

# Vocabularies

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1. Introduction
2. Vocabulary types
3. Development process
4. Vocabulary examples
  - Persons and Organizations: FOAF, vCard, ORG
  - Documents: DC, BIBO
  - Geo: points, lineString and polygons
  - Libraries: FRBR
  - Statistics: Data Cube
  - Other vocabularies: sensors, provenance, VoID, DCAT, etc.
5. Example of vocabulary networks within Linked Data applications
  - *Instituto Geográfico Nacional*
6. Conclusions

Which vocabularies should we use in order to describe and publish as Linked Data the organization chart of the different Ministeries, people who are part of them and their location?

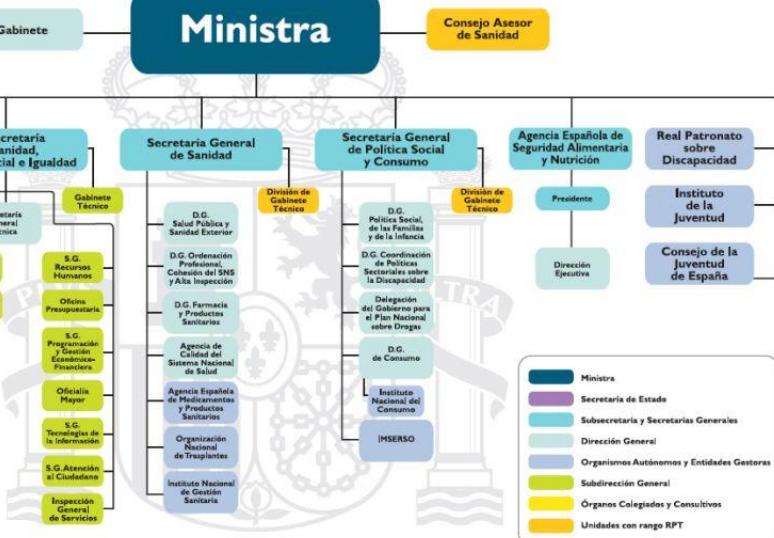


# Different organization charts in Ministries

## Ministerio de Sanidad, Política Social e Igualdad

Ministra

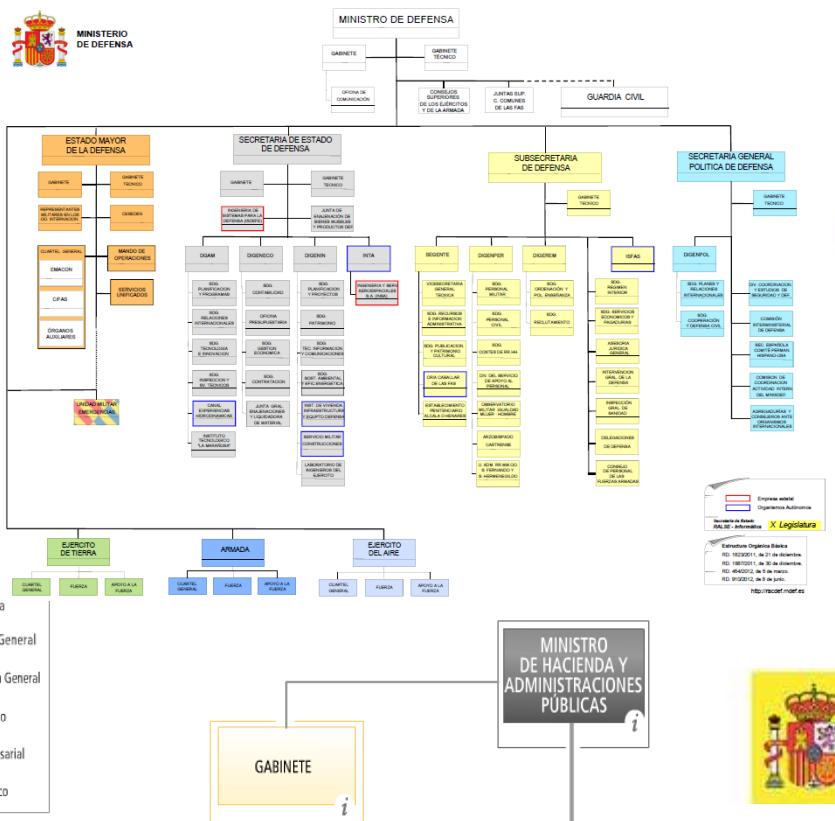
Consejo Asesor de Sanidad



4<sup>th</sup> December 2012

# Different organization charts in Ministries

## Ministerio de Defensa



R.D. 1313/2010, de 20 de octubre de 2010

MINISTRO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

GABINETE

Consejo de Política Fiscal y Financiera de las Comunidades Autónomas

Comisión Nacional de Administración Local

SOCIEDAD ESTATAL DE PARTICIPACIONES INDUSTRIALES

i

SECRETARIA DE ESTADO DE HACIENDA

i

SECRETARIA DE ESTADO DE PRESUPUESTOS Y GASTOS

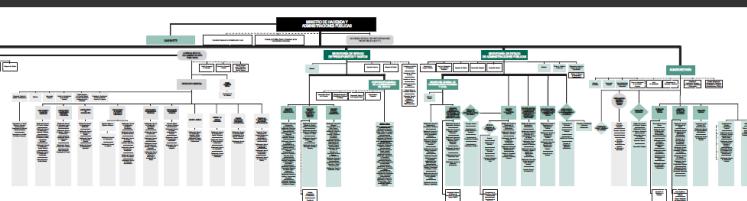
i

SECRETARIA DE ESTADO DE ADMINISTRACIONES PÚBLICAS

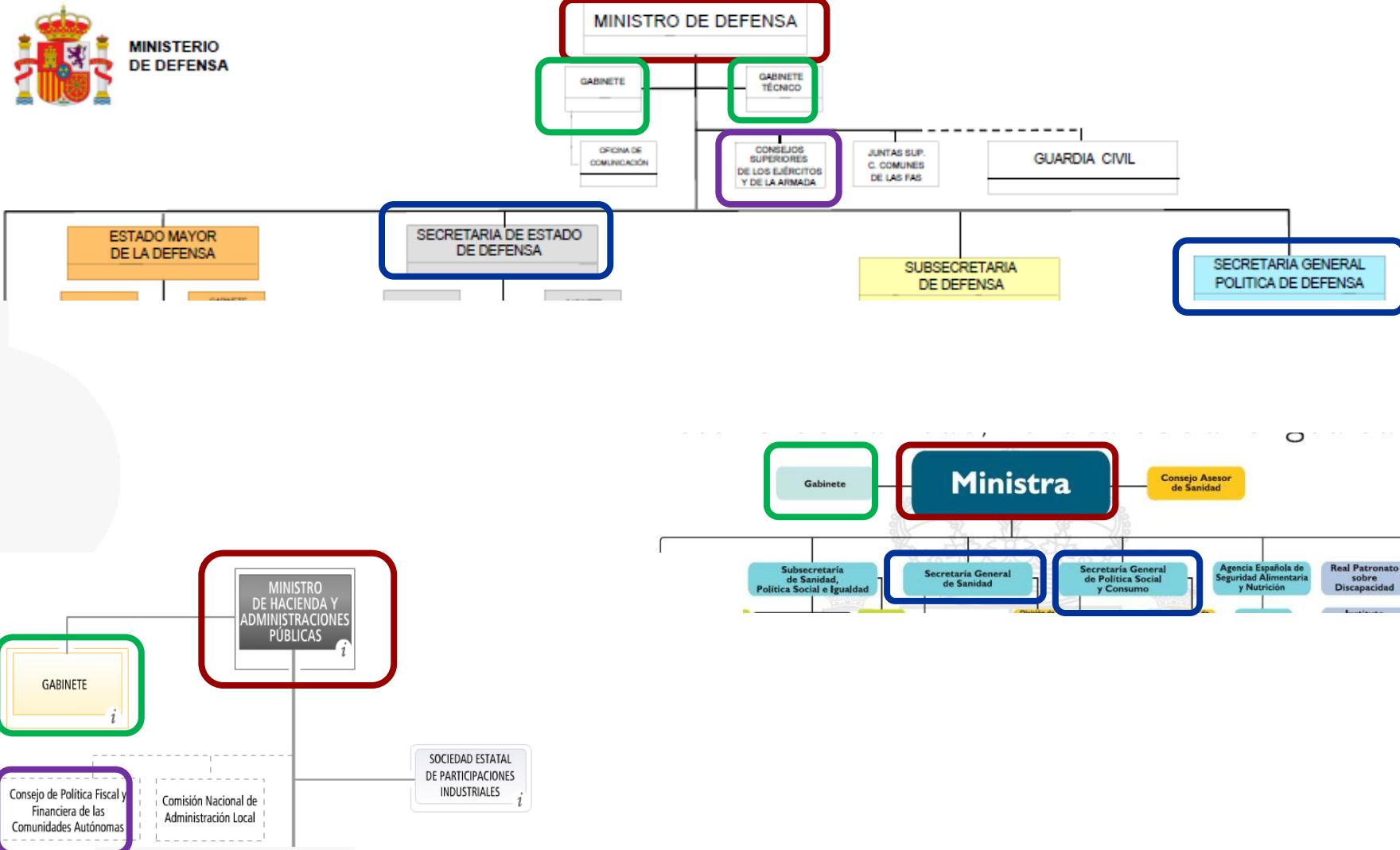
i

SECRETARIA DE ESTADO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

i



# Different terminology between organization charts



# Minister descriptions “à la carte”

## Ministra de Sanidad, Servicios Sociales e Igualdad



**Ana Mato Adrover**

Nacida en 1959.

Licenciada en Ciencias Políticas y en Sociología por la Universidad Complutense de Madrid.

- Ministra de Sanidad, Servicios Sociales e Igualdad desde diciembre de 2012

- Vicesecretaria General de Organización y Electoral del Partido Popular de 2008 hasta febrero de 2012
- Directora de las campañas electorales del PP a las elecciones europeas, las gallegas y las vascas en 2009; de las elecciones municipales y autonómicas de 2011, y de las últimas elecciones generales.
- Diputada nacional de 2008 hasta la actualidad.
- Eurodiputada de 2004 a 2008.
- Diputada nacional en el Congreso de los Diputados de 1993 a 2004.
- Diputada autonómica por Madrid de 1991 a 1993.
- Subdirectora del Gabinete del presidente de la Junta de Castilla y León de 1987 a 1990.
- Portavoz sobre medios de comunicación del PP entre 1983 y 1986 y de Transportes y Telecomunicaciones



## Cristóbal Montoro Romero

Nacido en Jaén el 28 de julio de 1950. Casado. Dos hijas

### Estudios

Doctor en Ciencias Económicas y Empresariales por la Universidad Autónoma de Madrid.

Catedrático de Economía Aplicada (Hacienda Pública y Derecho Tributario) de la Universidad de Cantabria.

### Experiencia profesional

Diputado por Sevilla en el Congreso en la X Legislatura.

Coordinador de Economía y Empleo del Partido Popular desde junio de 2008.

Diputado por Madrid en el Congreso en la IX Legislatura y Portavoz de Economía del Grupo Parlamentario Popular en el Congreso de los Diputados.

Eurodiputado desde Junio de 2004 hasta marzo del 2008.

Miembro del Comité Ejecutivo Nacional del Partido Popular desde 1999.

Ministro de Hacienda (2000-2004).

Secretario de Estado de Economía (1996-2000).

Diputado por Jaén en las VII y VIII Legislaturas.

Diputado por Madrid en las V y VI Legislaturas.

Director de Estudios del Instituto de Estudios Económicos (1981-1993).

Subdirector de Estudios del Banco Atlántico (1975-1981).

Nombramiento como Ministro de Hacienda y Administraciones Públicas por Real Decreto 1826/2011 de 21 de diciembre

# Different ways to describe contact addresses

## MINISTERIO DE JUSTICIA

► Dirección: San Bernardo, 45

► Teléfono:

- 913902000

► Localidad: Madrid

► Código Postal: 28071



### Plano de Situación

Plano Detalle, [\(Descargar\)](#)

Puede navegar con el Plano de Google-Maps aquí debajo y ver una imagen indicativa en el enlace de Plano Detalle



[Ver mapa más grande](#)

Ministerio de Sanidad, Servicios Sociales e Igualdad

Paseo del Prado 18 - 28014 - Madrid

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# Organizations manage vocabularies

Term	BT	NT	RT
Rice	Cereals	Broken rice Basmati rice	Rice straw Oryza
Oryza	Poaceae	Oryza sativa Oryza perennis Oryza rufipogon Oryza longistaminata Wetland rice Oryza glaberrima Upland rice Oryza punctata	Rice fields Cereal crops Rice



NOMENCLÁTOR GEGRÁFICO

ENTIDADES Catalogue/ID

Nación

Región geográfica

Capital de Nación

Elevación orográfica

Comunidad Autónoma

Llanura/Raso

Ciudad con Estatuto de Autonomía

Depresión orográfica

Capital de Comunidad Autónoma

Accidente costero

Provincia

Accidente marítimo

Capital de Provincia

Accidente hidrográfico

Coprincipado

Corriente fluvial

Capital de Coprincipado

Canal

Comarca

Embalse

Capital de Comarca

Lago/Laguna

Isla Humedal

Capital de Isla

Isla Fluvial

Municipio

Isla marítima

Capital de Municipio

Garganta/Hoz

E.A.T.I.M.

Lugar/Paraje

Capital de E.A.T.I.M.

Paso/Collado

Población

Puerto de montaña

Comunidad de Municipios

Puerto comercial

Enclave

Helipuerto comercial

Territorio anejo

Aeródromo/Aeropuerto

Territorio autonómico

Estación de Ferrocarril

Zona neutral

XX-YY-ZZ

02-01-02

02: transport

01: road

02: 3 lanes

semantic Technologies

## Informal Clasification

ID	Clasification	Value
20000	Water area	1
21000	Environmental area	20000
22000	Fishing Statistical area	20000
24020	Jurisdiction area	20000
21001	Inland/marine	21000
21002	Ocean	21000
21003	North/South/Equatorial	21000
21004	Sub Ocean	21000
21005	Large Marine ecosystem	21000

ID	Name
Ve	Vehicle
10.01	Car
10.02	Motorcycle
10.03	Bicycle
10.01.01	Vehicle
10.01.02	Wheel
10.01.02	Seat
10.01.03	Door

Diccionario de conversión DGN -> EDM.  
 FORMATO:  
 Tipo\_dgn Entidad Tipo\_istream Grupo Código\_bcn Cerrado Trato [

Tipo_dgn...	NNSCCGG	Código_bcn...	TTGGSS
NN	: Nivel elemento	TT	: Tema
S	: Estilo linea dgn	GG	: Grupo
CCC	: Color linea dgn	SS	: Subgrupo
GG	: Grosor linea dgn		

Entidad  
 104 : polilínea  
 203 : célula se convierte a símbolo  
 -1 : célula se explota en sus componentes  
 304 : rótulo

Tipo\_istream....???

Grupo  
 0 : sin determinar  
 1 : carreteras  
 2 : hidrografía  
 3 : conducciones  
 4 : administrativo

En textos el grupo corresponde a la fuente Microstation

Cerrado  
 en líneas  
 1 : perimetral  
 0 : entidad lineal abierta  
 -1 : cultivo perimetral  
 -2 : cultivo linea abierta

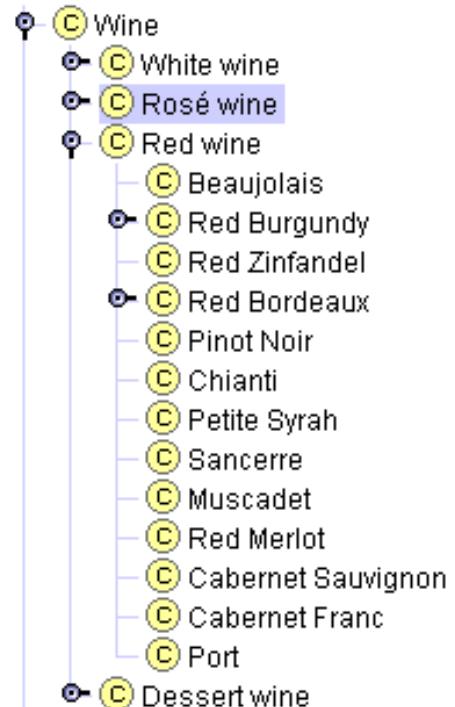
en textos  
 n : altur

Trato  
 I: Intocable A: Altimetría N: No tratar T: Textos Asociados  
 S: Textos Sueltos C: Cultivo F: solo salida !: Tratar norma  
 TTGGSS

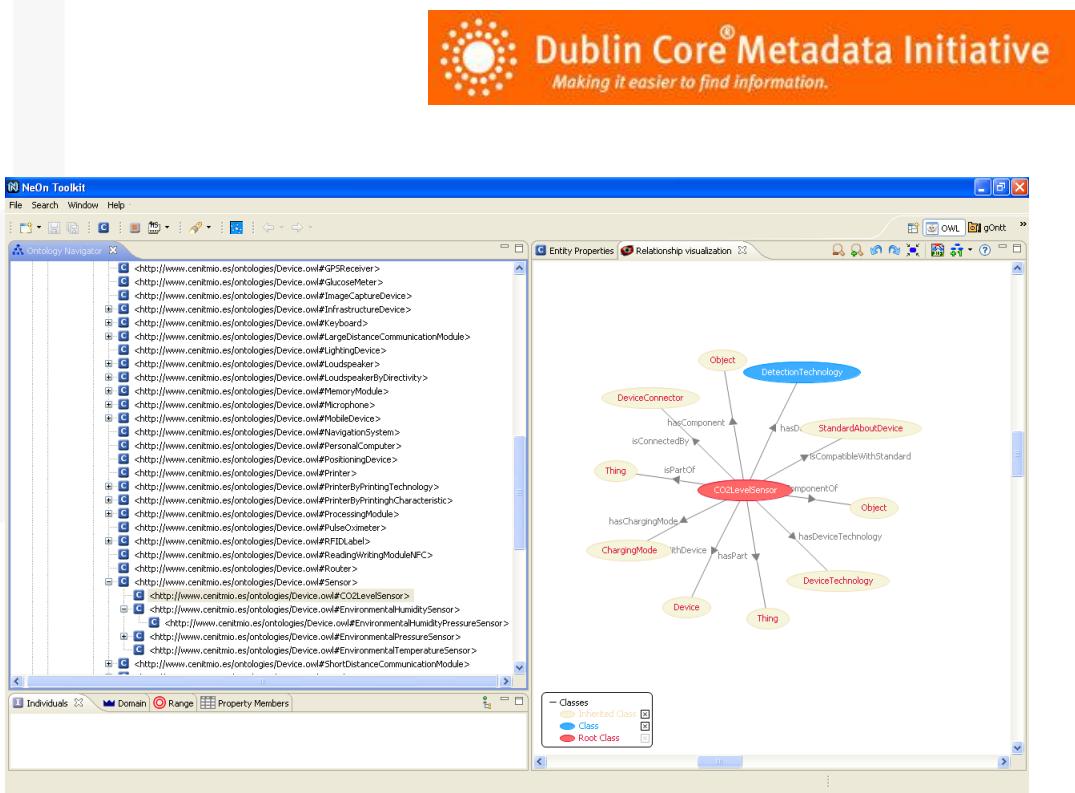
02000900	104	1	0	090101	1	!I	Marco de hoja
02300902	104	2	0	100200	0	!	Base Geodésica de Ma
06003900	104	3	0	025102	0	!	Acantilado
06006900	104	4	0	025302	0	!	Costa rocosa no acar
06009900	104	5	2	037402	1	!	Playa fluvial de gu
06012900	104	6	0	025501	1	!	Lavas. Contorno
06015900	104	7	0	058303	0	!I	Dique de hormigón >1
06018900	104	8	0	058304	0	!I	Dique de hormigón <
07013400	104	9	0	058302	0	!I	Dique de tierra
07016400	104	10	0	055401	1	!	Vertedero. Contorno
11003003	104	11	1	062202	0	!	Autopista. Enlace
11012000	104	12	0	056091	1	!	Patio. Contorno
13003300	104	13	1	060101	0	!	Autopista. Eje
13303300	104	14	1	060131	0	!	Autopista en Contruc
14002401	104	15	1	066901	1	!I	Puesto de S.O.S.
14003301	104	16	1	067901	1	!I	Peaje
15003003	104	17	1	062204	0	!	Autovía. Enlace
15003004	104	18	1	060701	0	!	Autovía

Knowledge implicit in the code numbers

- An ontology is an engineering artifact, which provides:
  - A set of terms
  - A set of explicit assumptions regarding the intended meaning of the terms.
    - Almost always including concepts and their classification
    - Almost always including properties between concepts
- Shared understanding of a domain of interest
- Ontologies expressed in OWL or RDF(S), both based on RDF
- Tools: Protégé, NeOn Toolkit, Topbraid Composer, etc.



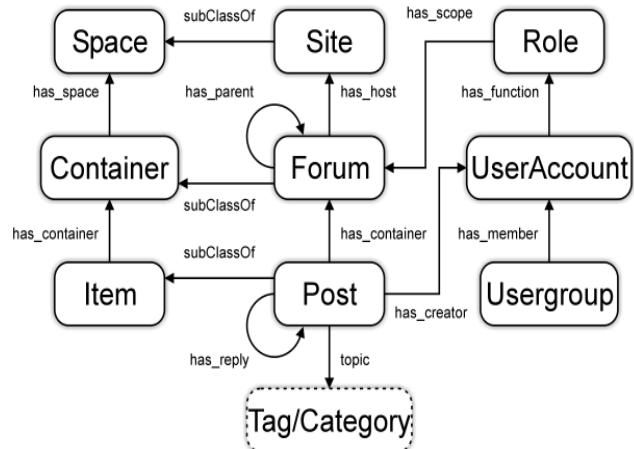
# Ontology examples



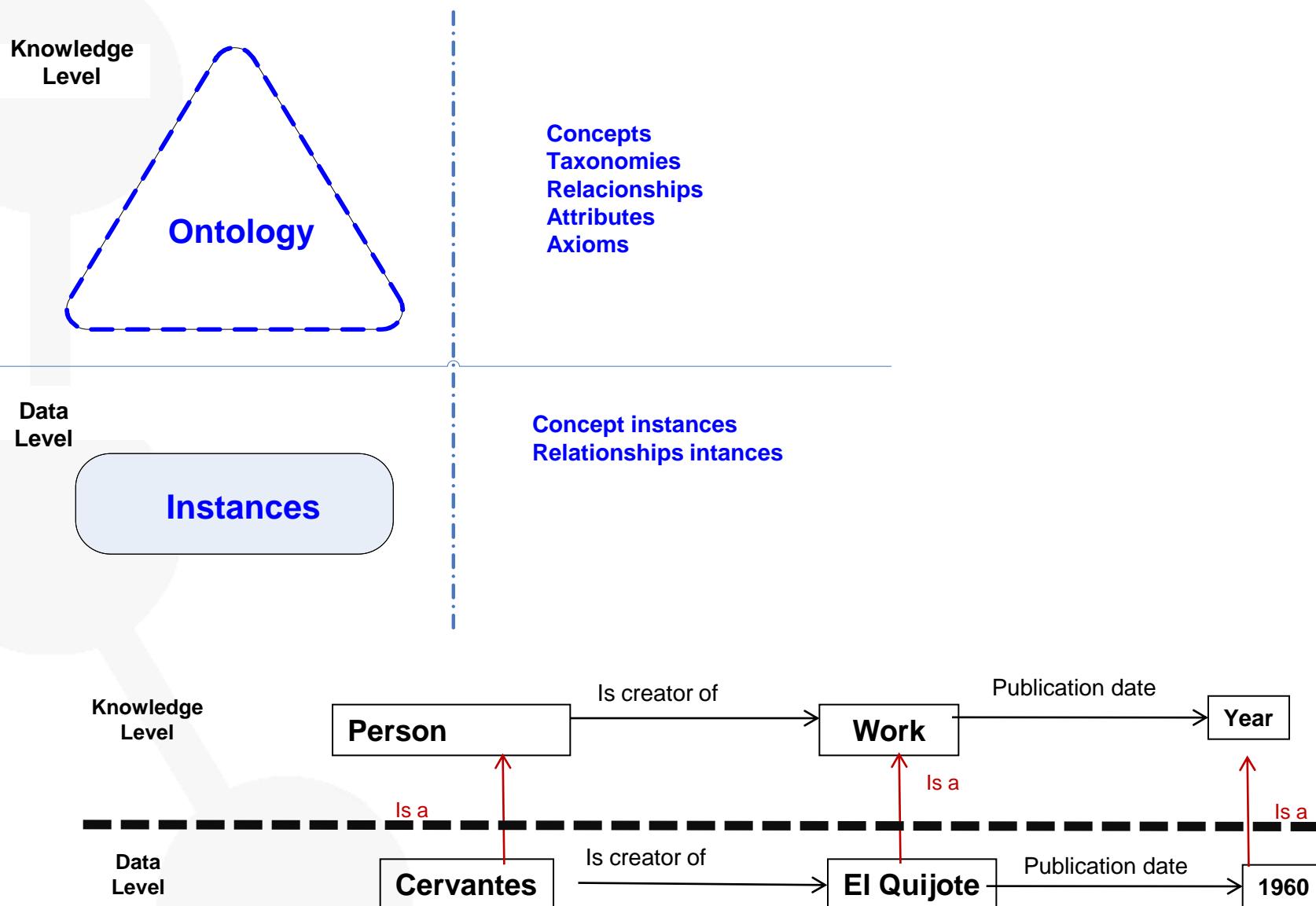
FOAF Core
<ul style="list-style-type: none"> <li>• <a href="#">Agent</a></li> <li>• <a href="#">Person</a></li> <li>• <a href="#">name</a></li> <li>• <a href="#">title</a></li> <li>• <a href="#">img</a></li> <li>• <a href="#">depiction (depicts)</a></li> <li>• <a href="#">familyName</a></li> <li>• <a href="#">givenName</a></li> <li>• <a href="#">knows</a></li> <li>• <a href="#">based_near</a></li> <li>• <a href="#">age</a></li> <li>• <a href="#">made (maker)</a></li> <li>• <a href="#">primaryTopic (primaryTopicOf)</a></li> <li>• <a href="#">Project</a></li> <li>• <a href="#">Organization</a></li> <li>• <a href="#">Group</a></li> <li>• <a href="#">member</a></li> <li>• <a href="#">Document</a></li> <li>• <a href="#">Image</a></li> </ul>

Social Web
<ul style="list-style-type: none"> <li>• <a href="#">nick</a></li> <li>• <a href="#">mbox</a></li> <li>• <a href="#">homepage</a></li> <li>• <a href="#">weblog</a></li> <li>• <a href="#">openid</a></li> <li>• <a href="#">jabberID</a></li> <li>• <a href="#">mbox sha1sum</a></li> <li>• <a href="#">interest</a></li> <li>• <a href="#">topic_interest</a></li> <li>• <a href="#">topic (page)</a></li> <li>• <a href="#">workplaceHomepage</a></li> <li>• <a href="#">workInfoHomepage</a></li> <li>• <a href="#">schoolHomepage</a></li> <li>• <a href="#">publications</a></li> <li>• <a href="#">currentProject</a></li> <li>• <a href="#">pastProject</a></li> <li>• <a href="#">account</a></li> <li>• <a href="#">OnlineAccount</a></li> <li>• <a href="#">accountName</a></li> <li>• <a href="#">accountServiceHomepage</a></li> <li>• <a href="#">PersonalProfileDocument</a></li> <li>• <a href="#">tipjar</a></li> <li>• <a href="#">sha1</a></li> <li>• <a href="#">thumbnail</a></li> <li>• <a href="#">logo</a></li> </ul>

## SIOC Ontology



# Ontologies: Knowledge and Data



# Example: Ontology

Travel Protégé 3.1 beta (file:/Users/natasha/Library/Mail%20Downloads/Travel.pprj, Protégé Files (.pont and .pins))

CLASS BROWSER      CLASS EDITOR

For Project: Travel

For Class: Travel (instance of :STANDARD-CLASS)

Class Hierarchy

- :THING
- :SYSTEM-CLASS
- Travel
- Flight
  - American Airways Flight
    - AA7462
    - AA2010
    - AA0488
  - British Airways Flight
  - Iberia Flight
- Ship
- Train Travel
- Location
  - European Location
  - African Location

Superclasses

- :THING

CLASS EDITOR

Name: Travel  
Documentation: A journey from place to place  
Role: Concrete

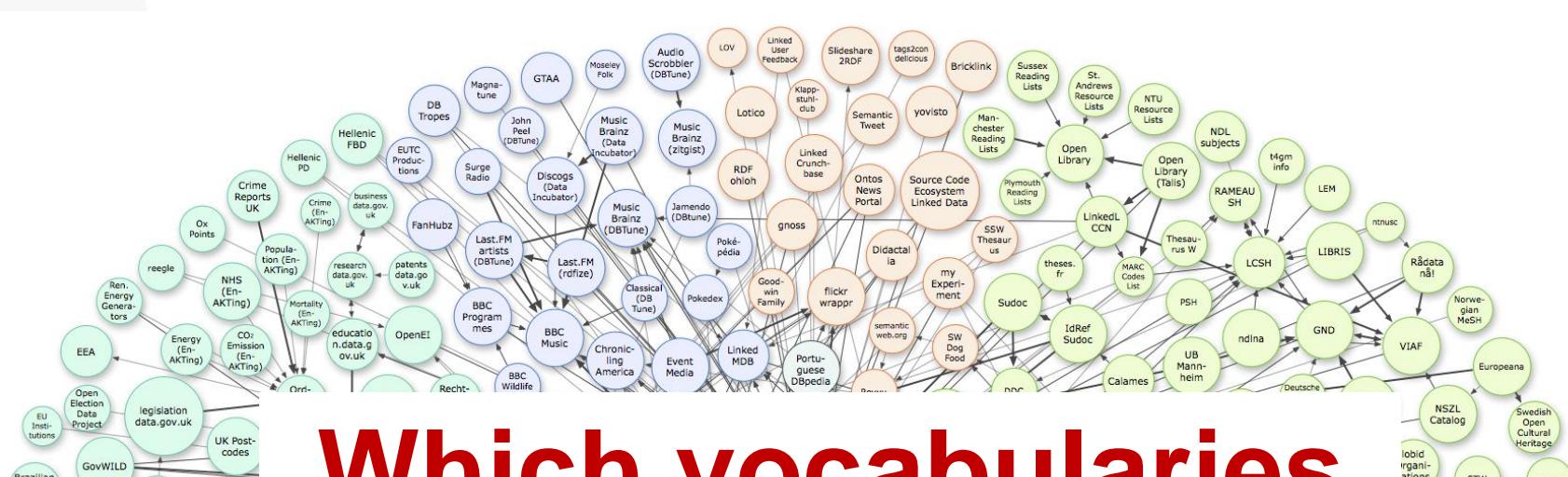
Constraints: ♦ No Train from USA to Europe

