



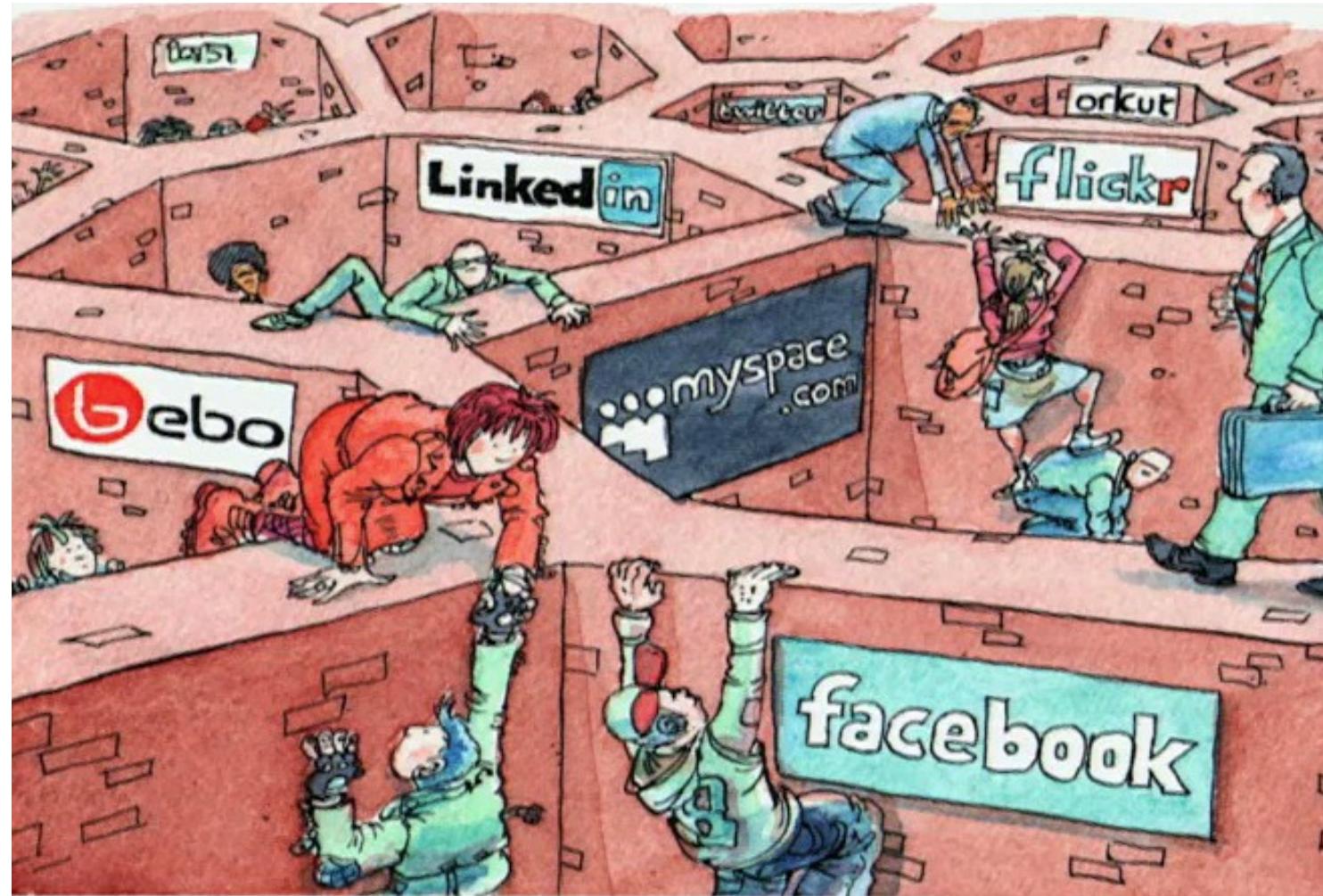
¿qué es esto de *linked data*?

