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organisationally
mobile public employees

Experiences with Using Protégé in a Knowledge Management Application: The Pellucid Study

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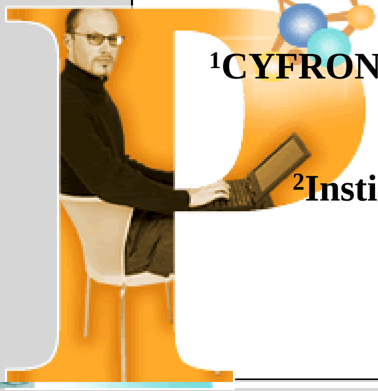

Overview

1. The Pellucid System
2. Generic Ontology
3. Contact Ontology
4. Document Ontology
5. Deployment Module
6. Experiences Using Protégé
7. Future Work and Open Questions

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The Pellucid System

- Pellucid aims to enhance **knowledge management for public employees**.
  - It is developing a customisable software platform …
    - … which is based on software agents …
    - … and which will be put into place at three pilot sites (local or regional governments in Italy and Spain).
- The scope of Pellucid
  - Pellucid is concentrating on ‘experience management’
  - The innovation lies in relating experience management to the working context.
- The Pellucid System provides:
  - Access to relevant documents, contacts and other advice
  - It is also able to offer advice spontaneously as well as respond to request for help

