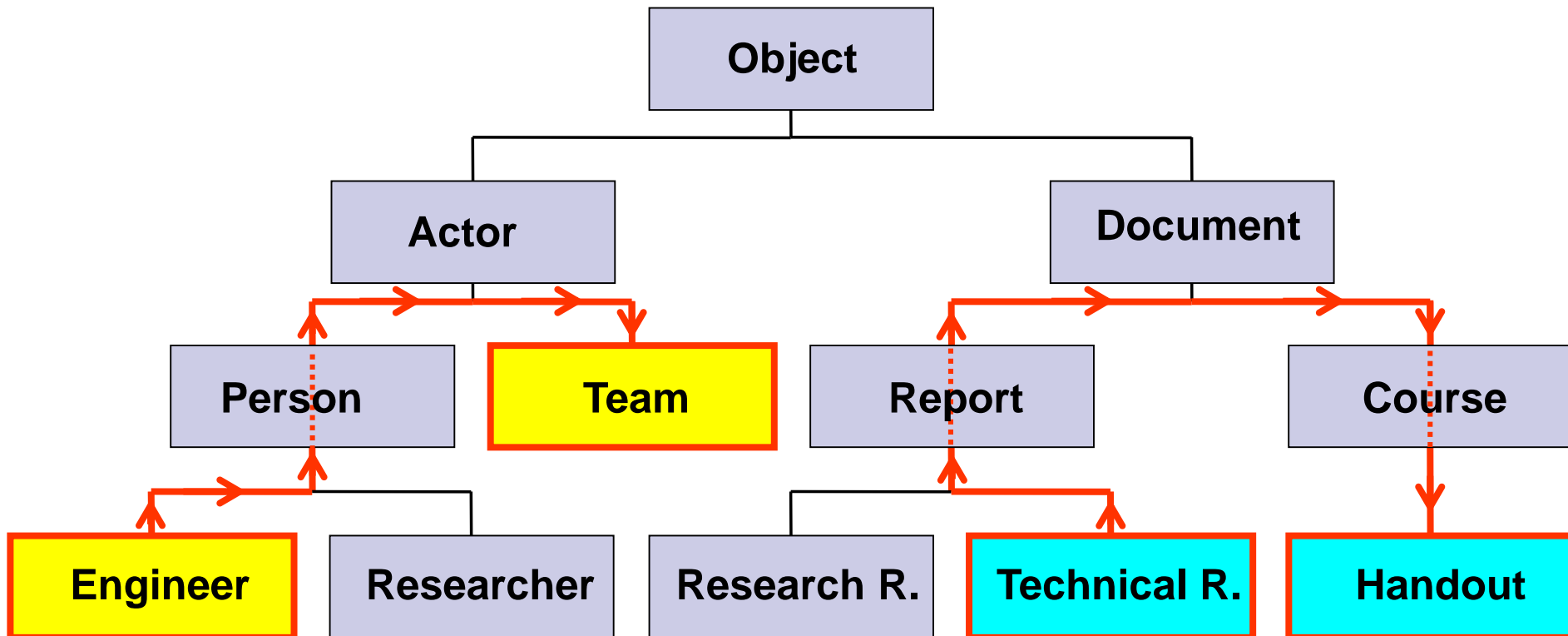
```
?x rdf:type ex:Person
```

```
?y rdf:type ex:Person
```

```
?x ex:relation[4] ?y
```

Approximate search

- **Request:** *Technical Report* about Java written by an *engineer* ?
- **Approximation :** *Technical Report* → *Handout*
Engineer → *Team*

