



Tenth International Protégé Conference, Budapest, Hungary

A PROTÉGÉ PLUG-IN-BASED SYSTEM TO MANAGE AND QUERY LARGE DOMAIN ONTOLOGIES



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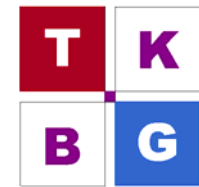
Alfonso Rios



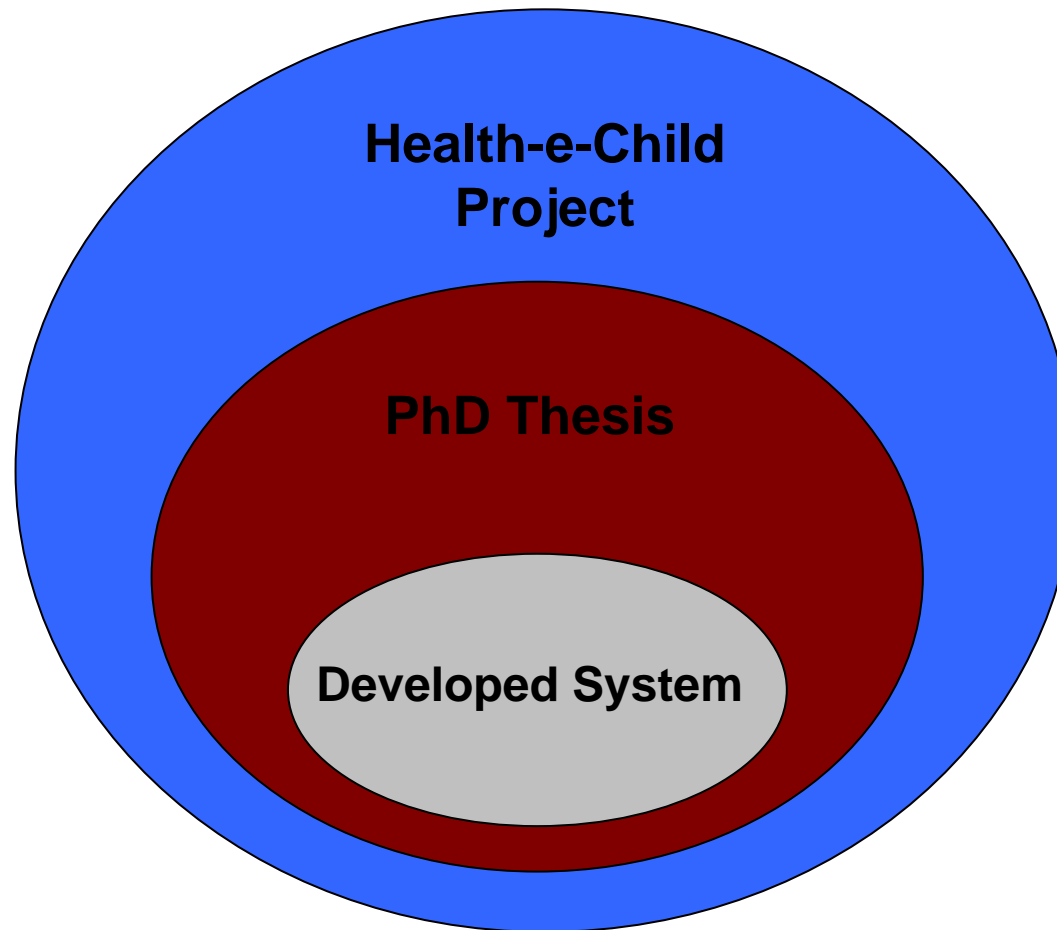
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Outline

- Context and Motivation
- Ontology Management System
- Conclusions and Future Work



Bioinformatics Domain





Health-e-Child Project

- General Objective: Aims to develop an integrated healthcare platform for European pediatrics, achieving a comprehensive view of children's health
 - Grid Architecture
 - Main Upper Level Applications: KDS, DSS
- Our tasks: Integration of biomedical data, information, and knowledge.
- Web: <http://health-e-child.org>

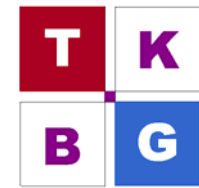


Health-e-Child Project

- The biomedical information sources will cover six distinct levels (vertical levels):
 - ☐ Molecular
 - ☐ Cellular
 - ☐ Tissue
 - ☐ Organ
 - ☐ Individual
 - ☐ Population

