

TopQuadrant



10:00 AM

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# Applications of Semantic Technologies

TopQuadrant, Inc.

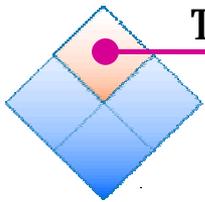
Market  
Needs

Business  
Strategy



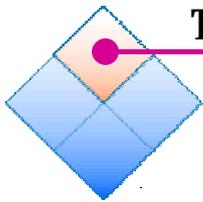
Solution  
Construction

Business  
Results



# Semantic Technology and the Internet

	<i>Static</i>	<i>Dynamic</i>	<i>Transactional</i>	<i>Semantic</i>
<b>Encoding</b>	HTML CGI, Perl, ...	+ RDBMS JSP, ASP, Java, ...	+ XML J2EE, .NET, ...	+ RDF, OWL ?
<b>Creation</b>	Hand crafted by people for people	Generated applying specific templates, used by people	Generated by applications based on fixed schemas, used by applications and people	Generated by applications based on models, used by applications, devices and people
<b>Paradigm</b>	Advertisement, Information, 1 large newspaper  <i>Set of mind = "browse"</i>	A newspaper becomes a catalog  <i>Set of mind = "retrieve/update"</i>	A catalog becomes a transaction platform  <i>Set of mind = "interact"</i>	Platforms connect  <i>Set of mind = "interoperate"</i>
<b>Killer Apps</b>	Marketing  • Browser	Sales  • Search • Content Mgmt • Web Application Servers	Service  • Portals • Process Integration • Web Services	Integration  • Advisors • Personal Agents • IP Apps • Cognitive Engines
	1995	2000	2005	



## According to the Analysts ...

**Gartner**

"Ontology capabilities will become a core technology. [...] By 2010, (taxonomies) will be application integration

"By 2010, ontologic representations w of application inte probability)."

From, Gartner, "Semantic Web Te

**FORRESTER**

evolutionary ontologies) will win out.

ware software agents others will age rapidly.

ers that don't make evolutionary will fall out."

, "How Things Will Communicate", 12/2001

**Bottom Line:** During the next three to four years, ontology tools and techniques will offer the unified semantics needed to support dynamic application integration at the enterprise level.

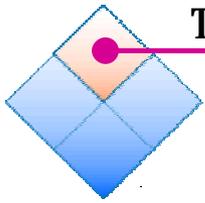
Enterprises should begin to develop the needed semantic modeling and information management skills with their integration competency centers.

From, Gartner, August 2002.

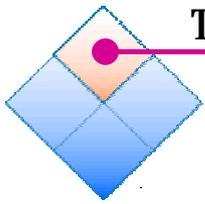
**CIO**

"[...] Semantics-based integration tools are destined to become increasingly powerful and capable, combined with web services applications, the technology could doom middleware as it is currently known."

From, CIO Magazine, August 2002.

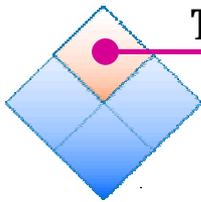


**Which is worth a poll ...**

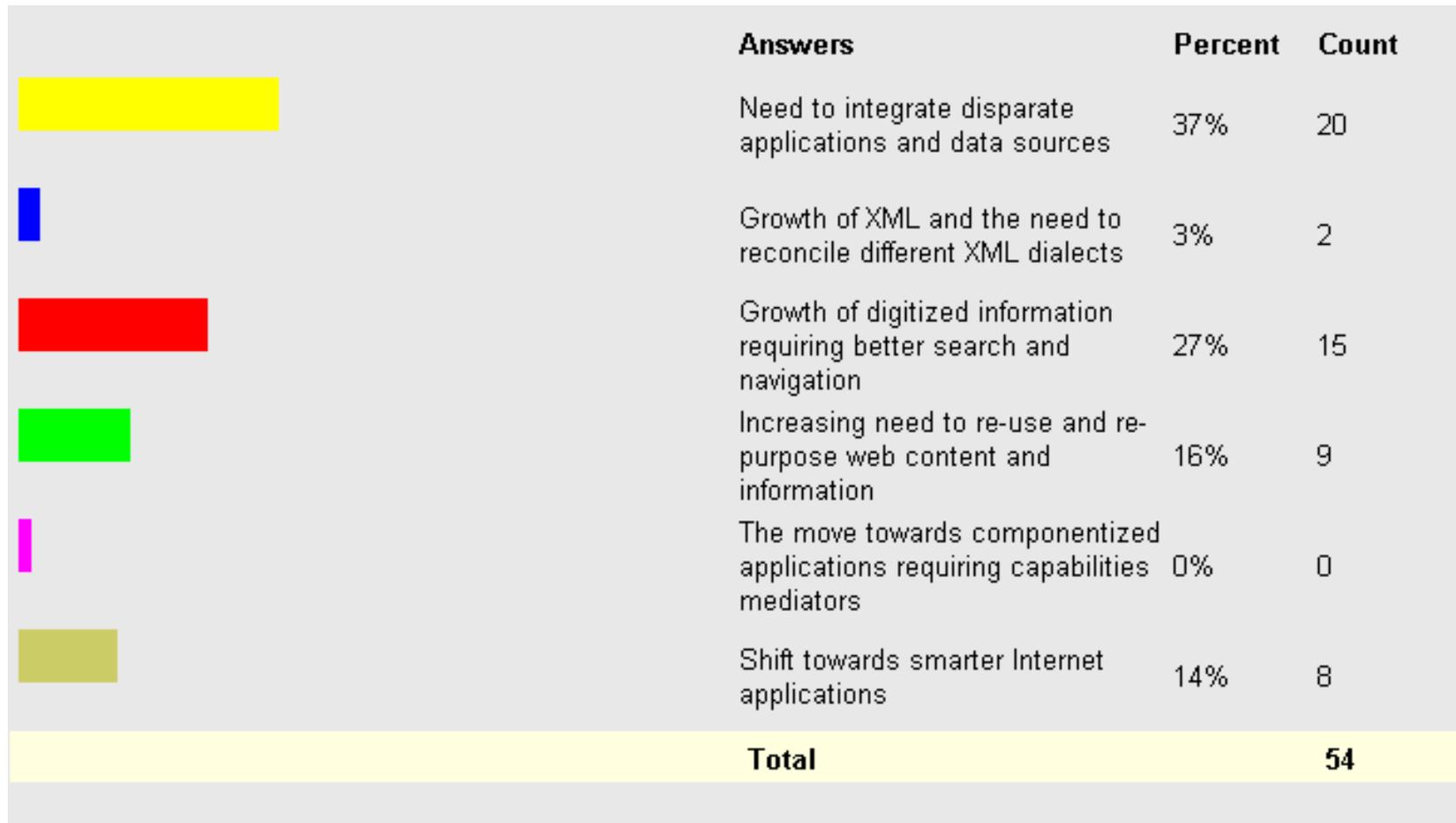


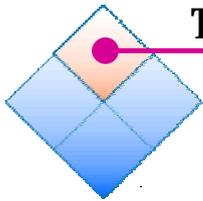
## What do you see as the biggest driver for implementing ontology-based solutions?

1. Need to integrate disparate applications and data sources
2. Growth of XML and the need to reconcile different XML dialects
3. Growth of digitized information requiring better search and navigation
4. Increasing need to re-use and re-purpose web content and information
5. The move towards componentized applications requiring capabilities mediators
6. Shift towards smarter Internet
7. Other

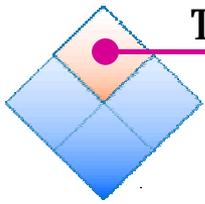


# What do you see as the biggest driver for implementing ontology-based solutions?



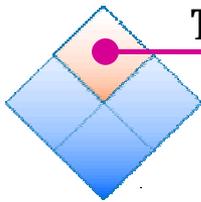


## Another Question

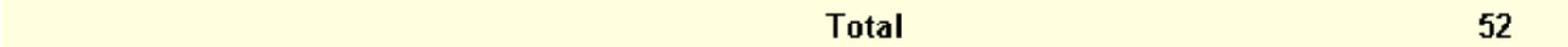


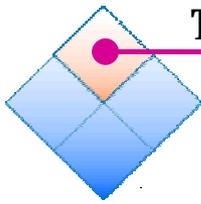
## Which of these needs do you perceive in your organization today?

1. Improve people's ability to find information
2. Enable workers to capture their knowledge
3. Facilitate collaboration via a knowledge portal
4. Reconcile terminology
5. Integrate several sources of data for single-point access
6. Have smart data that draws conclusions based on its meaning



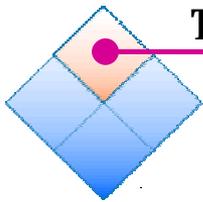
# Which of these needs do you perceive in your organization today?

	Answers	Percent	Count
	Improve people's ability to find information	34%	18
	Enable workers to capture their knowledge	7%	4
	Facilitate collaboration via a knowledge portal	11%	6
	Reconcile terminology	7%	4
	Integrate several sources of data for single-point access	21%	11
	Have smart data that draws conclusions based on its meaning	17%	9
	<b>Total</b>		<b>52</b>



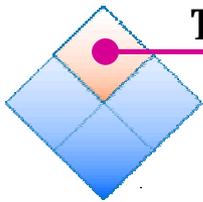
## Some Business Areas where Semantic Technologies have already proven ROI

- ❑ Customer Support/Technical Support
  - Improving self-service functionalities of support
  - Intelligent search
- ❑ E-Commerce
  - Improving sales by presenting products and related information in effective ways
  - Mediation
  - Recommenders
- ❑ Intranets
  - Re-using and dissemination of organizational knowledge
  - Aggregating and repurposing content
  - Support for Communities of Practice
- ❑ Business Intelligence And Surveillance
  - Information Patterns and Connections
  - Sense Making

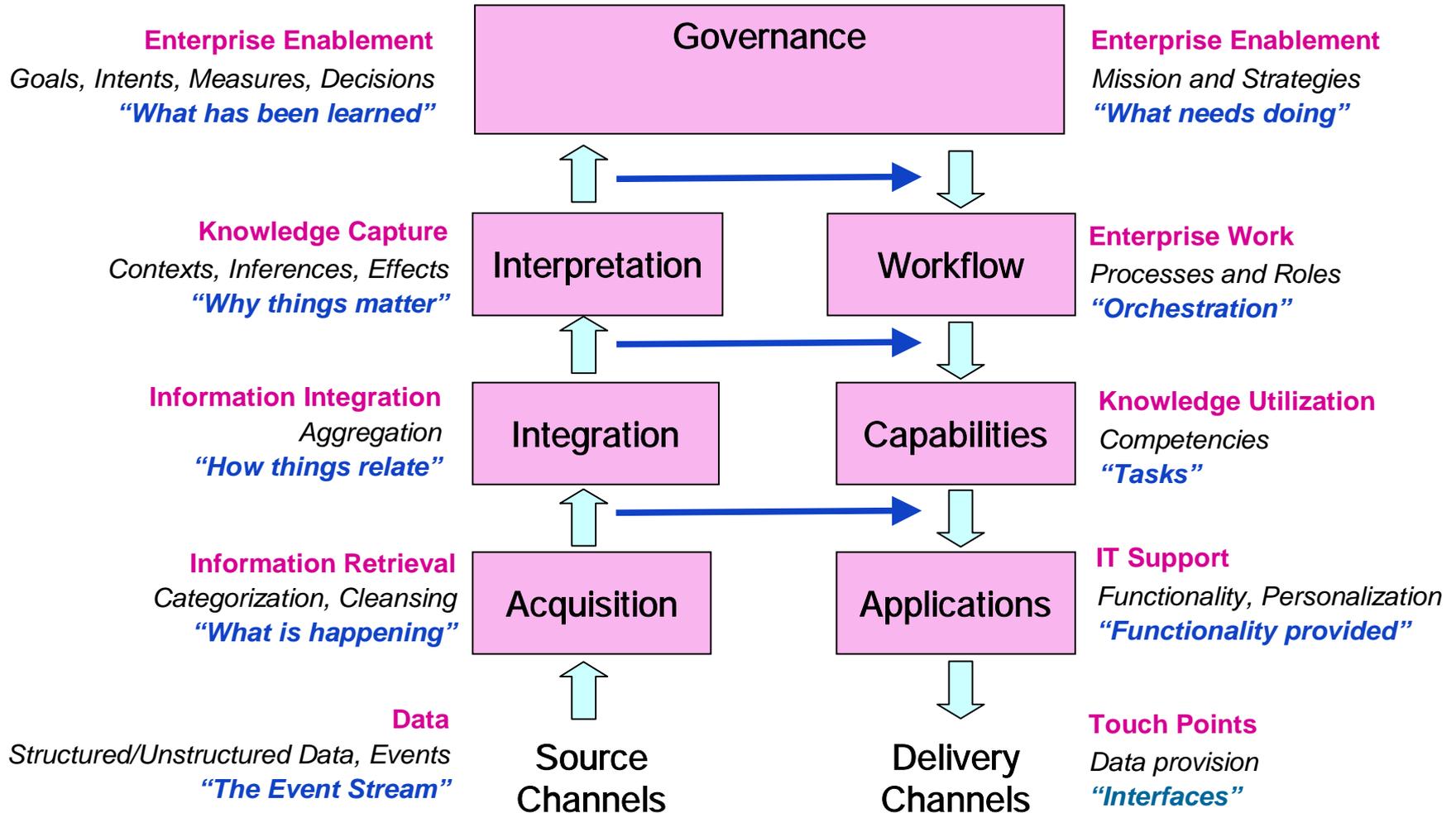


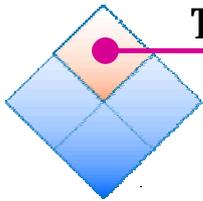
# Application Areas of Semantic Technology

- ❑ Content management
  - Personalized Information
  - Repurposing
  - News feeds
  - Markup
- ❑ Knowledge management
  - Concept-Based Search
  - Context-Aware Retrieval
  - Expert Locators
  - Collaboration
- ❑ Semantic Interoperability
  - Data Integration
  - Information Inferencing
- ❑ Advisors
  - Design Assistants
  - Matchmakers
  - Recommenders
  - Mediators
- ❑ User Interface
  - Dynamic User Interfaces



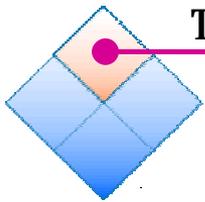
# Making Information Actionable





10:10 AM

# Semantic Technology in Content Management



# Semantic Technology Capability Cases: Content Management

## Documentation Generation

Generative  
Documentation

## Information Re-Purposing

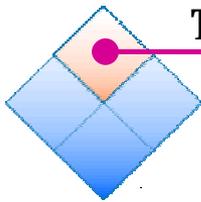
Content  
Repurposer

## Semantic Markup for Improved Search

Automated  
Content Tagger

Content  
Annotator

Semantically  
Enriched Content



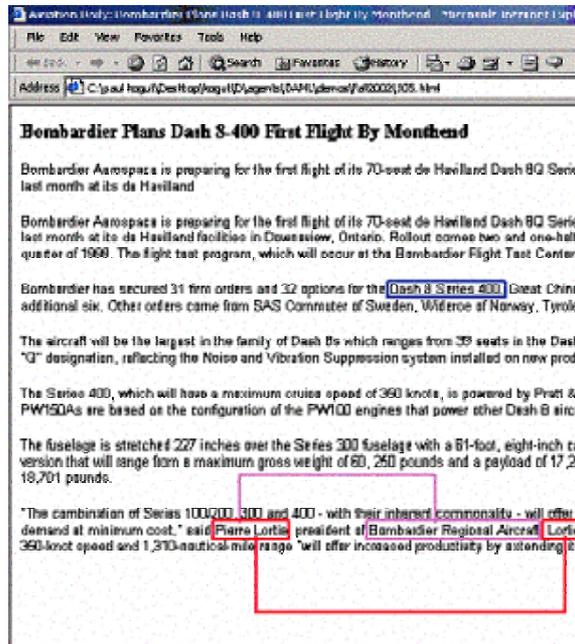
# Semantic Technology Capability Cases: Content Management

Automated Content Tagger

To provide semantic tags that allow a document or other work-product to be "better known" by one or more systems so that search, integration or invocation of other applications becomes more effective. Tags are automatically inserted based on the computer analysis of the information, typically using natural language analysis techniques. A predefined taxonomy or ontology of terms and concepts is needed to drive the analysis.

## "AeroDAML Automated Markup"

The news article is from Aviation Daily. It reports information about Bombardier Aerospace, including information about their Dash 8 Series 400 aircraft, and Pierre Lortie, the president of Bombardier Regional. AeroDAML parses the English text of this document. It recognizes that the Dash 8 Series 400 is an aircraft, and annotates the relationships between "Lortie" and "Bombardier" (including the fact that "Pierre Lortie" and "Lortie" refer to the same person). While AeroDAML does not successfully tag all the subtle relationships in a text, it catches a large number of the simplest ones, reducing the workload for the remaining items to a level manageable by human effort.

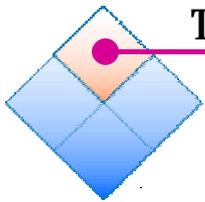


### Entities

```
<aac:AIRCRAFT rdf:about="Dash 8 Series 400">
  <daml:label><![CDATA[Dash 8 Series 400]]></daml:label>
</aac:AIRCRAFT>
```

### Relationships and Co-reference

```
<aac:PERSON rdf:about="Pierre Lortie">
  <aac:PersToOrg rdf:resource="BombardierRegionalAircraft"/>
  <daml:sameIndividualAs rdf:resource="Lortie"/>
  <daml:label><![CDATA[ Pierre Lortie ]]></daml:label>
</aac:PERSON>
```



# News Syndication: RSS 1.0

## RSS?

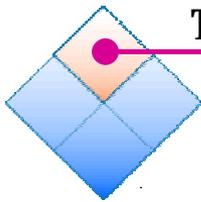
- Really Simple Syndication (RSS 0.91)
- RDF Site Summary (RSS 1.0)

## RSS is a format for syndicating news and news-like content.

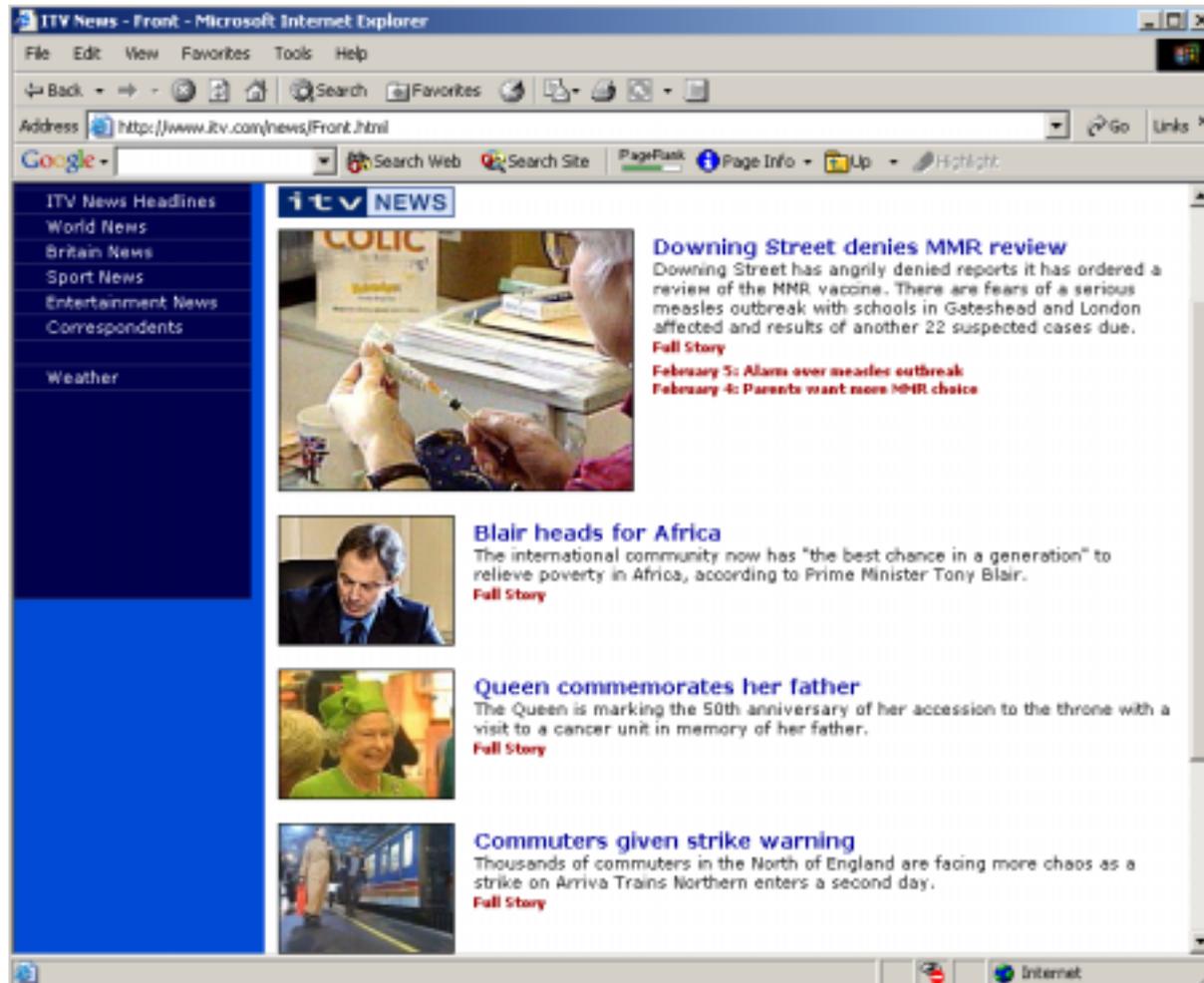
- lightweight multipurpose extensible metadata description
- defines a vocabulary for describing news headlines within news distribution channels

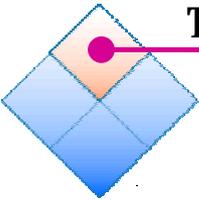
## Reuters, W3C News, Slashdot, XML News, ...