Template Slots

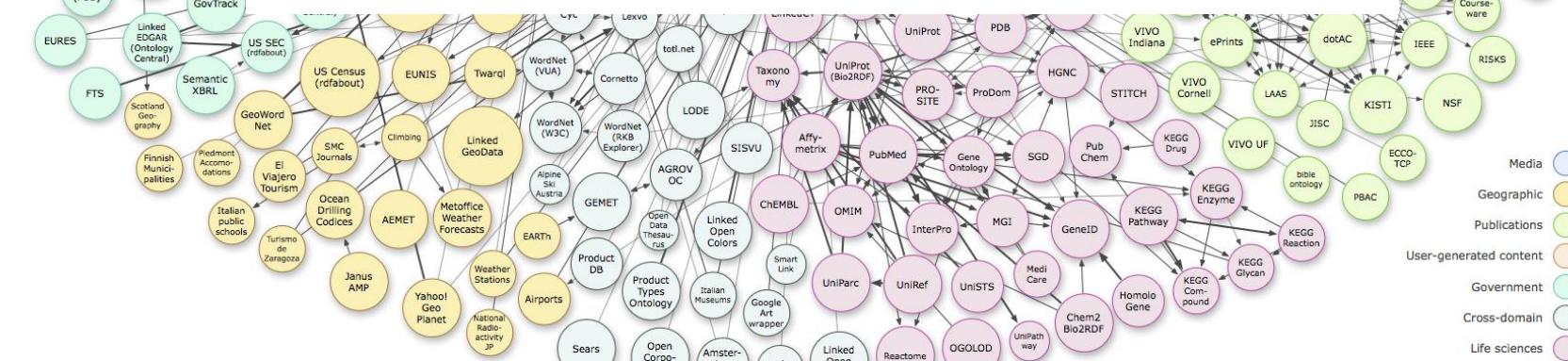
Name	Cardinality	Type	Other Facets
arrival Date	required single	Instance of Date	
arrival Place	required single	Instance of Location	
company Name	multiple	String	
departure Date	required single	Instance of Date	
departure Place	required single	Instance of Location	
single Fare	single	Float	
:NAME	required single	String	

1. Introduction
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- 3. Development process**
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6. Conclusions

# Vocabularies in the Web of Data



## Which vocabularies are the most used?



As of September 2011 CC BY-SA

Specification

Modelling

RDF Generation

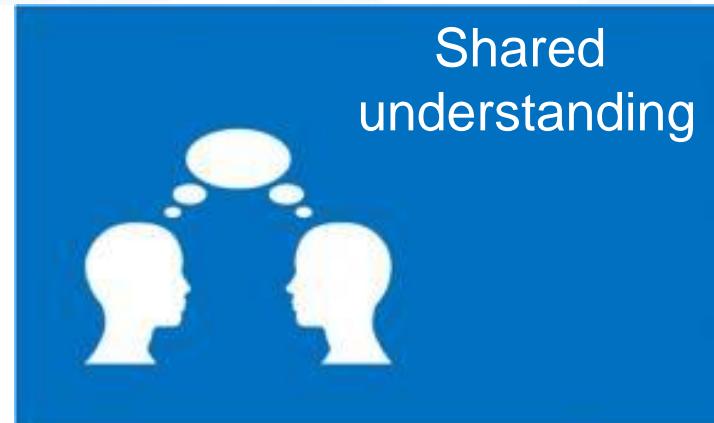
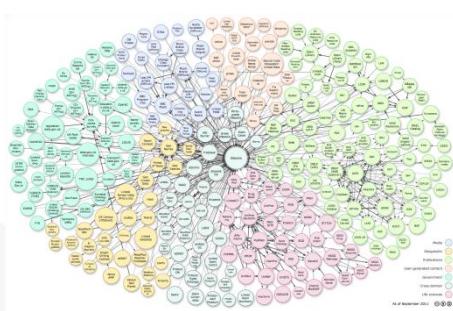
Links Generation

Publication

Exploitation

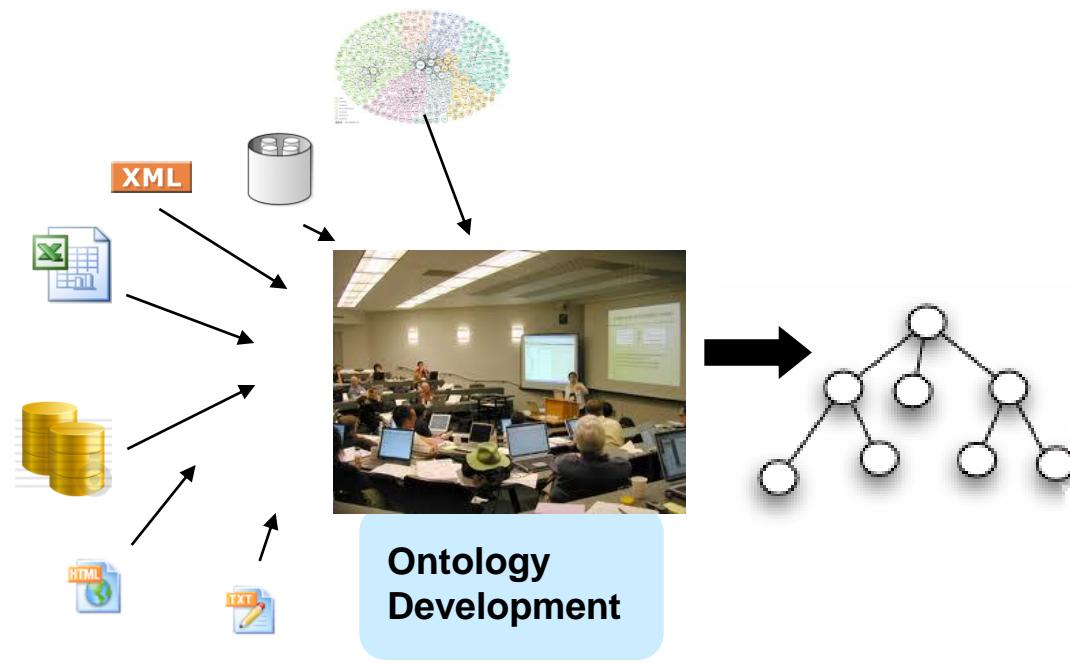
# Reuse

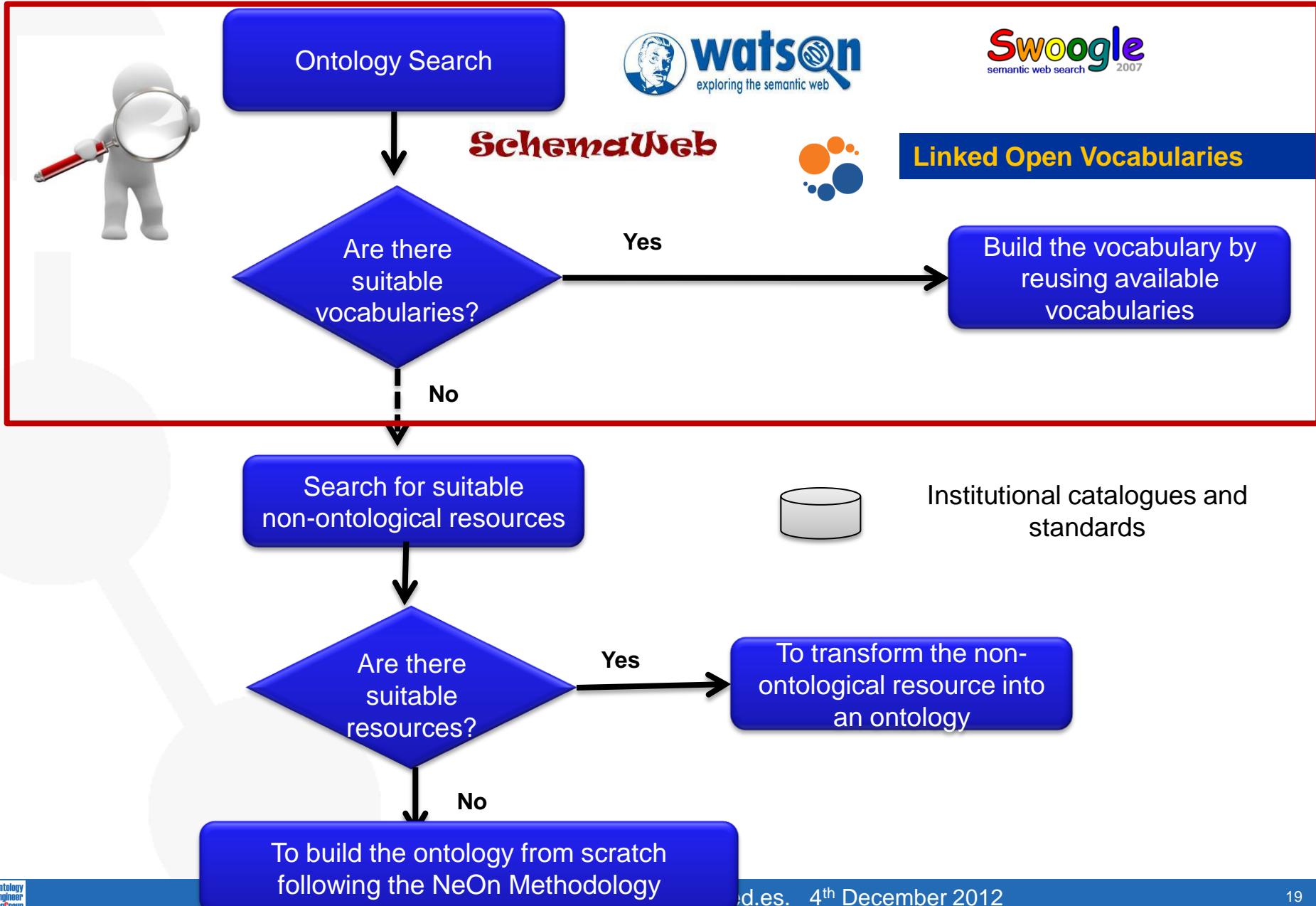
STANDARDS



# Ontology development trends

- To reuse rich knowledge resources
- Collaborative ontology and vocabulary development
- To connect ontologies and vocabularies creating networks







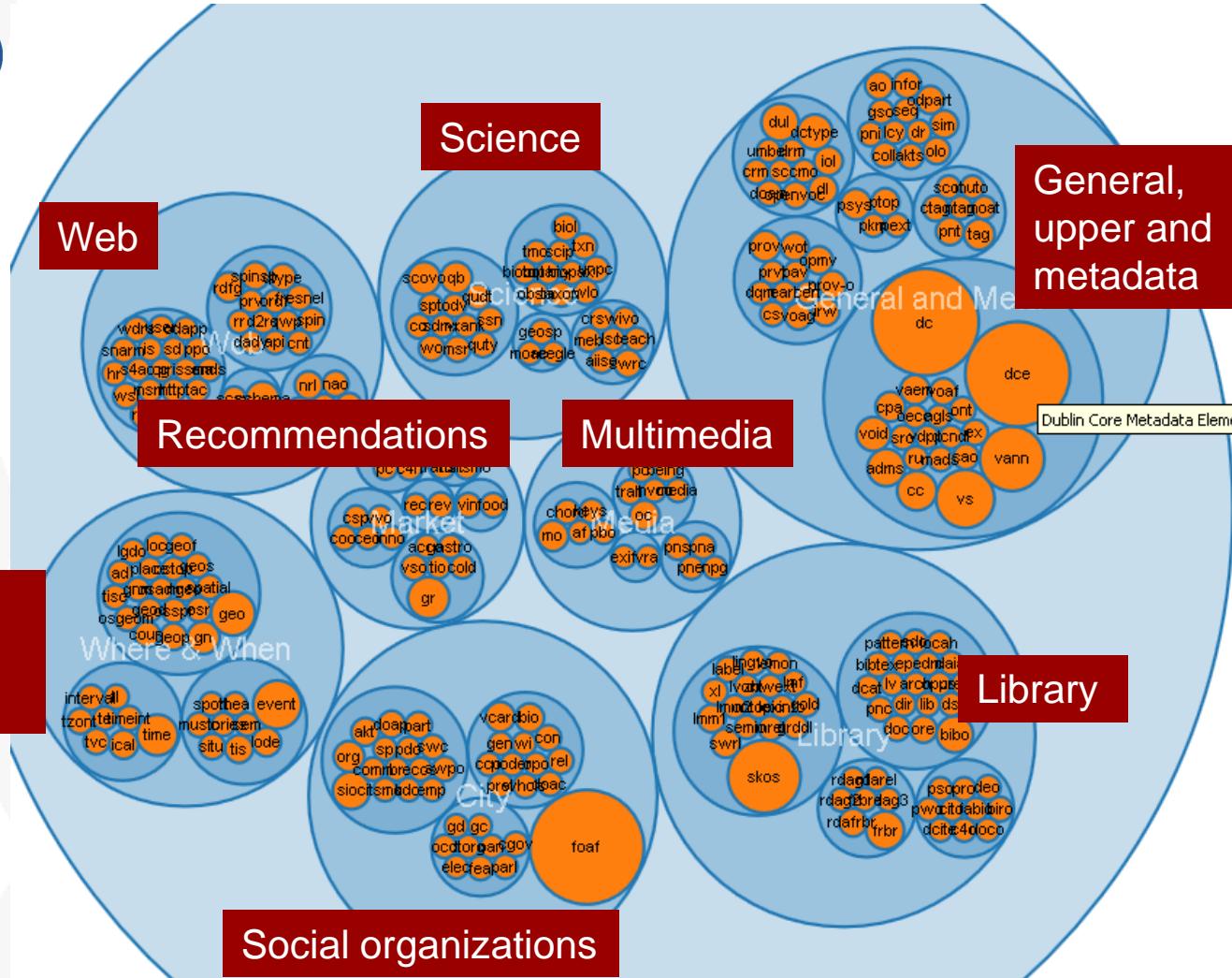
## Linked Open Vocabularies (LOV)

- Ecosystem of vocabularies used in Linked Open Data (RDFS or OWL ontologies)
  - 300 vocabularies described by means of metadata
  - Classified by topics (vocabulary spaces)
  - Linked using VOAF
  - Services
    - Look up
    - Search
    - Metrics

# LOV Vocabulary spaces



Space  
Time  
Events



# Vocabulary description in LOV

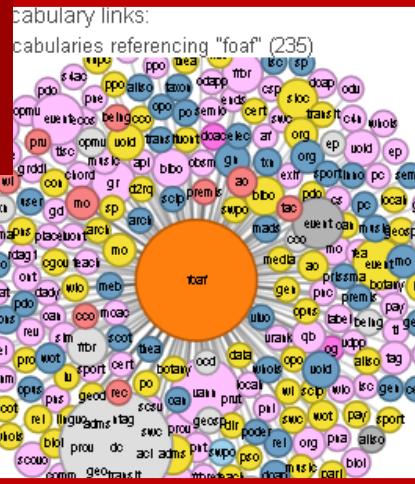


## Metadata:

<b>Property</b>	<b>Value</b>
is part of vocabulary space	All > City
Vocabulary URI	<a href="http://xmlns.com/foaf/0.1/">http://xmlns.com/foaf/0.1/</a>
Prefix	foaf
Namespace URI	<a href="http://xmlns.com/foaf/0.1/">http://xmlns.com/foaf/0.1/</a>
Last modified	2010-08-09
Creator	Dan Brickley, Libby Miller
Publisher	Dan Brickley
Class number	13
Property number	62
Homepage	<a href="http://www.foaf-project.org/">http://www.foaf-project.org/</a>
Represented by	format-foaf
Has review	(2011-03-11) <a href="#">Bernard Vatara</a> Wish it had more metadata

## Metadata

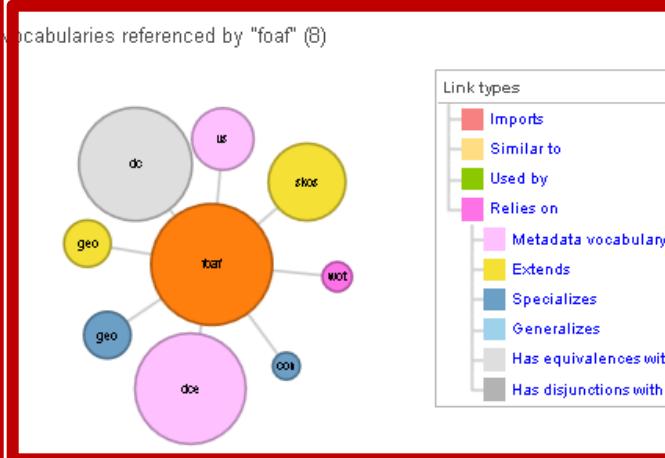
## Vocabularies referencing a given vocabulary



## Vocabulary history



Vocabularies referenced by the given vocabulary



## Versions

1. Introduction
2. Vocabulary types
3. Development process
4. Vocabulary examples
  - **Persons and Organizations: FOAF, vCard, ORG**
  - Documents: DC, BIBO
  - Geo: points, lineString and polygons
  - Libraries: FRBR
  - Statistics: Data Cube
  - Other vocabularies: sensors, provenance, VOID , DCAT, etc.
5. Example of vocabulary networks within Linked Data applications
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- RDF vocabulary to describe:
  - Persons
  - Groups
  - Documents

## FOAF - Friend of a Friend vocabulary



### Metadata:

Property	Value
is part of vocabulary space	All > City
Vocabulary URI	<a href="http://xmlns.com/foaf/0.1/">http://xmlns.com/foaf/0.1/</a>
Prefix	foaf
Namespace URI	<a href="http://xmlns.com/foaf/0.1/">http://xmlns.com/foaf/0.1/</a>
Last modified	2010-08-09
Creator	Dan Brickley, Libby Miller
Publisher	Dan Brickley
Class number	13
Property number	62
Homepage	<a href="http://www.foaf-project.org/">http://www.foaf-project.org/</a>
Represented by	format-foaf
Has review	(2011-03-11) <a href="#">Bernard Vatant</a> : FOAF is the ancestor of all LOV vocabularies, and is everywhere in the Cloud. Wish it had more metadata such as last modification date.



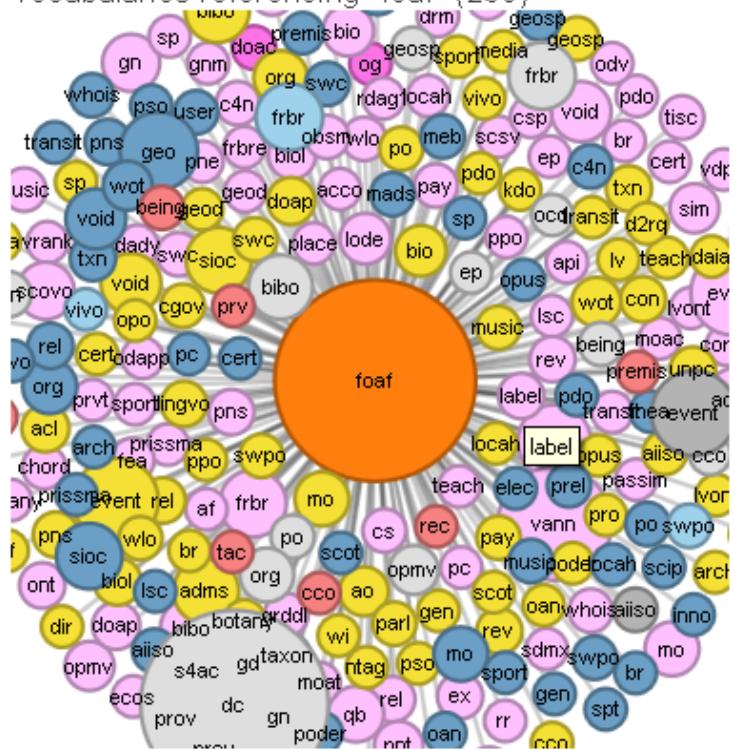
<http://www.foaf-project.org/>

# FOAF: Relationship with other vocabularies



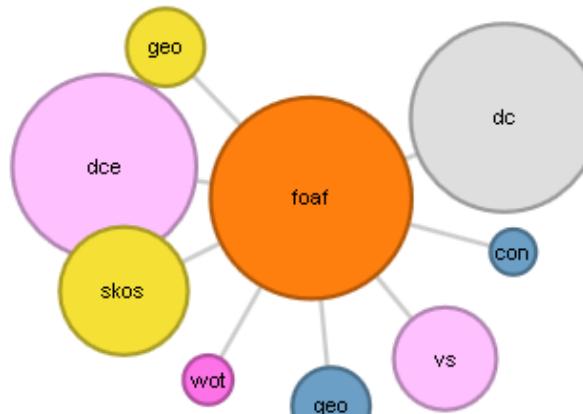
## Vocabulary links:

Vocabularies referencing "foaf" (235)



## Vocabulary history:

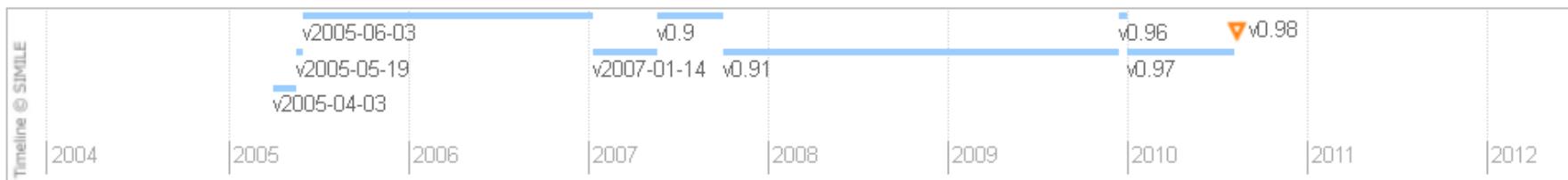
Vocabularies referenced by "foaf" (8)



Link types
Imports
Similar to
Used by
Relies on
Metadata vocabulary
Extends
Specializes
Generalizes
Has equivalences with
Has disjunctions with



## Vocabulary history:



The LOV dataset is licensed under Creative Commons [CC BY 3.0](#). It is developed in the framework of the [Datalift](#) project and supported by the [Open Knowledge Foundation \(OKFN\)](#).

If you have any remark, suggestion or question, please [contact editors](#)

# FOAF: The vocabulary



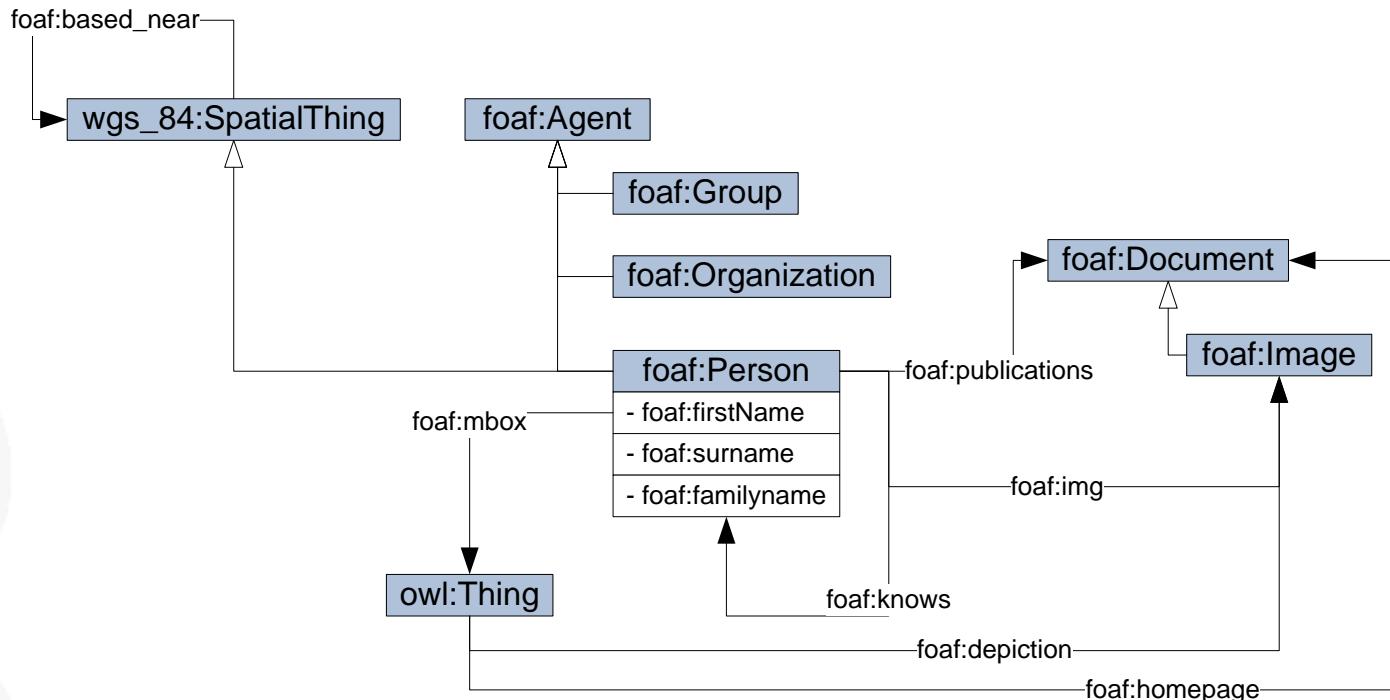
## FOAF Core

- - [Agent](#)
  - [Person](#)
  - [name](#)
  - [title](#)
  - [img](#)
  - [depiction](#) ([depicts](#))
  - [familyName](#)
  - [givenName](#)
  - [knows](#)
  - [based\\_near](#)
  - [age](#)
  - [made](#) ([maker](#))
  - [primaryTopic](#) ([primaryTopicOf](#))
- - [Project](#)
  - [Organization](#)
  - [Group](#)
  - [member](#)
- - [Document](#)
  - [Image](#)

## Social Web

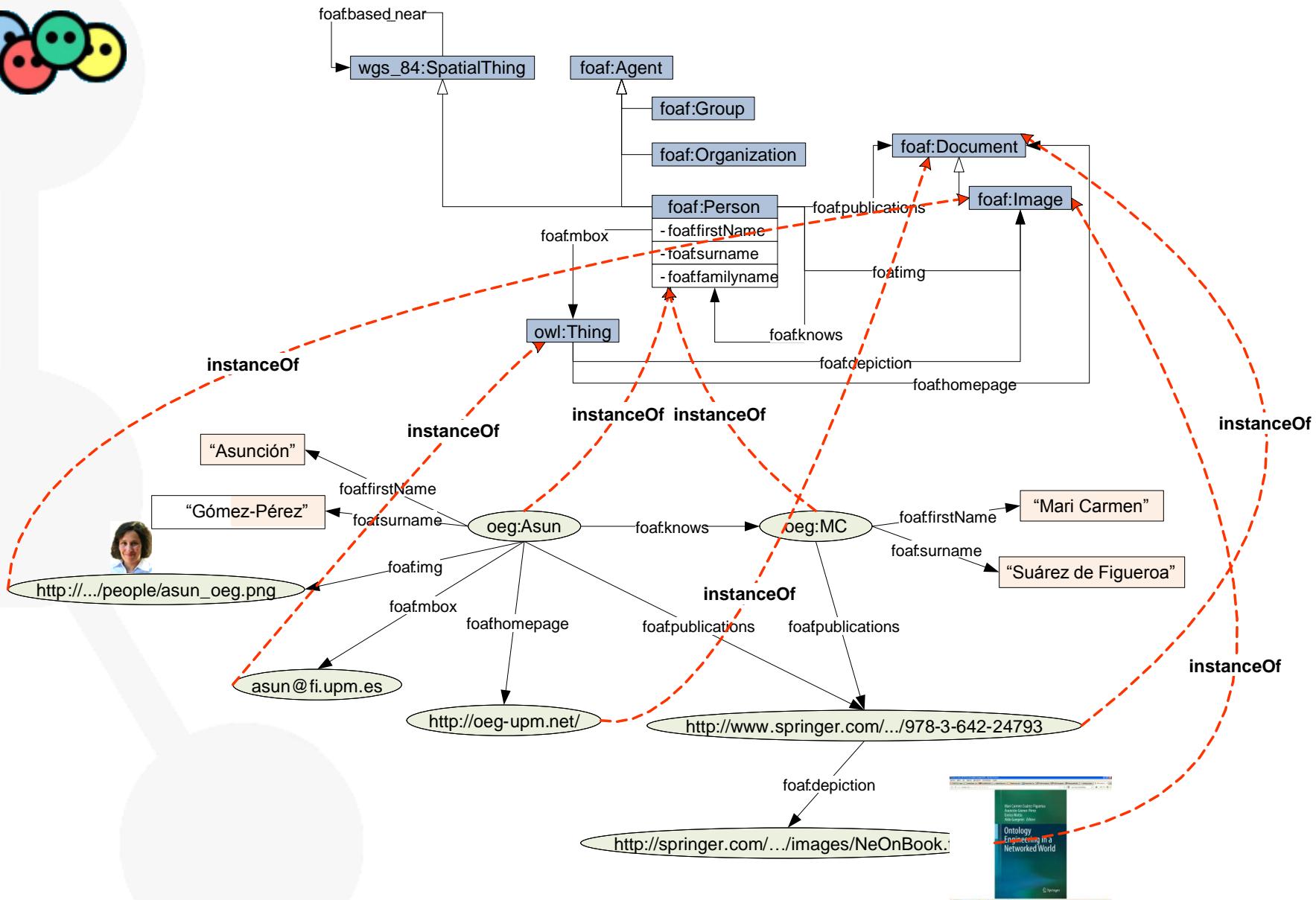
- [nick](#)
- [mbox](#)
- [homepage](#)
- [weblog](#)
- [openid](#)
- [jabberID](#)
- [mbox\\_sha1sum](#)
- [interest](#)
- [topic\\_interest](#)
- [topic\\_page](#)
- [workplaceHomepage](#)
- [workInfoHomepage](#)
- [schoolHomepage](#)
- [publications](#)
- [currentProject](#)
- [pastProject](#)
- [account](#)
- [OnlineAccount](#)
- [accountName](#)
- [accountServiceHomepage](#)
- [PersonalProfileDocument](#)
- [tipjar](#)
- [sha1](#)
- [thumbnail](#)
- [logo](#)

# FOAF: A model excerpt



An excerpt of FOAF model

# FOAF: Model and instances



# An example of a FOAF instantiation in RDF

```
<foaf:Person rdf:about="http://www.oeg-upm.es/resource/Asun">
  <rdfs:label xml:lang="es">Asun</rdfs:label>
  <foaf:firstName>Asunción</foaf:firstName>
  <foaf:surname>Gómez-Pérez</foaf:surname>
  <foaf:mbox rdf:resource="asun@fi.upm.es"/>
  <foaf:homepage rdf:resource="http://www.oeg-upm.net//"/>
</foaf:Person>
```

XML

Turtle

```
### http://www.oeg-upm.es/resource/Asun
<http://www.oeg-upm.es/resource/Asun> rdf:type owl:NamedIndividual ,
  <http://xmlns.com/foaf/0.1/Person> ;
  rdfs:label "Asun"@es ;
  <http://xmlns.com/foaf/0.1/firstName> "Asunción" ;
  <http://xmlns.com/foaf/0.1/surname> "Gómez-Pérez" ;
  <http://xmlns.com/foaf/0.1/mbox> <asun@fi.upm.es> ;
  <http://xmlns.com/foaf/0.1/homepage> <http://www.oeg-upm.net/> ;
```

# vCard: An Ontology for visit cards

- vCard automates the exchange of personal and organization information typically found on a traditional business card.
- RDF Classes:
  - Vcard
  - Name
  - Address
  - Organisation,
  - Location
  - Label
  - Tel
  - Email.