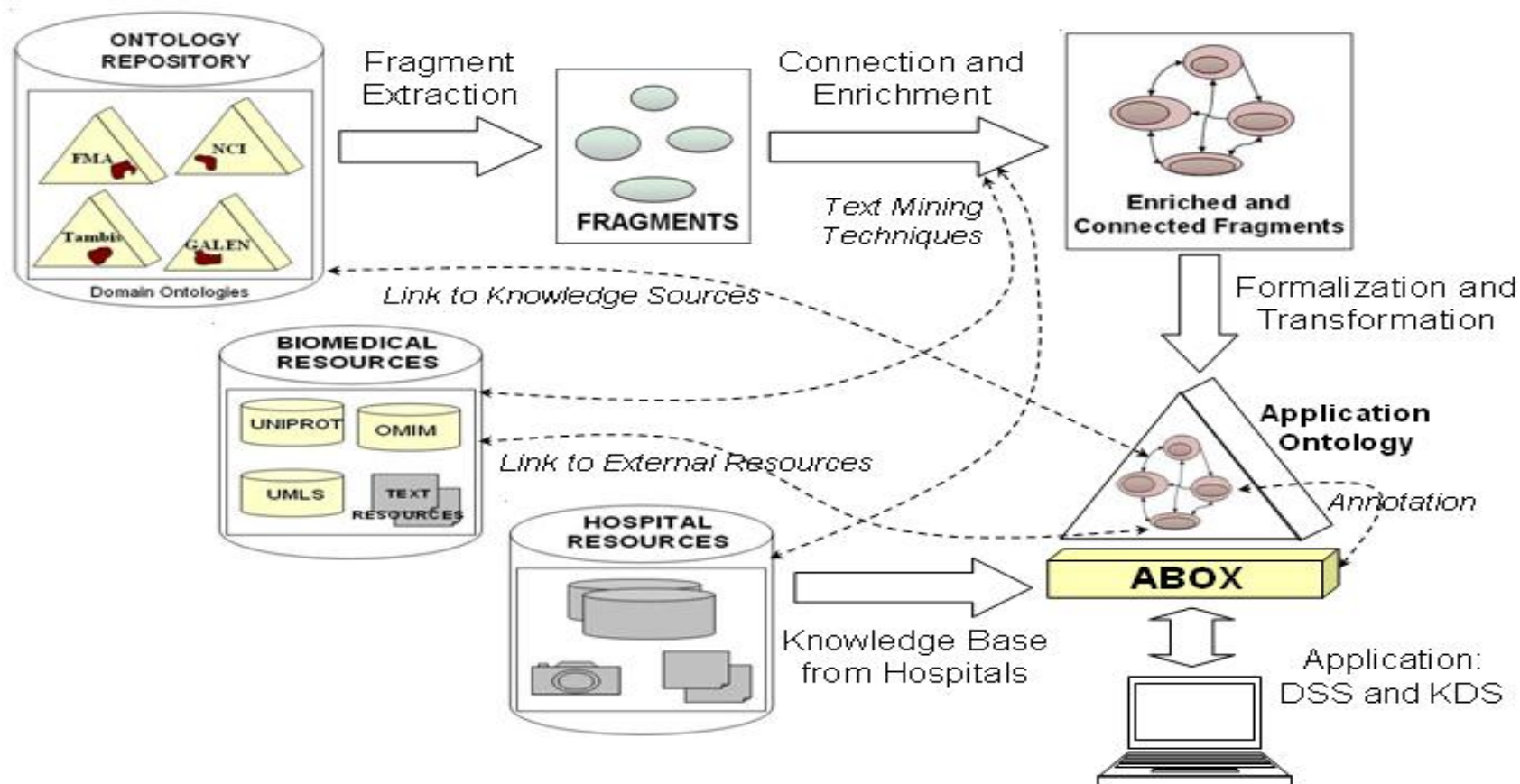
- And will focus on three representative diseases (inside paediatrics):
 - ☐ Heart diseases
 - ☐ Inflammatory diseases
 - ☐ Brain tumours.