## Based on RDF



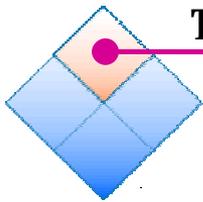
# RSS Example: A News Channel



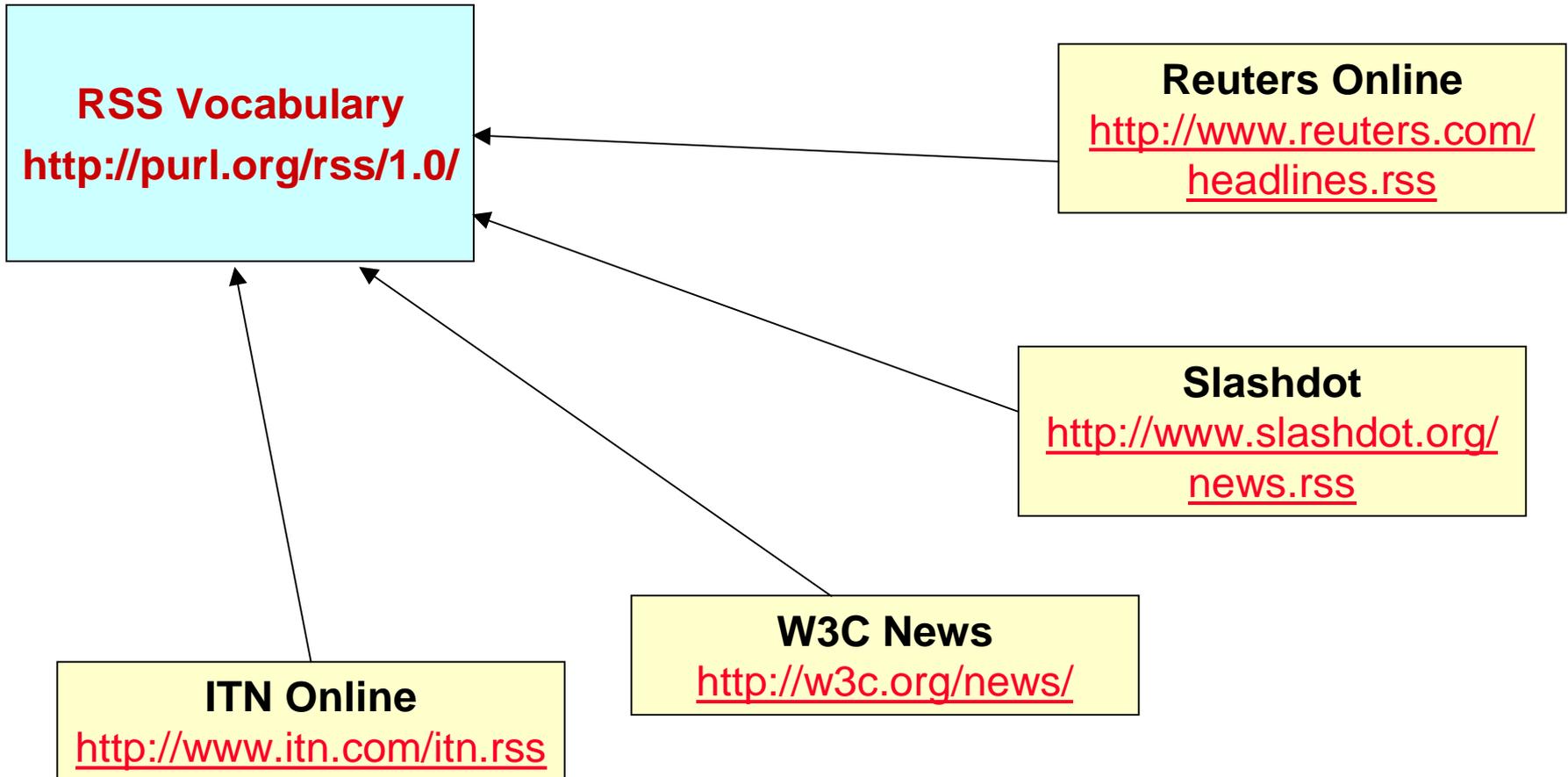


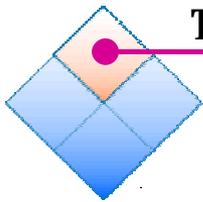
# RSS Vocabulary

- ❑ Defined as RDF Schema at <http://purl.org/rss/1.0/>
- ❑ 5 classes
  - Channel
  - Image
  - Item
  - Textinput
- ❑ 6 properties
  - Items
  - Title
  - Link (HTML link)
  - URL (image locator, src)
  - Description
  - Name



# RSS Instances – The News Channels





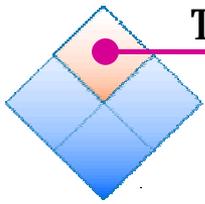
# RSS Element Instances

rss:channel

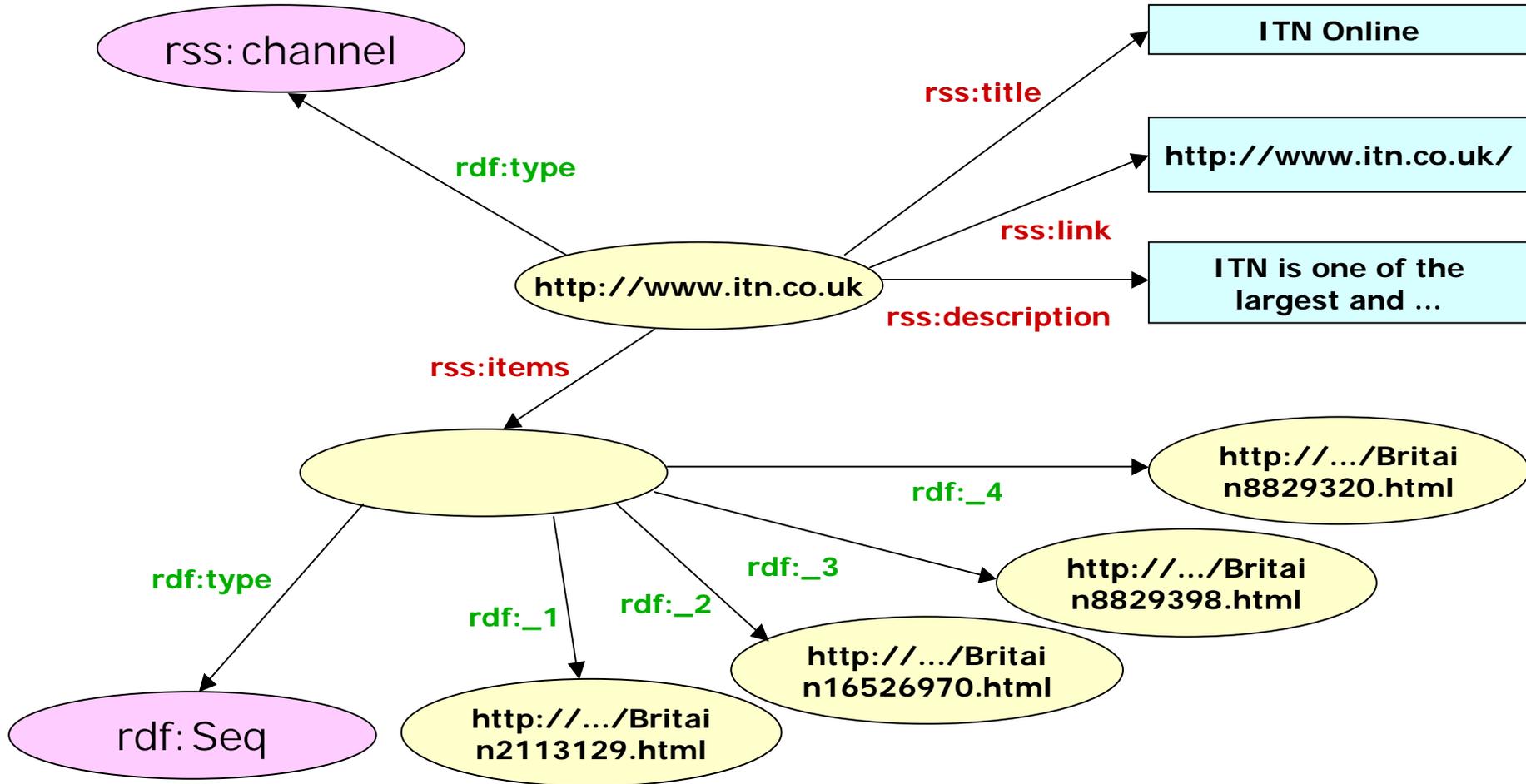
rss:item

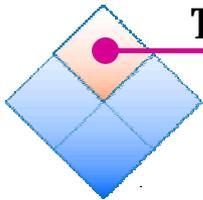
rss:title

rss:description



# RSS Channel – ITN Online News





# RSS Vocabulary – RDF Schema

## □ 5 classes

- Channel
- Image
- Item
- Textinput

```
<rdfs:Class rdf:about="http://purl.org/rss/1.0/channel"
rdfs:label="Channel" rdfs:comment="An RSS information channel.">
  <rdfs:isDefinedBy rdf:resource="http://purl.org/rss/1.0/" />
</rdfs:Class>
```

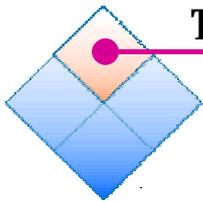
```
<rdfs:Class rdf:about="http://purl.org/rss/1.0/item" rdfs:label="Item"
rdfs:comment="An RSS item.">
  <rdfs:isDefinedBy rdf:resource="http://purl.org/rss/1.0/" />
</rdfs:Class>
```

## □ 6 properties

- Items
- Title
- Link (HTML link)
- URL (image)
- Descriptive
- Name

```
<rdf:Property rdf:about="http://purl.org/rss/1.0/title" rdfs:label="Title"
rdfs:comment="A descriptive title for the channel.">
  <rdfs:subPropertyOf
rdf:resource="http://purl.org/dc/elements/1.1/title" />
  <rdfs:isDefinedBy rdf:resource="http://purl.org/rss/1.0/" />
</rdf:Property>
```

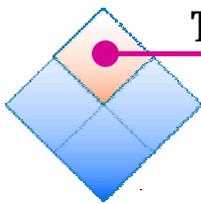
```
<rdf:Property rdf:about="http://purl.org/rss/1.0/name"
rdfs:label="Name" rdfs:comment="The text input field's (variable)
name.">
  <rdfs:isDefinedBy rdf:resource="http://purl.org/rss/1.0/" />
</rdf:Property>
```



# Example of RSS Channel with DC

```
<?xml version="1.0" encoding="UTF-8" ?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns="http://purl.org/rss/1.0/">

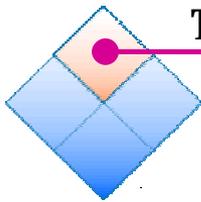
  <channel rdf:about="http://www.itn.co.uk/">
    <title>ITN Online</title>
    <link>http://www.itn.co.uk/</link>
    <description>ITN is one of the largest and most respected independent news
      organisations in the world, producing news and factual programming for
      national and international broadcasters.</description>
    <dc:language>en</dc:language>
    <dc:rights>All rights reserved Independent Television News Limited
      2002</dc:rights>
    <dc:date>02/06/02 10:03:01</dc:date>
    <dc:creator>Ave.Wrigley@itn.co.uk</dc:creator>
    <items>
      <rdf:Seq>
        <rdf:li rdf:resource="http://www.itv.com/news/Britain2113129.html" />
        <rdf:li rdf:resource="http://www.itv.com/news/Britain16526970.html" />
        <rdf:li rdf:resource="http://www.itv.com/news/Britain8829388.html" />
        <rdf:li rdf:resource="http://www.itv.com/news/Britain8829320.html" />
      </rdf:Seq>
    </items>
  </channel>
</rdf:RDF>
```



# Government Use of RSS



References: Ferry Hendriks, "A method for news content syndication", <http://www.govis.org.nz/forums-pres/rss-news-feeds.ppt>, also <http://www.nzqls.govt.nz/> and <http://www.e-government.govt.nz/docs/rss-v-1-0-final>



## PRISM: Publishing Requirements for Industry Standard Metadata

- ❑ An specification for exchanging 'descriptive metadata' in XML
  - Author, title, subject, rights and permissions, relations, timestamps and more ...
- ❑ Open standard developed by publishers and vendors
- ❑ Originally developed to meet the needs of magazines
  - Production, repurposing, aggregation, syndication, rights clearance
- ❑ Applies more broadly
  - to publishing-like operations within other types of organizations
- ❑ Version 1.0 released April 2001
  - See <http://www.prismstandard.org/>



Adapted from: Ron Daniel, "PRISM: An RDF-based Metadata Standard for Publishers", Interwoven, Inc., [http://www2.gca.org/knowledgetechnologies/2001/proceedings/ Daniel&Burman%20Slides.ppt](http://www2.gca.org/knowledgetechnologies/2001/proceedings/Daniel&Burman%20Slides.ppt)

# PRISM Goals

## ❑ Improved retrieval

- Synonyms and classification for better searching and browsing – even across different collections

## ❑ Routing and personalization

- Deliver targeted feeds based on subject codes
  - ⇒ Links to more relevant material
  - ⇒ Navigation by multiple categories

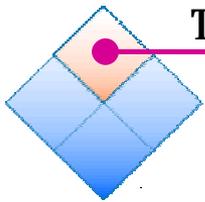
## ❑ Tracking Rights

## ❑ Additional purposes

- Enhanced content styling and presentation
- Support of basic business functions



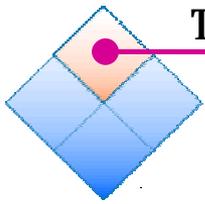
Adapted from: Ron Daniel, "PRISM: An RDF-based Metadata Standard for Publishers", Interwoven, Inc., [http://seminars.seyboldreports.com/2001\\_san\\_francisco/files/presentations/102/daniel\\_ron2.ppt](http://seminars.seyboldreports.com/2001_san_francisco/files/presentations/102/daniel_ron2.ppt)



# PRISM Overview

- ❑ PRISM is a metadata specification to meet needs of publishers
  - Reduce costs around current operations
  - Enable easier multi-purposing of content
  - Support discovery, licensing, and other operations needed by publishers
- ❑ Builds on RDF and Dublin Core
- ❑ Adds elements for publication-related operations

Adapted from: Ron Daniel, "PRISM: An RDF-based Metadata Standard for Publishers", Interwoven, Inc., <http://www2.gca.org/knowledgetechnologies/2001/proceedings/Daniel&Burman%20Slides.ppt>



# Dublin Core

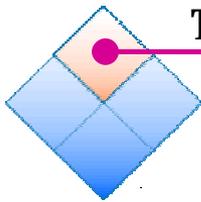
## □ History

- Began in 1995 as essential elements for discovering 'document-like objects' on the web
- Was generalized slightly in 1996 ('Creator' instead of 'Author') to deal with photographs and non-text resources
- See <http://purl.org/dc>

## □ DC Elements:

Title	Subject	Identifier
Creator	Description	Language
Contributor	Coverage	Rights
Publisher	Relation	Format
Date	Source	Type

Adapted from: Ron Daniel, "PRI SM: An RDF-based Metadata Standard for Publishers", Interwoven, Inc., <http://www2.gca.org/knowledgetechnologies/2001/proceedings/Daniel&Burman%20Slides.ppt>

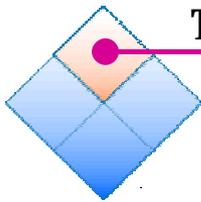


# PRISM Technical Foundations

- ❑ PRISM is built on RDF, XML + Namespaces, and the Dublin Core
- ❑ Simple descriptions look simple

```
<rdf:Description about="isbn:0-385-33415-X">  
  <dc:title>Roget's 21st Century Thesaurus</dc:title>  
  <dc:creator>Princeton Language Institute</dc:creator>  
  <dc:creator>Barbara Ann Kipfer, Head Lexicographer  
  </dc:creator>  
  <dc:publisher>Delta Trade Paperbacks</dc:publisher>  
  <dc:date>1999</dc:date>  
</rdf:Description>
```

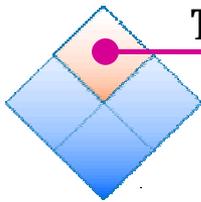
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# PRISM: Types of Values

- ❑ RDF has 'triple' model of Subject, Predicate, Object
- ❑ PRISM Objects can be strings, resource references, or in-line definitions of resources:
  - `<dc:creator>John Smith</dc:creator>`
  - `<dc:creator rdf:resource="lcnaf:Smith,%20John%201945"/>`
  - `<dc:creator>`
    - `<rdf:Description ID="123">`
    - `<rdf:label>John Smith</rdf:label>`
    - `</rdf:Description>`

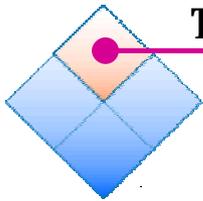
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## PRISM: Use of Controlled Vocabularies

- ❑ 'Controlled Vocabularies' encompass ontologies, taxonomies, authority lists
- ❑ Controlled vocabularies enable sophisticated operations.
- ❑ For example:
  - `<dc:creator>John Smith</dc:creator>` vs.  
`<dc:creator rdf:resource="empid:280804"/>`
  - `<dc:creator>`
    - `<pcv:Descriptor rdf:about="empid:280804">`
    - `<pcv:label>John Smith</pcv:label>`
    - `<x:division>Graphic Arts</x:division>`
    - `</pcv:Descriptor>`
  - `</dc:creator>`

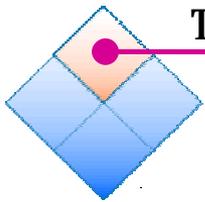
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# What's In The PRISM Specification?

- General Purpose Elements (creator, date, format, ...)
- Subject Description (subject, location, person, organization, ...)
- Provenance (receptionTime, source, ...)
- Timestamps (creationTime, modificationTime, ...)
- Resource Relationships (isVersionOf, hasComponent, ...)
- Rights Tracking (rightsAgent, releaseTime, #notReusable, ...)
- Controlled Vocabularies (code, label, broaderTerm, ...)
- In-line Markup (object, organization, location, person, ...)

