Application of OASIS Integrated Collaboration Object Model (ICOM) with Oracle Database 11g Semantic Technologies

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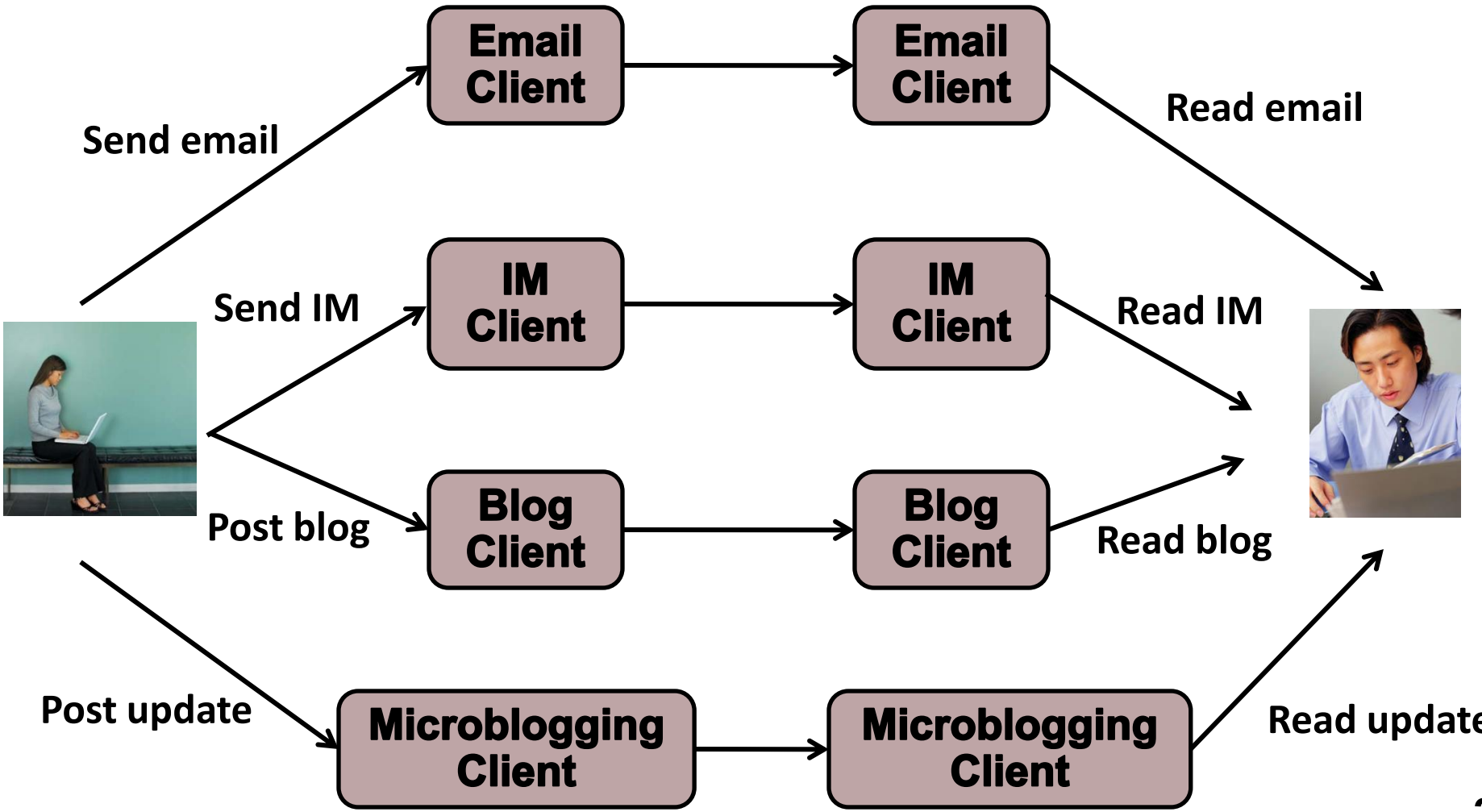
A Presentation for Ontolog Forum - OWL 2: Tools & Applications - 2010.08.05;

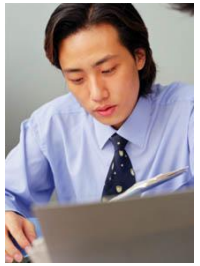
ref. http://ontolog.cim3.net/cgi-bin/wiki.pl?ConferenceCall_2010_08_05

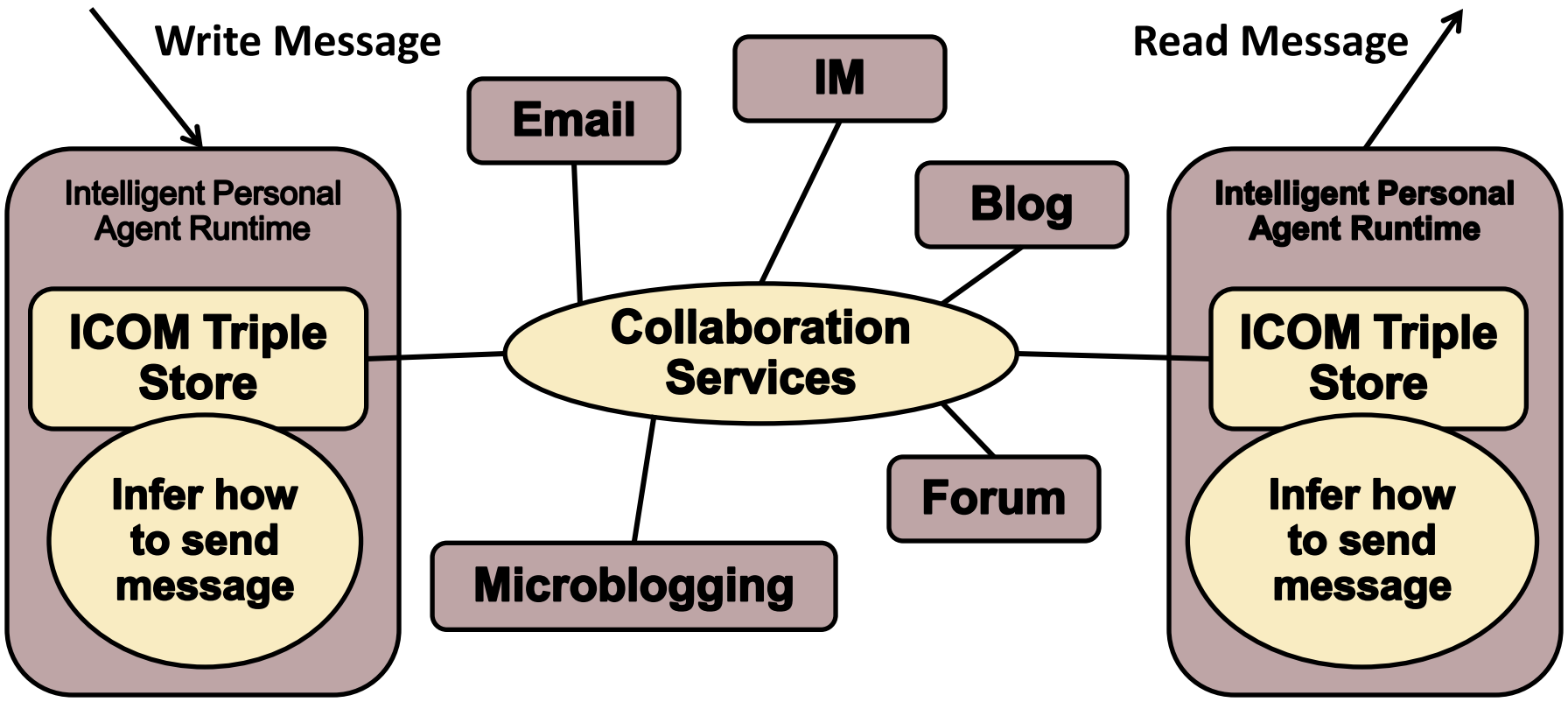
Today, if Lisa wants to send a message…



Need a Standard Ontology

to expose the data behind the 'Wall of Applications'





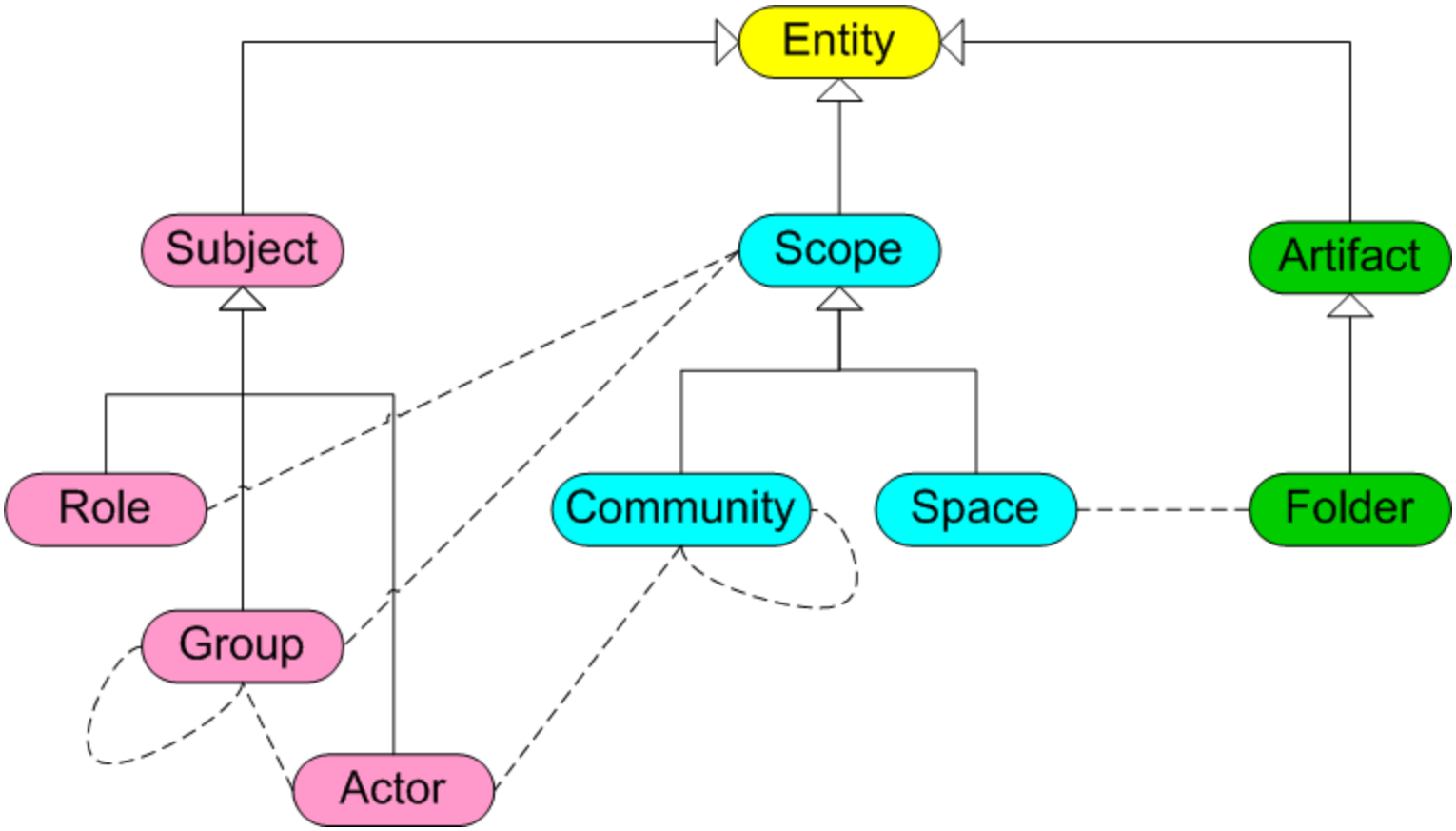
Problems with Collaboration Tools Today

- Require constant **context switching** among applications to perform a task
- Prevent **aggregation** and **reasoning** of diverse types of collaboration objects from **incompatible** applications
- Lack **interoperability** to enable collaboration across **organizational boundaries**
- Need to **weave unstructured** business **practices** and collaboration **activities** into **structured** business **processes**