Application of current Ontologies in HeC



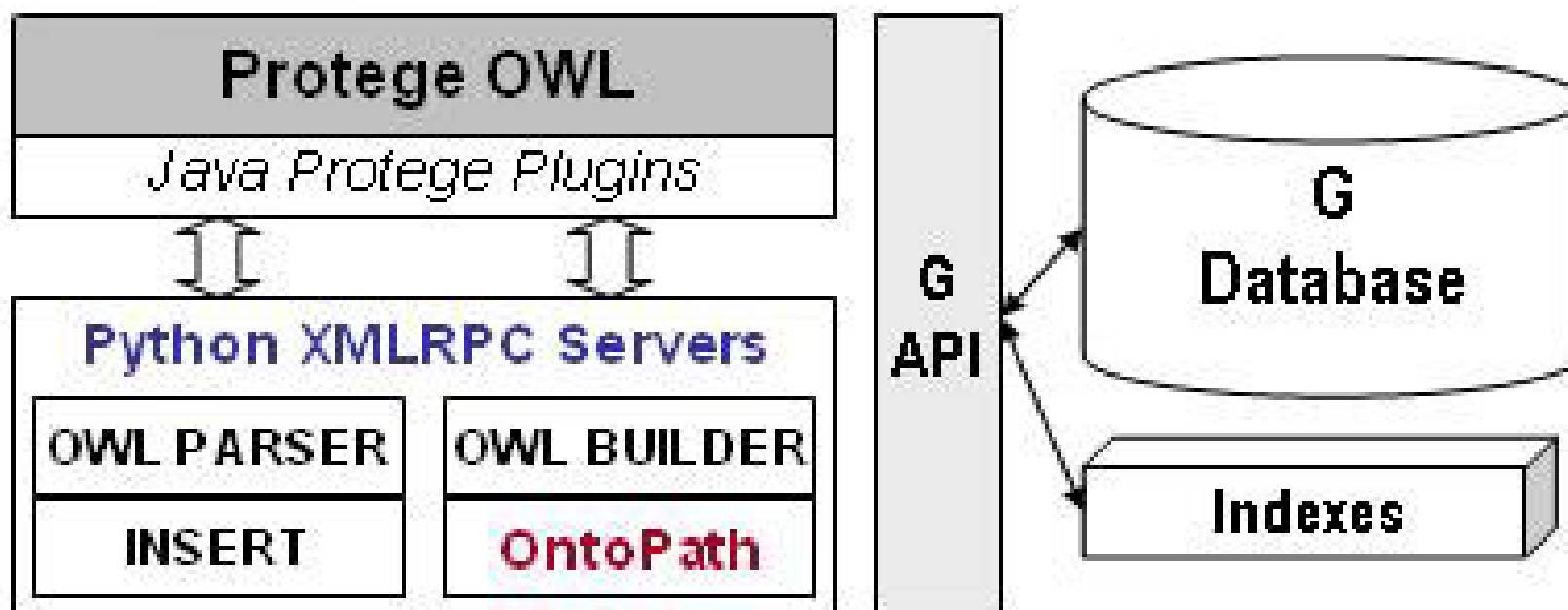
- HeC *vertical abstraction levels expressed by Ontologies*
- Available several large biomedical ontologies and taxonomies, e.g: GO, GALEN, FMA], NCI-Thesurus, Tambis, BioPax[, etc.
- Difficult too apply in concrete applications like HeC:
 - Scalability in reasoning.
 - Specificity: local view of the domain
 - Visualization and treatment

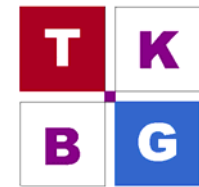
From Domain Ontologies to Applications (PhD Topic)