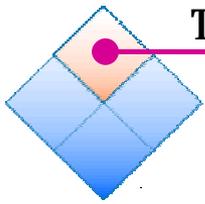
Adapted from: Ron Daniel, "PRISM: An RDF-based Metadata Standard for Publishers", Interwoven, Inc.,  
[http://seminars.seyboldreports.com/2001\\_san\\_francisco/files/presentations/102/daniel\\_ron2.ppt](http://seminars.seyboldreports.com/2001_san_francisco/files/presentations/102/daniel_ron2.ppt)



# Classes of PRISM Elements

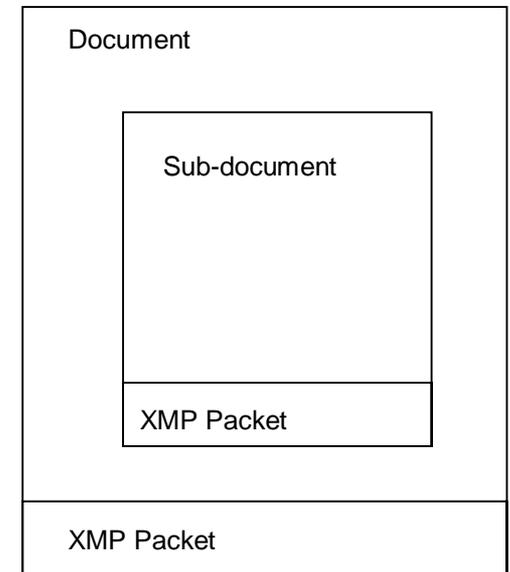
- Provenance
  - dc:publisher, prism:distriubutor, dc:source
- Timestamps
  - prism:creationTime, prism:modificationTime, prism:receptionTime, ...
- Subject Description
  - dc:subject, prism:location, prism:org, prism:objectTitle, prism:event, ...
- Resource Relationships
  - hasPart / isPartOf, hasCorrection / isCorrectionOf, ...
- Rights and Permissions
  - prism:copyright, prism:releaseTime, prism:expireTime, prism:rightsAgent
  - prl:usage, prl:geographic, prl:industry
- Controlled Vocabularies
  - pcv:label, pcv:id, pcv:definition, ...
- In-line Markup
  - pim:organization, pim:location, pim:industry, pim:person, ...

Adapted from: Ron Daniel, "PRISM: An RDF-based Metadata Standard for Publishers", Interwoven, Inc., <http://www2.gca.org/knowledgetechnologies/2001/proceedings/Daniel&Burman%20Slides.ppt>



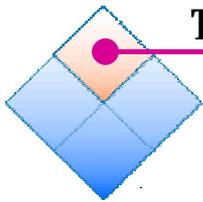
# Adobe XMP

- ❑ Adobe eXtensible Metadata Project
- ❑ Adobe tools are instrumented to track metadata
  
- ❑ Metadata represented in RDF
- ❑ Documents have parts, and
- ❑ ... each part has its own metadata
- ❑ RDF keeps track of metadata for parts and wholes



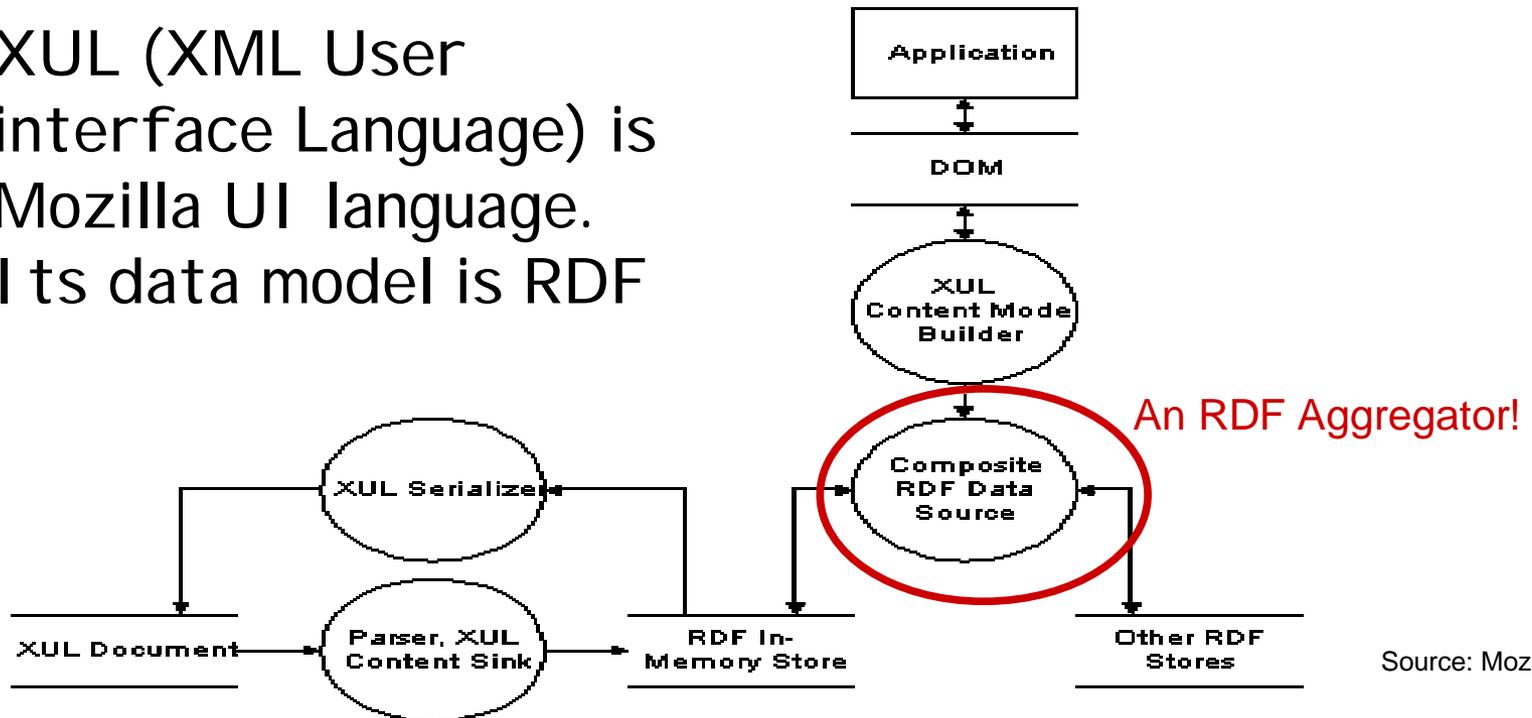
# RDF Application: Mozilla

- ❑ Mozilla is Open Source version of Netscape Web browser
- ❑ Developers all over the world contribute to the design
- ❑ Why RDF?
  - Interface design in a distributed environment is a distributed data problem
  - Local settings can override factory settings can override server settings – how do you integrate all this information into one coherent structure?
  - Distributed development means many classes of developers at different points in the lifecycle.

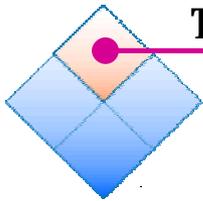


# RDF Application: Mozilla (continued)

- ❑ RDF is used with an “aggregator” to bring multiple RDF sources together
- ❑ XUL (XML User interface Language) is Mozilla UI language. Its data model is RDF

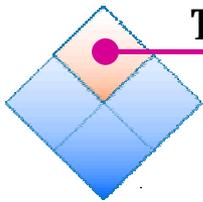


Source: Mozilla.org



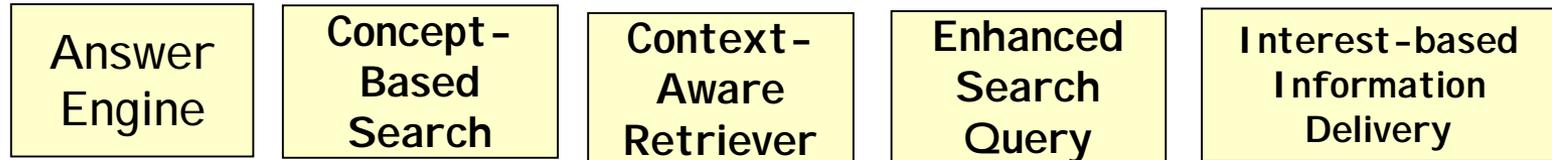
10:30 AM

# Semantic Technology in Knowledge Management

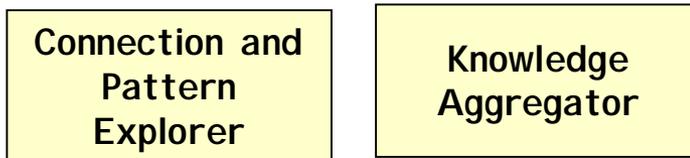


# Semantic Technology Capability Cases: Knowledge Management

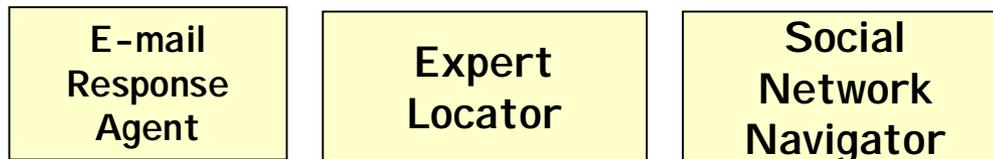
## □ Knowledge Provisioning

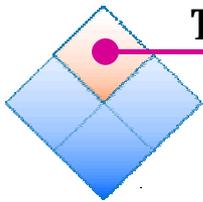


## □ Knowledge Discovery



## □ Collaboration and Communities of Practice





# Semantic Technology Capability Cases: Knowledge Management – Answer Engine

Answer Engine

Solution Stories

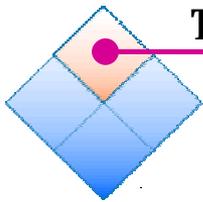
1

2

One **OneStep at LexisNexis**

LexisNexis, a leading information provider for legal, corporate and government professionals, publishes tax, legal, regulatory and other business information. It wanted to have its information easily accessible to users who are not researchers. The solution is deployed on top of its RedBooks.com site, profiling over 32,000 advertising agencies, and CompanyAffiliations.com, profiling over 175,000 companies. The iPhrase OneStep engine interprets the meaning of the question, searches all databases, and presents an appropriate answer to the user in real time. If needed it creates a customized table on the fly.

financial decisions. Many requests are now being serviced by the web site without the need to call on the customer service.



# Semantic Technology Capability Cases: Knowledge Management – Concept-Based Search

Concept-  
Based  
Search

To provide precise and concept-aware search capabilities specific to an area of interest using knowledge representations across multiple knowledge sources both structured and un-structured.

SIEMENS

Search Table of contents Home Personalisation English

Product Support Services Online-Services Information Support Shop

Automation and Drives Service & Support

SEARCH IN SERVICE & SUPPORT

powered by

Search range:

- Complete Offer
- Product Support

Search in Topic: All Topics

- FAQs
- Downloads
- Manuals
- Updates
- Test Reports

Services

- Online-Services
- Information
- Support Shop

Please type in your question:

plc y2k

No. Hits: 10

Information on search

Documents found:

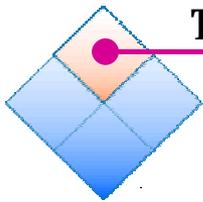
ReL	Date	ID	Title
99%	12/17/1999	405091	Behavior of COROS LS-B in the year 2000 [FAQs]
99%	11/08/1999	1315477	Year 2000 compliance of FB29 and FB129 in the AG150 SU [FAQs]
99%	09/21/1999	1138437	COROS LS-B without installation of the correction package 2000 [FAQs]
99%	08/19/1999	1000045	Year 2000 compliance of DIMOS 256 modules with the MLFB No. 6ES5256-3AA11 (-3AA21) [FAQs]
99%	03/25/1999	758801	Information on year 2000 problems with VIDEOMAT QS, TE and ZE [FAQs]
98%	09/11/1998	593793	Year 2000, effects at date test for year 2000, MMC software V4 x [FAQs]
98%	07/29/1998	409149	Year 2000 Problem [FAQs]
68%	02/27/2002	7379933	S5 back-up batteries for S5 controllers [FAQs]
68%	02/12/2002	2792880	Operating system updates for S7-412-CPU [Downloads]
68%	02/12/2002	10154913	Enabling password protection in an S7 CPU [FAQs]

Contact

© 2002 Siemens AG, Automation and Drives

## “Siemens Simatic Knowledge Manager”

Siemens Simatic system is a self-service WEB application for Siemens Industrial Control Products. In the screen shot above, "plc y2k" query returns a number of documents even though none of them contain the specified text string. The system "understands" the concepts of "y2k" and "plc" (Programmable Logic Controller) and finds documents that contain these or similar concepts. A knowledge model or a map of concepts used by the system operates as a unifying intelligent index seamlessly integrating information located in different repositories. Simatic is available over the web and on CD, as an intelligent knowledgebase.



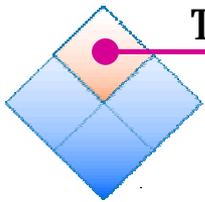
# Semantic Technology Capability Cases: Knowledge Management

Interest-based Information Delivery

Filter information for people needing to monitor and assess large volumes of data for relevance, volatility or required response. The volume of targeted information is reduced based on its relevance according to a role or interest of the end user. Sensitive information is filtered according to the "need to know".

## “Personalized News and TV Program Guide”

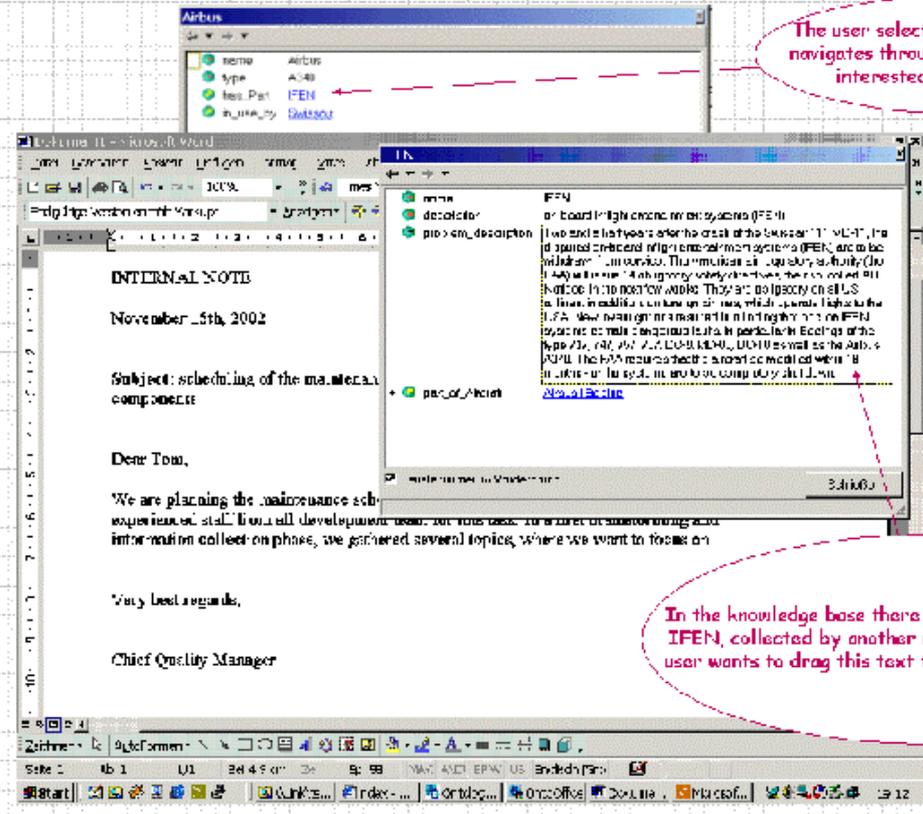
Personal TV Advisor uses a combination of model-based case based reasoning (CBR) and collaborative filtering technology to identify relevant information. Users set up their initial profiles and preferences based on the categories in a model of the entertainment domain. System continuously improves and refines its program recommendations learning from the feedback of the individual users (thumbs up/thumbs down function), as well as others who have similar tastes. Content can be delivered through a portal or via wireless interface.



# Semantic Technology Capability Cases: Knowledge Management

Context-Aware Retriever

To retrieve knowledge from one or more systems that is highly relevant to an immediate context, through an action taken within a specific setting -- typically in a user interface. A user no longer needs to leave the application they are in to find the right information.

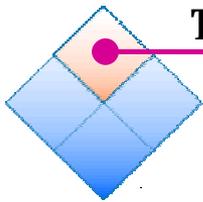


The user selects "show attributes" and navigates through knowledge base. He is interested in the "IFEN" part.

## "OntoOffice Collaborative Maintenance"

As a user is writing an internal memorandum about the onboard components of an aircraft, OntoOffice recognizes from the context that it has information from the knowledge base that could be relevant for this issue. It offers the user some choices of the information it has, including a particular on-board system. The user can select any of these items, viewing the detailed information that was stored with that knowledge item, bringing the information into the user's current work flow. OntoOffice monitors the input into any of a number of well-known office applications, automatically checking it against the enterprise knowledge base. Relevant entries are displayed for the user's benefit.

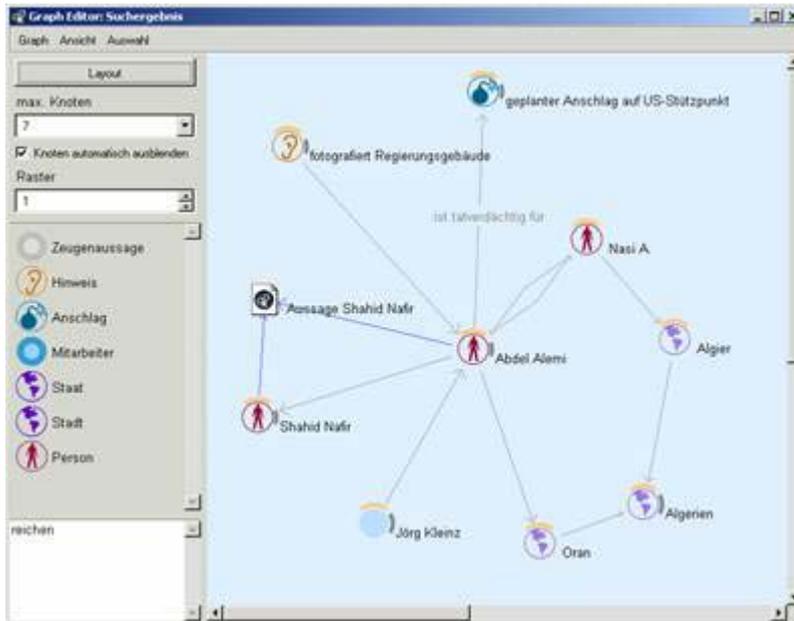
In the knowledge base there is a problem description of IFEN, collected by another user via OntoAnnotate. The user wants to drag this text to the MS Word document.



# Semantic Technology Capability Cases: Knowledge Management

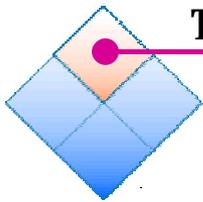
Connection and  
Pattern  
Explorer

To enable the discovery of relevant information in disparate but related sources of knowledge, by filtering on different combinations of connections or by exploring patterns in the types of connections present in the data.



## “Knowledge Management for a german land office for the protection of the constitution”

A government agency, which investigates and analyzes all activities against the German constitution, needs to see more than one evidence of suspicious activity or trend before it decides to take an action. The agency has access to large amounts of information from different sources. Quickly analyzing and understanding chains of possible connections between different facets of the data is challenging. The Solution was to use a semantic network to combine, explore and filter on selected connections. An application can be dynamically configured to focus on and analyze different subsets in the chain of relationships. In the example above three different, but potentially inter-related searches are combined: 1) All people with Muslim background in a certain area 2) Everyone who has been mentioned in a hint from the population (e.g. have been seen taking pictures of government buildings or meeting in otherwise empty apartments) 3) All people who are loosely connected to a terrorist organization (e.g. know someone who is active in a group which is associated with one, or live together with someone who is studying at the same facility where a known member of a terrorist organization studied).



# Semantic Technology Capability Cases: Knowledge Management - 2

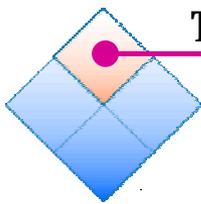
## Expert Locator

To provide users with convenient access to experts in a given area who can help with problems, answer questions, locate and interpret specific documents, and collaborate on specific tasks. Knowing who is an expert in what can be difficult in an organization with a large workforce of experts. Expert Locator could also identify experts across organizational barriers.