VCARD - An Ontology for vCards

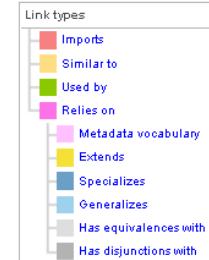
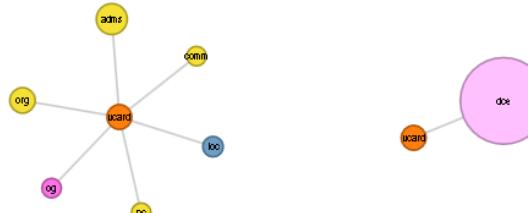


Metadata:	
Property	Value
is part of vocabulary space	All > City > People
Vocabulary URI	<a href="http://www.w3.org/2006/vcard/ns">http://www.w3.org/2006/vcard/ns</a>
Prefix	vcard
Namespace URI	<a href="http://www.w3.org/2006/vcard/ns#">http://www.w3.org/2006/vcard/ns#</a>
Description	This ontology models and represents vCards in RDF using current best practices @en
Last modified	2010-01-20
Creator	Brian Suda, Harry Halpin, Norman Walsh, Renato Iannella
Publisher	W3C
Class number	28
Property number	43
Homepage	<a href="http://www.w3.org/Submission/vcard-rdf/">http://www.w3.org/Submission/vcard-rdf/</a>
Represented by	format:vcard

## Vocabulary links:

Vocabularies referencing "vcard" (6)

Vocabularies referenced by "vcard" (1)

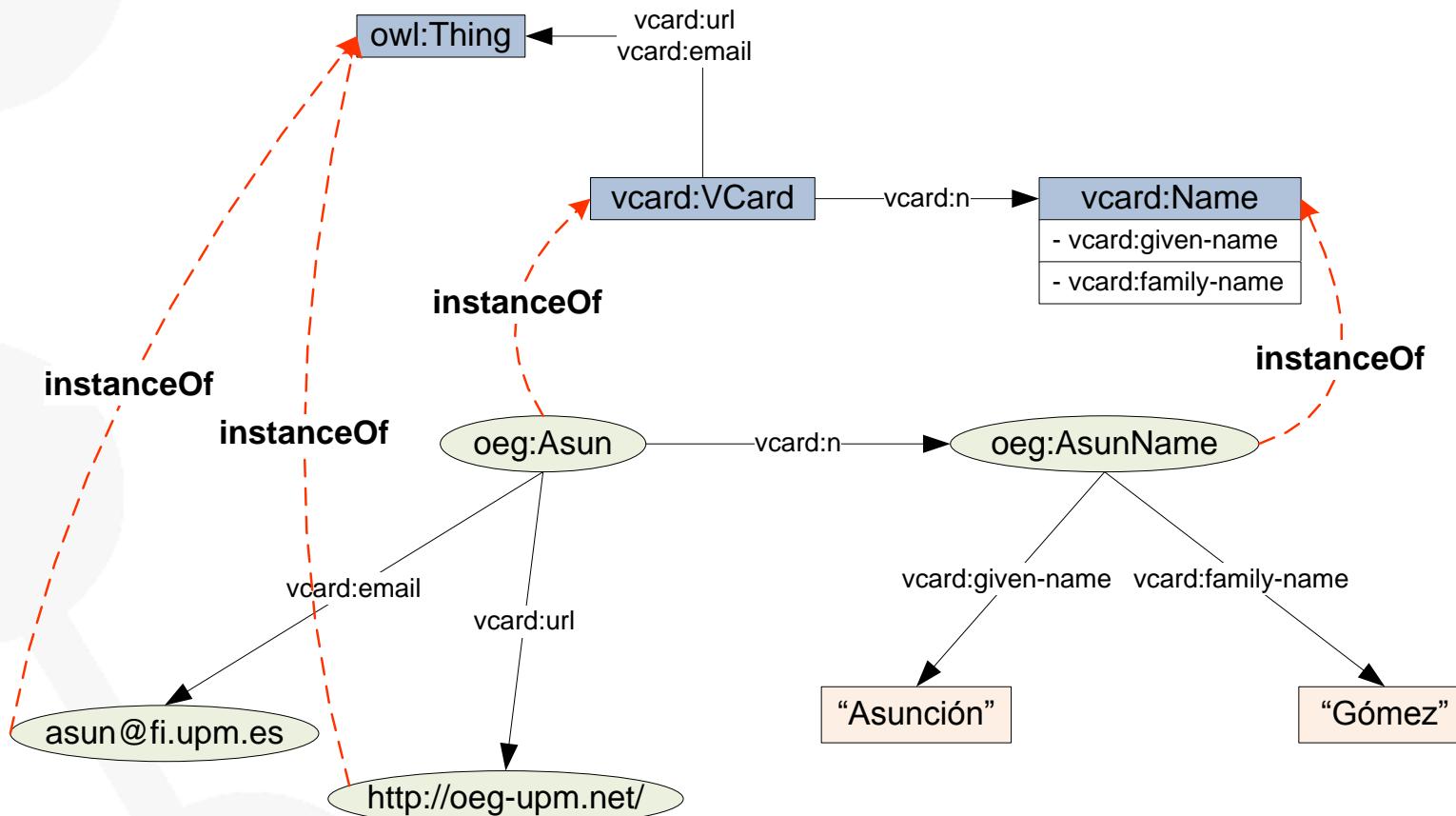


## Vocabulary history:



<http://www.w3.org/Submission/vcard-rdf/>

# An example of a vCard instantiation



# An example of a vCard instantiation in RDF

```
<ns:VCard rdf:about="http://www.oeg-upm.es/resource/Asun">
  <rdfs:label xml:lang="es">Asun</rdfs:label>
  <ns:url rdf:resource="http://oeg-upm.net/">
  <ns:n rdf:resource="http://www.oeg-upm.es/resource/AsunName"/>
  <ns:email rdf:resource="asun@fi.upm.es"/>
</ns:VCard>
```

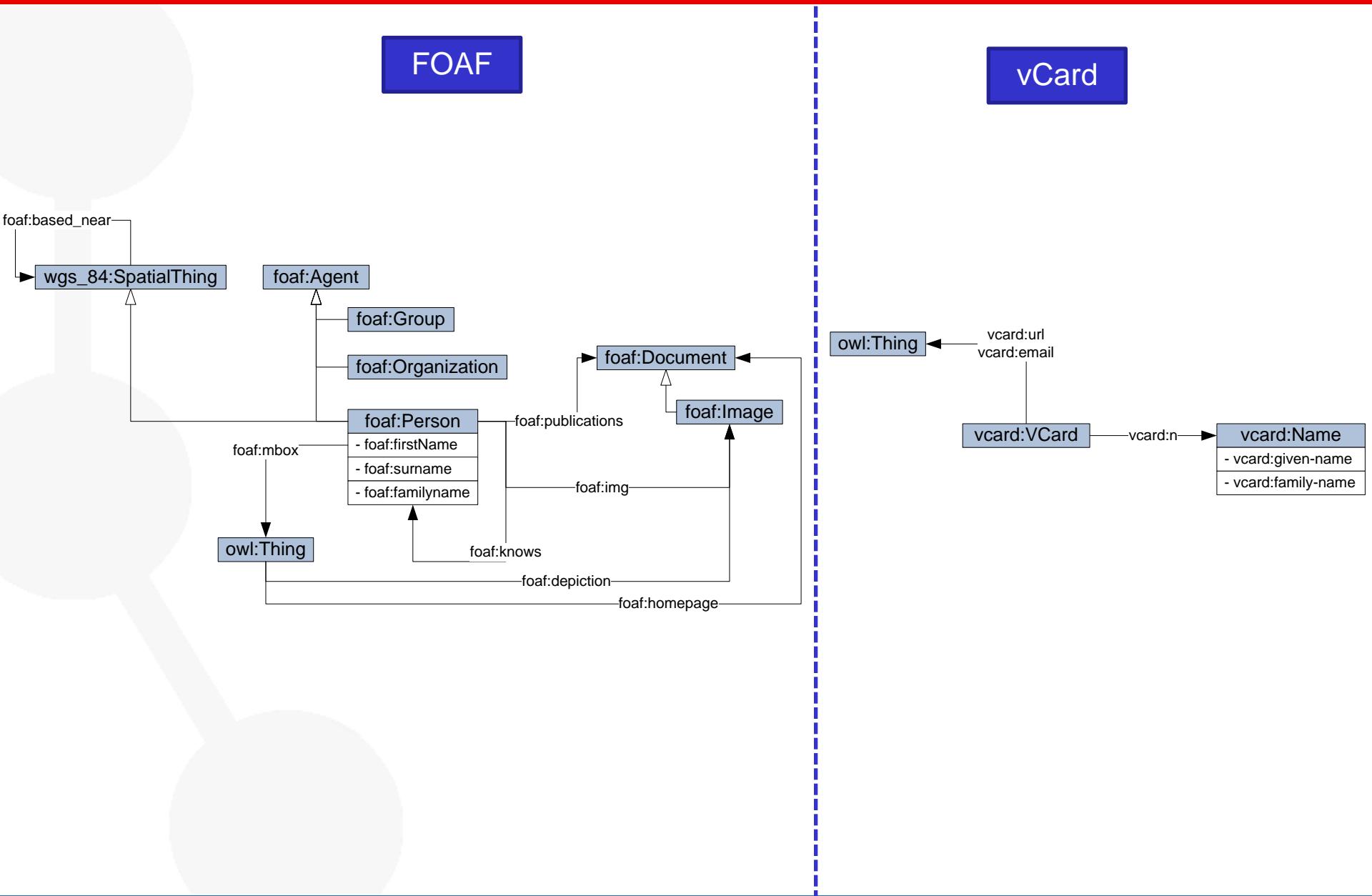
```
<ns:Name rdf:about="http://www.oeg-upm.es/resource/AsunName">
  <ns:family-name>Gómez</ns:family-name>
  <ns:given-name>Asunción</ns:given-name>
</ns:Name>
```

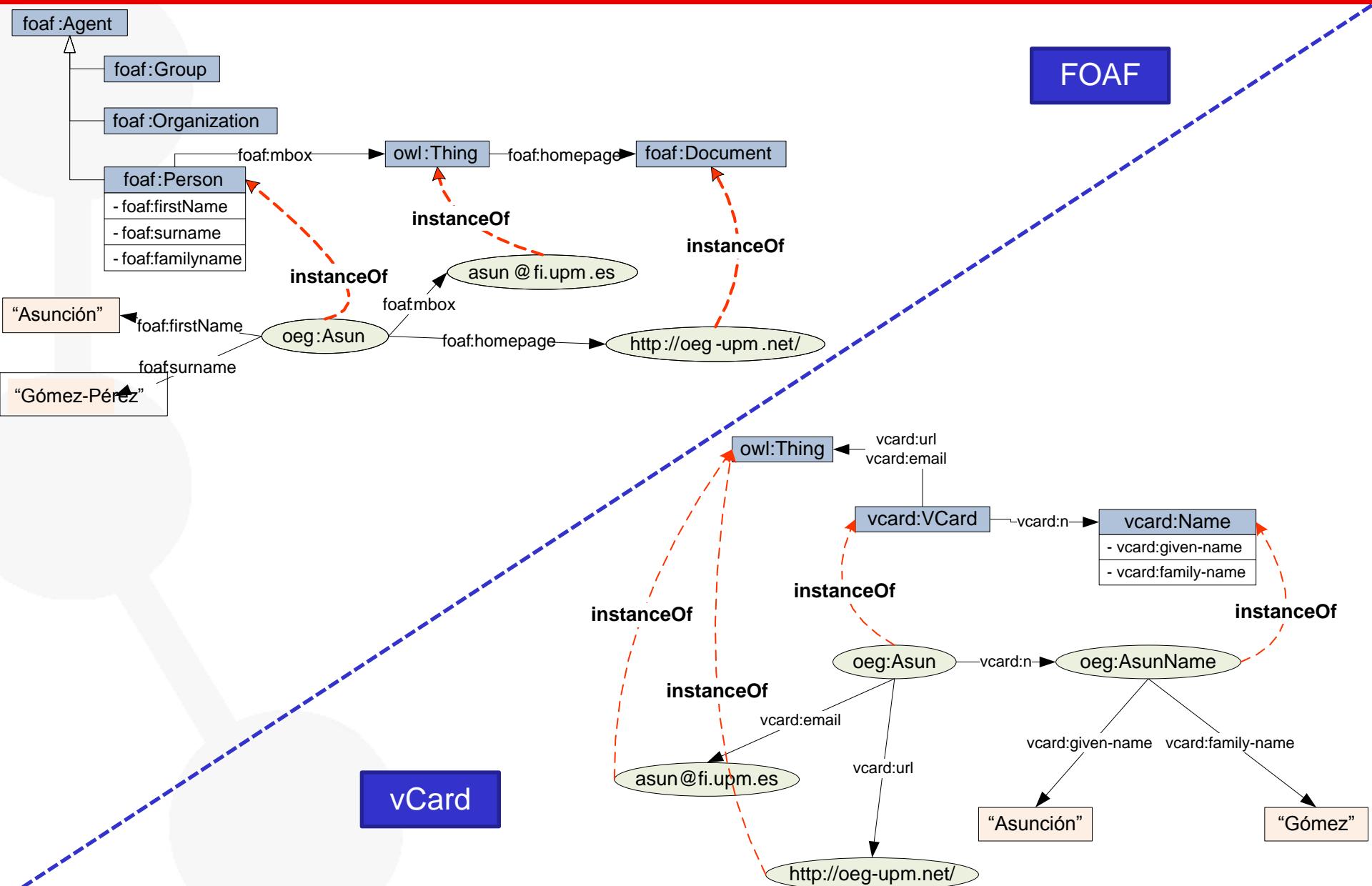
XML

Turtle

```
###  http://www.oeg-upm.es/resource/Asun
resource:Asun rdf:type owl:NamedIndividual ,
               ns:VCard ;
               rdfs:label "Asun"@es ;
               ns:url <http://oeg-upm.net/> ;
               ns:n resource:AsunName ;
               ns:email resource:asun@fi.upm.es .

###  http://www.oeg-upm.es/resource/AsunName
resource:AsunName rdf:type owl:NamedIndividual ,
                   ns:Name ;
                   rdfs:label "AsunName"@es ;
                   ns:family-name "Gómez" ;
                   ns:given-name "Asunción" .
```





# ORG: An organization ontology (W3C)



## An organization ontology

W3C Working Draft 23 October 2012

This version:

<http://www.w3.org/TR/2012/WD-vocab-org-20121023/>

Latest published version:

<http://www.w3.org/TR/vocab-org/>

Latest editor's draft:

<https://dvcs.w3.org/hg/gld/raw-file/default/org/index.html>

Previous version:

<http://www.w3.org/TR/2012/WD-vocab-org-20120405/>

Editor:

Dave Reynolds, [Epimorphics Ltd.](#)

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## Abstract

This document describes a core ontology for organizational structure classification of organizations and roles, as well as extensions to sup-

## Status of This Document

*This section describes the status of this document at the time of its publication. It may be superseded by other documents. Please refer to the [W3C technical reports index](#) at <http://www.w3.org/TR/>.*

This ontology was originally developed [and published](#) outside of W3C.

This document was published by the [Government Linked Data Working Group](#). Please send comments to [public-gld-wg@w3.org](mailto:public-gld-wg@w3.org) ([subscribe](#), [archives](#)).

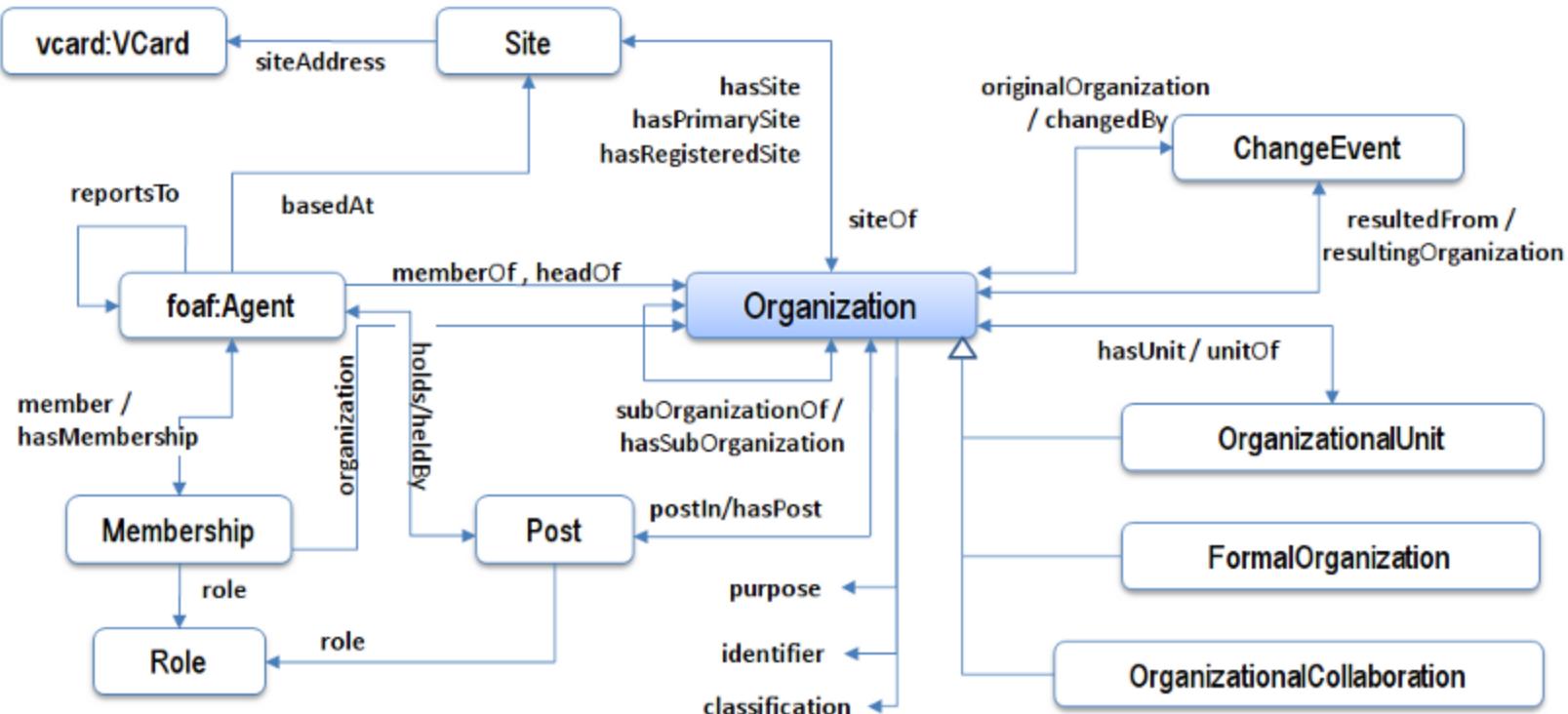
Publication as a Working Draft does not imply endorsement by the W3C Community or by other work in progress.

- ORG is a core ontology for organizational structures.
  - **organizational structure**
    - notion of an organization
    - decomposition into sub-organizations and units
    - purpose and classification of organizations
  - **reporting structure**
    - membership and reporting structure within an organization
    - roles, posts, and the relationship between people and organizations
  - **location information**
    - sites or buildings, locations within sites
  - **organizational history (merger, renaming)**
- It supports linked data publishing of organizational information across a number of domains.

<http://www.w3.org/TR/vocab-org/>

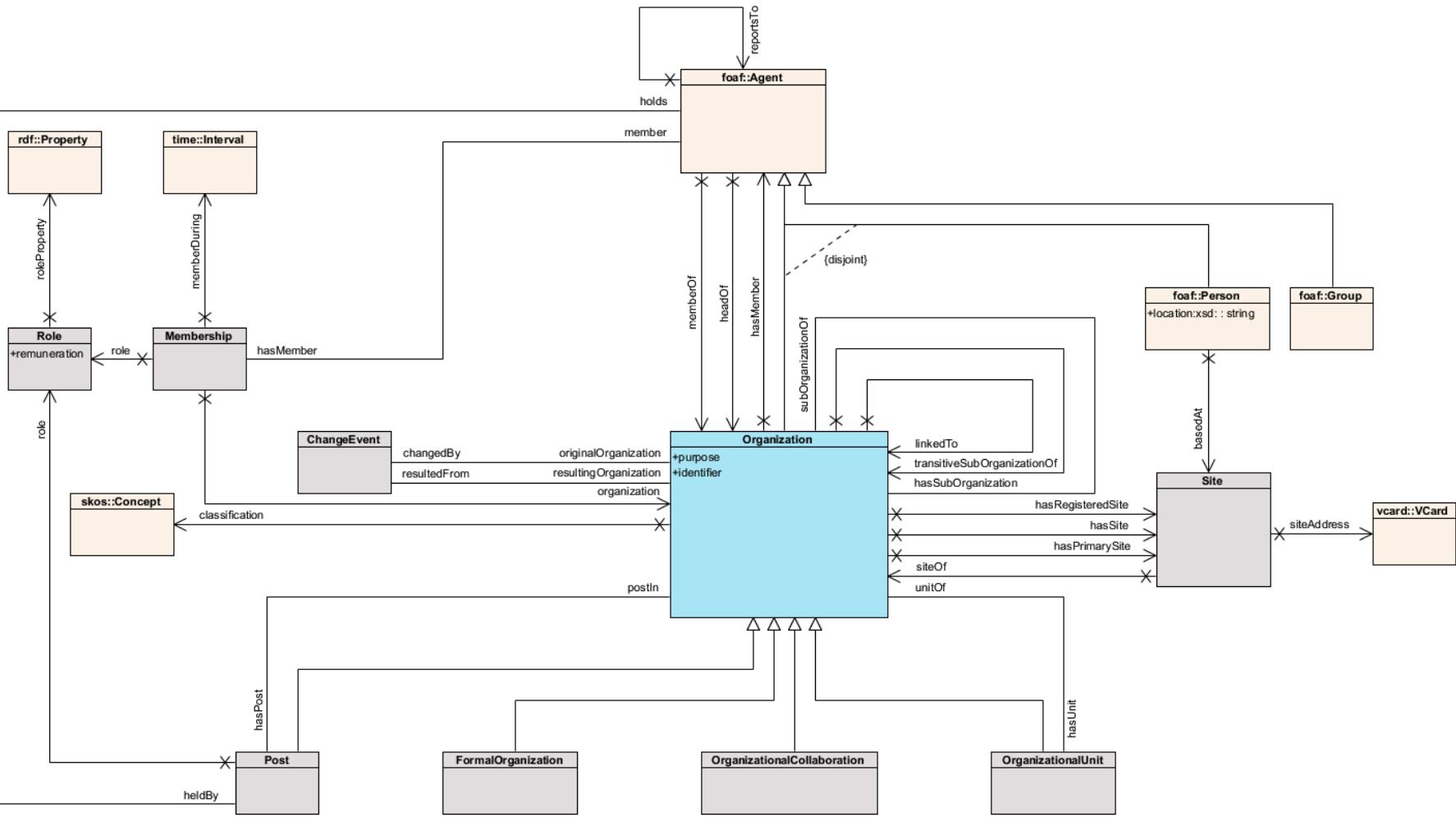


# ORG: An organization ontology



<http://www.w3.org/TR/vocab-org/>

# ORG: An organization ontology



<http://www.w3.org/TR/vocab-org/>



## ORG - Core organization ontology



## Metadata:

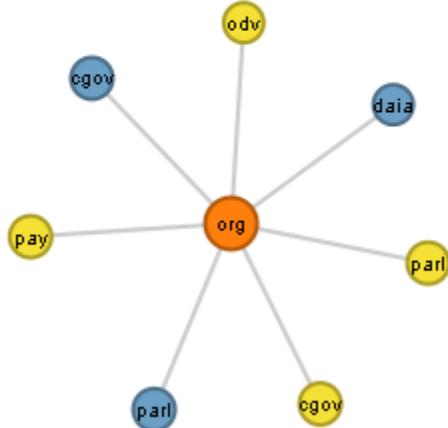
Property	Value
is part of vocabulary space	All > City > Society
Vocabulary URI	<a href="http://www.w3.org/ns/org#">http://www.w3.org/ns/org#</a>
Prefix	org
Namespace URI	<a href="http://www.w3.org/ns/org#">http://www.w3.org/ns/org#</a>
Description	Vocabulary for describing organizational structures, specializable to a broad variety of types of organization. <a href="#">@en</a>
Date issued	2010-05-28
Last modified	2012-10-06
Language	English, French
Creator	Dave Reynolds, Dominique Guardiola
Publisher	W3C
Class number	9
Property number	35
Homepage	<a href="http://www.w3.org/TR/vocab-org/">http://www.w3.org/TR/vocab-org/</a>
Represented by	format-org
Has review	(2012-10-02) <a href="#">Bernard Vatant</a> : Currently a W3C Working Draft as defined by <a href="http://www.w3.org/TR/vocab-org/">http://www.w3.org/TR/vocab-org/</a> . Version 0.4 is a transcription of <a href="http://www.epimorphics.com/public/vocabulary/org.html">http://www.epimorphics.com/public/vocabulary/org.html</a> into W3C style. Version 0.5 is an editor's draft. Versions 0.1 to 0.3 retrieved from <a href="http://www.epimorphics.com/public/vocabulary/">http://www.epimorphics.com/public/vocabulary/</a>

# ORG: relationship with other vocabularies

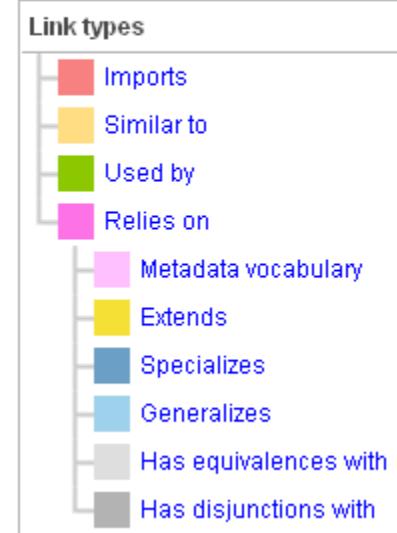
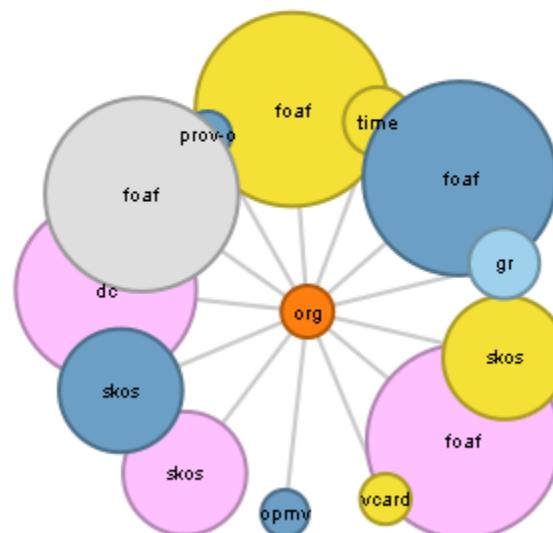


## Vocabulary links:

Vocabularies referencing "org" (7)



Vocabularies referenced by "org" (13)





## Vocabulary history:

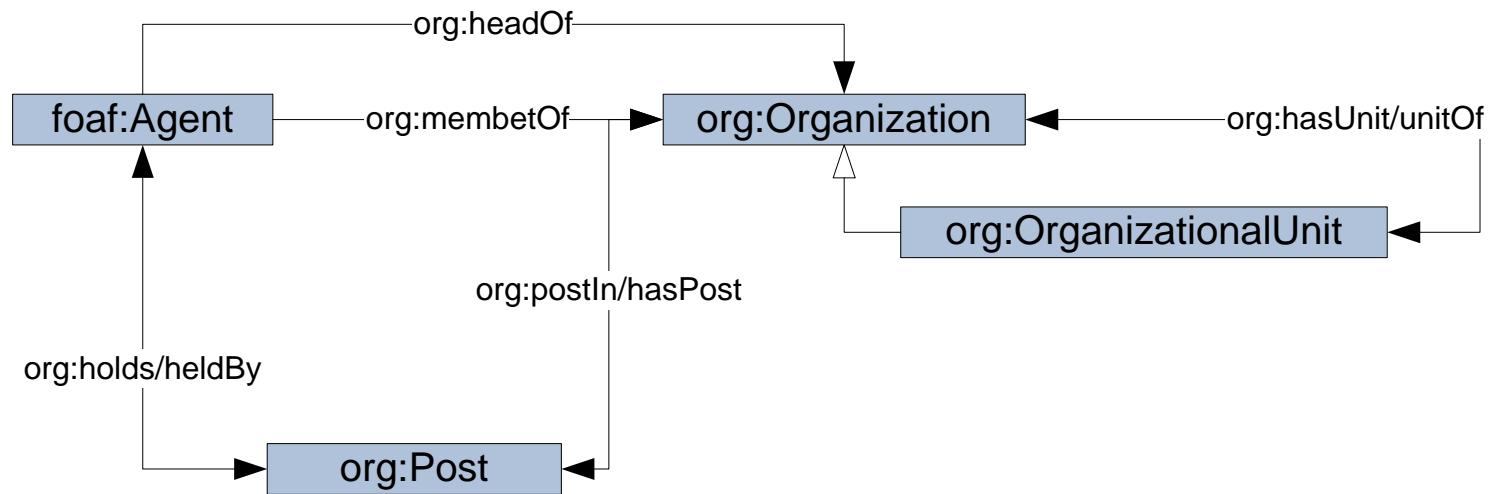


# ORG: The vocabulary

**Classes:** | [ChangeEvent](#) | [FormalOrganization](#) | [Membership](#) | [OrganizationalCollaboration](#) | [OrganizationalUnit](#) | [Organization](#) | [Post](#) | [Role](#) | [Site](#) |

**Properties:** | [basedAt](#) | [changedBy](#) | [classification](#) | [hasMember](#) | [hasMembership](#) | [hasPost](#)  
[memberDuring](#) | [memberOf](#) | [member](#) | [organization](#) | [originalOrganization](#) | [postIn](#) | [purpose](#) |  
[transitiveSubOrganizationOf](#) | [unitOf](#) |  
| [hasPrimarySite](#) | [hasRegisteredSite](#) | [hasSite](#) | [hasSubOrganization](#) | [hasUnit](#) | [headOf](#) | [heldBy](#) | [holds](#) | [identifier](#) | [linkedTo](#) | [location](#) |  
[remuneration](#) | [reportsTo](#) | [resultedFrom](#) | [resultingOrganization](#) | [role](#) | [roleProperty](#) | [siteAddress](#) | [siteOf](#) | [subOrganizationOf](#) |

