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

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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
• 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
The Pellucid System Conceptual View

End user

WfMS

Document repositories

Document indexing/searching

Pellucid agents

Organisational memory

Pellucid ontologies

The Pellucid system
• **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)
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
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.
- Generic ontology provides core concepts
- Extended into Contact and Document ontologies
- Support extension into Domain-Specific ontologies
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”)
Contact Ontology

Implementing Generic Ontology in Protege
Implementing Contact Ontology in Protégé
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.
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

Pellucid System

JADE Agent Platform

Java Classes + JADE Ontology representation

Editing of Java Classes
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!