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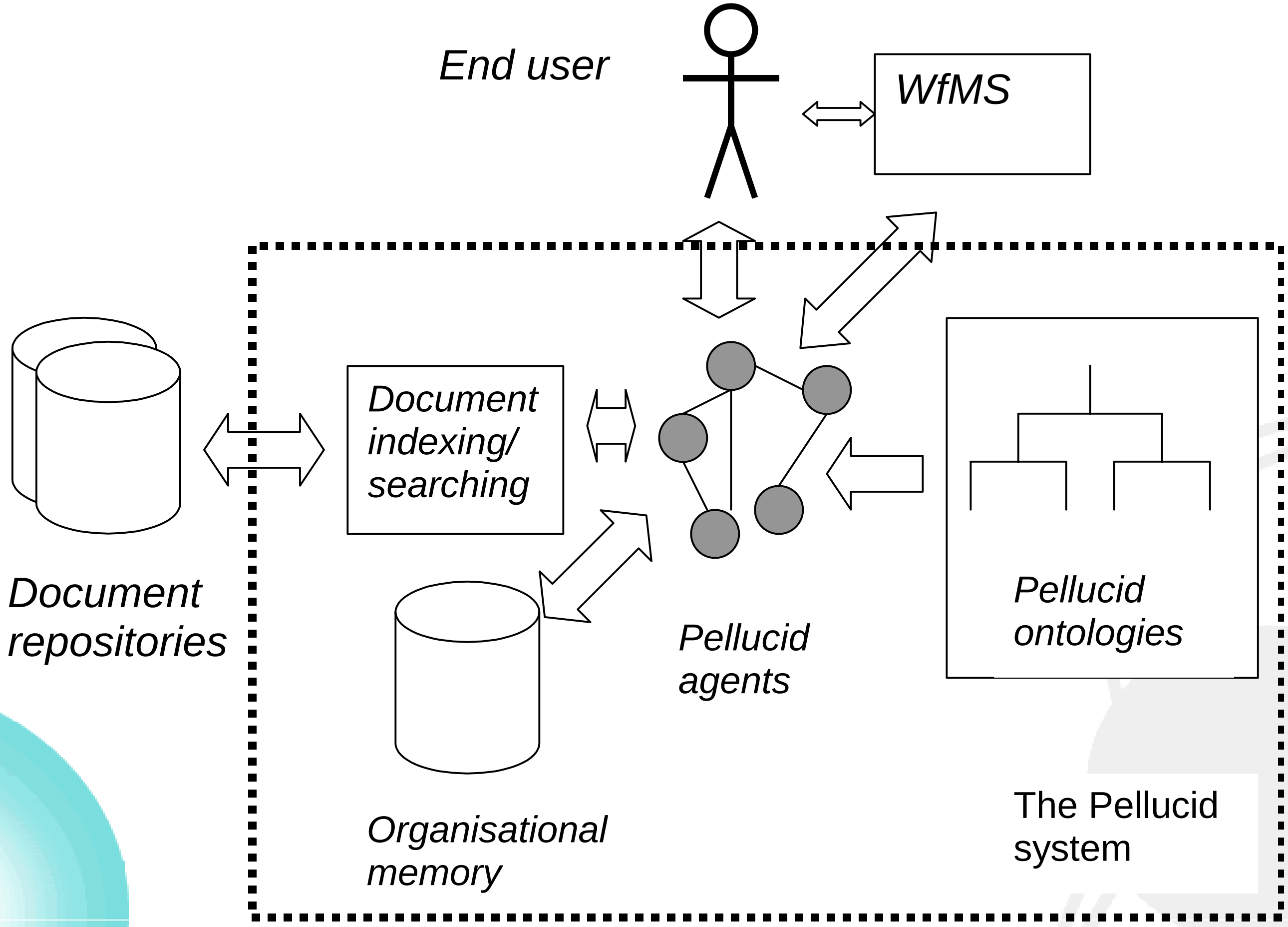
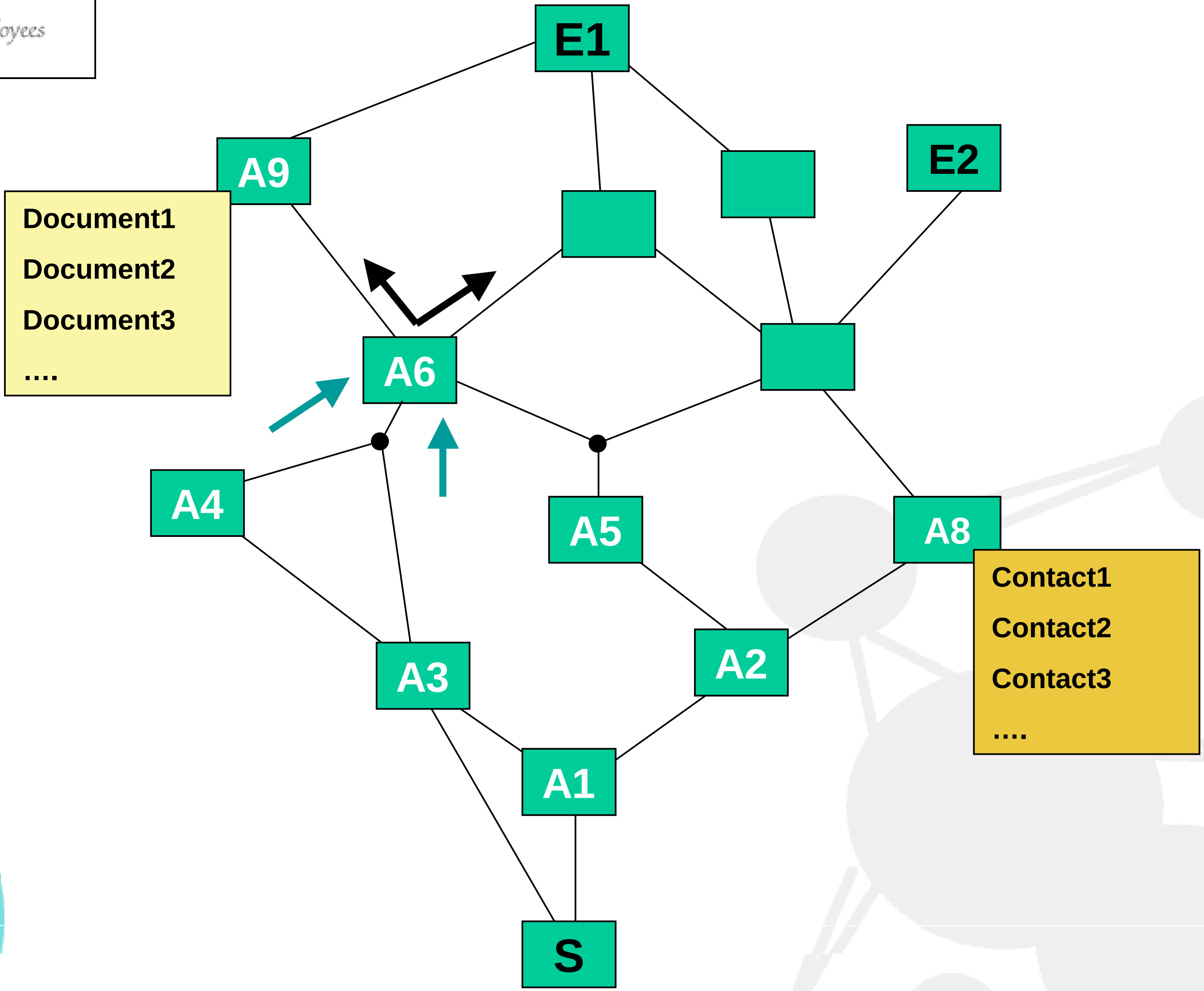
The Pellucid System Conceptual View



Workflow-Based Knowledge Management



Document1

Document2

Document3

....

Contact1

Contact2

Contact3

....