Lorena Etcheverry - Instituto de Computación, Facultad de Ingeniería, Udelar

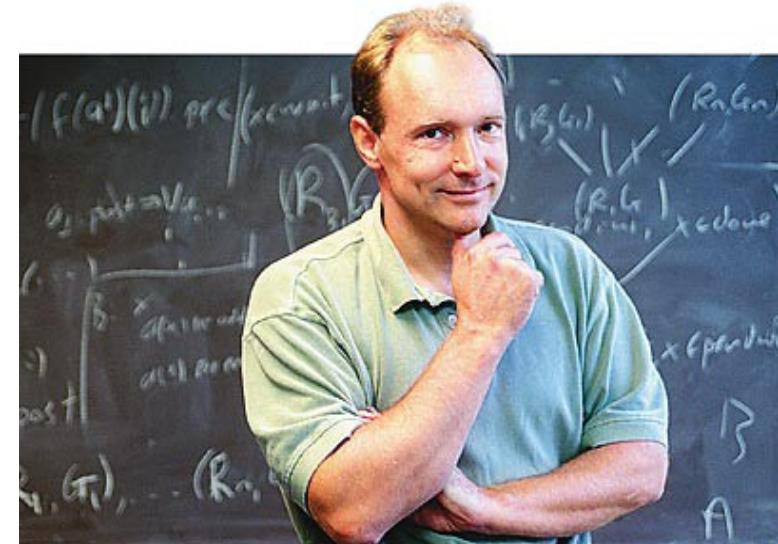
Octubre 2013

La web clásica es una red de
documentos,
interpretable por **humanos**,
donde las relaciones entre
documentos no tienen un
significado.

Además, la mayoría de los datos en la web están a i s l a d o s



La web de datos es una red de **afirmaciones**, interpretable por humanos y **máquinas**, donde las afirmaciones se relacionan y tienen un **significado**.



RDF: un **modelo de datos** basado en **triplas** que permite representar relaciones.

SPARQL: el lenguaje de **consultas** sobre RDF.

RDF-S y OWL, para representar metadatos y darles **significado** (ontologías).



<http://www.w3.org/2001/sw/wiki/RDF>



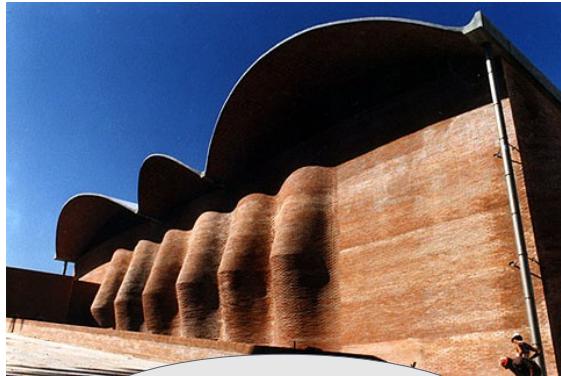
<http://www.w3.org/2001/sw/wiki/SPARQL>

afirmación o **tripla**

<sujeto, predicado, objeto>



Ing. Eladio Dieste



MVD Shopping
Center

esAutor



afirmación o **tripla**

<sujeto, predicado, objeto>



Ing. Eladio Dieste



esAutor

MVD Shopping
Center

ubicadoEn

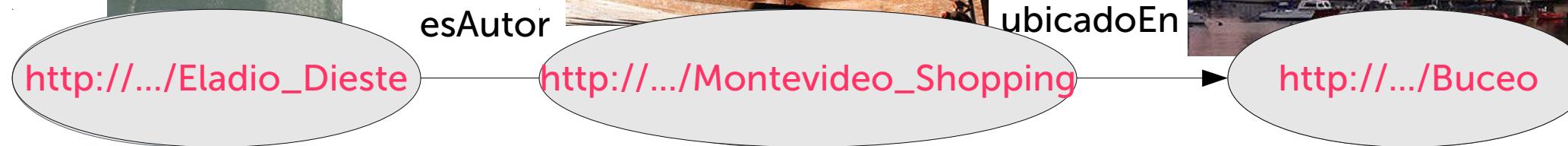


Barrio Buceo

En RDF todo es una tripla.
Los **recursos** y las **propiedades** se
identifican por URIs

afirmación o **tripla**

<sujeto, predicado, objeto>



En RDF todo es una tripla.
Los **recursos** y las **propiedades** se
identifican por URIs

Linked Data
es un conjunto de
buenas prácticas para
publicar y *relacionar*
datos en la web,
usando
tecnologías de la
web semántica

Principios de Linked Data

- 1) Usar **URIs** para nombrar cosas
- 2) Usar **URIs HTTP** que sean consultables por humanos y máquinas
- 3) Proveer información **útil** acerca de cada URI en RDF
- 4) Crear **links** entre URIs

Tim Berners-Lee – Linked Data (2006)

<http://www.w3.org/DesignIssues/LinkedData>

#TED Talk Tim Berners-Lee on the next Web (2009)

http://www.ted.com/talks/tim_berners_lee_on_the_next_web.html

1) Usar **URIs** para nombrar cosas

URI's *minting*: the act of establishing the association between the URI and the resource it denotes. A URI MUST only be minted by the URI's owner or delegate. Minting a URI from someone else's URI space is known as *URI squatting*

The URI Lifecycle in Semantic Web Architecture, David Booth,
<http://dbooth.org/2009/lifecycle/>