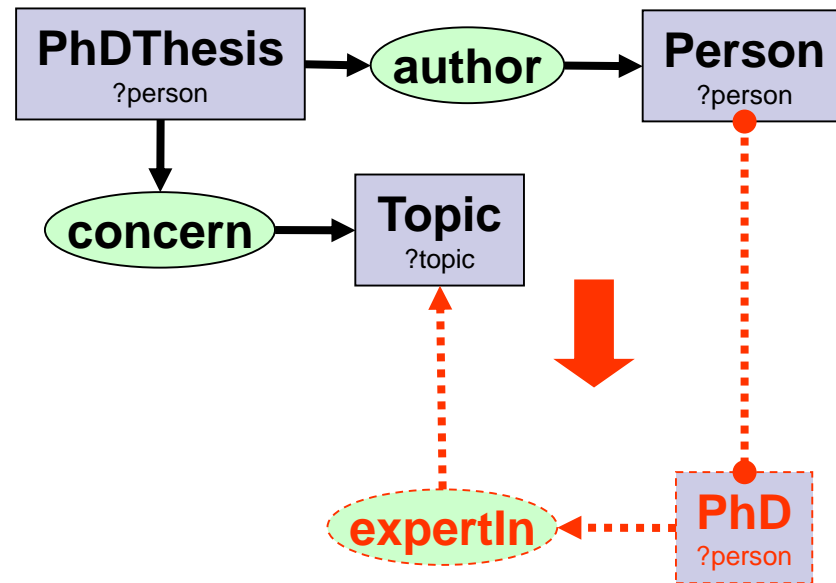


Production rules

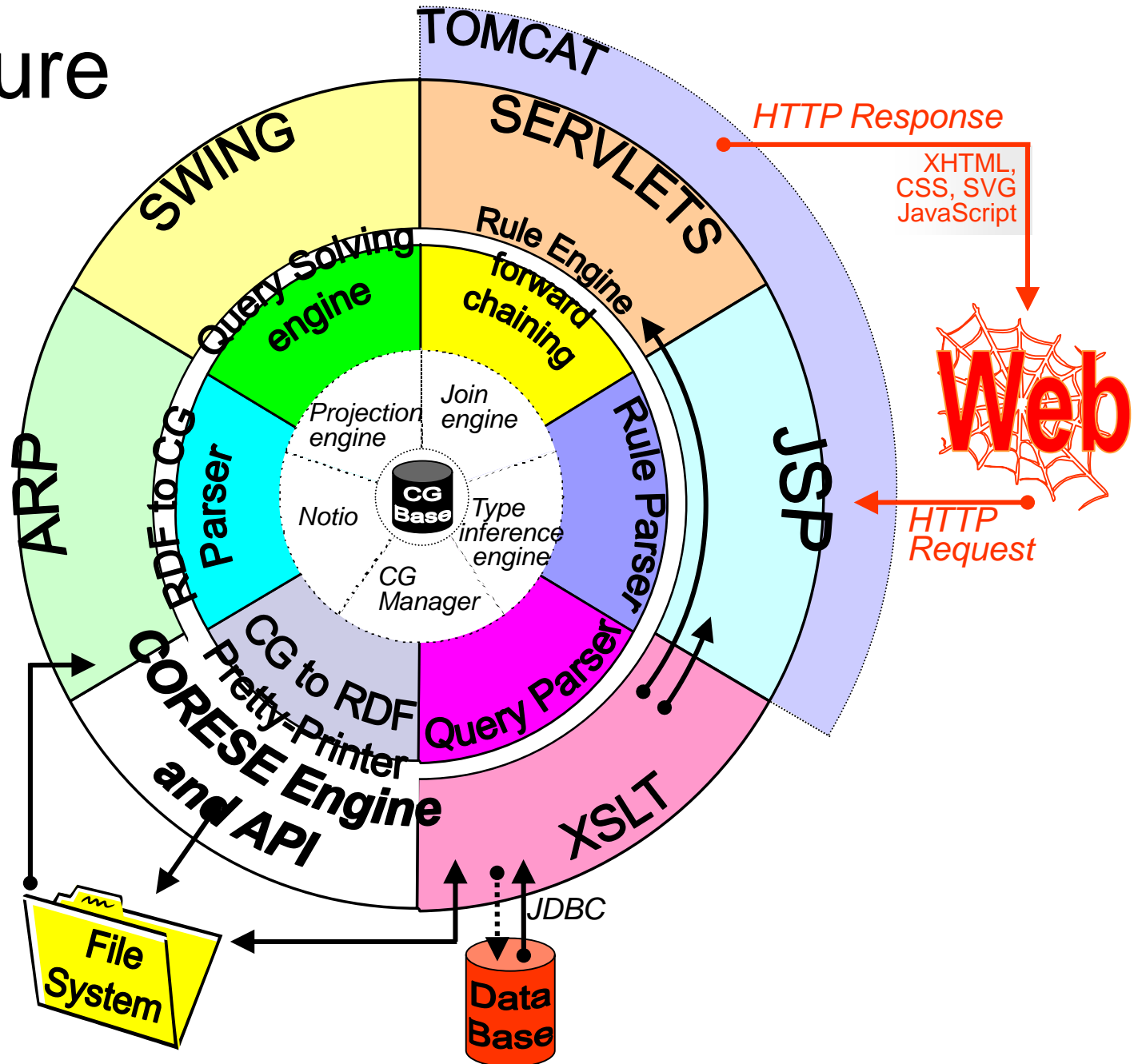
Classify a resource

If a *person* wrote a *Ph.D. thesis* on a *subject* the s/he is a *doctor* and an *expert* on that subject.

```
?person author ?doc
?doc rdf:type PhDThesis
?doc concern ?topic
→
?person expertIn ?topic
?person rdf:type PhD
```



Architecture



HCI and portal generation

- Build a list with sub-classes of *Person*

```
<select name='ihm_person' title='Profession'>
  <query>
    ?x rdfs:subClassOf c:Person
  </query>
</select>
```

- HTML rendering:

