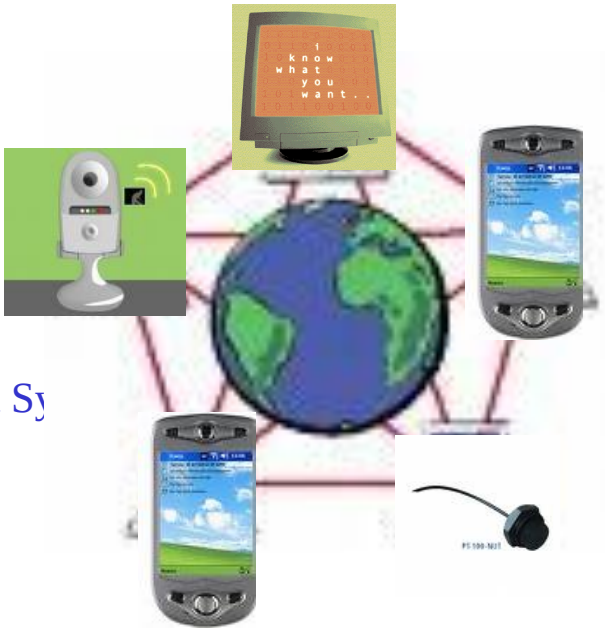
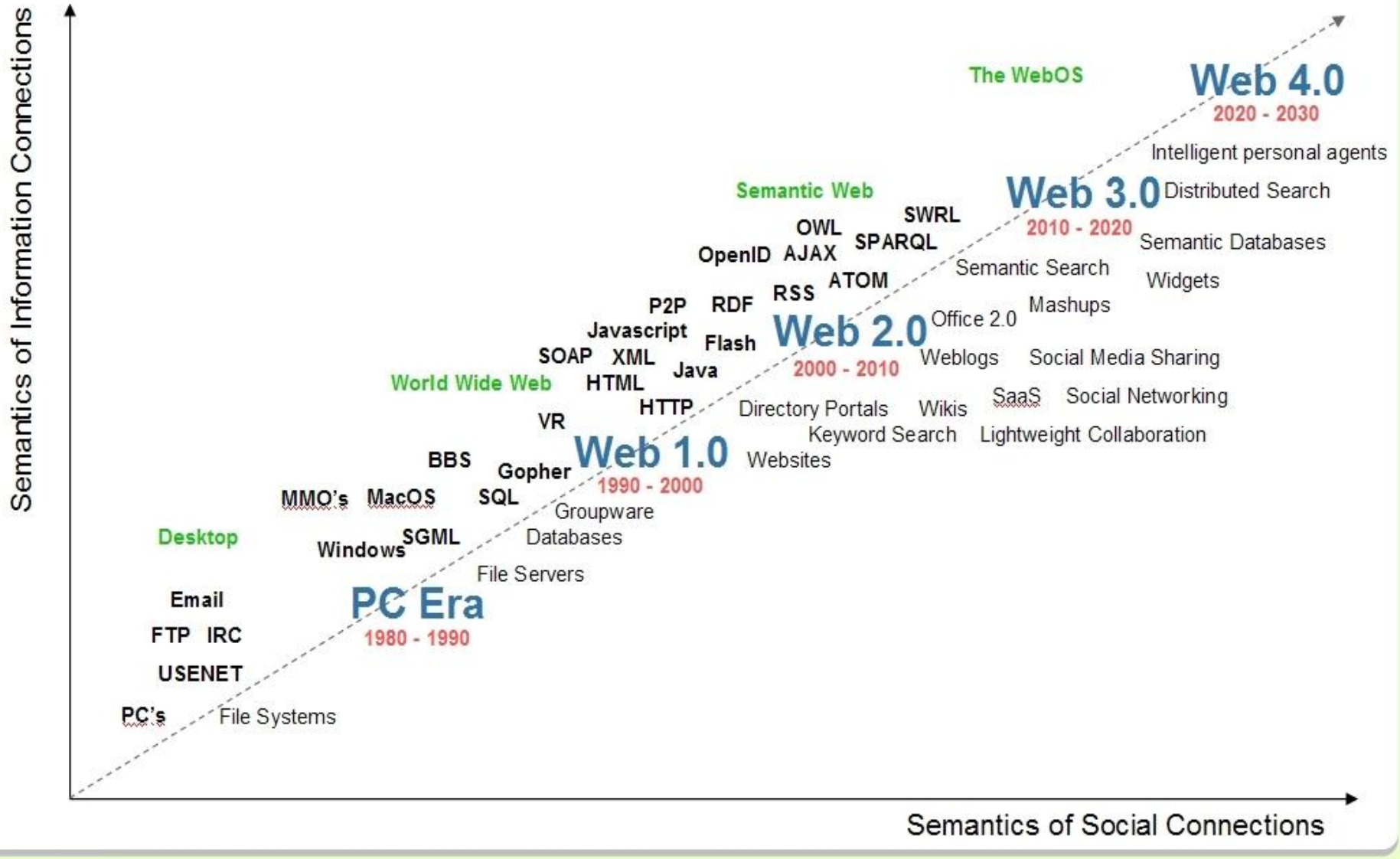
Applications

Asunción Gómez Pérez
Oscar Corcho

Table of Content

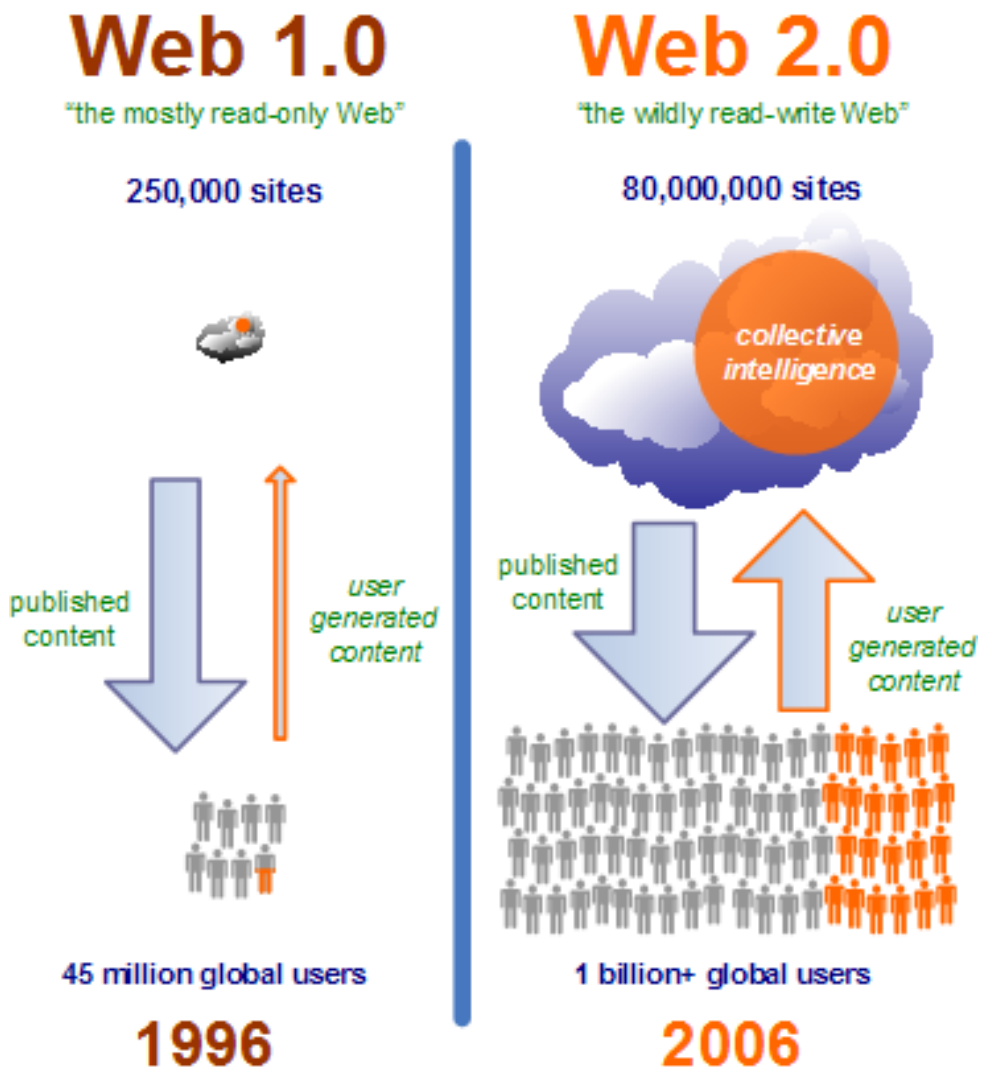


Web n+1: Roadmap

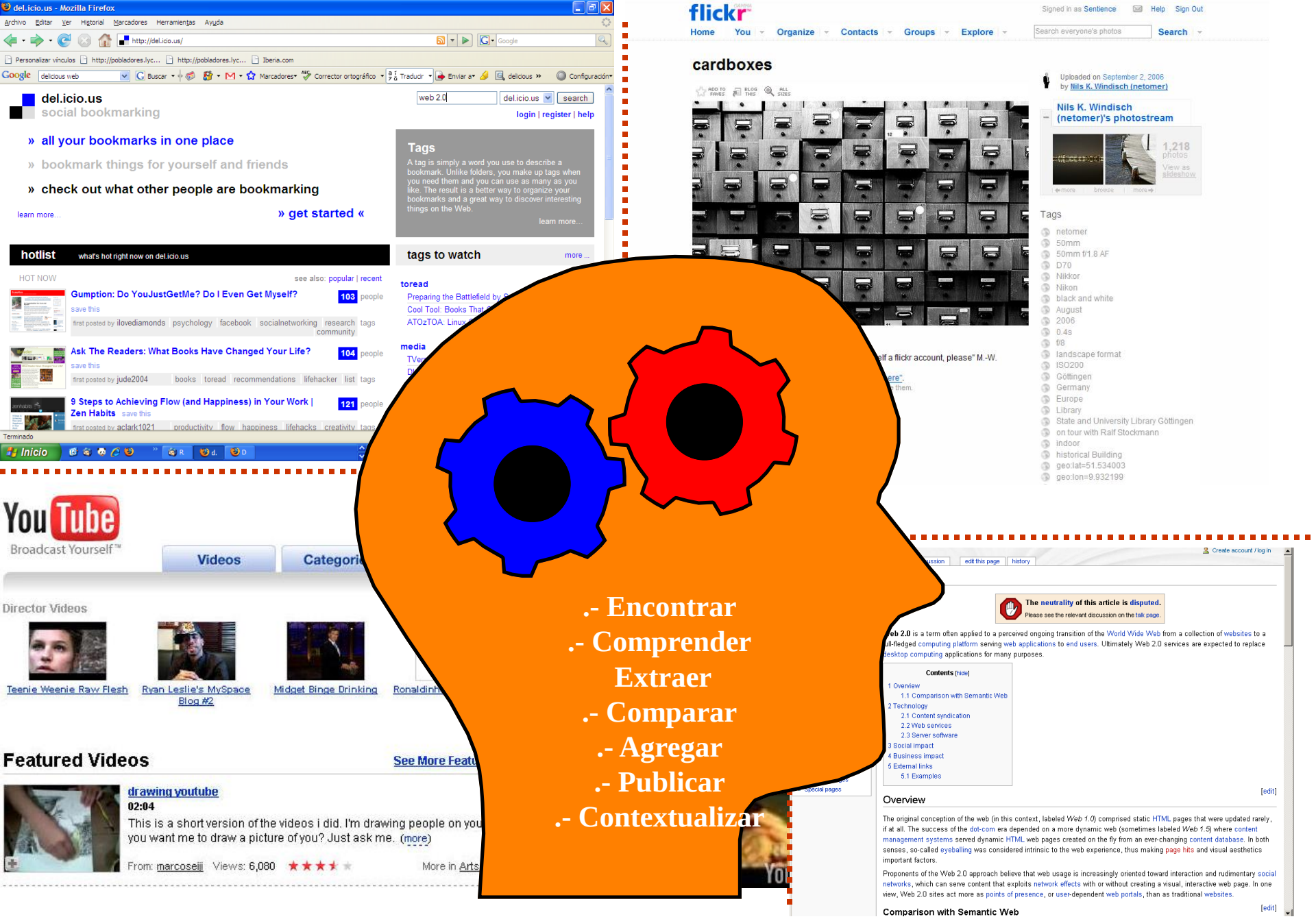


Source: Radar Networks & Nova Spivack, 2007 – www.radarnetworks.com

Web1.0 vs Web2.0



- Cooperation
- Dynamicity
- Decentralised change
- Heterogeneity
- Multimedia content


.- Encontrar
.- Comprender
Extraer
.- Comparar
.- Agregar
.- Publicar
.- Contextualizar

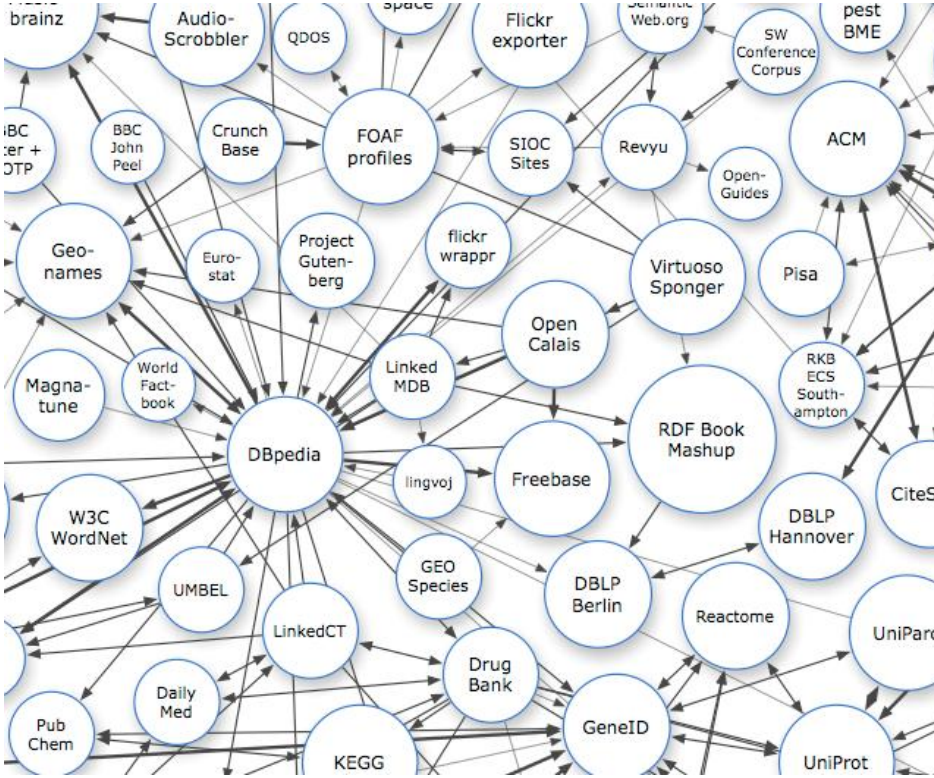
What is the Semantic Web?

- An extension of the current Web…
  - … where information and services are given well-defined and explicitly represented meaning, …
  - … so that it can be shared and used by humans and machines, ...
  - ... better enabling them to work in cooperation

- How?
  - Promoting information exchange by tagging web content with machine processable descriptions of its meaning.
  - And technologies and infrastructure to do this

What is the Web of Linked Data?

- An extension of the current Web…
  - … where i data given well-defined and explicitly represented meaning, …
  - … so that it can be shared and used by humans and machines, ...
  - ... better enabling them to work in cooperation



- How?
  - Promoting information exchange by tagging web content with machine processable descriptions of its meaning.
  - And technologies and infrastructure to do this
  - And clear principles on how to publish data

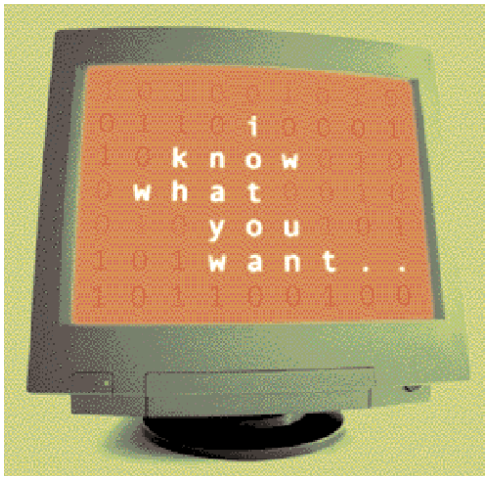
Web 3.0.
Definiciones para todos los gustos…

- Incluye, la transformación de la red en una base de datos, un movimiento hacia hacer los contenidos accesibles por múltiples aplicaciones *non-browser*, el empuje de las tecnologías de la Web Semántia, la Web Geoespacial, o la Web 3D.

- Serán aplicaciones conjuntas, de poco tamaño, que puedan correr en cualquier componente ya sea móvil o PC, aplicaciones rápidas y muy configurables y lo más importante de todo es que serán distribuidas por marketing viral, como son las redes sociales (digg, meneame, stumble upon, etc.) o los correos

Web 3.0

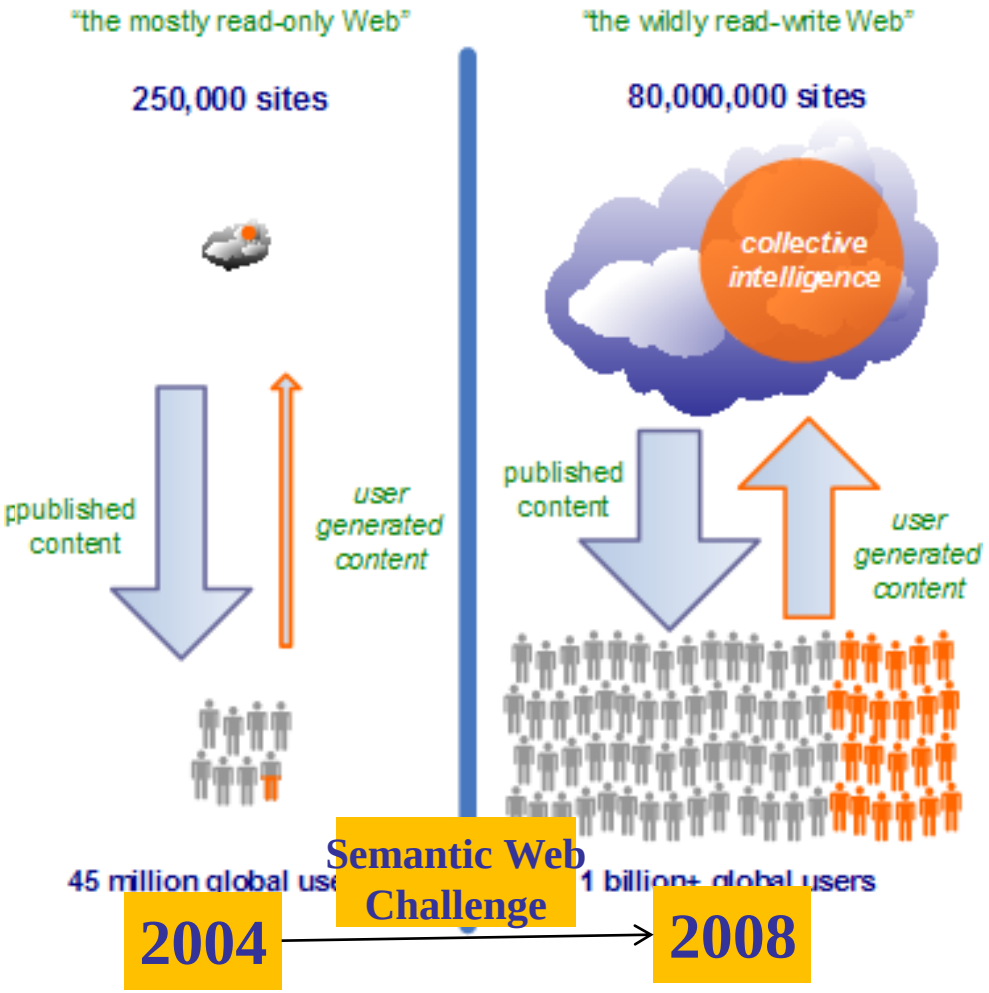
- **Web Inteligente**
  - Semantic Web technologies
  - The Data Web – a global database
  - Intelligent applications (NLP, machine learning, machine reasoning, autonomous agents)
- **Conexión Ubicua**
  - Broadband adoption
  - Mobile Internet access
  - Mobile devices
- **Computación en red**
  - Software-as-a-service business models
  - Web services interoperability
  - Distributed computing (P2P, grid computing, hosted "cloud computing" server farms)
- **Tecnologías abiertas**
  - Open APIs and protocols
  - Open data formats
  - Open-source software platforms
  - Open data (Creative Commons, Open Data License, etc.)
- **Open Identity**
  - Open identity (OpenID)
  - Open reputation
  - Portable identity and personal data



http://lifeboat.com/ex/web.3.0

The evolution of the Semantic Web

pre-Semantic Web Semantic Web 1.0 Semantic Web 3.0



No standardised formats e.g., $(KA)^2$

RDFS, OWL

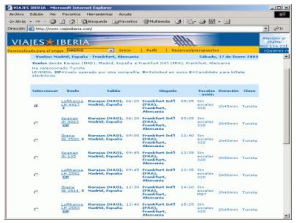
- Cooperation
- Decentralised change
- Heterogeneity