Pellucid Agents

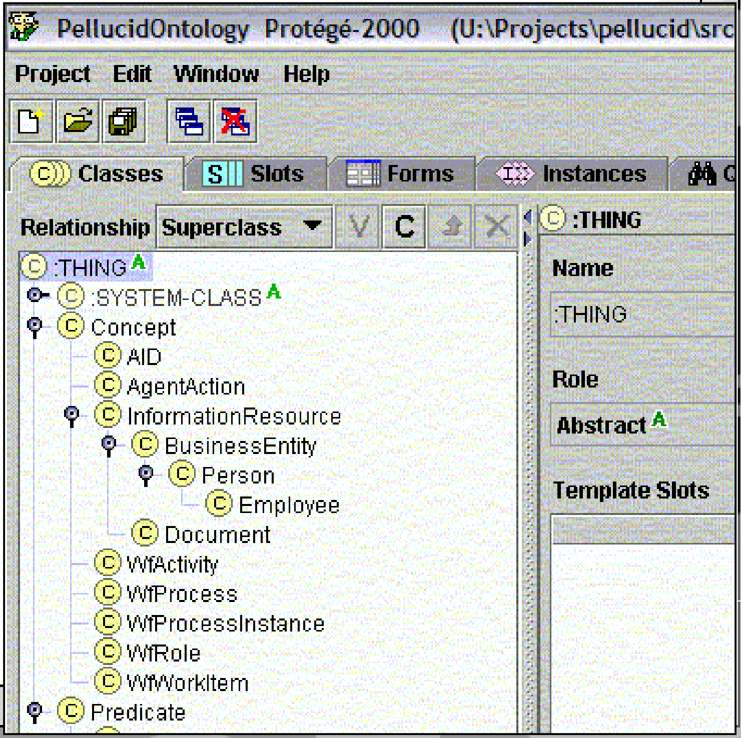
- Interaction Layer (IL)
  - The Personal Assistant Agent (PAA)
- Process Layer (PL)
  - The Monitoring Agent (MA)
  - The Role Agent (RA)
  - The Task Agent (TA)
  - The Capitalization Agent (CA)
- Access Layer (AL)
  - The Information and Search Agent (ISA)

Organisational Memory

- Store all relevant knowledge gathered, created and accumulated during the system life cycle
  - Ontologies and instances
  - Indexes
- The technology – object database
  - Ontology instances stored as objects using JDO (Java Data Objects)
  - Lucene as text indexing engine

Ontologies

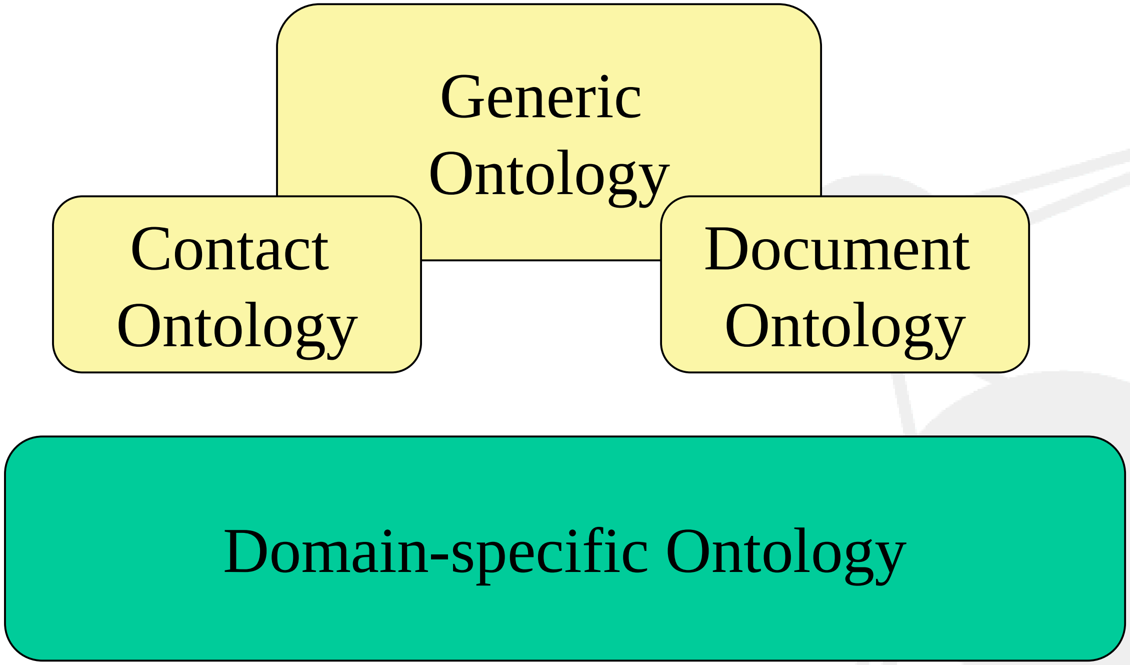
- Ontology = formal conceptualisation of a domain
  - CLASSES of things
  - PROPERTIES they have
- Why use an ontology?
  - Allows structured communication of knowledge
  - Guarantees mutual understanding
- Ontologies are basis for agent communication
  - JADE agents talk in FIPA-SL with user-defined ontologies.