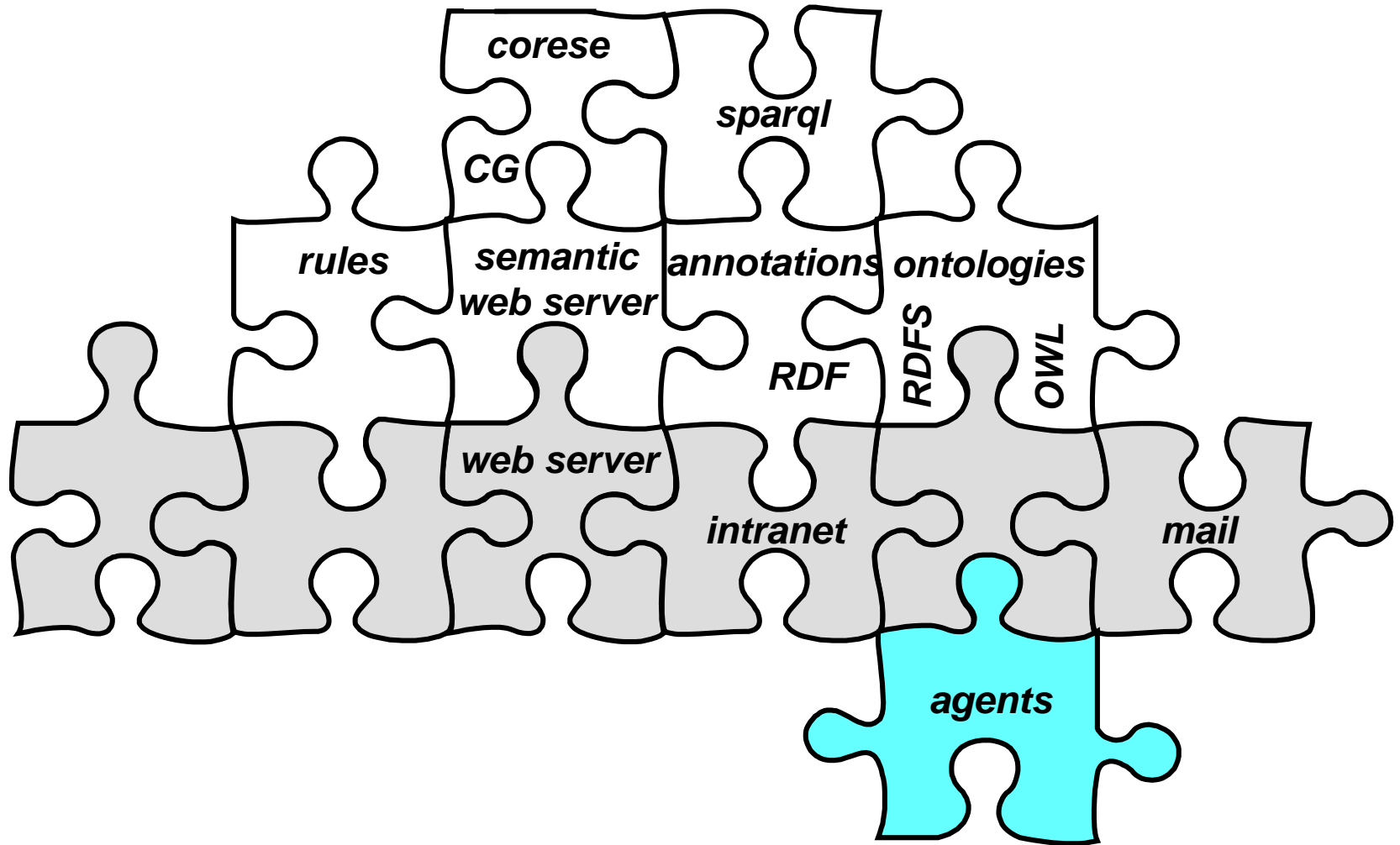
Profession	consultant employee engineer executive external people
------------	--