1) Usar URIs para nombrar cosas

- Evitar el uso de *namespaces* que no están bajo nuestro control

<http://www.imdb.com/title/tt0057012/#film>

- No incluir detalles de implementación

<http://tiger.biglynx.co.uk/people.php?id=dave-smith&format=rdf>

- Evitar claves “artificiales”

<http://data.nytimes.com/66209802438676211043>

2) Usar **URIs HTTP** que sean consultables por humanos y máquinas

HTTP URI: mecanismo universal de acceso a una URI

Las URIs HTTP deberían ser **desreferenciables**

“HTTP clients can look up the URI using the HTTP protocol and retrieve a description of the resource that is identified by the URI”

Redirecccionamiento y negociación de contenido

text/html



URI que identifica al concepto Uruguay

application/rdf+xml

About: Uruguay
An Entity of Type : [populated place](#), from Named Graph : <http://dbpedia.org>, within Data Space : [dbpedia.org](#)

Uruguay Listen /juərəgwaɪ/, officially the Oriental Republic of Uruguay and sometimes called the Eastern Republic of Uruguay, is a country in the southeastern part of South America. It is home to 3.3 million people, of whom 1.8 million live in the capital Montevideo and its metropolitan area. An estimated 88% of the population is of European descent. With an area of approximately 176,000 square kilometres, Uruguay is the second-smallest nation in South America by area, after Suriname.

Property	Value
dbpedia-owl:PopulatedPlace/areaTotal	<ul style="list-style-type: none">176215.0176215.0210629304

URI que identifica el documento HTML que describe al concepto Uruguay

dbpedia.org/data/Uruguay.rdf

This XML file does not appear to have any style information associated with it.

```
-<rdf:RDF>
--<rdf:Description rdf:about="http://dbpedia.org/resource/Uruguay
  <dbpedia-owl:birthPlace rdf:resource="http://dbpedia.org/resource/...
  <dbpprop:birthPlace rdf:resource="http://dbpedia.org/re...
```

URI que identifica el documento RDF que describe al concepto Uruguay

HTTP GET request(text/html)
<http://dbpedia.org/resource/Uruguay>



HTTP 303 See Other response
<http://dbpedia.org/page/Uruguay>



HTTP GET request
<http://dbpedia.org/page/Uruguay>



HTTP 200 OK response
Código HTML



```
curl -i -L -H "Accept: text/html" http://dbpedia.org/resource/Uruguay
```

HTTP/1.1 303 See Other

Date: Wed, 02 Oct 2013 22:21:01 GMT

Content-Type: text/html; charset=UTF-8

Server: Virtuoso/07.00.3203 (Linux) i686-generic-linux-glibc212-64 VDB

Location: http://dbpedia.org/page/Uruguay

...

HTTP/1.1 200 OK

Date: Wed, 02 Oct 2013 21:59:40 GMT

Content-Type: text/html; charset=UTF-8

Content-Length: 608380

Server: Virtuoso/07.00.3203 (Linux) i686-generic-linux-glibc212-64 VDB

...

```
<?xml version="1.0" encoding="UTF-8" ?>
```

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML+RDFa 1.0//EN" ...
```

The screenshot shows a web browser window with the URL 'dbpedia.org/page/Uruguay' in the address bar. The page title is 'About: Uruguay'. It states that Uruguay is an entity of type 'populated place' from the 'dbpedia.org' named graph. The page content describes Uruguay as the Oriental Republic of Uruguay, located in South America, with a population of approximately 3.3 million, where 1.8 million live in Montevideo. It is noted as the second-smallest nation by area after Suriname. Below this, there is a table with two columns: 'Property' and 'Value'. The 'Property' column contains 'dbpedia-owl:PopulatedPlace/areaTotal', and the 'Value' column contains two items: '176215.0' and '176215.0210629304'.

Property	Value
dbpedia-owl:PopulatedPlace/areaTotal	176215.0 176215.0210629304

HTTP GET request(application/rdf+xml)

<http://dbpedia.org/resource/Uruguay>



HTTP 303 See Other response

<http://dbpedia.org/data/Uruguay.xml>



HTTP GET request

<http://dbpedia.org/data/Uruguay.xml>



HTTP 200 OK response

Datos en RDF



```
curl -i -L -H "Accept: application/rdf+xml"  
http://dbpedia.org/resource/Uruguay
```

HTTP/1.1 303 See Other

Date: Wed, 02 Oct 2013 22:28:35 GMT

Content-Type: application/rdf+xml; qs=0.95

Server: Virtuoso/07.00.3203 (Linux) i686-generic-linux-glibc212-64 VDB

Location: <http://dbpedia.org/data/Uruguay.xml>

...

HTTP/1.1 200 OK

Date: Wed, 02 Oct 2013 22:28:35 GMT

Content-Type: application/rdf+xml; charset=UTF-8

Content-Length: 603067

...