- :THING
  - :SYSTEM-CLASS
  - Concept
    - AID
    - AgentAction
    - InformationResource
      - BusinessEntity
        - Person
          - Employee
      - Document
    - WfActivity
    - WfProcess
    - WfProcessInstance
    - WfRole
    - WfWorkItem
  - Predicate

Ontologies

- Generic ontology provides core concepts
- Extended into Contact and Document ontologies
- Support extension into Domain-Specific ontologies



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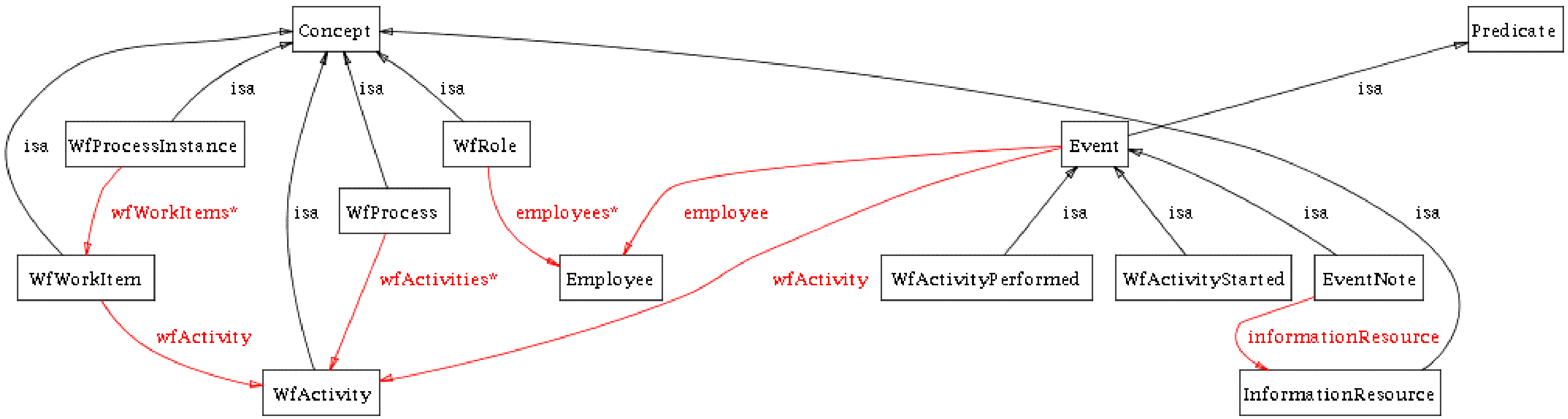
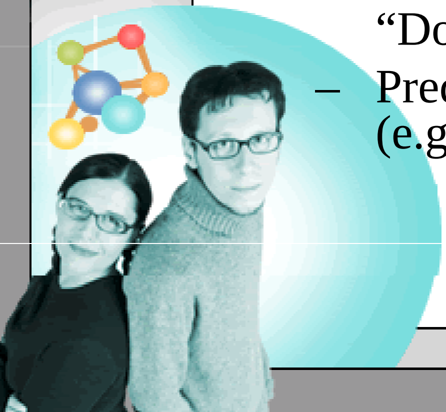
Generic Ontology



Ontologies in Pellucid consist of:

- Concepts – concrete elements (e.g.: “Employee” or “WfActivity” or “Document”)
- Predicates – relations between two or more Concepts (e.g.: “DocumentUsed”)



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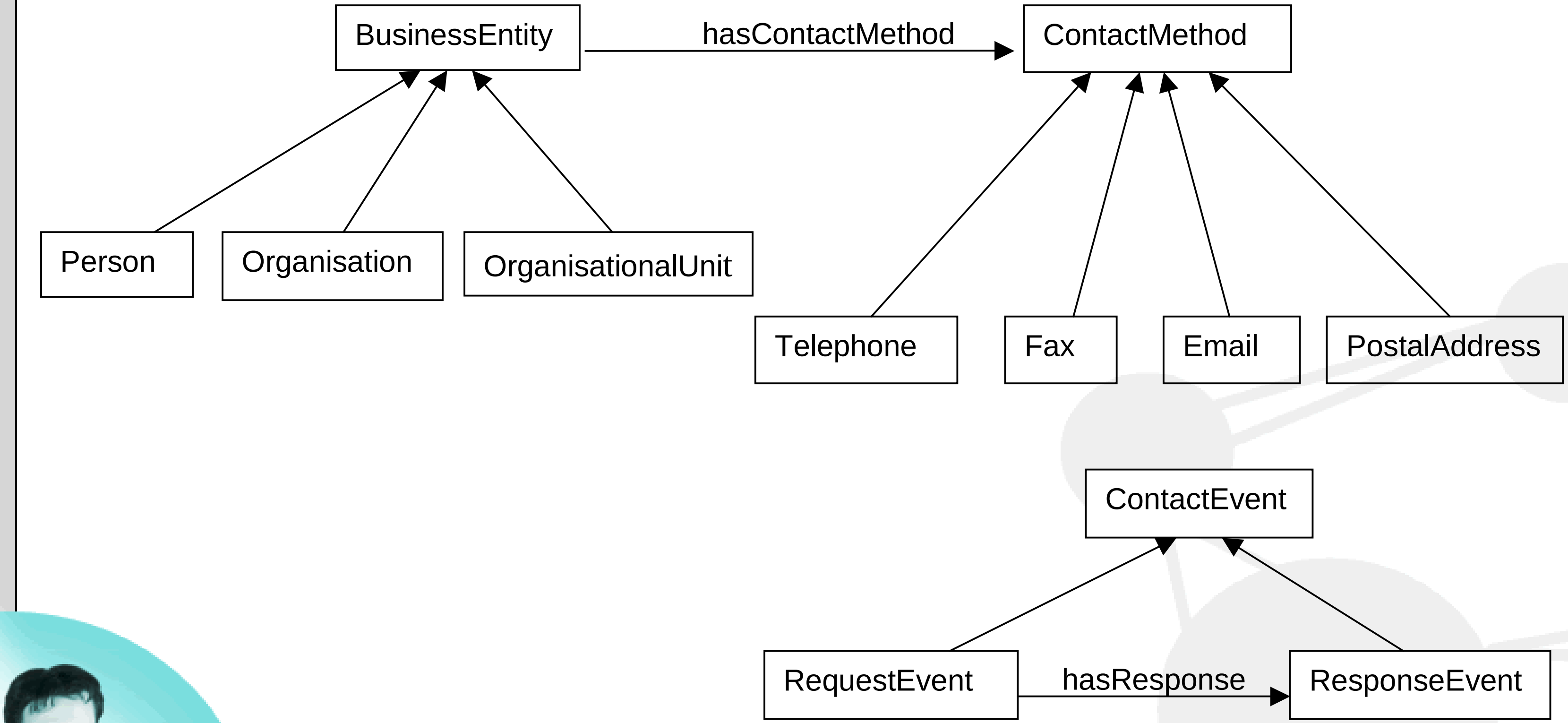
Contact Ontology