Thesis Proposal Available at: <http://krono.act.uji.es/people/Ernesto>

System Architecture



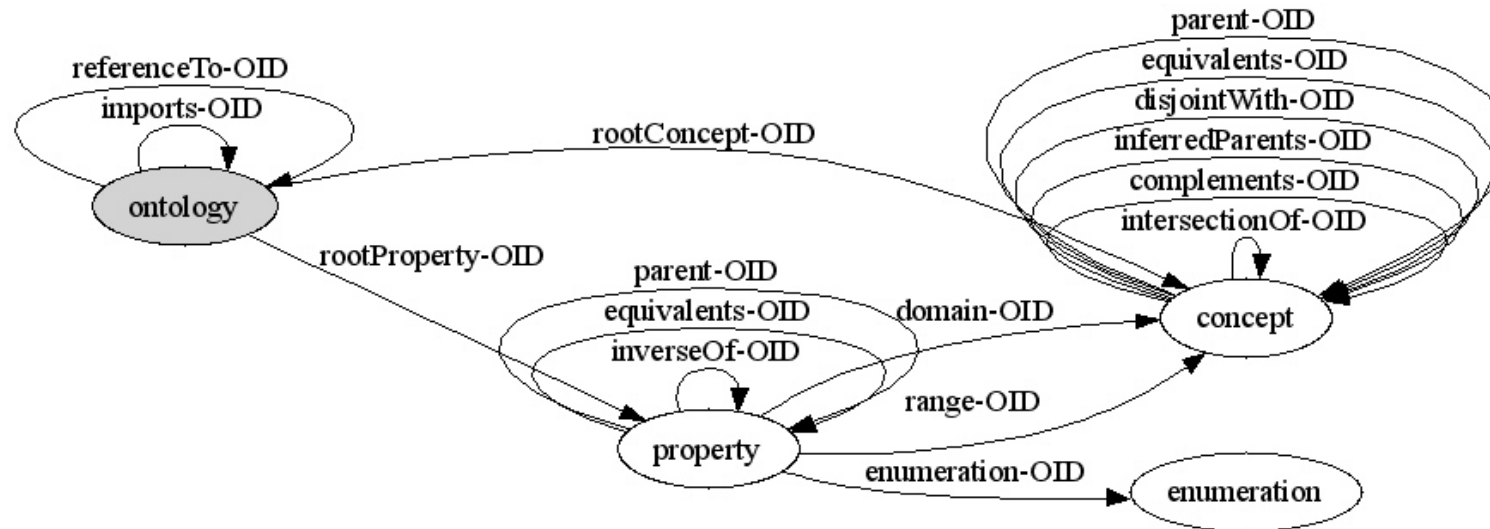


OWL Parser and Constructor

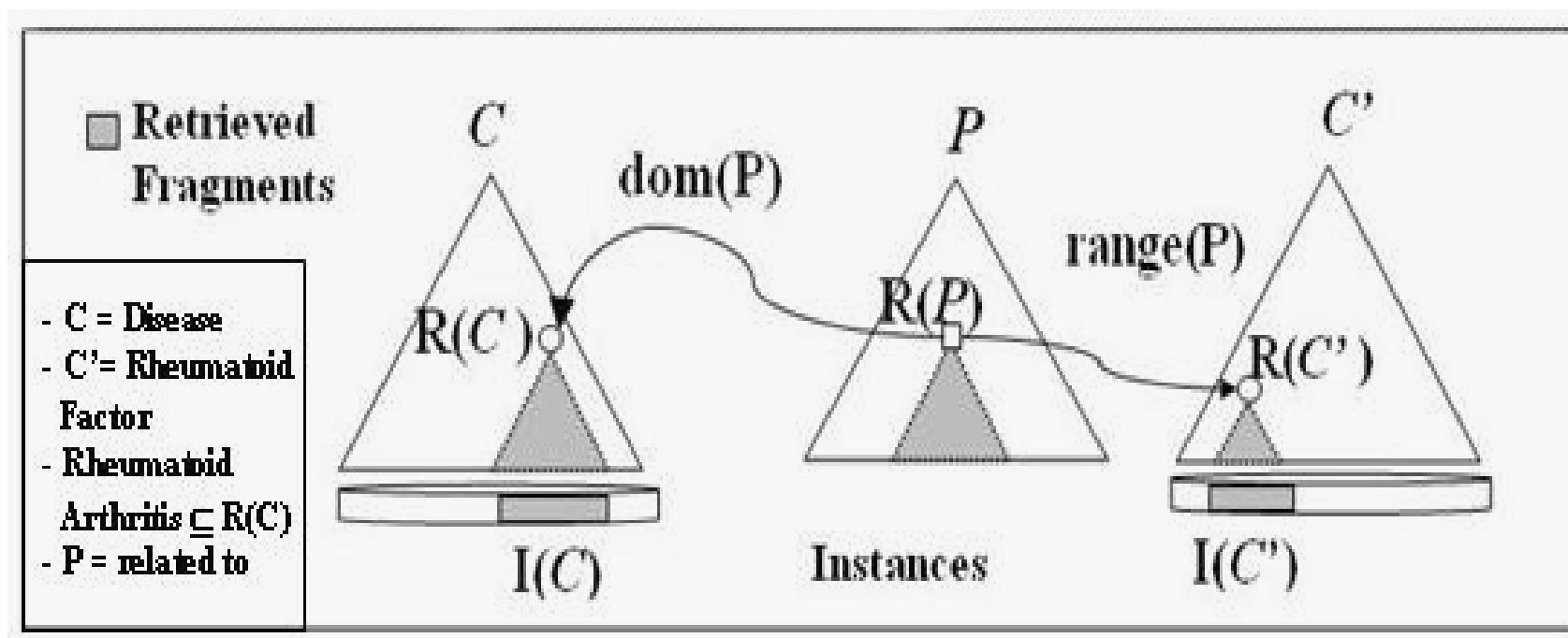
- Greater flexibility in the **OWL treatment** and storage capabilities (e.g. indexes)
 - “OntoPath: a Language for Retrieving Ontology Fragments.”
Submitted to OTM-ODBASE 2007
- The OWL parser creates from the OWL file a set of structures for classes, properties, nominal and individuals.
- These structures will be stored in the graph-based database G.