- Request associated to the list :

```
?p rdf:type get:ihm_person
```

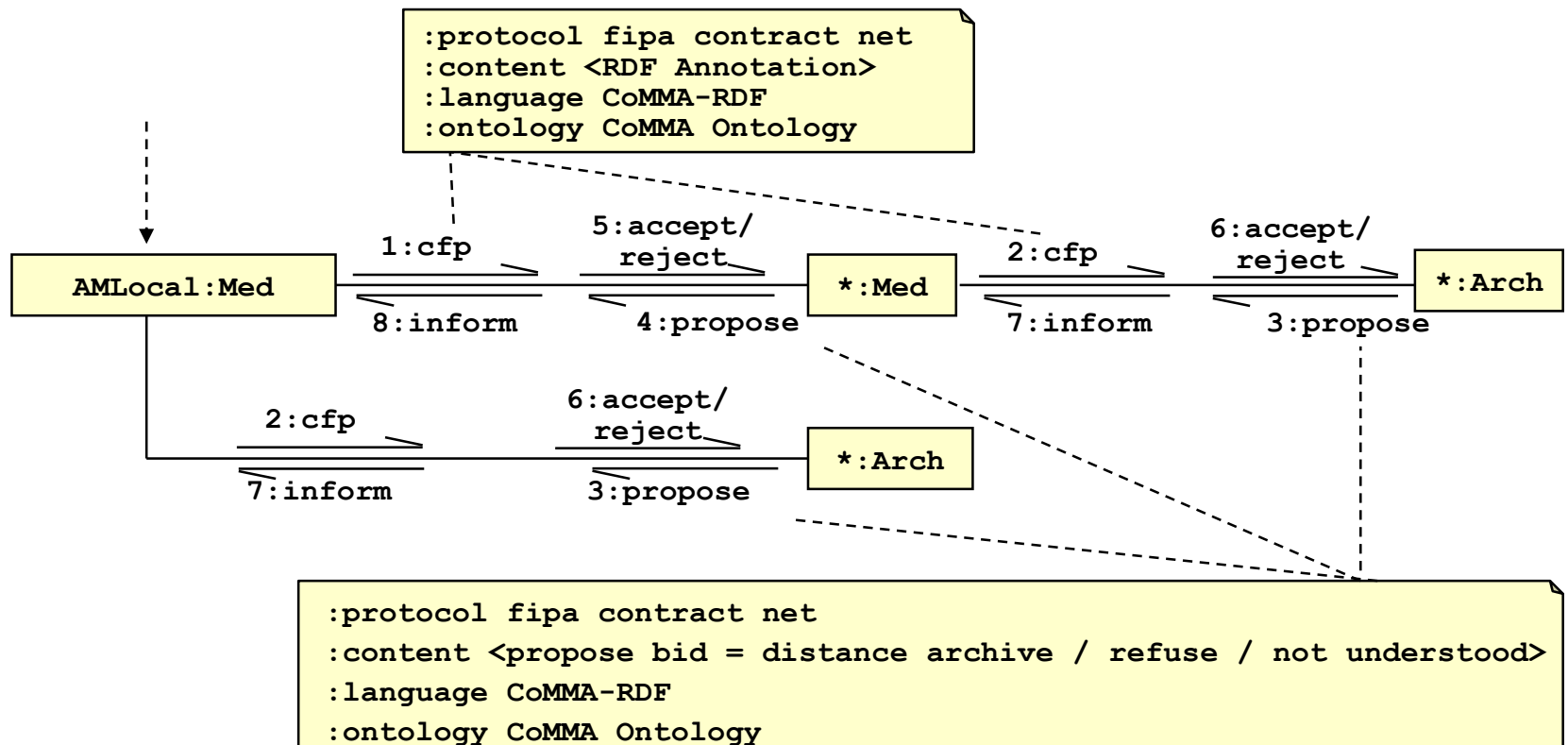


Corporate distributed knowledge



DAI & DFK

- archives **distributed** all over organisation
- find **best archive** for new annotation
- **Contract-net (CfP, Proposal, Accept/Reject):**



sniffer0@fapollo:1099/JADE - Sniffer Agent

Actions About

JADE

AgentPlatforms

- "fapollo: 1099/JADE"
- Main-Container
 - localUPA@fapollo
 - ams@fapollo: 10
 - df@fapollo: 1099
 - localIC@fapollo:
 - localUPM@fapol
 - RMA@fapollo: 10
 - localOA@fapollc
 - profileAA@fapol
 - localAA1@fapoll
 - sniffer0@fapollo
 - localAA2@fapoll
 - AM@fapollo: 109
 - sniffer0-on-Main

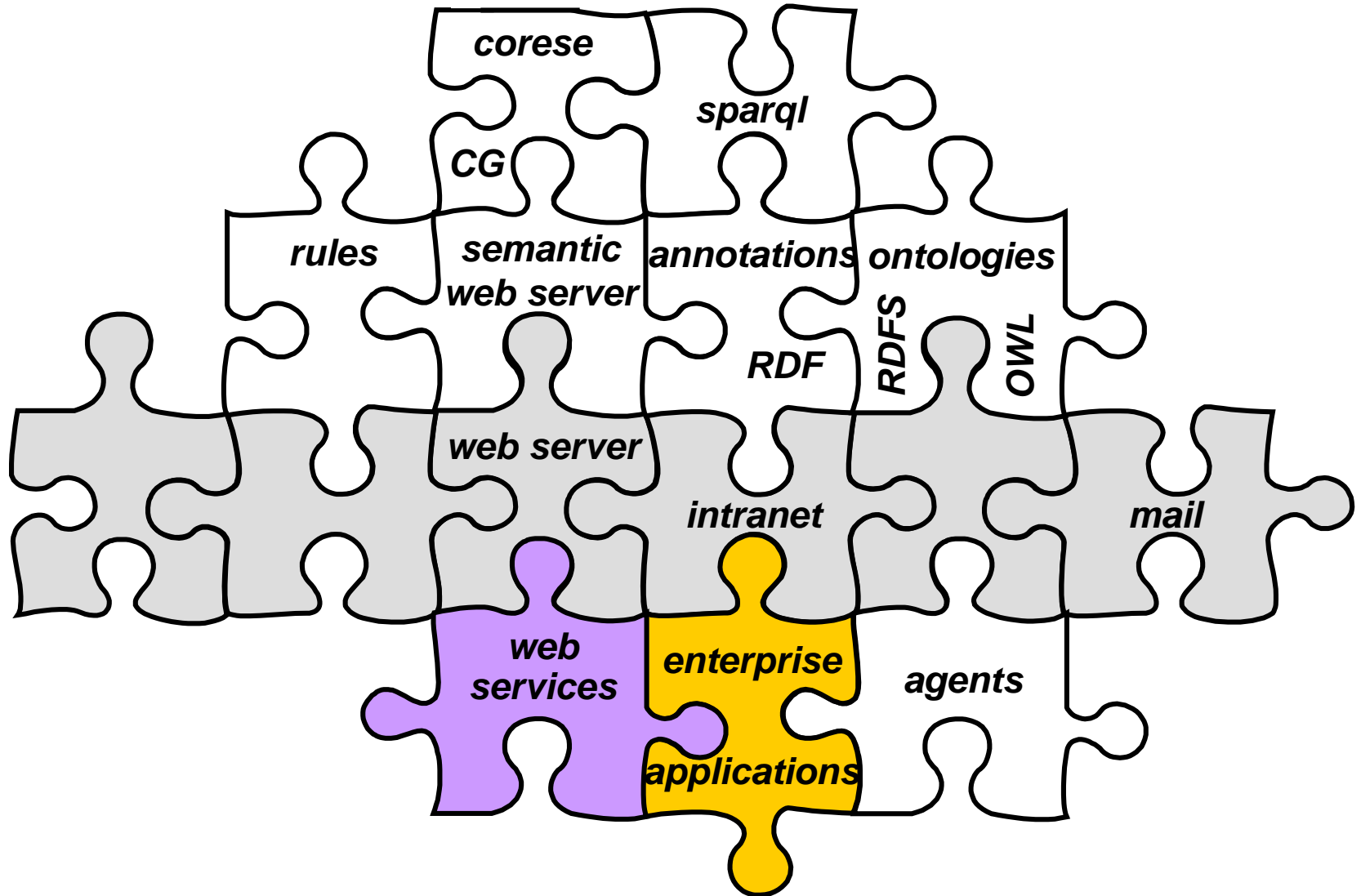
Other localIC localIUPM AM localAA1 localAA2 profileAA