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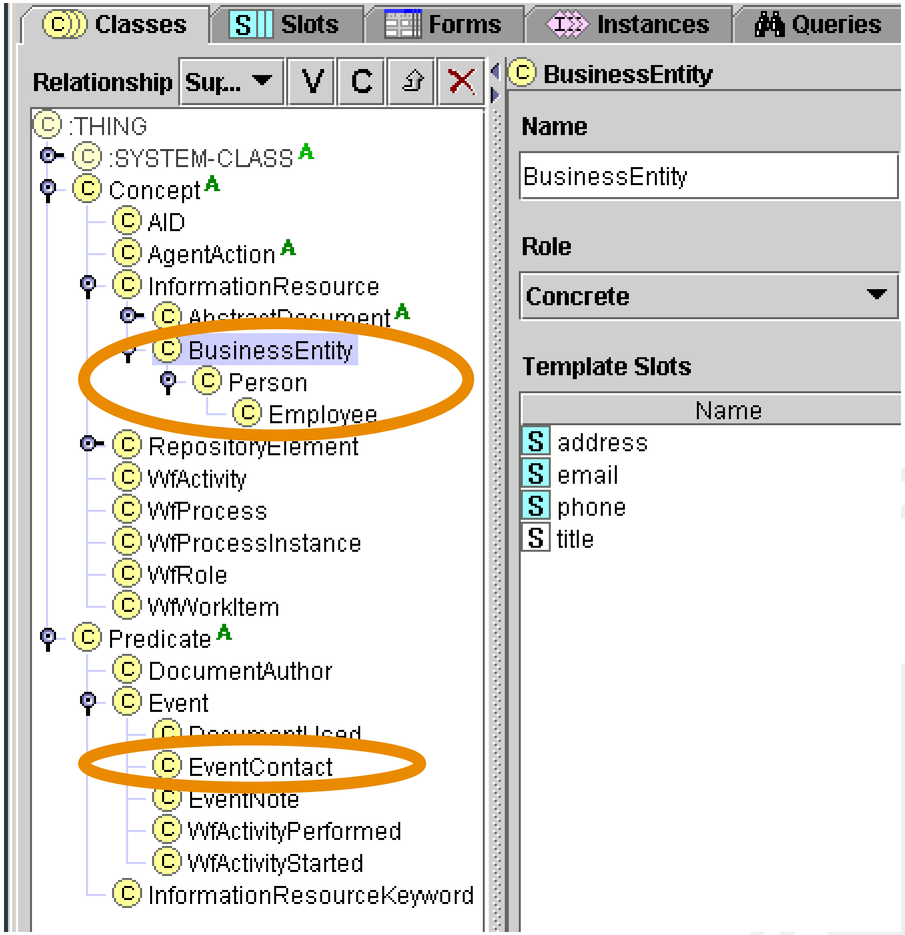
Implementing Contact Ontology in Protégé



- :THING
  - :SYSTEM-CLASS A
  - Concept A
    - AID
    - AgentAction A
    - InformationResource
      - AbstractDocument A
      - BusinessEntity
        - Person
          - Employee
    - RepositoryElement
    - WfActivity
    - WfProcess
    - WfProcessInstance
    - WfRole
    - WfWorkItem
  - Predicate A
    - DocumentAuthor
    - Event
      - DocumentUsed
      - EventContact
      - EventNote
      - WfActivityPerformed
      - WfActivityStarted
    - InformationResourceKeyword