```
<?xml version="1.0" encoding="utf-8" ?>
```

```
<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:owl="http://www.w3.org/200
```

```
    xmlns:dcterms="http://purl.org/d
```

...

← dbpedia.org/data/Uruguay.rdf

This XML file does not appear to have any style information associated with

```
- <rdf:RDF>
```

```
- <rdf:Description rdf:about="http://dbpedia.org/resource/%C3%81lvaro
    <dbpedia-owl:birthPlace rdf:resource="http://dbpedia.org/resource/
    <dbpprop:birthPlace rdf:resource="http://dbpedia.org/resource/Uru
    <dbpprop:placeOfBirth rdf:resource="http://dbpedia.org/resource/Uruguay
  </rdf:Description>
```

```
curl -i -L -H "Accept: text/rdf+n3" http://dbpedia.org/resource/Uruguay
```

HTTP/1.1 303 See Other

Date: Wed, 02 Oct 2013 22:29:03 GMT

Content-Type: text/rdf+n3; qs=0.8

Server: Virtuoso/07.00.3203 (Linux) i686-generic-linux-glibc212-64 VDB

Location: http://dbpedia.org/data/Uruguay.nt

...

HTTP/1.1 200 OK

Date: Wed, 02 Oct 2013 22:29:04 GMT

Content-Type: text/rdf+n3; charset=UTF-8

Content-Length: 296903

...

```
@prefix owl: <http://www.w3.org/2002/07/owl#> .  
@prefix ns1: <http://cs.dbpedia.org/resource/> .  
@prefix dbpedia: <http://dbpedia.org/resource/> .  