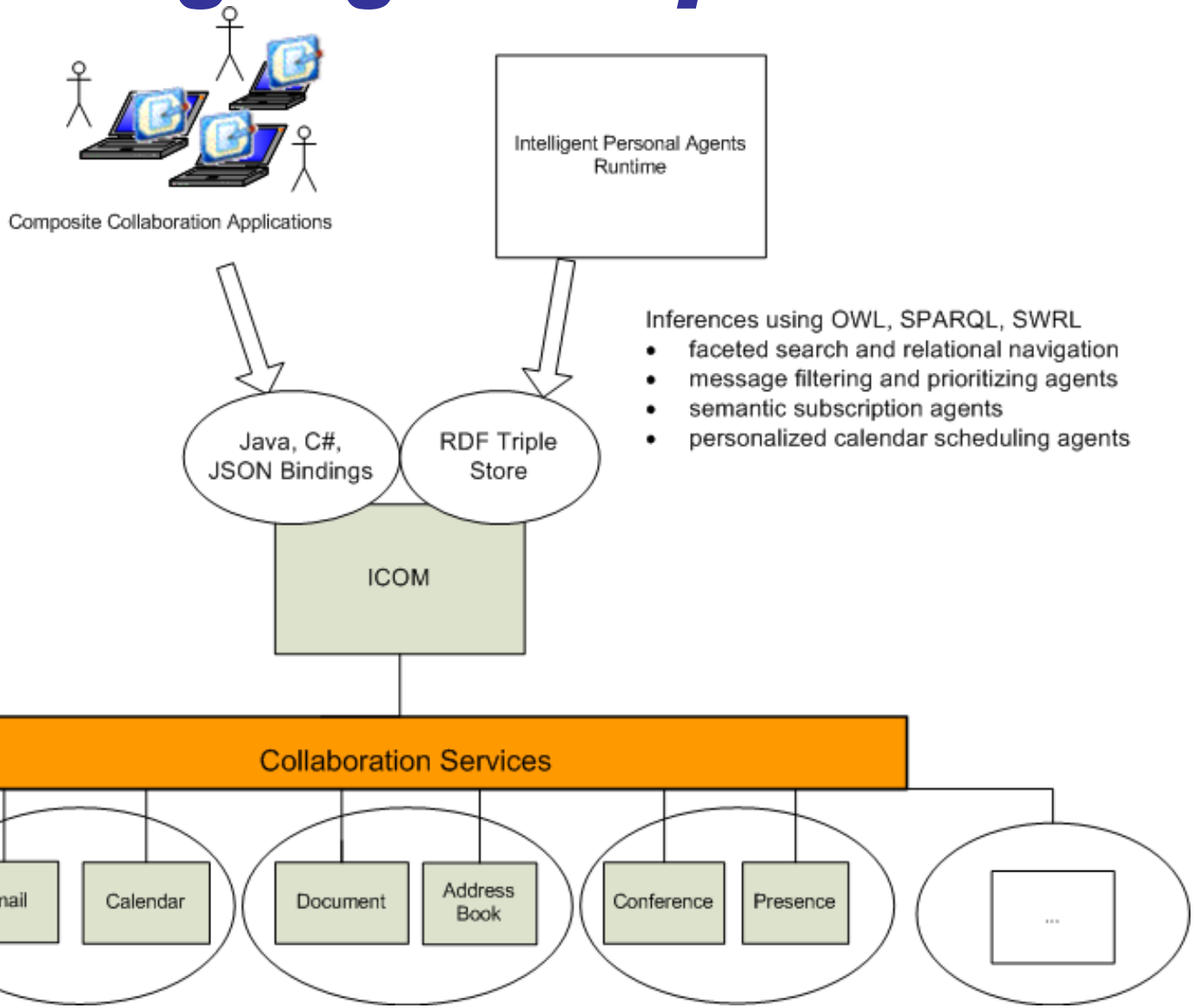
OASIS ICOM TC

- Chartered in March 2009
- Define a standard for integrated and interoperable enterprise collaboration.
- Specification to include classes and properties of collaboration objects for a broad range of collaboration activities.
- Encompass and improve on existing collaboration models.

Basic Entities in ICOM



Language-independent



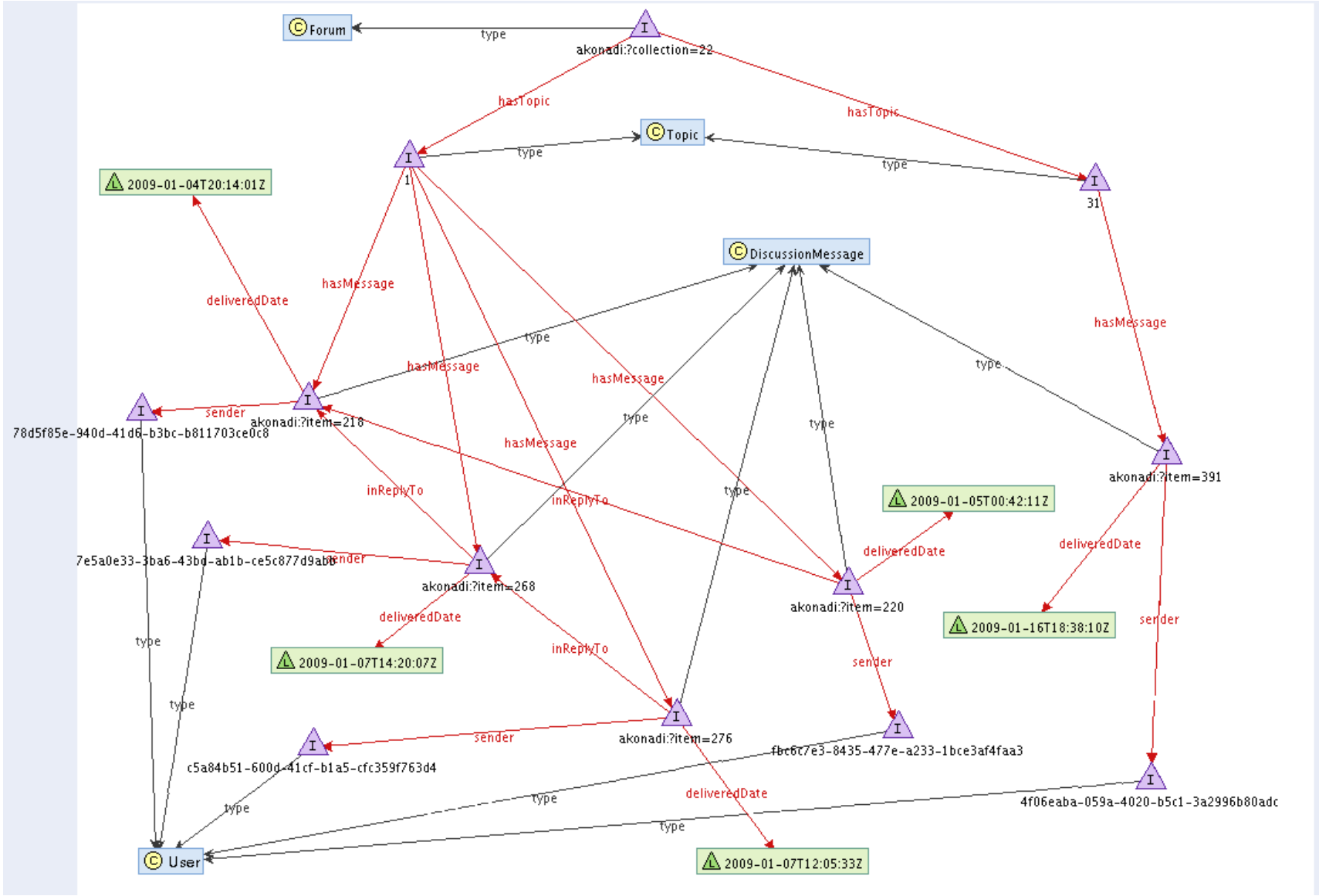
Demonstrate Versatility of ICOM

Develop mapping rules from different data sources to ICOM RDF

- **map NEPOMUK, SIOC, MIME, etc., to ICOM RDF**
- **work in progress to represent Ontolog Forum in ICOM**
- **see http://wiki.oasis-open.org/icom/OntologForumData**
- **primary investigators: Deirdre Lee and Laura Dragan**

NEPOMUK, SIOC, FOAF, DC	***ICOM***
nmo:Mailbox, sioc_t:MailingList	*icom_forum:Forum*
nmo:Email, sioc_t:MailMessage	*icom_forum:DiscussionMessage*
nco:PersonContact	*icom_contact:Contact*
nfo:Attachment	*icom:MimeConvertible*
sioc:UserAccount	*icom:User*
dcterms:created	*icom:createdOn*
sioc:has_creator	*icom:hasCreatedBy*
nmo:from	*icom:hasSender*
nmo:isPartOf, sioc:has_container	*icom:hasParent*

ICOM RDF Representation of Ontolog Forum



Join the TC!