G Semi-structured Database

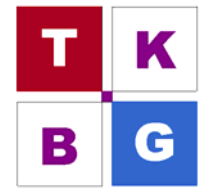
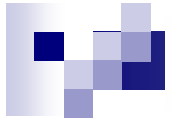
- Backend to store, index and retrieve the OWL ontologies as graphs.
- Four database object types are needed: *ontology*, *property*, *concept*, and *enumeration (nominals)*



OntoPath Query Language

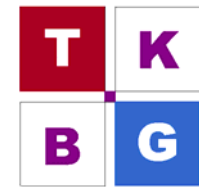


□ Disease / related_to / Rheumatoid_Factor



Ontology Editor Protégé

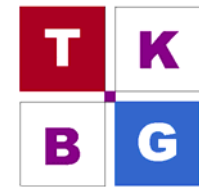
- Selected as the front-end to visualize and manipulate ontologies
- Flexibility to be extended
- Some plug-ins and GUIs has been created



Protégé Extensions


- Storing Ontologies
- Retrieving full ontologies or fragments
- Representation in a definition hierarchy
- Connection with Python codes

Storing Ontologies



Save Ontology into Hierarchy

SAVE OWL ONTOLOGY INTO THE ONTOLOGY-VIEW HIERARCHY REPRESENTATION



OWL Ontology File:

Referenced ontologies-views	Coverage of the Ontology over the HeC Levels
1-cell.owl	Population
1049-disease_ontology.owl	Individual
20188-diseaseVic.owl	Organ
20201-galen.owl	Tissue
25514-hec_onto_drugs.owl	Cellular
25592-nciOncology.owl	Molecular
67278-openGalen-Anatomy.owl	HeC Database
76823-PatientOntology.owl	
76935-tambis-full.owl	