BusinessEntity

Name

BusinessEntity

Role

Concrete

Template Slots

Name
S address
S email
S phone
S title

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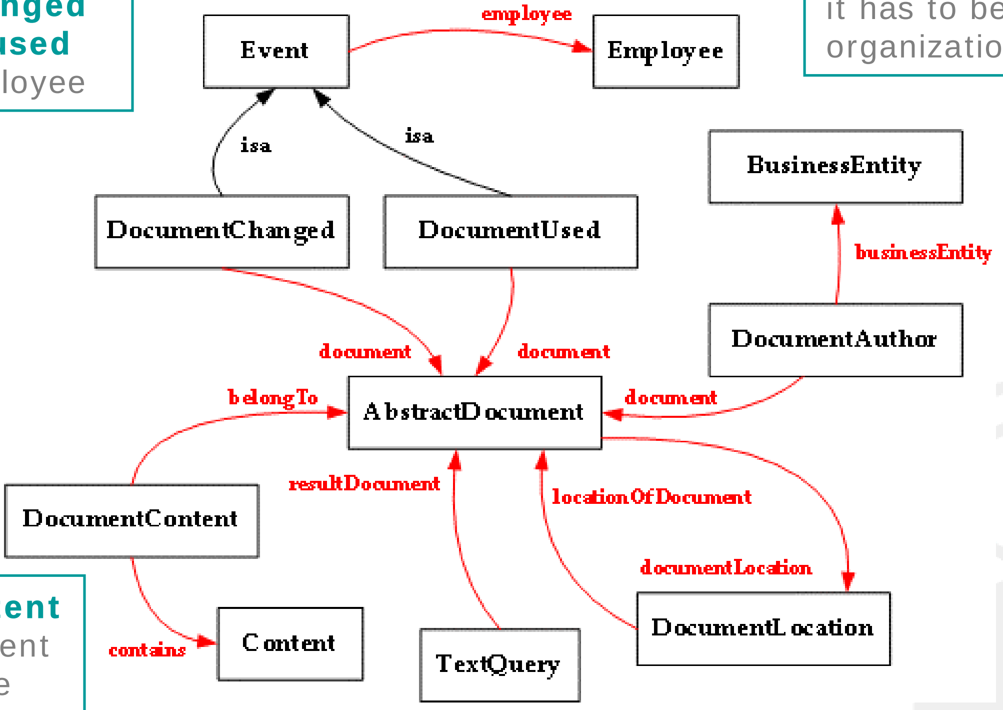
Document Ontology

The document can be **changed** as well as **used** by the employee



The author of the document can be any **BusinessEntity** which means that not necessary it has to be Pellucid organization employee

The **Content** of document allows the Pellucid to know what is inside of the document

TextQuery is predicate to perform **full text searching** within indexes

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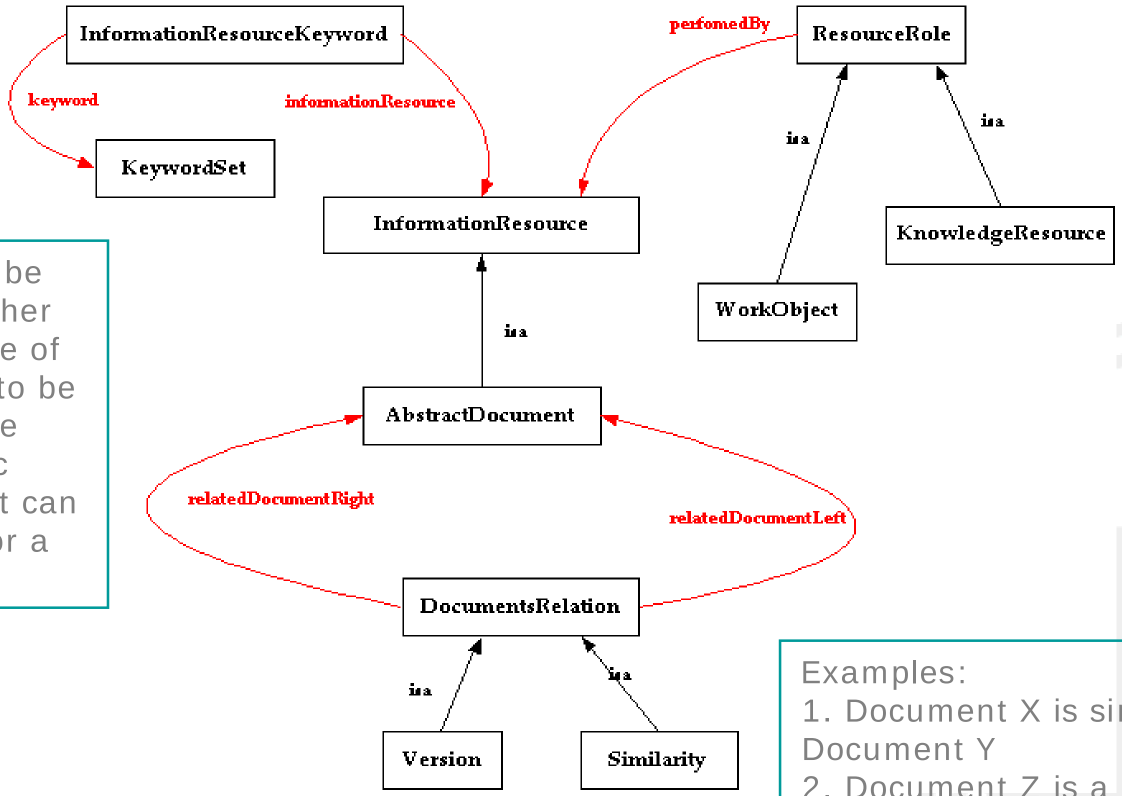
Document Ontology