# ORG: A model excerpt



An excerpt of ORG model

# ORG: model and instances –Turtle Syntax

```
### http://www.w3.org/ns/org#15

fi:15 rdf:type owl:NamedIndividual ,
        org:Post ;
        skos:prefLabel "Director de departamento" ;
        org:postIn fi:DIA .

### http://www.oeg-upm.es/resource/Asun

oeg:Asun rdf:type owl:NamedIndividual ,
           foaf:Agent ;
           org:holds fi:15 ;
           org:memberOf fi:DIA ;
           org:headOf fi:DIA ;
           org:memberOf upm:FI ,
           univEs:UPM .

### http://www.fi.upm.es/resource/DIA

fi:DIA rdf:type owl:NamedIndividual ,
        org:OrganizationalUnit ;
        org:unitOf upm:fi
        skos:prefLabel "Departamento de Inteligencia Artificial" .

### http://www.upm.es/resource/FI

upm:FI rdf:type owl:NamedIndividual ,
        org:OrganizationalUnit ;
        org:unitOf univEs:UPM
        skos:prefLabel "Facultad de Informática" .

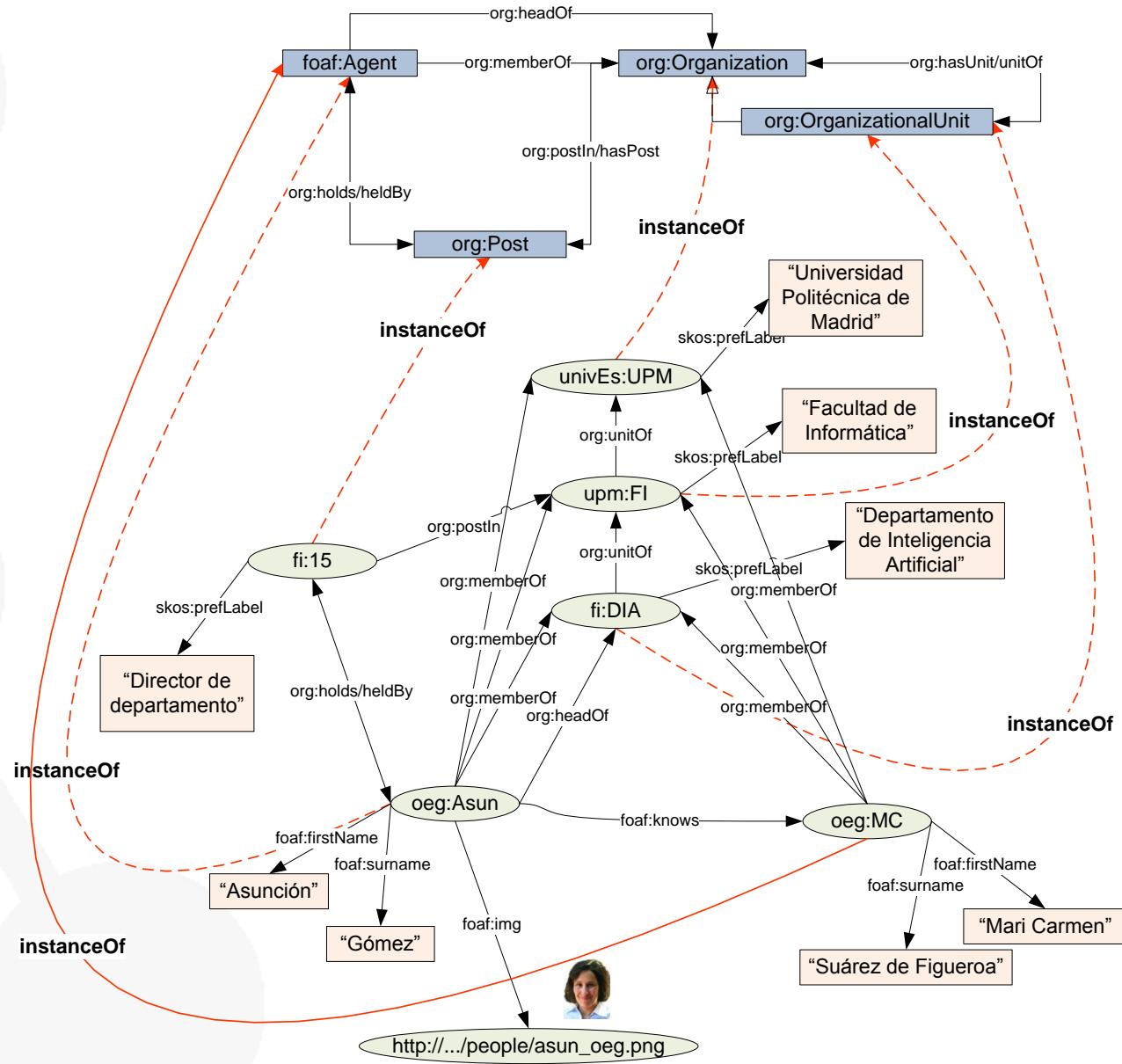
### http://www.universidadesespañolas.es/resource/UPM

univEs:UPM rdf:type owl:NamedIndividual ,
            org:Organization ;
            skos:prefLabel "Universidad Politécnica de Madrid" .

### http://www.oeg-upm.es/resource/MC

oeg:MC rdf:type owl:NamedIndividual ,
        foaf:Agent ;
        org:memberOf fi:DIA ,
        upm:FI ,
        univEs:UPM .
```

# ORG: Model and instances



# ORG: Model and instances - RDF/XML Syntax

```
<!-- http://www.w3.org/ns/org#15 -->

<Post rdf:about="http://www.w3.org/ns/org#15">
  <rdf:type rdf:resource="&owl;NamedIndividual"/>
  <skos:prefLabel>Director de departamento</skos:prefLabel>
  <postIn rdf:resource="http://www.fi.upm.es/resource/DIA"/>
</Post>

<!-- http://www.oeg-upm.es/resource/Asun -->

<foaf:Agent rdf:about="http://www.oeg-upm.es/resource/Asun">
  <rdf:type rdf:resource="&owl;NamedIndividual"/>
  <holds rdf:resource="http://www.w3.org/ns/org#15"/>
  <memberOf rdf:resource="http://www.fi.upm.es/resource/DIA"/>
  <headOf rdf:resource="http://www.fi.upm.es/resource/DIA"/>
  <memberOf rdf:resource="http://www.upm.es/resource/FI"/>
  <memberOf rdf:resource="http://www.universidadesespanolas.es/resource/UPM"/>
</foaf:Agent>

<!-- http://www.fi.upm.es/resource/DIA -->

<OrganizationalUnit rdf:about="http://www.fi.upm.es/resource/DIA">
  <rdf:type rdf:resource="&owl;NamedIndividual"/>
  <skos:prefLabel>Departamento de Inteligencia Artificial</skos:prefLabel>
  <unitOf rdf:resource="http://www.upm.es/resource/FI"/>
</OrganizationalUnit>

<!-- http://www.upm.es/resource/FI -->

<OrganizationalUnit rdf:about="http://www.upm.es/resource/FI">
  <rdf:type rdf:resource="&owl;NamedIndividual"/>
  <skos:prefLabel>Facultad de Informática</skos:prefLabel>
  <unitOf rdf:resource="http://www.universidadesespanolas.es/resource/UPM"/>
</OrganizationalUnit>

<!-- http://www.oeg-upm.es/resource/MC -->

<foaf:Agent rdf:about="http://www.oeg-upm.es/resource/MC">
  <rdf:type rdf:resource="&owl;NamedIndividual"/>
  <memberOf rdf:resource="http://www.fi.upm.es/resource/DIA"/>
  <memberOf rdf:resource="http://www.upm.es/resource/FI"/>
  <memberOf rdf:resource="http://www.universidadesespanolas.es/resource/UPM"/>
</foaf:Agent>

<!-- http://www.universidadesespanolas.es/resource/UPM -->

<Organization rdf:about="http://www.universidadesespanolas.es/resource/UPM">
  <rdf:type rdf:resource="&owl;NamedIndividual"/>
  <skos:prefLabel>Universidad Politécnica de Madrid</skos:prefLabel>
</Organization>
```

1. Introduction
2. Vocabulary types
3. Development process
4. Vocabulary examples
  - Persons and Organizations: FOAF, vCard, ORG
  - **Documents: DC, BIBO**
  - Geo: points, lineString and polygons
  - Libraries: FRBR
  - Statistics: Data Cube
  - Other vocabularies: sensors, provenance, VoID , DCAT, etc.
5. Example of vocabulary networks within Linked Data applications
6. Conclusions

# DC: The Bibliographic Ontology



- **Dublin Core** is a vocabulary to describe resources by means of simple and general metadata (DC terms).
- A subset of 15 elements (DC elements) has been ratified as IETF RFC 5013, ANSI/NISO Standard Z39.85-2007, and ISO Standard 15836:2009.
- To be used together with other specialized vocabularies to meet particular implementation requirements.

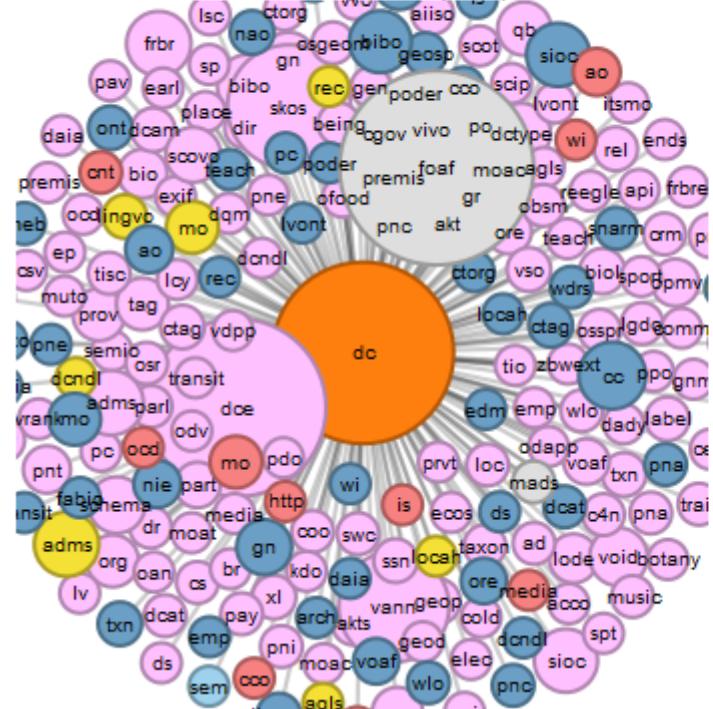
- <http://dublincore.org/documents/2012/06/14/dc/terms/?v=terms>

# DC: relationship with other vocabularies

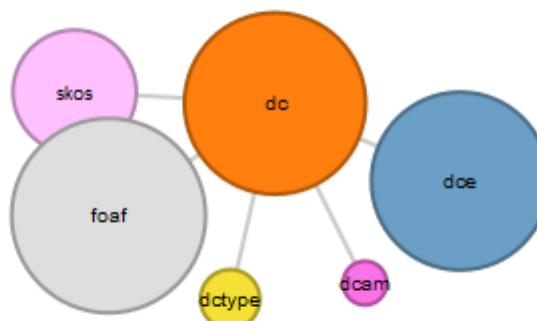


## Vocabulary links:

Vocabularies referencing "dc" (205)



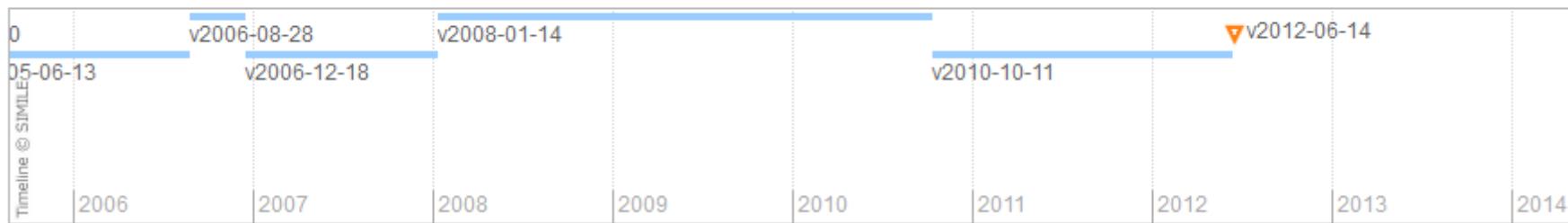
Vocabularies referenced by "dc" (5)



Link types	
Imports	
Similar to	
Used by	
Relyes on	
Metadata vocabulary	
Extends	
Specializes	
Generalizes	
Has equivalences with	
Has disjunctions with	



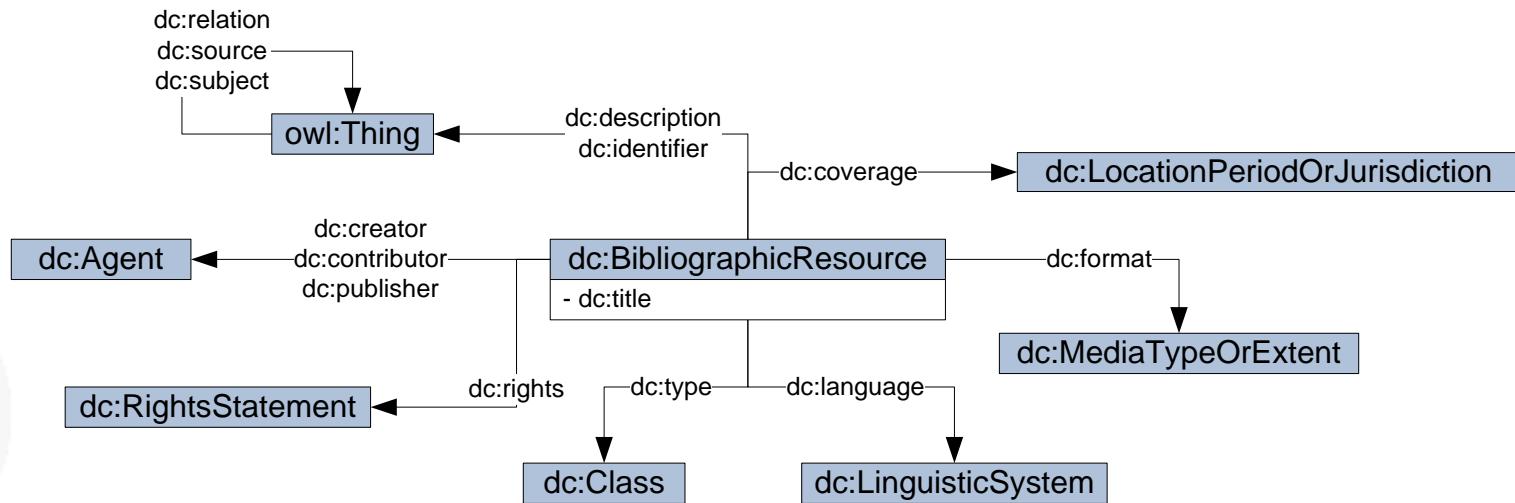
## Vocabulary history:



## 126 Elements

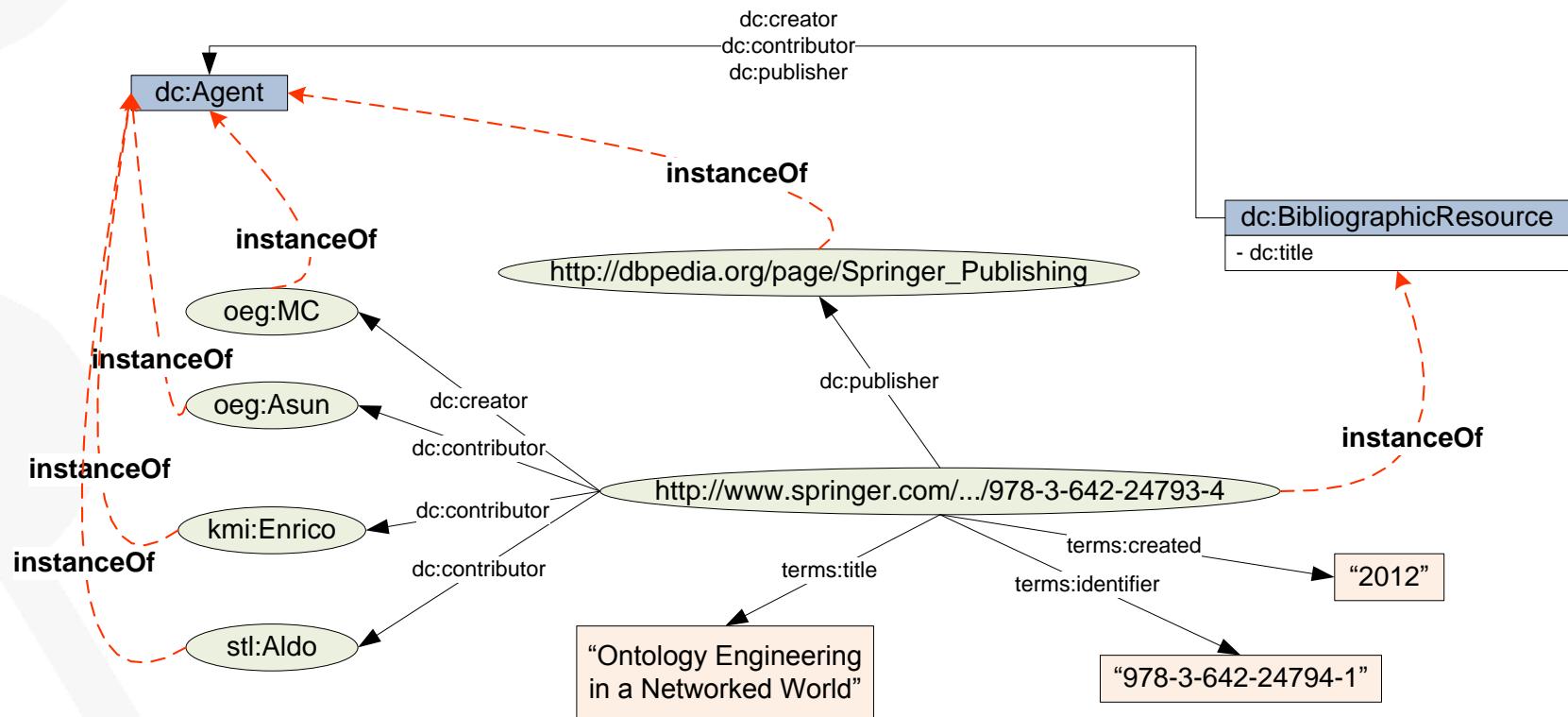
Properties in the /terms/ namespace	<a href="#">abstract</a> , <a href="#">accessRights</a> , <a href="#">accrualMethod</a> , <a href="#">accrualPeriodicity</a> , <a href="#">accrualPolicy</a> , <a href="#">alternative</a> , <a href="#">audience</a> , <a href="#">available</a> , <a href="#">bibliographicCitation</a> , <a href="#">conformsTo</a> , <a href="#">contributor</a> , <a href="#">coverage</a> , <a href="#">created</a> , <a href="#">creator</a> , <a href="#">date</a> , <a href="#">dateAccepted</a> , <a href="#">dateCopyrighted</a> , <a href="#">dateSubmitted</a> , <a href="#">description</a> , <a href="#">educationLevel</a> , <a href="#">extent</a> , <a href="#">format</a> , <a href="#">hasFormat</a> , <a href="#">hasPart</a> , <a href="#">hasVersion</a> , <a href="#">identifier</a> , <a href="#">instructionalMethod</a> , <a href="#">isFormatOf</a> , <a href="#">isPartOf</a> , <a href="#">isReferencedBy</a> , <a href="#">isReplacedBy</a> , <a href="#">isRequiredBy</a> , <a href="#">issued</a> , <a href="#">isVersionOf</a> , <a href="#">language</a> , <a href="#">license</a> , <a href="#">mediator</a> , <a href="#">medium</a> , <a href="#">modified</a> , <a href="#">provenance</a> , <a href="#">publisher</a> , <a href="#">references</a> , <a href="#">relation</a> , <a href="#">replaces</a> , <a href="#">requires</a> , <a href="#">rights</a> , <a href="#">rightsHolder</a> , <a href="#">source</a> , <a href="#">spatial</a> , <a href="#">subject</a> , <a href="#">tableOfContents</a> , <a href="#">temporal</a> , <a href="#">title</a> , <a href="#">type</a> , <a href="#">valid</a>
Properties in the /elements/1.1/ namespace	<a href="#">contributor</a> , <a href="#">coverage</a> , <a href="#">creator</a> , <a href="#">date</a> , <a href="#">description</a> , <a href="#">format</a> , <a href="#">identifier</a> , <a href="#">language</a> , <a href="#">publisher</a> , <a href="#">relation</a> , <a href="#">rights</a> , <a href="#">source</a> , <a href="#">subject</a> , <a href="#">title</a> , <a href="#">type</a>
Vocabulary Encoding Schemes	<a href="#">DCMIScheme</a> , <a href="#">DDC</a> , <a href="#">IMT</a> , <a href="#">LCC</a> , <a href="#">LCSH</a> , <a href="#">MESH</a> , <a href="#">NLM</a> , <a href="#">TGN</a> , <a href="#">UDC</a>
Syntax Encoding Schemes	<a href="#">Box</a> , <a href="#">ISO3166</a> , <a href="#">ISO639-2</a> , <a href="#">ISO639-3</a> , <a href="#">Period</a> , <a href="#">Point</a> , <a href="#">RFC1766</a> , <a href="#">RFC3066</a> , <a href="#">RFC4646</a> , <a href="#">RFC5646</a> , <a href="#">URI</a> , <a href="#">W3CDTF</a>
Classes	<a href="#">Agent</a> , <a href="#">AgentClass</a> , <a href="#">BibliographicResource</a> , <a href="#">FileFormat</a> , <a href="#">Frequency</a> , <a href="#">Jurisdiction</a> , <a href="#">LicenseDocument</a> , <a href="#">LinguisticSystem</a> , <a href="#">Location</a> , <a href="#">LocationPeriodOrJurisdiction</a> , <a href="#">MediaType</a> , <a href="#">MediaTypeOrExtent</a> , <a href="#">MethodOfAccrual</a> , <a href="#">MethodOfInstruction</a> , <a href="#">PeriodOfTime</a> , <a href="#">PhysicalMedium</a> , <a href="#">PhysicalResource</a> , <a href="#">Policy</a> , <a href="#">ProvenanceStatement</a> , <a href="#">RightsStatement</a> , <a href="#">SizeOrDuration</a> , <a href="#">Standard</a>
DCMI Type Vocabulary	<a href="#">Collection</a> , <a href="#">Dataset</a> , <a href="#">Event</a> , <a href="#">Image</a> , <a href="#">InteractiveResource</a> , <a href="#">MovingImage</a> , <a href="#">PhysicalObject</a> , <a href="#">Service</a> , <a href="#">Software</a> , <a href="#">Sound</a> , <a href="#">StillImage</a> , <a href="#">Text</a>
Terms related to the DCMI Abstract Model	<a href="#">memberOf</a> , <a href="#">VocabularyEncodingScheme</a>

# DC: A model excerpt



An excerpt of DC model

# DC: model and instances



# An example of a DC instantiation in RDF

XML

```
<owl:Thing rdf:about="http://www.springer.com/resource/book/978-3-642-24793-4">
  <rdf:type rdf:resource="#terms:BibliographicResource"/>
  <rdfs:label xml:lang="es">http://www.springer.com/resource/book/978-3-642-24793-4</rdfs:label>
  <terms:created rdf:datatype="#rdfs:Literal">2012</terms:created>
  <terms:identifier rdf:datatype="#rdfs:Literal">978-3-642-24794-1</terms:identifier>
  <terms:title rdf:datatype="#rdfs:Literal">Ontology Engineering in a Networked World</terms:title>
  <dc:publisher rdf:resource="http://dbpedia.org/page/Springer_Publishing"/>
  <dc:contributor rdf:resource="http://people.kmi.open.ac.uk/motta/">
  <dc:contributor rdf:resource="http://www.istc.cnr.it/people/aldo-gangemi"/>
  <dc:contributor rdf:resource="http://www.oeg-upm.es/resource/Asun"/>
  <dc:creator rdf:resource="http://www.oeg-upm.es/resource/MC"/>
</owl:Thing>
```

Turtle

```
<http://www.springer.com/resource/book/978-3-642-24793-4> rdf:type terms:BibliographicResource ,
  terms:created "2012"^^rdfs:Literal ;
  terms:identifier "978-3-642-24794-1"^^rdfs:Literal ;
  terms:title "Ontology Engineering in a Networked World"^^rdfs:Literal ;
  dc:publisher <http://dbpedia.org/page/Springer_Publishing> ;
  dc:contributor <http://people.kmi.open.ac.uk/motta/> ,
    <http://www.istc.cnr.it/people/aldo-gangemi> ,
    <http://www.oeg-upm.es/resource/Asun> ;
  dc:creator <http://www.oeg-upm.es/resource/MC> .
```

# DC in Protégé

The screenshot shows the Protégé ontology editor interface with the following panels:

- Top Bar:** File, Edit, Ontologies, Reasoner, Tools, Refactor, Tabs, View, Window, Help.
- Title Bar:** http://purl.org/dc/terms/ (http://purl.org/dc/terms/)
- Toolbar:** Active Ontology, Entities, Classes, Object Properties, Data Properties, Individuals, OWLViz, DL Query.
- Asserted class hierarchy:** Shows the class hierarchy under "BibliographicResource".
  - Thing
  - VocabularyEncodingScheme
  - Collection
  - Agent
  - BibliographicResource
  - Frequency
  - LinguisticSystem
  - LocationPeriodOrJurisdiction
  - MediaTypeOrExtent
  - MethodOfAccrual
  - MethodOfInstruction
  - PhysicalResource
  - Policy
- Annotations:** Annotations for "BibliographicResource".
  - comment: "A book, article, or other documentary resource."@en
  - isDefinedBy: "http://purl.org/dc/terms/"^^anyURI
  - label: "Bibliographic Resource"@en
- Object property hierarchy:** Shows properties under "language".
  - language
  - publisher
  - relation
  - rights
  - source
  - subject
  - type
  - accrualMethod
  - accrualPeriodicity
  - accrualPolicy
  - audience
- Description:** Description of "BibliographicResource".
  - Equivalent classes
  - Superclasses
  - Inferred anonymous superclasses
  - Members

# BIBO: The Bibliographic Ontology



- The **Bibliographic Ontology (BIBO)** describes bibliographic things on the Semantic Web in RDF.
- BIBO can be used as
  - a citation ontology,
  - a document classification ontology, or
  - a way to describe any kind of document in RDF

BIBO - The Bibliographic Ontology



## Metadata:

Property	Value
is part of vocabulary space	All > Library > Documentation
Vocabulary URI	<a href="http://purl.org/ontology/bibo/">http://purl.org/ontology/bibo/</a>
Prefix	bibo
Namespace URI	<a href="http://purl.org/ontology/bibo/">http://purl.org/ontology/bibo/</a>
Date issued	2008-06-03
Last modified	2009-11-04
Language	English
Creator	Bruce D'Arcus, Frédéric Giasson
Class number	58
Property number	67
See also	<a href="http://stats.lod2.eu/vocabularies/36">http://stats.lod2.eu/vocabularies/36</a>
Represented by	format-bibo

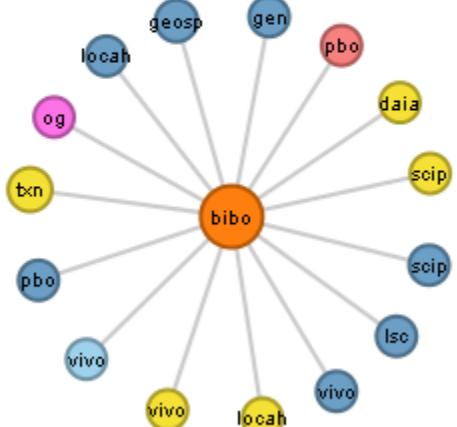
- [bibliontology.com](http://bibliontology.com)
- <http://purl.org/ontology/bibo/>

# BIBO: Relationship with other vocabularies

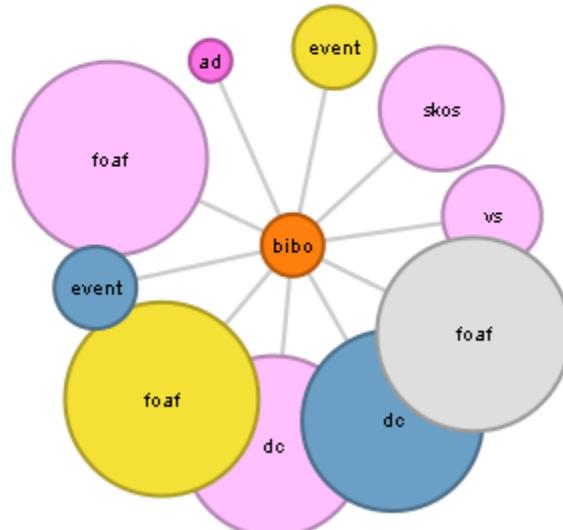


## Vocabulary links:

Vocabularies referencing "bibo" (15)



Vocabularies referenced by "bibo" (10)



Link types
Imports
Similar to
Used by
Relyes on
Metadata vocabulary
Extends
Specializes
Generalizes
Has equivalences with
Has disjunctions with



## Vocabulary history:



# BIBO: The vocabulary

## 189 Elements

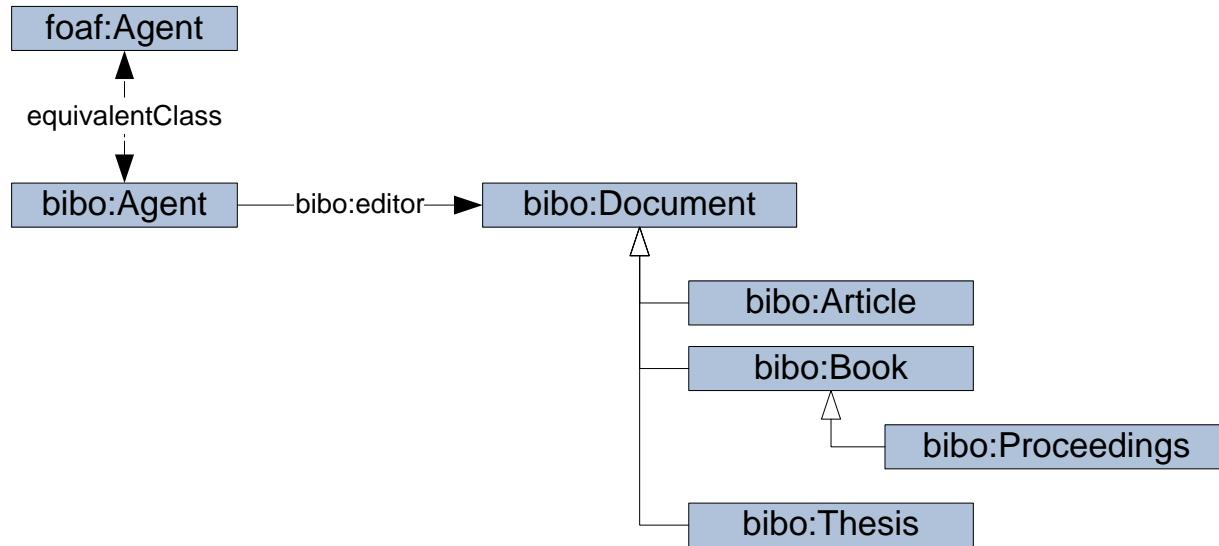
- owl:Thing
- bibo:abstract
- bibo:AcademicArticle
- bibo:affirmedBy
- bibo:annotates
- bibo:argued
- bibo:Article
- bibo:asin
- bibo:AudioDocument
- bibo:AudioVisualDocument
- bibo:authorList
- bibo:bdarcus
- bibo:Bill
- bibo:Book
- bibo:BookSection
- bibo:Brief
- bibo:chapter
- bibo:Chapter
- bibo:citedBy
- bibo:cites
- bibo:Code
- bibo:coden
- bibo:CollectedDocument
- bibo:Collection
- bibo:Conference
- bibo:content
- bibo:contributorList
- bibo:court
- bibo:CourtReporter
- bibo:degree
- bibo:degrees/ma
- bibo:degrees/ms
- bibo:degrees/phd
- bibo:director
- bibo:distributor

- bibo:Document
- bibo:DocumentPart
- bibo:DocumentStatus
- bibo:doi
- bibo:eanucc13
- bibo:EditedBook
- bibo:edition
- bibo:editor
- bibo:editorList
- bibo:eissn
- bibo:Email
- bibo:Event
- bibo:Excerpt
- bibo:fgiasson
- bibo:Film
- bibo:gtin14
- bibo:handle
- bibo:Hearing
- bibo:identifier
- bibo:Image
- bibo:Interview
- bibo:interviewee
- bibo:interviewer
- bibo:isbn
- bibo:isbn10
- bibo:isbn13
- bibo:issn
- bibo:Issue
- bibo:issue
- bibo:issuer
- bibo:Journal
- bibo:lccn
- bibo:LegalCaseDocument
- bibo:LegalDecision
- bibo:LegalDocument
- bibo:Legislation
- bibo:Letter