☒ Without References ☐ Without HeC Levels

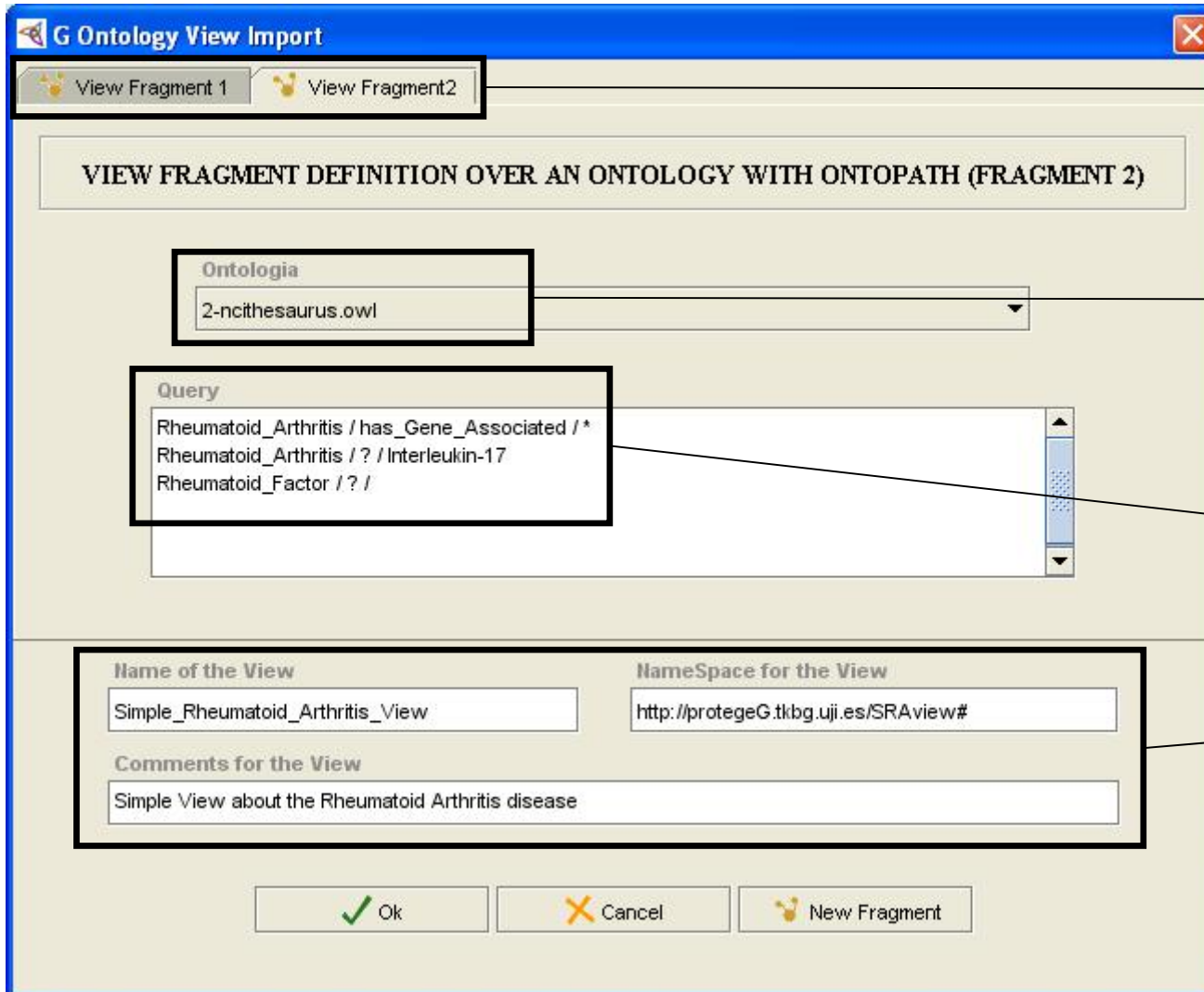
Console:
 Inserting ontology: tambis-full.owl...
 This operation may take several minutes
 Ontology tambis-full.owl inserted

OWL File
Selection

Biomedical (HeC)
Coverage

References to
other Ontologies
(Views)

Retrieving full ontologies or fragments



G Ontology View Import

View Fragment 1 View Fragment2

VIEW FRAGMENT DEFINITION OVER AN ONTOLOGY WITH ONTOPATH (FRAGMENT 2)

Ontologia
2-ncithesaurus.owl

Query
Rheumatoid_Arthritis / has_Gene_Associated / *
Rheumatoid_Arthritis / ? / Interleukin-17
Rheumatoid_Factor / ? / ?