Homepage

- http://oasis-open.org/committees/icom

More info on current developments

- http://wiki.oasis-open.org/icom

Oracle Database 11g Semantic Technologies Overview

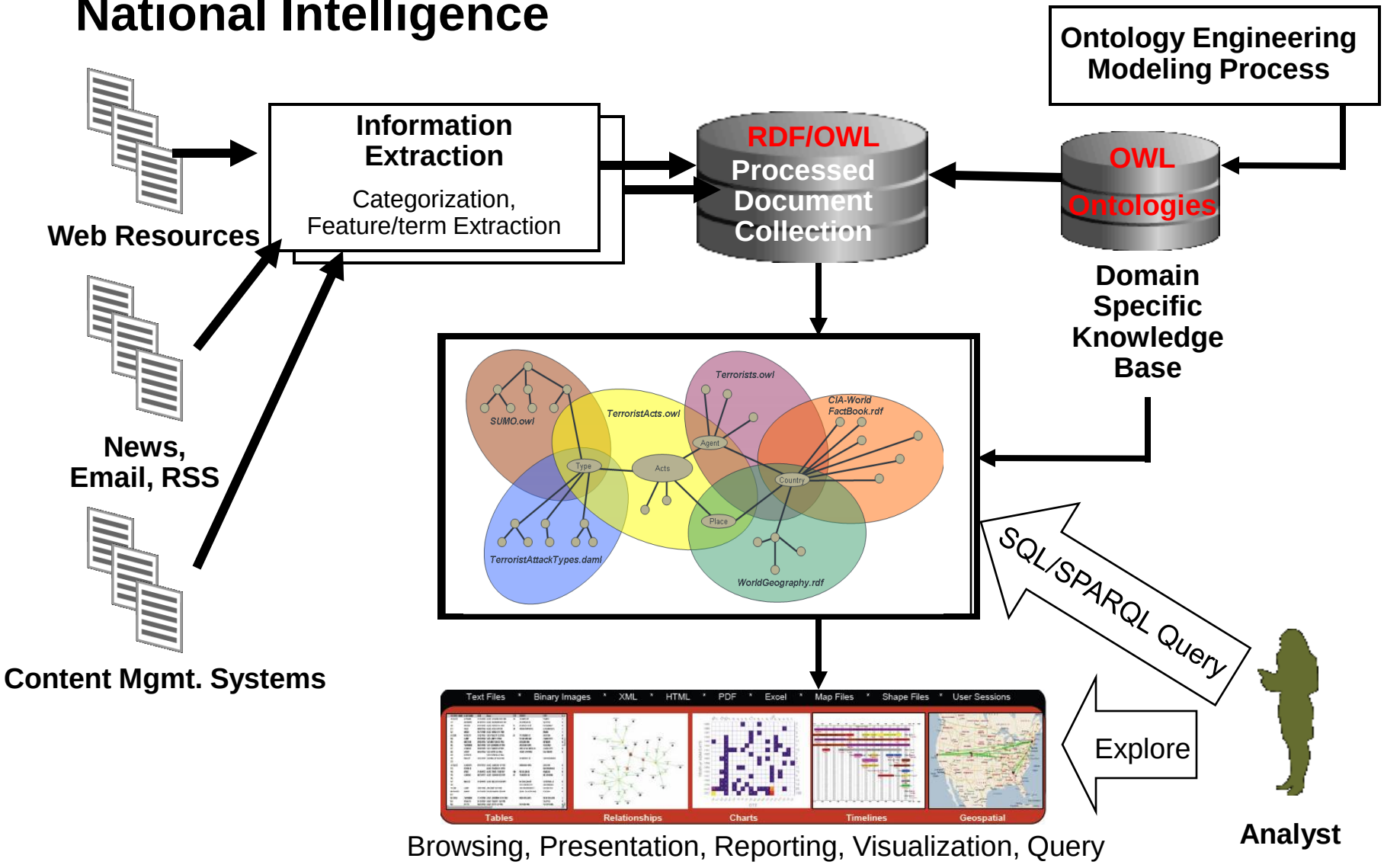
Aug 2010

Business Needs

- Discovery of data relationships across…
  - Structured data (database, apps, web services)
  - Unstructured data (email, office documents) Multi-data types (graphs, spatial, text, sensors)
- Text Mining & Web Mining infrastructure
  - Terabytes of structured & unstructured data
- Enable data reuse by associating more meaning (context) with the data
- Allow schemas to continuously and dynamically evolve
- Support queries that are not defined in advance

Canonical Use Case: Text Mining

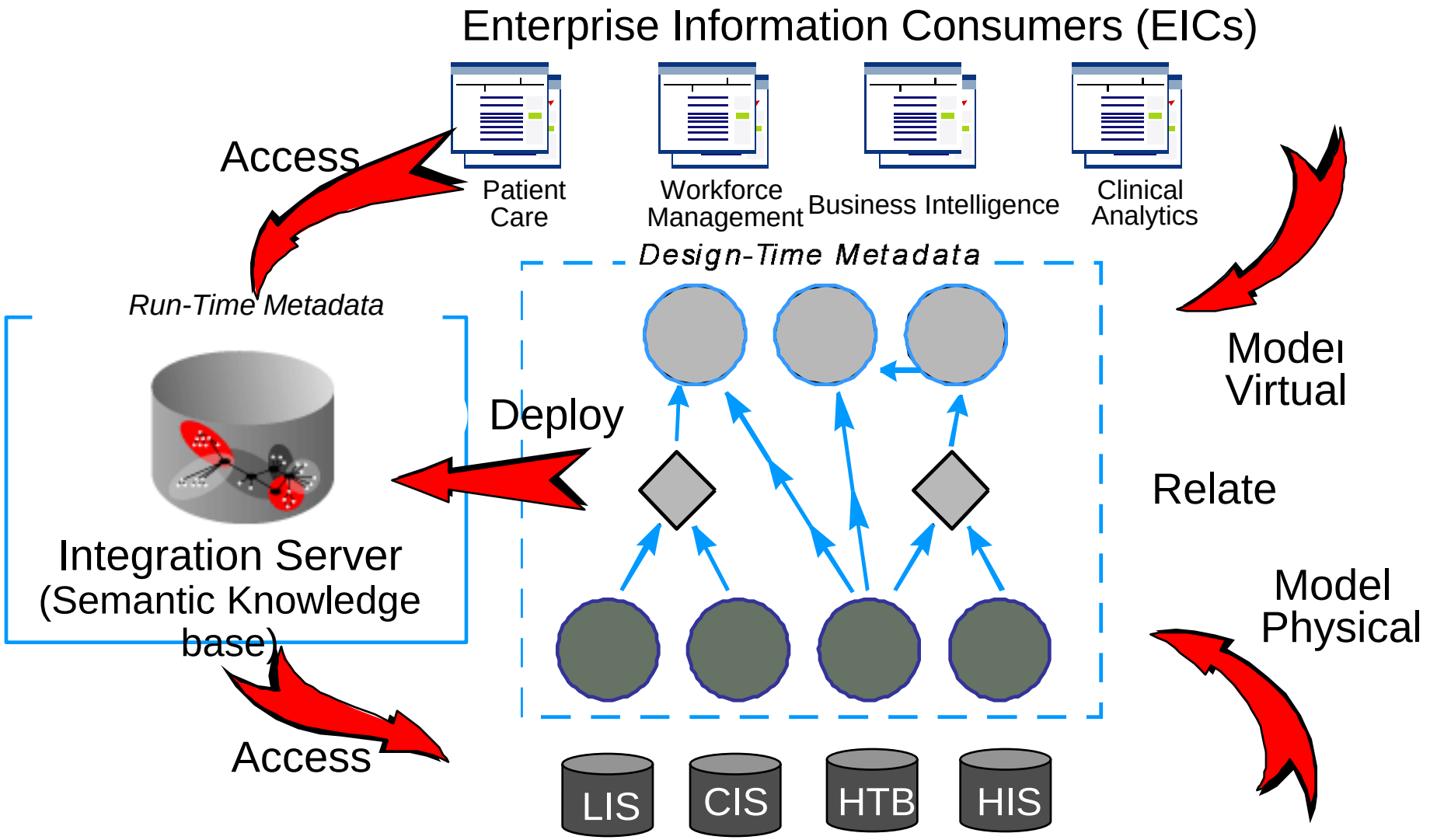
National Intelligence



Browsing, Presentation, Reporting, Visualization, Query

Canonical Use Case: Data Integration

Health Informatics



Semantic Application Workflow

Transform & Edit Tools

Entity Extraction & Transform
- OpenCalais
- Linguamatics
- GATE
- D2RQ

Ontology Eng.
- TopQuadrant
- Mondeca
- Ontoprise
- Protege

Categorization
- Cyc

Custom Scripting

Partner Tools

Load, Query & Inference

- RDF/OWL Data Management
- SQL & SPARQL
  - Sesame Adapter
  - Jena Adapter
- Native Inferencing
- Semantic Rules
- Scalability & Security
- Semantic Indexing

ORACLE SPATIAL

Applications & Analysis Tools

BI, Analytics
- Teranode
- Metatomix
- MedTrust

Graph Visualization
- Cytoscape

Social Network Analysis

Metadata Registry

Faceted Search

PartnerTools

Oracle's Partners for Semantic Technologies

Integrated Tools and Solution Providers:

Ontology Engineering

TopQuadrant

ontoprise
know how to use Know-how

protégé

Reasoners

thinking clearly
clark & parsia, llc

ontoprise
know how to use Know-how

Applications

TERANODE

MONDECA

metatomix

MedTrust

Query Tool Interfaces

semantic web framework
jena

openRDF.org
Sesame

Joseki

cYcorp

Standards

W3C WORLD WIDE WEB consortium

RDF

NLP Entity Extractors

CALAIS
Powered by Thomson Reuters

Linguamatics

hijik
GATE 011
stu x
general architecture
for text engineering

SI / Consulting

NORTHROP GRUMMAN

Raytheon

orbis
TECHNOLOGIES, INC.

BOEING

McDONALD BRADLEY

Cognia

accenture

Some Oracle Database Semantics Customers

Life Sciences

Lilly

Pfizer

SIB Swiss Institute of Bioinformatics

Defense/ Intelligence

Education

Telecomm & Networking

Hutchinson 3G Austria

CISCO

Clinical Medicine & Research

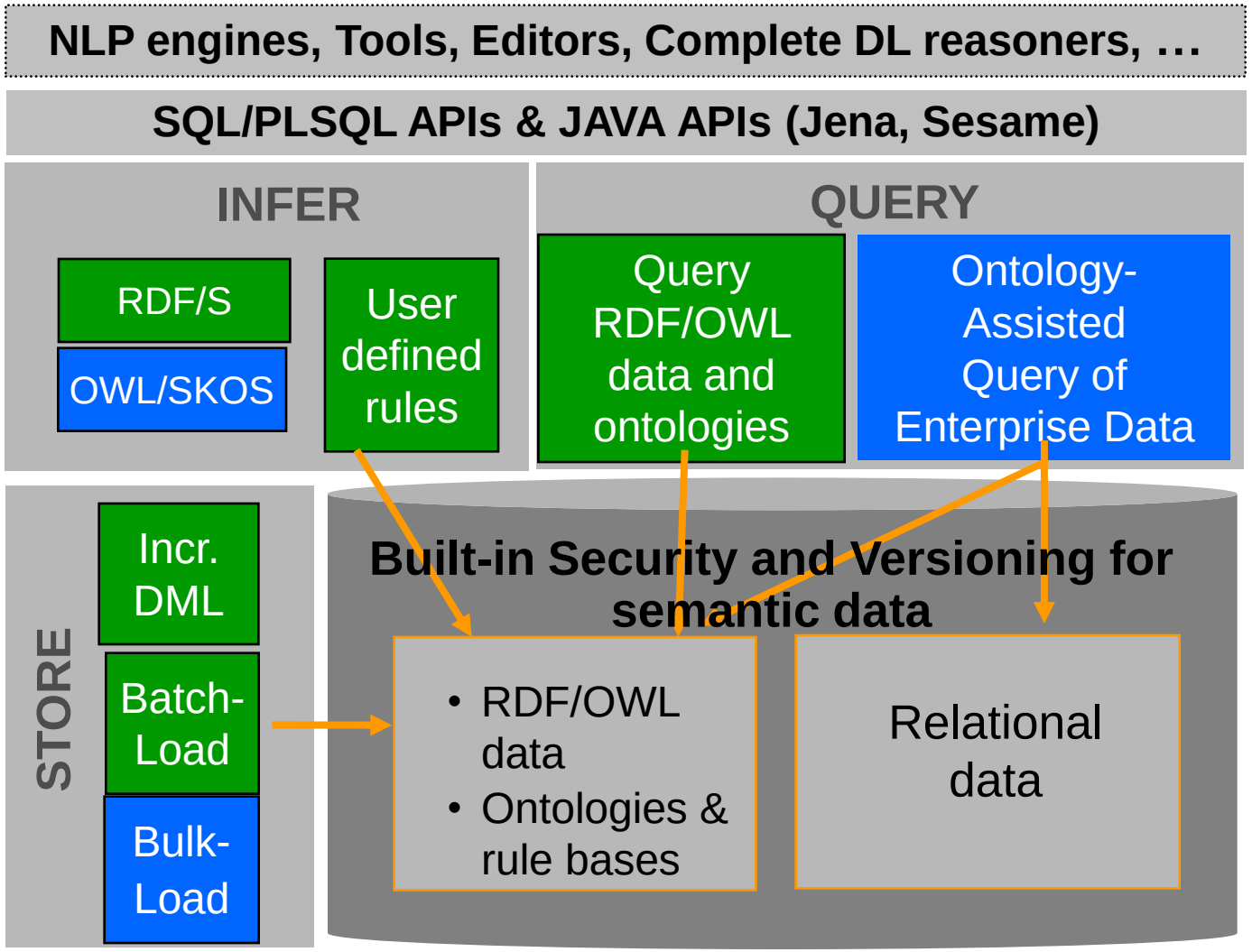
The University of Texas Health Science Center at Houston