Dynamicity

Multimedia

The Web



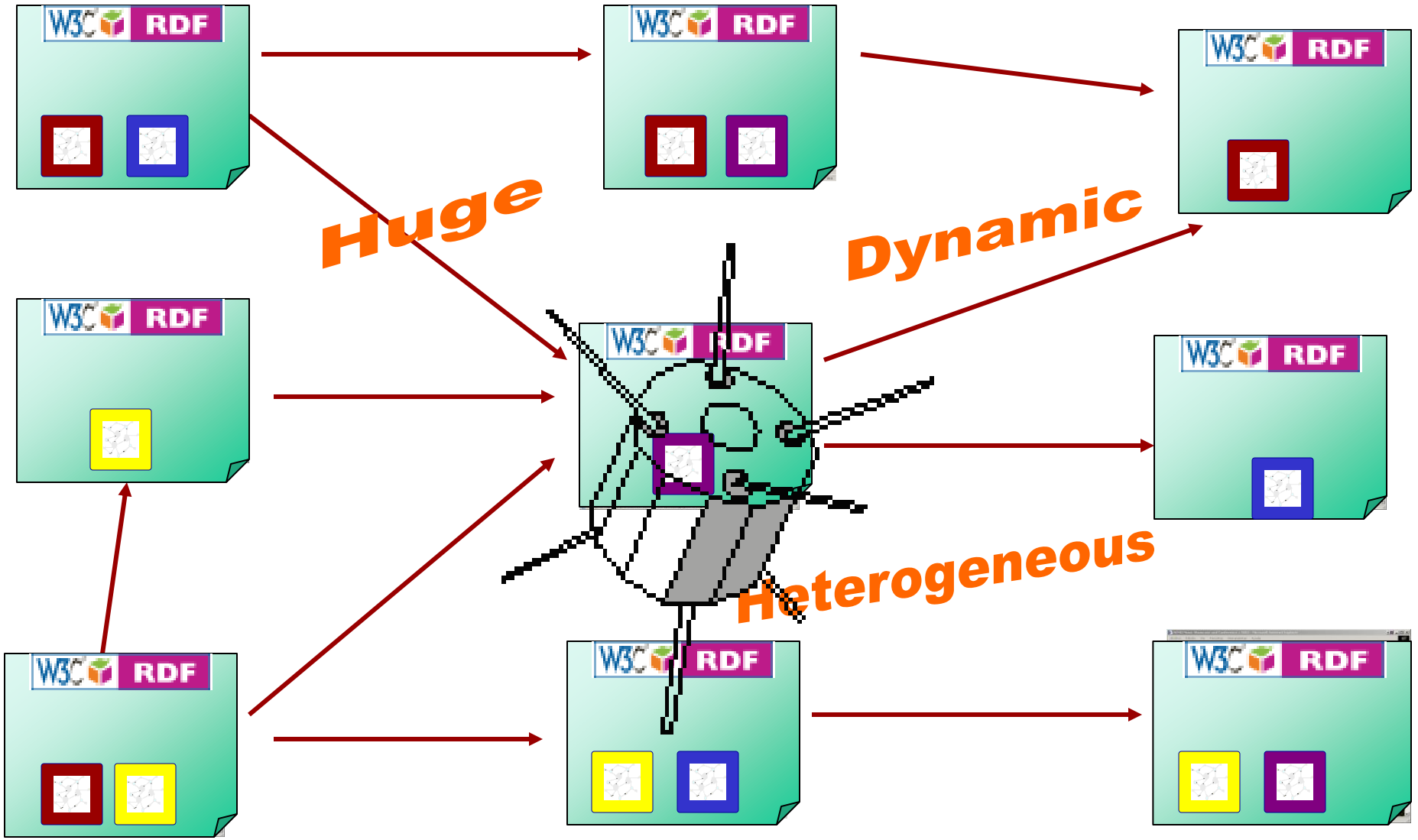


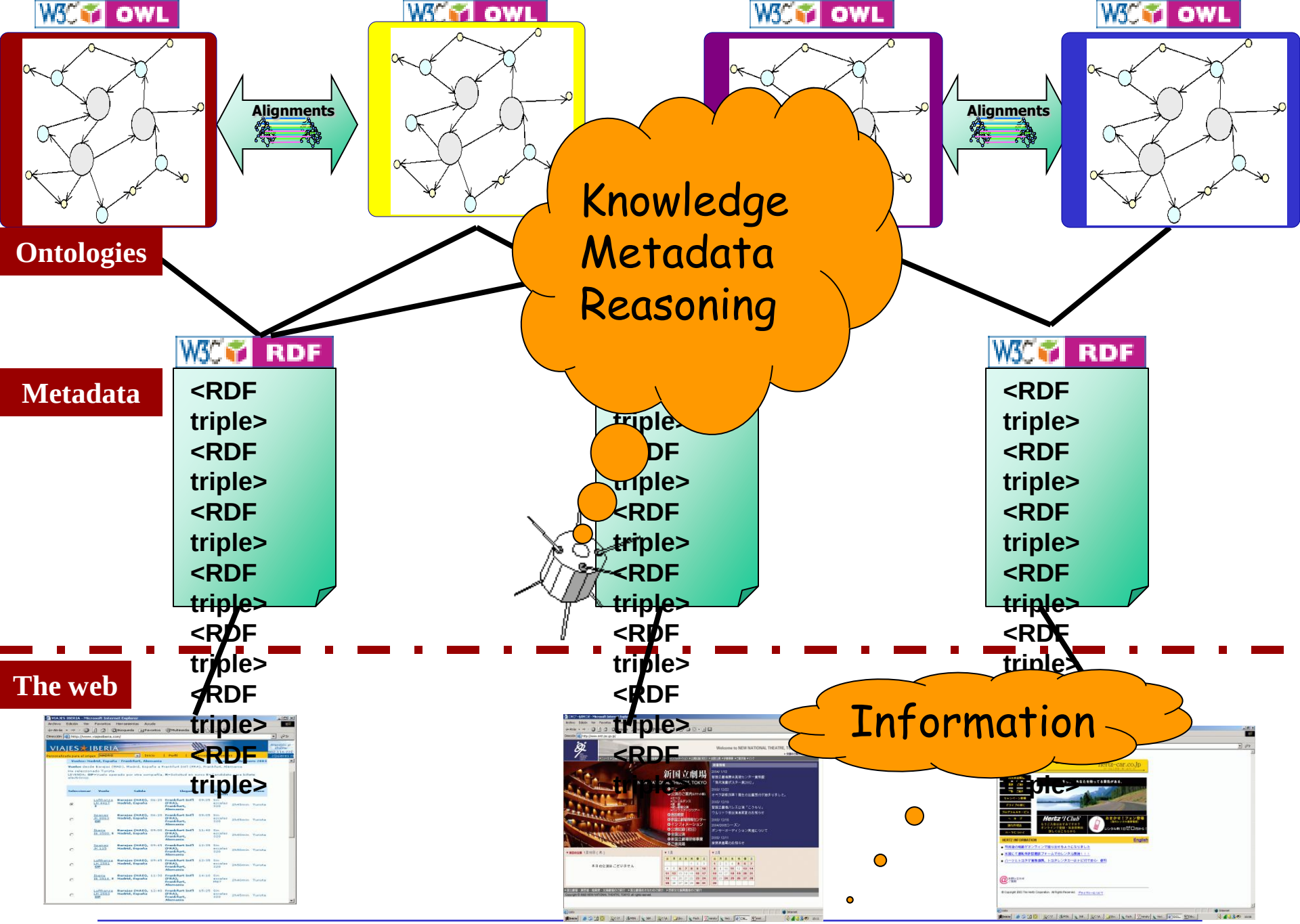

Huge

Dynamic

Heterogeneous

Semantic Webs




OWL
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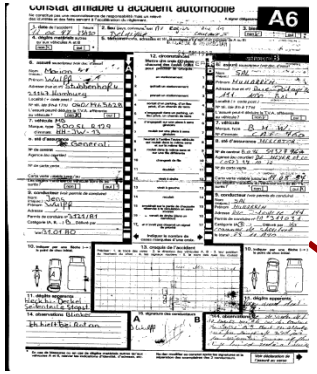
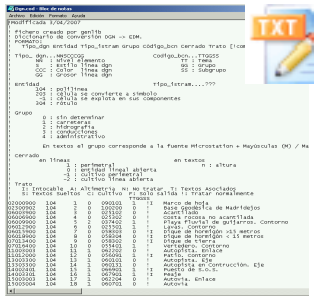
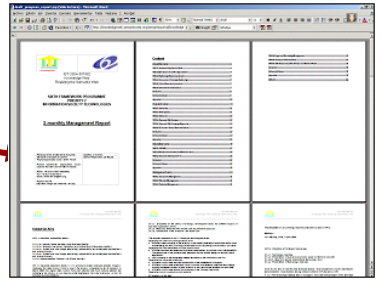
The web
Information

Corporative Semantics

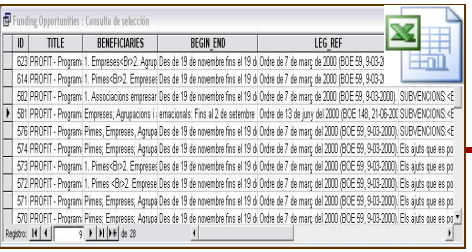




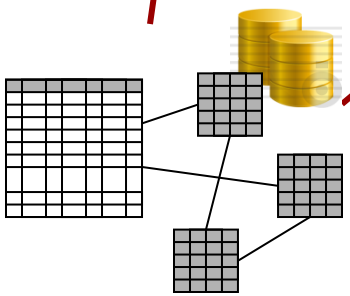


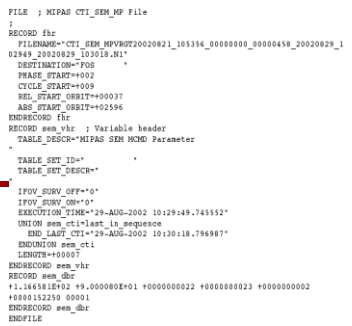
Huge

Dynamic

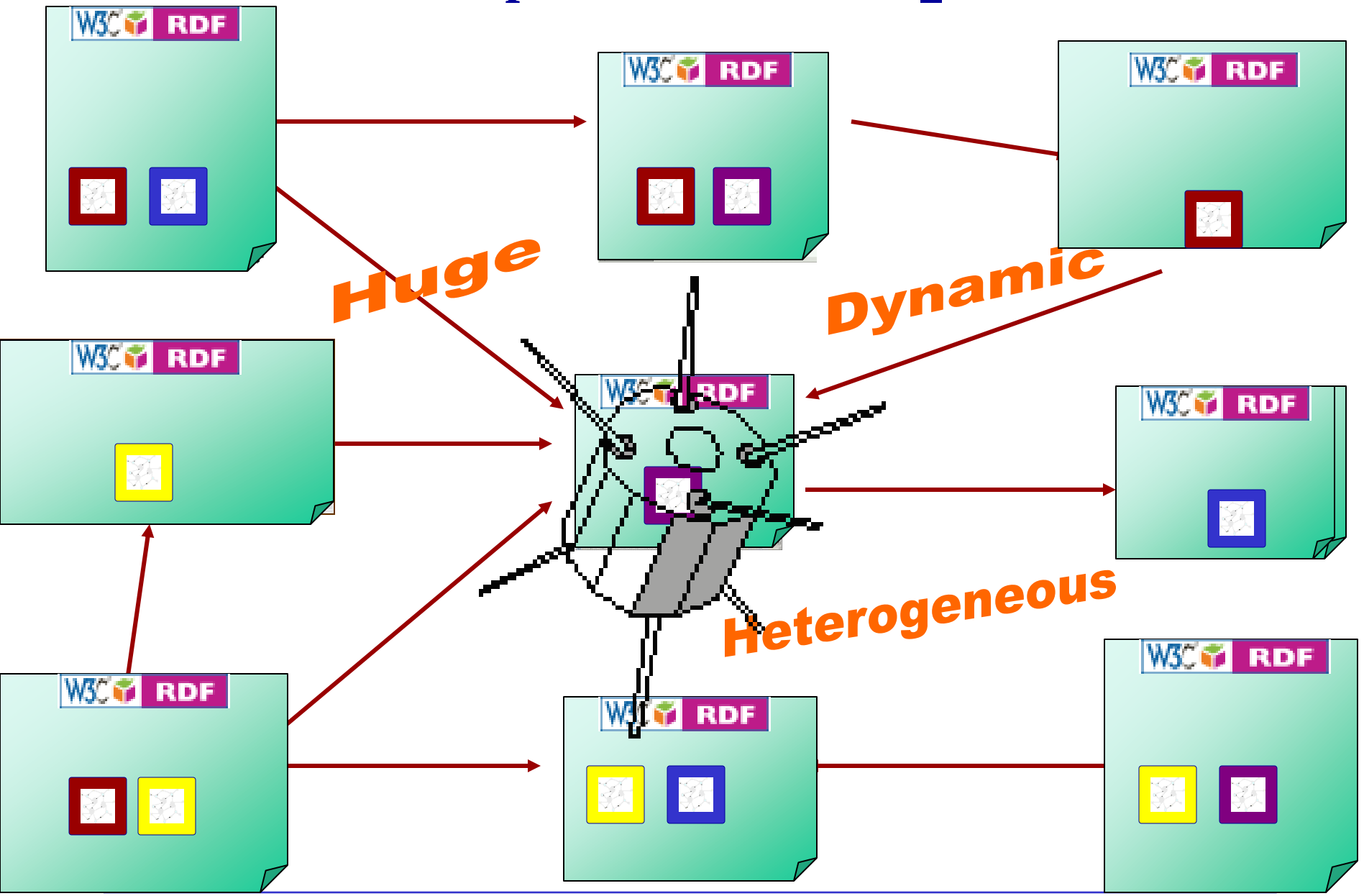


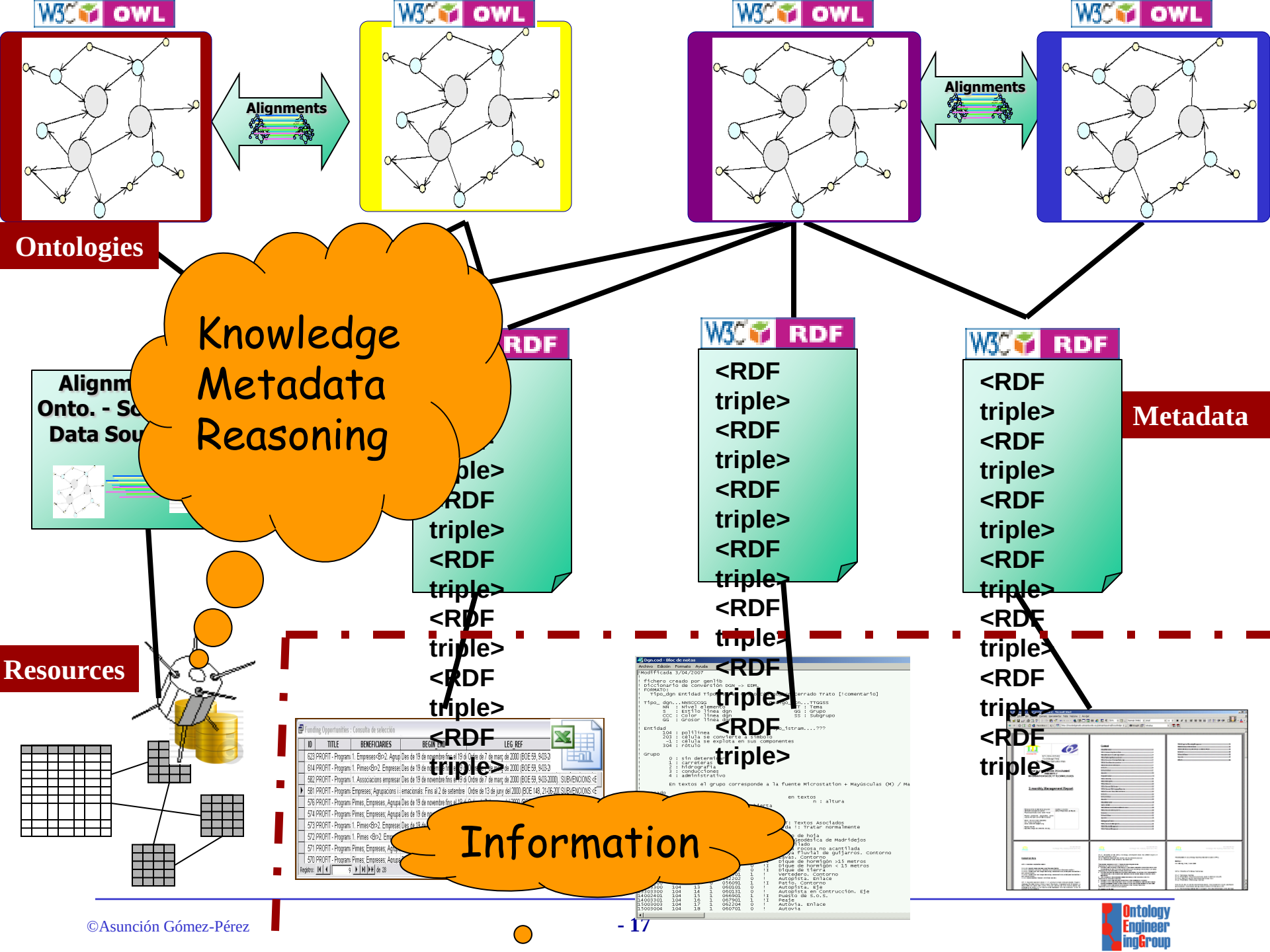
Heterogeneous





Corporative Semantics

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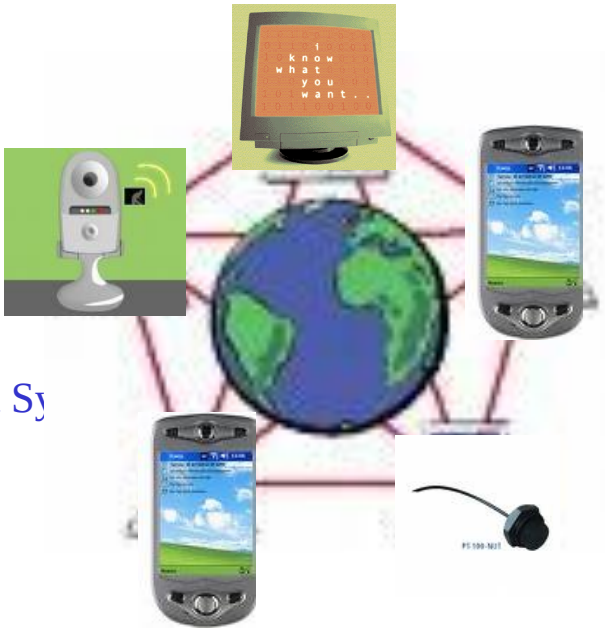
Metadata
Resources
Information

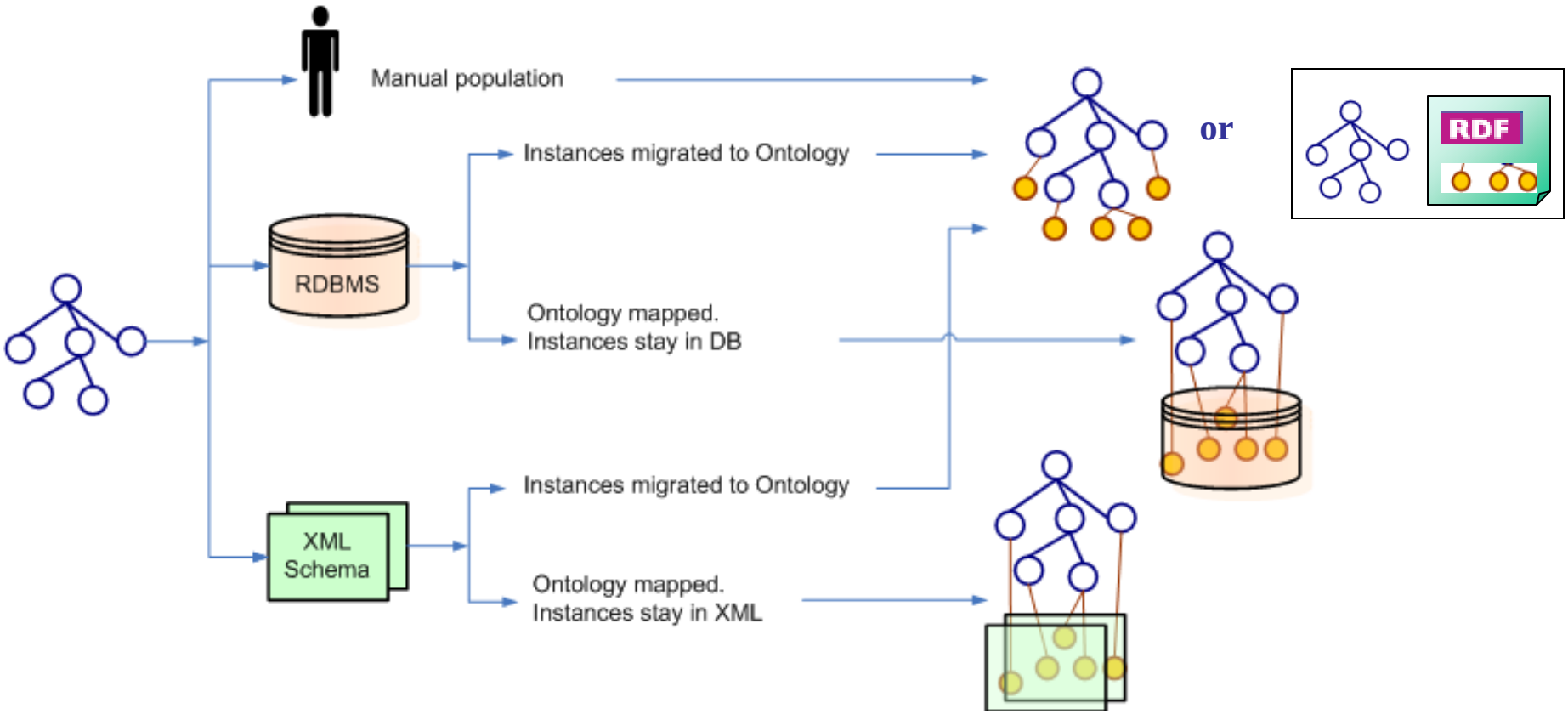
Table of Content



Key aspects of Ontological Engineering

- Ontologies
  - Single versus network of ontologies?
  - Are ontologies built from scratch or reusing knowledge-aware resources?
  - Are mappings used for solving conceptual mistmaches?
- Instances
  - Where are the data/instances?
    - Instances are in the ontology
    - Instances are in RDF files independently of the ontology
    - Data are kept in the original sources
  - Are instances distributed or centralized?
  - Have instances a very high rate of changes?
  - Heterogeneous provenance of instances
  - Degrees of data quality
  - Permissions

Where are the instances?

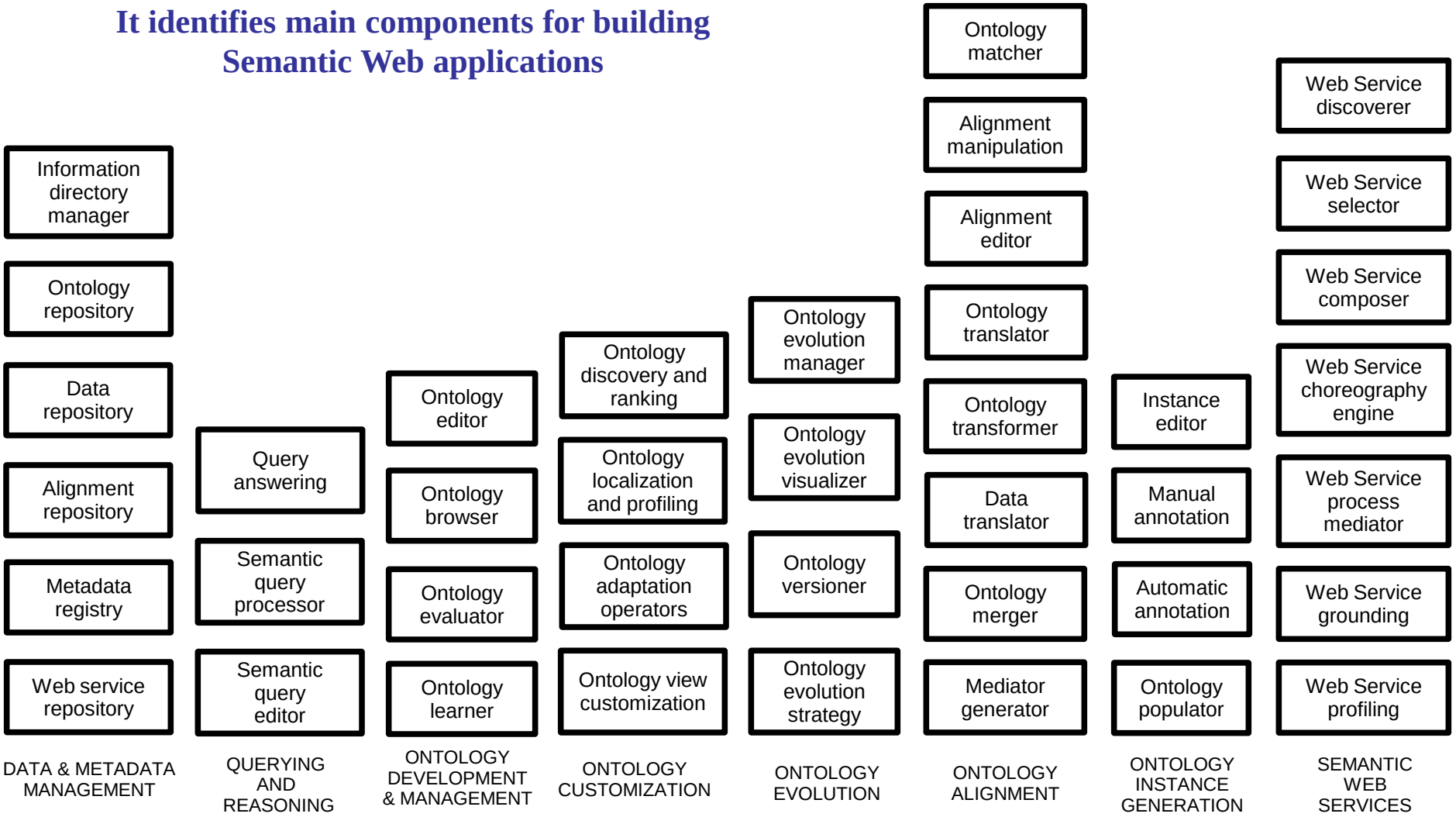


Key aspects of Semantic Applications

- Hugeness on semantic markups
- Conceptual Heterogeneity: Sem. markup based on many different ontologies
- Interoperability with other semantic resources
- Open to Web resources
- Open to Web services
- Web 2.0 like
- Mobile devices
- Geo-spatial information

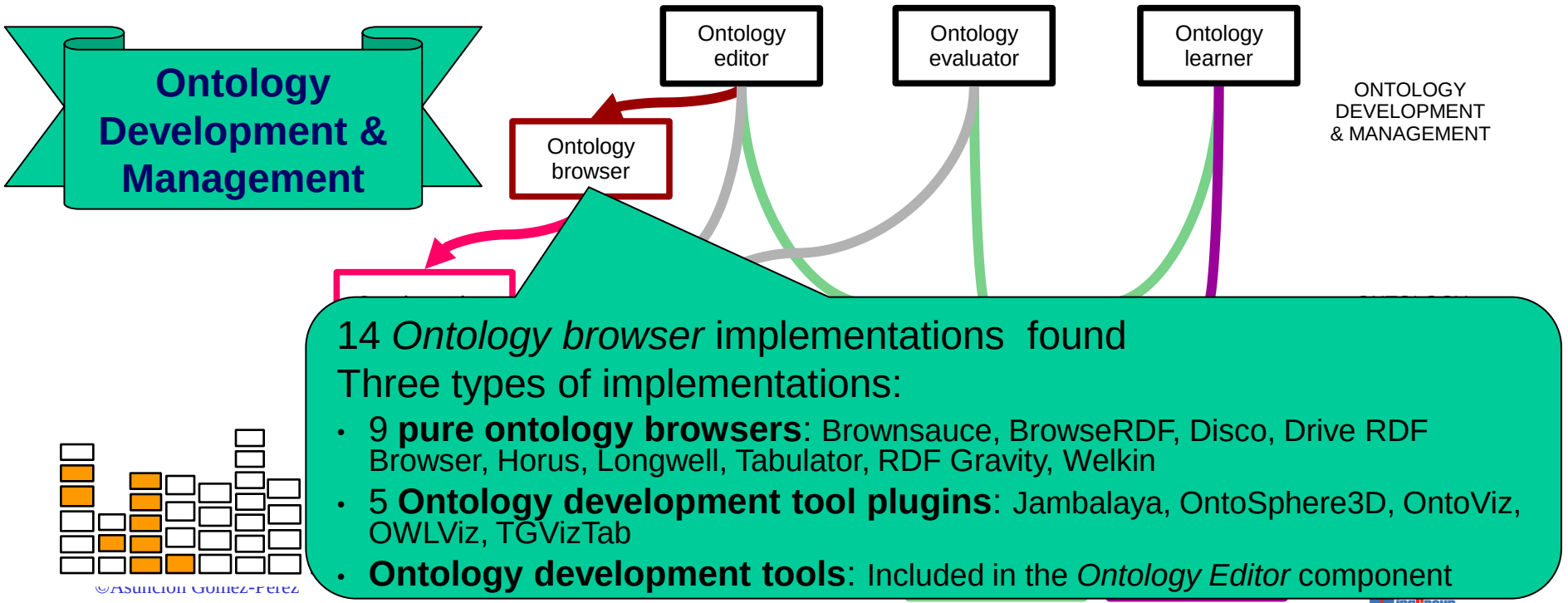
Semantic Web Framework

It identifies main components for building Semantic Web applications



Dimensions of the SWF

- For each dimension, we have identified:
  - Components
  - Component dependencies
  - Existing implementations