ns1:Uruguay owl:sameAs dbpedia:Uruguay .  
@prefix ns3: <http://pl.dbpedia.org/resource/> .  
ns3:Urugwaj owl:sameAs dbpedia:Uruguay .
```

Utilización de Hash URLs

```
curl -i http://www.w3.org/2006/07/SWD/recipes/examples-20080421/
example1#ClassA
```

HTTP/1.1 200 OK

Date: Thu, 03 Oct 2013 13:08:38 GMT

Server: Apache/2

Content-Type: application/rdf+xml;

...

```
<?xml version="1.0"?>
<rdf:RDF
  xml:base="http://www.w3.org/2006/07/SWD/recipes/examples20080421/example1">
  <owl:Ontology
    rdf:about="http://www.w3.org/2006/07/SWD/recipes/examples20080421/example1">
      <rdfs:comment>An example vocab for minimal hash setup.</rdfs:comment>
      <rdfs:label>Example 1 Ontology</rdfs:label>
    </owl:Ontology>
    <owl:Class rdf:about="http://www.w3.org/2006/07/SWD/recipes/examples-
20080421/example1#ClassA">
      </owl:Class> ...
    </rdf:RDF>
```

3) Proveer información útil acerca de cada URI en RDF

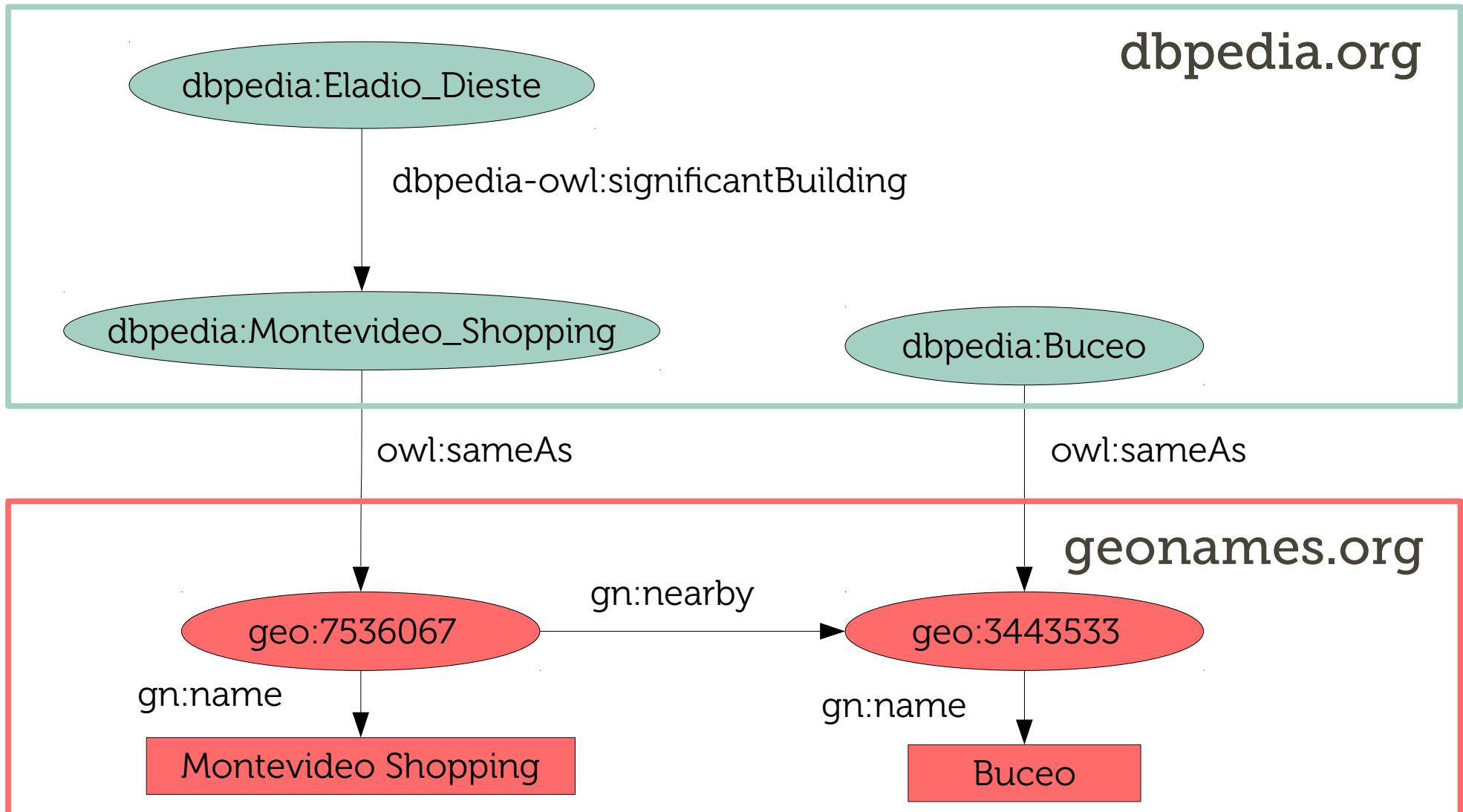
```
dbpedia:Eladio_Dieste dbpedia-owl:birthPlace  
dbpedia:Uruguay ;  
    dbpprop:birthPlace dbpedia:Uruguay ;  
    dbpprop:deathPlace dbpedia:Uruguay ;  
    dbpedia-owl:deathPlace dbpedia:Uruguay .
```

4) Crear **links** entre URLs