Cleveland Clinic

Publishing

Westlaw Thomson Reuters

Capabilities Overview of Release 11.2



Oracle Database Provides

Reasoning and Discovery

- RDFS / OWL inferencing
- User-defined rules for inferencing
- Plug-in architecture for inference engines such as PelletDB
- Inferencing proofs and explanations
- SPARQL & mixed SQL DB queries

Data Integration

- Distributed SPARQL queries through Service in Jena
- Ontologically-assisted SQL queries
- Integration with 3rd party NLP entity extraction engines: e.g., OpenCalais
- Semantic Indexing for documents

Oracle Database Provides

Scalability

- Efficient RDBMS storage and loading of RDF data
- Support RAC, Exadata platform, partitioning, compression, versioning
- Incremental & parallel inferencing
- Supports concurrent users, distributed applications

Security

- Graph level security
- Virtual Private Database declarative constraints based on RDF data char. & app. / user context
- Oracle Label Security restricts RDF data access to users having compatible access labels

Demo: Application of OASIS Integrated Collaboration Object Model (ICOM) with Oracle Beehive Collaboration and Oracle Database 11g Semantic Technologies

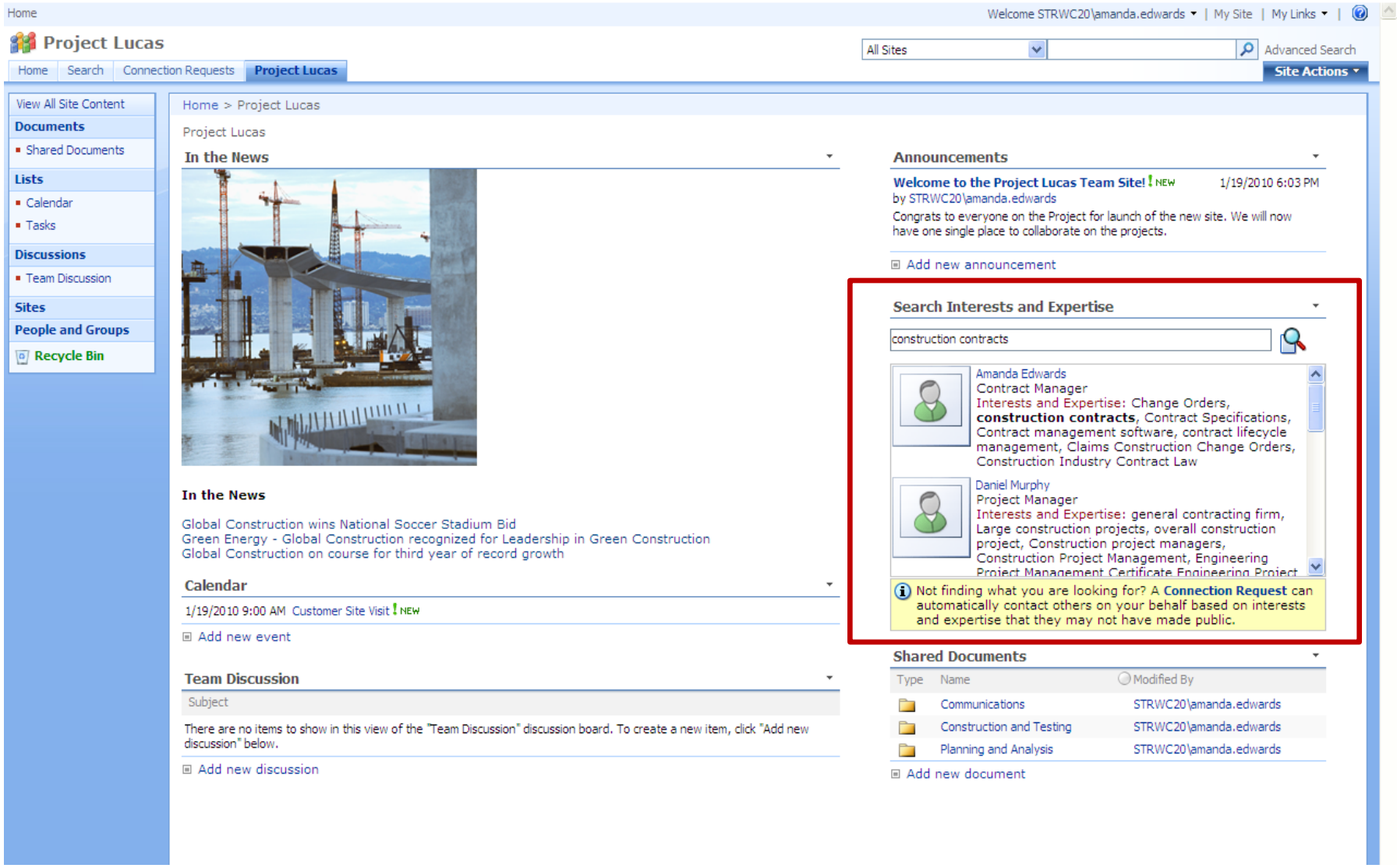
An Example Application of ICOM with Oracle Beehive and Semantic Technologies

- Represent Ontolog forum discussion threads in ICOM RDF
  - extend ICOM with triples for user interest profile
    - <?user hasInterest ?interest>
    - <?interest hasTerm ?literal>
- Extract users' interests and expertise
  - Beehive continuously update user interests and expertise profiles based on user's authorship of artifacts
- Connect information seekers to the right people at the right time to collaborate

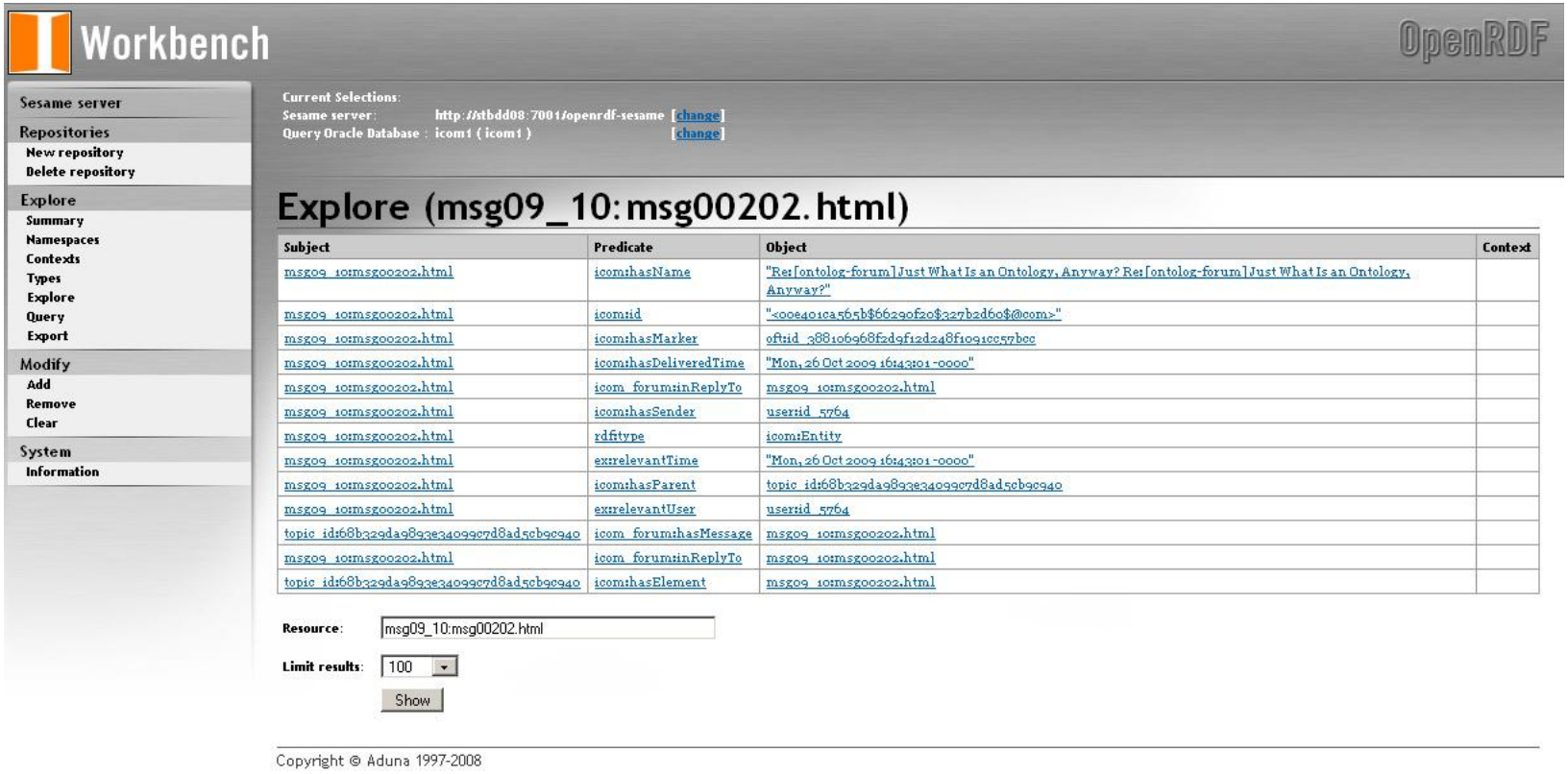
Extract User Interests and Expertise Profiles

- Rank the phrases continuously by
  - composition
  - relative frequency of use
  - aging in a moving window of time
- Let the users declare extracted terms as “public” or keep them as “protected”
  - “protected” terms are used by single-blind broker
  - through the broker, searchers see topics, not user identities
- Criteria for matching expertise requests
  - - strength of the terms
  - - social proximity
  - - responsiveness
  - - availability (rich presence)