Criteria to compare applications

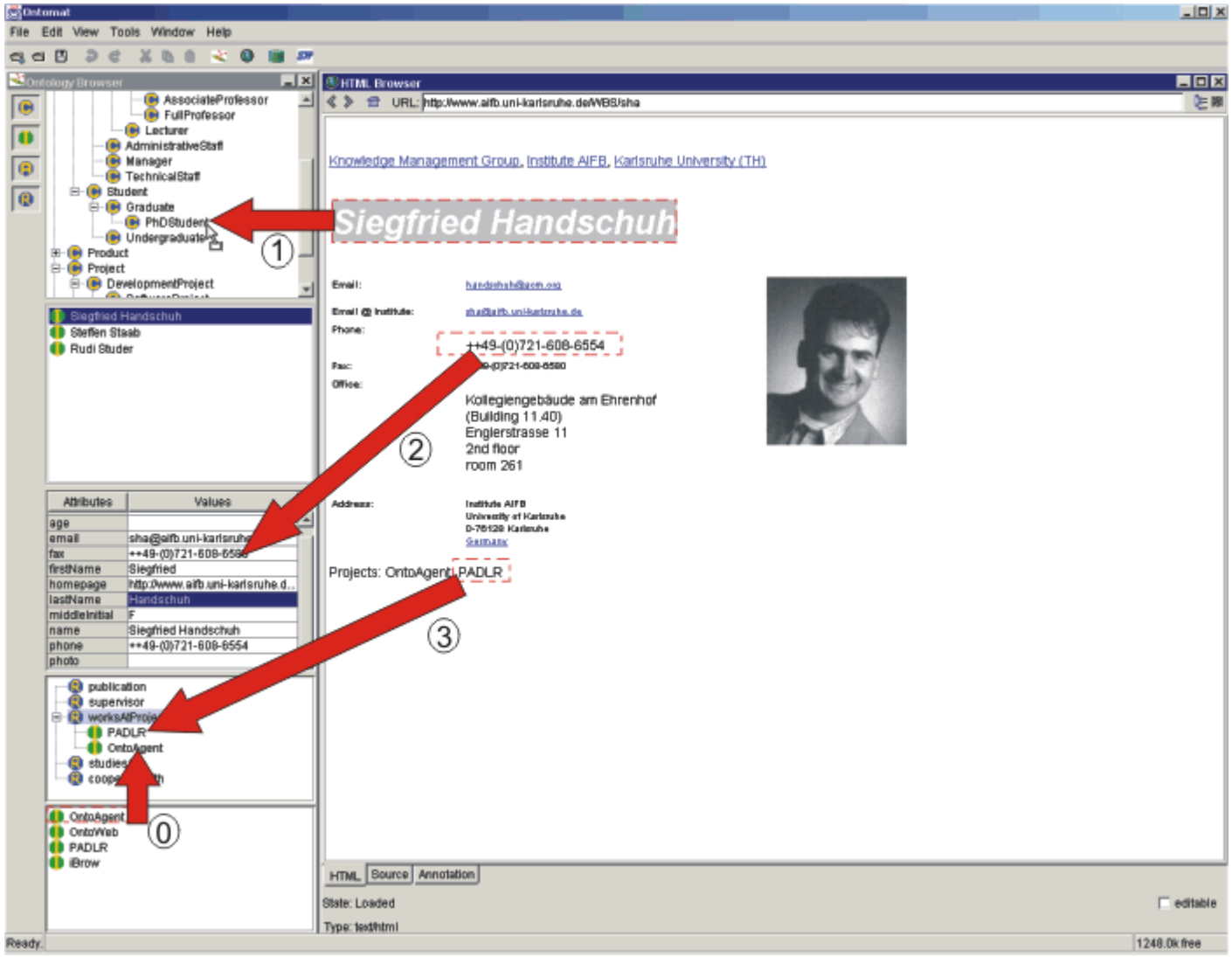
Single versus network of ontologies		**Type of Application**		Software Components Used
Ont. Built from scratch or reusing resources		**Hugeness: Operates at scale?**		
Conceptual Heterogeneity (mappings)		**Open to semantic resources?**		
Where are the data/instances?		**Open to web resources?**		
Are instances distributed or centralized?		**Open to web services?**		
Very high rate of change in instances?		**Web 2.0 like?**		
Heterogeneous Provenance of instances		**Mobile devices?**		
Various degrees of data quality		Geo-spatial Information		

Overview

- Semantic-based Applications
  - preSemanticWeb Applications
    - Annotation
  - Semantic Web 1.0 Applications
    - Annotation, Data Integration and Decision Support Systems
  - Semantic Web 3.0 Applications
    - (Collaborative) Annotation and Data Integration

Annotation in the pre-Semantic Web

- $(KA)^2$



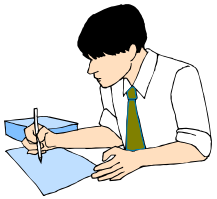
Semantic Web Portals

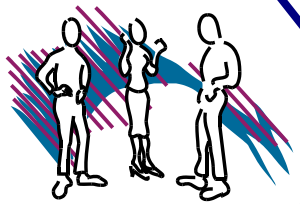
Semantic Driven

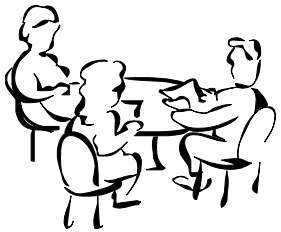
Permission-based

User Oriented

Portal Administrators
Ontologies and Software







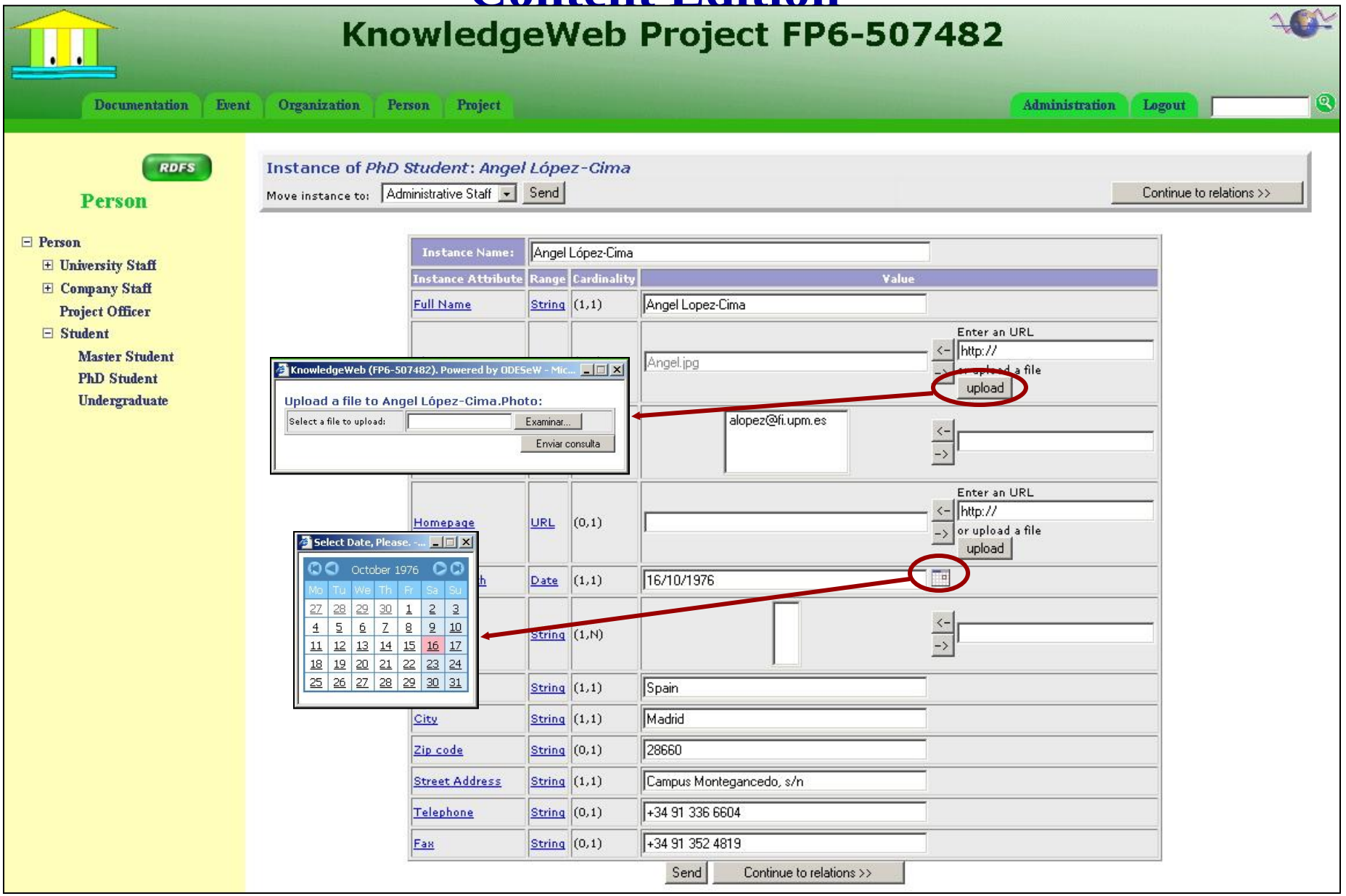
Extranet Users

Agents

External resources

Extranet view

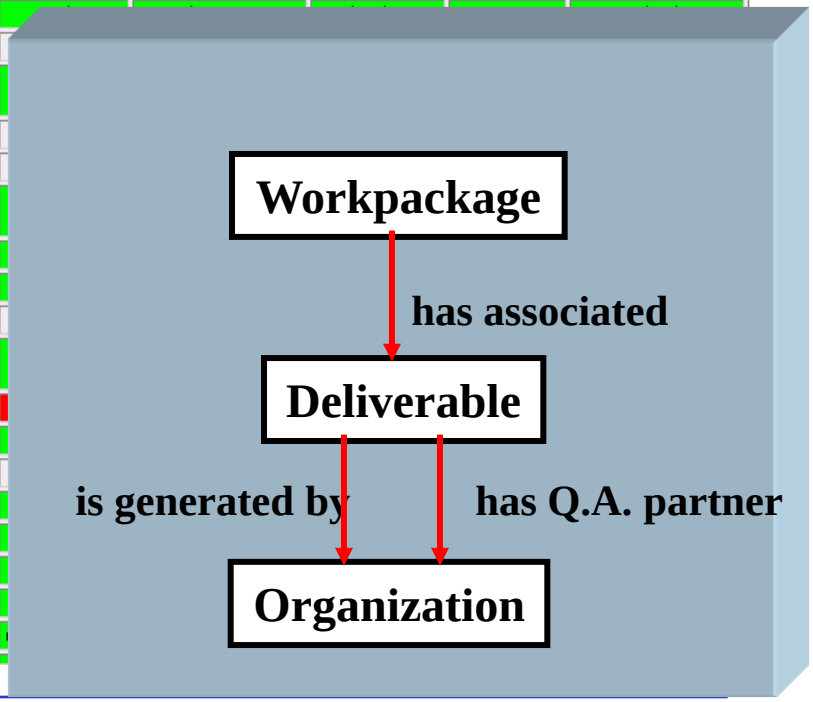
Content Edition



Semantic-based Visualisation

Status of the Deliverables

Workpackage	Deliverable	Generated By	Q.A. Responsibility	Delivery Date	Project Month	Status
WP1: Ontologies	D1.1: State of the art in ontologies from the SW perspective	UPM	IFI	11/08/2002	2	Final
	D1.2: Kernel Ontology Specification. Knowledge architecture	UPM	UdS	09/24/2003	27	Final
	D1.3: Ontology Workbench Specification	UPM	UniLiv	09/26/2003	27	Final
	D1.4: Ontology Alignment Solution	IFI	UPM	09/12/2003	27	Final
WP2: Window on Semantic Web languages	D2.1: State of the art on Semantic Web languages	IFI	UPM	02/17/2003	2	Final
	D2.2: Report on SW languages evolution	IFI	iSOCO	08/28/2003	30	Final
WP3: Annotation services	D3.1: State of the art on annotation tools and services	iSOCO	UdS	02/28/2003	2	---
	D3.2: Methodology for the development of wrappers and annotation tools	iSOCO	UdS	09/15/2003	10	---
	D3.3: Annotation services for static resources	iSOCO	UPM	---	10	---
	D3.4: Annotation services for dynamic resources	iSOCO	UniLiv	---	23	---
	D3.5: Annotation services for multimedia content					
	D3.6: Annotation services for web services					
WP4: Semantic indexation and routing	D4.1: State of the art on indexation, routing techniques and negotiation techniques					
	D4.2: Semantic Index Solution					
	D4.3: Routing Solution					
WP5: Multilinguality	D5.1: State of the art on multilinguality for ontologies, annotation services and user interfaces					
	D5.2: Multilinguality and ontologies					
	D5.3: Multilinguism and annotation services					
	D5.4: Multilingual user interface					
WP6: User interface and visualisation services	D6.1: State of the art on visualisation technologies feasible for the Semantic Web					
	D6.2: Ontology visualisation core services					
	D6.3: Semantic Web content visualisation services					
	D6.4: Semantic Index and Routing Monitor service					
WP7: Definition and integration	D7.1: System specification					
	D7.2: Cooperation protocol definition					
	D7.3: Application development guidelines					
	D7.4: Integration test plan					
WP8: Test case 1. Fund finder for	D8.1: Test case system specification					



Extranet View (RDF lives behind)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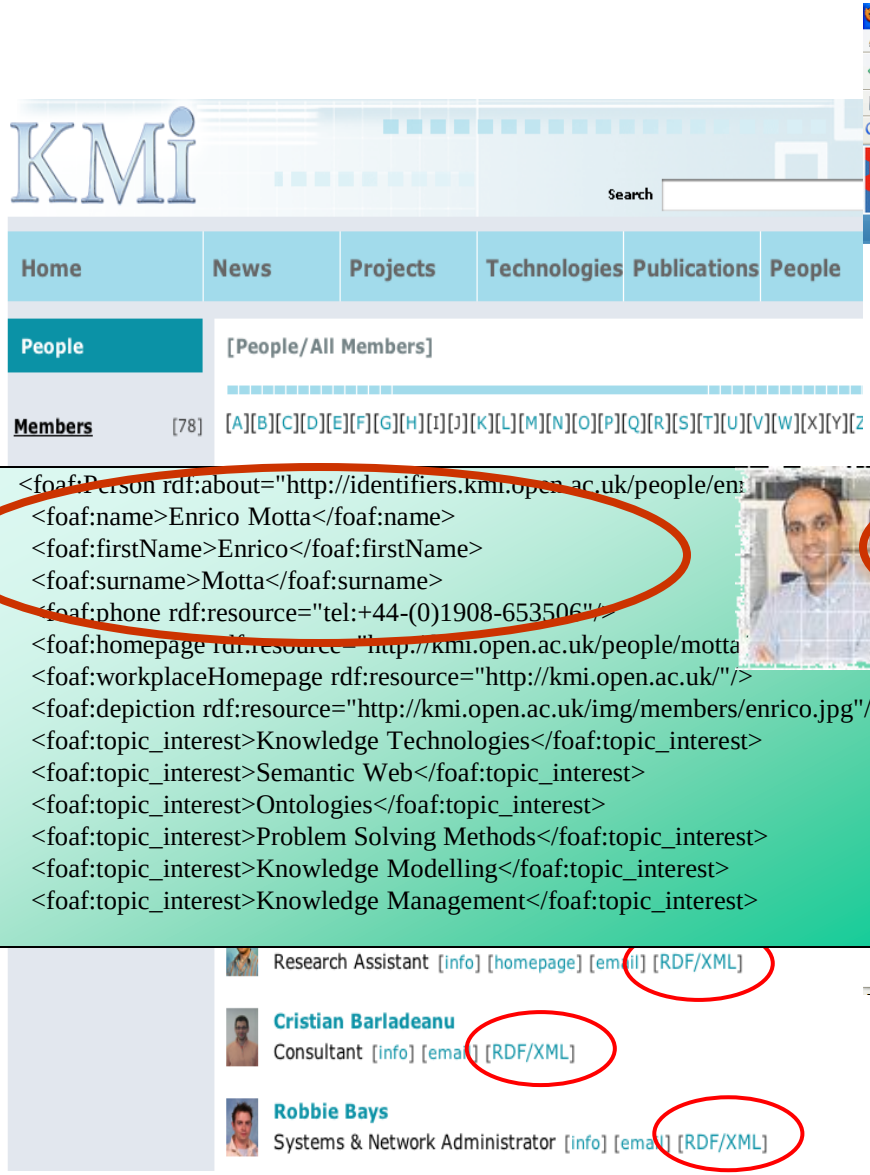
Semantic markup based on many different ontologies

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  <foaf:firstName>Enrico</foaf:firstName>
  <foaf:surname>Motta</foaf:surname>
  <foaf:phone rdf:resource="tel:+44-(0)1908-653506"/>
  <foaf:homepage rdf:resource="http://kmi.open.ac.uk/people/motta
  <foaf:workplaceHomepage rdf:resource="http://kmi.open.ac.uk/"/>
  <foaf:depiction rdf:resource="http://kmi.open.ac.uk/img/members/enrico.jpg"/>
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  <NS0:Last_Name2>Pérez</NS0:Last_Name2>
  <NS0:DisplayName>Asunción de María Gómez Pérez</NS0:DisplayName>
  <NS0:Academic_Degree>Ph.D.</NS0:Academic_Degree>
  <NS0:E-mail>asun@fi.upm.es</NS0:E-mail>
  <NS0:Telephone>34 913367439</NS0:Telephone>
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Conceptual Mistmatch

Corporate Semantic Web: ODESeW

Single versus network of ontologies	Ontology Networks	**Type of Application**	Corporate Semantic Web	Software Components Used from the SWF
Ont. Built from scratch or reusing resources	From scratch	**Hugeness: Operates at scale?**	Partially	1. Ontology repository 2. Data repository 3. Metadata registry 4. Query answering 5. Semantic query processor 6. Ontology browser 7. Ontology view customization 8. Instance editor 9. Manual annotation. 10. Ontology Populator
Conceptual Heterogeneity (mappings)	No	**Open to semantic resources?**	Yes	
Where are the data/instances?	In the ontology	**Open to web resources?**	Yes	
Are instances distributed or centralized?	Centralized	**Open to web services?**	No	
Very high rate of change in instances?	No	**Web 2.0 like?**	No	
Heterogeneous Provenance of instances	Yes	**Mobile devices?**	No	
Various degrees of data quality	Yes	Geo-spatial Information	NO	

Overview

-
- Semantic-based Applications
  - preSemanticWeb Applications
    - Annotation
  - Semantic Web 1.0 Applications
    - Annotation, Data Integration and Decision Support Systems
  - Semantic Web 3.0 Applications
    - (Collaborative) Annotation and Data Integration
-

Ontology-based Access to DBs

1. **Build a new ontology from 1 DB schema and 1 DB**

2. **Align the ontology built with approach 1 with a legacy ontology**

3. **Align an existing DB with a legacy ontology**

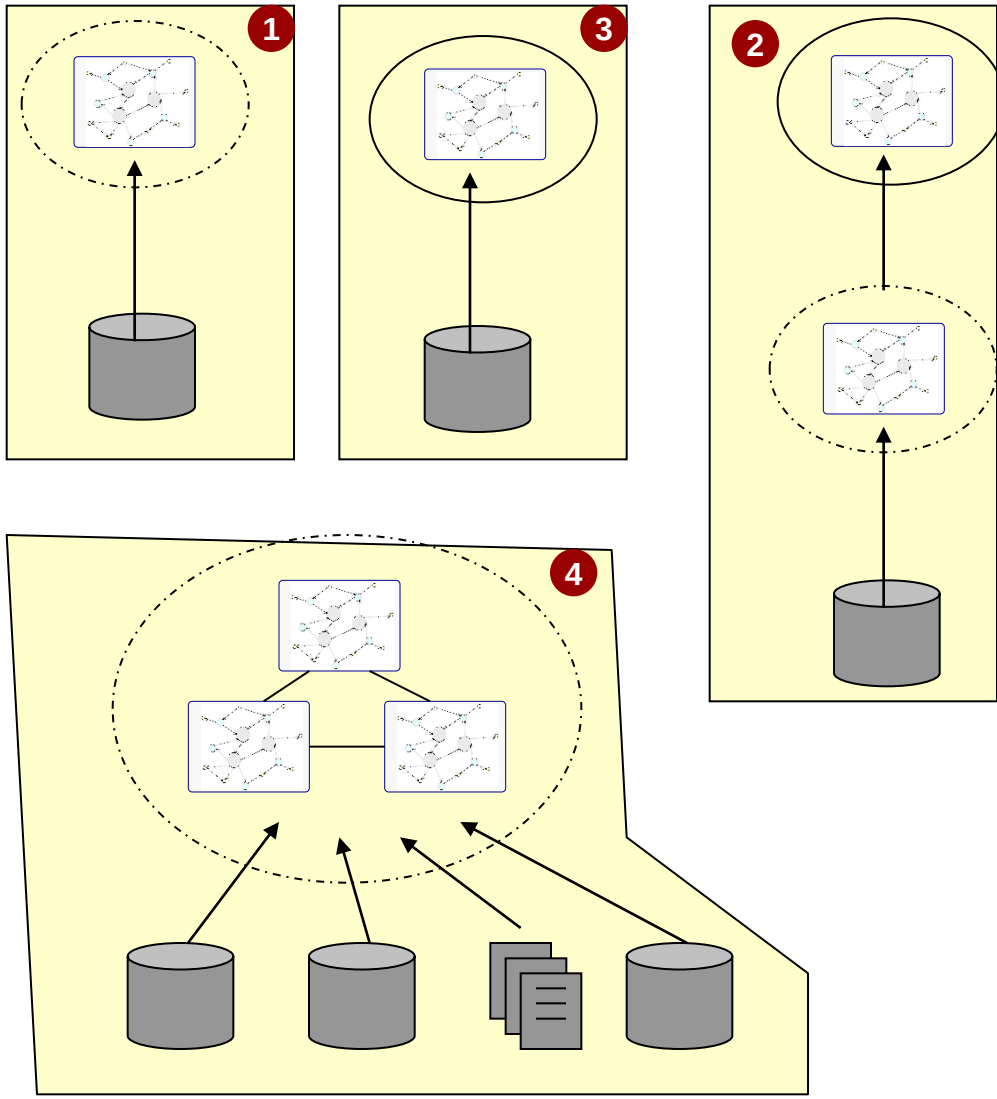
   a) Massive dump (semantic data warehouse)

   b) Query-driven

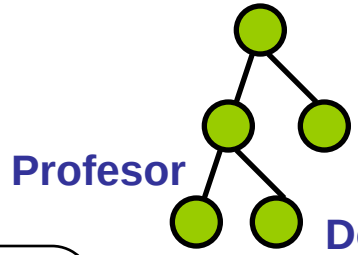
4. **Align an ontology network with n DB schemas and other data sources**

   a) Massive dump (semantic data warehouse)

   b) Query-driven

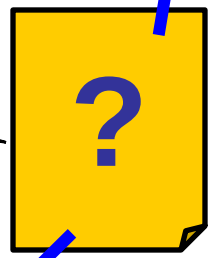


Ontology-based Access to Databases

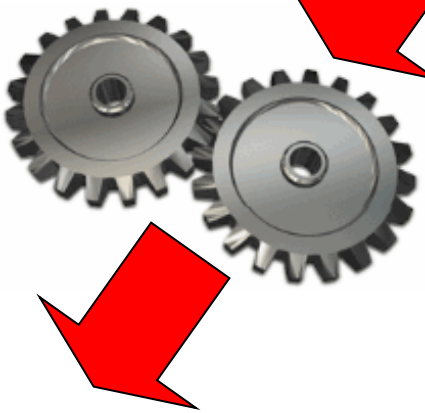


Ontología

* Un profesor es una persona cuyo puesto es "docente"
* Una universidad es una organización de tipo "3"