## “Exploiting a Thesaurus-Based Semantic Net for Knowledge-Based Search”

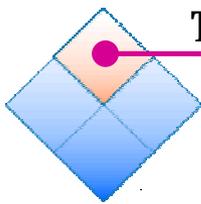
Boeing has a large workforce of experts making it hard to find the right person. This web-based system returns details on potentially appropriate experts. The Boeing technical thesaurus was harnessed to create expert profiles. Boeing Technical Libraries already had made a considerable investment to develop by hand a technical thesaurus in the form of a semantic network. It incorporates 37,000 concepts with an additional 19,000 synonym concept names, and 100,000 links including broaderTerm, narrowerTerm, and relatedTerm. The developers harnessed techniques from artificial intelligence to refine the thesaurus by fixing missing links in the semantic network to give a useful online engineering ontology that contains many complex concepts. The infrastructure includes innovative use of RDF and F-Logic. It also includes a flexible and general architecture for integrating meta-data storage and retrieval services with template languages



# AKT CS Aktive Space: Dynamic Communities of Practice

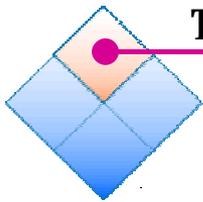
# AKT Aktive Space Content

- ❑ Content harvested and published from multiple Heterogeneous Sources of UK Higher Education directories
- ❑ 2001 RAE submissions
- ❑ UK EPSRC project database
  - all grants awarded by EPSRC in the past decade
- ❑ Details on personnel, projects and publications:
  - all AKT partners
  - all 5 or 5\* CS departments in the UK
  - Automatic NL mining: Armadillo
- ❑ Additional resources
  - All the world's countries (from ISO3166-1)
  - All UK administrative areas (from ISO3166-2)
  - All UK settlements listed in the UN LOCODE service
  - All the world's airports, from the IATA - all integrated via the AKT reference ontology



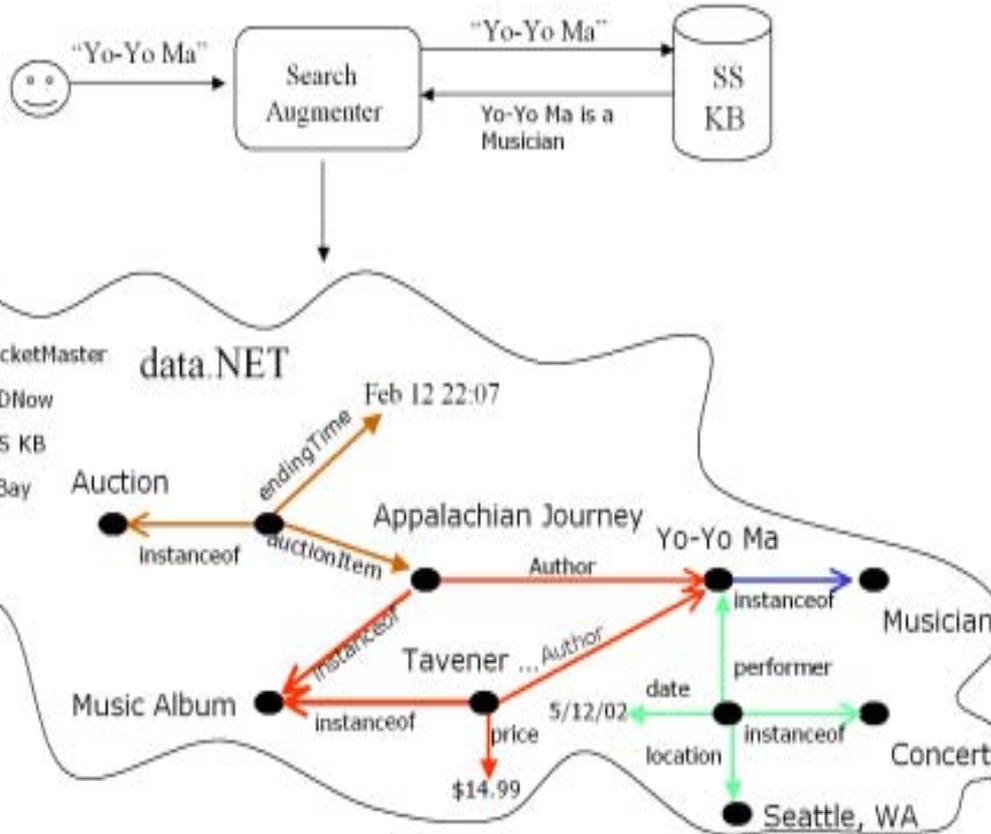
## AKT 3store – RDF triplestore

- ❑ Database optimised for RDF storage and retrieval
  - Design based on the belief that the efficient storage and retrieval of vast quantities of RDF data with a few simple inferences is better than the inefficient storage of a small amount of data with more sophisticated inferences.
- ❑ Supports taxonomic inferences for class and property hierarchies



# RDF: Music Searches

## Searching for Music from Yo-Yo Ma

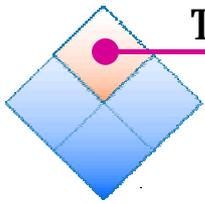


“Many KR systems had a problem merging or interrelating two separate knowledge bases. They therefore did not scale, or pass the test of independent invention. ...

The RDF work, by contrast is designed for this in mind, and the retrospective documentation of relationships between originally independent concepts.”

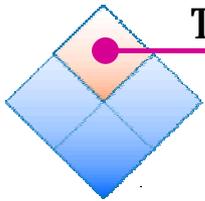
[From “What the Semantic Web can represent”, Tim Berners-Lee, Sept. 1998, <http://www.w3.org/DesignIssues/RDFnot.html>]

[Source: R.V.Guha, IBM Research, Rob McCool, Stanford KSL]



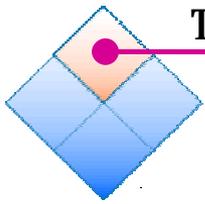
## RDF Example: FOAF

- ❑ "Friend of a Friend"
- ❑ Uses the RDF ability to merge information to create a shared community of topical information
- ❑ Extended version of popular "blog" trend
- ❑ Includes "cool" tools:
  - "foaf-a-matic" – simple RDF generator
  - Foaf Explorer
  - Foaf chat agent
  - Foaf-naut graphical navigator



10:40 AM

# Semantic Interoperability



# Interoperability is not one thing

## □ Interoperability is:

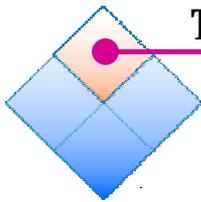
- Data Translation
- Information Exchange
- Knowledge Sharing
- Integration of Disparate Systems
- Data Consolidation
- Component Interchange

## □ According to the IEEE

- the ability of two or more systems or components to exchange information and to use the information that has been exchanged

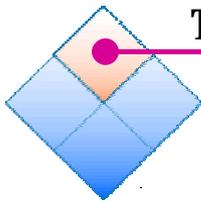
## □ According to the IETF (Internet Engineering Task Force)

- "interoperable" means to be functionally equivalent or interchangeable components of the system or process in which they are used. [RFC 2026, section 4.1.2]



# The Enterprise Data Problem

- ❑ Enterprise business information is stored & transmitted in thousands of incompatible data formats
  - Different technologies
    - ⇒ VSAM, Hierarchical, Relational, XML, ...
    - ⇒ Structured vs Unstructured (Document Repositories)
  - Schemas with different “data semantics” (business meaning)
    - ⇒ Different names for the same thing
    - ⇒ Different definitions for the same thing
  - Databases with different parts of complete picture
- ❑ Leaving enterprises with:
  - Poor knowledge of data environment
  - No shared business vocabulary or meaning of data
  - Data out of context
  - No consolidated view of data



# Data Dictionaries and Registries offer a way to catalog and share knowledge

**Analytical Precision**

**Definition:** A measure of the agreement among individual measurements of the same property in duplicate laboratory samples (duplicate laboratory spiked samples) under prescribed similar conditions to estimate variability in the measurement method or procedures.

**XML Tag:** AnalyticalPrecisionMeasure

**Registration Authority:** XXX-XXX-XXX U.S. Environmental Protection Agency

**Reg Auth ID:** 1

**Data Identifier:** 89447

**Version:** 1

**Registration Status:** Recorded

**Value Domain:** [Analytical Precisions](#)

**Data Concept:** [Analytical Precision Label](#)

**Representation Class:** [Measure](#)

**Administration Status:** Review for Standard

**Datatype:** Alphanumeric

**Format:** A(12)

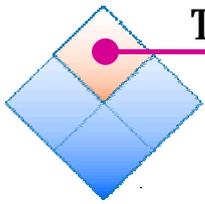
**Maximum Character Quantity:** 12

**Minimum Character Quantity:** 1

**Explanatory Comment:** Alternate Names: Precision of Value  
Precision is expressed as:  
(A) Standard Deviation (SD)  $SD = \sqrt{[(\sum (x_i - \text{avg } x)^2) / (n-1)]}$   
(B) Percent Relative Standard Deviation (% RSD),  $\% RSD = (SD / \text{avg } x) \times 100$   
(C) Relative Percent Difference (RPD),  $RPD = \frac{|(X1 - X2)|}{(X1 + X2) / 2} \times 100$

- ❑ What is Data Registry?
  - A place to keep facts about characteristics that are necessary to clearly describe, inventory, analyze, and classify data.
  - A standard defined by I SO 11179

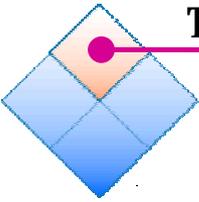
- ❑ Key Interoperability Questions not addressed:
  - In what databases does this element "live"?
  - What applications use it?
  - What elements depend on it or relate to it? In what ways?



# The Enterprise Applications Problem

- ❑ Enterprise applications are implemented in silos
  - Different technologies
    - ⇒ Custom built, Siebel, SAP, PLM, ...
    - ⇒ COBOL, Java, Microsoft, ..
  - Unsynchronized Business Logic
    - ⇒ Conflicting business rules
    - ⇒ The same business rules repeated in many places
- ❑ Leaving enterprises with:
  - Poor knowledge of application environment
  - Inconsistent enforcement of business policies
  - **Brittle and expensive systems** - high degree of custom coding and costly ongoing maintenance





## The Problem according to a major software vendor

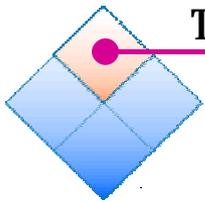
"Semantic differences, remain the primary roadblock to smooth application integration, one which Web Services alone won't overcome.

Until someone finds a way for applications to understand each other, the effect of Web services technology will be fairly limited.

When I pass customer data across [the Web] in a certain format using a Web Services interface, the receiving program has to know what that format is.

You have to agree on what the business objects look like. And no one has come up with a feasible way to work that out yet -- not Oracle, and not its competitors..."

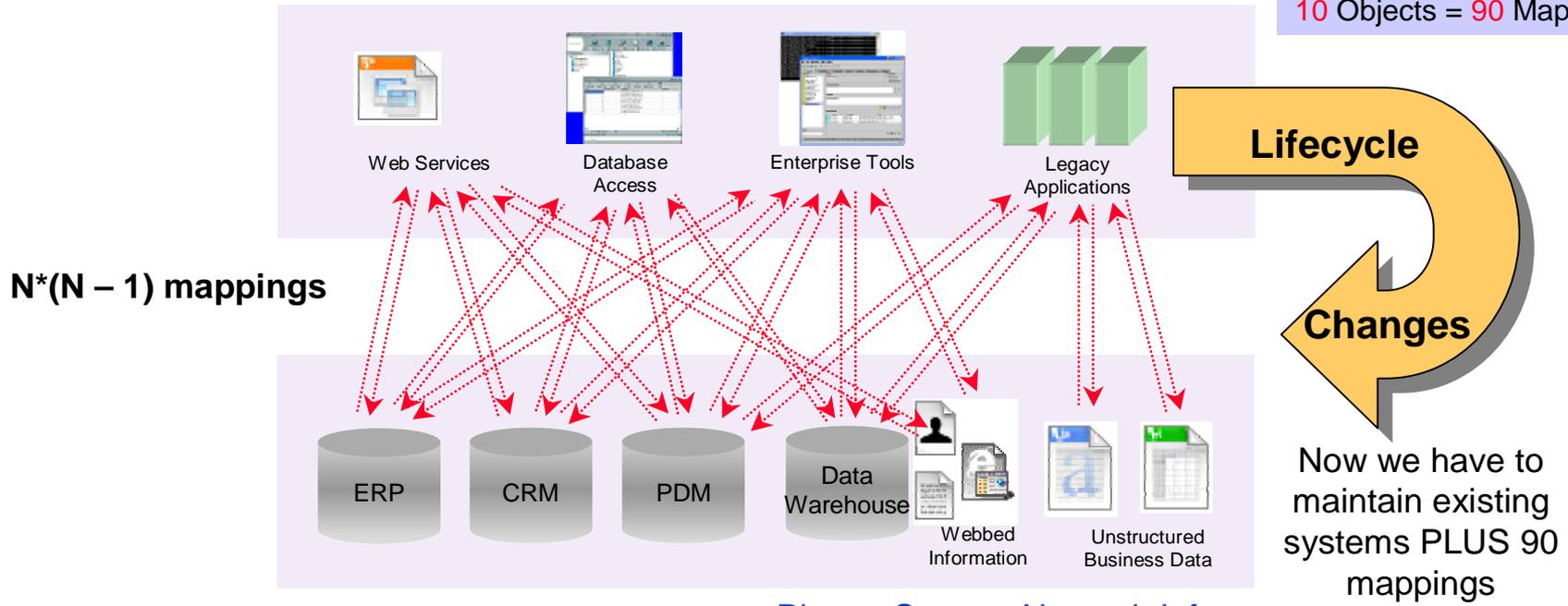
-- Oracle Chairman and CEO Larry Ellison



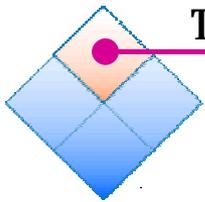
# Expedient Approaches often magnify the Problem

- ❑ A one to one mapping system between each business object doesn't scale in the changing business environment.
- ❑ It is error prone because the person doing the mapping must understand nuances of both systems

2 Objects = 2 Mappings  
3 Objects = 6 Mappings  
4 Objects = 12 Mappings  
5 Objects = 20 Mappings  
·  
·  
10 Objects = 90 Mappings

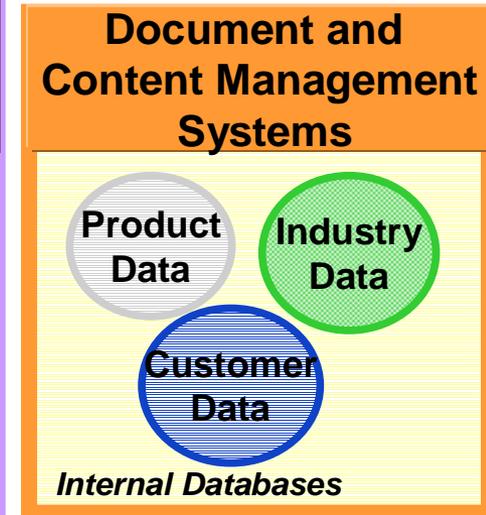
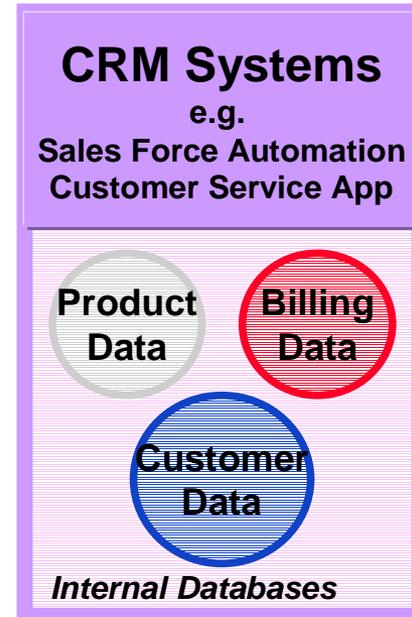
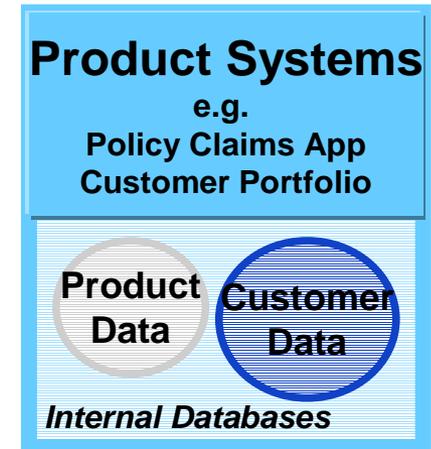
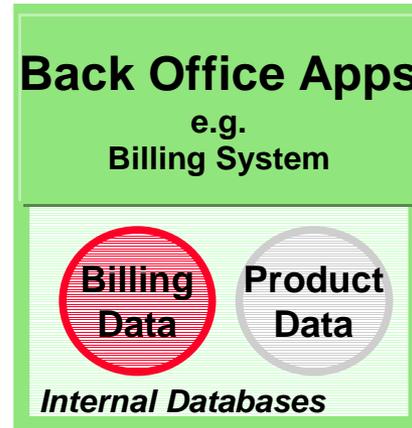


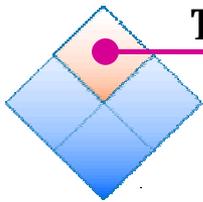
Picture Source: Network Inference



# The technical challenge of application silos

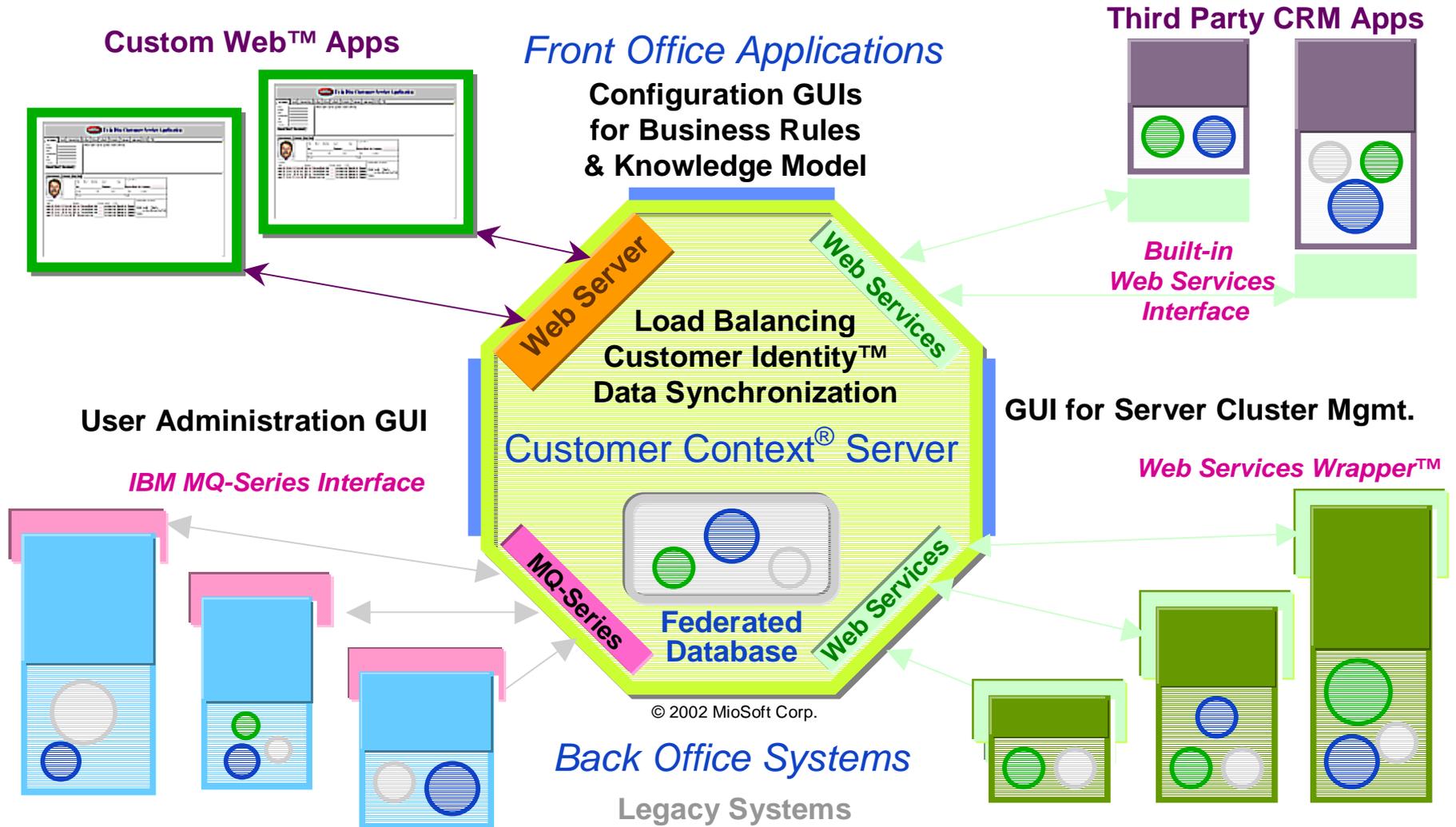
- ❑ Application silos
  - Overlapping, Inconsistent and un-leveraged Data
- ❑ Data Warehouses
  - don't work in real time
  - don't integrate unstructured data - 70% of all information
- ❑ Technology vendors
  - offering unique "magic bullets"