Interests and Expertise Search



ICOM RDF Describing One Message



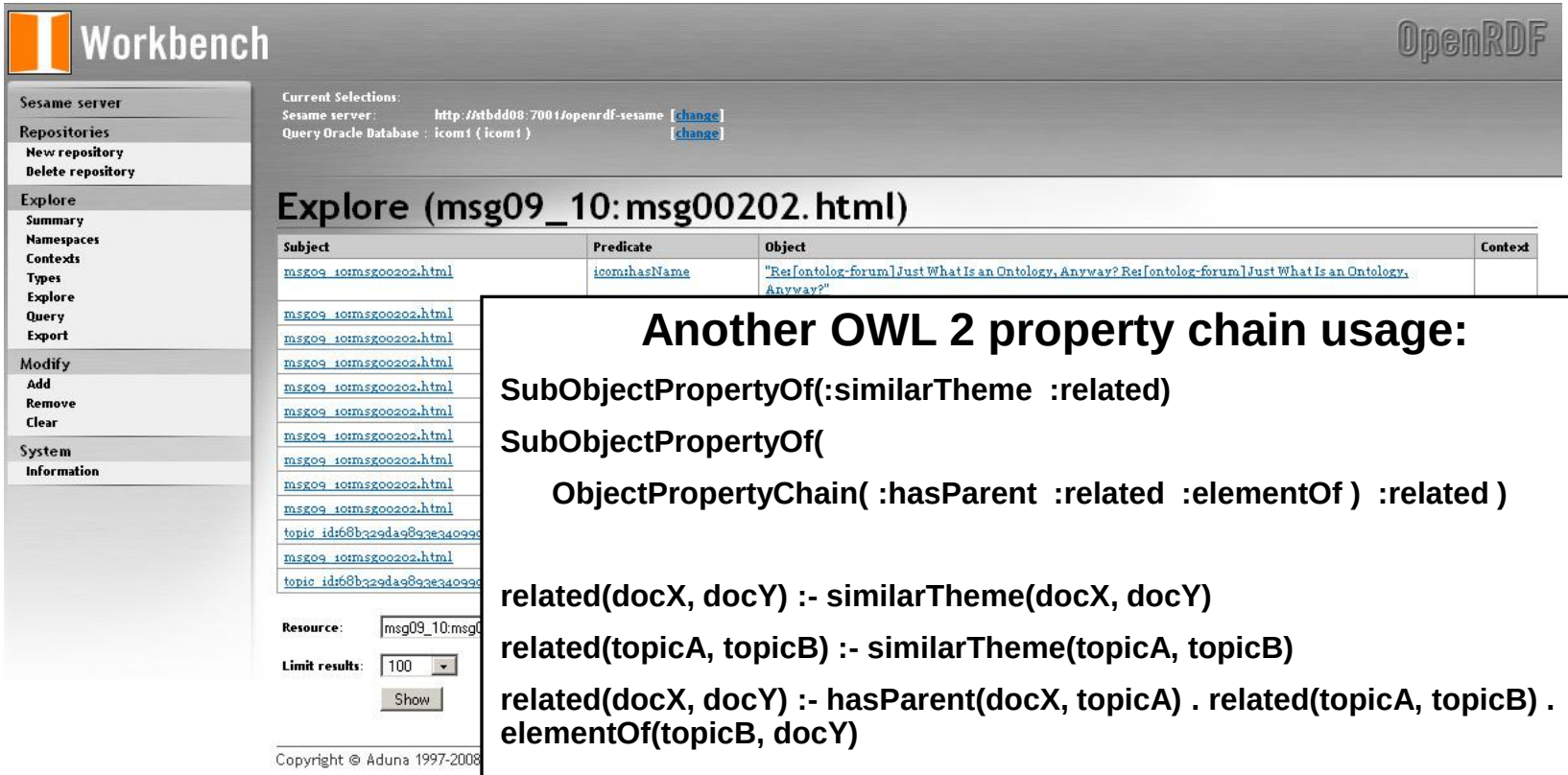
- **Above RDF triples describing the following Ontology forum message.**

  http://ontolog.cim3.net/forum/ontolog-forum/2009-10/msg00202.html

- **Tbox uses OWL 2 property chain feature:**

  SubObjectPropertyOf(ObjectPropertyChain(:hasElement :hasTopic :hasMessage) ex:contains)

ICOM RDF Describing One Message



Another OWL 2 property chain usage:

SubObjectPropertyOf(:similarTheme :related)

SubObjectPropertyOf(

ObjectPropertyChain(:hasParent :related :elementOf) :related)

related(docX, docY) :- similarTheme(docX, docY)

related(topicA, topicB) :- similarTheme(topicA, topicB)

related(docX, docY) :- hasParent(docX, topicA) . related(topicA, topicB) . elementOf(topicB, docY)

- **Above RDF triples des**

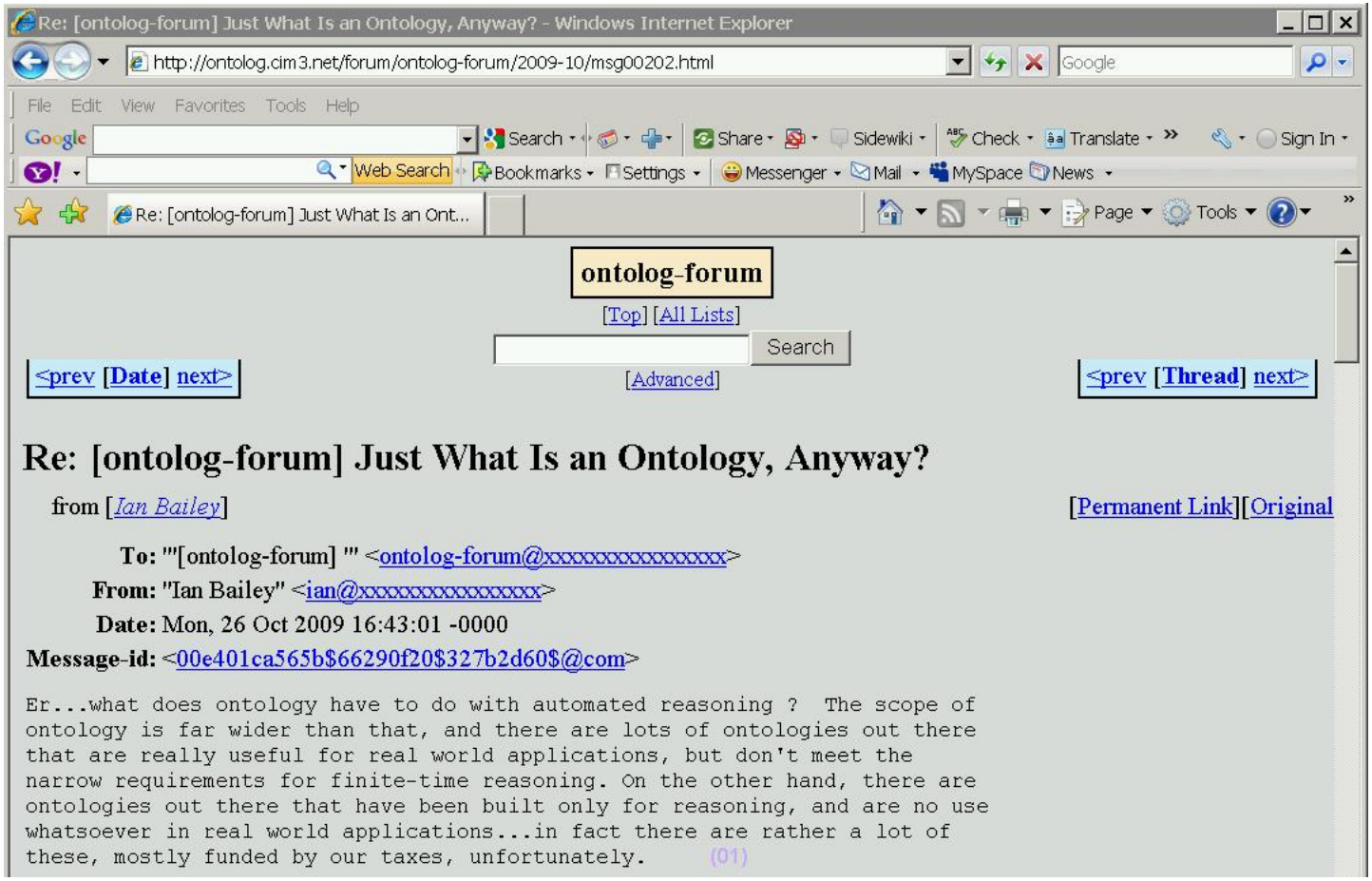
  http://ontolog.cim3.net/forum/or

- **Tbox uses OWL 2 pro**

  SubObjectPropertyOf(Objectl

- **This kind of recursive definition of relations is common in social network applications.**