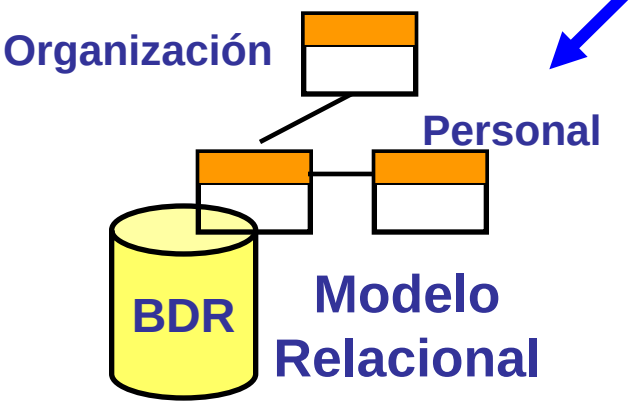


Pregunta: Nombre de los profesores de la universidad UPM



Procesador

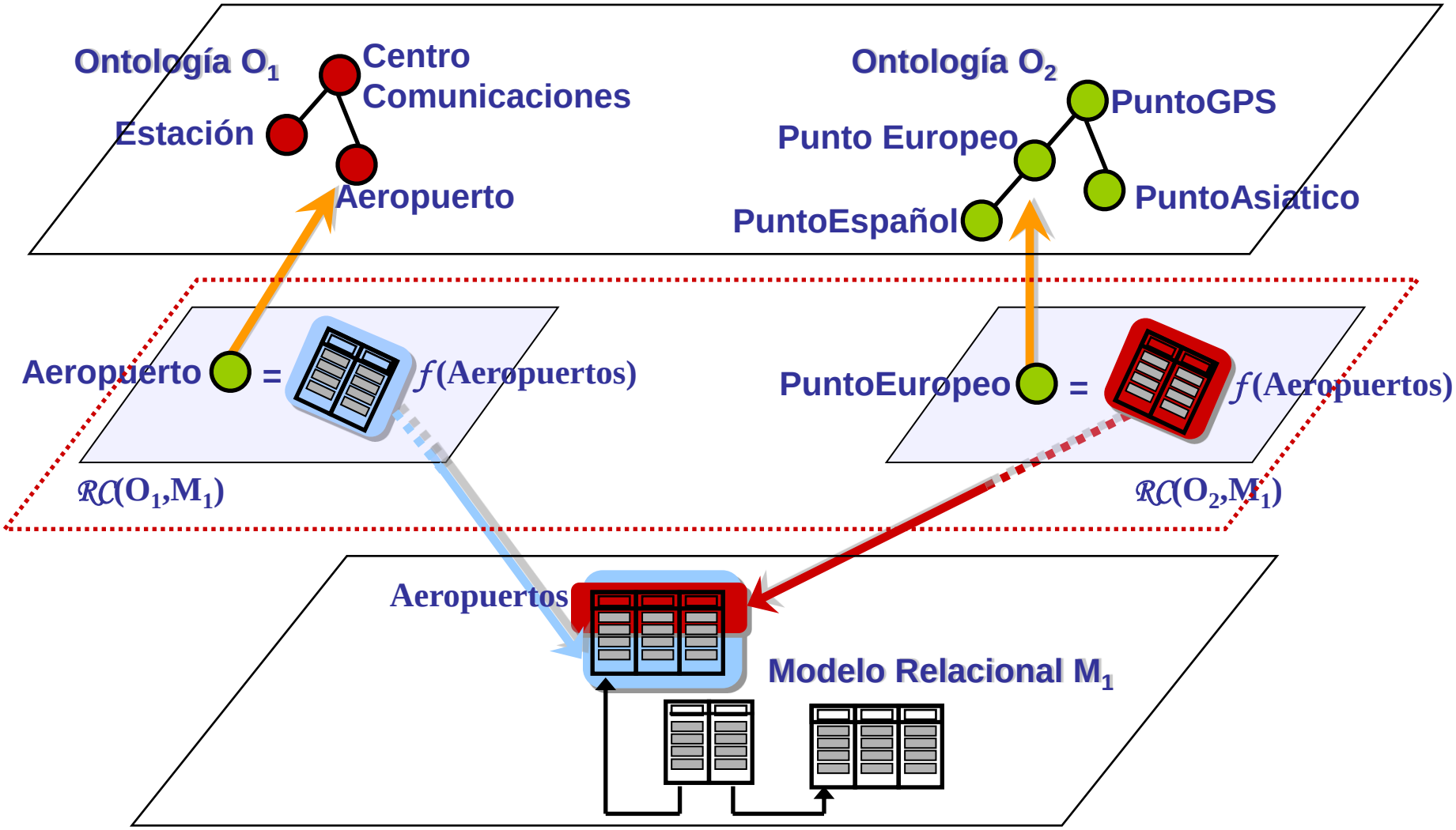
Procesado de la consulta de acuerdo a la descripción formal de correspondencia



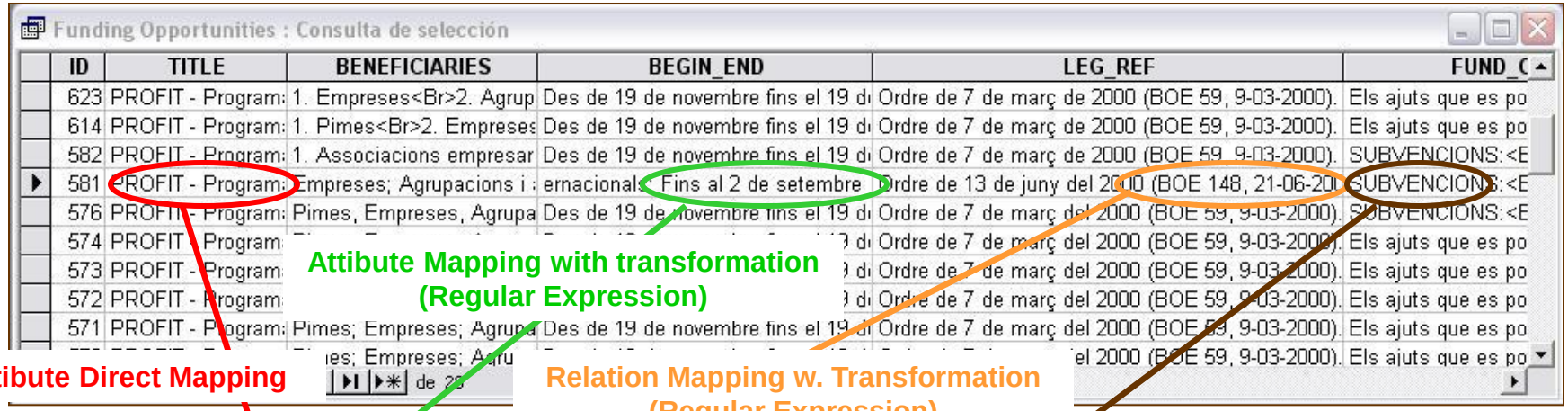
Modelo Relacional

Consulta: valores de la columna *nombre* de los registros de la tabla *Personal* para los que el valor de la columna *puesto* is *"docente"* que estén relacionados con al menos un registro de la tabla *Organización* con el valor "3" en la columna *tipo* y "*UPM*" en la columna *nombre*.

Align existing data sources with legacy ontologies



CIDEM: Ontology-based access to DBs



Ontology-based Access to Documents

4.2.1) Documentación administrativa:

a) Original o fotocopia compulsada del documento acreditativo de la personalidad de la entidad solicitante.

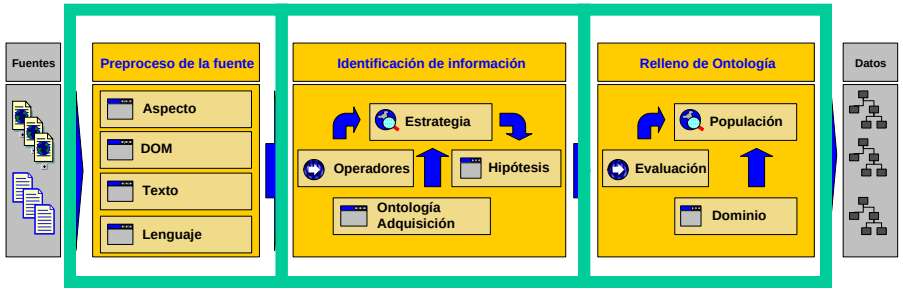
b) Poder notarial bastante del representante de dicha entidad, o documentación acreditativa de dicha cualidad.

c) Fotocopia compulsada de la tarjeta de identificación fiscal de la Entidad.

d) Original o copia con el carácter de auténtica o fotocopia compulsada de los Estatutos debidamente legalizados.

e) Original o fotocopia compulsada de la siguiente documentación acreditativa del cumplimiento de Obligaciones Tributarias y de Seguridad Social:

Recibo del año anterior a la co
económicas, o en su caso, exenci
Certificaciones administrativa
por las Administraciones corresp
nistración Tributaria y de la Tes
de conformidad con lo estableci
Presupuestaria y en su caso, exe
y del Impuesto de Sociedades.




```
<Funding_Opportu:DocumentationItem
  rdf:about="http://protege.stanford.edu/tmp_namespace#tmp_Instance_10032" rdfs:label="BOE">
  <tmp_namespace:Description>Fotocopia compulsada de la tarjeta de identificación fiscal de la
    Entidad.</tmp_namespace:Description>
  <Funding_Opportu:isNeededToApplyFor
    rdf:resource="http://protege.stanford.edu/tmp_namespace#tmp_Instance_10004" />
</Funding_Opportu:DocumentationItem>
- <Funding_Opportu:DocumentationItem
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  <tmp_namespace:Description>Original o copia con el carácter de auténtica o fotocopia compulsada de
    los Estatutos debidamente legalizados.</tmp_namespace:Description>
  <Funding_Opportu:isNeededToApplyFor
    rdf:resource="http://protege.stanford.edu/tmp_namespace#tmp_Instance_10004" />
</Funding_Opportu:DocumentationItem>
- <Funding_Opportu:DocumentationItem
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    acreditativa del cumplimiento de Obligaciones Tributarias y de Seguridad Social: Recibo del año
    anterior a la convocatoria del Impuesto sobre actividades económicas, o en su caso, exención
    concedida por el órgano competente. Certificaciones administrativas con el carácter de positivas
    expedidas por las Administraciones correspondientes de la Agencia Estatal de Administración
    Tributaria y de la Tesorería Territorial de la Seguridad Social, de conformidad con lo establecido en
    el artículo 81 de la Ley General Presupuestaria y en su caso, exenciones del Impuesto del Valor
    Añadido y del Impuesto de Sociedades.</tmp_namespace:Description>
```
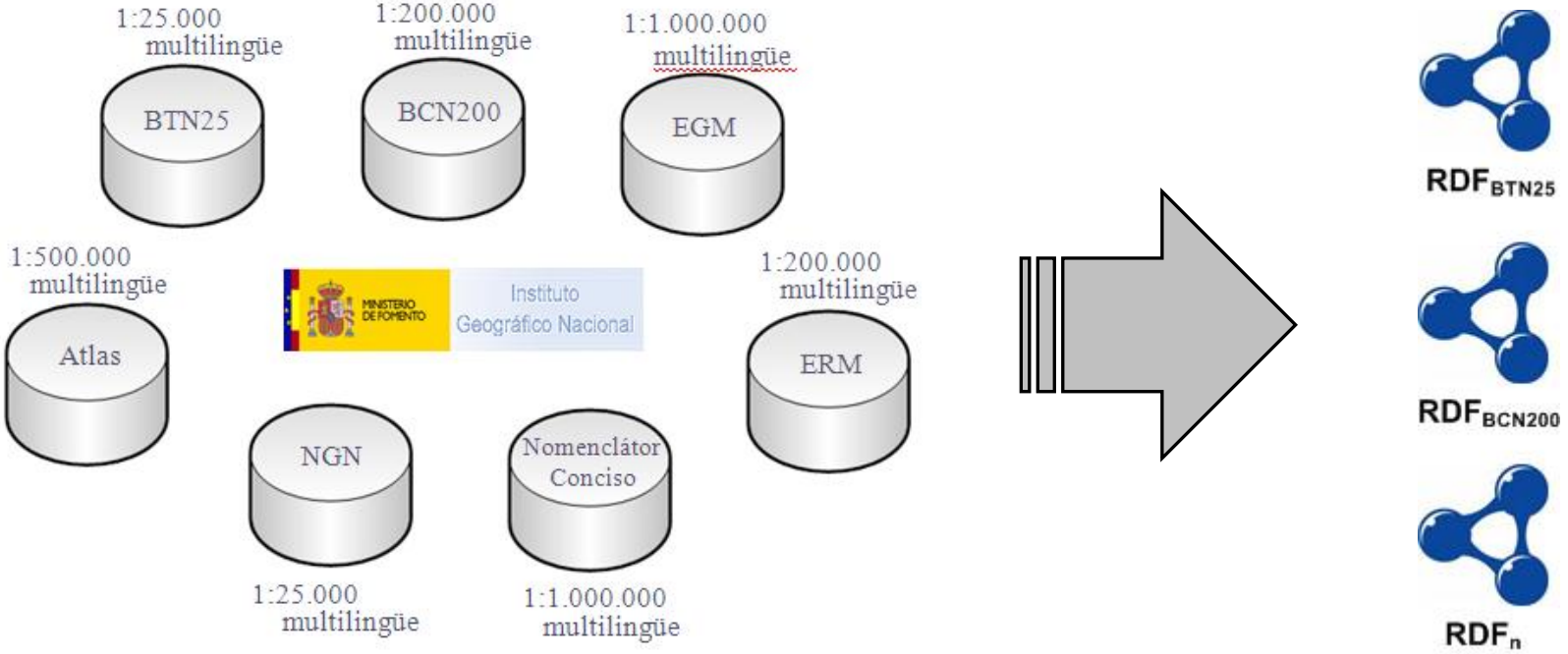
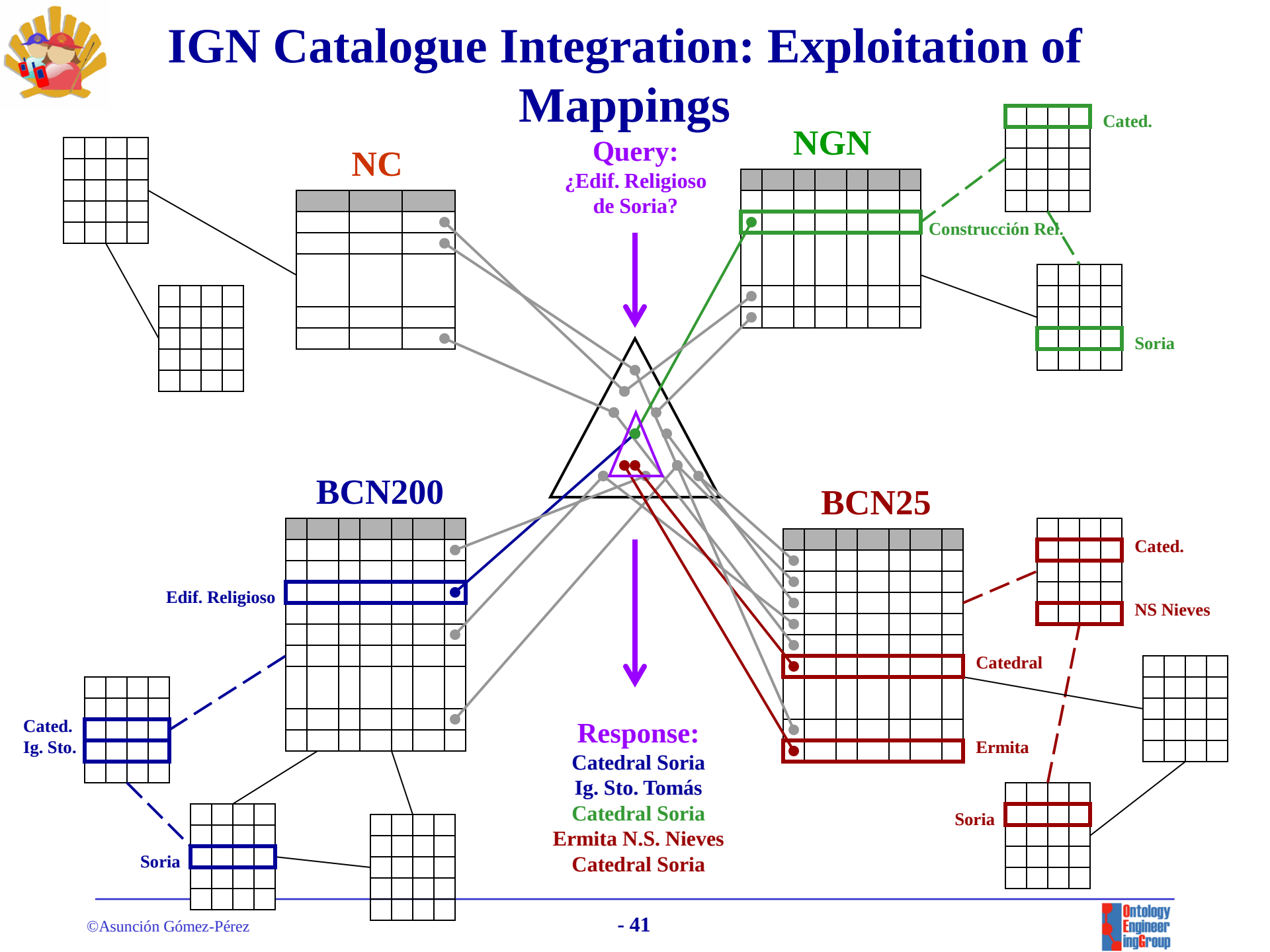
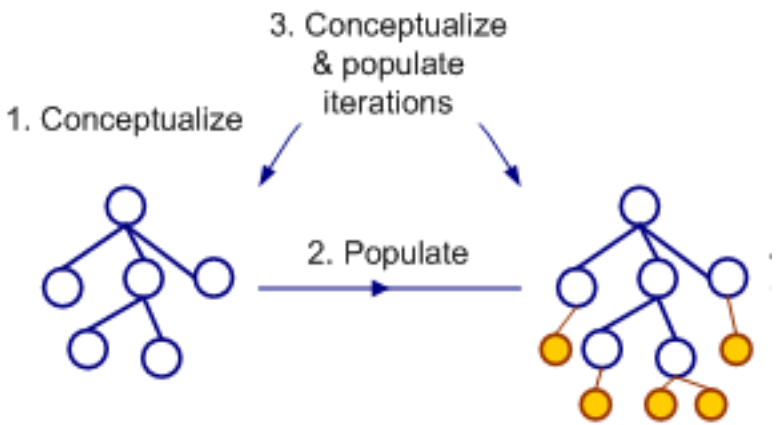

Migrating IGN (Instituto Geográfico Nacional) sources

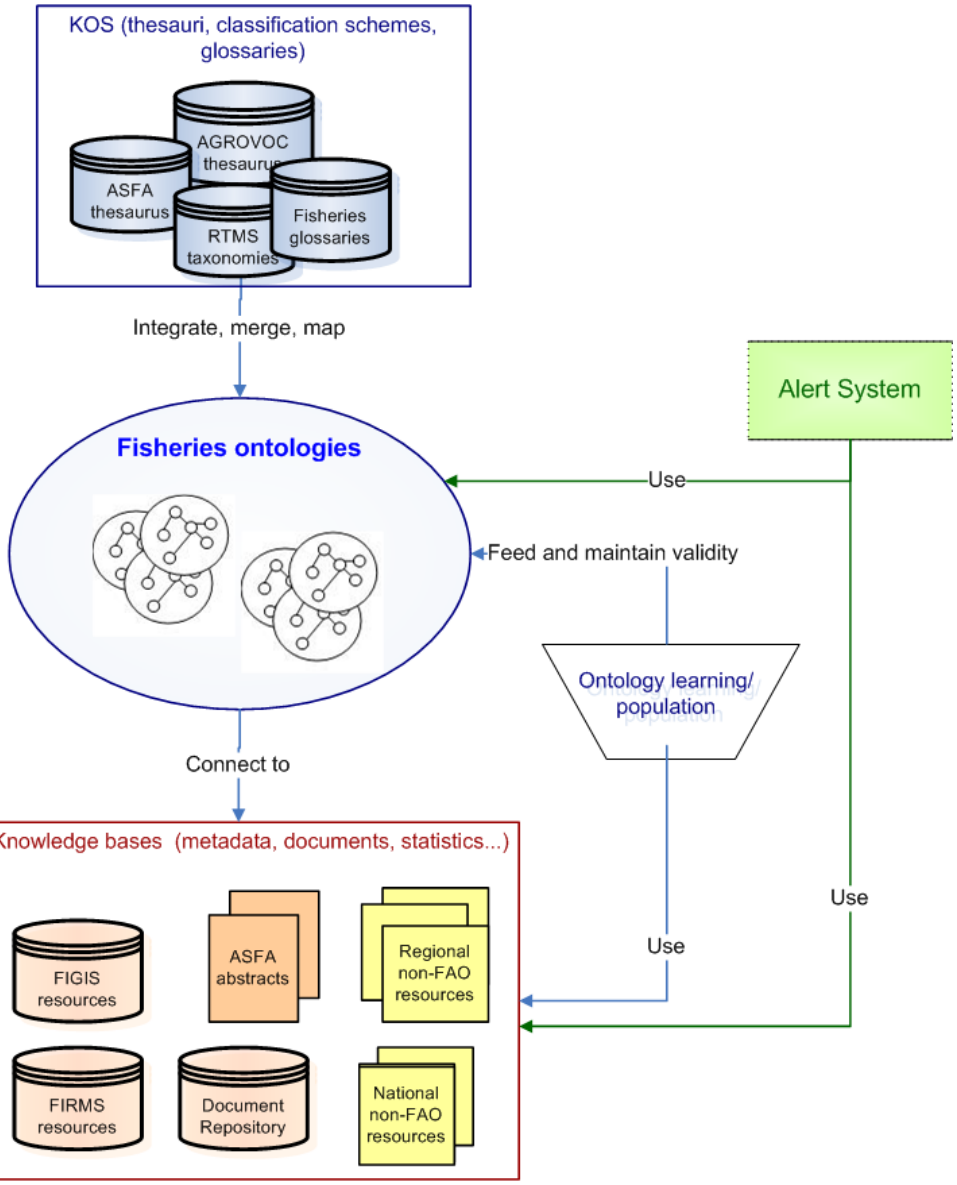


IGN Catalogue Integration: Exploitation of Mappings

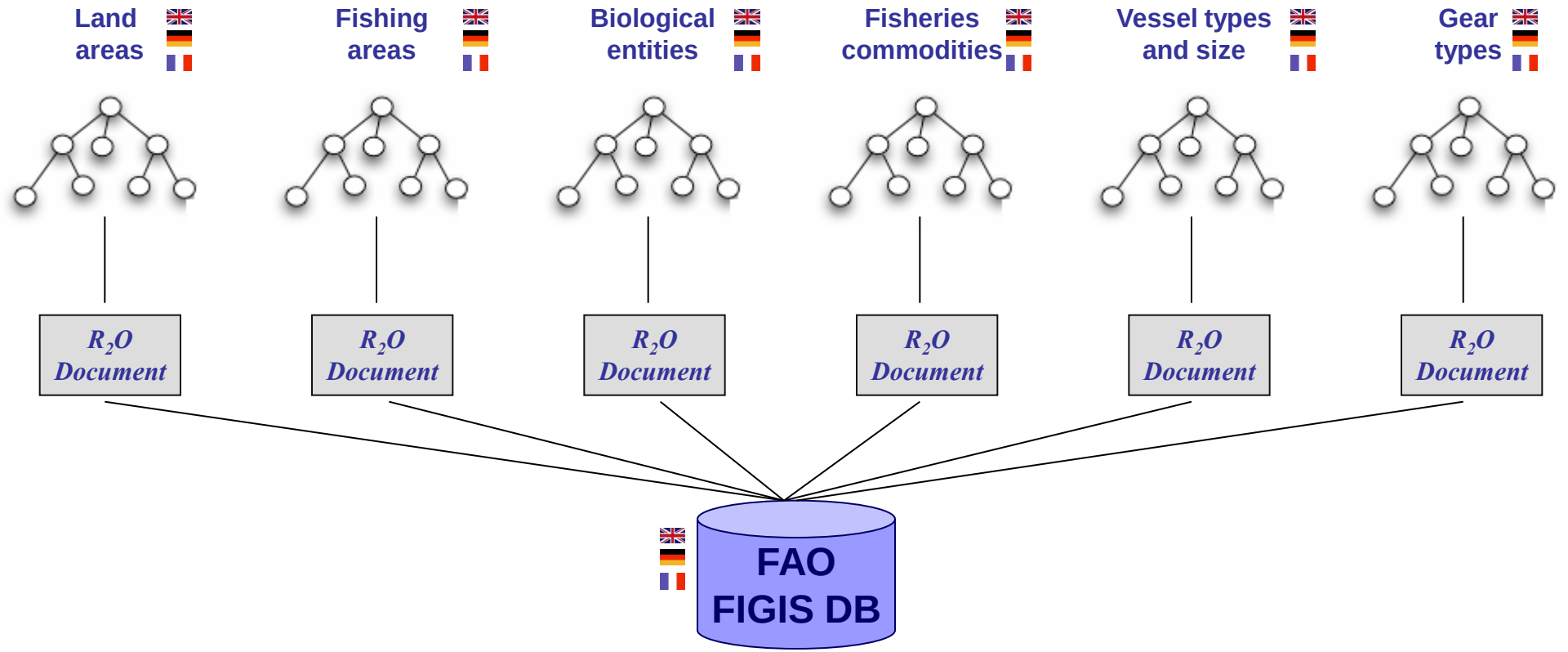


UN FAO Example





Alignments between ontologies and the DB



Land areas	
Concepts	4
Properties	25
Instances	289

Fishing areas	
Concepts	5
Properties	14
Instances	134

Biological entities	
Concepts	5
Properties	21
Instances	11571

Fisheries commoditie	
Concepts	5
Properties	14
Instances	1380

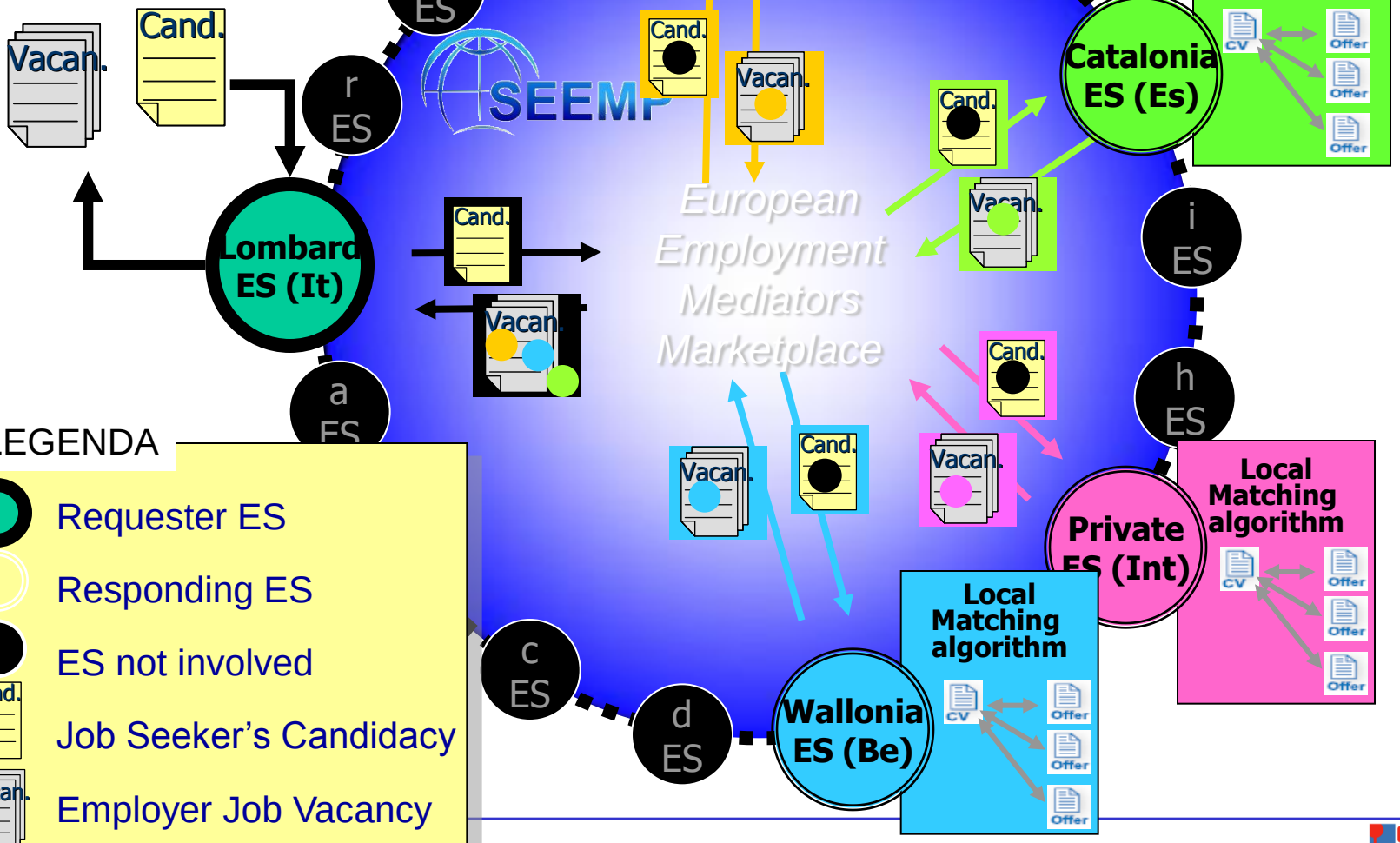
Vessel types and size	
Concepts	5
Properties	20
Instances	120