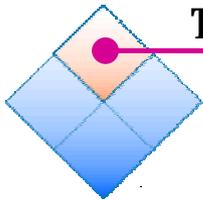




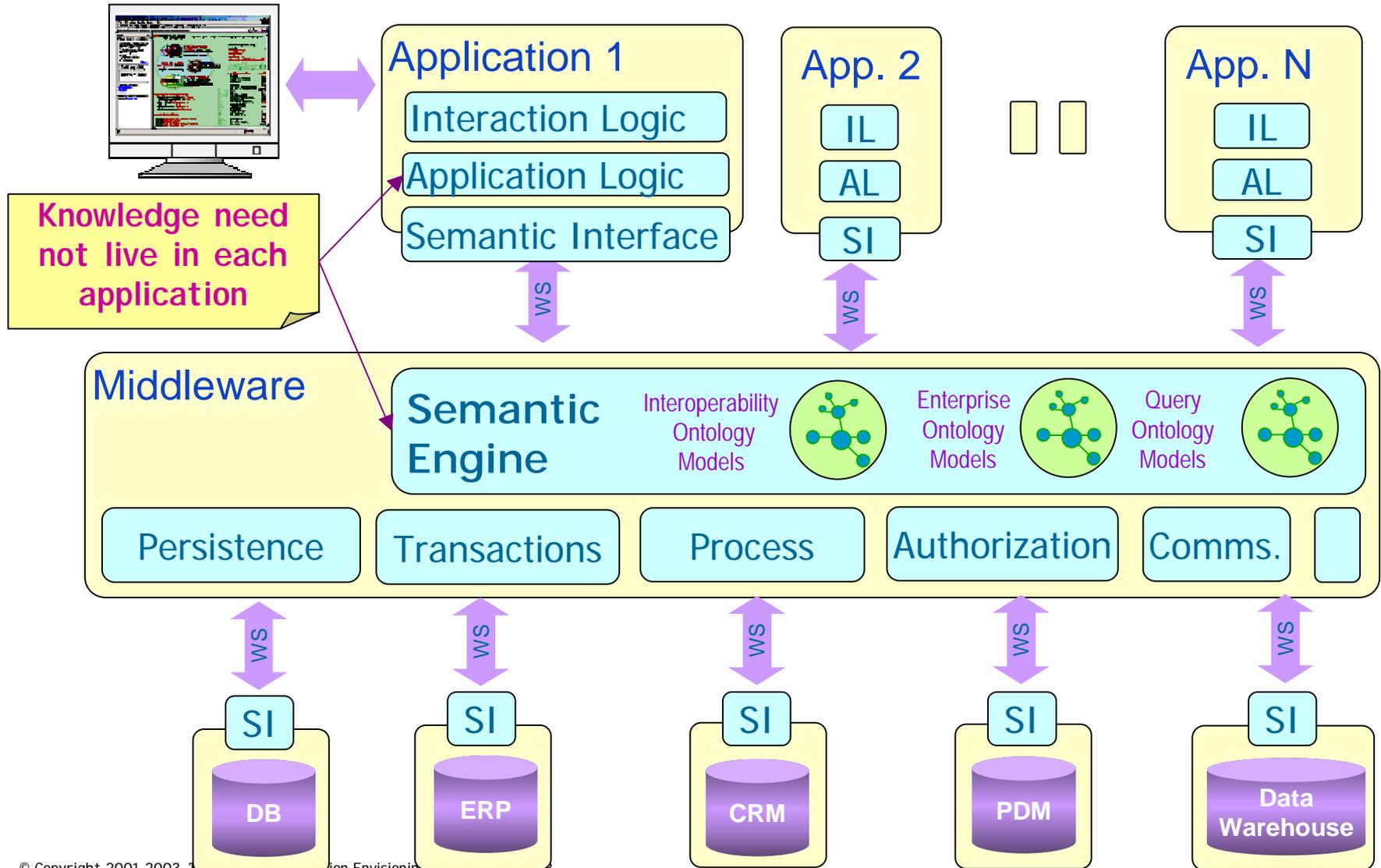
# How new technology helps to solve challenges

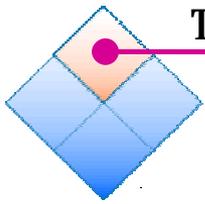
## Web Services within a Context Server Knowledge Architecture





# Semantic Technology allows knowledge to be shared across applications enabling interoperability

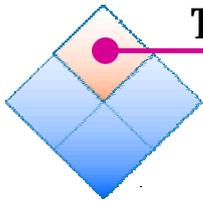




# Interoperability Patterns

- ❑ Adapter
  - “Provides technical connectivity”
- ❑ Mapper
  - “Map to one another”
- ❑ Hub and Spoke
  - “Map to a common model”
- ❑ Translate and Repurpose
  - “Translate between sources and targets”
- ❑ Tuple Spaces
  - “Asynchronous Blackboard”
- ❑ Publish and Subscribe
  - “Asynchronous Interest-based Notification”
- ❑ Semantic Mediator
  - “Knowledge-centric Integration”

Each Pattern carries a set of Business and Technical Implications



# The move towards “smart data”

- ❑ “Smart data” and automated services can amplify enterprise infrastructures far beyond current capabilities

- Smart data classified

- ❑ XML provides encoding

- ❑ XML shifts data, BUT

- No semantics except by explicit agreement
- Too many dialects
- Poor interoperability between different dialects

“XML IS ONLY THE FIRST STEP TO ENSURING COMPUTERS CAN COMMUNICATE FREELY.

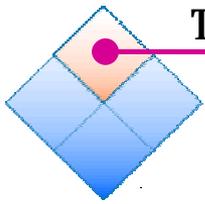
XML IS AN ALPHABET FOR COMPUTERS AND KNOWING THE ALPHABET DOESN'T MEAN YOU CAN SPEAK ITALIAN OR FRENCH”

Business Week

nt, composable, system

anism for

ication to the



# Semantic Technology Capability Cases: Semantic Interoperability

## □ Application and Data Integration

Ontology-Based  
Enterprise Application  
Integration

Customer  
Context Server

Semantic  
Application  
Integrator

Semantic  
Data  
Integrator

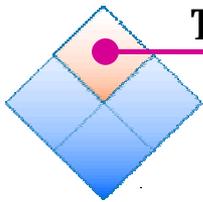
## □ Brokers and Mediators

Registry  
Advisor

Semantic  
Mediator

## □ Advisors and Recommenders

Recommender



# Semantic Technology Capability Cases: Semantic Interoperability

Semantic Data Integrator

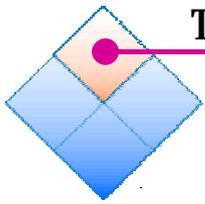
Systems developed in different work practice settings have different semantic structures for their data. Time-critical access to data is made difficult by these different semantics. Semantic Data Integration allows data to be shared and understood across these settings.

## “Aviation Security – Passenger Threat Analysis”

Data for passenger threat analysis comes from a wide range of heterogeneous, structured and unstructured sources, including the FBI most wanted list, flight details, news, public records, and biometrics. A solution built using Semagix Freedom allows security personnel to assess passenger threats while maintaining a high rate of passenger flow. Semagix Freedom interfaces with diverse information sources, extracts relevant information in near real-time, and then organizes and normalizes them based upon the ontology. It co-relates the information from different sources to determine possible threats. by discovering hidden relationships between seemingly unrelated pieces of information.

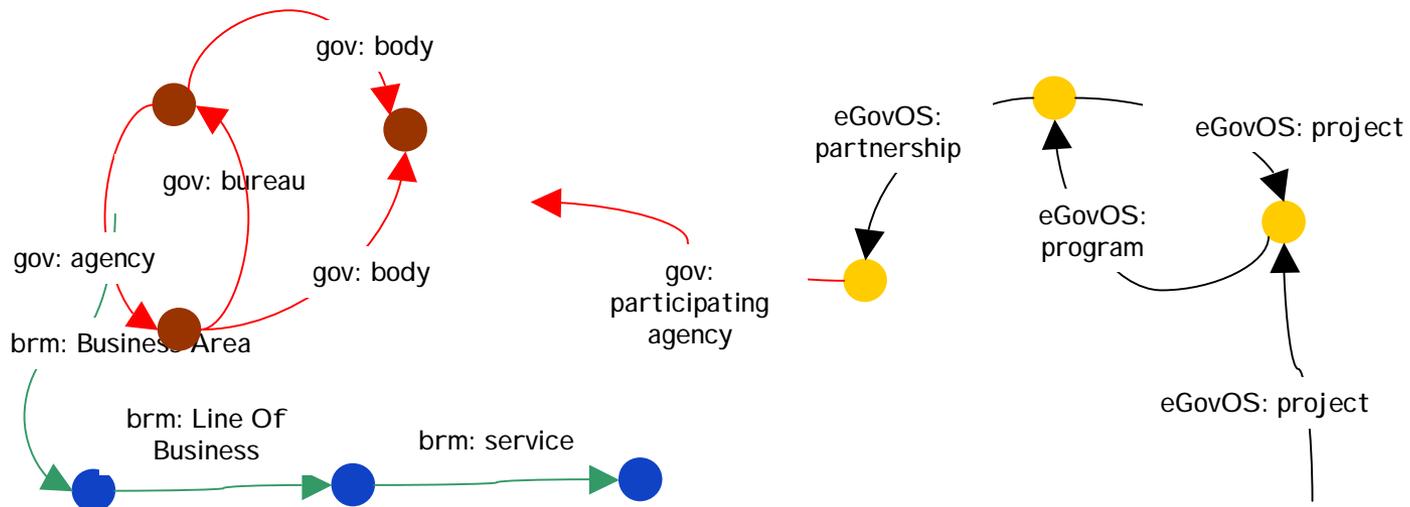
Score Component	Score	Reason
Associated Aircraft	97	Impressed with Pilot
Organization Class	10	Eligible
Excluding Organization Class	0	
<b>Aggregate Score: 11</b>		

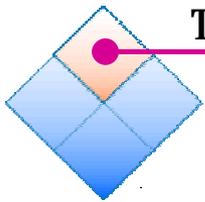
Passenger Threat Analysis Console (Ontology-based Analysis)



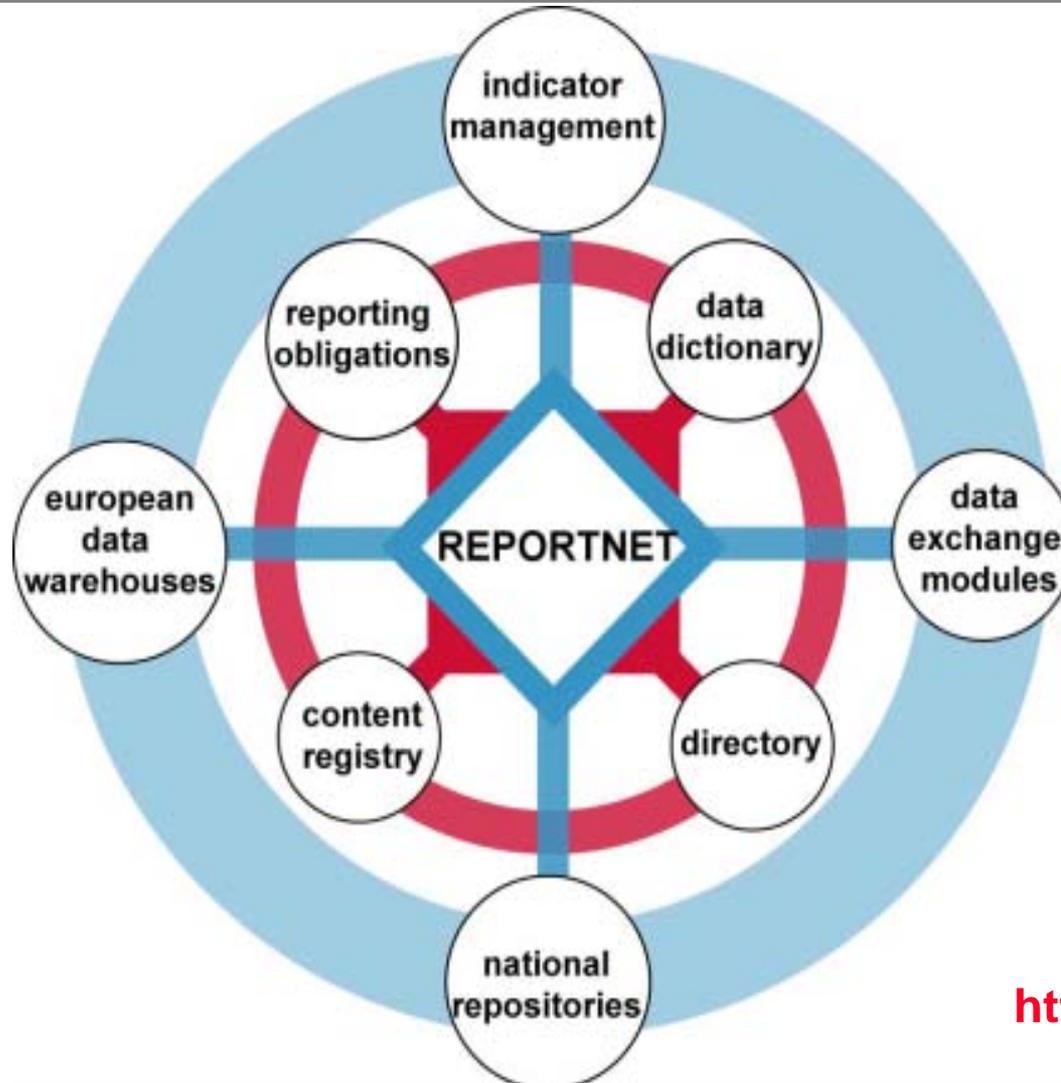
# Today's Registries are in-active Catalogs

- ❑ To become "active" Data Registries need a capability to capture and represent networks of connections:
  - Support for Rich Semantics:
    - ⇒ Relationships between Data Elements
    - ⇒ Rules and Constraints
    - ⇒ Logical Expressions
  - Connectivity to Live Data Sources
    - ⇒ Databases, XML documents, Legacy sources, ...
- ❑ To make code generation and data validation possible

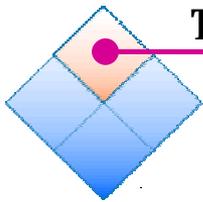




# European Environment Agency - ReportNet



<http://www.eea.eu.int>



# On which issues are countries in Europe obliged to monitor and report?

(the inner, normative circle)

## WebROD



EIONET   WebROD   Legal instrument   Reporting obligation   Reporting activity

### Details of reporting activity

**Title:** AE-2: UNFCCC/GHG Data

**Related obligation:** [EIONET Priority Data Flow](#) from EEA AWP 2001

**Next reporting:** 31/12/2001

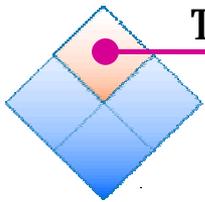
**Reporting frequency:** annually 31 December

**Related parameters:**

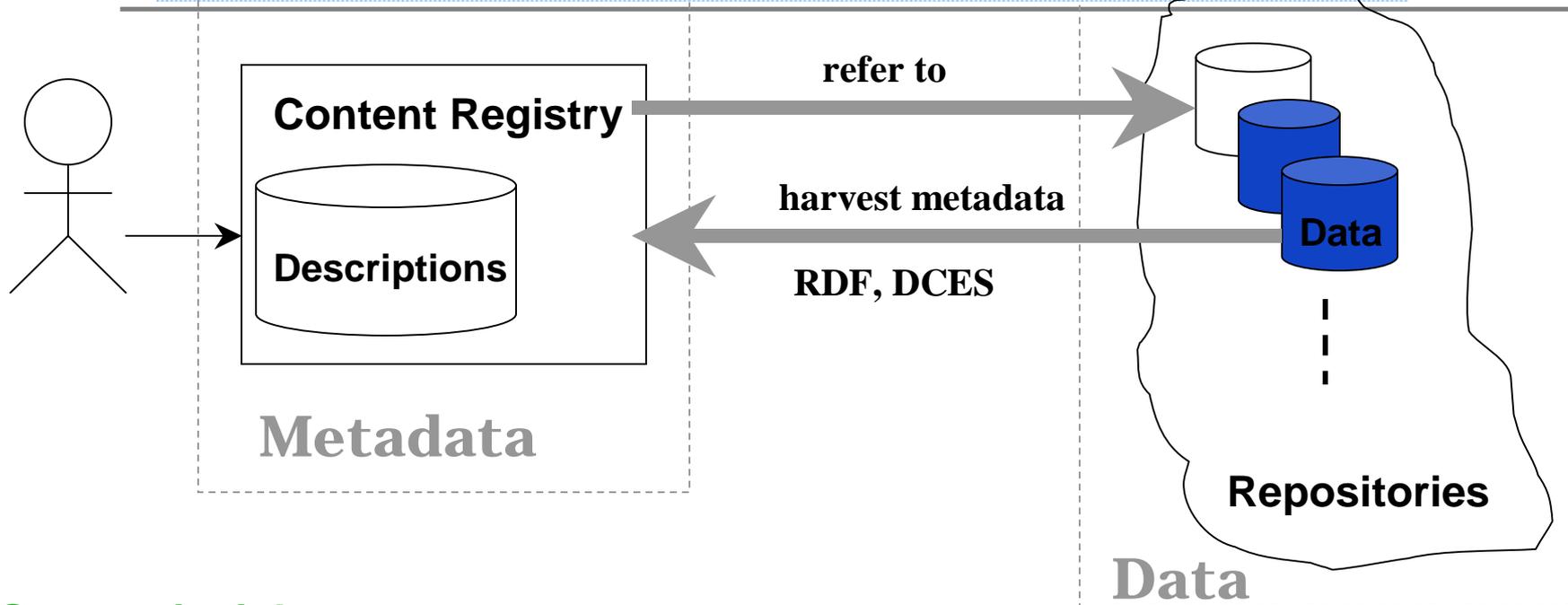
Nr	Parameter	Unit type
1.	CH4, methane	mass/time
2.	CO2, carbon dioxide	mass/time
3.	HFCs, hydrofluorocarbons	mass/time
4.	N2O, nitrous oxide	mass/time
5.	PFCs, perfluorocarbons	mass/time
6.	SF6, sulphur hexafluoride	mass/time

**Reporting format:** N/A

**Link to reporting format template:** [Common Reporting Format \(CRF\)](#)

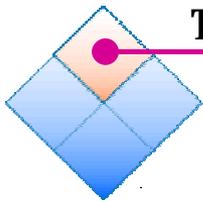


# The EEA ReportNet Content Registry uses RDF for harmonization



## Some principles:

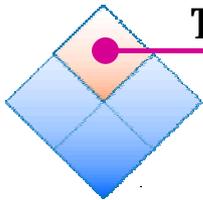
- Connecting services providing metadata in XML/RDF harvested into a MySQL database
- Dublin Core plus free extension (to be stored in service specific namespaces) as meta data model
- developed in OpenSource (Java)



## EEA ReportNet Content Registry- Basic Concept

### Transfer of metadata from services (repository) to CR

- Put it into RDF, send to CR when requested
  - RDF generated on the fly
  - RDF pre-saved(Scenario for most of the services)
- Send it as objects via SOAP calls
  - requires an API wrapper at the service side(Scenario for CIRCA)