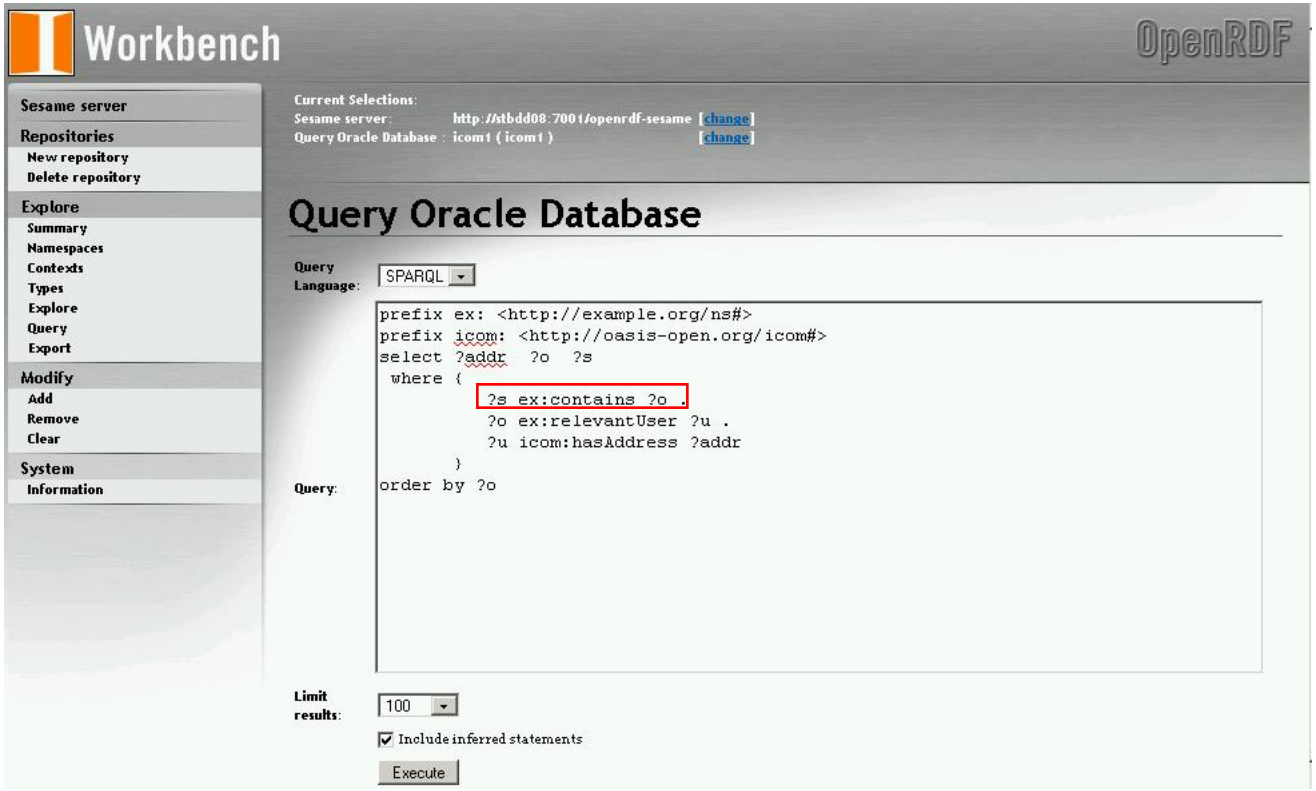
The Actual Message Contents



http://ontolog.cim3.net/forum/ontolog-forum/2009-10/msg00202.html

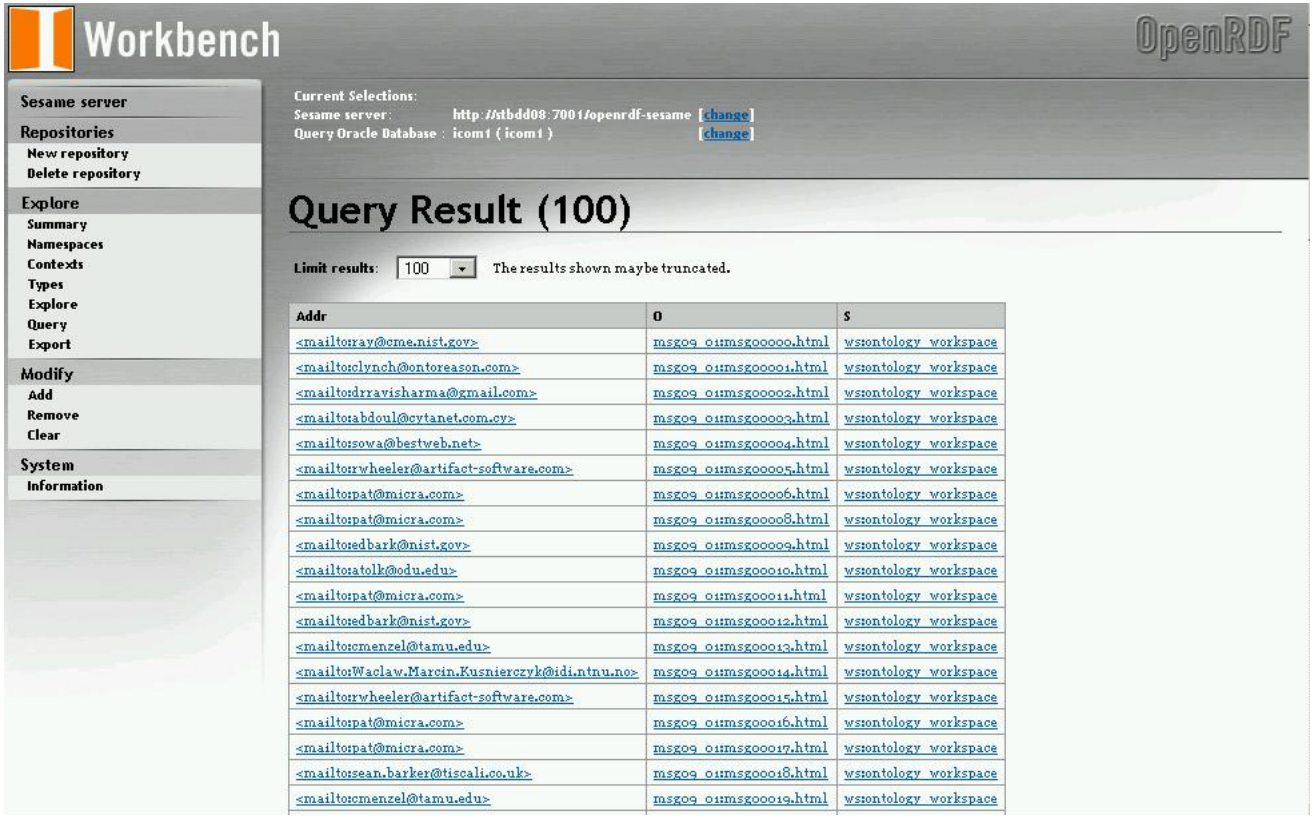
SPARQL Query

- A generic query simplified by using OWL 2 property chain



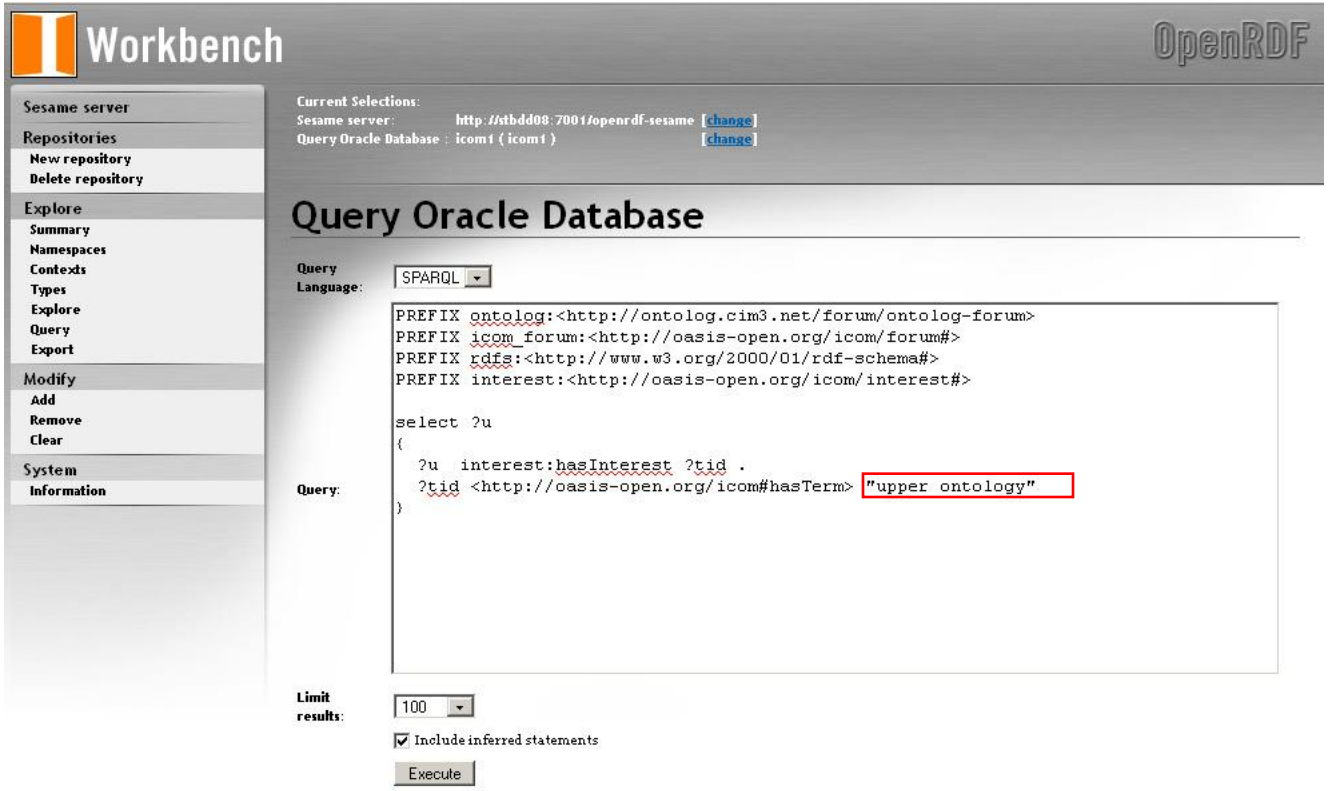
SPARQL Query

- A generic query simplified by using OWL 2 property chain



SPARQL Query

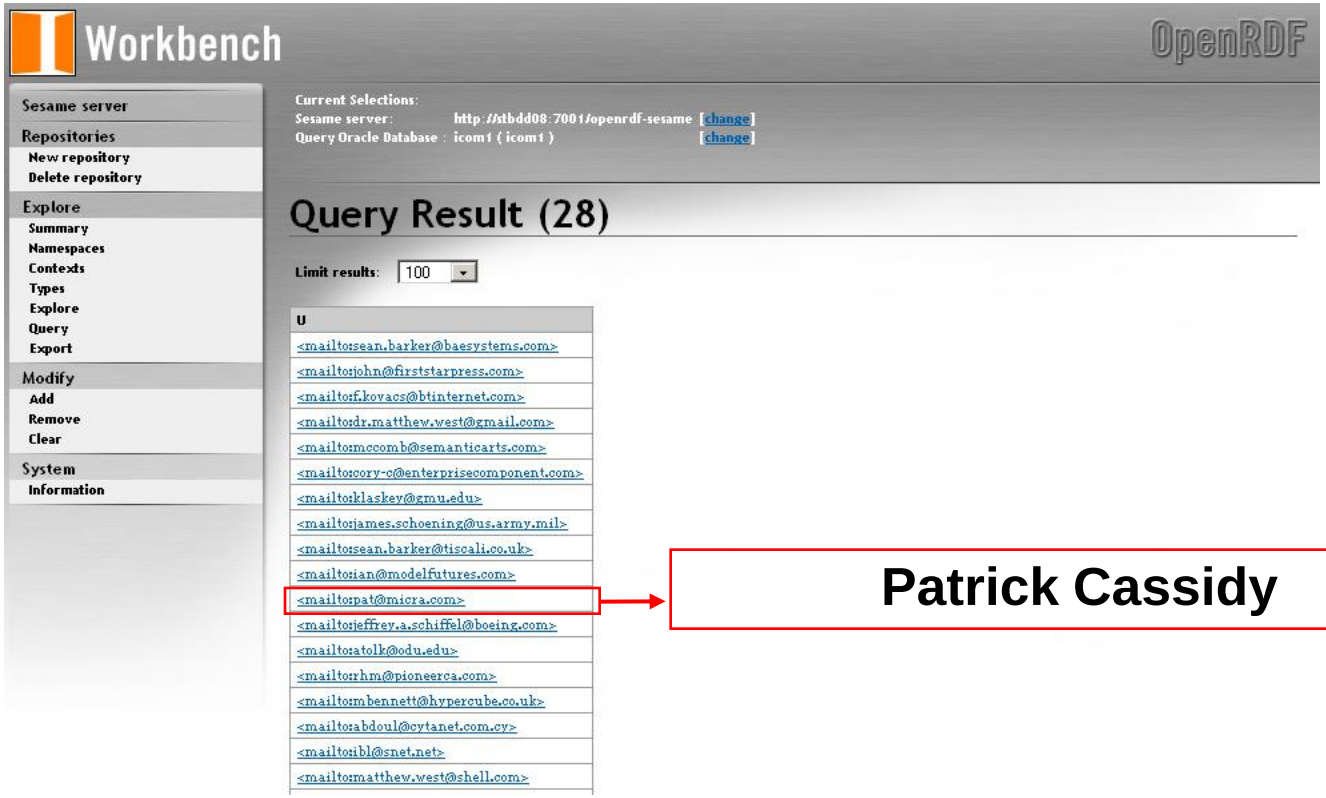
- Find users with certain interests



This query asks for users who have interest in “upper ontology”