```
@prefix ns192: <http://www.wikidata.org/entity/> .  
@prefix ns17: <http://nl.dbpedia.org/resource/> .  
@prefix ns18: <http://eu.dbpedia.org/resource/> .
```

```
dbpedia:Uruguay owl:sameAs ns192:Q77 ,  
    <http://gadm.geovocab.org/id/0_233> ,  
    dbpedia:Uruguay ,  
    <http://rdf.firebaseio.com/ns/m.07twz> ,  
    ns18:Uruguai ,  
    ns17:Uruguay .
```

```
@prefix gn: http://www.geonames.org/ontology/
@prefix dbpedia: http://dbpedia.org/resource/
@prefix dbpedia-owl: http://dbpedia.org/ontology/
@prefix geo: http://sws.geonames.org/
@prefix owl: http://www.w3.org/2002/07/owl#
```

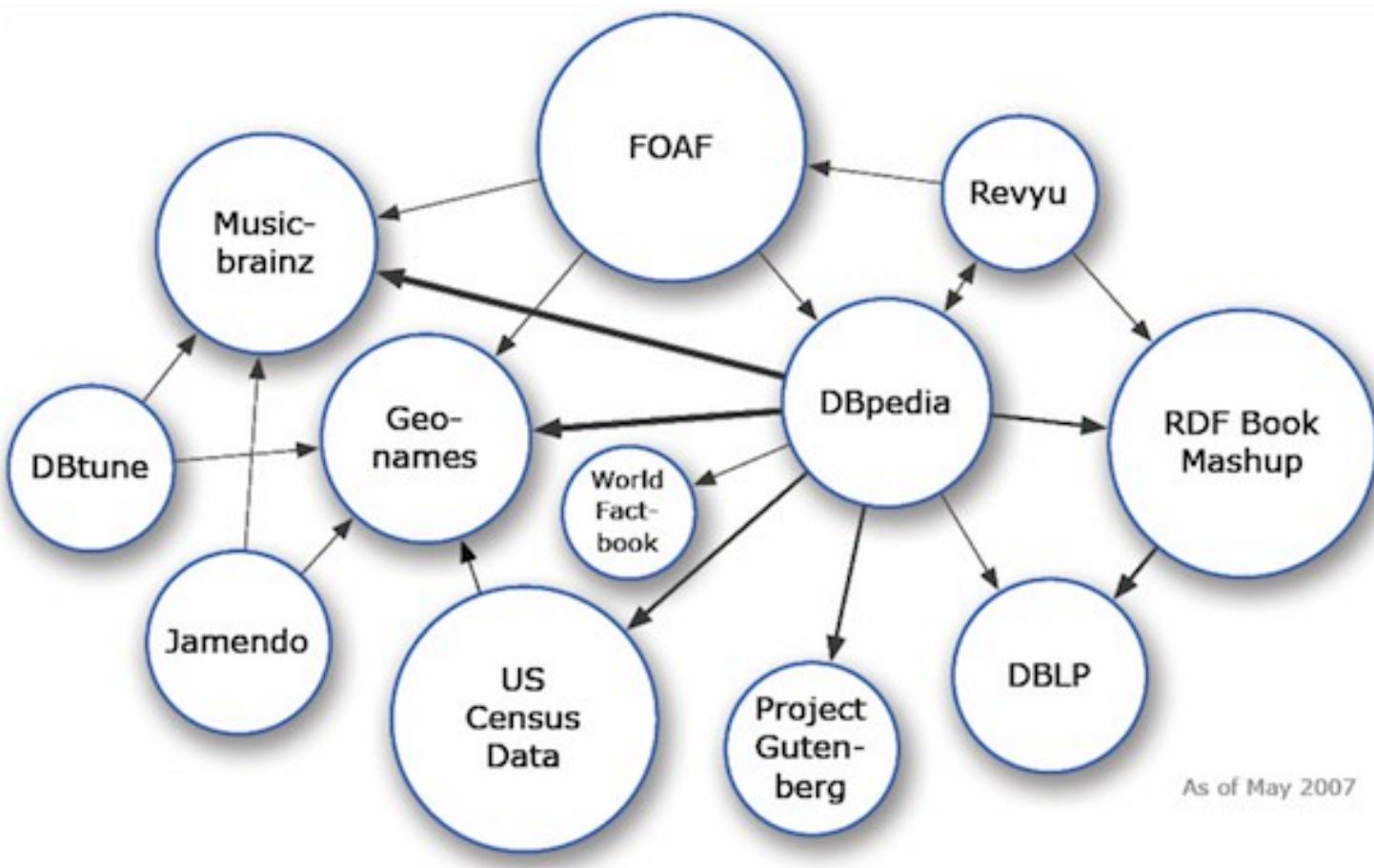