Gear types	
Concepts	4
Properties	14
Instances	0

FAO case study

Single versus network of ontologies	Network of ontologies	**Type of Application**	Desktop application	Software Components Used
Ont. Built from scratch or reusing resources	Reusing resources	**Hugeness: Operates at scale?**	Yes	1. Information directory manager 2. Ontology repository 3. Data repository 4. Alignment repository 5. Metadata registry 6. Query answering 7. Semantic query proccesor 8. Ontology editor 9. Ontology browser 10. Ontology evaluator 11. Ontology learner 12. Ontology matcher 13. Ontology localization and profiling 14. Ontology adapation operators 15. Ontology view customization 16. Ontology evolution manager 17. Ontology evolution visualizer 18. Ontology versioner 19. Instance Editor 20. Manual annotation 21. Automatic annotation 22. Ontology populator
Conceptual Heterogeneity (mappings)	Yes	**Open to semantic resources?**	Yes	
Where are the data/instances?	DB + XML + RDF files	**Open to web resources?**	Yes	
Are instances distributed or centralized?	Distributed	**Open to web services?**	No	
Very high rate of change in instances?	Yes	**Web 2.0 like?**	No	
Heterogeneous Provenance of instances	Yes	**Mobile devices?**	No	
Various degrees of data quality	Yes	Geo-spatial Information	Yes	

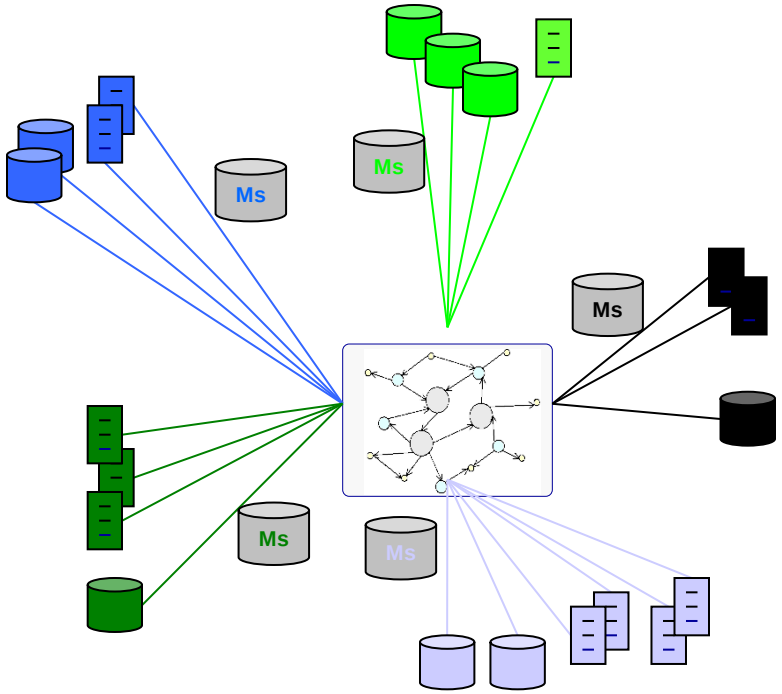
The Goal: Helping Job Seekers on their way



LEGENDA

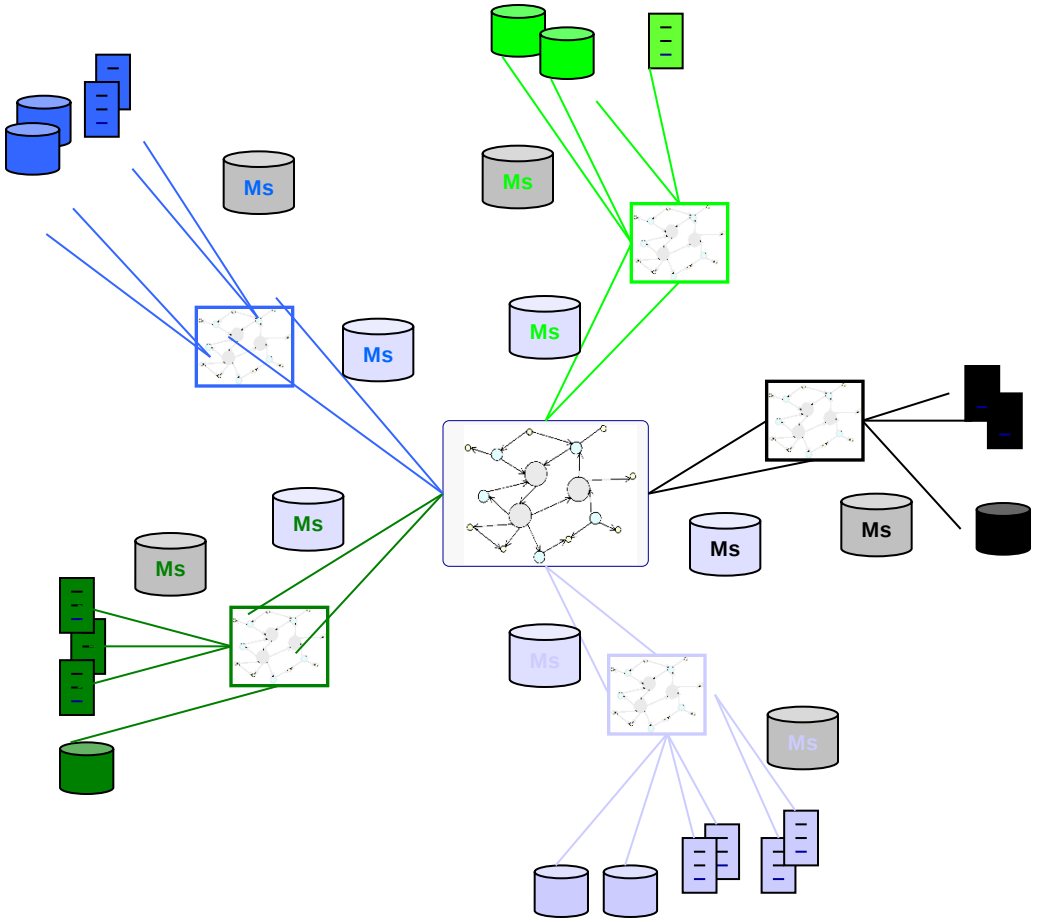
- Requester ES
- Responding ES
- ES not involved
- Cand. — Job Seeker's Candidacy
- Vacan. — Employer Job Vacancy

Centralized network of ontologies

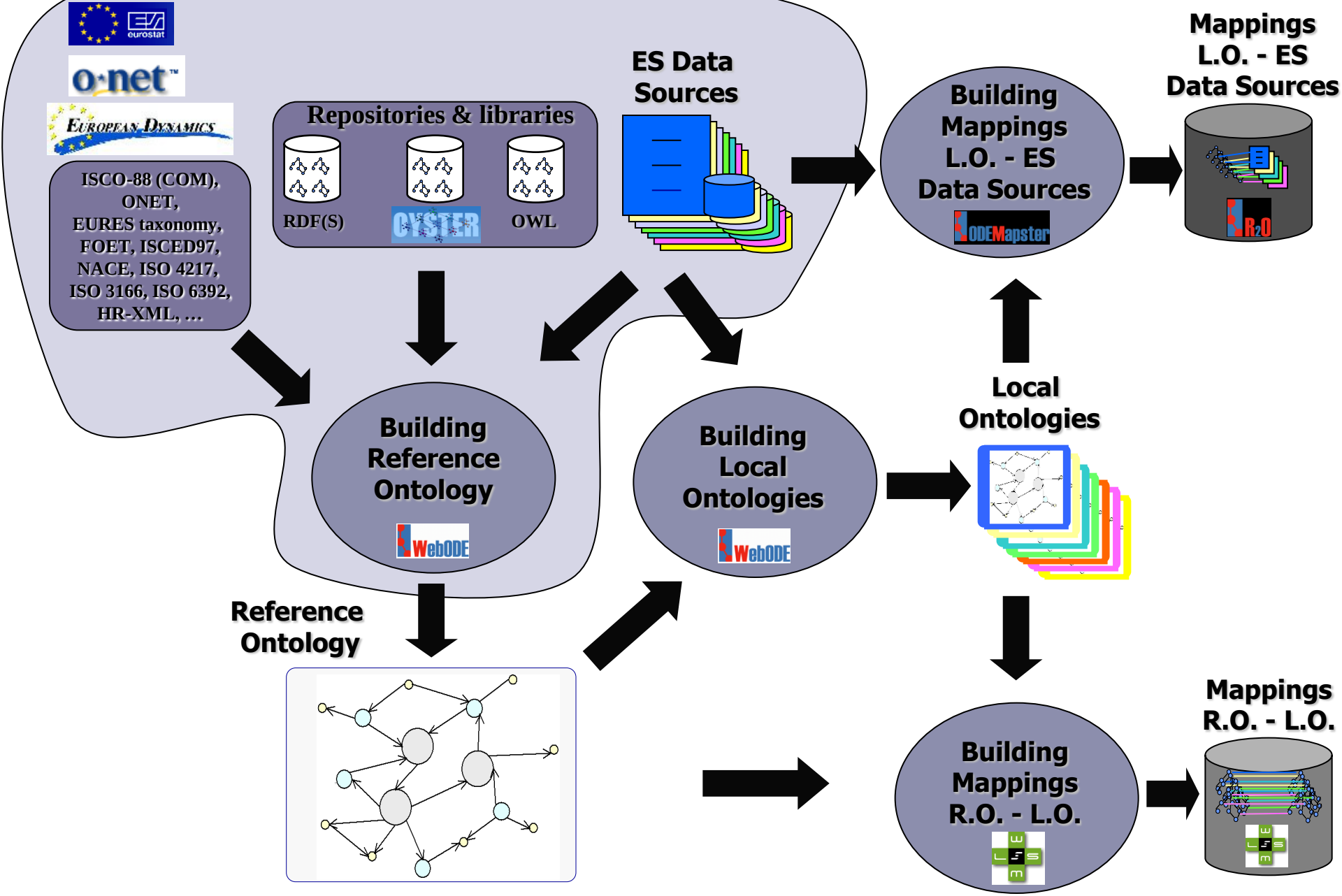


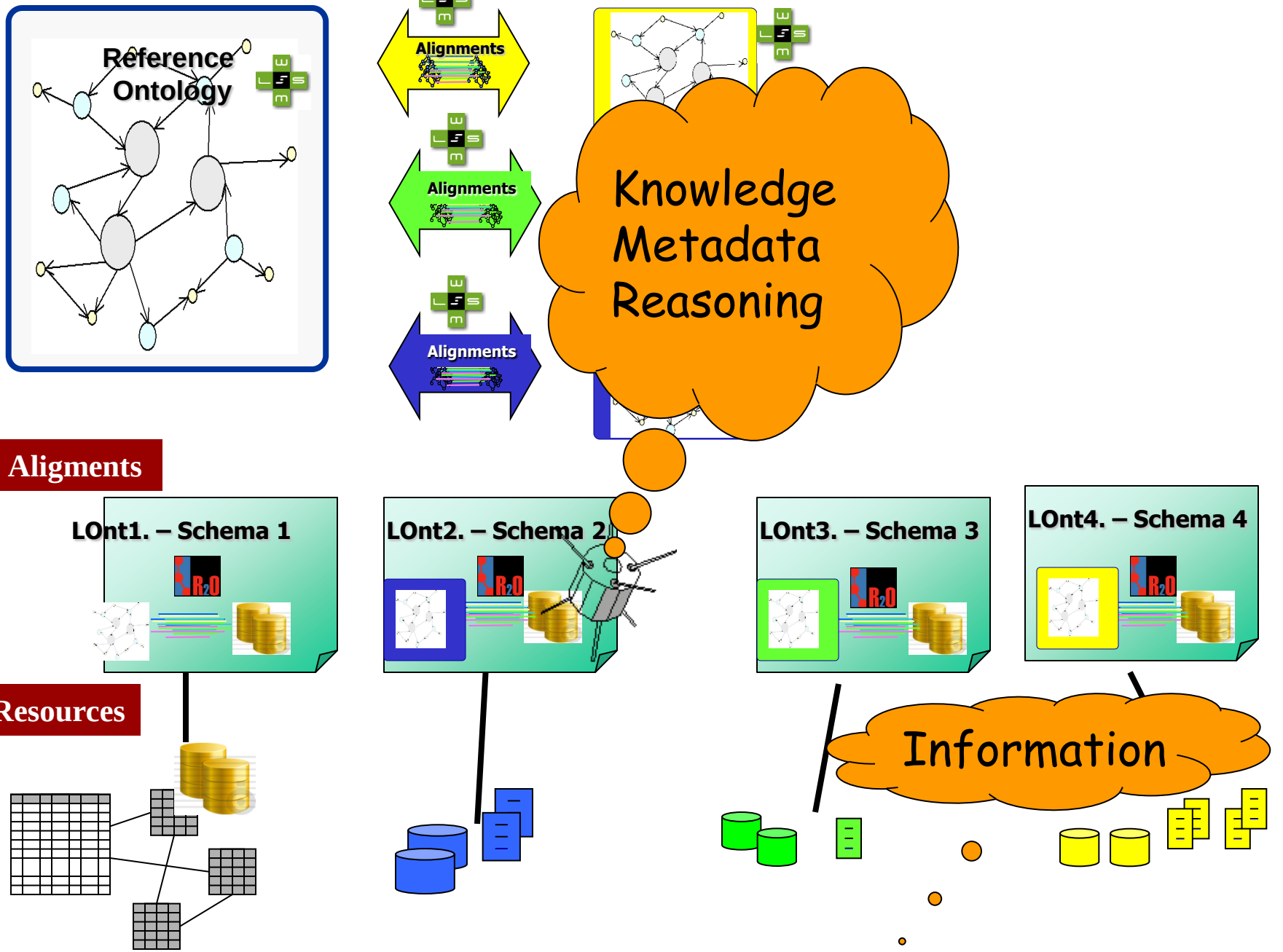
1. Build a reference ontology
2. Build mappings between the reference ontology and the data sources

Federated network of ontologies



1. **Build a reference ontology for the domain**
2. **Build local ontologies**
3. **Build mappings between the core and local ontologies**
4. **Build mappings between the local ontologies and the da sources**


ISCO-88 (COM), ONET, EURES taxonomy, FOET, ISCED97, NACE, ISO 4217, ISO 3166, ISO 6392, HR-XML, …
Repositories & libraries
RDF(S)
OWL
ES Data Sources
Building Mappings L.O. - ES Data Sources
ODEMapster
Mappings L.O. - ES Data Sources
R2O
Building Reference Ontology
WebODE
Building Local Ontologies
WebODE
Local Ontologies
Reference Ontology
Building Mappings R.O. - L.O.
Mappings R.O. - L.O.


Reference Ontology
Alignments
Alignments
Alignments
Knowledge
Metadata
Reasoning
Aligments
LOnt1. – Schema 1
LOnt2. – Schema 2
LOnt3. – Schema 3
LOnt4. – Schema 4
Resources
Information

SEEMP

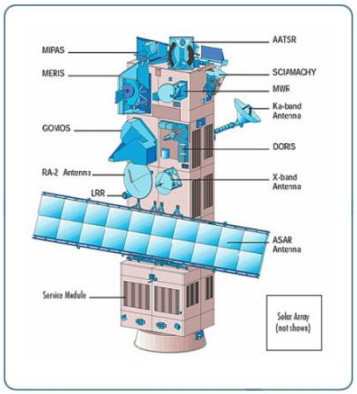
Single versus network of ontologies	Network of ontologies	Type of Application	Data integration	Software Components Used
Ont. Built from scratch or reusing resources	Reusing standardized resources	Hugeness: Operates at scale?	Yes	1. Ontology repository 2. Data repository 3. Alignment repository 4. Metadata registry 5. Query answering 6. Semantic query processor 7. Semantic query editor 8. Ontology editor 9. Ontology browser 10. Ontology localization and profiling 11. Ontology adaptation operators 12. Ontology view customization 13. Instance editor 14. Manual annotation 15. Ontology populator 16. Web Service discoverer 17. Web Service selector 18. Web Service choreography engine 19. Web service grounding
Conceptual Heterogeneity (mappings)	Yes	Open to semantic resources?	No	
Where are the data/instances?	In the original sources	Open to web resources?	No	
Are instances distributed or centralized?	Distributed	Open to web services?	Yes	
Very high rate of change in instances?	Yes	Web 2.0 like?	No	
Heterogeneous Provenance of instances	Yes	Mobile devices?	No	
Various degrees of data quality	Yes	Geo-spatial Information	No	

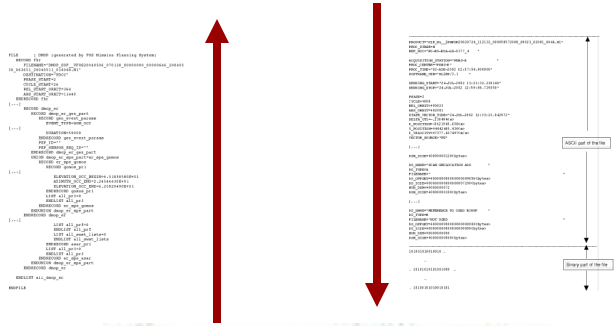
Overview

- Semantic-based Applications
  - preSemanticWeb Applications
    - Annotation
  - Semantic Web 1.0 Applications
    - Annotation, Data Integration and Decision Support Systems
  - Semantic Web 3.0 Applications
    - (Collaborative) Annotation and Data Integration
-

Procesamiento de información de satélites

- Geographically distributed organizations
- Organizations send plans to the Envisat
- Envisat has Instruments on board that take “pictures”
- Envisat sends back information to the Earth



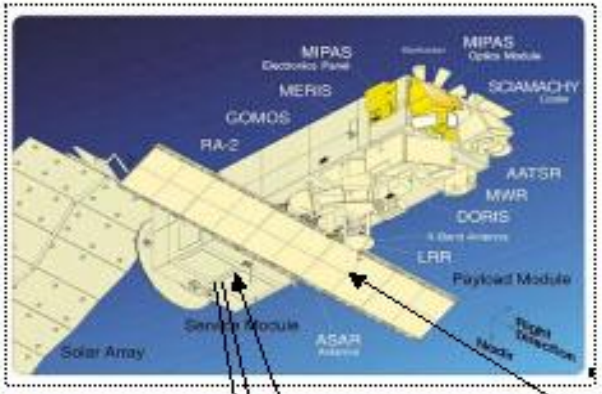


USE CASE DIMENSION:

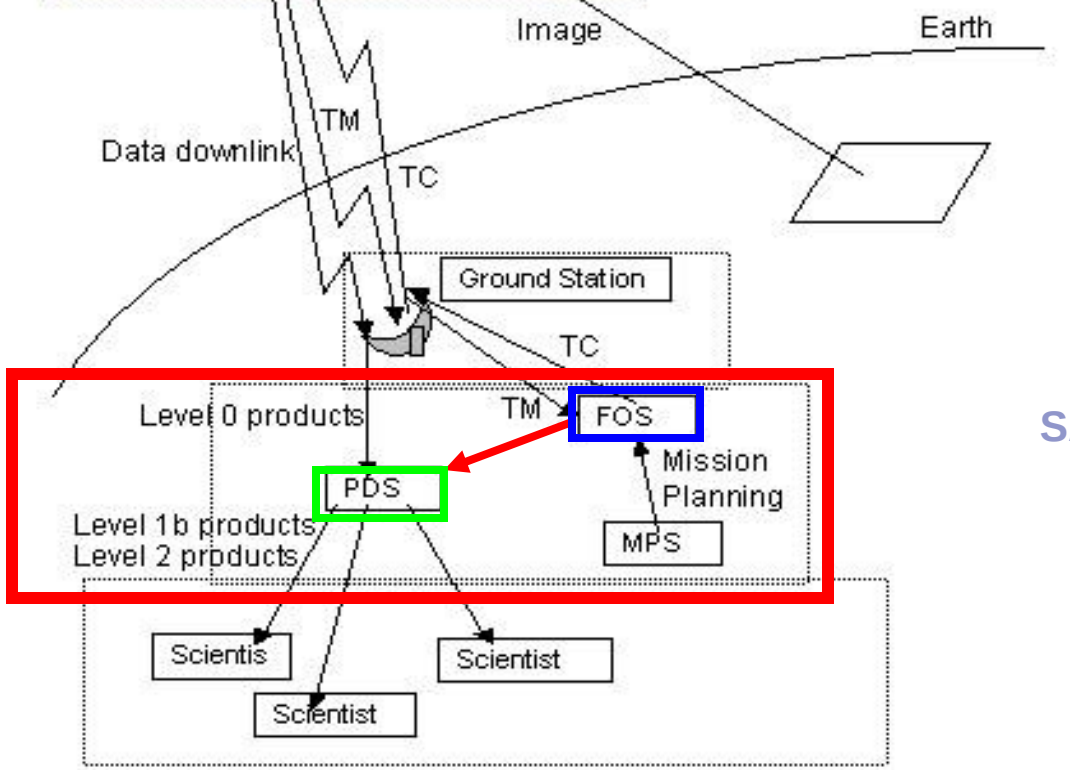
- 1 planning file (DMOP) is generated per planning day
  - Parameters for instrument operation (taking pictures)
  - Parameters for the satellite general configuration.
  - MacroCommands (MCMD’s): translation from planning
- For each DMOP file:
  - Hundreds of planning activities per instrument and instrument mode
  - Hundreds of Product files are generated per instrument and instrument mode
  - Each product file corresponds with a planning activity

Analysis needs to be carried out on the existence, contents and correlation of these files