Document inherits Relation from InformationResource

InformationResource can be described using **keywords**

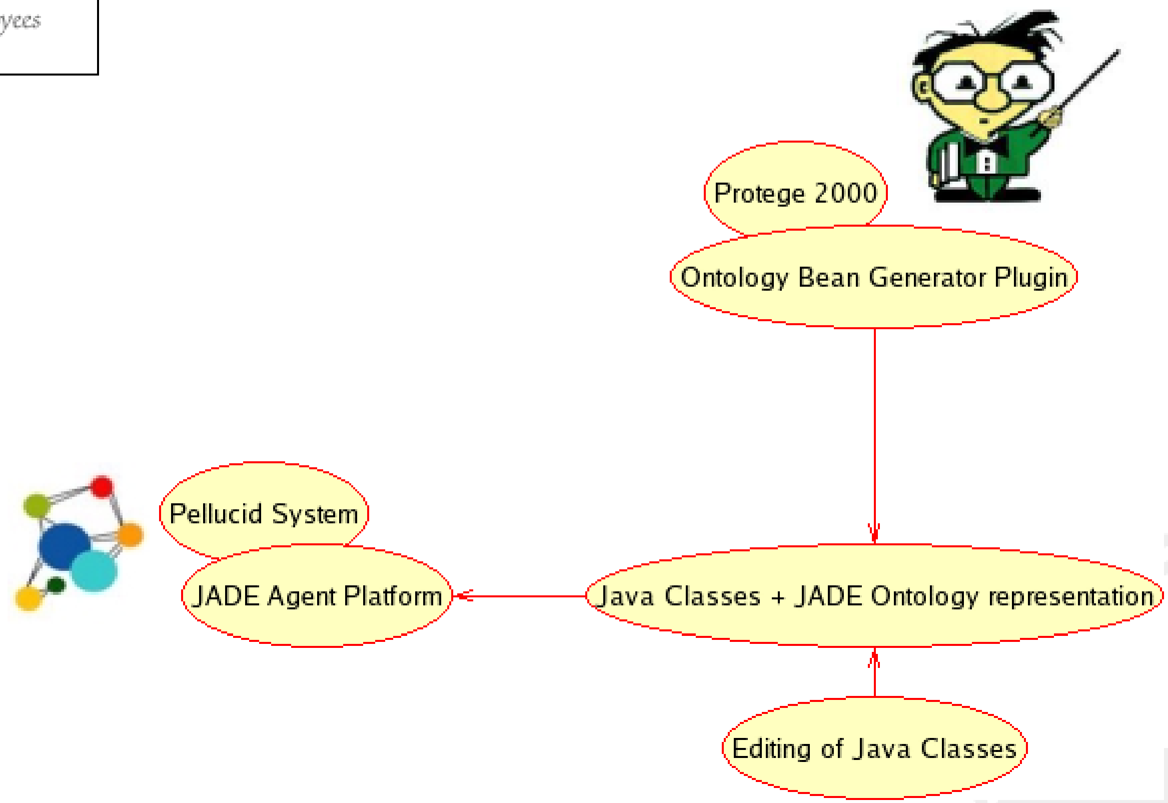
And **plays** different **roles** in organization



Document can be related to another one. The nature of the relation is to be described in the domain specific ontology. But it can be a **version** or a **similarity**.