# EEA ReportNet Content Registry- Metadata transfer with RDF

Store into CR-DB



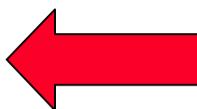
```

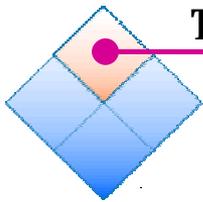
<?xml version="1.0" encoding="iso-8859-1" ?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:dc="http://purl.org/dc/elements/1.1/">

  <rdf:Description
    rdf:about="http://eea.eu.int/sdrat4">
    <dc:creator>Jensen</dc:creator>
    <dc:title>Signals 2002</dc:title>
    <dc:language>English</dc:language>
    ...
    <dc:type>Report</dc:type>
    <dc:coverage>EU</dc:coverage>
    <dc:relation>
      follow up of Signals 2001
      <eionet:rod-id>78890</eionet:rod-id>
    </dc:relation>
  </rdf:Description>
</rdf:RDF>

```

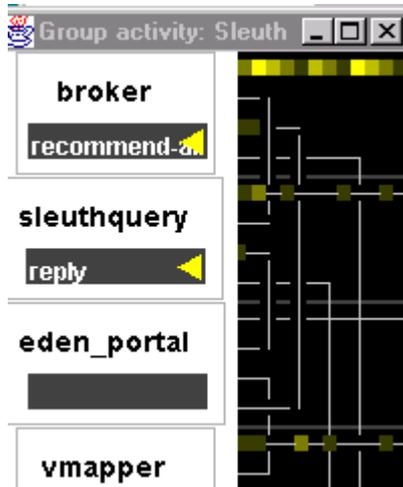
Store RDF into file system



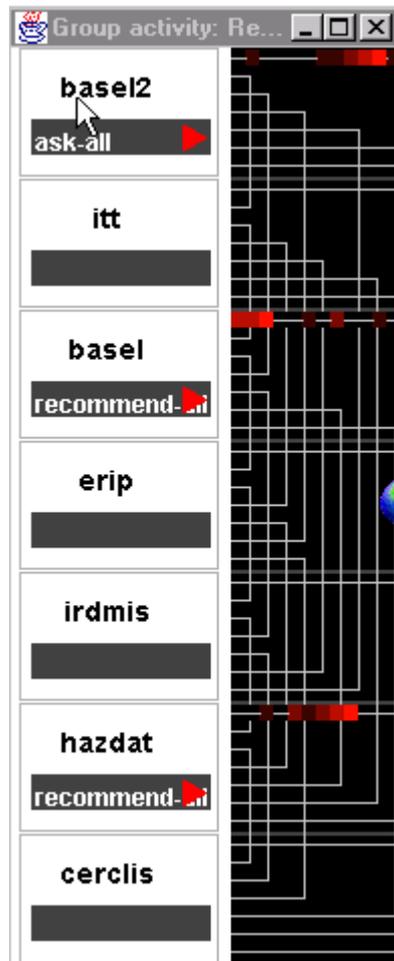


# EDEN Project: An Agent Based Federated Query System

## Agents



## Knowledge Sources



## Query Constructor

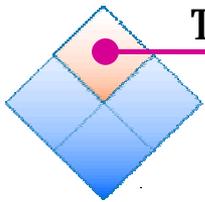


Source: screencam

EDEN (Environmental Data Exchange Network), applies a technology called InfoSleuth, an agent technology, to conduct concept-based searches of heterogeneous, distributed information contained in databases and the Web. EDEN is a collaborative project between EEA and EPA and has been running for more than four years.

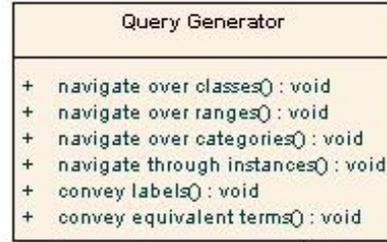
<http://www.eden-iw.org/>

<http://eea.eionet.eu.int:8980/Members/irc/envirowindows/eden/home>



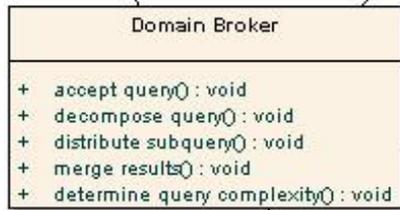
# Semantic Mediator – Logical Model

Applications

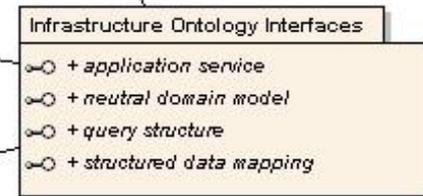


Generate queries for specific databases and systems

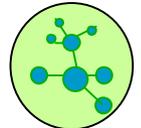
Decompose query and aggregate results



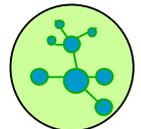
Ontology Server



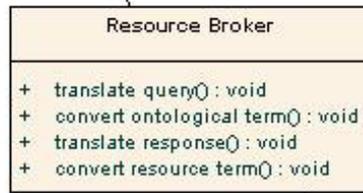
FEA Ontology Models



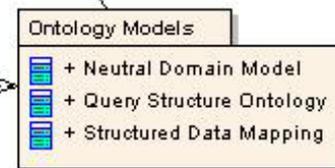
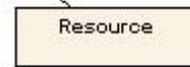
Integration Ontology Models



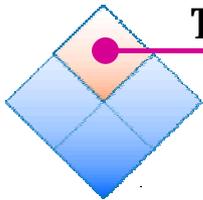
Translates queries and responses



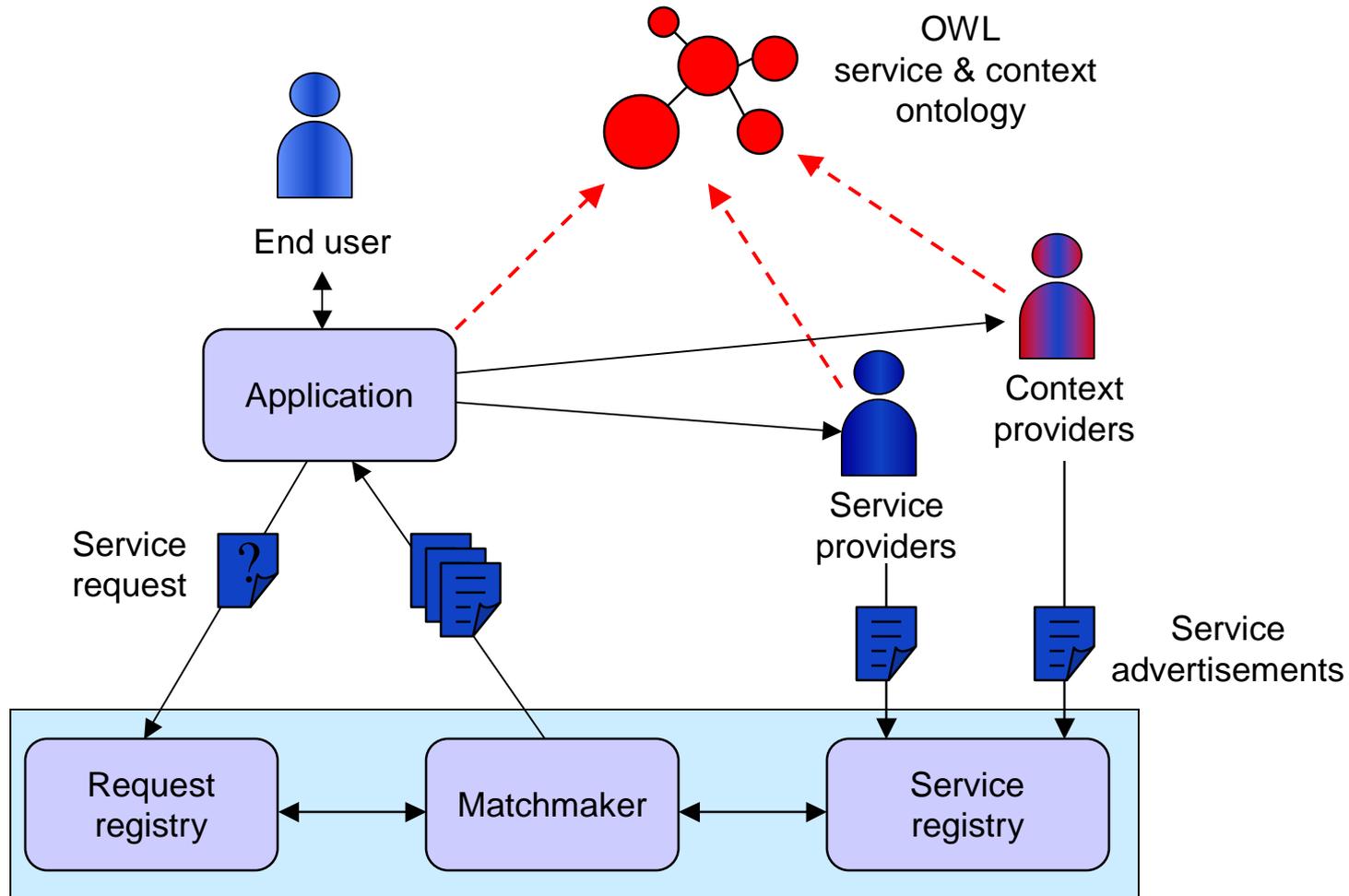
Every structured resource has a Structure Data Mapping to one or more Neutral Domain models

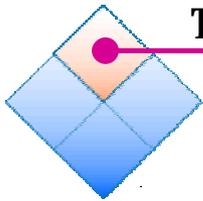


adapted from: Tom Barrett et al, "RDF Representation of Metadata for Semantic Integration of Corporate Information Resources", 2000



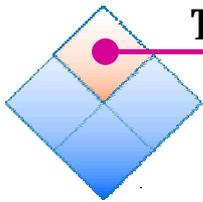
# Web Service Capability Matchmaking





10:50 AM

# Semantic Technology Applications in CAD and PLM



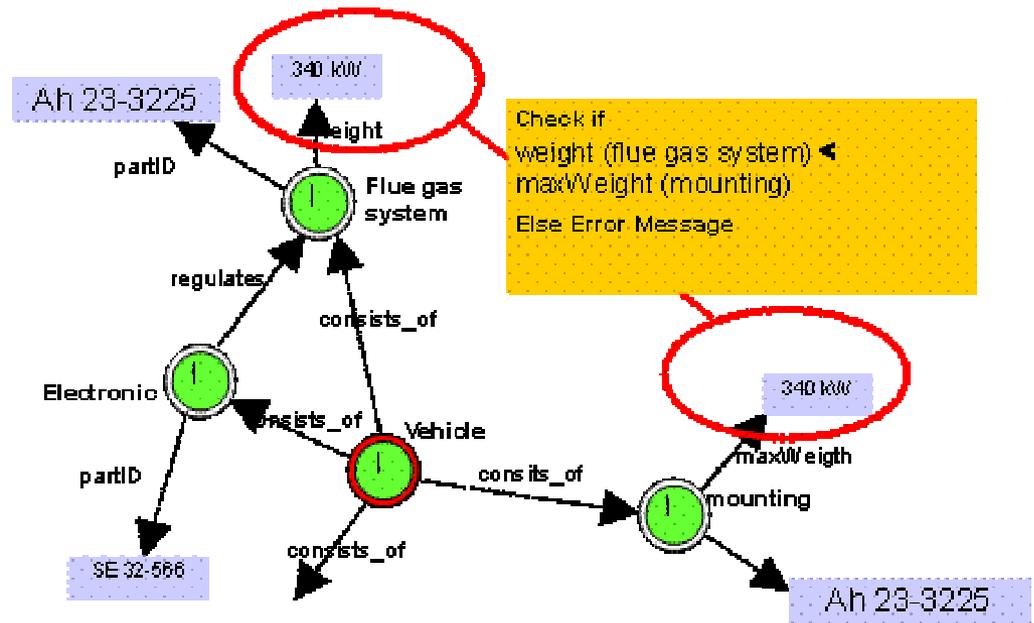
# Semantic Technology Capability Cases: CAD and PLM

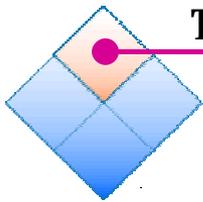
Product Design Assistant

To support the innovative product development and design process, by bringing engineering knowledge from many disparate sources to bear at the appropriate point in the process. Possible enhancements to the design process that result include rapid evaluation, increased adherence to best practices and more systematic treatment of design constraints.

## “Semantic Testcar Configurator for Audi”

Audi manufacturing engineers design, build and test new prototypes as part of the innovation process. The faster this cycle can be completed, the greater the number of innovations that can be brought to market, and the sooner. AUDI uses semantic technologies provided by Ontoprise to represent complex design knowledge in electronic form. Ontoprise technology brings together knowledge from many different sources, and draws logical conclusions from the combined information. Audi uses this capability to provide a computational representation of complex dependencies between components of research test vehicles. These dependencies play a key role in the configuration and development of new vehicles. For example, in order for testing to proceed smoothly, the engineer must know if a selected engine can be built into the chosen chassis, if the brakes are sufficient for the engine performance, or that correct electronics is present in the vehicle. "We expect a shortening of the development cycle, while at the same time improving development quality," said Thomas Syldatke of Audi. "The electronic advisor shall take care of routine tasks, allowing our engineers to concentrate on creative efforts."





# Semantic Technology Capability Cases: CAD and PLM

Product Design Assistant

To support the innovative product development and design process, by bringing engineering knowledge from many disparate sources to bear at the appropriate point in the process. Possible enhancements to the design process that result include rapid evaluation, increased adherence to best practices and more systematic treatment of design constraints.

## “Sharing Engineering Knowledge at Ford”

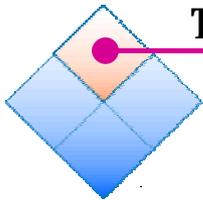
Engineers from many different disciplines and geographic sites need to share knowledge to facilitate design. The knowledge has to come from the right source, and be targeted to the right audience during the design lifecycle. Emergent System's E2KS product provides the Ford Motor Company a comprehensive knowledge acquisition, organization and delivery system that empowers their engineers to share knowledge in an efficient, focused way. Expert engineers author knowledge packets (K-PACS), which come in several forms for different kinds of engineering knowledge.

The screenshot shows a web browser window with the title 'Engineering Checklist'. The main content area displays a checklist for 'Parting Line and Ejection' with a table of criteria. Below the table is a 3D CAD model of a part with labels for 'Knockout at Intersection' and 'Blade Knockout'.

Group/Func	SearchType	Criteria
Checklist/Criteria:	PTC	Filter (Allg Feasibility)

Q	N	Kpacid	Description	Notes
<input type="checkbox"/>	<input type="checkbox"/>	PTC-1	The minimum amount of Draft on the surfaces with the die direction. Assume no grain. Additional draft would be required if grain is present.	
<input type="checkbox"/>	<input type="checkbox"/>	PTC-2	The Minimum shut off angle for stepped parting line.	
<input type="checkbox"/>	<input type="checkbox"/>	PTC-3	The side sections should be minimized by building Features with short off faces where ever possible.	
<input type="checkbox"/>	<input type="checkbox"/>	PTC-4	Knockouts should be placed on the top of ribs or at intersections for deep ribs and protrusions.	
<input type="checkbox"/>	<input type="checkbox"/>	PTC-5	The basic wall of the part should be kept uniform.	



# Ontology Technology for PLM - Example (Cogito)

Design



Construction



Operation/Management



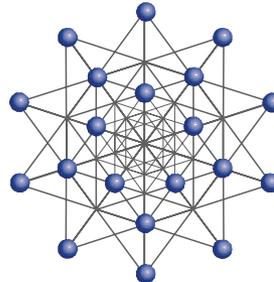
Design Views

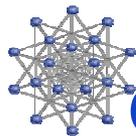


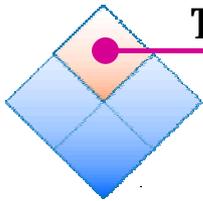
Construction Views



Operations & Maintenance Views



 **Cogito Knowledge Centered™ Solutions**



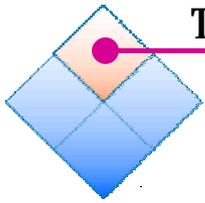
# Semantic Technology Capability Cases: Other