Satellite Image Processing



Satellite with instruments

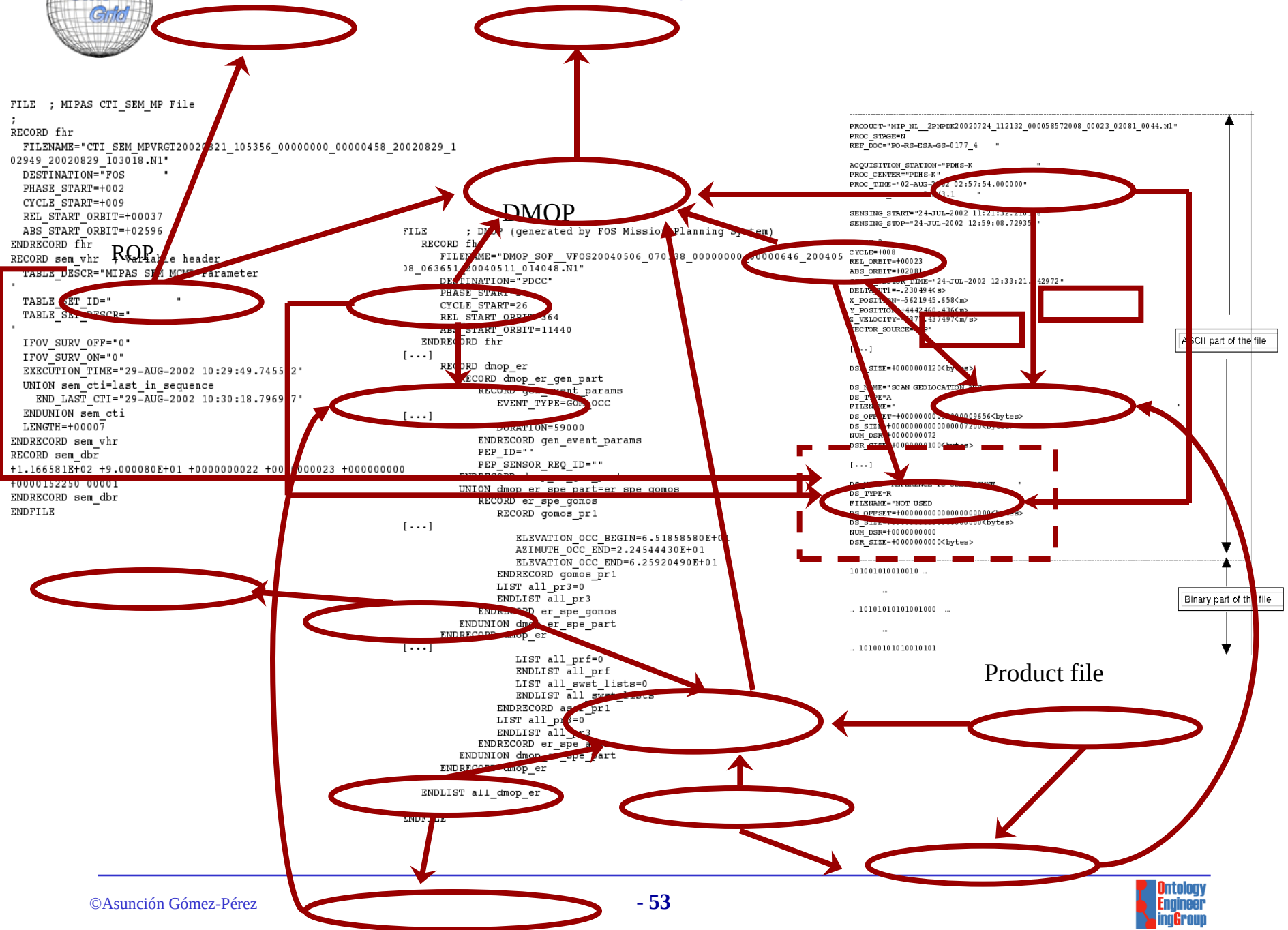


SATELLITE FILES:

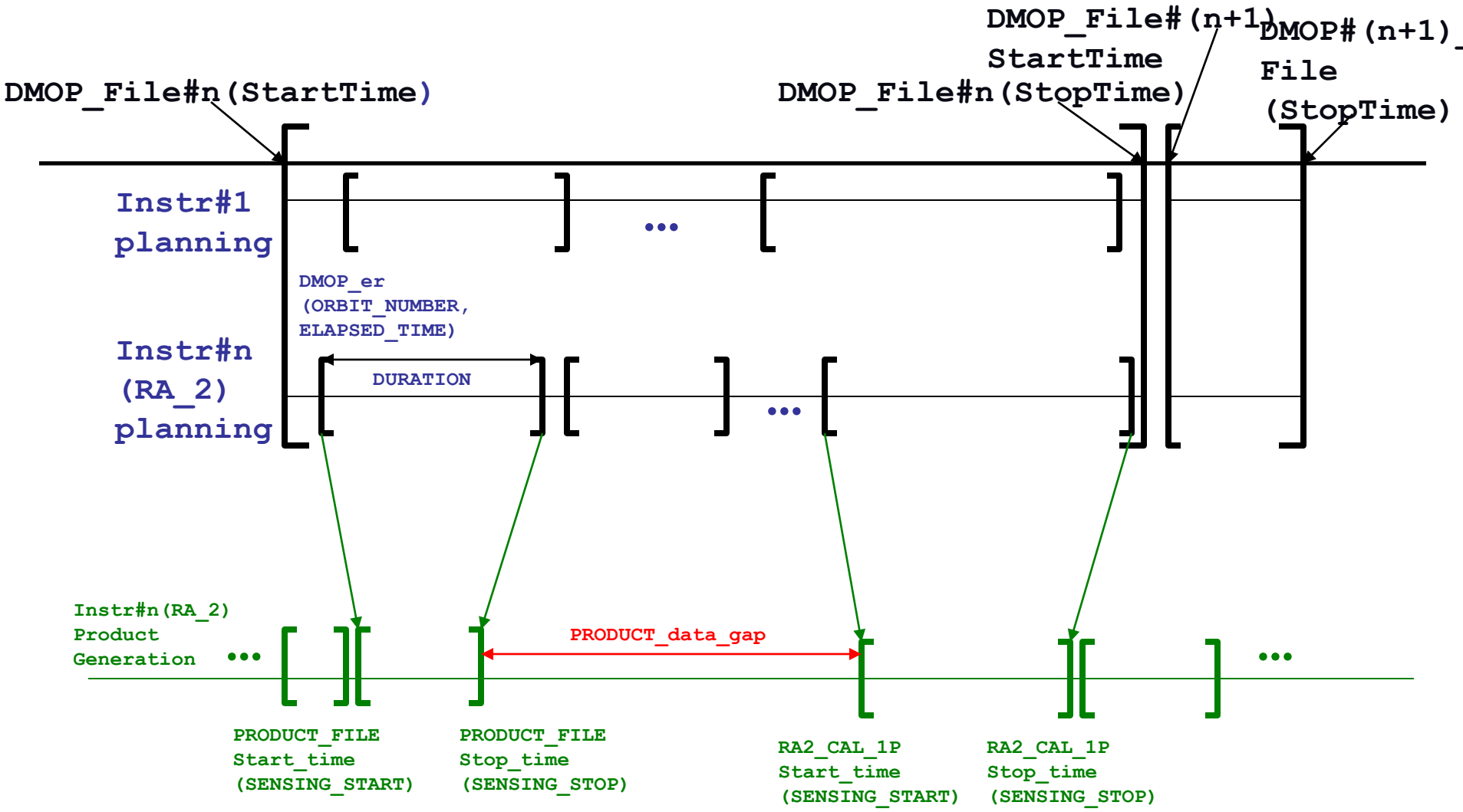
DMOP files

Product files

Anotar las fuentes de datos



Comparison between planning and product generation



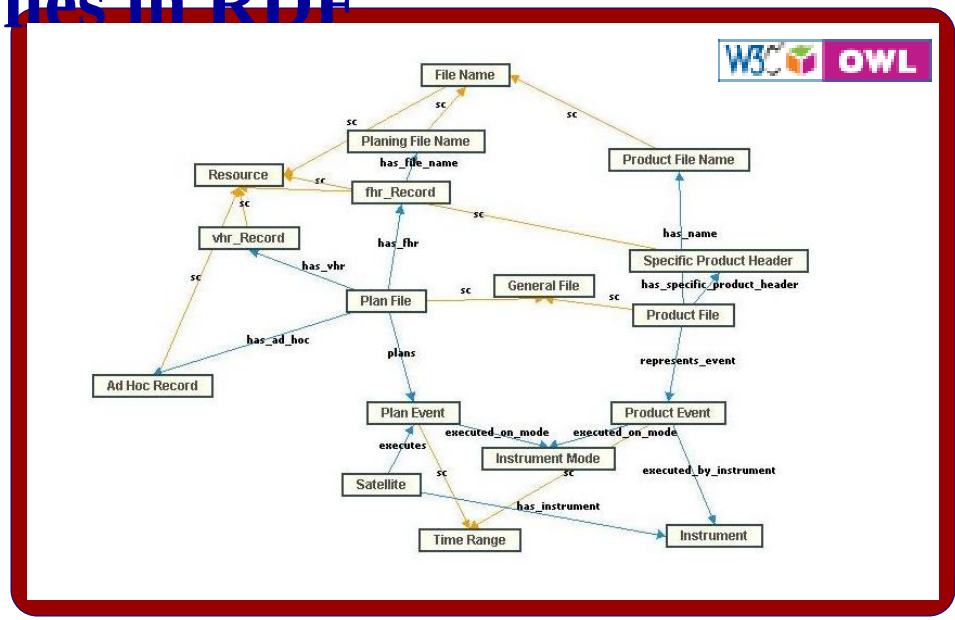
Generating files in RDF

```
FILE       ; DMOP (generated by FOS Mission Planning
System)
   RECORD fhr

FILENAME="DMOP_SOF__VFOS20060124_103709_00000000_000
01215_20060131_014048_20060202_035846.N1"
      DESTINATION="PDCC"
      PHASE_START=2
      CYCLE_START=44
      REL_START_ORBIT=404
      ABS_START_ORBIT=20498

   ENDRECORD fhr
.................................
 RECORD dmop_er
        RECORD dmop_er_gen_part
           RECORD gen_event_params

              EVENT_TYPE=RA2_MEA
              EVENT_ID="RA2_MEA_00000000002063"
              NB_EVENT_PR1=1
              NB_EVENT_PR3=0
              ORBIT_NUMBER=20521
              ELAPSED_TIME=623635
              DURATION=41627862
           ENDRECORD gen_event_params
      ENDRECORD dmop_er
ENDLIST all_dmop_er
ENDFILE
```

RECORD ID

RECORD parameters

RECORD parameters corresponding to other RECORD

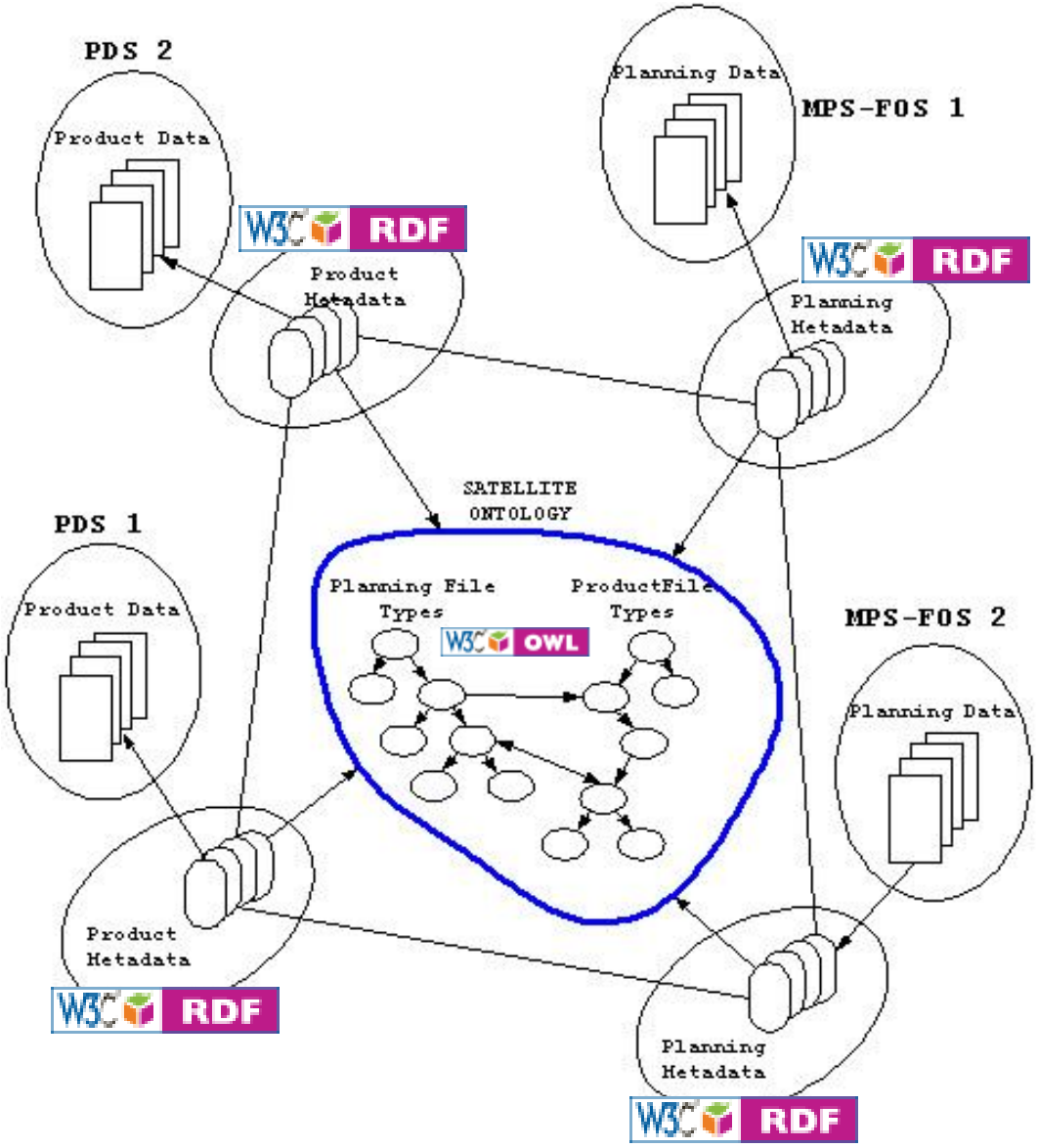



```
<?xml version='1.0' encoding='ISO-8859-1'?><rdf:RDF
 xmlns:rdf='http://www.w3.org/1999/02/22-rdf-syntax-ns#'
 xmlns:rdfs='http://www.w3.org/2000/01/rdf-schema#'
 xmlns:NS0='http://protege.stanford.edu/kb#'
>
 <rdf:Description rdf:about='http://protege.stanford.edu/kb#10822'>
  <rdf:type rdf:resource='http://protege.stanford.edu/kb#Instrument_mode'/>
  <NS0:instrument_mode_id>MS</NS0:instrument_mode_id>
 </rdf:Description>
 <rdf:Description rdf:about='http://protege.stanford.edu/kb#11224'>
  <rdf:type rdf:resource='http://protege.stanford.edu/kb#DMOP_ER'/>
  <NS0:event_id>&quot;GOM_OCC_00000000541299&quot;</NS0:event_id>
  <NS0:duration rdf:datatype='http://www.w3.org/2001/XMLSchema#int'>53000</NS0:duration>
  <NS0:orbit_number rdf:datatype='http://www.w3.org/2001/XMLSchema#int'>20552</NS0:orbit
  <NS0:elapsed_time rdf:datatype='http://www.w3.org/2001/XMLSchema#int'>2452293</NS0:elap
  <NS0:event_type rdf:resource='http://protege.stanford.edu/kb#10713'/>
 </rdf:Description>
```

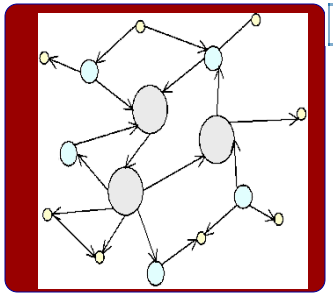
RDF

Satellite Use Case: Technical issues

- Methodology for building the ontology:
  - Methontology
- Ontology Development tools:
  - WebODE & Protégé
- Metadata generation:
  - GridKp
- Metadata access in distributed enviroment:
  - Atlas
- Ontology access:
  - WS-DAIOnt-RDF(S)
- Query Language:
  - SPARQL



1 Ontology



OWL

1 reference ontology for annotating all files
RDF files are distributed

Distributed Metadata for Planning files

RDF

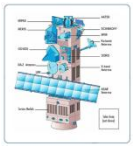
<RDF triple>
<RDF triple>
<RDF triple>
<RDF triple>

Distributed Metadata for Product files

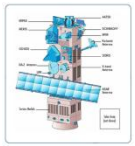
RDF

<RDF triple>
<RDF triple>
<RDF triple>
<RDF triple>

The planning files



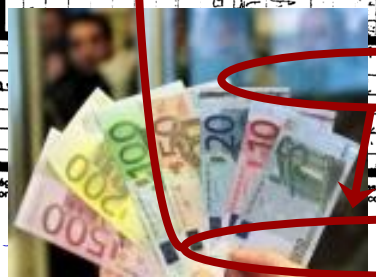
The product files



Satellite use case

Single versus network of ontologies	Single Ontology	**Type of Application**	Data integration	Software Components Used
Ont. Built from scratch or reusing resources	Built from scratch	**Hugeness: Operates at scale?**	Yes	1. Ontology repository 2. Data repository 3. Metadata registry 4. Query answering 5. Semantic query processor 6. Ontology editor 7. Ontology browser 8. Instance editor 9. Automatic annotation 10. Ontology populator
Conceptual Heterogeneity (mappings)	No	**Open to semantic resources?**	No	
Where are the data/instances?	RDF files	**Open to web resources?**	No	
Are instances distributed or centralized?	Distributed	**Open to web services?**	No	
Very high rate of change in instances?	Yes	**Web 2.0 like?**	No	
Heterogeneous Provenance of instances	No	**Mobile devices?**	No	
Various degrees of data quality	No	Geo-spatial Information	No	

Fraud detection in car insurance



Detección del Fraude en seguros de coches

Single versus network of ontologies	Single Ontology	**Type of Application**	Data integration	Software Components Used
Ont. Built from scratch or reusing resources	Built from scratch	**Hugeness: Operates at scale?**	Yes	1. Ontology repository 2. Metadata registry 3. Query answering 4. Semantic query processor 5. Ontology editor 6. Ontology browser 7. Instance editor 8. Manual annotation 9. Automatic annotation 10. Ontology populator
Conceptual Heterogeneity (mappings)	No	**Open to semantic resources?**	No	
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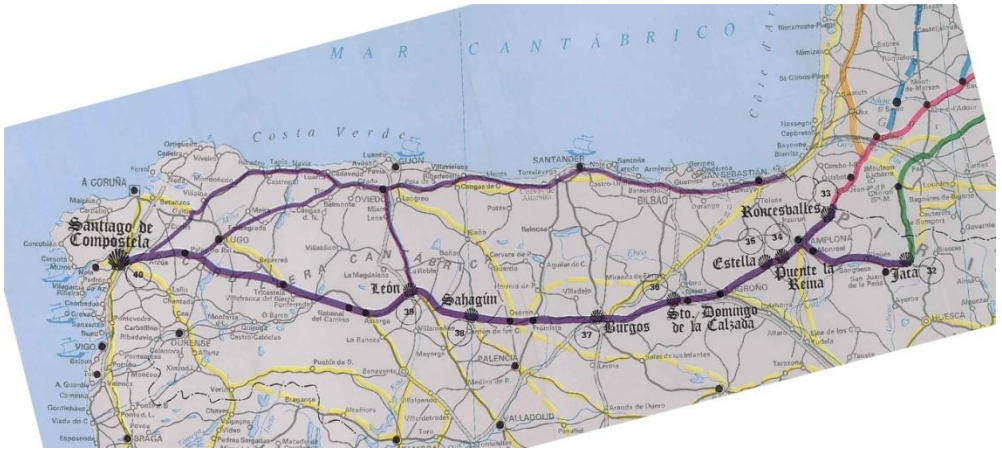
    - Annotation, Data Integration and Decision Support Systems
  - Semantic Web 3.0 Applications
    - (Collaborative) Annotation and Data Integration

Geobuddies

Semantic & Collaborative annotation using mobile devices in the "Camino de Santiago"

- Ontologies
- Web 3.0
  - Semantic Web
  - Web 2.0
- Mobile devices
- Data Grid
- Geographic information



A pilgrim in St. James' Way (Camino de Santiago)




- Diverse routes for pilgrims
- Self-emergent community of pilgrims
  - People that talk about their experiences during the way
  - People that join together in the joy of walking
  - Mobile users
- People want to
  - Find interesting locations
  - Find community services
  - Provide information

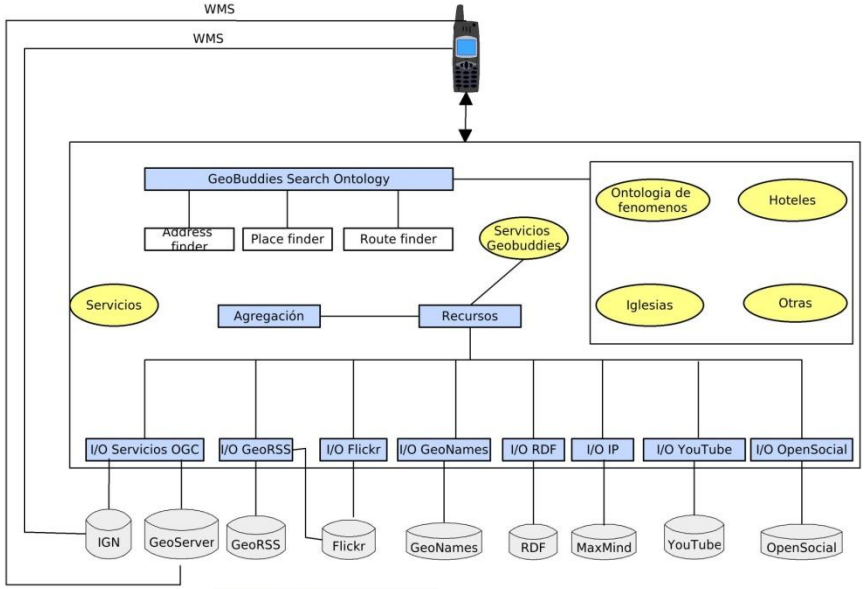






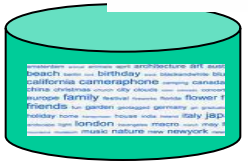
GeoBuddies: architecture and main themes

- Agile methods for Web2.0 data integration
  - Facebook
  - Flickr
  - …
- Mobile applications exploiting user generated content
- Evolution of folksonomies and ontologies



Las anotaciones se guardan y los objetos se consolidan con bases de datos geográficas y anotaciones existentes

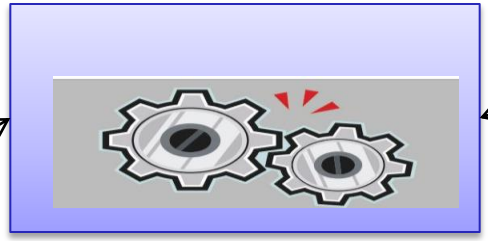
Servid… anotac…



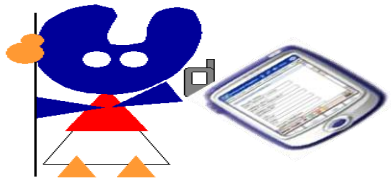
El usuario ve un punto de interés y envía una foto con sus correspondientes anotaciones

BBDD geográficas

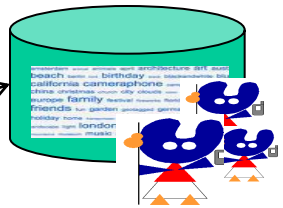
Motor de recomendaciones (sólo geográfico)



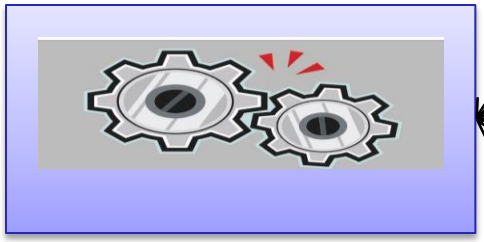
El usuario quiere saber qué puntos de interés le pueden interesar en la zona en la que se encuentra



Servidor de anotaciones (todos los usuarios)



Motor de recomendaciones (geográfico + tags + ontologías)