0

No Message



Corporate web services



Web services & Enterprise application

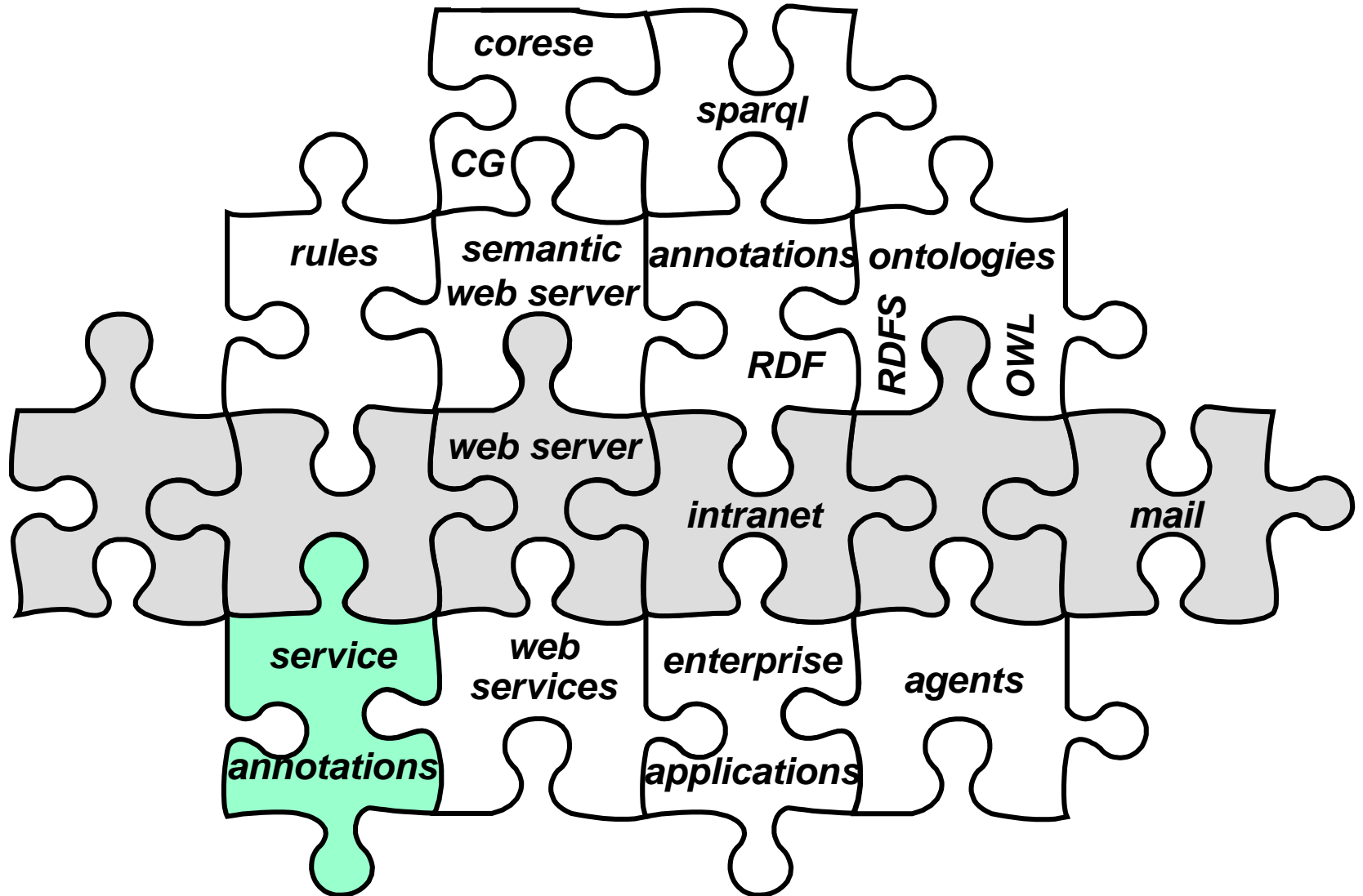
- Transversal use of enterprise modeling
 - End of 90's: enterprise modeling for KM
 - In the past 2 years: technology and application integration can benefit from these models too
- Evolution of KM scenarios
 - Until end of 90's focus on: knowledge capture, storage, access and diffusion
 - More and more often: computation, decision, routing, transformation,... knowledge workflow
- Unified and integrated access to knowledge sources and corporate applications

Memories with a broaden scope

- Corporate memories including:
 - information storage services;
 - information capture services;
 - computation and inference services;
 - information flows management services;
 - information mediation services;
 - information presentation services;
- Resources may be internal or external
 - external standard library // online service;
 - interoperate smoothly and integrate workflows at the business layer.

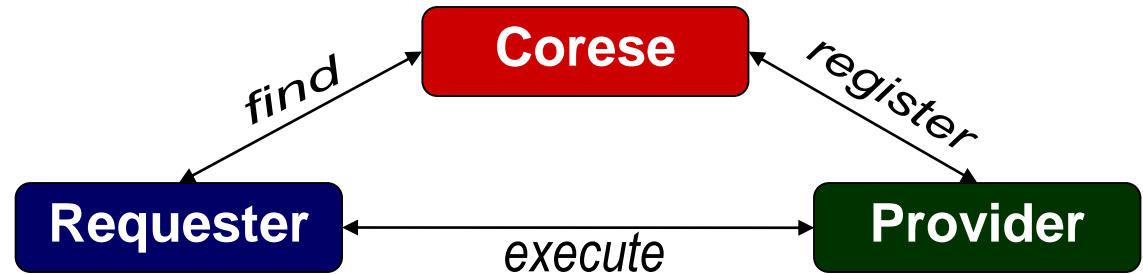


Corporate semantic web services



Corporate semantic web services


- Consider service just like other corporate semantic web resources: annotate them
- Sub set of OWL-S (profile, grounding, ++)
- Rely on CORESE to provide a corporate semantic UDDI