## User Interfaces

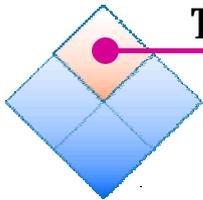
Dynamic User  
Interface

## Collaborative Environments

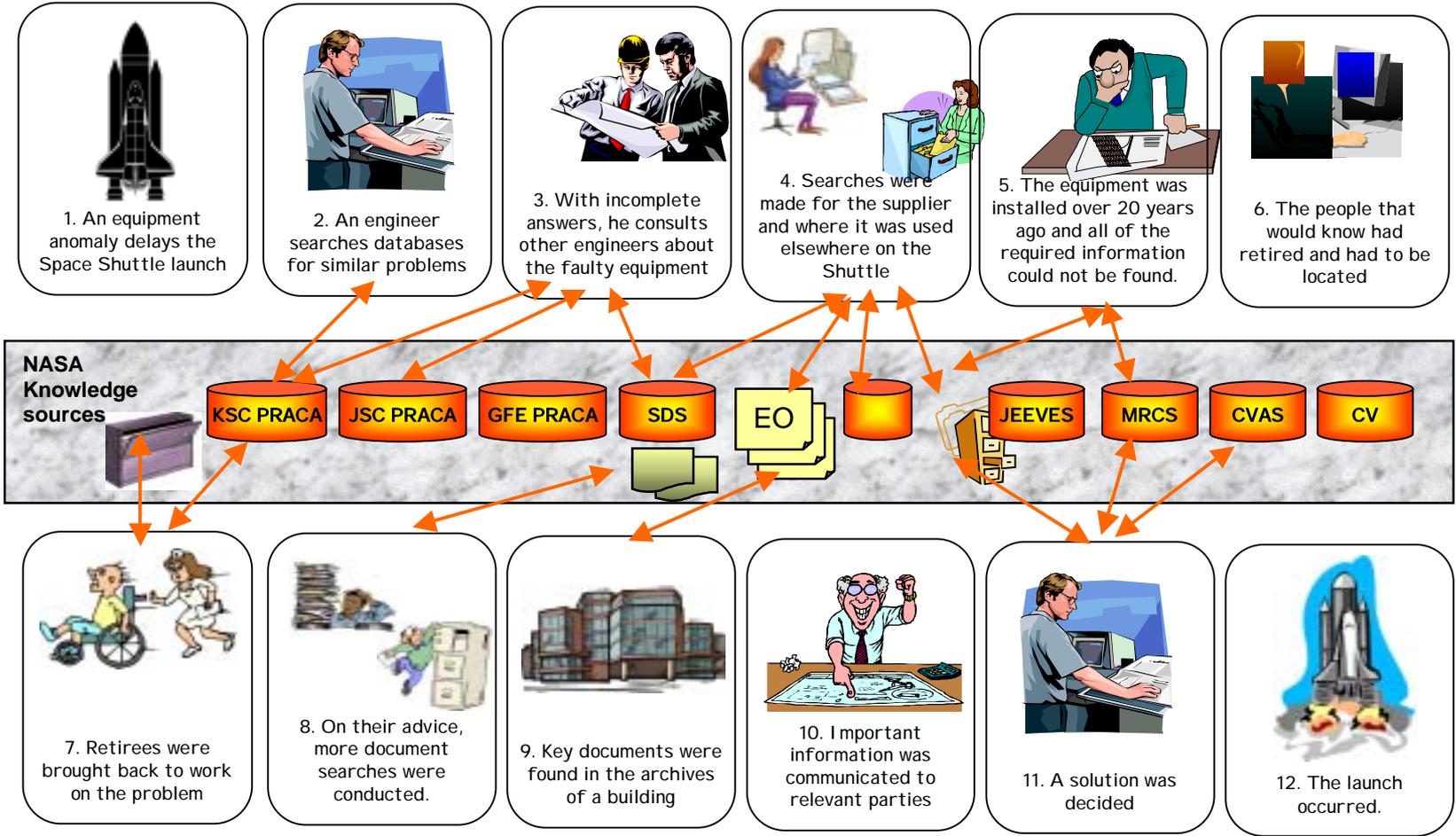
Virtual  
Consultant



# NASA Digital Shuttle

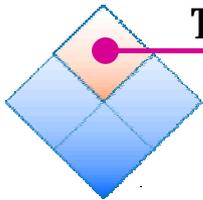


# Why integration? NASA - An Illustrative Imagined Scenario

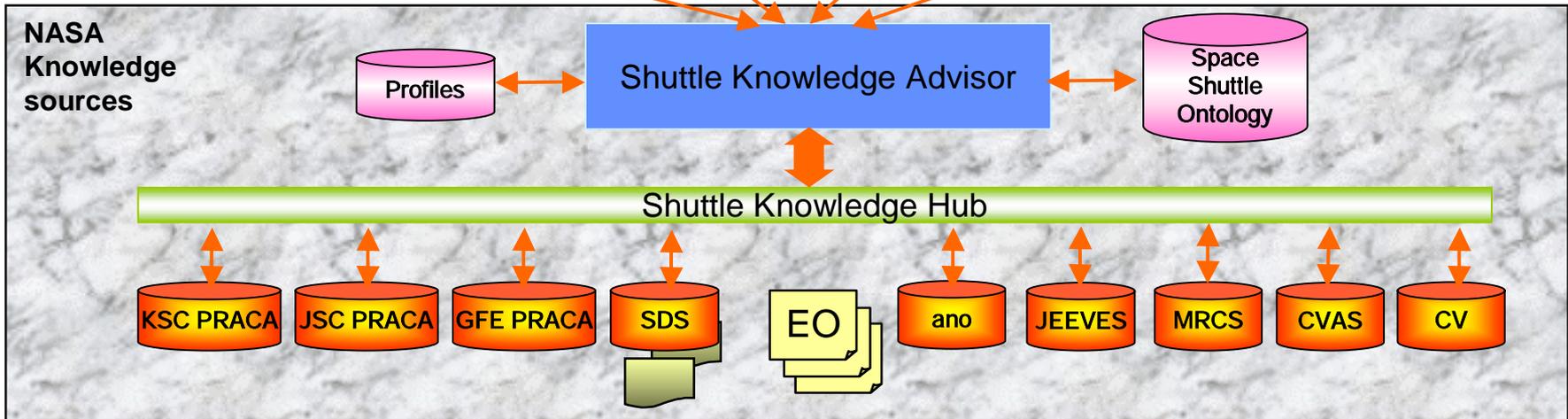
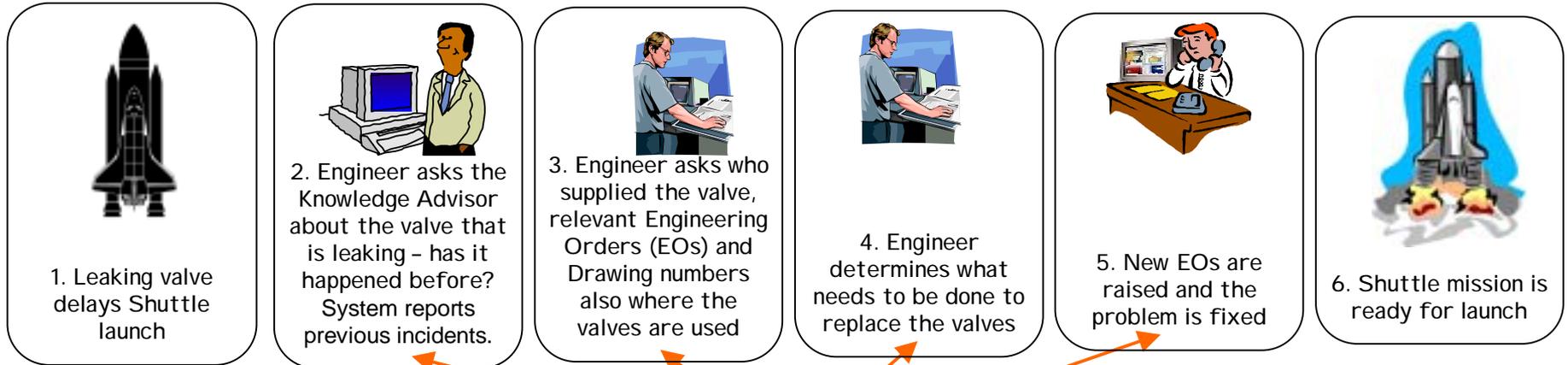


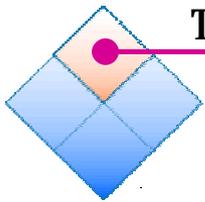
**Disclaimer**

*This scenario is fictitious and is not based on any actual occurrences on the Space Shuttle. It is inspired by the movie entitled "The Space Cowboys".*



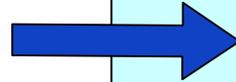
# Future Scenario – Leaking valve is discovered on STS-*nnn*





# NASA Semantic Model Example

Organization has Policies  
 Organization has Groups  
 Team has Goals  
 Team uses System

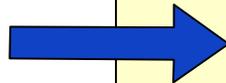


## Governance Knowledge

Business Concept

CAM

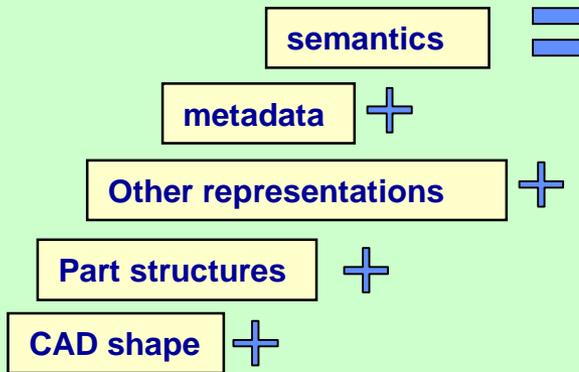
Process has Activities  
 Activity produces Workproduct  
 Workproduct is\_approved\_by Role  
 Workproduct is\_reviewed\_by Role  
 Workproduct is\_produced\_by Role  
 Document isa Workproduct  
 Document is\_held\_in System



## Engineering Process Knowledge

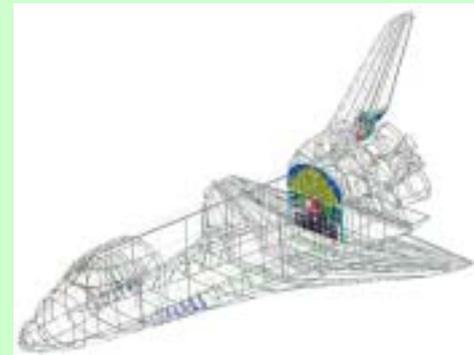
Process Concept

PLM



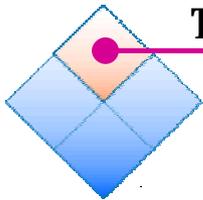
## Engineering Domain Knowledge

Engineering Object



CAD

CAE



# A number of Ontology Models and capabilities are envisioned:

## Static Ontology (st-OM)

- describing concepts and properties and their relationships

## Dynamic Ontology (dy-OM)

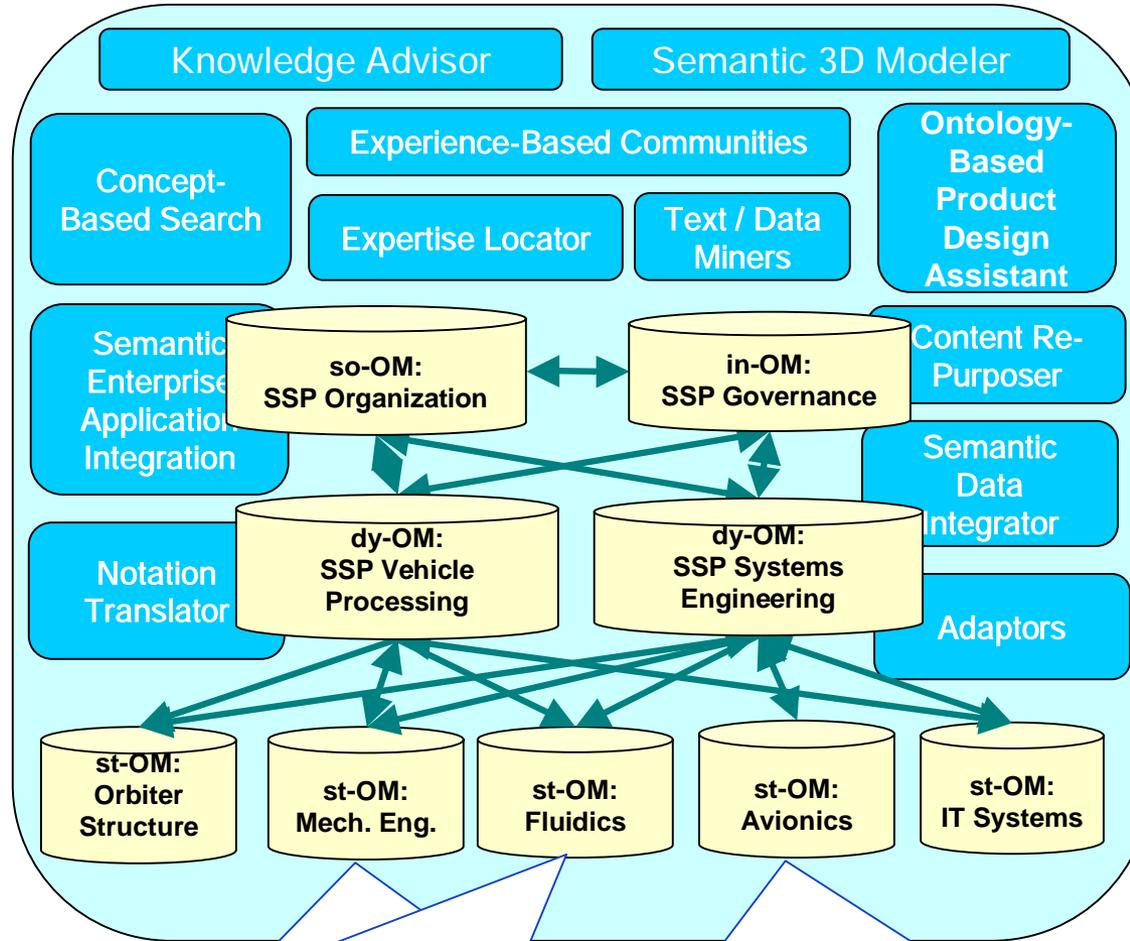
- showing a process view of the Space Shuttle Program

## Intentional Ontology (in-OM)

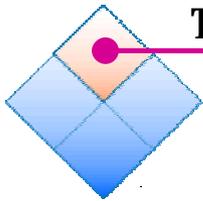
- goal-oriented view of the Space Shuttle Program.

## Social Ontology (so-OM)

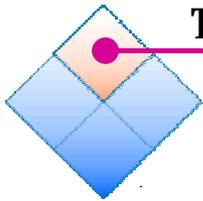
- governance view of the work described by the dynamic ontology



Vehicle Electrical Power & Distribution (EPD), Guidance & Navigation, Launch Processing System (LPS), Flight Controls, 60HZ Power Distribution & UPS, Ground Special Power, Hazardous Warning System, Safety Systems (e.g.: Oxygen Deficiency Monitoring)

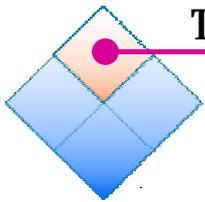


# eGovernment Semantic Technology Pilot – Federal Enterprise Architecture Capability Manager



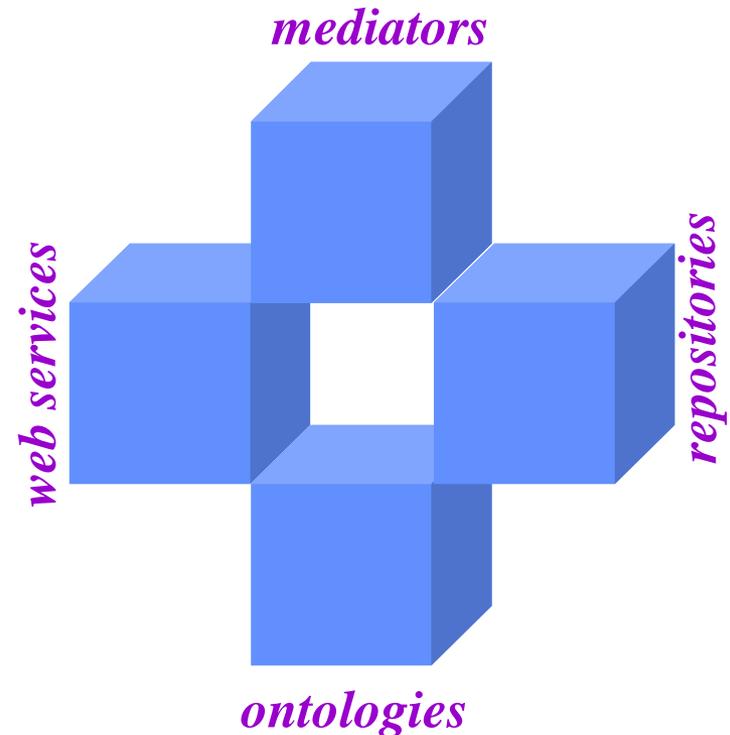
## The Federal Enterprise Architecture (FEA): An inspiring opportunity & challenge

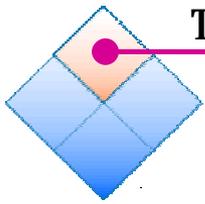
- ❑ OMB is charged with assisting the Agencies to implement and improve the EA process
  
- ❑ Agencies are charged with updating their EAs to reflect the guidance from the OMB
  - Learning and establishing a repeatable evolutionary process
  - Continually focusing on the *dynamic alignment* of changing business and technical environments
  
- ❑ This requires evolving and flexibly integrated *FEA knowledge infrastructure*.



# FEA Capabilities and Partnership Manager

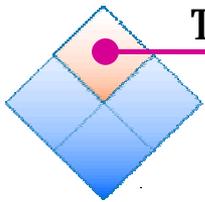
- ❖ A semantic engine accessible through WEB Services
- ❖ Advises on capabilities being provided and developed in support of e-Government initiatives
- ❖ Allows users to make queries about the FEA model, agency services and capabilities
- ❖ Allows agencies to discover partners





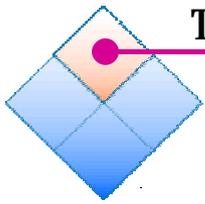
## A “Business Case Constructor” can be readily built on semantic models

- The models will answer questions such as:
  - How do agencies develop credible commitments, risk mitigation, and foresight in the contracting needed to develop successful business cases?
  - How do agencies find federal, state and local partners?
  - How do agencies ensure business cases comply with FEA?
  - How can agencies promote and find reusable capabilities?

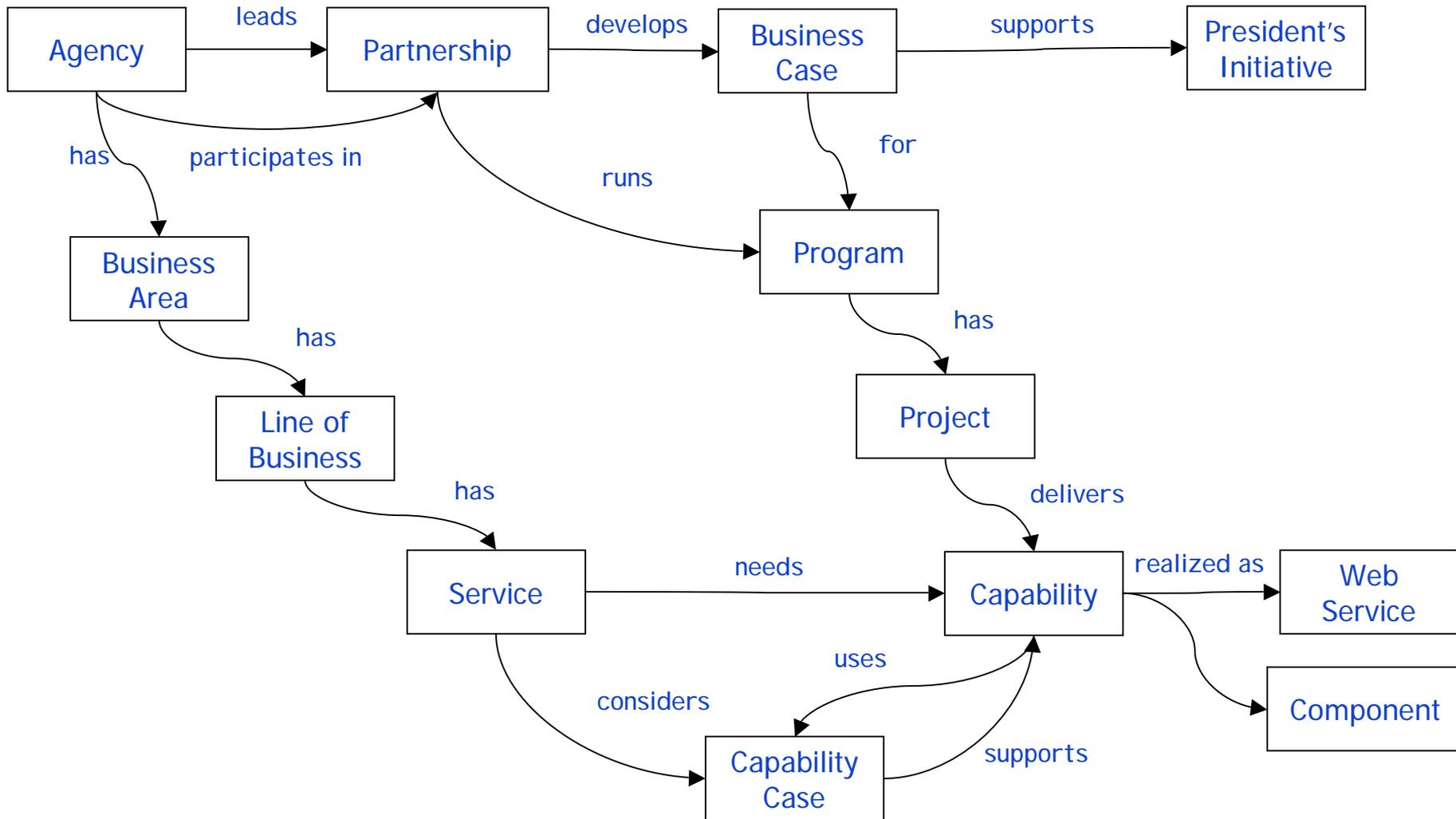


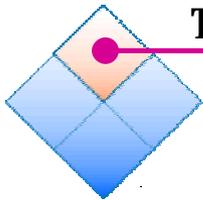
# Why semantic technologies?