Examples:
1. Document X is similar to Document Y
2. Document Z is a version of Document U

Ontology Conversion to JADE



Protege 2000

Ontology Bean Generator Plugin

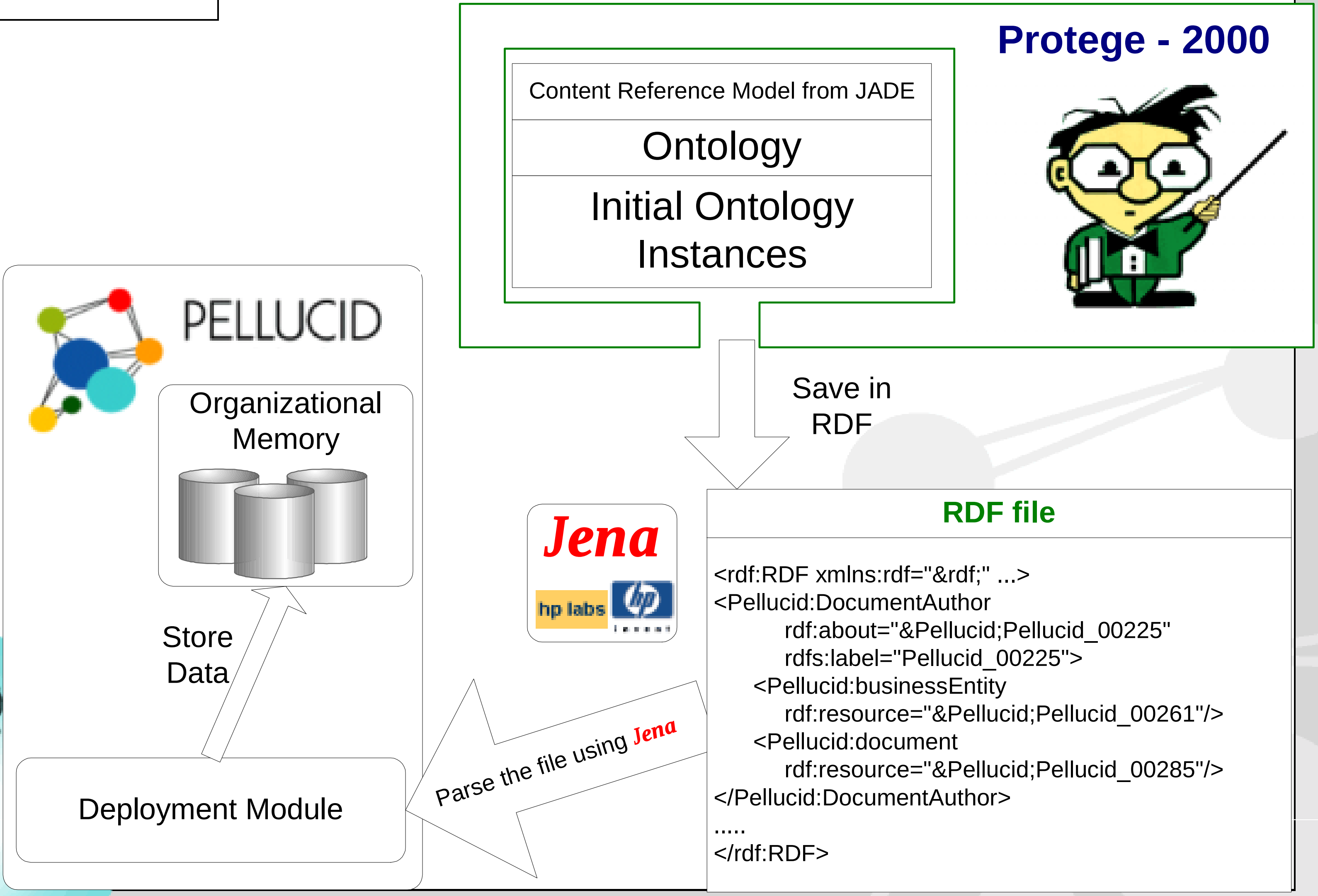
Java Classes + JADE Ontology representation

Editing of Java Classes

Pellucid System

JADE Agent Platform

Deployment Module



```
<rdf:RDF xmlns:rdf="&rdf;" ...>
<Pellucid:DocumentAuthor
        rdf:about="&Pellucid;Pellucid_00225"
        rdfs:label="Pellucid_00225">
    <Pellucid:businessEntity
        rdf:resource="&Pellucid;Pellucid_00261"/>
    <Pellucid:document
        rdf:resource="&Pellucid;Pellucid_00285"/>
</Pellucid:DocumentAuthor>
.....
</rdf:RDF>
```

Experiences using Protégé

- We have used the following Protégé extensions:
  - RDF storage model
  - Ontology Bean Generator Tab plug-in
  - Ontoviz Tab plug-in

- Some extra features in development:
  - User-friendly way to display ontology instances (knowledge)
    - We did this in the JADE implementation by adding a method to each ontology class. So Instances were displayed as string.
  - User-friendly way to display ontology information
    - Assigning human readable text to ontology elements and slots
    - Multi-language support for presenting ontology

Future Work and Open Questions

- More reasoning in Pellucid
  - Domain-specific reasoning
  - Experience knowledge discovery where ontology instances are input for:
    - Classification – categorization into previously defined groups
    - Clustering – finding groups of experiences
    - Association rules – detecting trends, relations
  - Experience generalization and aggregation
- Extend the work to other contexts
  - Contact and Document management are only instances of a more general case
  - Time management
- Explore other facilities associated to Protégé

Thank you !