- bibo:locator
- bibo:Magazine
- bibo:Manual
- bibo:Manuscript
- bibo:Map
- bibo:MultiVolumeBook
- bibo:Newspaper
- bibo:Note
- bibo:number
- bibo:numPages
- bibo:numVolumes
- bibo:oclcnum
- bibo:organizer
- bibo:owner
- bibo:pageEnd
- bibo:pages
- bibo:pageStart
- bibo:Patent
- bibo:Performance
- bibo:performer
- bibo:Periodical
- bibo:PersonalCommunication
- bibo:PersonalCommunicationDocument
- bibo:pmid
- bibo:prefixName
- bibo:presentedAt
- bibo:presents
- bibo:Proceedings
- bibo:producer
- bibo:Quote
- bibo:recipient
- bibo:ReferenceSource
- bibo:Report
- bibo:reproducedIn
- bibo:reversedBy
- bibo:reviewOf
- bibo:section

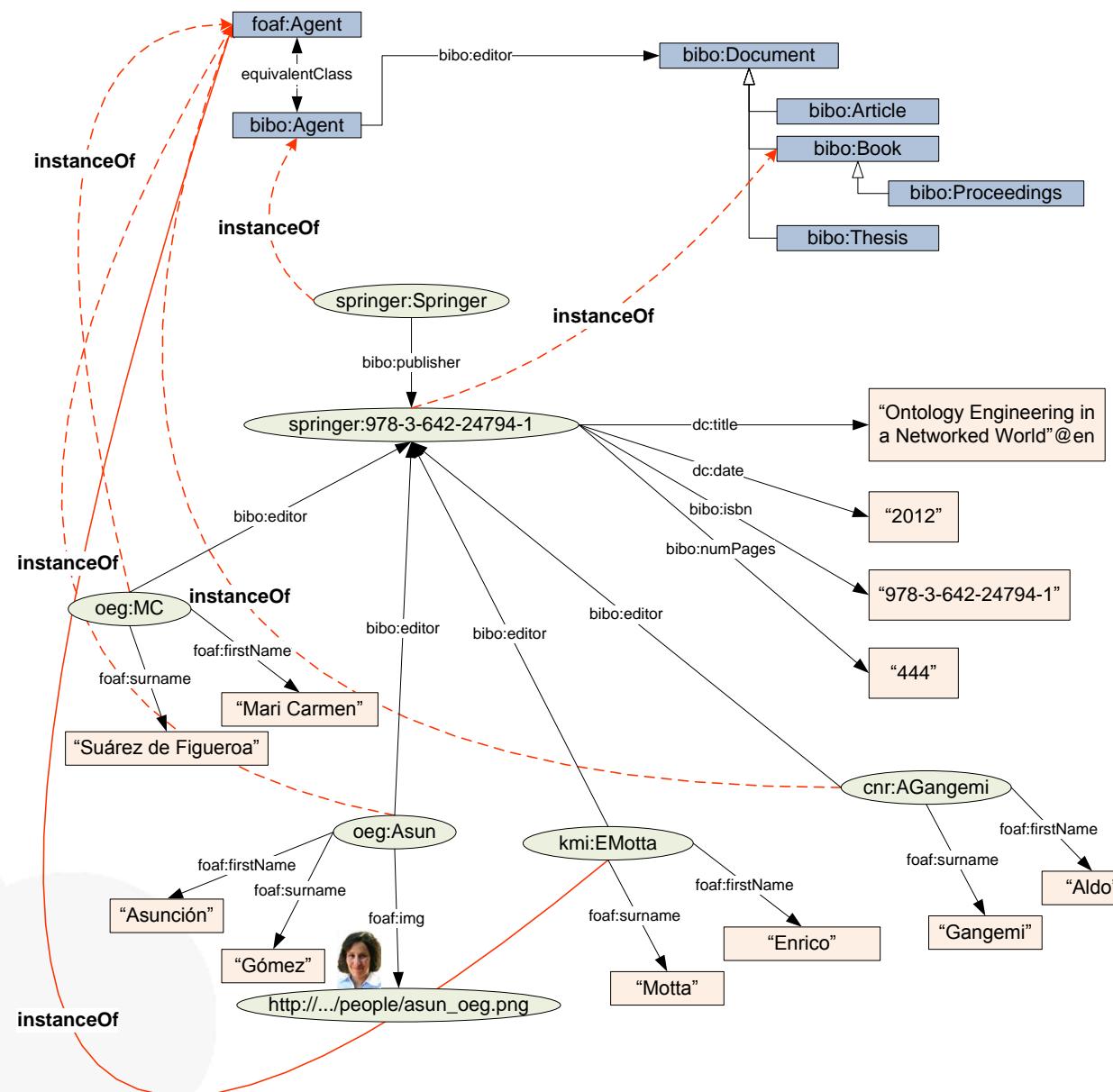
- bibo:Series
- bibo:shortDescription
- bibo:shortTitle
- bibo:sici
- bibo:Slide
- bibo:Slideshow
- bibo:Standard
- bibo:status
- bibo:status/accepted
- bibo:status/draft
- bibo:status/forthcoming
- bibo:status/legal
- bibo:status/nonPeerReviewed
- bibo:status/peerReviewed
- bibo:status/published
- bibo:status/rejected
- bibo:status/unpublished
- bibo:Statute
- bibo:subsequentLegalDecision
- bibo:suffixName
- bibo:Thesis
- bibo:ThesisDegree
- bibo:transcriptOf
- bibo:translationOf
- bibo:translator
- bibo:upc
- bibo:uri
- bibo:volume
- bibo:Webpage
- bibo:Website
- bibo:Workshop
- dcterms:Agent
- dcterms:contributor
- dcterms:created
- dcterms:date
- dcterms:description
- dcterms:format
- dcterms:hasPart
- dcterms:isPartOf
- dcterms:isReferencedBy
- dcterms:issued
- dcterms:isVersionOf
- dcterms:language
- dcterms:publisher
- dcterms:relation
- dcterms:rights
- dcterms:subject
- dcterms:title
- event:agent
- event:Event
- event:place
- event:produced\_in
- event:product
- event:sub\_event
- event:time
- foaf:Agent
- foaf:based\_near
- foaf:depiction
- foaf:Document
- foaf:family\_name
- foaf:givenname
- foaf:homepage
- foaf:Image
- foaf:name
- foaf:Organization
- foaf:Person
- localityName
- prism:doi
- prism:edition
- prism:eIssn
- prism:endingPage
- prism:isbn
- prism:issn
- prism:number
- prism:volume
- prism:volumestartingPage
- rdf>List
- rdf:Seq
- rdf:value
- rdfs:Resource

# BIBO: A model excerpt



An excerpt of BIBO model

# BIBO: Model and instances



# BIBO in Protégé

The screenshot shows the Protégé ontology editor interface with the BIBO ontology loaded. The top menu bar includes File, Edit, View, Reasoner, Tools, Refactor, Window, and Help. The title bar indicates the file is "bibo (http://purl.org/ontology/bibo/) - [C:\Documents and Settings\Mari Carmen\Escritorio\bibo.owl]".

The main workspace is divided into several panels:

- Class hierarchy:** Shows the class hierarchy for the "Book" class, which is a subclass of "Document". Other subclasses include "Agent", "Collection", "Article", "AudioDocument", "AudioVisualDocument", "Proceedings", "CollectedDocument", "DocumentPart", "Image", "LegalDocument", "Manual", "Manuscript", "Note", "Patent", "PersonalCommunicationDocument", "ReferenceSource", "Report", and "Slideshow".
- Annotations:** Displays annotations for the "Book" class, including:
  - comment:** "A written or printed work of fiction or nonfiction, usually on sheets of paper fastened or bound together within covers."@en
  - isDefinedBy:** "http://purl.org/ontology/bibo/"^^anyURI
  - label:** "Book"@en
  - term\_status:** "stable"
- Description:** Shows the description of the "Book" class, including:
  - Equivalent classes:** None listed.
  - Superclasses:** "Document".
  - Inherited anonymous classes:** Two instances of "Document" are listed.
  - Members:** None listed.
  - Keys:** None listed.
  - Disjoint classes:** None listed.
  - Disjoint union of:** None listed.
- Object property hierarchy:** Shows the object property hierarchy for the "editor" class, including:
  - topObjectProperty:** "agent", "based\_near", "citedBy", "cites", "contributor".
  - contributor:** "director", "editor", "interviewee", "interviewer", "performer", "translator".
  - contributorList:** "court".

At the bottom right, there is a note: "To use the reasoner click Reasoner->Start Reasoner" with a checked checkbox for "Show Inferences".

# BIBO: Model and instances – RDF/XML Syntax

```
<!-- http://springer.de/resource/978-3-642-24794-1 -->

<owl:NamedIndividual rdf:about="http://springer.de/resource/978-3-642-24794-1">
  <rdf:type rdf:resource="http://purl.org/ontology/bibo/Book"/>
  <prism:isbn>978-3-642-24794-1</prism:isbn>
  <terms:date>2012</terms:date>
  <terms:title>Ontology Engineering in a Networked World</terms:title>
  <numPages>444</numPages>
</owl:NamedIndividual>

<!-- http://cnr.it/resource/AGangemi -->

<owl:NamedIndividual rdf:about="http://cnr.it/resource/AGangemi">
  <rdf:type rdf:resource="#terms:Agent"/>
  <editor rdf:resource="http://springer.de/resource/978-3-642-24794-1"/>
</owl:NamedIndividual>

<!-- http://www.oeg-upm.es/resource/Asun -->

<owl:NamedIndividual rdf:about="http://www.oeg-upm.es/resource/Asun">
  <rdf:type rdf:resource="#terms:Agent"/>
  <editor rdf:resource="http://springer.de/resource/978-3-642-24794-1"/>
</owl:NamedIndividual>

<!-- http://kmi.uk/resource/EMotta -->

<owl:NamedIndividual rdf:about="http://kmi.uk/resource/EMotta">
  <rdf:type rdf:resource="#terms:Agent"/>
  <editor rdf:resource="http://springer.de/resource/978-3-642-24794-1"/>
</owl:NamedIndividual>

<!-- http://www.oeg-upm.es/resource/MC -->

<owl:NamedIndividual rdf:about="http://www.oeg-upm.es/resource/MC">
  <rdf:type rdf:resource="#terms:Agent"/>
  <editor rdf:resource="http://springer.de/resource/978-3-642-24794-1"/>
</owl:NamedIndividual>
```

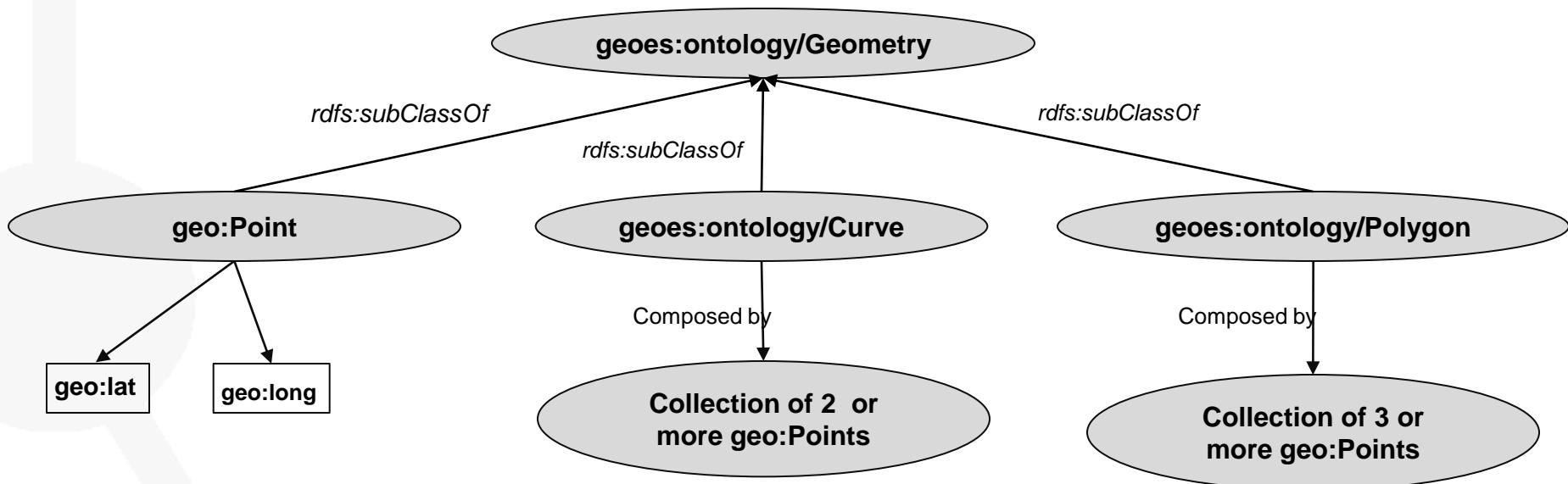
1. Introduction
2. Vocabulary types
3. Development process
4. Vocabulary examples
  - Persons and Organizations: FOAF, vCard, ORG
  - Documents: DC, BIBO
  - **Geo: points, lineString and polygons**
  - Libraries: FRBR
  - Statistics: Data Cube
  - Other vocabularies: sensors, provenance, VoID , DCAT, etc.
5. Example of vocabulary networks within Linked Data applications
6. Conclusions

- Vocabulary for representing Points:
  - Latitude
  - Longitude
  - @en
- <http://www.w3.org/2003/01/geo/>

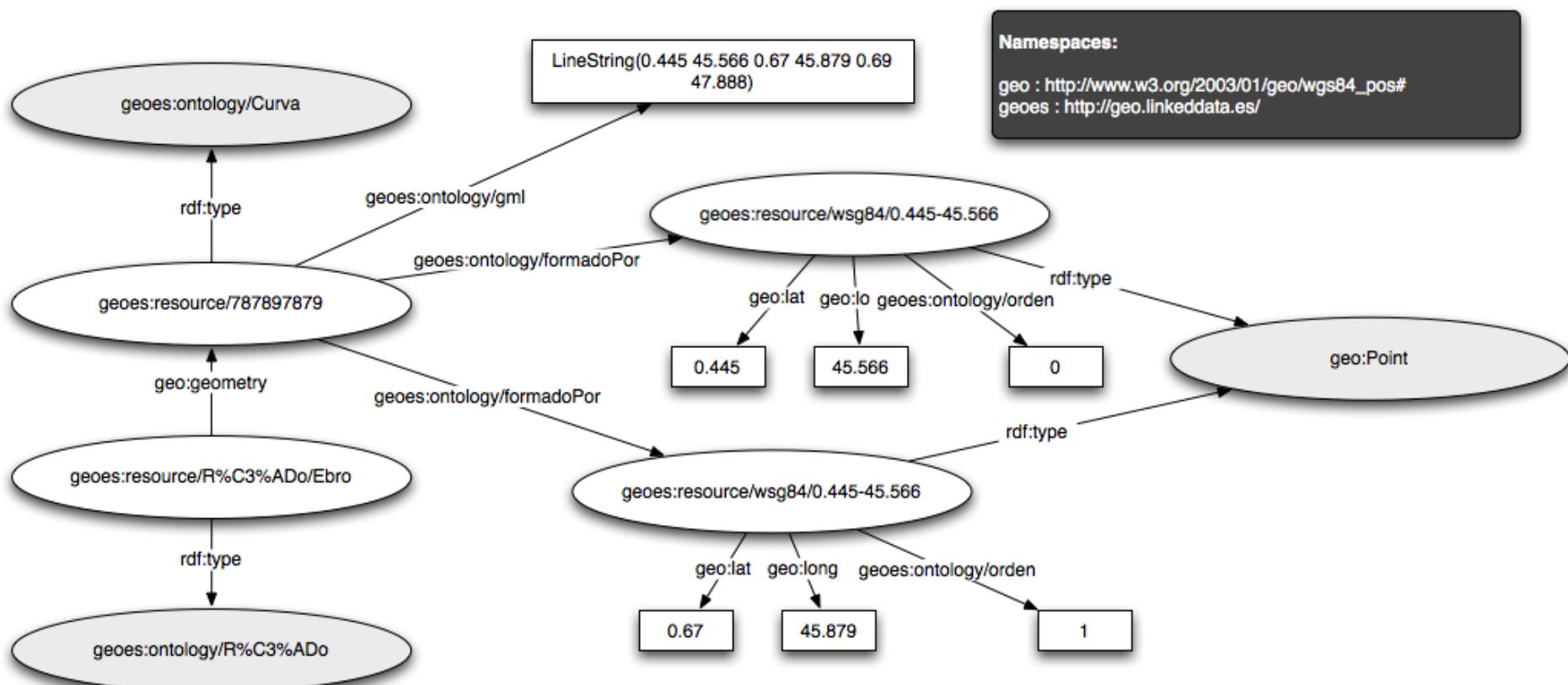
```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"  
         xmlns:geo="http://www.w3.org/2003/01/geo/wgs84_pos#">  
  <geo:Point>  
    <geo:lat> 55.701</geo:lat>  
    <geo:long>12.552</geo:long>  
  </geo:Point>  
</rdf:RDF>
```

# Geoes: Geometry Model

geoes: <http://geo.linkeddata.es/>  
geo: [http://www.w3.org/2003/01/geo/wgs84\\_pos#](http://www.w3.org/2003/01/geo/wgs84_pos#)

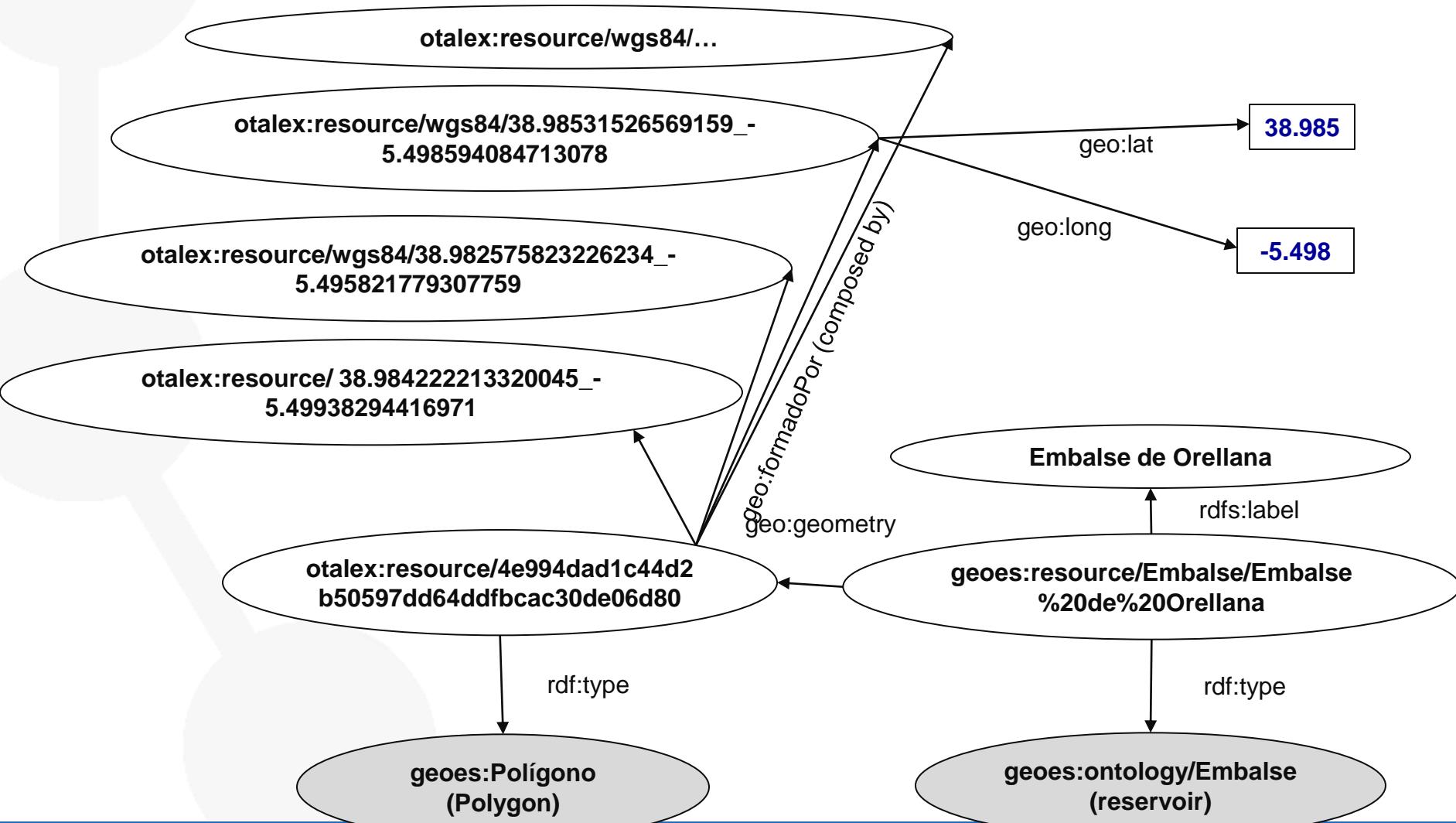


# Geoes: lineString



# Geoes: Polygon

geoes: <http://geo.linkeddata.es/>  
otalex: <http://otalex.linkeddata.es/>  
geo: [http://www.w3.org/2003/01/geo/wgs84\\_pos#](http://www.w3.org/2003/01/geo/wgs84_pos#)