- The power of managed relationships for discovering knowledge
  - about the FEA models
  - about government agencies and bureaus, their services and capabilities
  - about partnerships and programs of work
  
- The power of models based on RDF[S] for federated navigation and inference of distributed models
  - "one model in one place"
  - "decentralized but connectable"

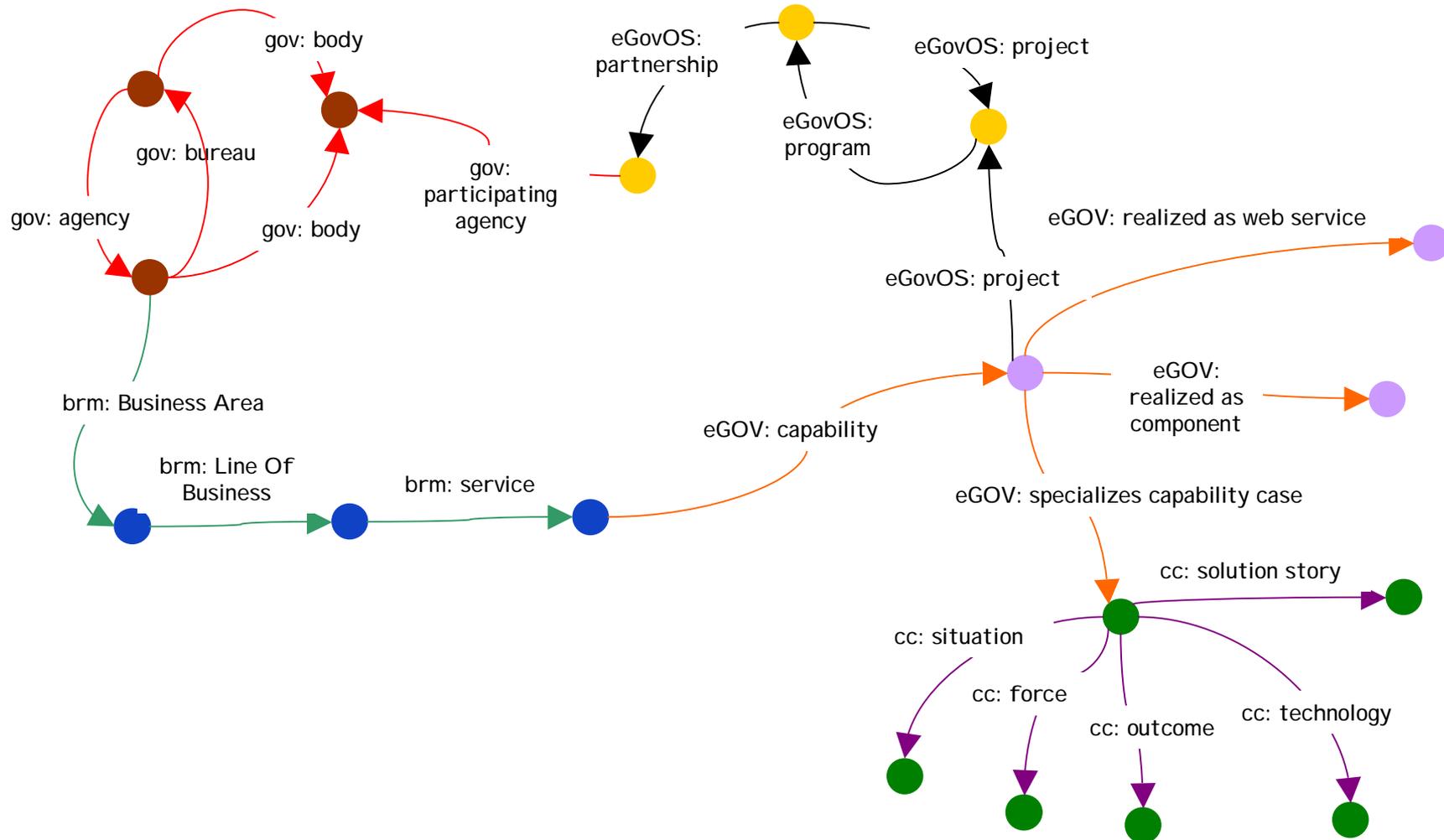


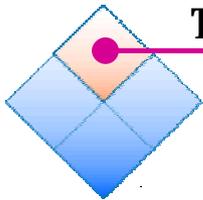
# Assisting Partnering through Models



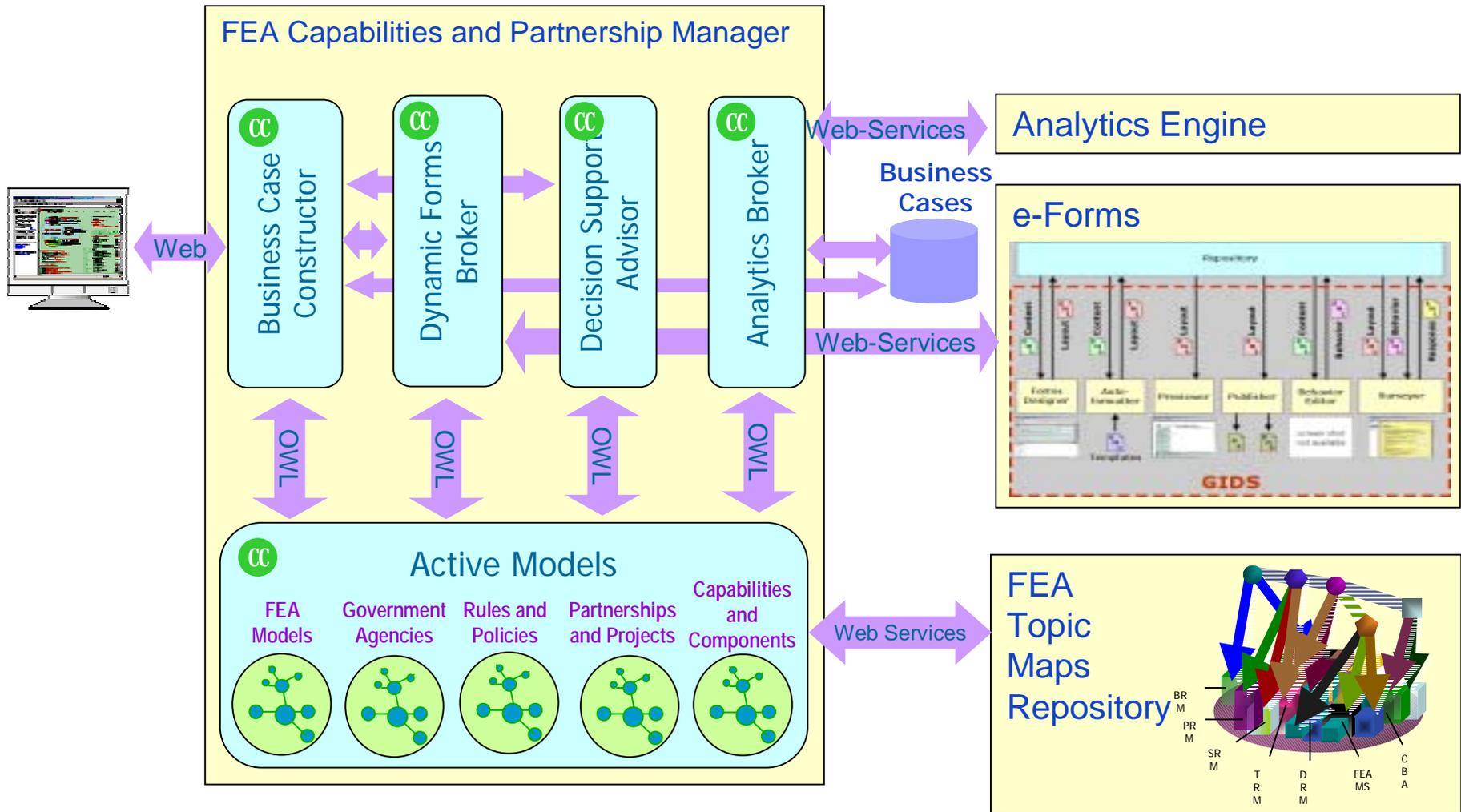


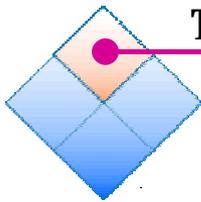
# The Power of RDF[S]





# FEA Capabilities and Partnership Manager – Conceptual Architecture





# Sample Screenshot

The screenshot shows the TopQuadrant FEA Partnership Advisor (Exploratory Sketch) interface. The header includes the TopQuadrant logo and the tagline "helping enterprises envision, architect and plan knowledge-based and web services systems". The main title is "FEA Partnership Advisor (Exploratory Sketch)" with a "Home" link.

**Search:** A search box with a "Search" button.

**Browse:** A list of categories with counts:

- Agency (236)
- Bureau (243)
- Business Area (3)
- Business Case (1)
- Capability (13)
- Capability Case (21)
- Initiative (24)
- Line of Business (34)
- Office (2)
- Partnership (5)
- Person (3)
- Program (16)

**Reports:** A list of report links:

- Partnerships by Agency
- Capabilities by Capability Case
- Open Partnerships

**Instructions:** Use the navigation features to the left (Browse, Search, or Reports) to locate and select required capability cases. The Advisor will suggest potential partners based upon those selections.

**Selected Capability Cases:**

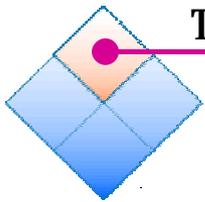
- [Interactive Map](#) (remove)
- [Asset Locator](#) (remove)
- [Alert Me](#) (remove)
- [Resource Locator](#) (remove)

**Suggested Partners:**

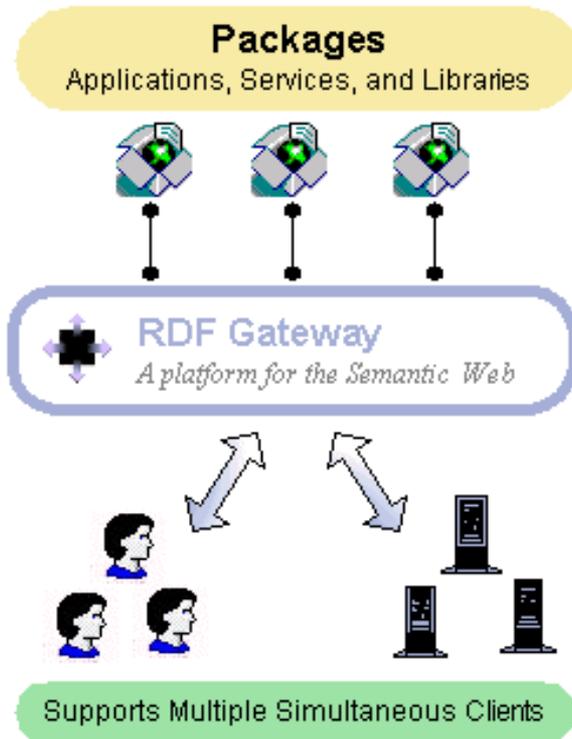
- [Recreation One Stop](#) (for Interactive Map, Asset Locator)
- [The GovBenefits.gov](#) (for Alert Me)

**Capability\_Case:**

- [Alert Me](#)
- [Asset Locator](#)
- [Eligibility Advisor](#)
- [Expert Locator](#)
- [Information Aggregator](#)
- [Interactive Map](#)
- [Loan Locator](#)
- [Need Analytics Engine](#)
- [Online Application](#)
- [Online Auction](#)
- [Online Purchase](#)
- [Online Purchase Agent](#)
- [Online Registration Agent](#)
- [Permit Manager](#)
- [Process Advisor](#)
- [Process Status Checker](#)
- [Profile Matcher](#)
- [Recreation Explorer](#)
- [Resource Locator](#)
- [Semantic Data Integrator](#)
- [Tax Advisor](#)



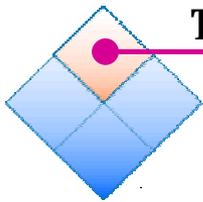
# FEA Capabilities Manager Implementation Architecture (1)



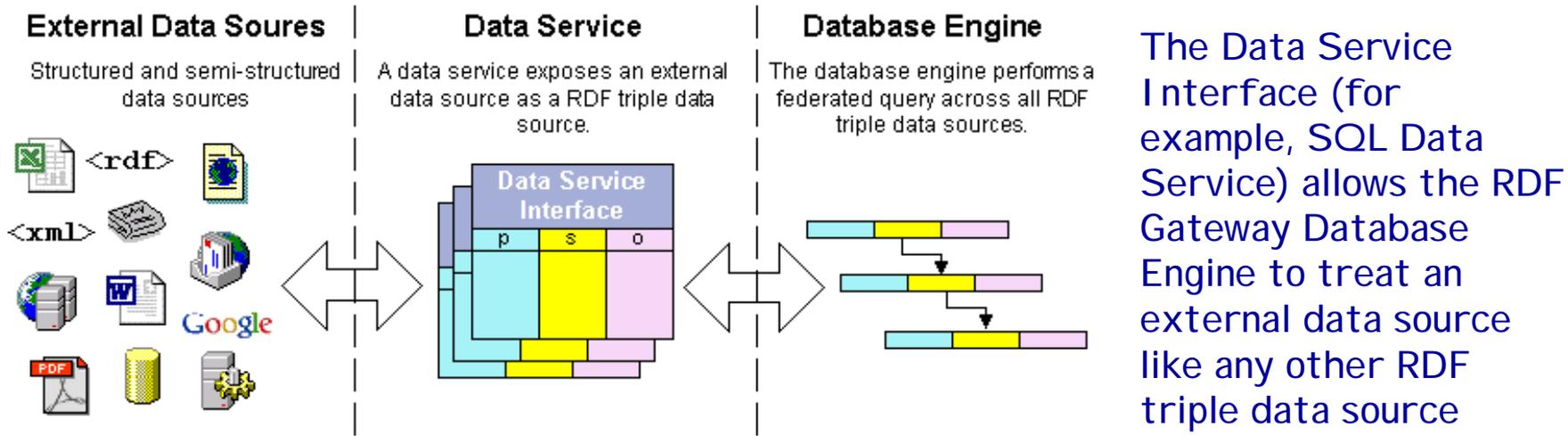
At the core of the application is a semantic engine implemented using RDF Gateway Database

Solutions are deployed on RDF Gateway as packages. A package can implement an application, provide a service or just be a common library of core functionality. RDF Gateway can simultaneously host multiple packages and users allowing it to act as an application server.

To implement FEA Partnership Advisor we have imported eGov Knowledge Models created with Protégé and OntoEdit ontology editing tools

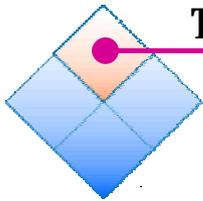


# FEA Capabilities Manager Implementation Architecture (2)

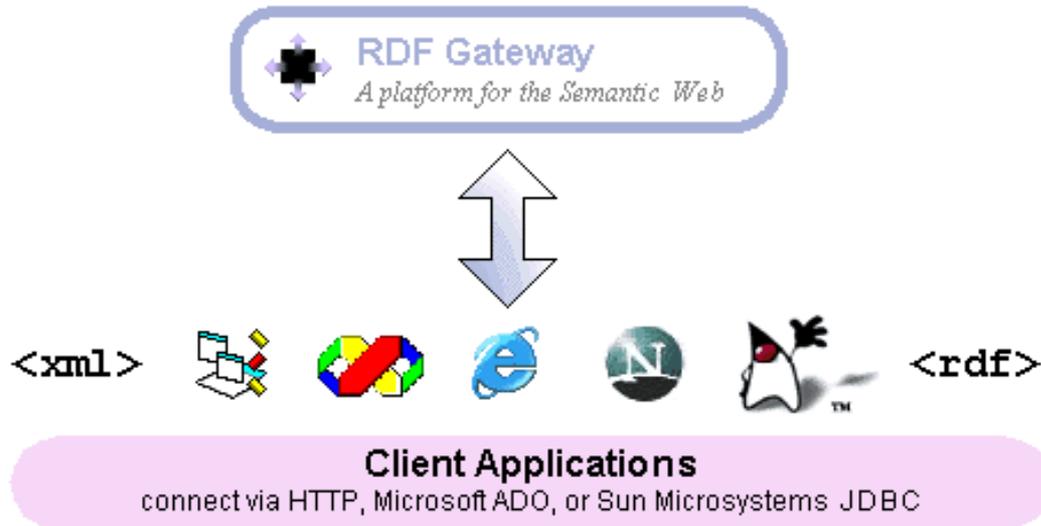


RDF Gateway Inference Rules provide a useful mechanism for semantically mapping schemas based on their RDF Schemas. A query can be expressed using a single schema and the inference rules will automatically map data from disparate schemas into the query schema.

The RDF Gateway Database Engine is a fully functional logical inference engine. This allows RDFQL to support inference rules to dynamically generate additional RDF statements and execute complex recursive and non-recursive algorithms while executing a query.

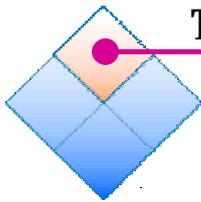


# FEA Capabilities Manager Implementation Architecture (3)

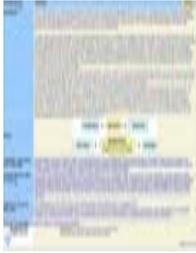


RDF Gateway integrates with client applications using a variety of standard data access technologies such as XML and RDF over HTTP, Microsoft ADO, and Sun Microsystems JDBC.

FEA Partnership Advisor (Exploratory Sketch) is available as both a web application and a local client application



# Where to find out more



## WEB Resources

- TopQuadrant Capability Cases Galleries:  
[http://www.topquadrant.com/topGallery/tq\\_topgallery.htm](http://www.topquadrant.com/topGallery/tq_topgallery.htm)
- TopQuadrant Reports:  
[http://www.topquadrant.com/tq\\_white\\_papers.htm](http://www.topquadrant.com/tq_white_papers.htm)
- Others:  
<http://www.xfront.com>, <http://www.semanticweb.org>,  
<http://daml.semanticweb.org/services/>



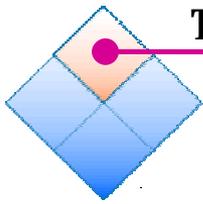
## Semantic Applications – Bibliography

- Jeff Heflin, James Hendler, and Sean Luke: "*Applying Ontology to the Web: A Case Study*", University of Maryland, 1998
- Citeseer search on "semantic integration" gives 187 papers  
⇒ <http://citeseer.nj.nec.com/cs?cs=1&q=semantic+integration&submit=Documents&co=Expected+Citations&cm=50&cf=Any&ao=Expected+Citations&am=20&af=Any>

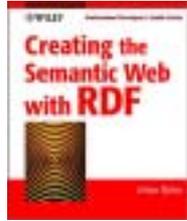


## TopQuadrant Services

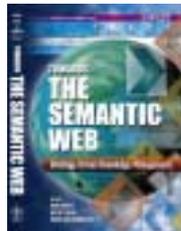
- [http://www.topquadrant.com/FPweb/tq\\_service\\_offerings.htm](http://www.topquadrant.com/FPweb/tq_service_offerings.htm)



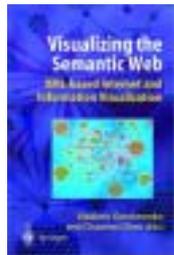
# Where to find out more about Semantic Technologies: Books



Johan Hjelm, “*Creating the Semantic Web with RDF*”, John Wiley, 2001



John Davies, Dieter Fensel & Frank van Harmelen:, “*Towards the Semantic WEB – Ontology Driven Knowledge Management*”, John Wiley, 2002



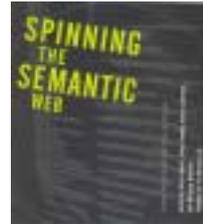
Vladimir Geroimenko (Editor), Chaomei Chen (Editor), “*Visualizing the Semantic Web*”, Springer-Verlag, 2003



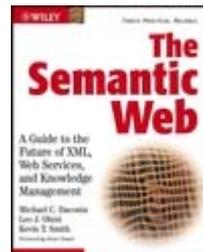
Sheller Powers, “*Practical RDF*”, O'Reilly, 2003



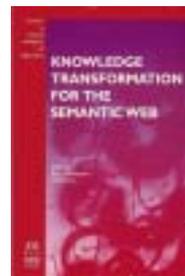
Dieter Fensel: “*Ontologies: A Silver Bullet for Knowledge Management and Electronic Commerce*”, Springer Verlag, 2001



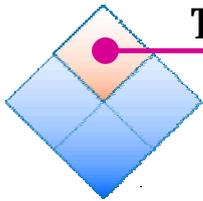
Dieter Fensel, Wolfgang Wahlster, Henry Lieberman, James Hendler (Eds.): “*Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential*”, MIT Press, 2002



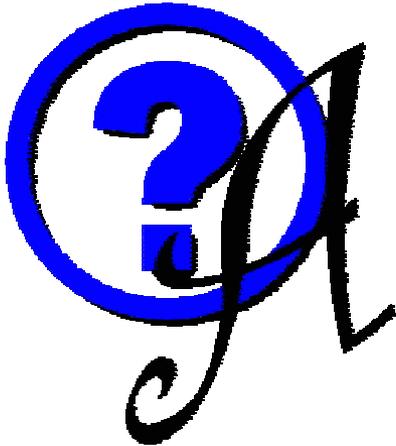
Michael C. Daconta, Leo J. Obrst, Kevin T. Smith: “*The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management*”, John Wiley, 2003



M. Klein and B. Omelayenko (eds.), “*Knowledge Transformation for the Semantic Web*”, Vol. 95, [Frontiers in Artificial Intelligence and Applications](#), IOS Press, 2003



# Questions and Answers



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[www.topquadrant.com](http://www.topquadrant.com)

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