- Access resources (documents, services)



Discover and invoke a service



The screenshot shows the CORESE web interface. At the top left is the CORESE logo, and at the top right is the INRIA logo. In the center is the Acacia logo, which features a stylized tree and the word "Acacia" in a cursive font. Below the logos is a search bar with a "Go!" button and a list of links: (Advanced search), Reload, Ontology, Rules, and Query. To the left of the main content area is a "Query..." sidebar with links for Main (en), Main (fr), Search, Team, Apply, Table, Skill, All, XML doc, Direct, Direct RDF, Edit, and Update. Below the sidebar is a "Context: table" field and a "Search" field. The main content area is titled "Corporate Semantic Webs" and contains several sections: "Service", "Find a Service", "Atomic Process", and "Composite Process". Each section has a "Describe" checkbox and a "Category" dropdown menu. The "Service" section also has "group" and "count" checkboxes. The "Find a Service" section has "Input" and "Output" dropdown menus. The "Atomic Process" section also has "group" and "count" checkboxes. The "Composite Process" section has a "Describe" checkbox. At the top of the main content area, there are "Style", "Display", "List", "Search", "More", "Rule", and "Clear" buttons.

CORESE

INRIA
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Acacia

Search...

[\(Advanced search\)](#)
[Reload](#)
[Ontology](#)
[Rules](#)
[Query](#)

Query...
[Main \(en\)](#)
[Main \(fr\)](#)
[Search](#)
[Team](#)
[Apply](#)
[Table](#)
[Skill](#)
[All](#)
[XML doc](#)
[Direct](#)
[Direct RDF](#)
[Edit](#)
[Update](#)

Context: table

Search

Corporate Semantic Webs
Style Display List

Service
Describe
Category

Find a Service
Describe
Input
Output

Atomic Process
Describe
Atomic Process

Composite Process
Describe

Service description

```
<service:Service rdf:ID="PosteService_Secretaire">
  <service:presents
    rdf:resource="#Profile_Poste_Service_Secretaire"/>
  <service:describedBy rdf:resource="#PosteSecretaire"/>
  <service:supports rdf:resource="#PosteGrounding_Secretaire"/>
</service:Service>
```

```
<profile:Profile rdf:ID="Profile_Poste_Service_Secretaire">
  <service:presentedBy rdf:resource="#PosteService_Secretaire"/>
  <profile:has_process rdf:resource="#PosteSecretaire"/>
  <profile:serviceName>PosteSecretaire</profile:serviceName>
  <profile:hasInput rdf:resource="#PosteSecr_input"/>
  <profile:hasOutput rdf:resource="#PosteSecr_output"/>
</profile:Profile>
```

Input description & extension

```
<process:AtomicProcess rdf:ID="PosteSecretaire">
  <service:describes rdf:resource="#PosteService_Secretaire"/>
  <process:hasInput>
    <process:Input rdf:ID="PosteSecr_input">
      <process:parameterType>&xsd;#string</process:parameterType>
      <process:semanticType rdf:resource="&doc;#EmployeeName" />
    </process:Input>
  </process:hasInput>

  <process:hasOutput>
    <process:Output rdf:ID="PosteSecr_output">
      <process:parameterType>&xsd;#string</process:parameterType>
      <process:semanticType rdf:resource="&doc;#AssistantPhone" />
    </process:Output>
  </process:hasOutput>
</process:AtomicProcess>
```


Extension parameters OWL-S

```
<owl:ObjectProperty rdf:ID="semanticType">  
  <rdfs:domain rdf:resource="#Parameter" />  
</owl:ObjectProperty>
```

(...)

```
<cos:rule>  
  <cos:if>  
    ?x rdf:type c:Employee  
    ?x c:Name ?n  
  </cos:if>  
  <cos:then>  
    ?x c:EmployeeName ?n  
  </cos:then>  
</cos:rule>
```

(...)

```
<c:Employee rdf:ID='ML'>  
  <c:Name>Moussa Lo</c:Name>  
</c:Employee>
```