SPARQL Query

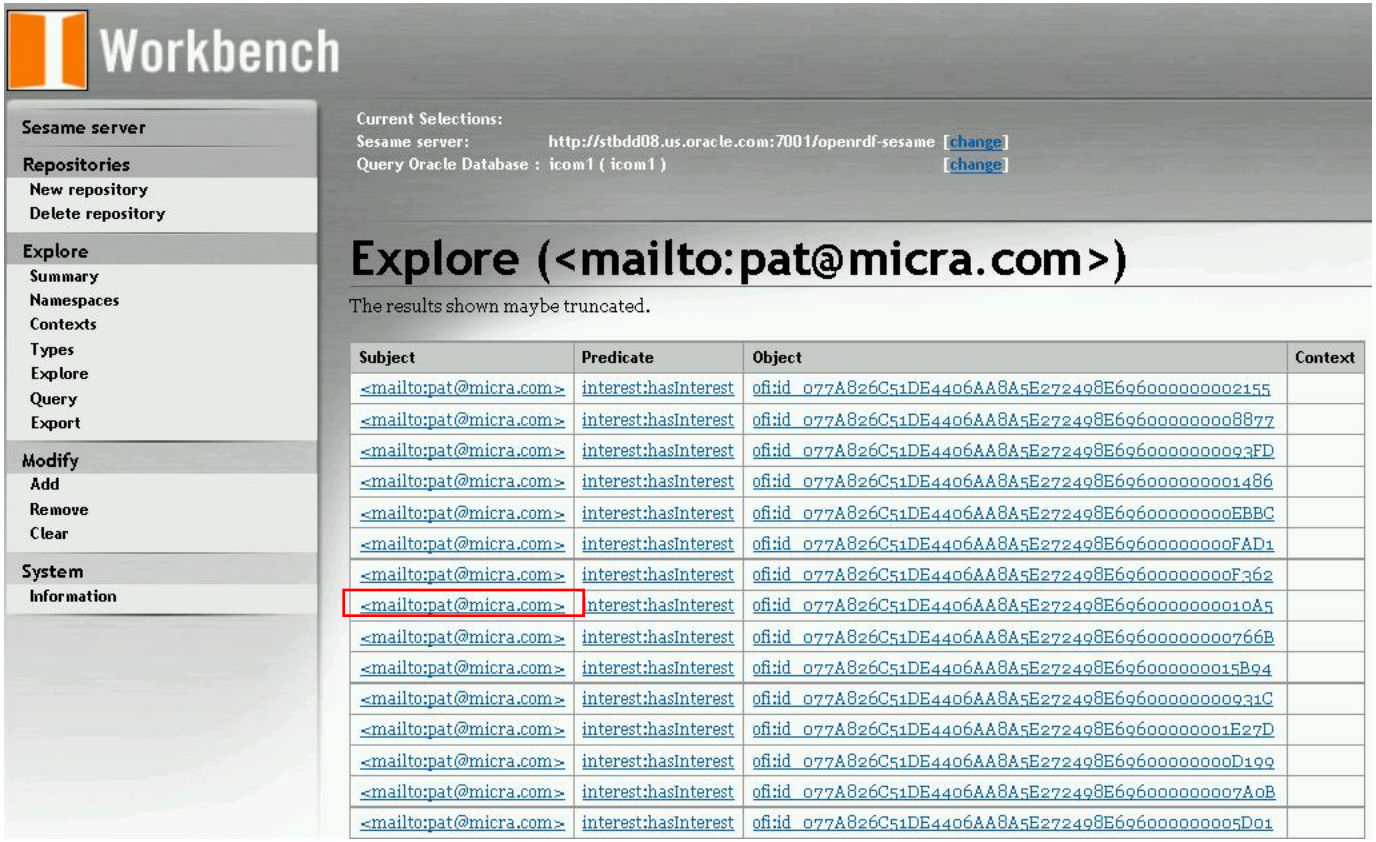
- Find users with certain interests



Patrick Cassidy is among those who have interest or expertise in "upper ontology"

SPARQL Query

- Find users with certain interests

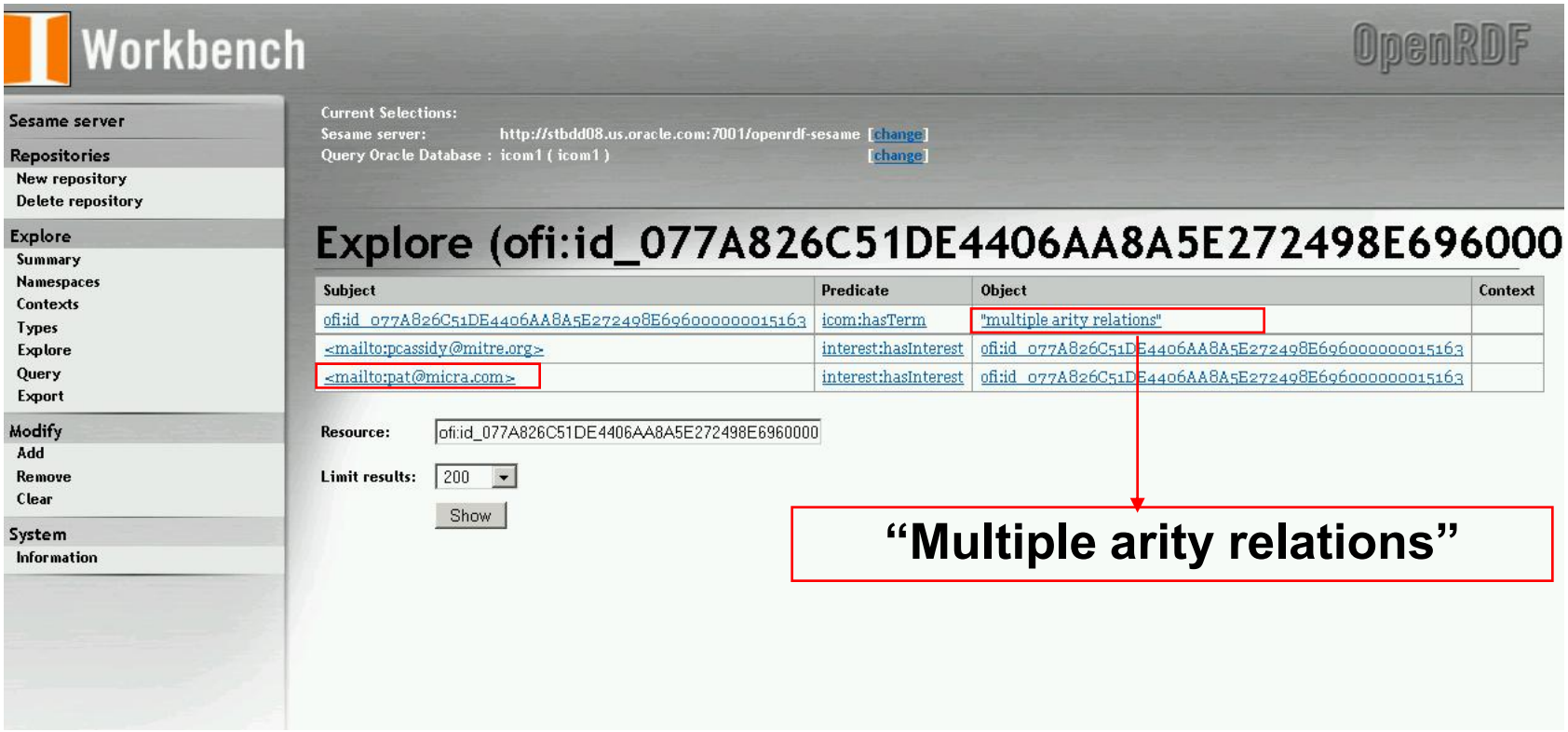


Subject	Predicate	Object	Context
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E6960000000002155	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E6960000000008877	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E696000000000093FD	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E6960000000001486	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E696000000000EBBC	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E696000000000FAD1	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E696000000000F362	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E6960000000010A5	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E696000000000766B	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E6960000000015B94	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E696000000000931C	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E6960000000001E27D	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E696000000000D199	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E6960000000007A0B	
<mailto:pat@micra.com>	interest:hasInterest	ofi:id_077A826C51DE4406AA8A5E272498E6960000000005D01	

This table shows that Patrick Cassidy has many interests.

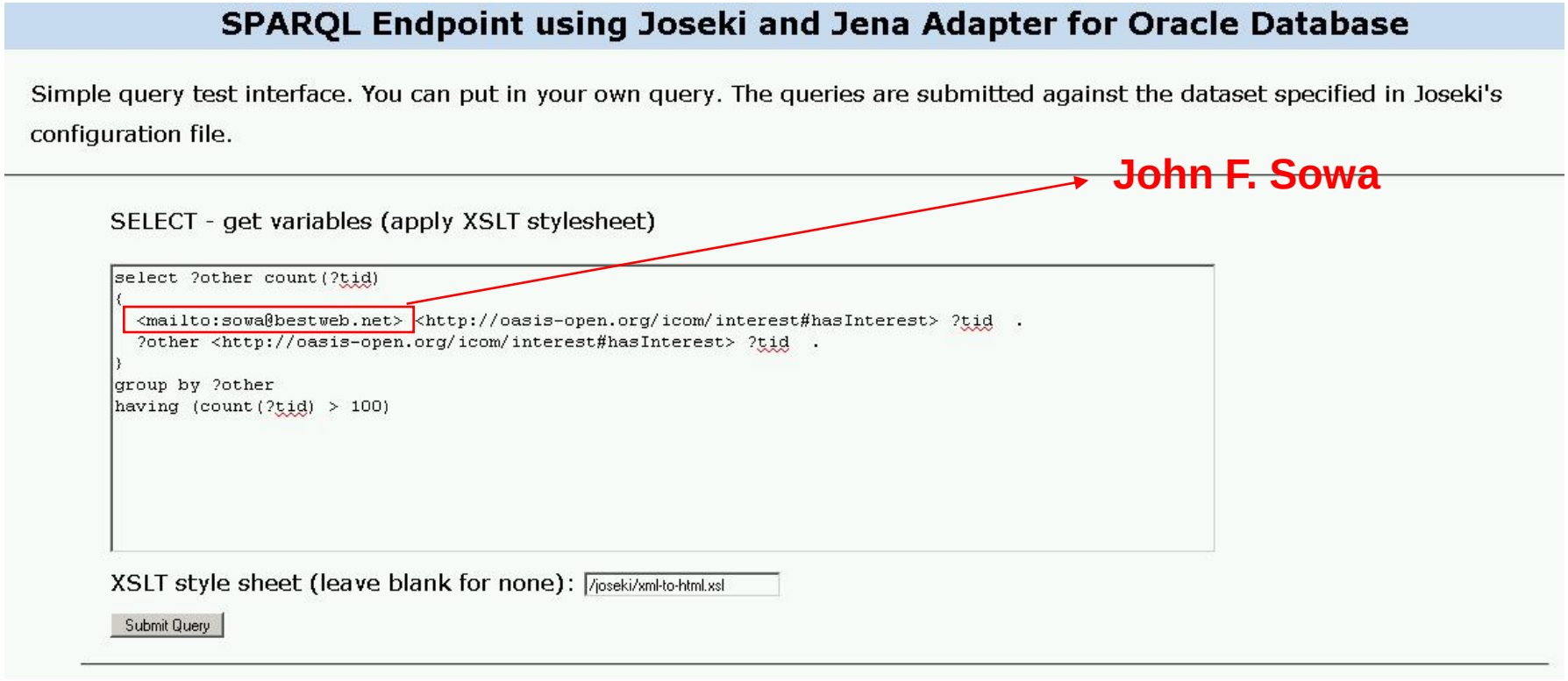
SPARQL Query

- Find users with certain interests



This table shows details about a particular interest Patrick Cassidy has and another person who shares the same interest.