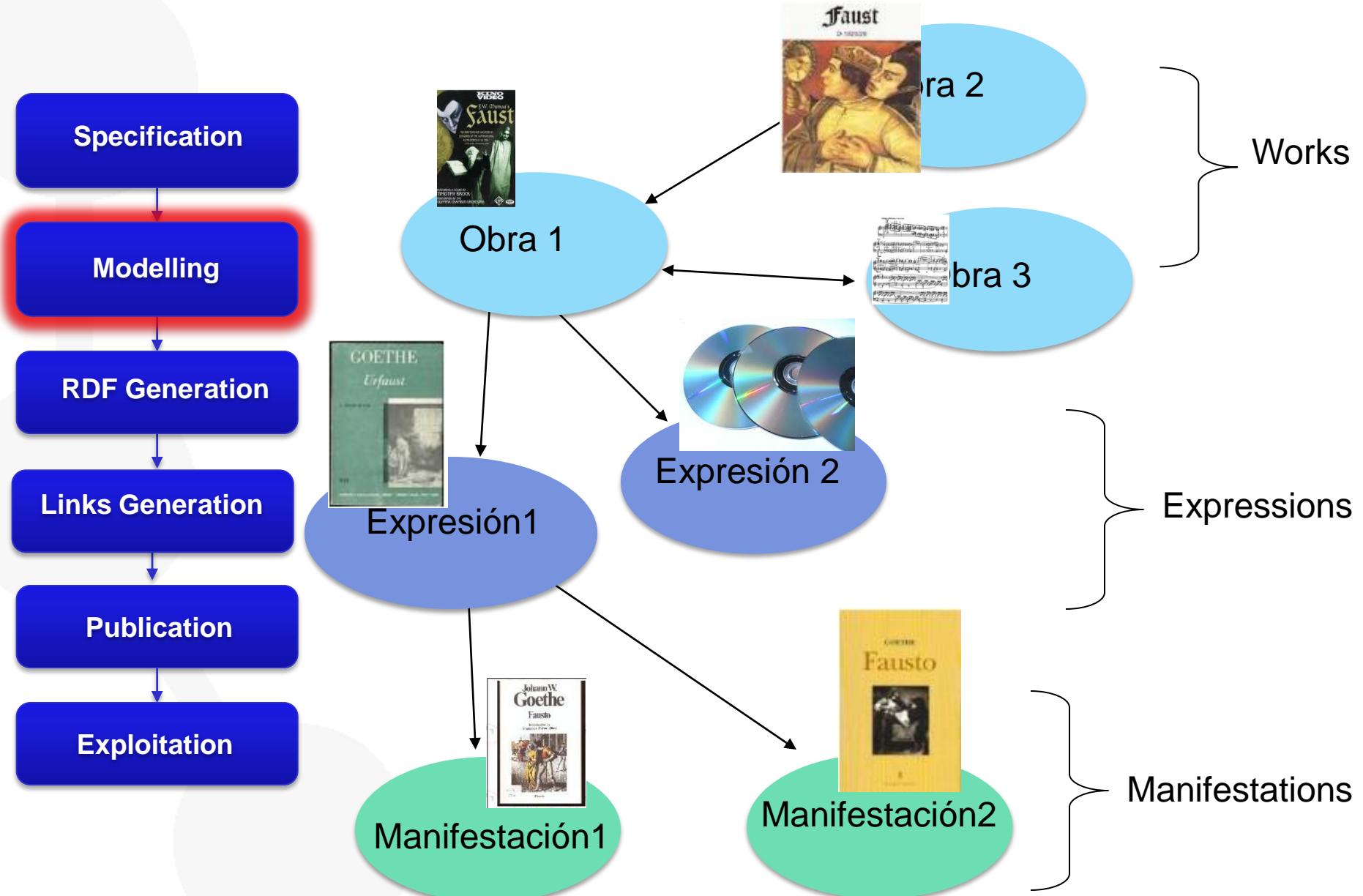


# RDF example

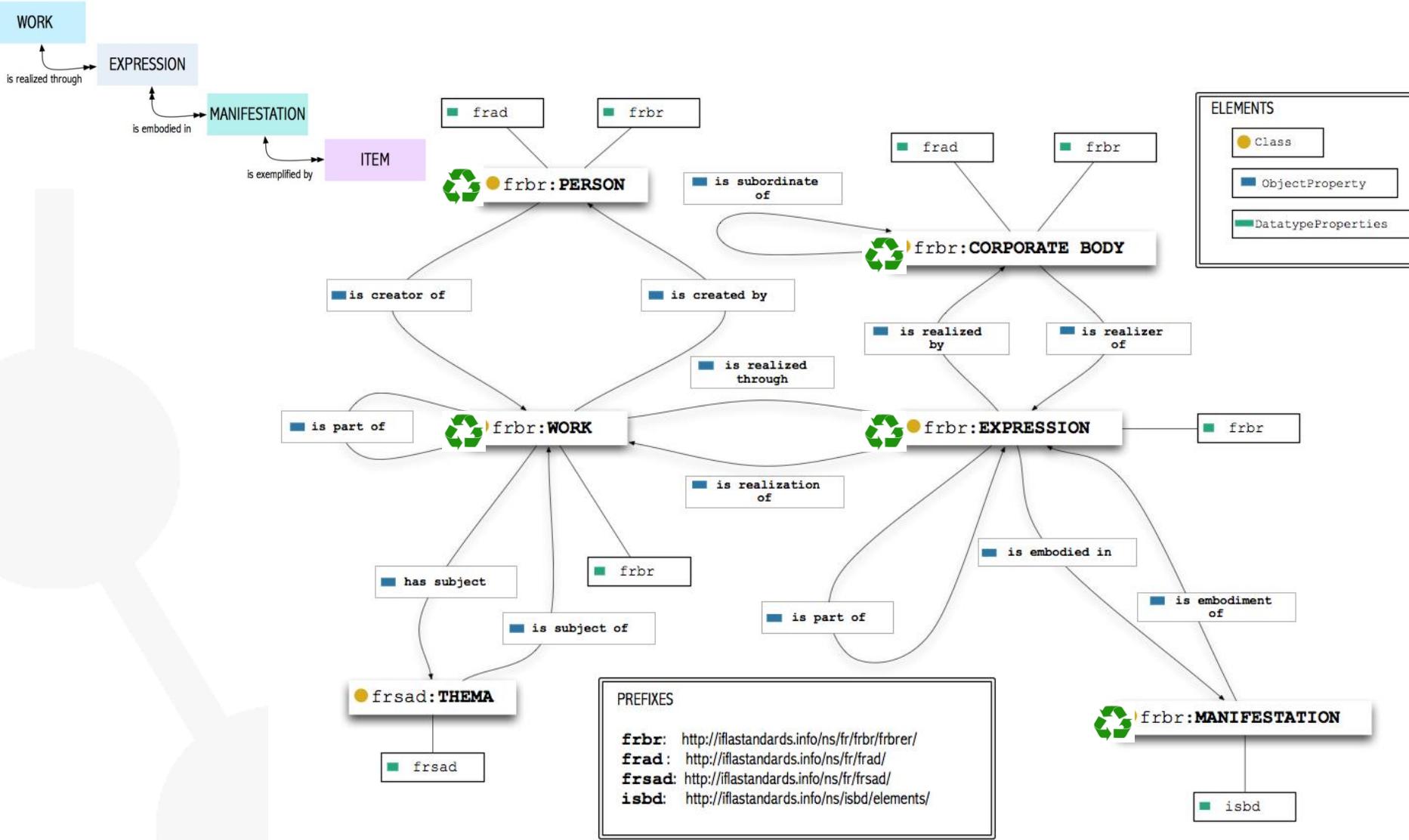


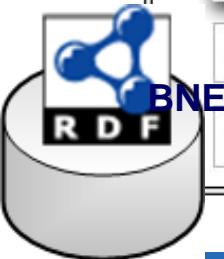
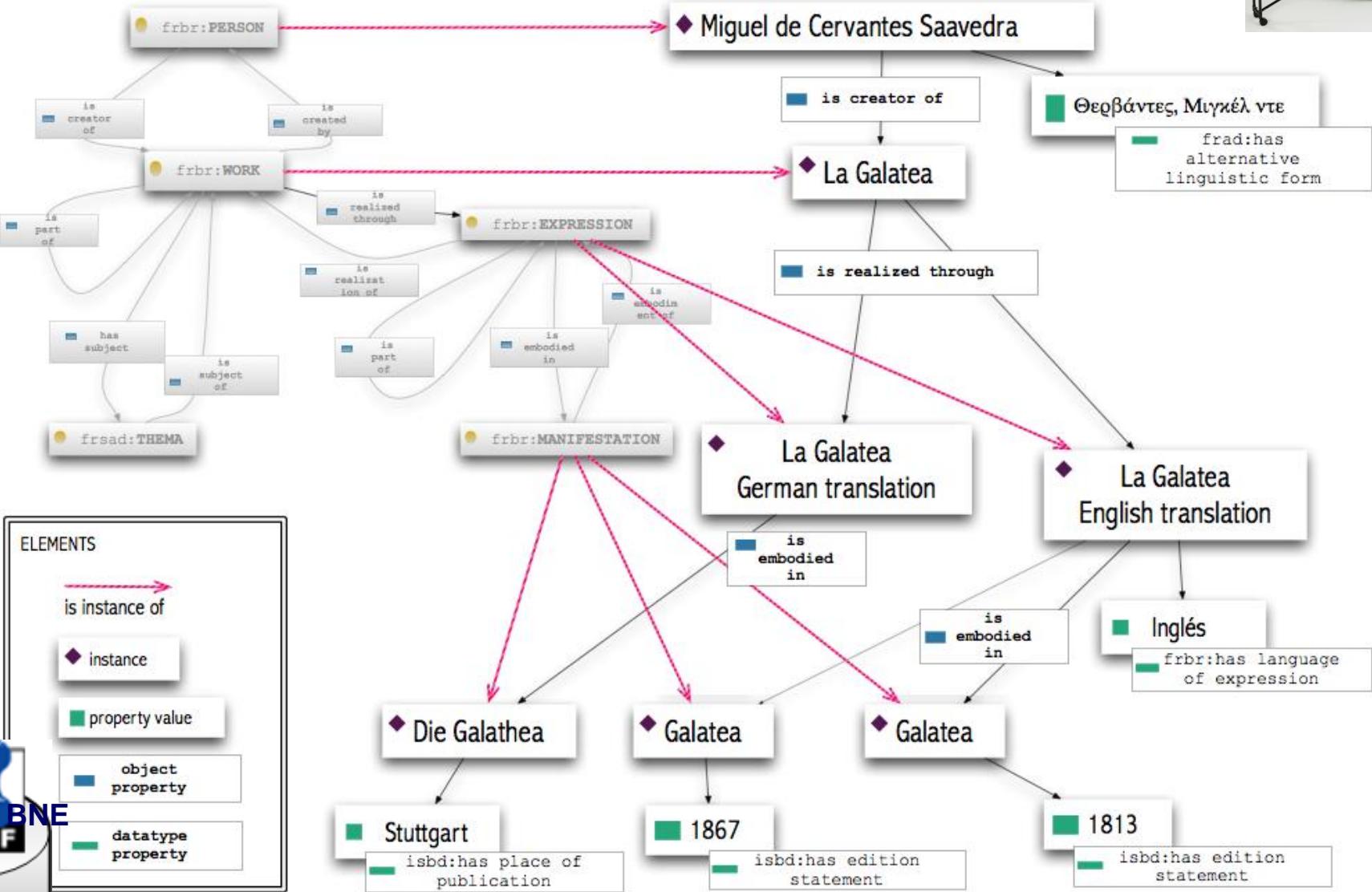
```
CursosAgua_Ribera_pt.rdf |  
  
<geo:long rdf:datatype="http://www.w3.org/2001/XMLSchema#double">-7.546908556154153</geo:long>  
<phenomenontology:order rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">22</phenomenontology:order>  
</rdf>Description>  
<rdf>Description rdf:about="http://otalex.linkeddata.es/resource/Ribera/Ribeira%20Roxo%20ou%20Santa%20Vit%C3%A1ria">  
  <rdf:type rdf:resource="http://phenomenontology.linkeddata.es/ontology/Ribera"/>  
  <rdfs:label xml:lang="pt">Ribeira Roxo ou Santa Vitória</rdfs:label>  
  <geo:geometry rdf:resource="http://otalex.linkeddata.es/resource/12a8e26f658ce69c32a661e1d70f9e3eb14ce4cb"/>  
  <geo:geometry rdf:resource="http://otalex.linkeddata.es/resource/fc7adee1455c7cd93f3a78995e3060edae918dfb"/>  
  <geo:geometry rdf:resource="http://otalex.linkeddata.es/resource/f9e20db8cecfd15c7af590e7ee34813a335d0c"/>  
  <geo:geometry rdf:resource="http://otalex.linkeddata.es/resource/f0d1968a000b18ccbf14a31b754dfb41a637a18e"/>  
  <geo:geometry rdf:resource="http://otalex.linkeddata.es/resource/1e079fb98f30ce4a35a5f461f44d07e20210d203"/>  
  <geo:geometry rdf:resource="http://otalex.linkeddata.es/resource/c10167df3ca039958b382df6be573654bbe6bb02"/>  
  <geo:geometry rdf:resource="http://otalex.linkeddata.es/resource/3f2e65143098574df09797fee5ad175c69ccf187"/>  
  <geo:geometry rdf:resource="http://otalex.linkeddata.es/resource/a86af9b1b9b10b5af54e1b86afda37d6f0f0a6ed"/>  
</rdf>Description>  
<rdf>Description rdf:about="http://otalex.linkeddata.es/resource/wgs84/38.49952306000987_-7.9575410886066855">  
  <rdf:type rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#Point"/>  
  <geo:lat rdf:datatype="http://www.w3.org/2001/XMLSchema#double">38.49952306000987</geo:lat>  
  <geo:long rdf:datatype="http://www.w3.org/2001/XMLSchema#double">-7.9575410886066855</geo:long>  
  <phenomenontology:order rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">81</phenomenontology:order>  
</rdf>Description>  
<rdf>Description rdf:about="http://otalex.linkeddata.es/resource/wgs84/37.60032705349898_-7.866609206347145">  
  <rdf:type rdf:resource="http://phenomenontology.linkeddata.es/ontology/SuperficiesAcuaticas_Embalse"/>  
  <geo:lat rdf:datatype="http://www.w3.org/2001/XMLSchema#double">37.60032705349898</geo:lat>  
  <geo:long rdf:datatype="http://www.w3.org/2001/XMLSchema#double">-7.866609206347145</geo:long>  
  <rdf>Description rdf:about="http://otalex.linkeddata.es/resource/Embalse/Embalse%20de%20Orellana">  
    <rdf:type rdf:resource="http://phenomenontology.linkeddata.es/ontology/Embalse"/>  
    <rdfs:label xml:lang="es">Embalse de Orellana</rdfs:label>  
    <geo:geometry rdf:resource="http://otalex.linkeddata.es/resource/4e994dad1c44d2b50597dd64ddfbcac30de06d80"/>  
</rdf>Description>  
<rdf>Description rdf:about="http://otalex.linkeddata.es/resource/wgs84/39.78939335312412_-6.634303184878576">  
  <rdf:type rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#Point"/>  
  <geo:lat rdf:datatype="http://www.w3.org/2001/XMLSchema#double">39.78939335312412</geo:lat>  
  <geo:long rdf:datatype="http://www.w3.org/2001/XMLSchema#double">-6.634303184878576</geo:long>  
  <phenomenontology:orden rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">501</phenomenontology:orden>  
</rdf>Description>  
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  <rdf:type rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#Point"/>  
  <geo:lat rdf:datatype="http://www.w3.org/2001/XMLSchema#double">38.023236386391986</geo:lat>  
  <geo:long rdf:datatype="http://www.w3.org/2001/XMLSchema#double">-5.965401624295247</geo:long>  
  <phenomenontology:orden rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">56</phenomenontology:orden>  
</rdf>Description>  
<rdf>Description rdf:about="http://otalex.linkeddata.es/resource/wgs84/39.202640915721915_-6.86069117552422">  
  <rdf:type rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#Point"/>  
  <geo:lat rdf:datatype="http://www.w3.org/2001/XMLSchema#double">39.202640915721915</geo:lat>  
  <geo:long rdf:datatype="http://www.w3.org/2001/XMLSchema#double">-6.86069117552422</geo:long>  
  <phenomenontology:orden rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">272</phenomenontology:orden>  
</rdf>Description>  
<rdf>Description rdf:about="http://otalex.linkeddata.es/resource/wgs84/38.64426984809233_-6.172548118463356">  
  <rdf:type rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#Point"/>
```

1. Introduction
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  - Persons and Organizations: FOAF, vCard, ORG
  - Documents: DC, BIBO
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  - **Libraries: FRBR**
  - Statistics: Data Cube
  - Other vocabularies: sensors, provenance, VoID , DCAT, etc.
5. Example of vocabulary networks within Linked Data applications
6. Conclusions



# BNE Ontology: based on FRBR vocabularies

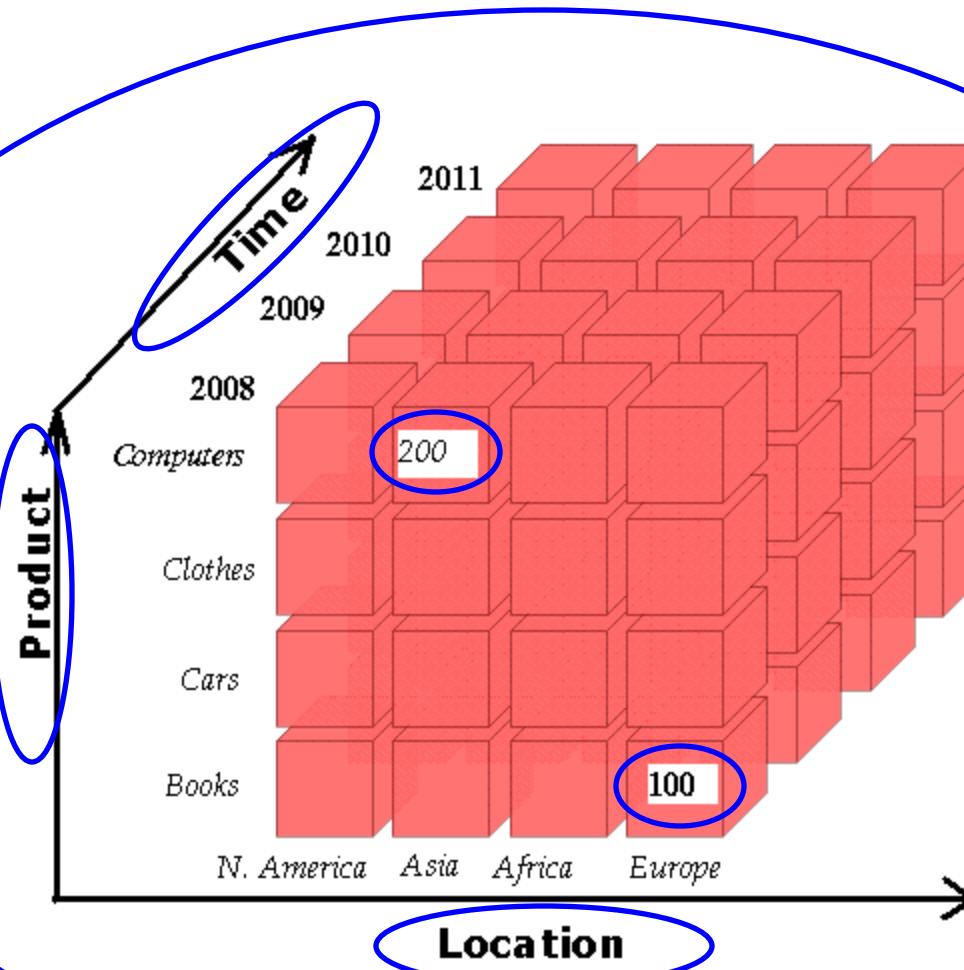




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  - Geo: points, lineString and polygons
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- A **cube** can be considered a multidimensional extension of 2-D tables (as in geometry a cube is a three-dimensional extension of a square)
  - The term **hypercube** is sometimes used, especially for data with more than three dimensions
- Each **dimension** represents some attribute in the database (such as sales, profits, expenses...)
- The **cells** in the data cube represent the measure of interest. For example, they could contain a count for the number of times that attribute combination occurs in the database, or the minimum, maximum, sum or average value of some attribute
- Queries are performed on the cube to retrieve decision support information

# Data cubes



# Example: Unemployment

## Mercado laboral Paro registrado

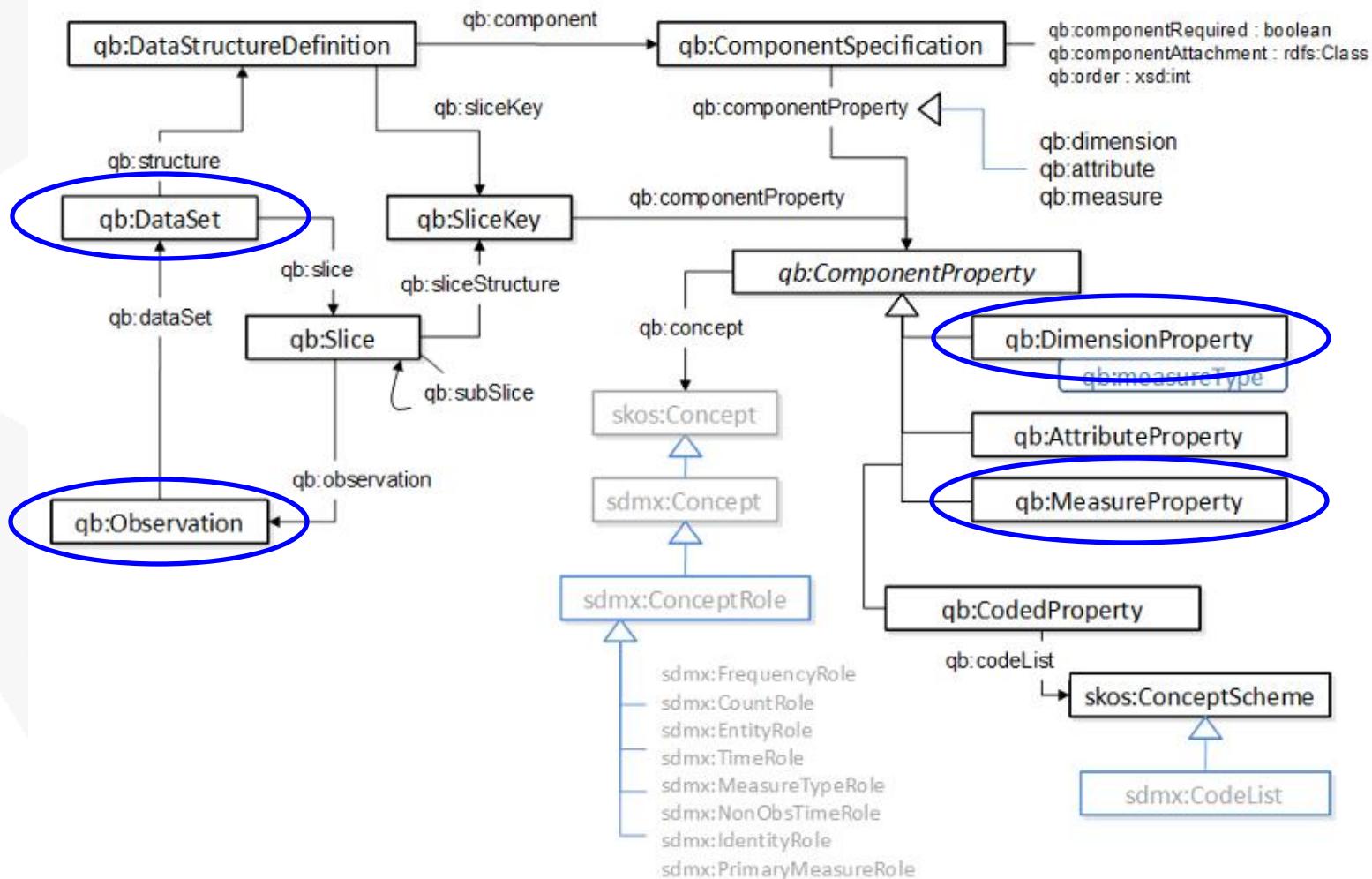
Paro registrado por CCAA y periodo.  
Unidades:miles de personas (media anual)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
	Unemployr											
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Andalucía	587,5	544	493,7	475,8	465,9	483,9	478,5	462,3	456,5	477,3	492,3	602,9
Aragón	58,5	51,4	45,9	40,6	40	42,5	41,4	39,2	39,6	37,7	35,9	48,2
Principado de Asturias	79,7	72,1	64,3	62,1	58	59,1	60,4	61,6	57,6	53,4	50	52,8
Illes Balears	36,8	33,3	29,8	29,1	30,8	35,4	38,8	39,3	38,3	36,1	37,2	49,1
Canarias	133,7	123,2	109,6	106,6	108,9	112,7	119,4	132,1	133,4	130,4	133,7	175,1
Cantabria	31,8	28,3	24,6	23,3	23,4	24,5	25	25,6	24,2	21,8	20,6	25,4
Castilla y León	145,5	133,7	123,1	120,2	114,9	116,1	116,4	116,9	113,3	110	106,1	123,3
Castilla-La Mancha	108,3	97,6	88,6	87	86,6	88,9	91,4	93,5	94	91,6	91,7	115,5
Cataluña	322,5	272,5	232,5	213,8	222,1	252,5	264	270,4	265,5	260,8	256,4	333,7
Comunitat Valenciana	279,5	240	201,9	169,6	158,9	171	179,8	190,9	197,7	195,9	201,4	277,9
Extremadura	80,1	77,2	71,4	70,5	70,3	74	75,5	78,1	77,3	76,2	74,6	84,5
Galicia	201,7	186,3	168	163,4	159,5	168,4	174,7	176,9	172,1	161,3	150,5	162,5
Comunidad de Madrid	321,6	284	242,1	223,2	218,7	244,7	253,8	248,1	226	216,5	221,7	281
Región de Murcia	59,9	51,9	44,6	44	43,7	43,2	45,7	45,2	44,2	44,4	46,6	69,8
Comunidad Foral de Navarra	27,8	25,1	22,3	21,3	21,1	21,9	21,7	21,7	22,3	21	20,6	25,3
País Vasco	135,1	117,9	104	94,1	88,4	88,9	89,7	89,7	84,8	80,8	75,6	84,6
Rioja, La	12	10,9	9,6	9,1	8,9	9,7	9,5	9,8	10	10,2	10	12,8
Ceuta	1,7	4,4	4,1	4,4	4,7	4,8	5,2	6	6,5	7,4	6,9	7,4
Melilla	5,3	5,6	5,3	5,3	5,5	5,6	6,1	6,2	6,5	6,7	6,9	7,9

### Notas:

1.- El INEM ha estimado series de paro registrado para los datos anteriores a mayo de 2005.

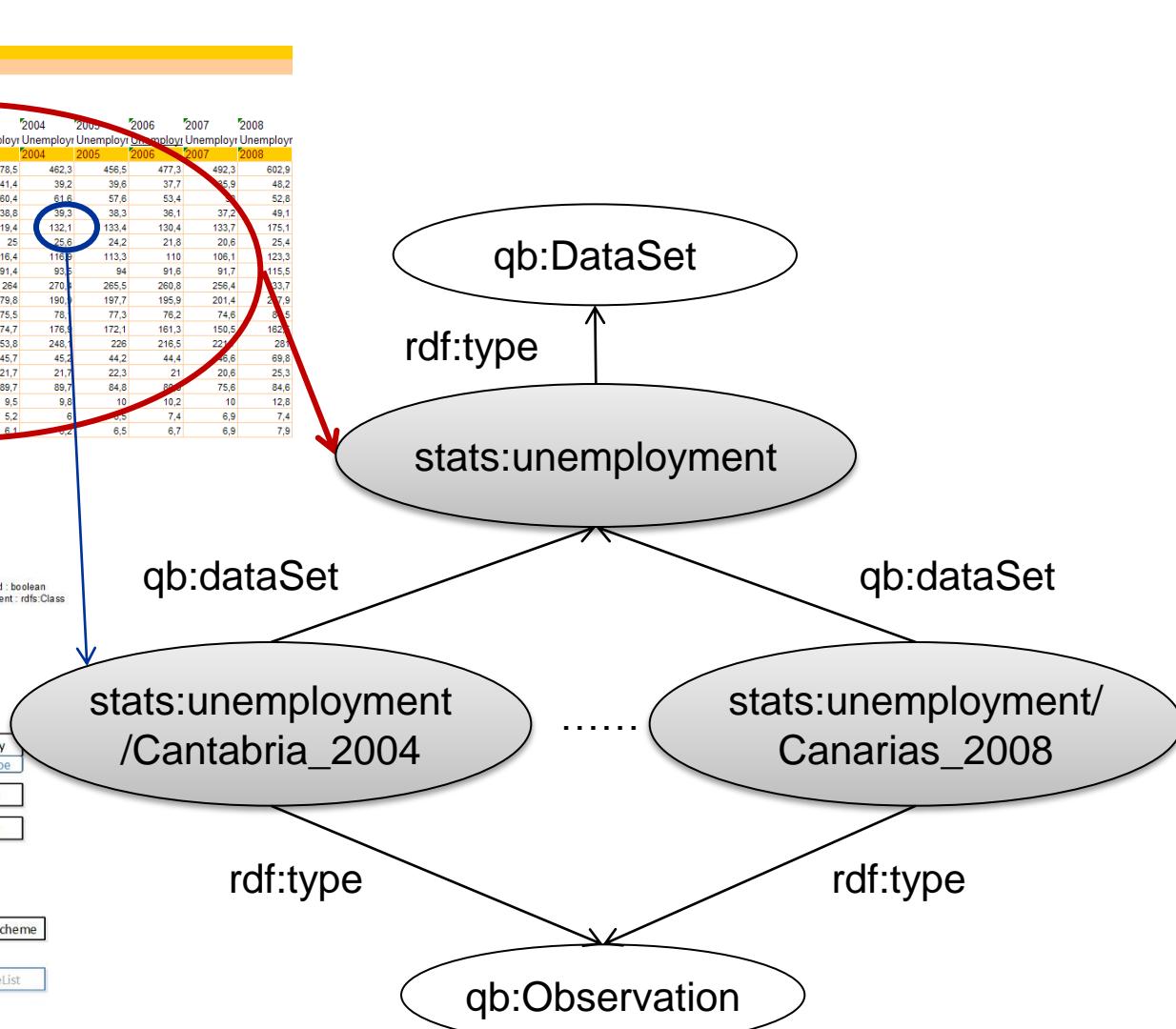
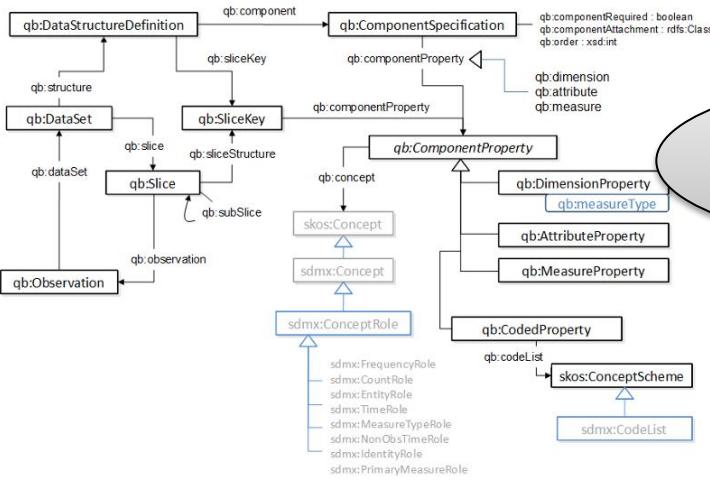
# RDF Data Cube: Vocabulary



# Example: Data Cube and Unemployment

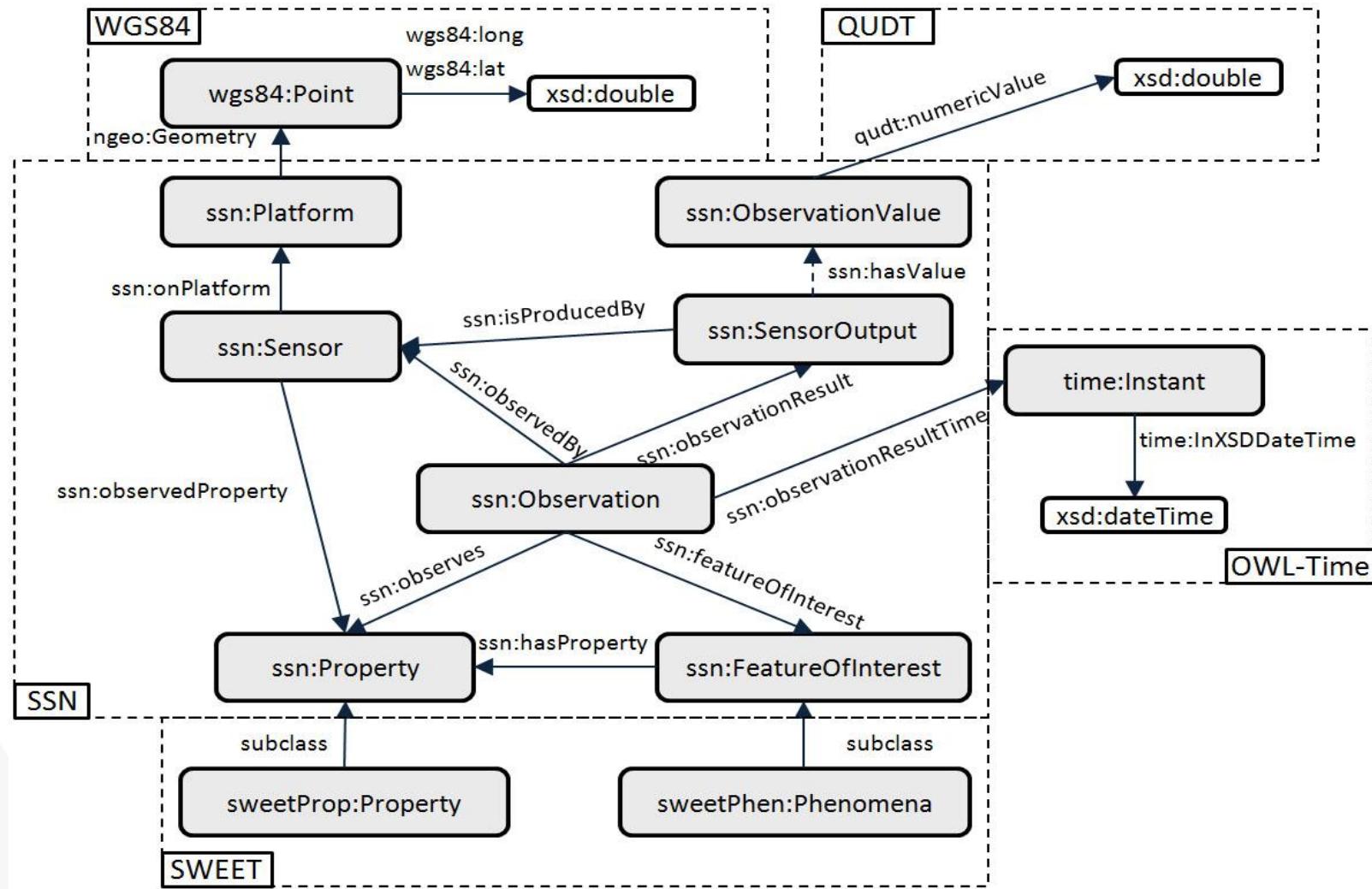
Mercado laboral		Paro registrado											
		Paro registrado por CCAA y periodo.											
		Unidades:miles de personas (media anual)											
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
		Unemploy	Unemploy	Unemploy	Unemploy	Unemploy	Unemploy	Unemploy	Unemploy	Unemploy	Unemploy	Unemploy	Unemploy
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Andalucía		587,5	544	493,7	475,8	465,9	483,9	478,5	462,3	456,5	477,3	492,3	602,9
Aragón		58,5	51,4	45,9	40,6	40	42,5	41,4	39,2	39,6	37,7	35,9	48,2
Principado de Asturias		7,4	7,2	6,4	6,1	5,8	5,9,1	6,0,4	6,1,6	5,7,6	5,3,4	5,9,6	5,2,8
Iles Balears		36,8	33,3	29,8	29,1	30,8	35,4	38,8	39,3	38,3	36,1	37,2	49,1
Canarias		133,7	123,2	109,6	106,6	108,9	112,7	119,4	132,1	133,4	130,4	133,7	175,1
Cantabria		31,8	28,3	24,6	23,3	23,4	24,5	25	25,6	24,2	21,8	20,6	25,4
Castilla y León		145,5	133,7	123,1	120,2	114,9	116,1	116,4	116,9	113,3	110	106,1	123,3
Castilla-La Mancha		108,3	97,6	88,6	87	86,8	88,9	91,4	93,5	94	91,6	91,7	115,5
Cataluña		322,5	272,5	232,5	213,8	222,1	252,5	264	270,9	265,5	260,8	258,4	33,7
Comunitat Valenciana		279,5	240	201,9	169,6	158,9	171	179,8	190	197,7	195,9	201,4	217,9
Extremadura		80,1	77,2	71,4	70,5	70,3	74	75,5	78	77,3	76,2	74,6	8,5
Galicia		91,7	186,3	168	163,4	159,5	168,4	174,7	176,3	172,1	161,3	150,5	162
Comunidad de Madrid		35,6	284	242,1	223,2	218,7	244,7	253,8	248	226	216,5	221	28
Región de Murcia		59,5	51,9	44,6	44	43,7	45,2	45,7	45,2	44,2	44,4	46,6	69,8
Comunidad Foral de Navarra		27,8	25,1	22,3	21,3	21,1	21,9	21,7	21,7	22,3	21	20,6	25,3
País Vasco		135,1	111,9	104	94,1	88,4	88,9	89,7	88,7	84,8	89	75,6	84,6
Rioja, La		12	10,9	9,6	9,1	9,9	9,7	9,5	9,6	10	10,2	10	12,8
Ceuta		4,7	4,4	4,1	4,4	4,7	4,8	5,2	6	6,5	7,4	6,9	7,4
Melilla		5,3	5,6	5,3	5,5	5,5	5,6	6,1	6,2	6,5	6,7	6,9	7,9

Notas:  
1.- El INEM ha estimado series de paro registrado para los datos anteriores a mayo de 2005.