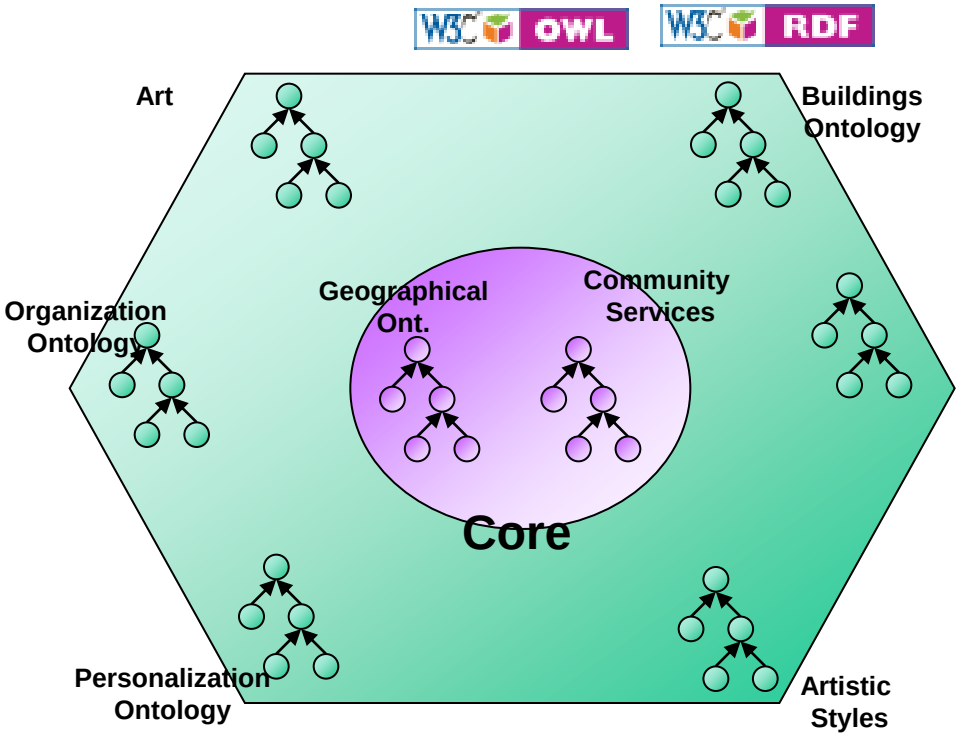
mezcla

Servidor de ontologías

Camino Personalizado

Geobuddies Networks of Ontologies

- Localizaciones Geográficas y puntos de interés:
  - Ciudades, rios colinas
- Edificios
  - Iglesias, catedrales, etc.
  - Estilos de arquitectura
- Arte
  - Pinturas, escultura, música, etc.
  - Estilos de
- Servicios comunitarios
  - Comida, salud, alojaminento
- Gustos, preferencias, personalización

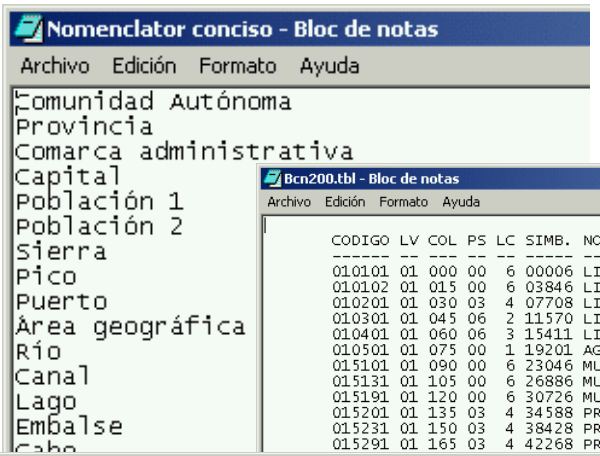


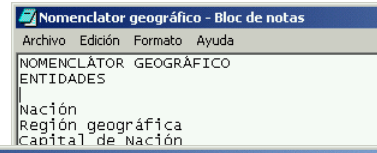
Geographical ontologies

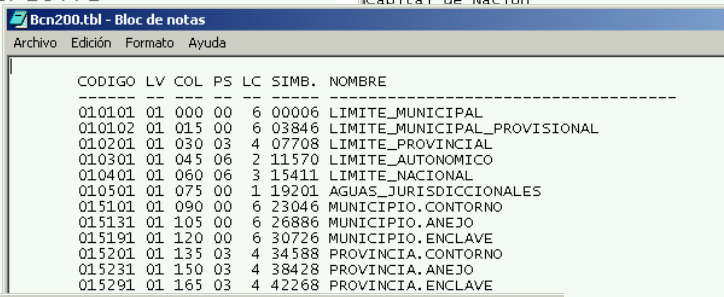
- Monolingual **Knowledge bases** of IGN (spanish):
  - **NC** (Nomenclátor Conciso),
  - **NGN** (Nomenclátor Geográfico Nacional),
  - **BCN200** (Base Cartográfica Nacional escala 1:200.000),
  - **BCN25** (Base Cartográfica Nacional escala 1:25.000)

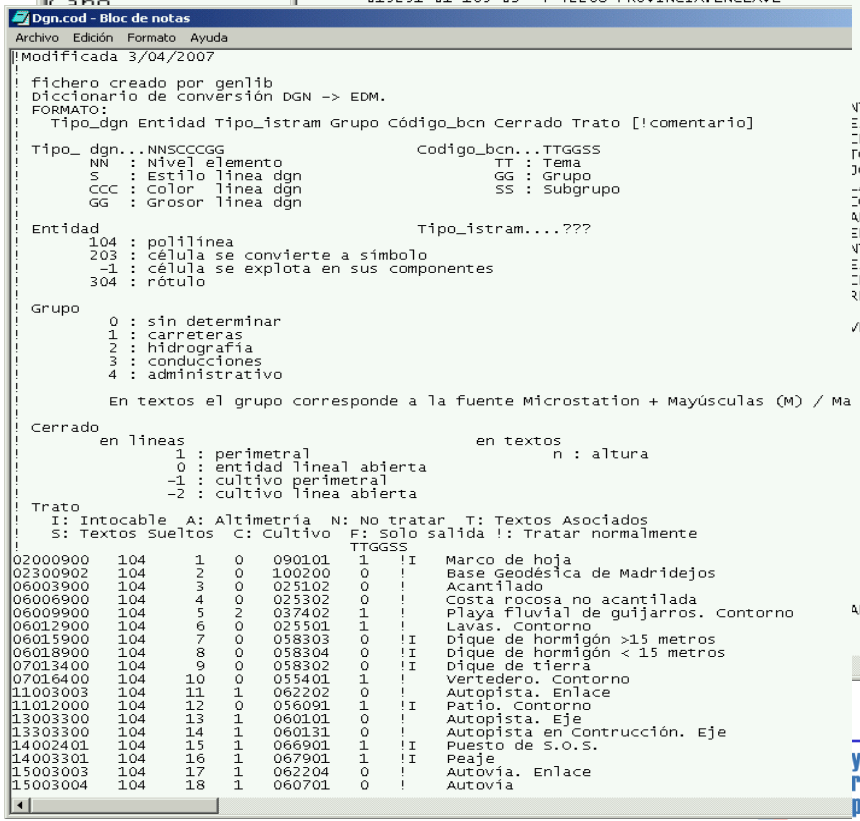
- Monolingual **Knowledge bases** of CC.AA. (spanish, basque, galician): Castilla y León, Cataluña, Euskadi, Extremadura, Galicia, La Rioja, Madrid, Murcia, Navarra.

- Creation of an **ontology from IGN resources and creation of mappings** with IGN knowledge bases

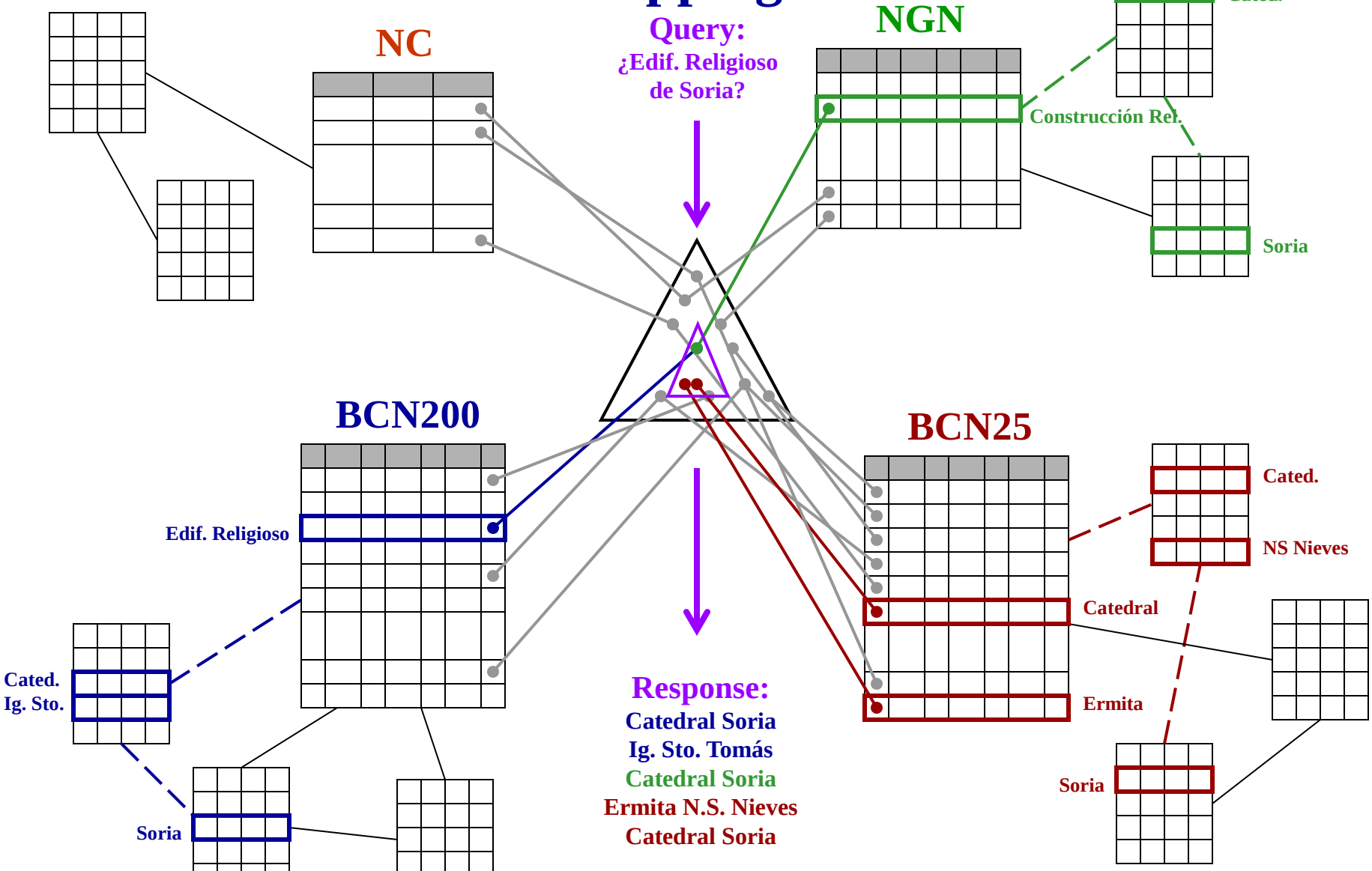






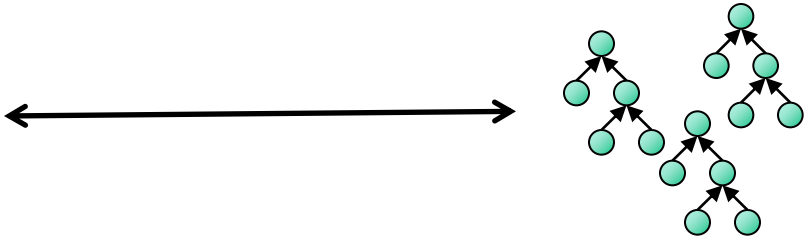


[GN Catalogue Integration: Exploitation of Mappings



When folksonomies meet ontologies

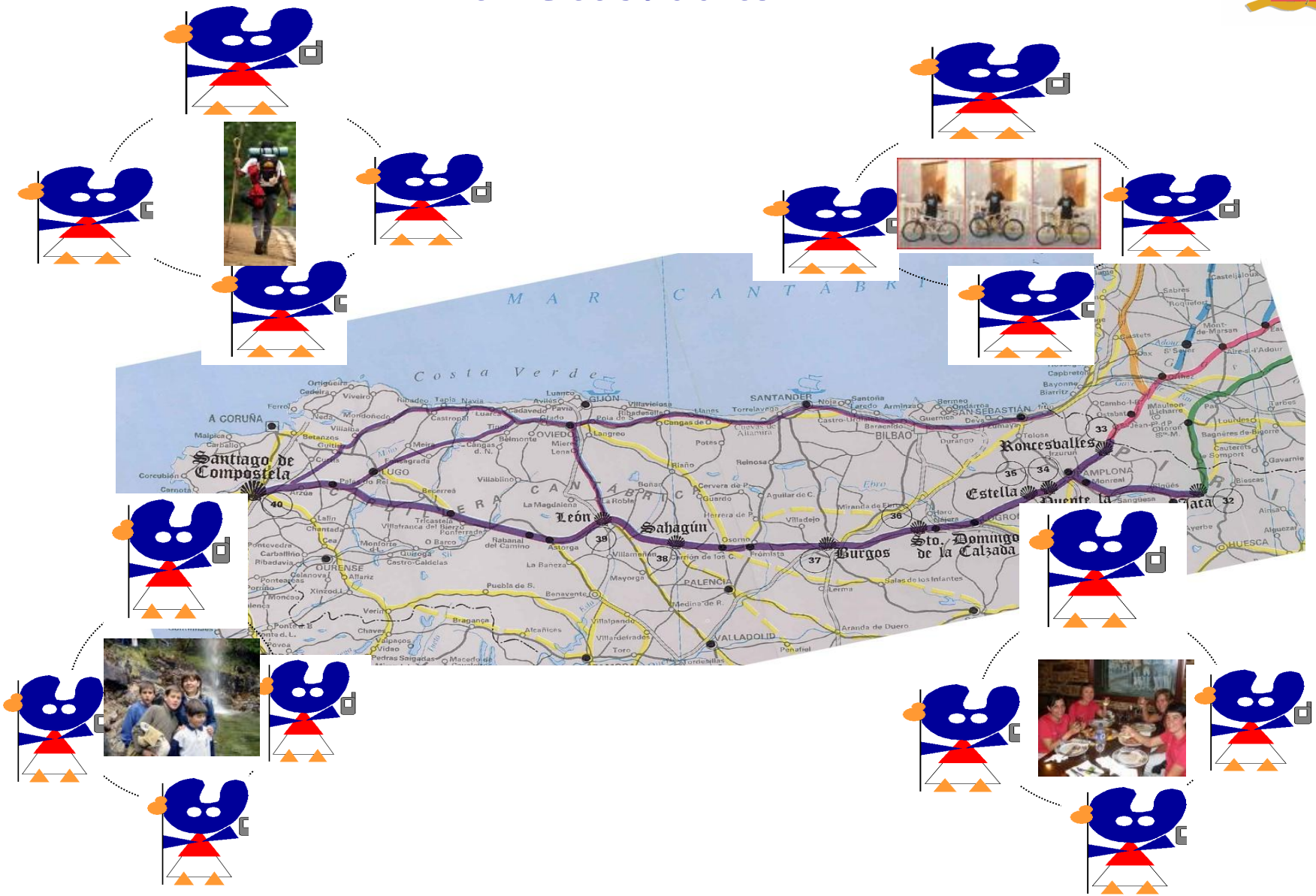
Users annotate with their own tags
-The system provides hints about commonly used tags on a predictive style (like SMSs)
-Tag clouds can be generated out of this, based on geographical information, services or in general



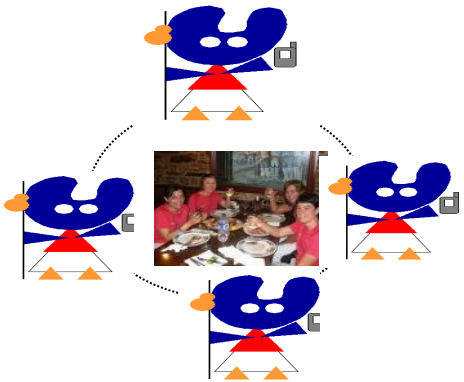
Tags are indexed according to ontologies
Predictive tags are enriched with ontologies

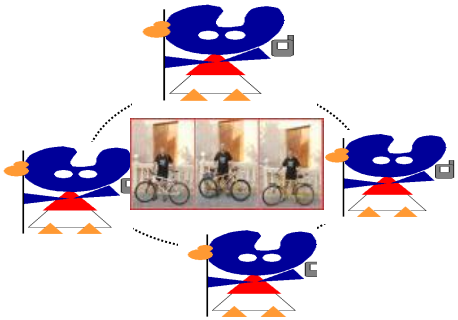
Users request information using their own tags
-The system provides hints about commonly used tags on a predictive style (like SMSs)
-Collaborative filtering techniques can be used to recommend the most closely-related tags
-Requests can be extended with ontology-based annotations

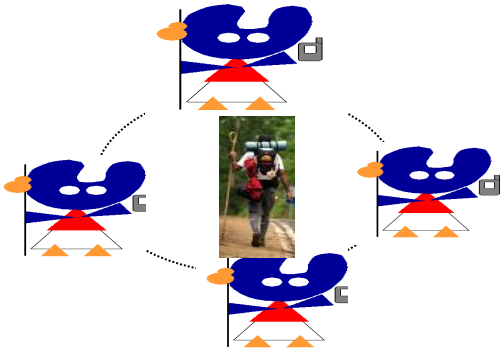
Comunidades Sociales en Geobuddies

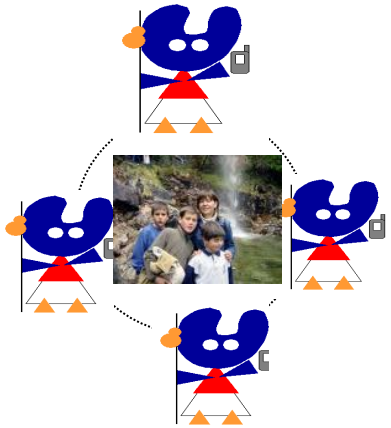


Recomendaciones basadas en el usuario

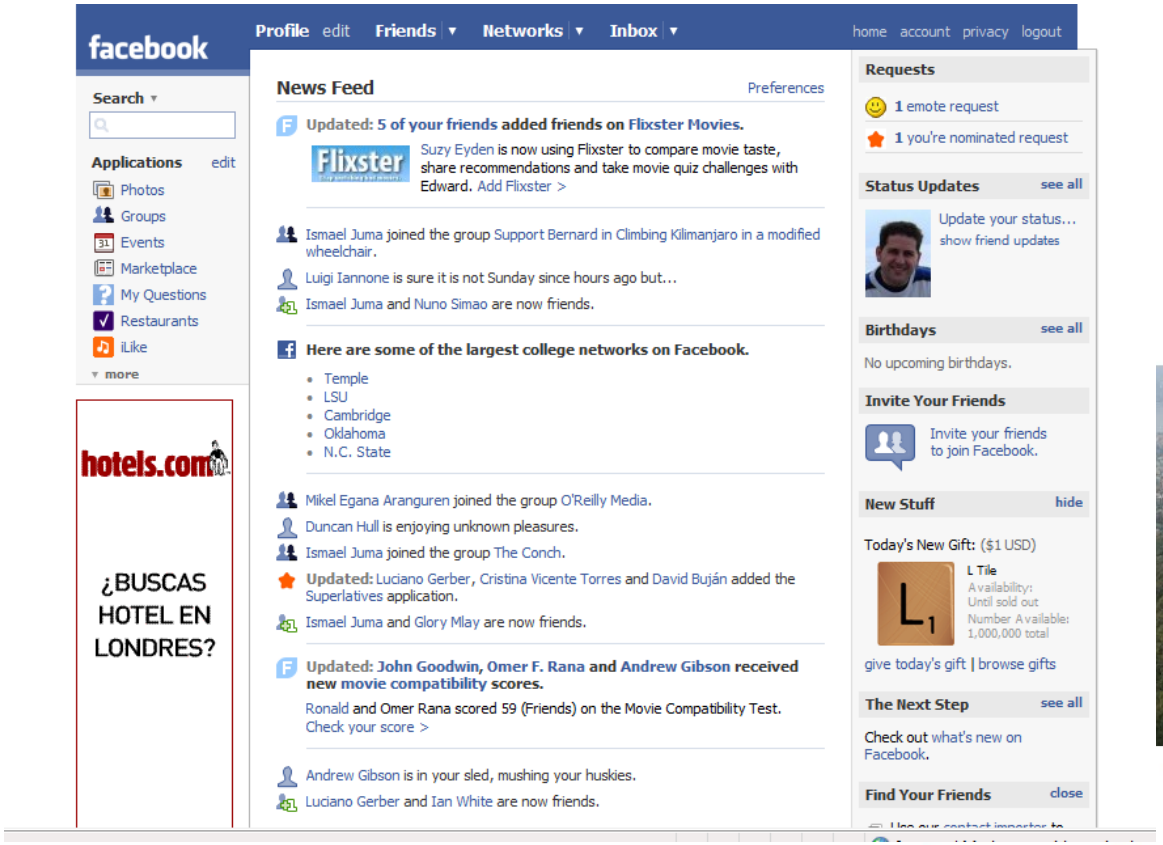








Transferencia de la comunidad generada



cerca de Ballabio Inferiore (Italy) de elio colombo
Ver en Google Earth | Tamaño original

Regístrate para comentar. Entra si ya estás registrado.

Generated social communities are transferred into social community sites (facebook, Google social API)

- Reuse of other off-the-shelf services
- Sustainability of people links found during the walk
- Ease of implementation

Geobuddies Application

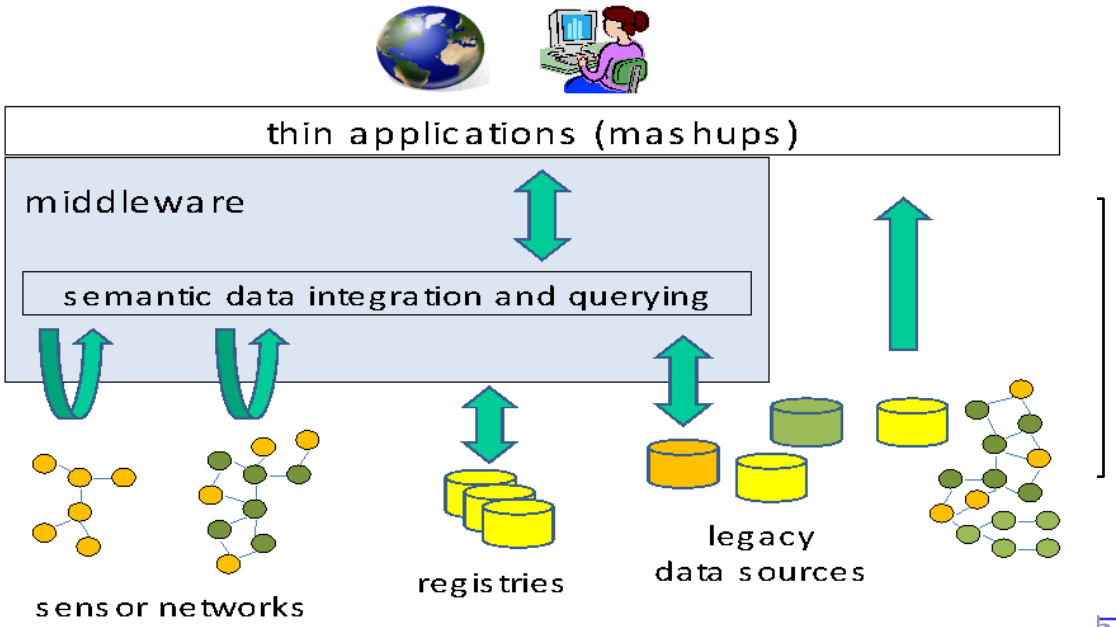
Single versus network of ontologies	Ontology Networks	**Type of Application**	Web 3.0 application	Software Components Used from the SWF
Ont. Built from scratch or reusing resources	Reusing standardized and web resources	**Hugeness: Operates at scale?**	Yes	1. Information directory manager 2. Ontology repository 3. Data repository 4. Alignment repository 5. Metadata registry 6. Query answering 7. Semantic query proccesor 8. Ontology editor 9. Ontology browser 10. Ontology learner 11. Ontology matcher 12. Ontology localization and profiling 13. Ontology view customization 14. Instance Editor 15. Manual annotation 16. Ontology populator
Conceptual Heterogeneity (mappings)	Yes. .- Ontol-Catalogues .- Onto - BD	**Open to semantic resources?**	Yes	
Where are the data/instances?	DB + RDF files	**Open to web resources?**	Yes	
Are instances distributed or centralized?	Distributed	**Open to web services?**	Yes	
Very high rate of change in instances?	YES	**Web 2.0 like?**	Yes	
Heterogeneous Provenance of instances	Yes	**Mobile devices?**	Yes	
Various degrees of data quality	Yes	Geo-spatial Information	Yes	

SemSorGrid4Env

www.semsorgrid.eu

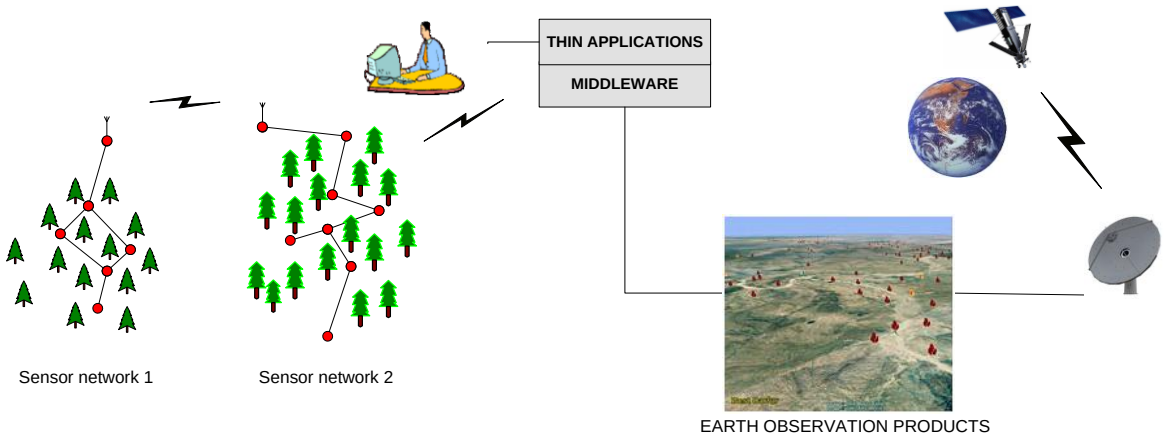
1. Development of an integrated information space where new sensor networks can be easily discovered and integrated with existing ones and possibly other data sources (e.g., historical databases),

2. Rapid development of flexible and user-centric decision support systems that use data from multiple autonomous independently deployed sensor networks and other applications.