Semantic Query for Similar Interests
- SPARQL 1.1 feature used



This query asks for users who share interests with John F. Sowa

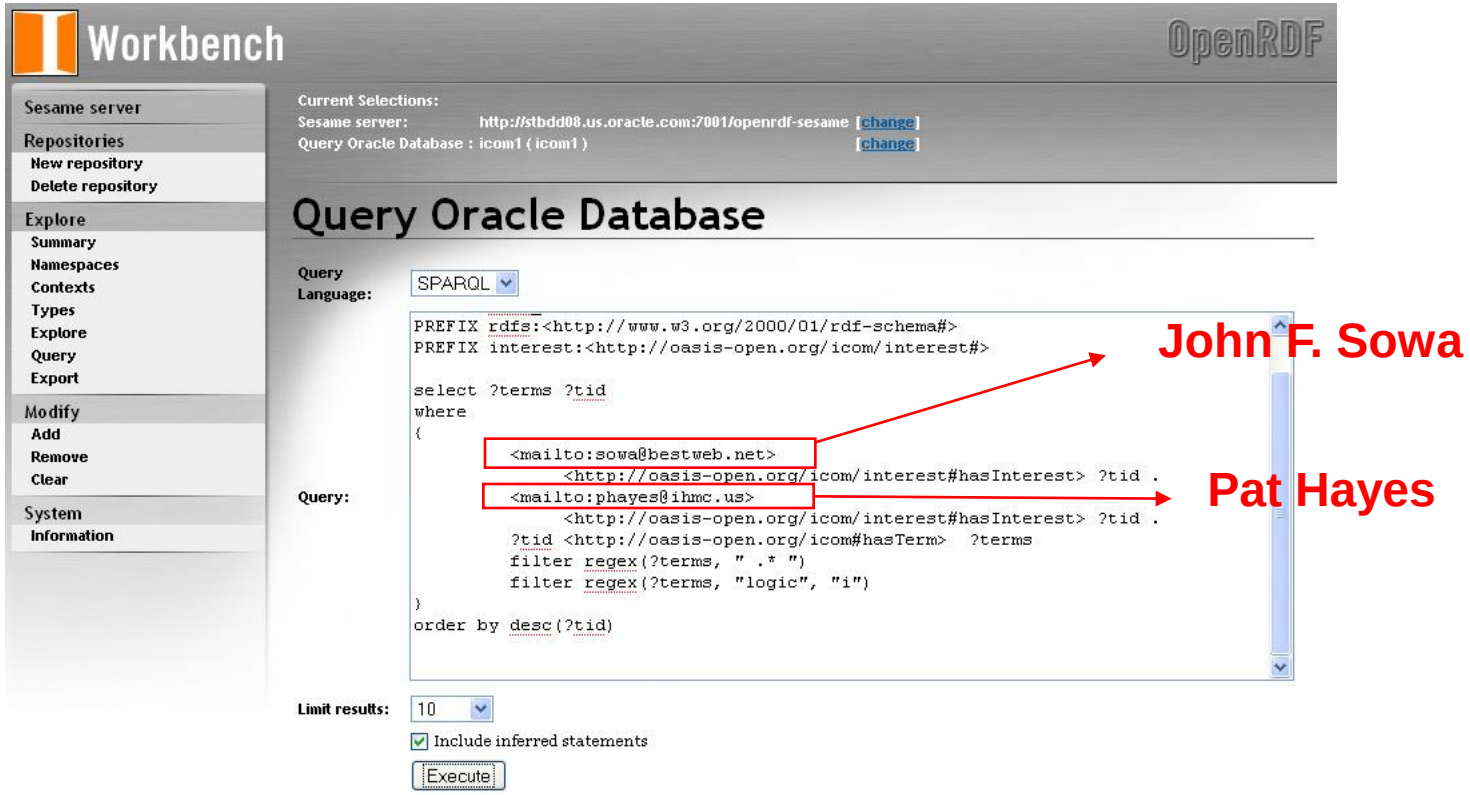
Semantic Query for Similar Interests
- SPARQL 1.1 feature used

User	Number of shared interests
<mailto:f.kovacs@btinternet.com>	"331" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:rich@englishlogickernel.com>	"373" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:ravi.sharma@vangent.com>	"124" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:phayes@ihmc.us>	"671" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:edbark@nist.gov>	"115" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:abdoul@cytanet.com.cy>	"508" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:cms@metaset.co.za>	"265" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:pat@micra.com>	"916" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:gary.berg-cross@em-i.com>	"224" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:bgajdero@ryerson.ca>	"128" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:cmenzel@tamu.edu>	"126" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:lobrst@mitre.org>	"211" ^^<http://www.w3.org/2001/XMLSchema#integer>
<mailto:ingvar.johansson@ifomis.uni-saarland.de>	"125" ^^<http://www.w3.org/2001/XMLSchema#integer>

Pat Hayes

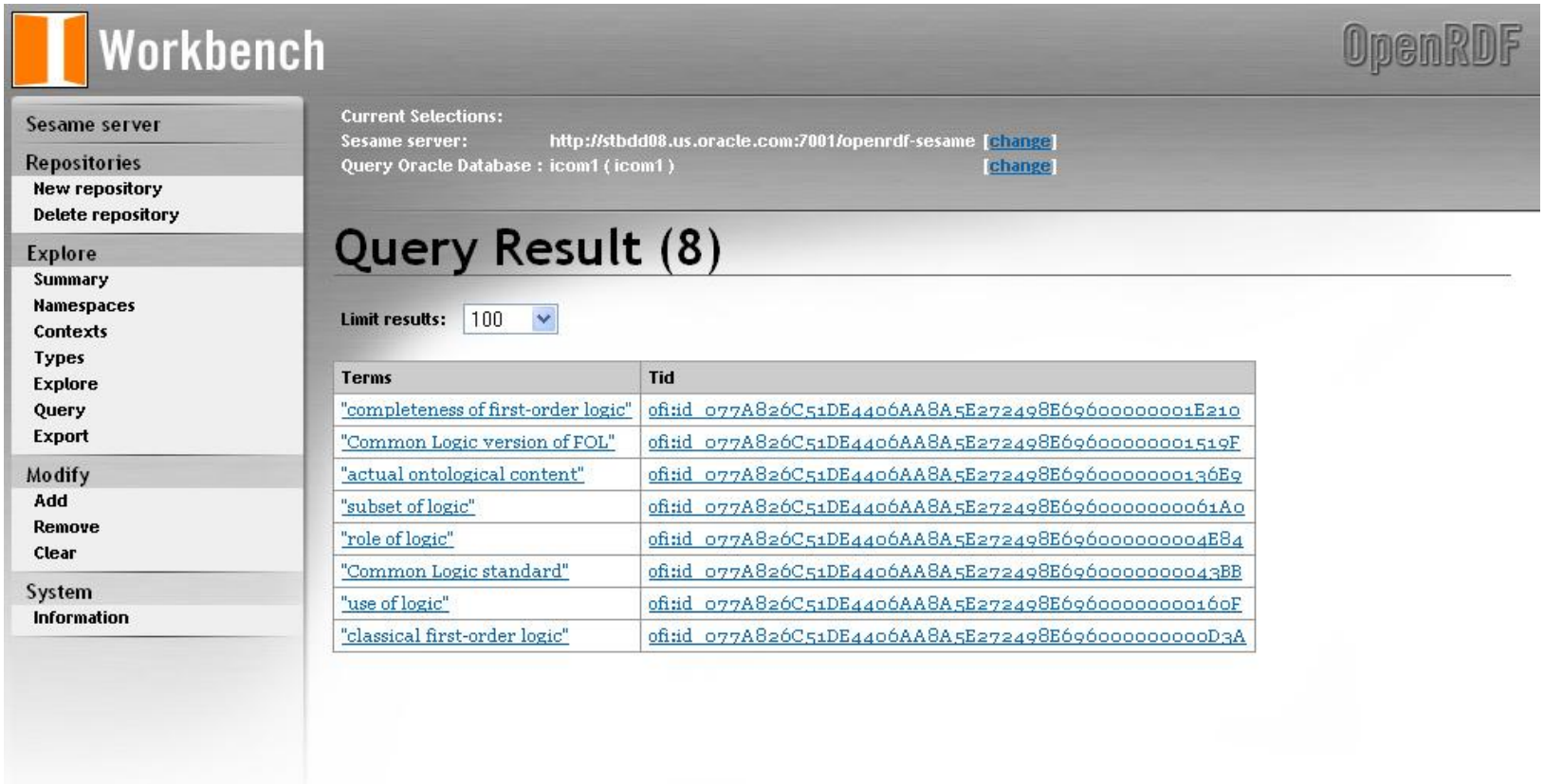
Pat Hayes shares quite a few interests with John F. Sowa

Semantic Query for Common Interests



This query asks for the common "logic" related interests between John F. Sowa and Pat Hayes.

Semantic Query for Common Interests



Their common interests include: completeness of first-order logic, common logic version of FOL, …

For More Information

http://search.oracle.com

semantic technologies

Check the following site for Oracle's

SemTech 2010 presentations

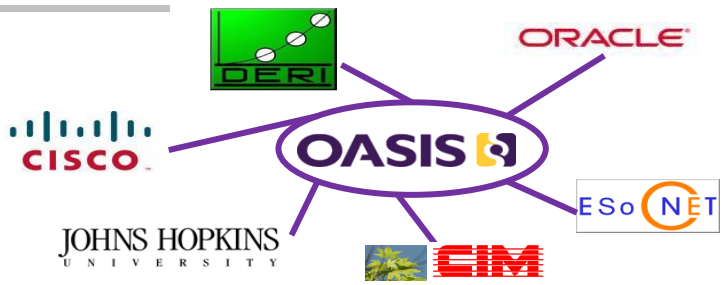
www.oracle.com/technetwork/database/options/semantic-tech/events-082086.html

ICOM Homepage

- http://oasis-open.org/committees/icom

More info on current developments

- http://wiki.oasis-open.org/icom



Ontolog-CIM3