1. Introduction
2. Vocabulary types
3. Development process
4. Vocabulary examples
  - Persons and Organizations: FOAF, vCard, ORG
  - Documents: DC, BIBO
  - Geo: points, lineString and polygons
  - Statistics: Data Cube
  - Libraries: FRBR
  - **Other vocabularies: sensors, provenance, VoID, DCAT, etc.**
5. Example of vocabulary networks within Linked Data applications
6. Conclusions

# SSN Ontology with other Ontologies



## Process:

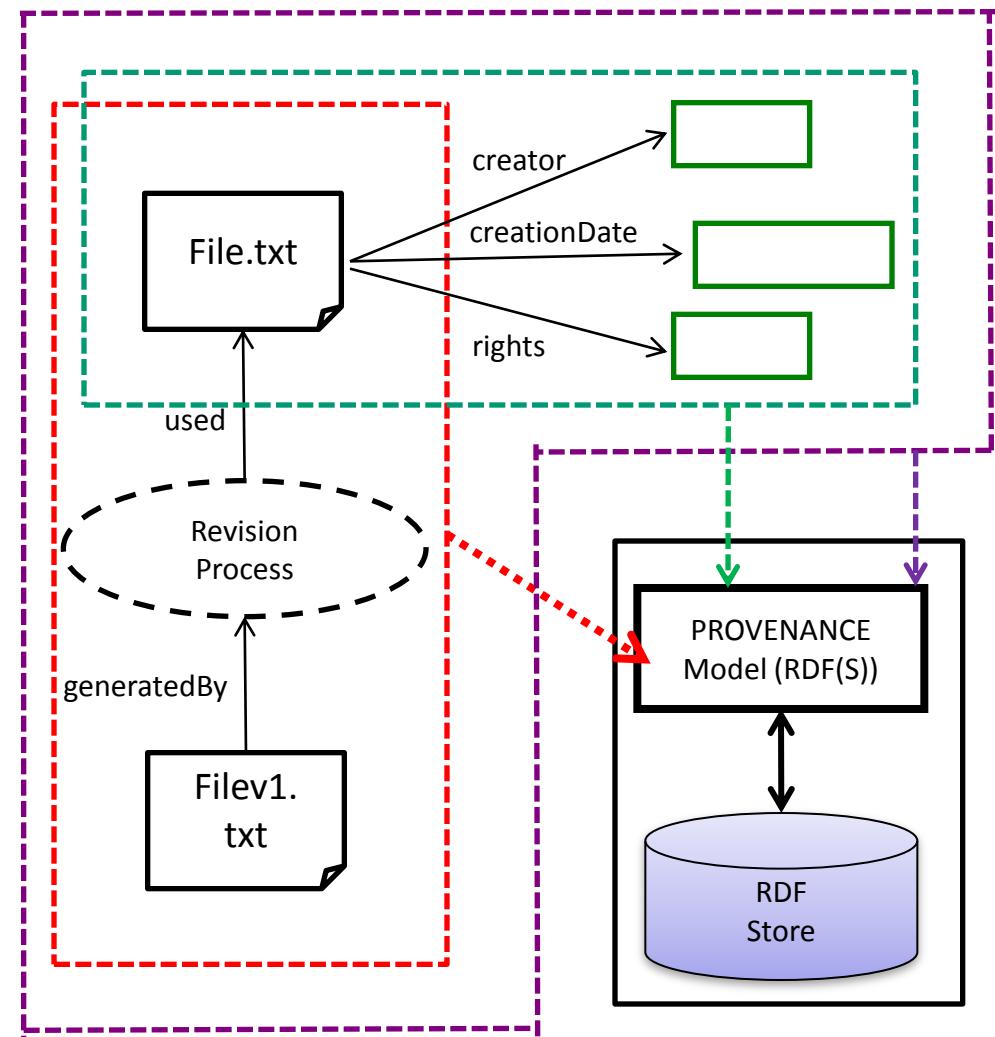
- OPM, Provernir, PM,
- PROV-O @W3C

## Resource:

- DC, Premis, SWANL
- EDM (including aggregation)

## Meta-provenance:

- DC-PROV @ W3C (ongoing)
- OAI-ORE

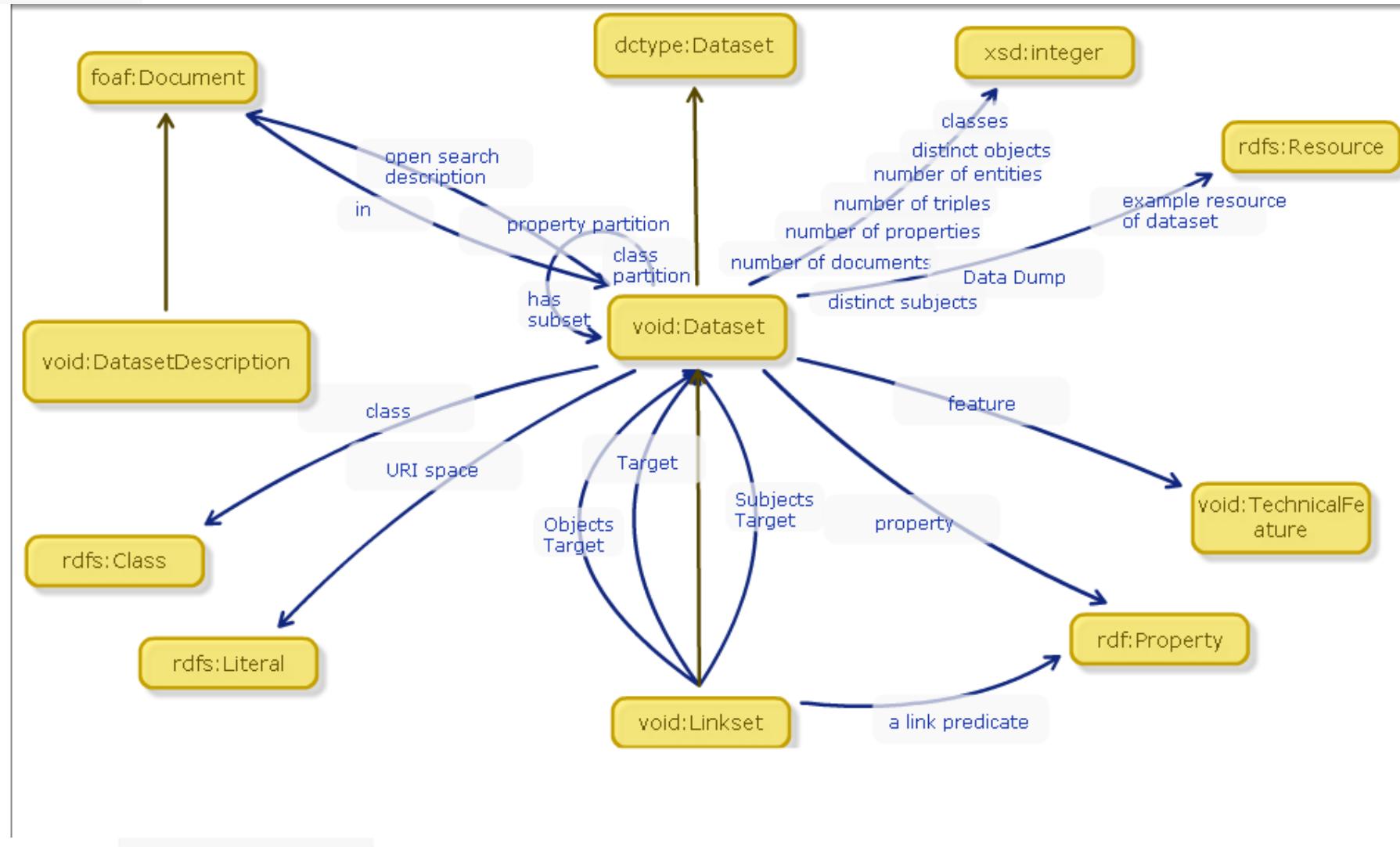


# VoID: Vocabulary of Interlinked Datasets

- RDFS vocabulary published by W3C
- VoID allows expressing metadata about RDF datasets
- VoID helps in the discovery and use of datasets by potential users (e.g., developers, aggregators, etc.) application indexers,
- General Metadata: license, author, topic, number of triples, etc.
- Access methods: SPARQL endpoint, downloaded files, etc.
- Structural metadata: resource examples, URI pattern, used vocabularies, etc.
- Linksets (datasets linked to the dataset): describe the used property (e.g. owl:sameAs, skos:closeMatch), linked dataset URI, link examples, etc.

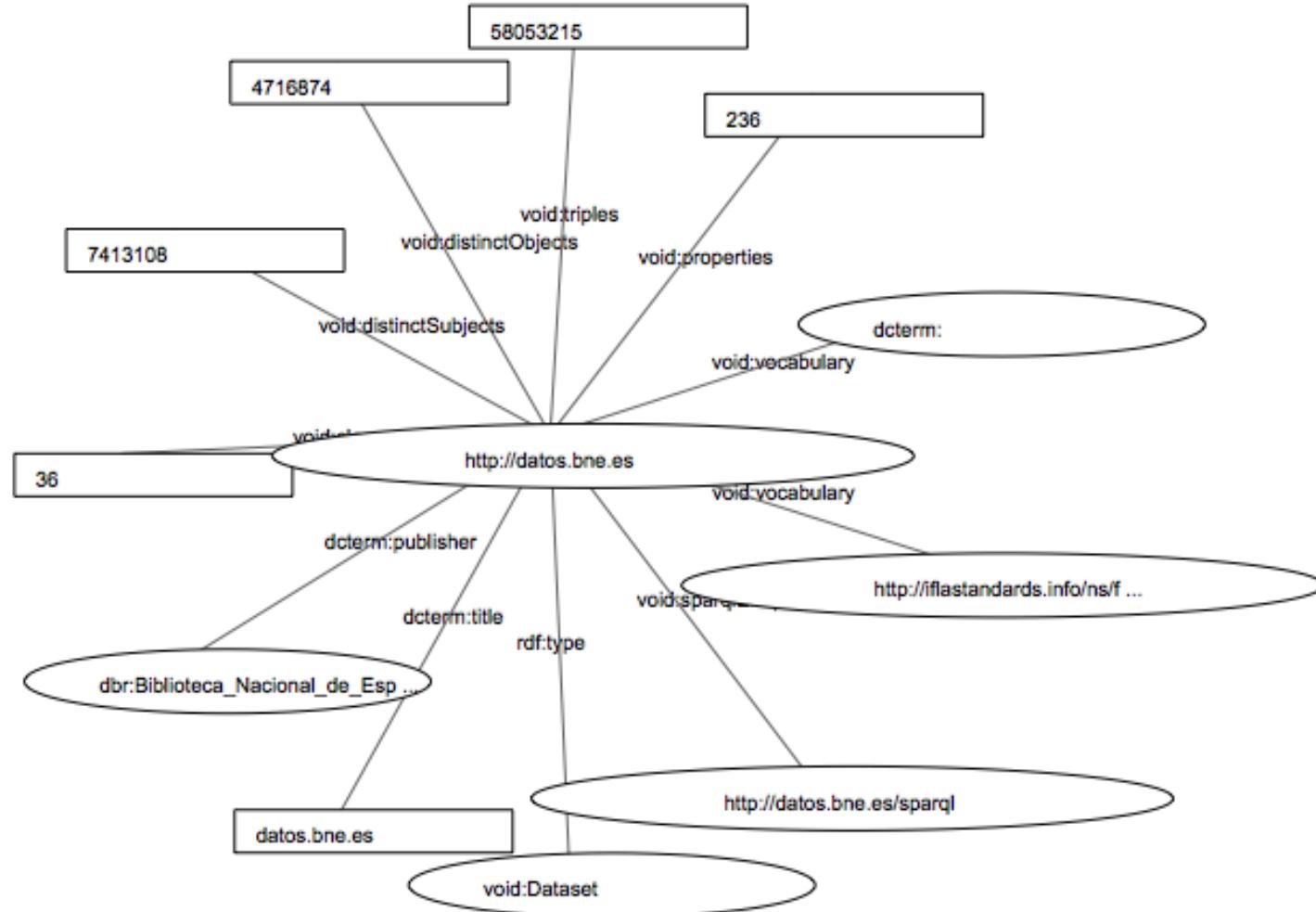
<http://www.w3.org/TR/void/>

# VoID: The Vocabulary



## Prefixes

void: ...http://rdfs.org/ns/void#  
rdf: ...http://www.w3.org/1999/02/22-rdf-syntax-ns#  
dcterm: ...http://purl.org/dc/terms/  
dbr: ...http://dbpedia.org/resource/



# DCAT: Data Catalog Vocabulary

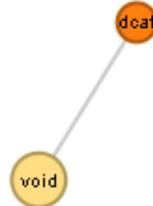
- DCAT is an RDF vocabulary designed to facilitate interoperability between data catalogs published on the Web.
- DCAT increases discoverability and enable applications easily to consume metadata from multiple catalogs.
- Main concepts described in DCAT are:
  - Catalog
  - Catalog record
  - Dataset
  - Distribution
  - Download
  - Web service
- <http://www.w3.org/TR/vocab-dcat/>

# DCAT: Relationship with other vocabularies

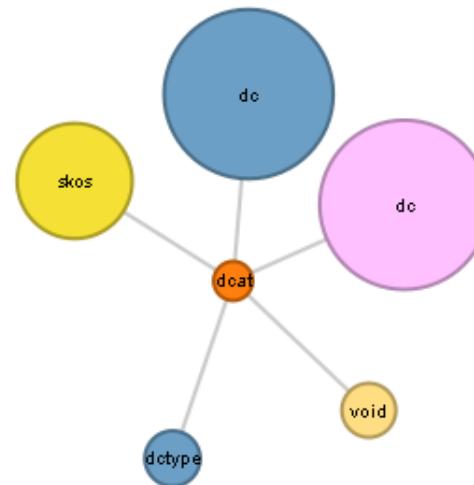


## Vocabulary links:

Vocabularies referencing "dcat" (1)



Vocabularies referenced by "dcat" (5)



Link types
Imports
Similar to
Used by
Relyes on
Metadata vocabulary
Extends
Specializes
Generalizes
Has equivalences with
Has disjunctions with



## Vocabulary history:



# DCAT: The vocabulary

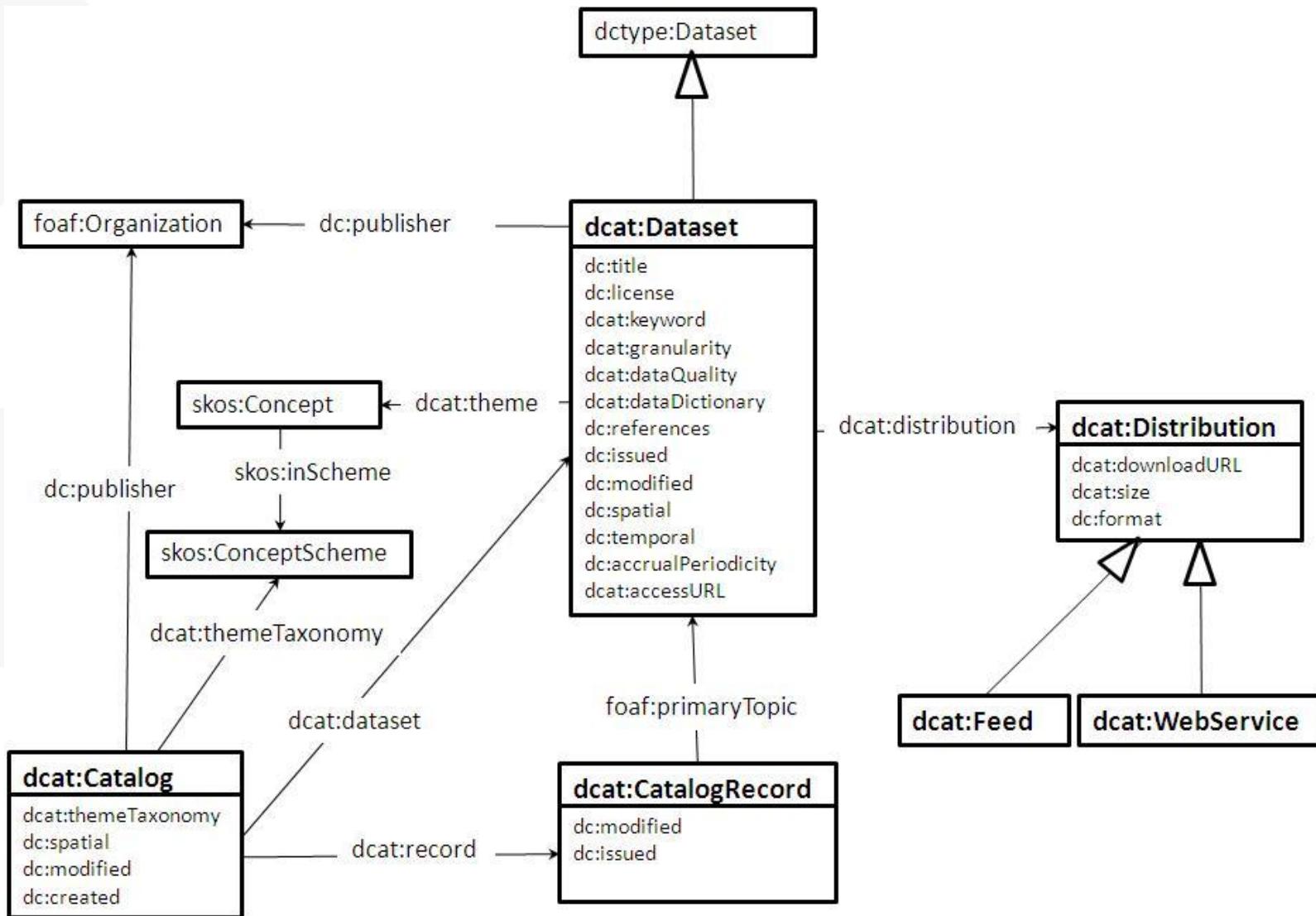
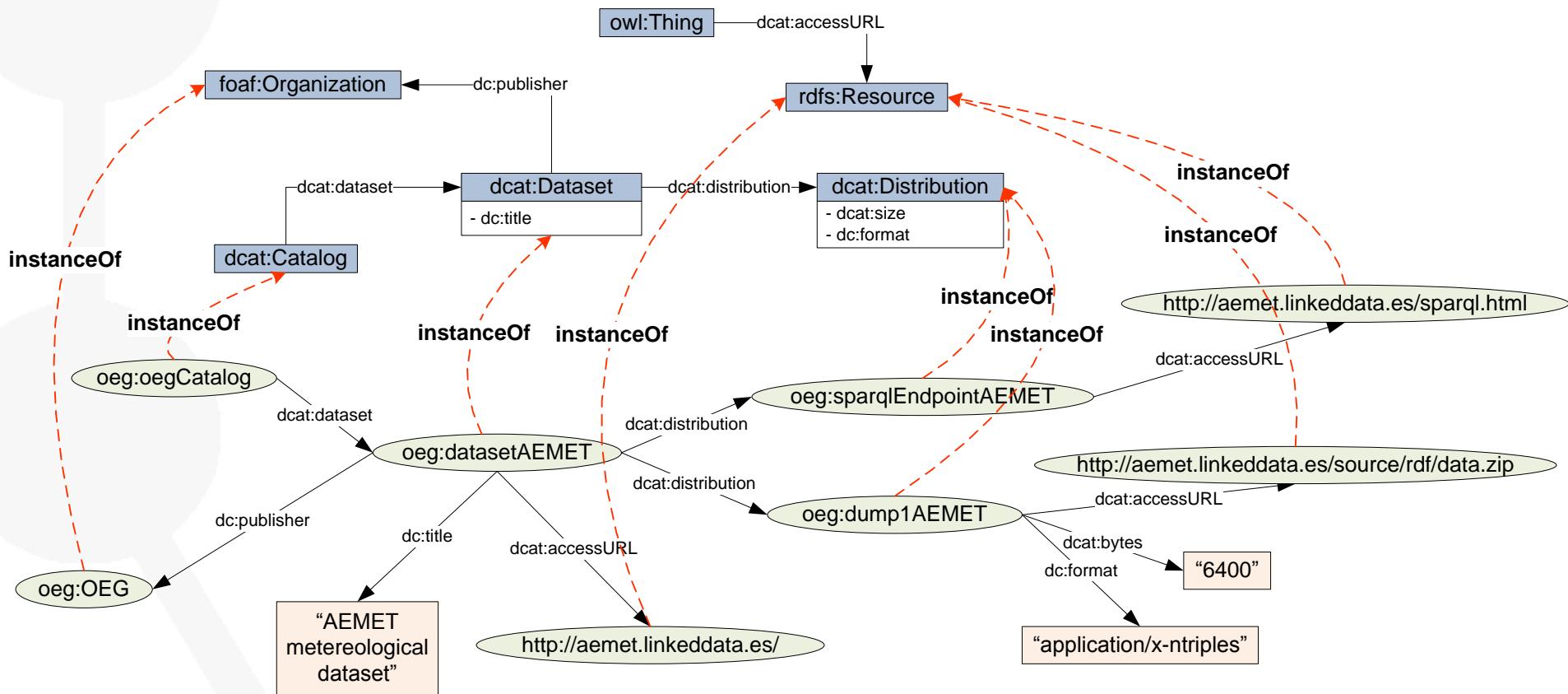


Image taken from <http://www.w3.org/TR/vocab-dcat/>

# DCAT: Model and instances



# An example of a DCAT instantiation in RDF

```
<dcat:Catalog rdf:about="http://www.oeg-upm.es/resource/oegCatalog">
  <rdfs:label xml:lang="es">oeg catalog</rdfs:label>
  <dcat:dataset rdf:resource="http://www.oeg-upm.es/resource/datasetAEMET"/>
</dcat:Catalog>

<dcat:Dataset rdf:about="http://www.oeg-upm.es/resource/datasetAEMET">
  <rdfs:label xml:lang="es">dataset AEMET</rdfs:label>
  <terms:title xml:lang="en">AEMET metereological dataset</terms:title>
  <dcat:accessURL rdf:resource="http://aemet.linkeddata.es/">
  <dc:publisher rdf:resource="http://www.oeg-upm.es/resource/OEG"/>
  <dcat:distribution rdf:resource="http://www.oeg-upm.es/resource/dump1AEMET"/>
  <dcat:distribution rdf:resource="http://www.oeg-upm.es/resource/sparqlEndpointAEMET"/>
</dcat:Dataset>

<dcat:Distribution rdf:about="http://www.oeg-upm.es/resource/dump1AEMET">
  <rdfs:label xml:lang="es">dump1AEMET</rdfs:label>
  <terms:format>application/x-ntriples</terms:format>
  <dcat:bytes>6400</dcat:bytes>
  <dcat:accessURL rdf:resource="http://aemet.linkeddata.es/source/rdf/data.zip"/>
</dcat:Distribution>

<dcat:Distribution rdf:about="http://www.oeg-upm.es/resource/sparqlEndpointAEMET">
  <rdfs:label xml:lang="es">sparqlEndpointAEMET</rdfs:label>
  <dcat:accessURL rdf:resource="http://aemet.linkeddata.es/sparql.html"/>
</dcat:Distribution>
```

XML

```
:oegCatalog rdf:type dcat:Catalog ;
  rdfs:label "oeg catalog"@es ;
  dcat:dataset :datasetAEMET .

:datasetAEMET rdf:type dcat:Dataset ;
  rdfs:label "dataset AEMET"@es ;
  terms:title "AEMET metereological dataset"@en ;
  dcat:accessURL <http://aemet.linkeddata.es/> ;
  dc:publisher :OEG ;
  dcat:distribution :dump1AEMET ,
    :sparqlEndpointAEMET .

:dump1AEMET rdf:type dcat:Distribution ;
  rdfs:label "dump1AEMET"@es ;
  terms:format "application/x-ntriples" ;
  dcat:bytes "6400" ;
  dcat:accessURL <http://aemet.linkeddata.es/source/rdf/data.zip> .

:sparqlEndpointAEMET rdf:type dcat:Distribution ;
  rdfs:label "sparql Endpoint AEMET"@es ;
  dcat:accessURL <http://aemet.linkeddata.es/sparql.html> .
```

Turtle

# adms: Asset Description Metadata Schema

- The adms vocabulary describes concepts related to **Semantic Interoperability Assets**.
- It includes concepts as **Semantic Asset Repository**, **Semantic Asset** and **Semantic Asset Distribution**, that are specialisations of more general concepts as **Repository**, **Asset** and **Distribution**.
- It has been created as part of the Interoperability solutions for European public administrations (ISA) programme of the European Commission (EC).

- <http://www.w3.org/ns/adms#>

# adms: The vocabulary

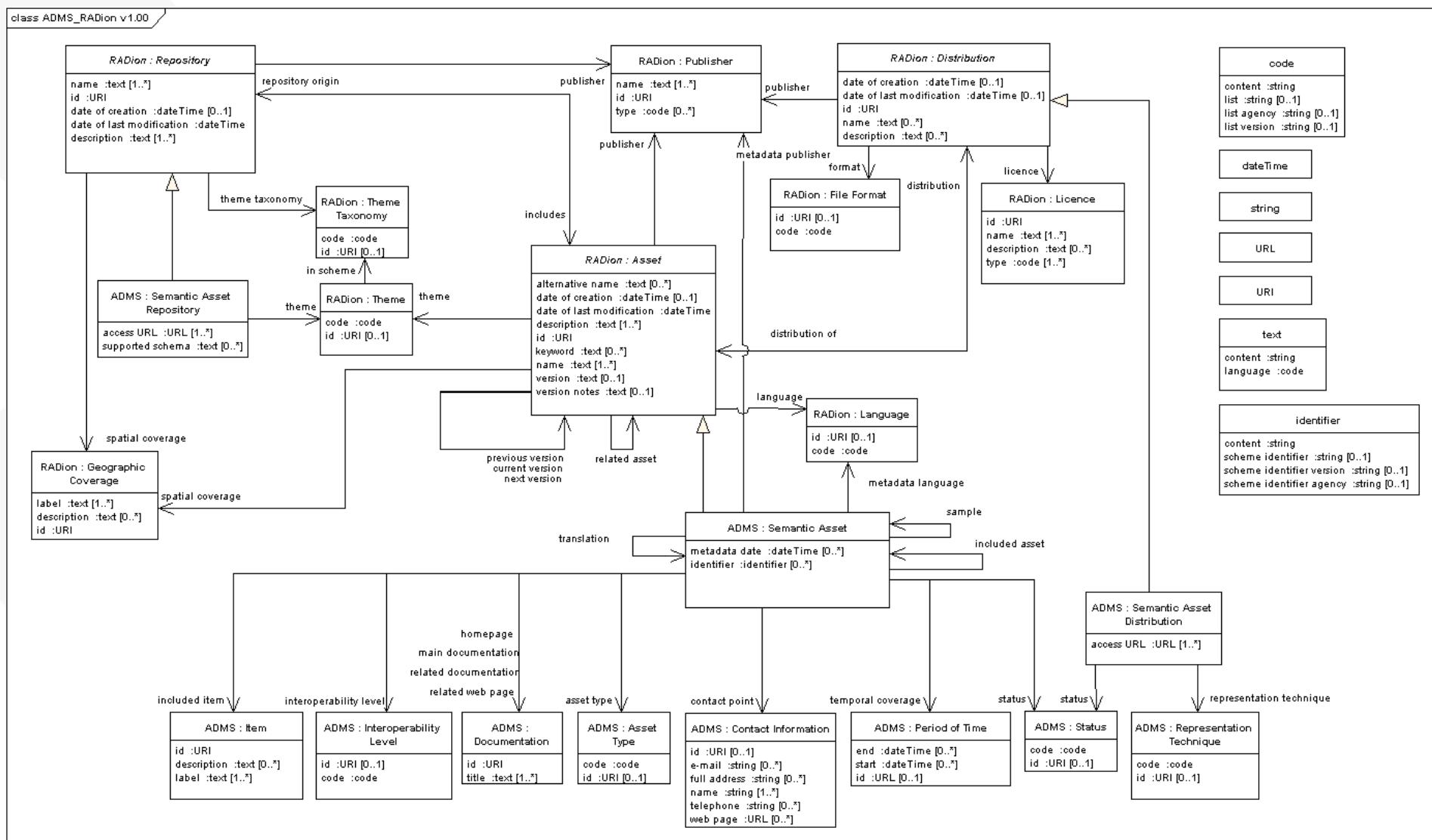


Image taken from <http://www.w3.org/ns/adms>

# The Public Contracts Ontology

- The **Public Contracts Ontology** serves to express structured data about public contracts in RDF
- The ontology enables seamless exchange of semantically annotated data across distributed data sources.
- It is developed by the Czech OpenData initiative.
- Public Contracts Ontology reuses parts of several established vocabularies and ontologies, such as
  - GoodRelations for modelling price specifications
  - Other vocabularies are aligned with the ontology via mappings, for example
    - Call for Anything, a vocabulary expressing demands

- <http://code.google.com/p/public-contracts-ontology/>
- <http://data.gov.uk/resources/payments>

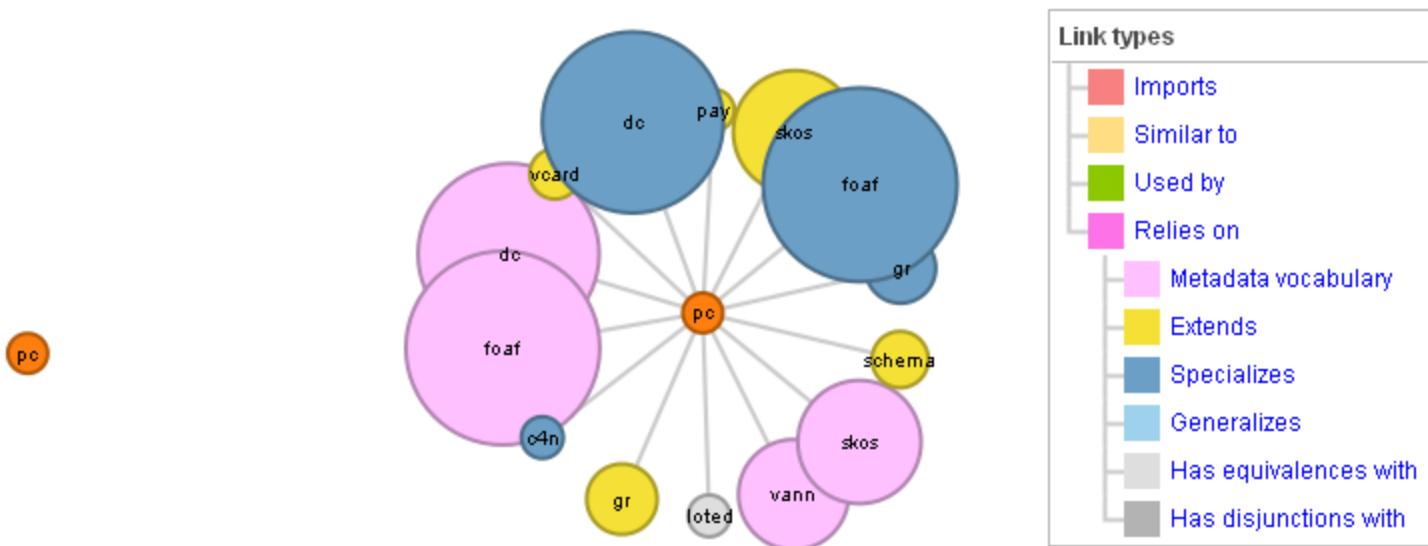
# The Public Contracts Ontology: Relationship with other vocabularies



## Vocabulary links:

Vocabularies referencing "pc" (0)

Vocabularies referenced by "pc" (14)