Composing with memory



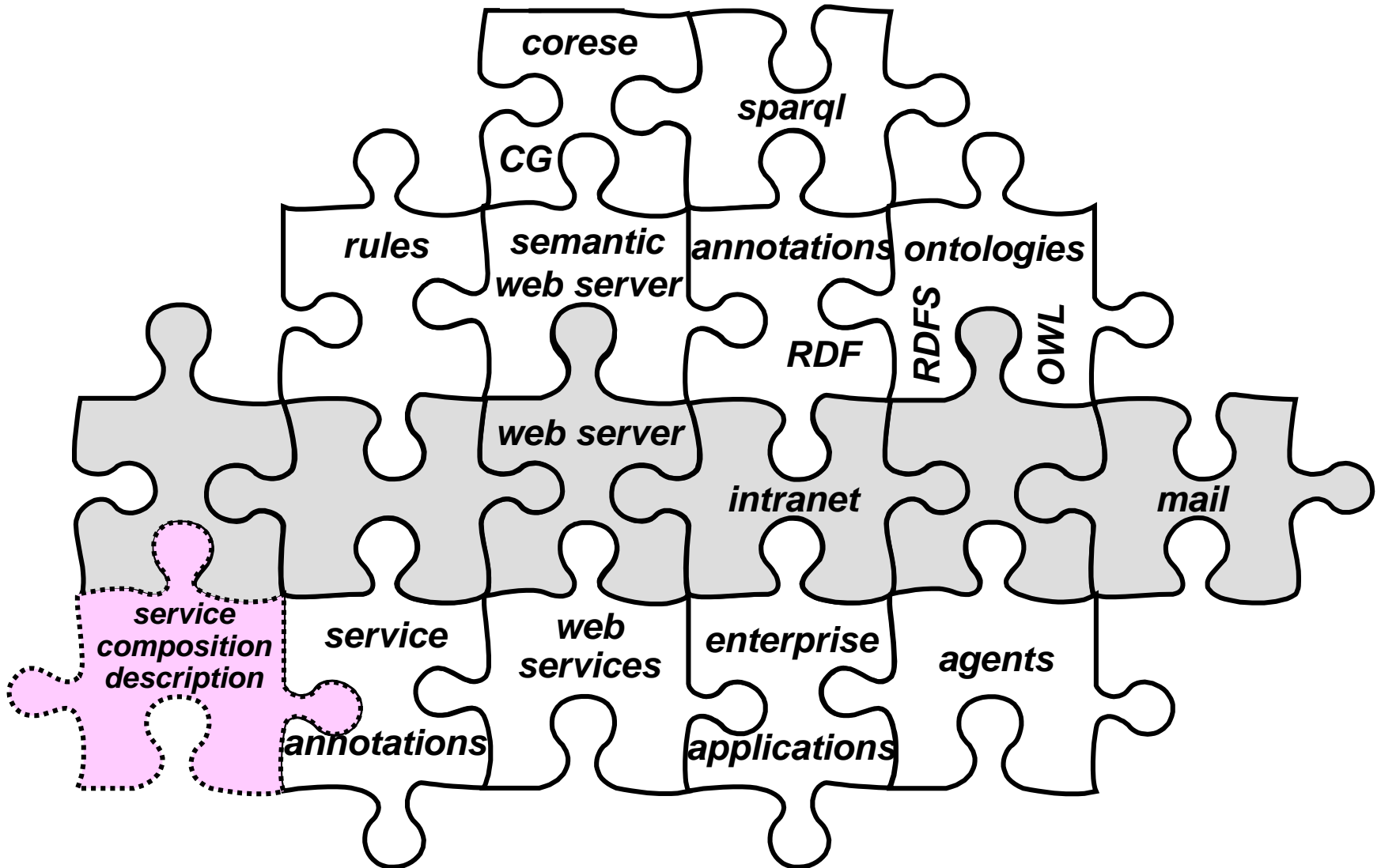
The screenshot displays the Acacia web interface, which is used for composing with memory. The interface is divided into several sections:

- Header:** Features the CORESE logo on the left, the Acacia logo (a tree with a green grid) in the center, and the INRIA logo (Sophia Antipolis) on the right.
- Search...:** A search bar with a "Go!" button. Below it are links for "Advanced search", "Reload", "Ontology", "Rules", and "Query".
- Query...:** A list of links including "Main (en)", "Main (fr)", "Search", "Team", "Apply", "Table", "Skill", "All", "XML doc", "Direct", "Direct RDF", "Edit", and "Update".
- Corporate Semantic Webs:** A section with a "Style" dropdown (set to "std"), a "Display" dropdown (set to "none"), a "List" checkbox, and buttons for "Search", "More", "Rule", and "Clear".
- Service:** A section with a "Describe" checkbox, a "Category" dropdown (set to "none"), and checkboxes for "group" and "count".
- Find a Service:** A section with a "Describe" checkbox, an "Input" dropdown (set to "none"), and an "Output" dropdown (set to "none").
- Atomic Process:** A section with a "Describe" checkbox, an "Atomic Process" dropdown (set to "none"), and checkboxes for "group" and "count".
- Composite Process:** A section with a "Describe" checkbox.

At the bottom left, there are input fields for "Context: table" and "Search".



Corporate semantic web applications



Ongoing...

■ Composing services

- Manual: Classic scenario = IT manager describes a composed service and publishes its description
- Macro-recording interface
- Semi-automatic: finding **a path** from a given input to a given output
- Fully-automatic ???
 - Capture and decompose end-users' needs?
 - Even small examples seem to require a lot of domain knowledge
 - Controlled workflow description

Composite services

Search...

[\(Advanced search\)](#)
[Reload](#)
[Ontology](#)
[Rules](#)
[Query](#)

Query...

[Main \(en\)](#)
[Main \(fr\)](#)
[Search](#)
[Team](#)
[Apply](#)
[Table](#)
[Skill](#)
[All](#)
[XML doc](#)
[Direct](#)
[Direct RDF](#)
[Edit](#)
[Update](#)

Context: table

Search

en
c:Person

Browse...