Name of the View
Simple_Rheumatoid_Arthritis_View

Namespace for the View
http://protegeG.tkbg.uji.es/SRAview#

Comments for the View
Simple View about the Rheumatoid Arthritis disease

Ok Cancel New Fragment

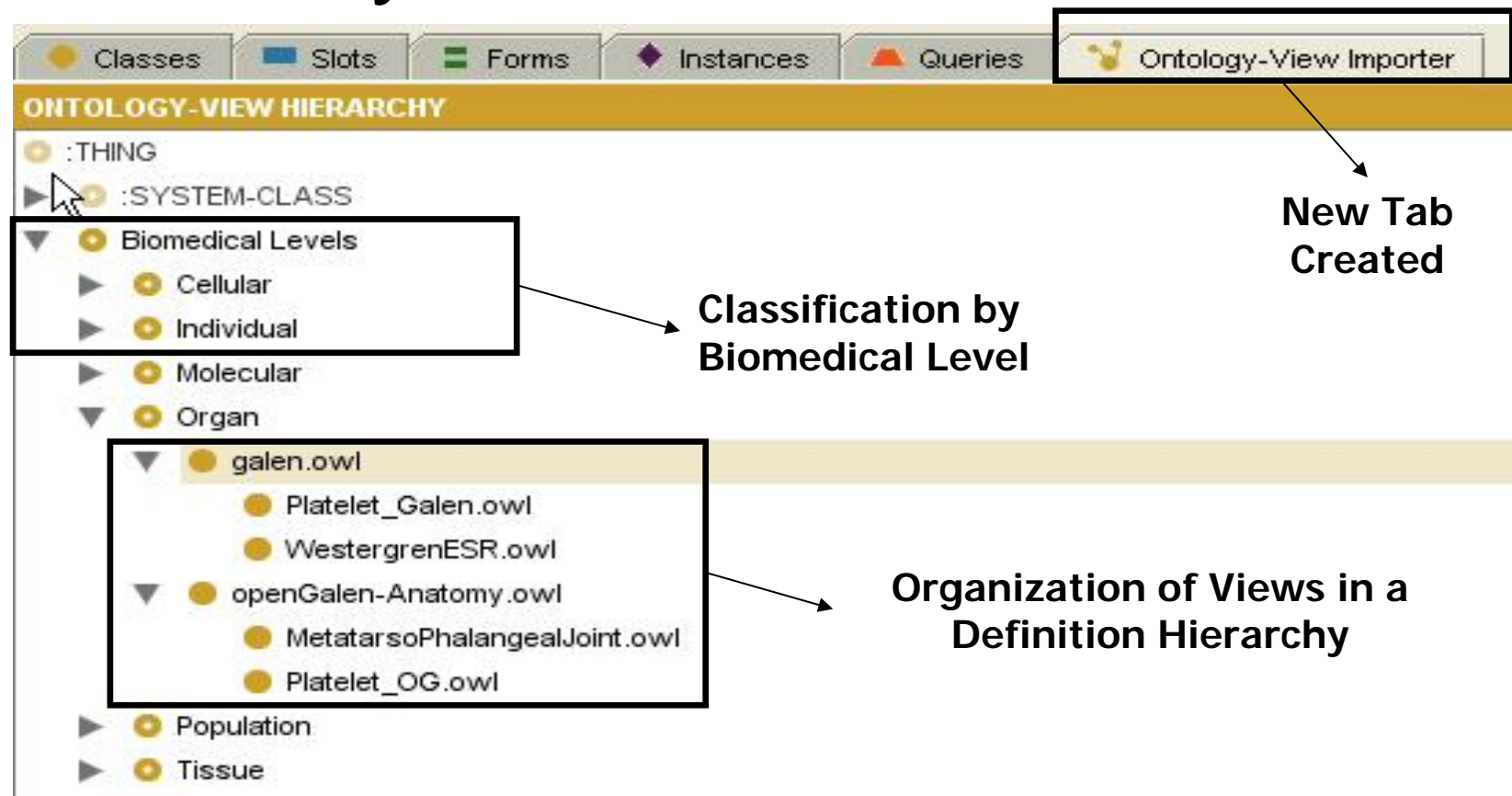
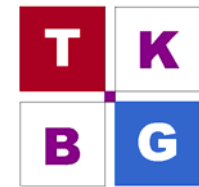
Several
Fragments

Source
Ontology

Set of
OntoPath
Queries

Metadata

Representation in a definition hierarchy



Conclusions

- The system is work in progress
- Some improvements needed
 - Formalizations of connections between fragments and source knowledge.
 - e-connections? → Manchester
 - Enrichment by text mining techniques
 - Work at EBI: form text to ontologies
 - Draft: <http://krono.act.uji.es/people/Ernesto>
 - Apply the ontology: evaluation and validation

Questions and Feedback

- Ernesto Jiménez-Ruiz
 - <http://www3.uji.es/~ejimenez> , ejimenez@uji.es
- Reources:
 - Plug-in (beta): http://krono.act.uji.es/people/Ernesto/G_Protege_Plugin
 - Thesis proposal: <http://krono.act.uji.es/people/Ernesto>
 - “OntoPath: a Language for Retrieving Ontology Fragments.” Submitted to OTM-ODBASE 2007
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 - Maat GKnowledge: <http://maat-g.com> → Alfonso Rios (arios@maat-g.com)