# The Public Contracts Ontology: Evolution



## Vocabulary history:



# The Public Contracts Ontology: The vocabulary

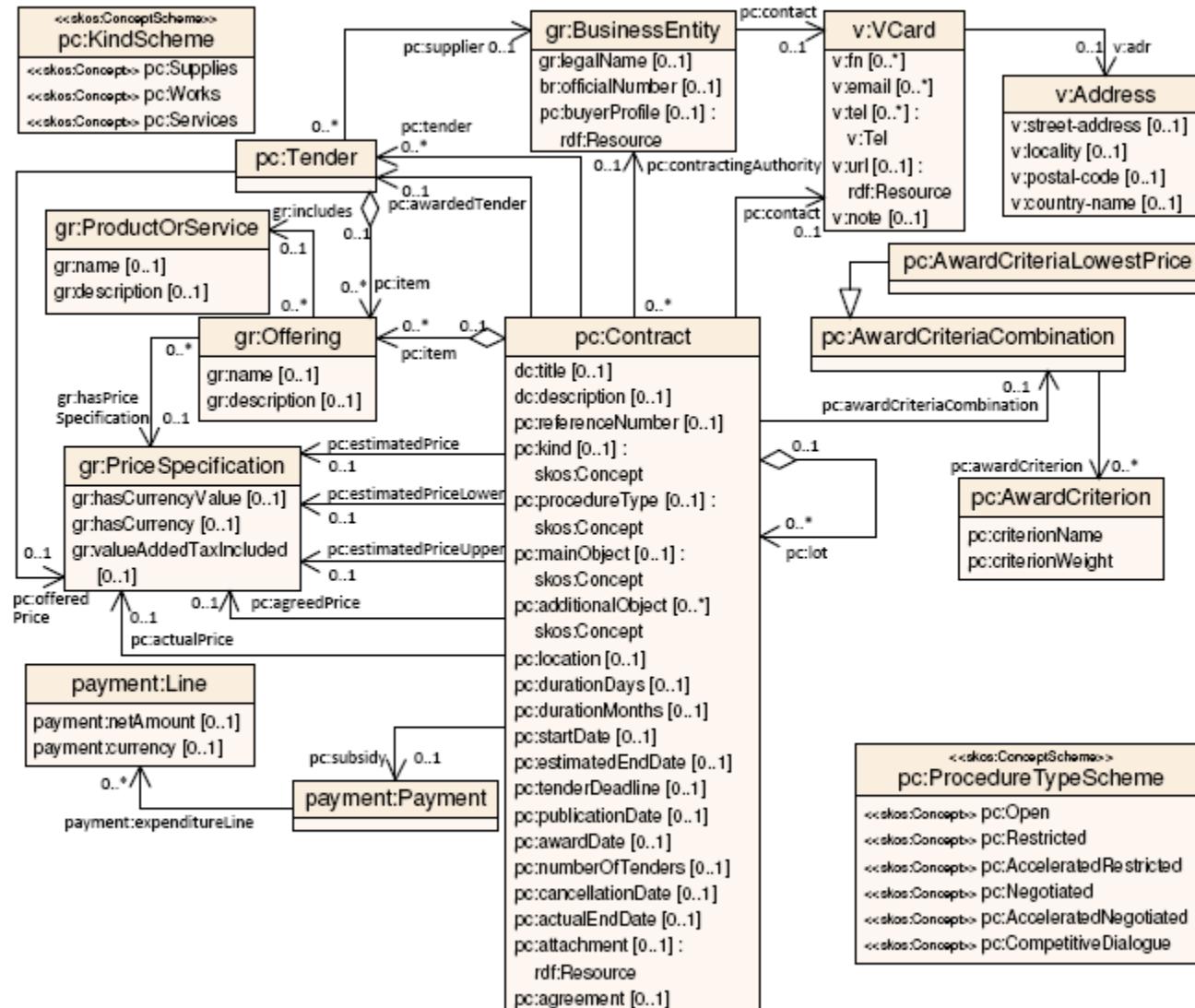


Image from <http://static.lod2.eu/Deliverables/deliverable-9a.1.1.pdf>



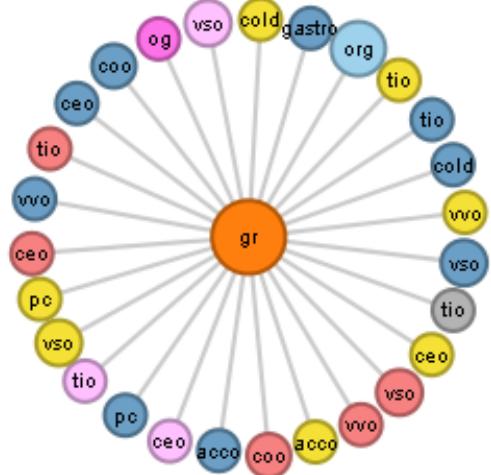
- **GoodRelations** is a standardized vocabulary for product, price, store, and company data.
- Based on the **Agent-Promise-Object Principle**:
  1. An **agent** (e.g. a person or an organization) →
  2. An **object** (e.g. a camcorder, a house, a car,...) or service (e.g. a haircut),
  3. A **promise** (offer) to transfer some rights (ownership, temporary usage, a certain license, etc.) on the object or to provide the service for a certain compensation (e.g. an amount of money), made by the agent and related to the object or service, and
  4. A **location** from which this offer is available (e.g. a store, a bus stop, a gas station,...).
- Correspondences in GoodRelations are
  - gr:BusinessEntity for the agent
  - gr:Offering for an offer
  - gr:ProductOrService for the object or service
  - gr:Location for a store or location from which the offer is available
- <http://www.heppnetz.de/ontologies/goodrelations/v1.html>

# GoodRelations: Relationship with other vocabularies

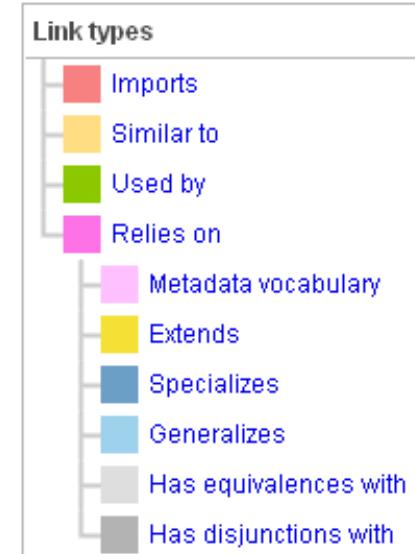
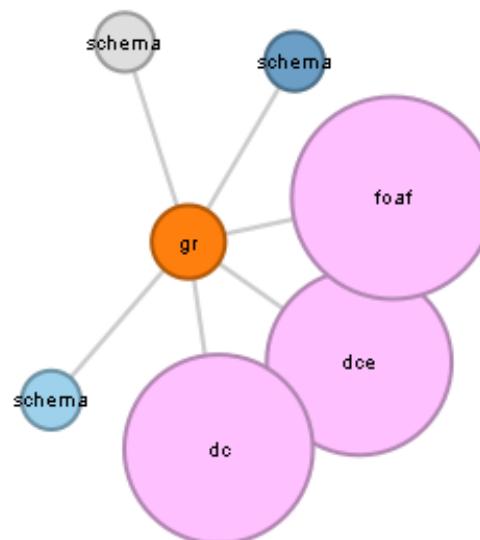


## Vocabulary links:

Vocabularies referencing "gr" (27)



Vocabularies referenced by "gr" (6)



# GoodRelations: Evolution

## Vocabulary history:



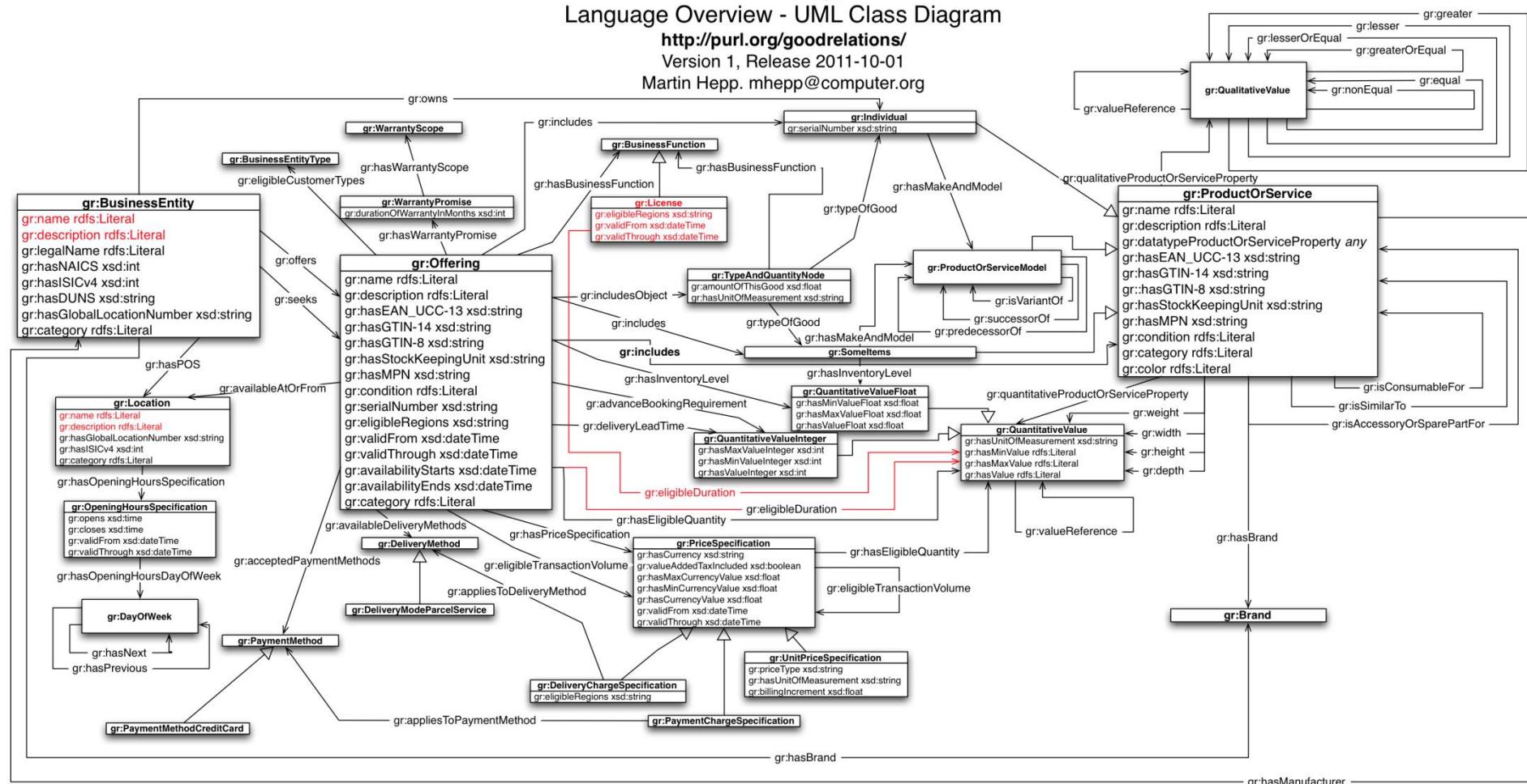
# GoodRelations: The vocabulary

## The GoodRelations Ontology for E-Commerce Language Overview - UML Class Diagram

<http://purl.org/goodrelations/>

Version 1, Release 2011-10-01

Martin Hepp. mhepp@computer.org

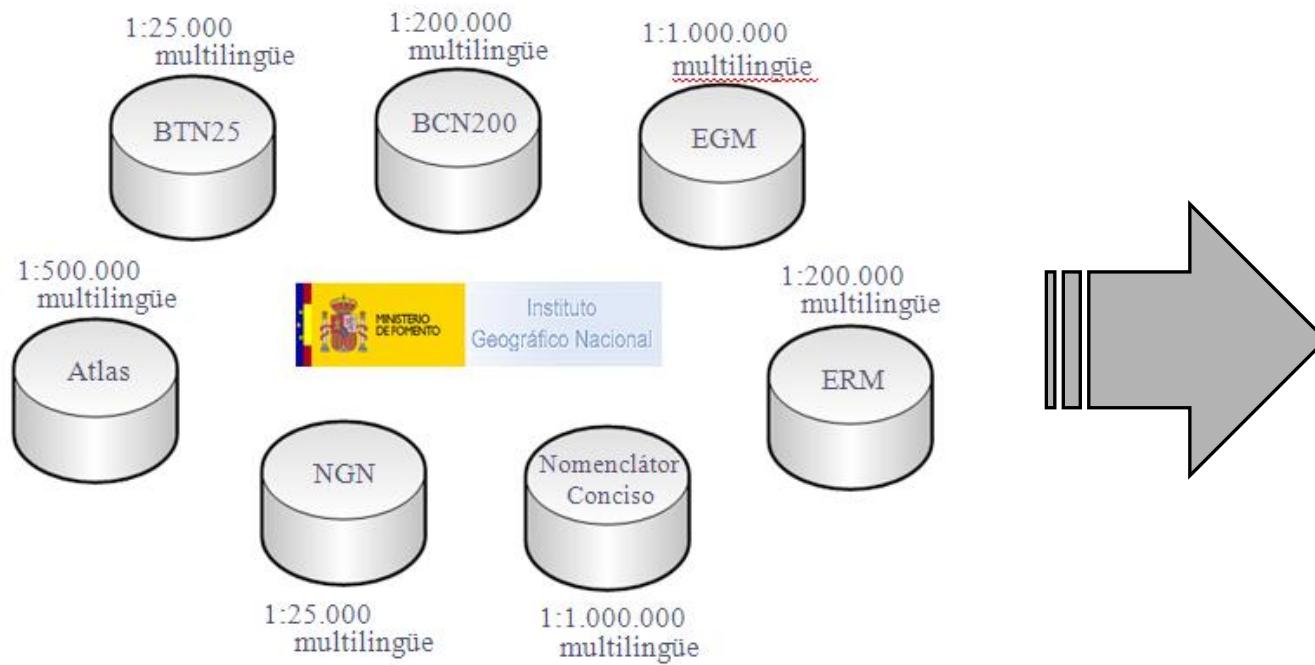


Red highlighting indicates elements added or changed in this release.

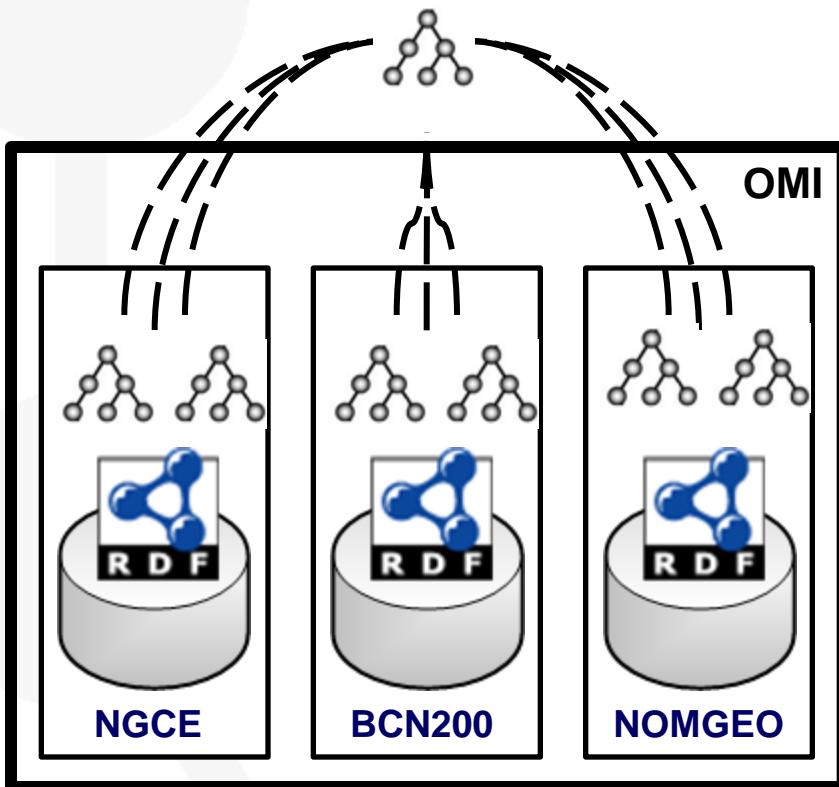
Image taken from <http://www.heppnetz.de/ontologies/goodrelations/goodrelations-UML.png>

1. Introduction
2. Vocabulary types
3. Development process
4. Vocabulary examples
5. **Example of vocabulary networks within Linked Data applications**
  - *Instituto Geográfico Nacional*
6. Conclusions

# Geolinkeddata ontologies



# Uniform Access to DB



Ontology about phenomena

Lake

Ontology network

Lake  
Fresh water lake  
Salt water lake

SPARQL Endpoints

URI: <http://geo.linkeddata.es/NGCE/resource/Laguna/Tae%C3%B1a%20Laguna%20de>  
URI: <http://geo.linkeddata.es/NGCE/resource/Laguna/Tollos%2C%20Laguna%20de%20los>  
[...]

URI: <http://geo.linkeddata.es/NOMGEO/resource/Laguna/Hilejas%20Laguna%20de%20las>

URI: <http://geo.linkeddata.es/NOMGEO/resource/Laguna/Tejo%20Laguna%20del>

[...]

URI: <http://geo.linkeddata.es/BCN200/resource/Laguna/Laguna%20de%20Paniagua>

URI: <http://geo.linkeddata.es/BCN200/resource/Laguna/Laguna%20Laguna%20>

[...]



Final answer composed by 1.806 URI  
(38 from NGCE, 1.416 from NOMGEO and 406 from BCN200).

# Ontology for cartographic phenomena

0201	CURVA DE NIVEL
ATRIBUTO: 020101	TIPO DE CURVA DE NIVEL 01 NORMAL 02 DEPRESIÓN 03 GLACIAR 04 BATIMÉTRICA
ATRIBUTO: 020102	CATEGORÍA 01 NORMAL 02 MAESTRA 03 AUXILIAR
ATRIBUTO: 020103	ORIGEN 00 DESCONOCIDO 01 RESTITUCIÓN 02 DIGITALIZACIÓN 03 MDT

02

0201 Curva de nivel

## Tipo

- NDepresión
- Glaciar
- Batimétrormal  
rica

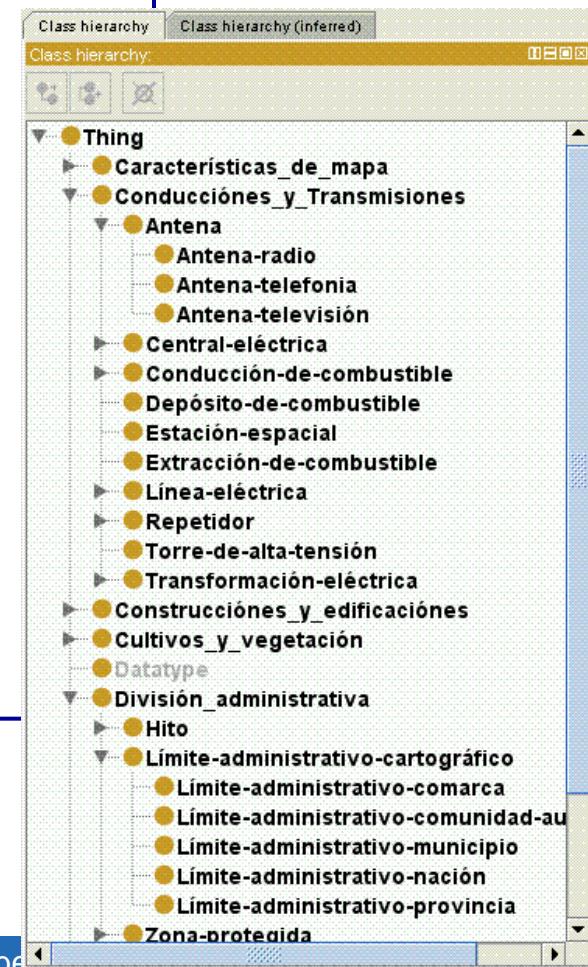
## Categoría

Normal

- Maestra
- Auxiliar

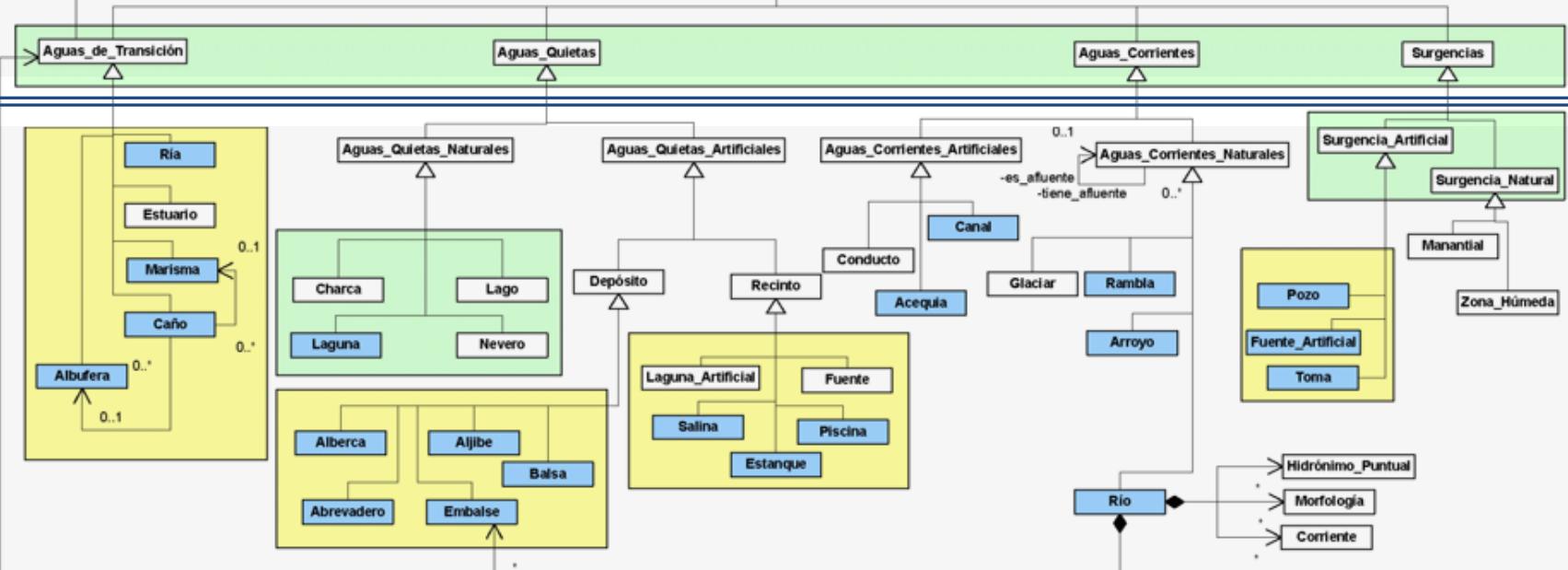
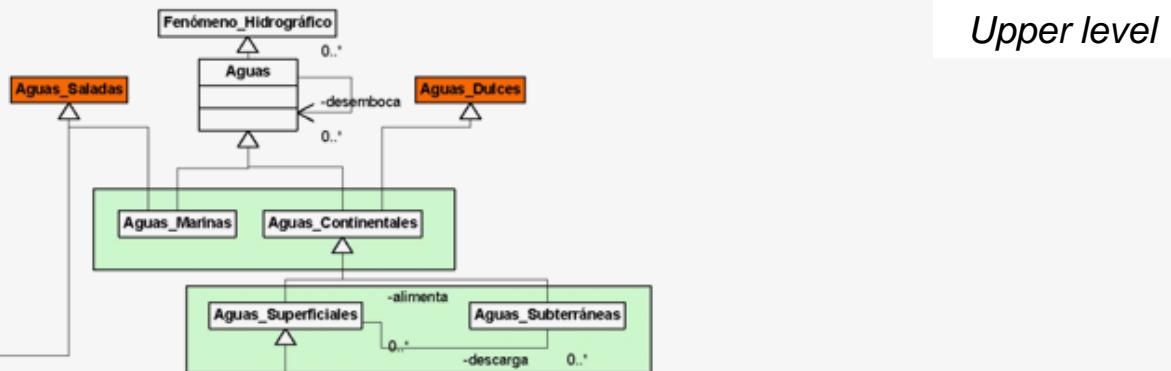
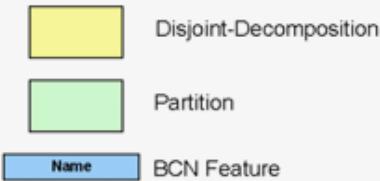
## Origen

- Desconocido
- Restitución
  - Digitalización
  - MDT

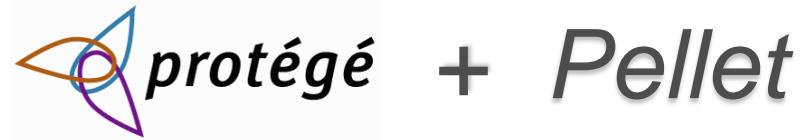


<http://mayor2.dia.fi.upm.es/oeg-upm/files/phenomontology/Phenom4.0.1.owl>

# Hydrology Ontology



# Implementation



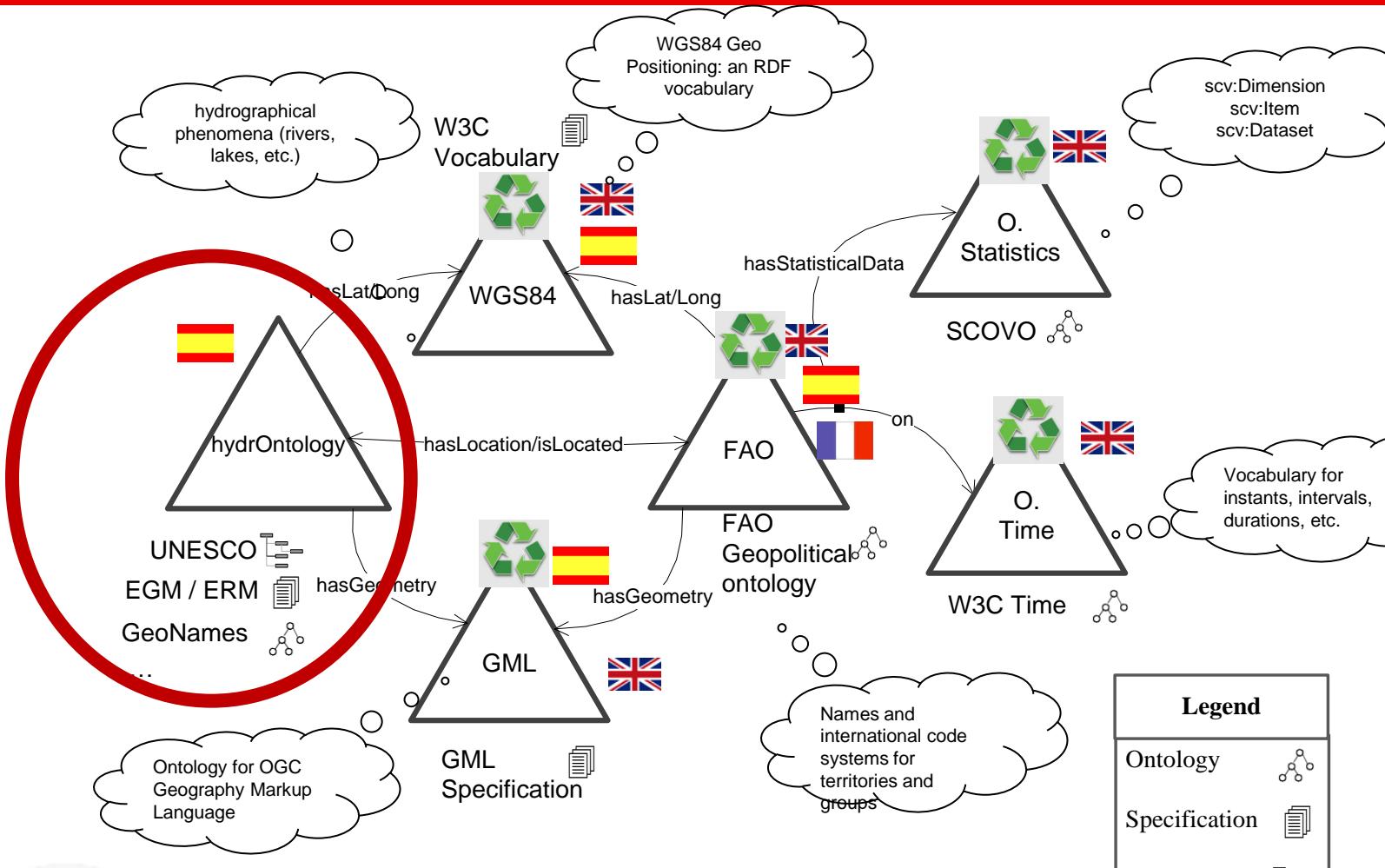
Screenshot of the Protégé ontology editor interface showing the implementation of an ontology for groundwater (Aguas Subterráneas) using Pellet.

The interface displays several panels:

- Asserted Class Hierarchy: Aguas\_Subterráneas**: Shows the asserted class hierarchy where **Aguas\_Subterráneas** is asserted to be equivalent to **Aguas\_Superficiales**.
- Class Annotations: Aguas\_Subterráneas**: Shows annotations for the class, including labels in English and Spanish (Aguas Subterráneas / Groundwater), and a bibliographic reference to the European Parliament and the Council of the European Union Directive 2000/60/EC.
- Object Properties**: A list of object properties: **actúa\_de\_emisario**, **alimenta**, **almacena**, **comunica**, **conduce**, **consta\_de**, **deposita**, **descarga**, **desemboca**, **ejercen\_influencia**, **es\_afluente**, **es\_alimentada**, **es\_almacenado**, **es\_comunicada**, **es\_conducido**, **es\_conectado**, **es\_inundada**, and **es\_originado**.
- Data Properties**: A list of data properties: **afloramiento**, **altura**, **aportación**, **autoridad\_competente**, **bibliographic\_property**, and **capacidad**.
- Disjoint Classes: Aguas\_Subterráneas**: Shows that **Aguas\_Superficiales** is disjoint from **Aguas\_Subterráneas**.
- Asserted Superclass Hierarchy: Aguas\_Subterráneas**: Shows the asserted superclass hierarchy where **Aguas\_Subterráneas** is a subclass of **Aguas\_Continentes** and **Masa\_de\_Agua\_Subterránea**.

Red circles highlight the asserted class hierarchy, the object properties panel, and the data properties panel, indicating the main components of the ontology implementation.

# Geolinkeddata Ontologies



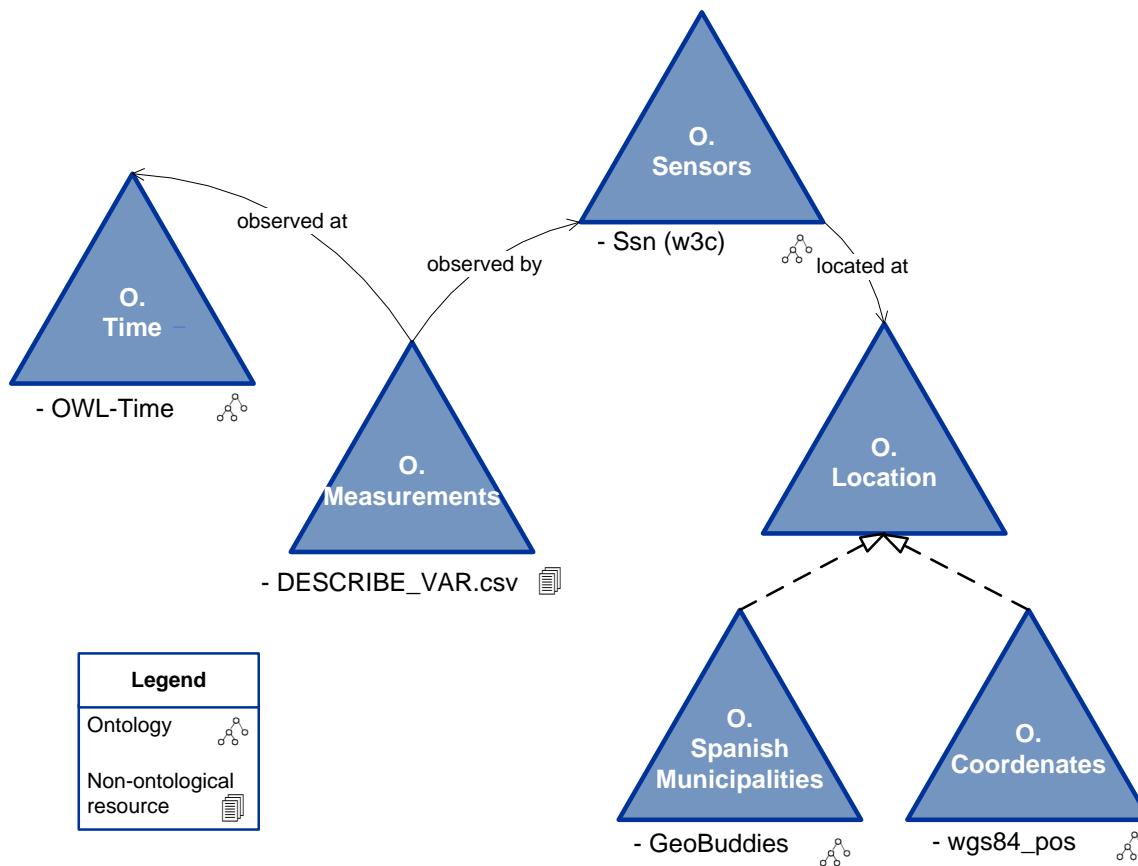
Classes	33	33
Object Properties	44	44
Data Properties	318	318



Following the INSPIRE  
(INfrastructure for SPatial InfoRmation in Europe) recommendation.  
hydrOntology, SCOVO, FAO Geopolitical, WGS84, GML, and Time



# Mereology Ontology



1. Introduction
  2. Vocabulary types
  3. Development process
  4. Vocabulary examples
  5. Example of vocabulary networks within Linked Data applications
- 6. Conclusions**

Public Administrations must agree on which vocabularies are going to use to describe their data and provide semantic interoperability

Vocabularies should be multilingual