[Concept tree](#)

Corporate Semantic Webs

Style Display List

Service

Describe

Category

Find a Service

Describe

Input

Output

Atomic Process

Describe

Atomic Process


Composite Process

Describe

Composite Process

Generic Query

Automatic “sequences” using paths

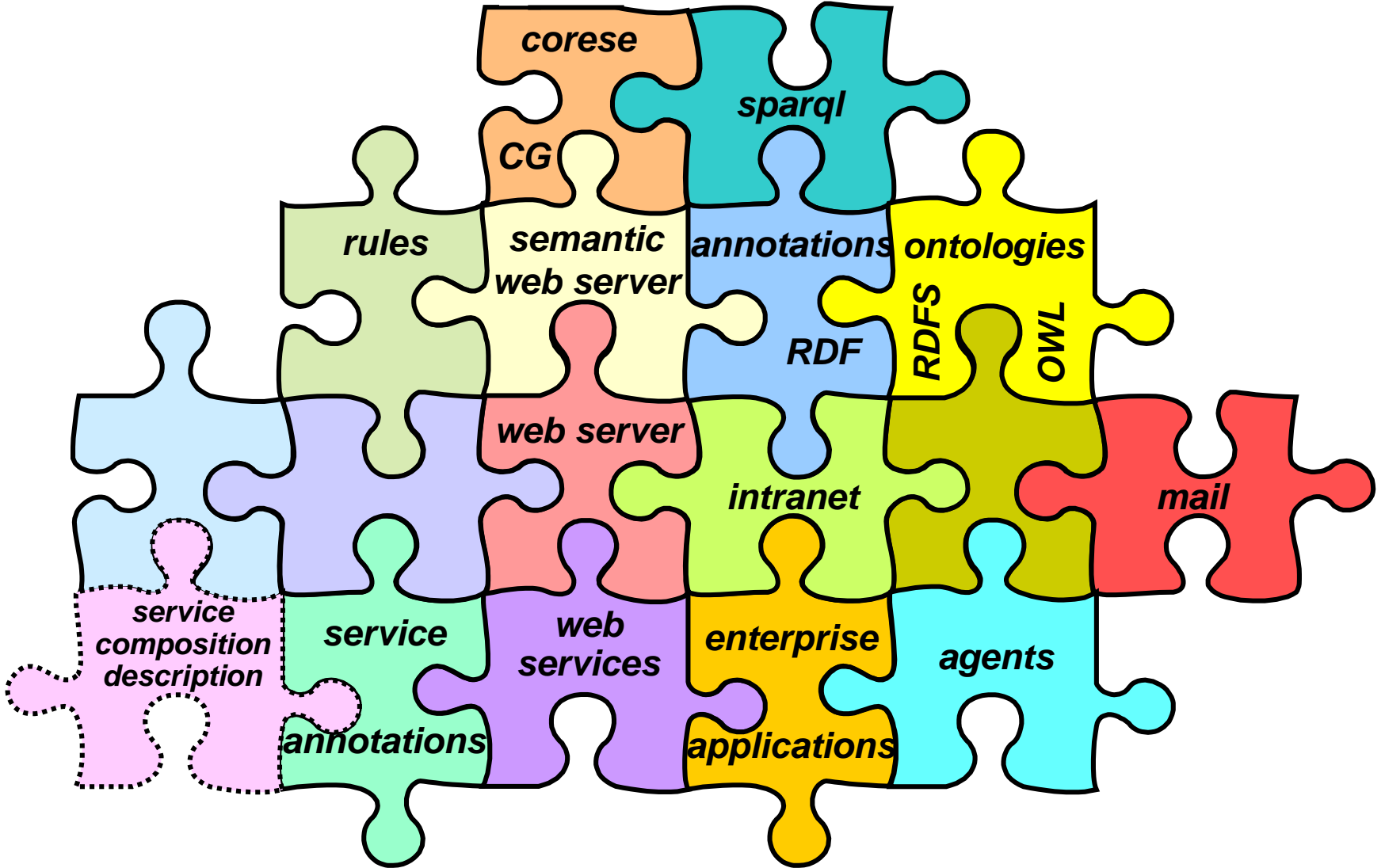


The screenshot displays the Acacia web interface, which is used for managing and querying semantic web data. The interface is organized into several sections:

- Header:** Features the CORESE logo on the left, the Acacia logo (a stylized tree) in the center, and the INRIA logo (Sophia Antipolis) on the right.
- Search...:** A search bar with a "Go!" button. Below it are links for "(Advanced search)", "Reload", "Ontology", "Rules", and "Query".
- Query...:** A list of navigation links including "Main (en)", "Main (fr)", "Search", "Team", "Apply", "Table", "Skill", "All", "XML doc", "Direct", "Direct RDF", "Edit", and "Update".
- Corporate Semantic Webs:** The main content area, which includes:
 - Style:** A dropdown menu set to "std".
 - Display:** A dropdown menu set to "none".
 - List:** A checkbox that is currently unchecked.
 - Buttons:** "Search", "More", "Rule", and "Clear".
 - Service:** A section with a "Describe" checkbox (unchecked), a "Category" dropdown set to "none", and checkboxes for "group" (unchecked) and "count" (unchecked).
 - Find a Service:** A section with a "Describe" checkbox (unchecked), an "Input" dropdown set to "none", and an "Output" dropdown set to "none".
 - Atomic Process:** A section with a "Describe" checkbox (unchecked), an "Atomic Process" dropdown set to "none", and checkboxes for "group" (unchecked) and "count" (unchecked).
 - Composite Process:** A section with a "Describe" checkbox (unchecked).
- Context: table:** A text input field at the bottom left.
- Search:** Another text input field at the bottom left.



Corporate semantic web puzzle



My one cent

- Unified, integrated and simplified descriptions
 - Current implementation of SWS is too complex
 - IMHO: low-hanging fruits & convincing scenarios (RDFS was the right way to start not OWL)
- Full integration has many facets:
 - Description (of course)
e.g. WSDL + Grounding + Parameter typing
 - But there are other facets, e.g. WS & SOAP, SOAP & SPARQL, SW Rules, SWS as WS sources
- Dynamic end-users' interfaces for (composed) semantic web services