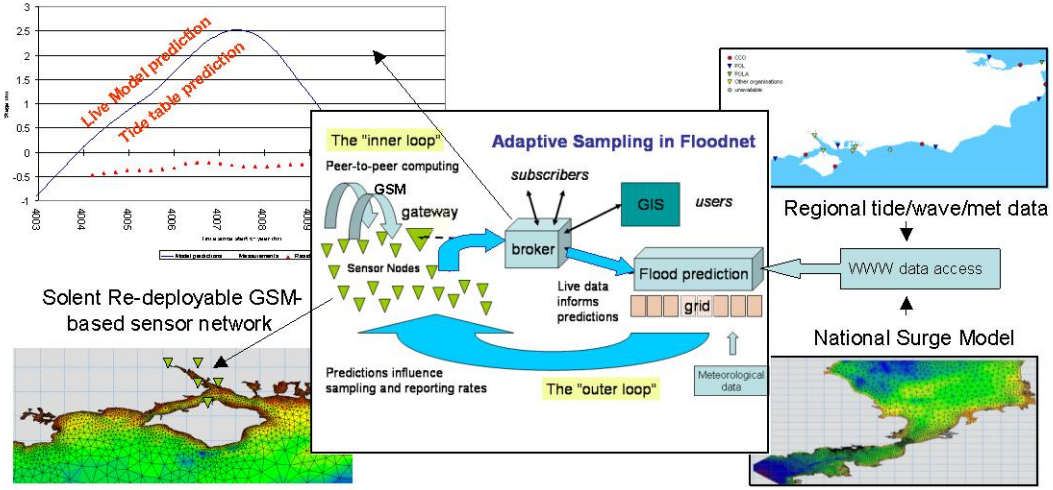


Main Outcomes: Two large-scale environmental management use cases:

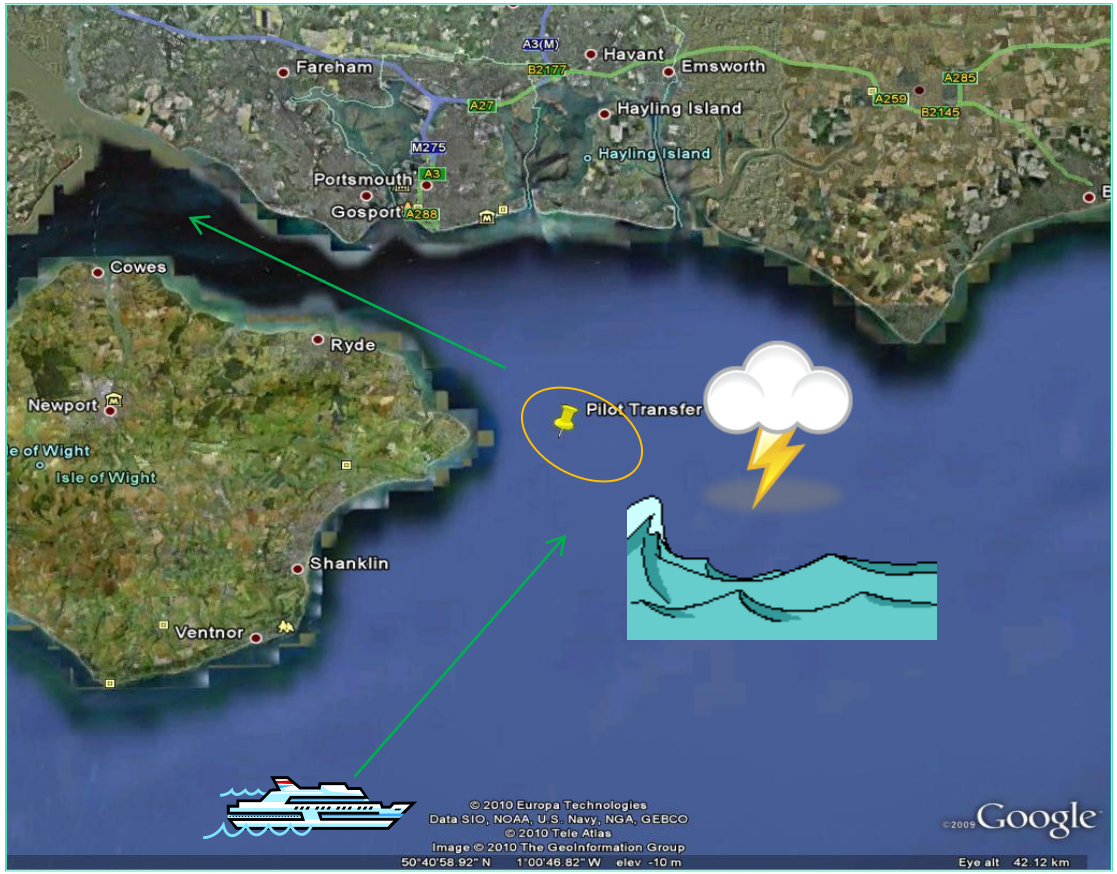
Fire Risk Monitoring and Warning in a specific area in the north west of Spain.



Coastal and Estuarine Flood Warning in Southern UK.



ABP: Pilotage Scenario



Shipping data (ABP)

Weather Forecast

Sea state

Coastal Defence Partnership (CDP)

Statutory Authorities

Fareham

Gosport

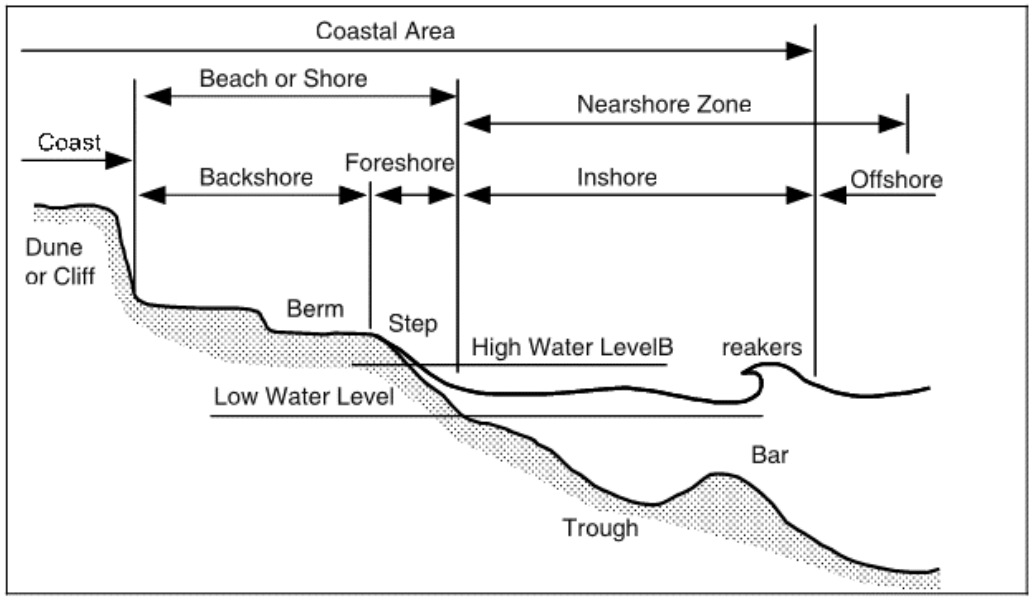
Havant

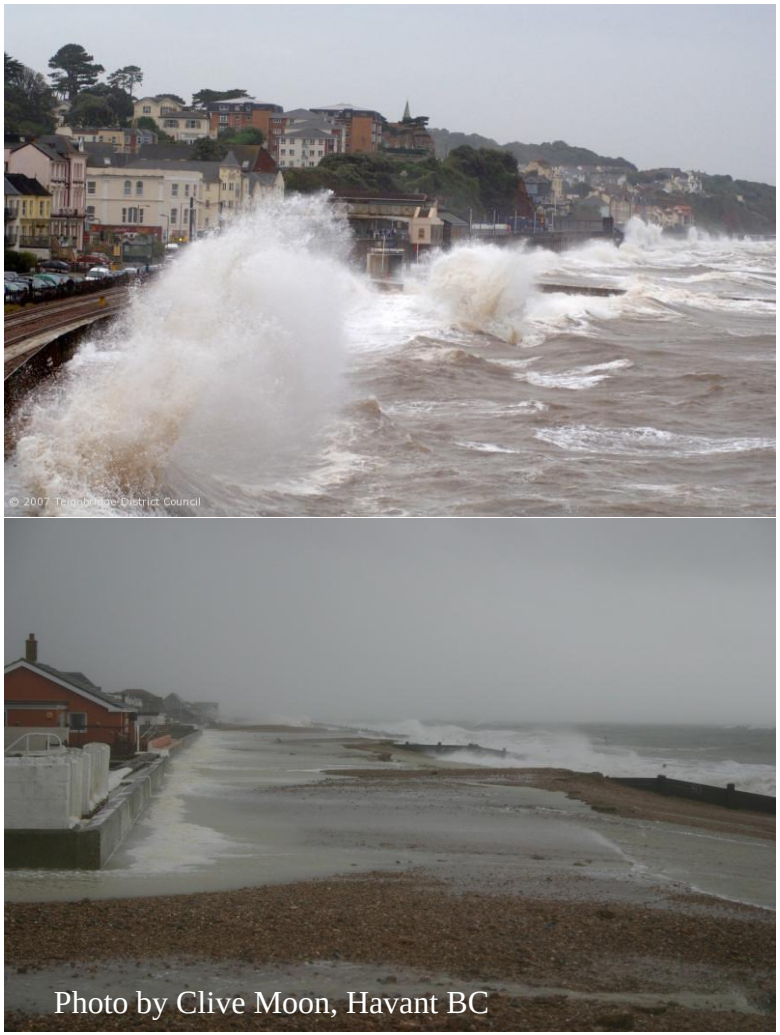
Portsmouth

Coastal Flood Forecast

CCTV (CDP)

Physical Defence Models

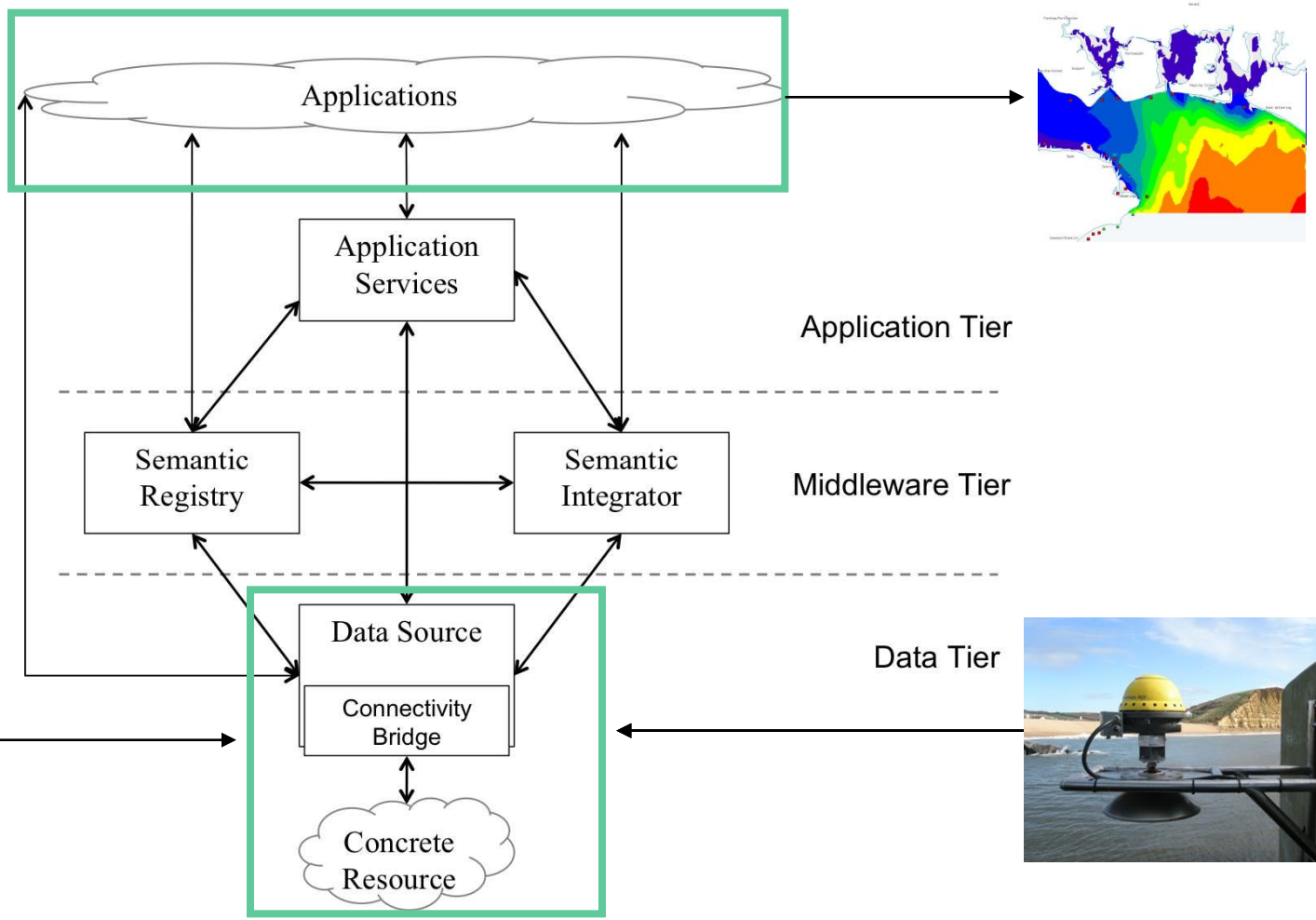




Real time data

- Installation method
- Method of operation
- Cost

Outline Structure

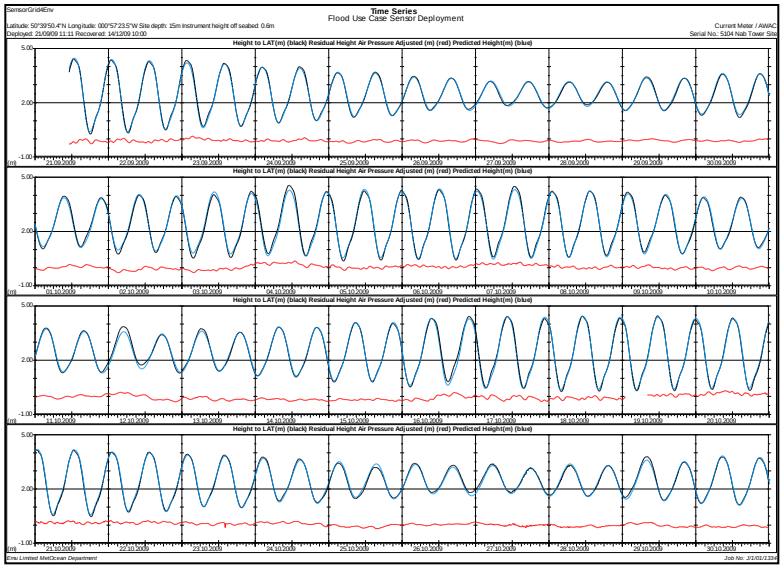


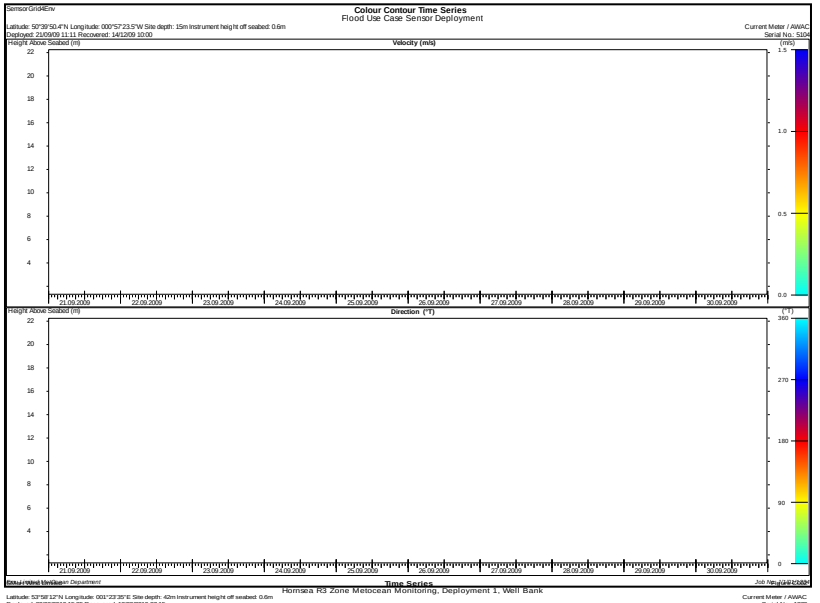
Data

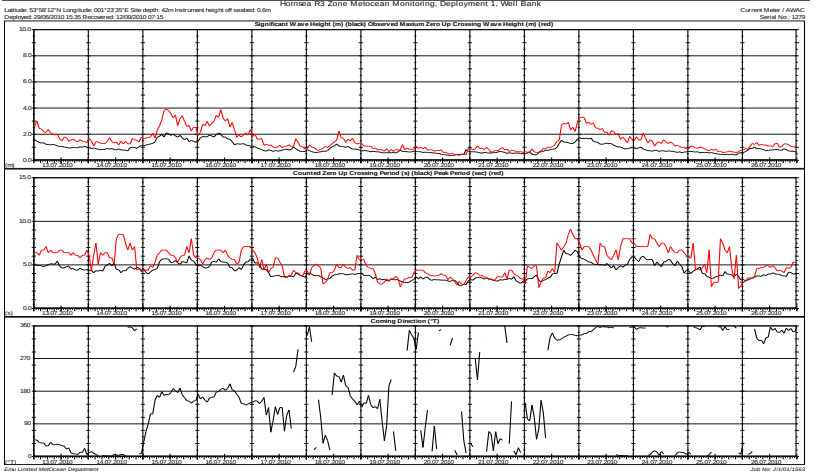
Data generated on:

- **Wave heights**
- **Tidal heights**
- **Current speed and direction**

In support of modelling and to enhance the existing real time networks.





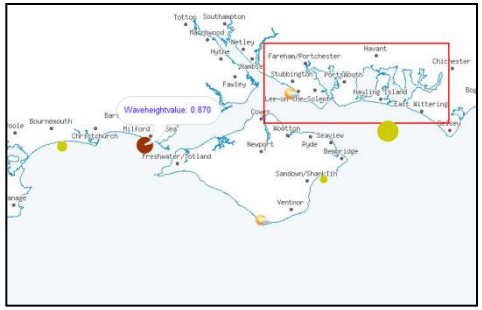


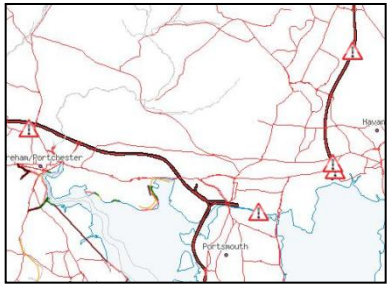
Demonstration of Flood Response

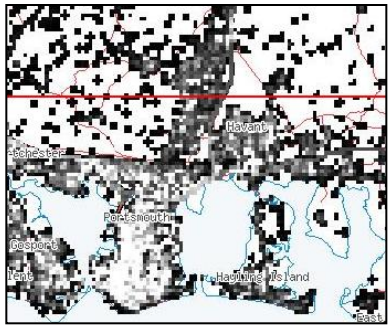
A Coastal Flood Warning:
- **Wave heights**
- **Tidal heights**
- **Sea defence failure probability**
- **Modelled data**
- **Observed data**

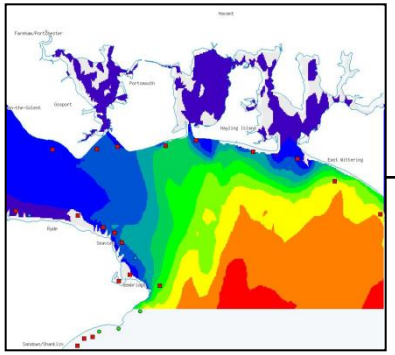
Response requires knowledge of:
- **Where people are**
- **The state of the roads**
- **The assets at risk**

Utilising:
- **WP2 – Data management**
- **WP3 – Stream & Ontology**
- **WP4 – Registry**





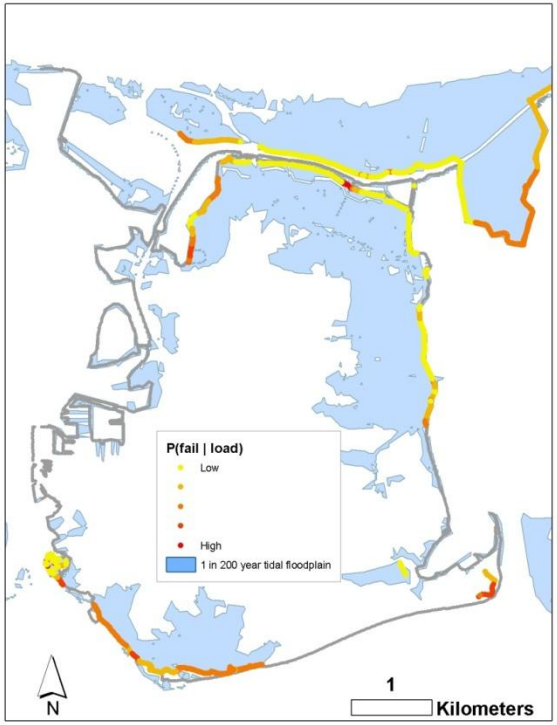


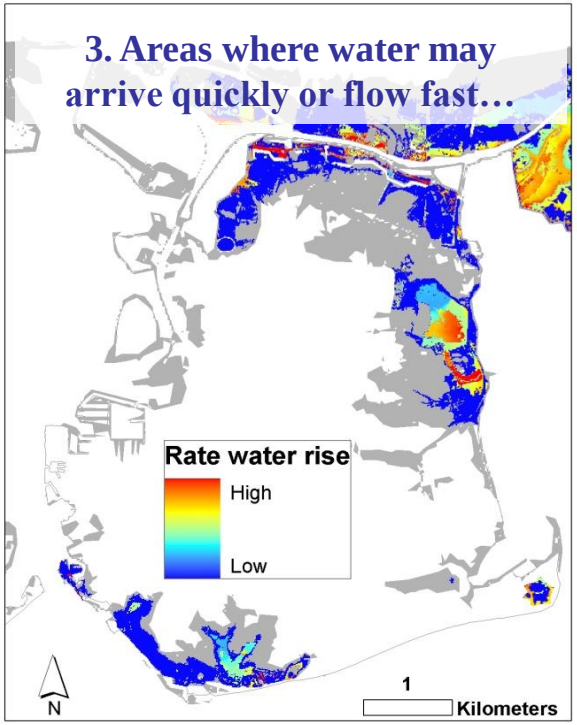


Portsmouth 1 in 200 year water level event

Real-time defence failure risk using water levels and wave forecasts from MIKE-21.

Accompanied by **pre-modelled** floodplain results. These are from simulations of inundation related to defence responses applicable to a given boundary water level





SemSorGrid4Env

Single versus network of ontologies	Network of ontologies	**Type of Application**	Decission Support systems	Software Components Used
Ont. Built from scratch or reusing resources	Reusing resources	**Hugeness: Operates at scale?**	Yes	1. Information directory manager 2. Ontology repository 3. Data repository 4. Metadata registry 5. Query answering 6. Semantic query processor 7. Ontology editor 8. Ontology browser 9. Instance editor 10. Manual annotation 11. Ontology populator
Conceptual Heterogeneity (mappings)	Yes (Onto-BD)	**Open to semantic resources?**	Yes	
Where are the data/instances?	In DB + RDF files + SENSORS!!!	**Open to web resources?**	yes	
Are instances distributed or centralized?	Distributed	**Open to web services?**	Yes	
Very high rate of change in instances?	Yes	**Web 2.0 like?**	No	
Heterogeneous Provenance of instances	Yes	**Mobile devices?**	yes	
Various degrees of data quality	Yes	Geo-spatial Information	yes	

Conclusions

We are moving into a new generation of semantic applications

- Open to web resources
- Open to semantic resources
- Open to web services
- Open to the physical world and having an impact on it.

where …

data integration at large scale is one of the main challenge

and …

everything combined with

1. Social communities
2. Mobile devices
3. Ubiquitous computing

Thanks to

- Jesús Barrasa
- Oscar Corcho
- Angel López Cima
- Oscar Muñoz
- Jose Angel Ramos Gargantilla
- Carmen Suarez de Figueroa
- Boris Villazón

Tendencias en el Desarrollo de Aplicaciones Semánticas

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