Linked Data + Open Data

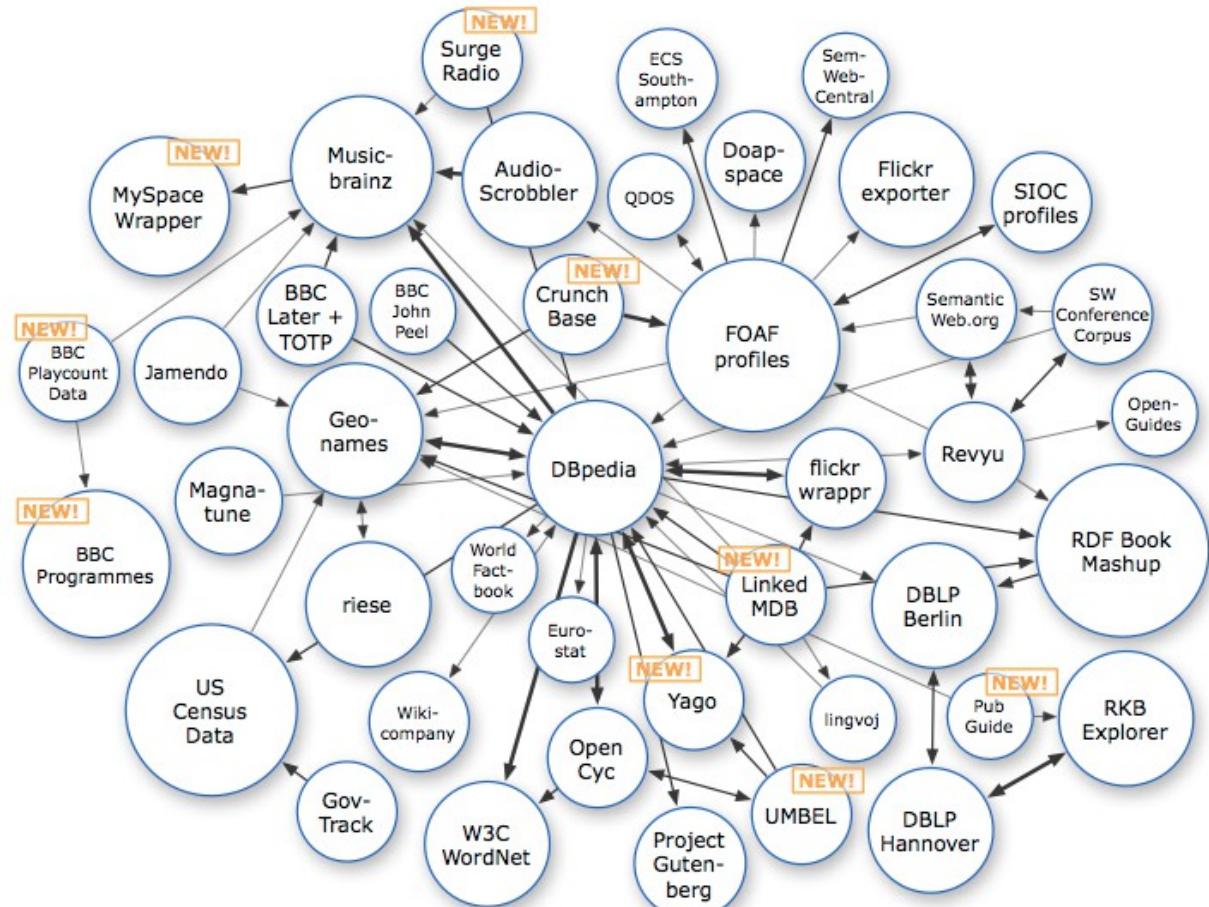
= LOD

LINKED DATA

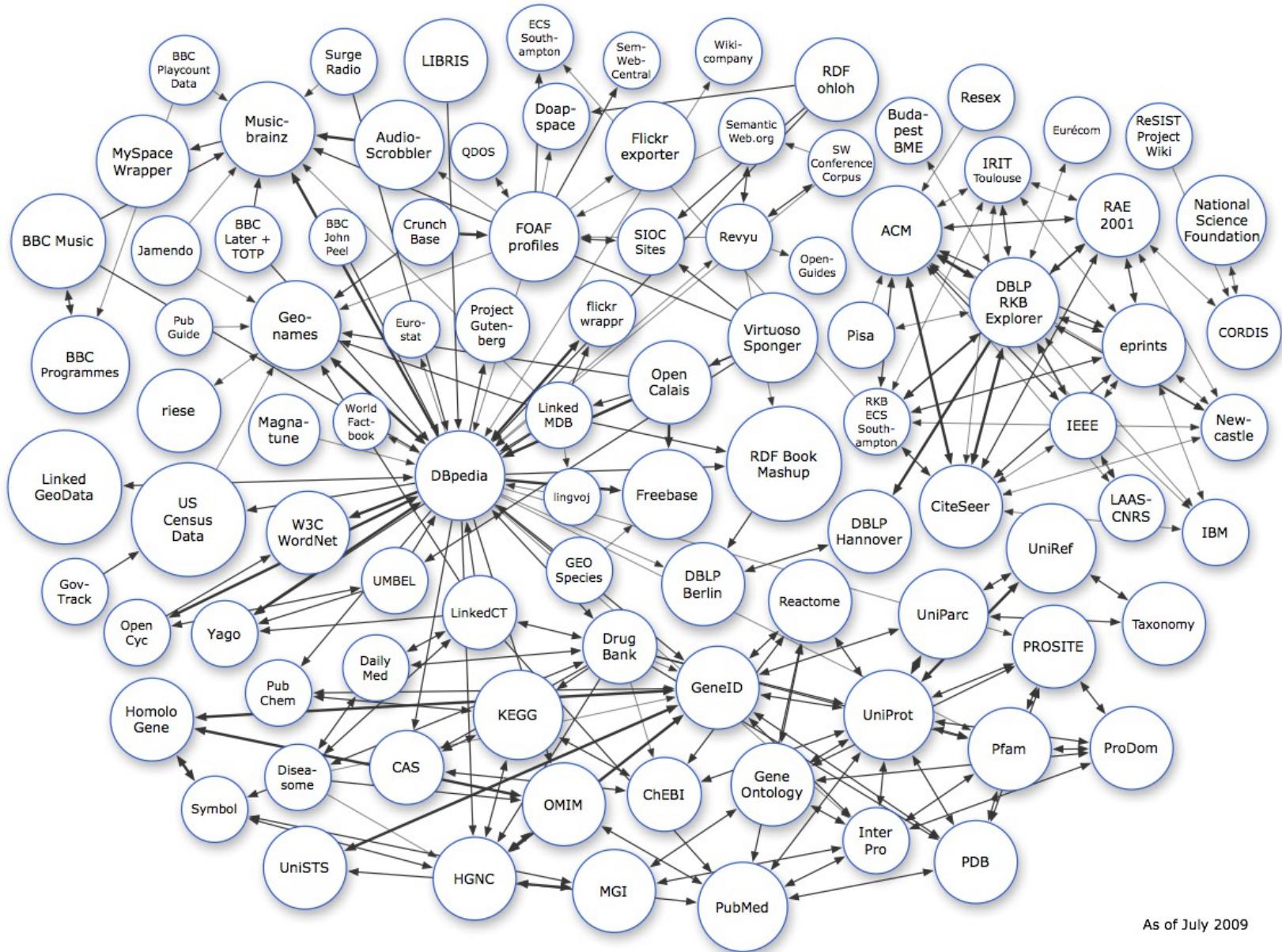
- ★ On the web, open license
 - ★ Machine-readable data
 - ★ Non-proprietary format
 - ★ RDF standards
 - ★ Linked RDF
- IS YOUR DATA 5 ★ ?



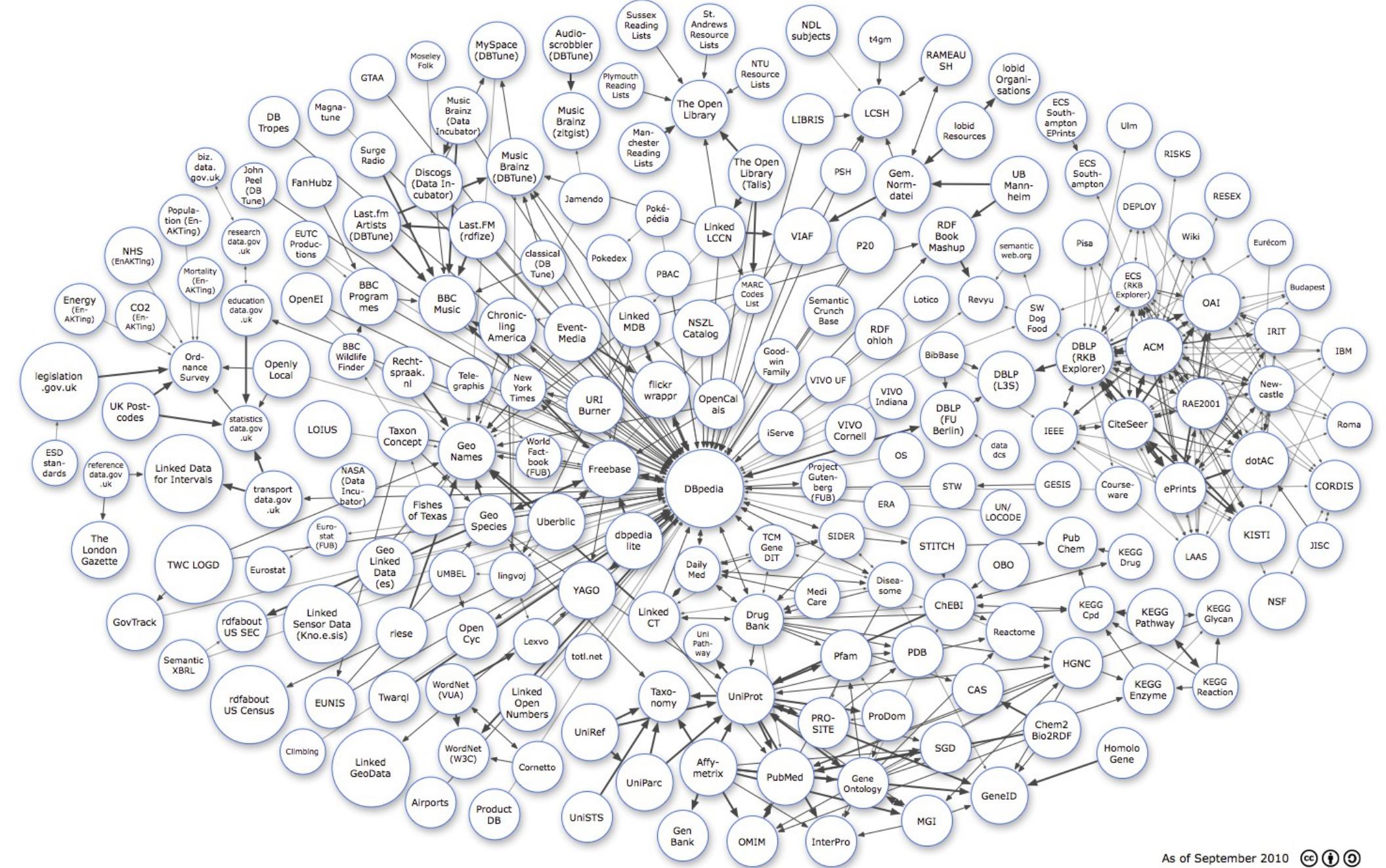
As of May 2007

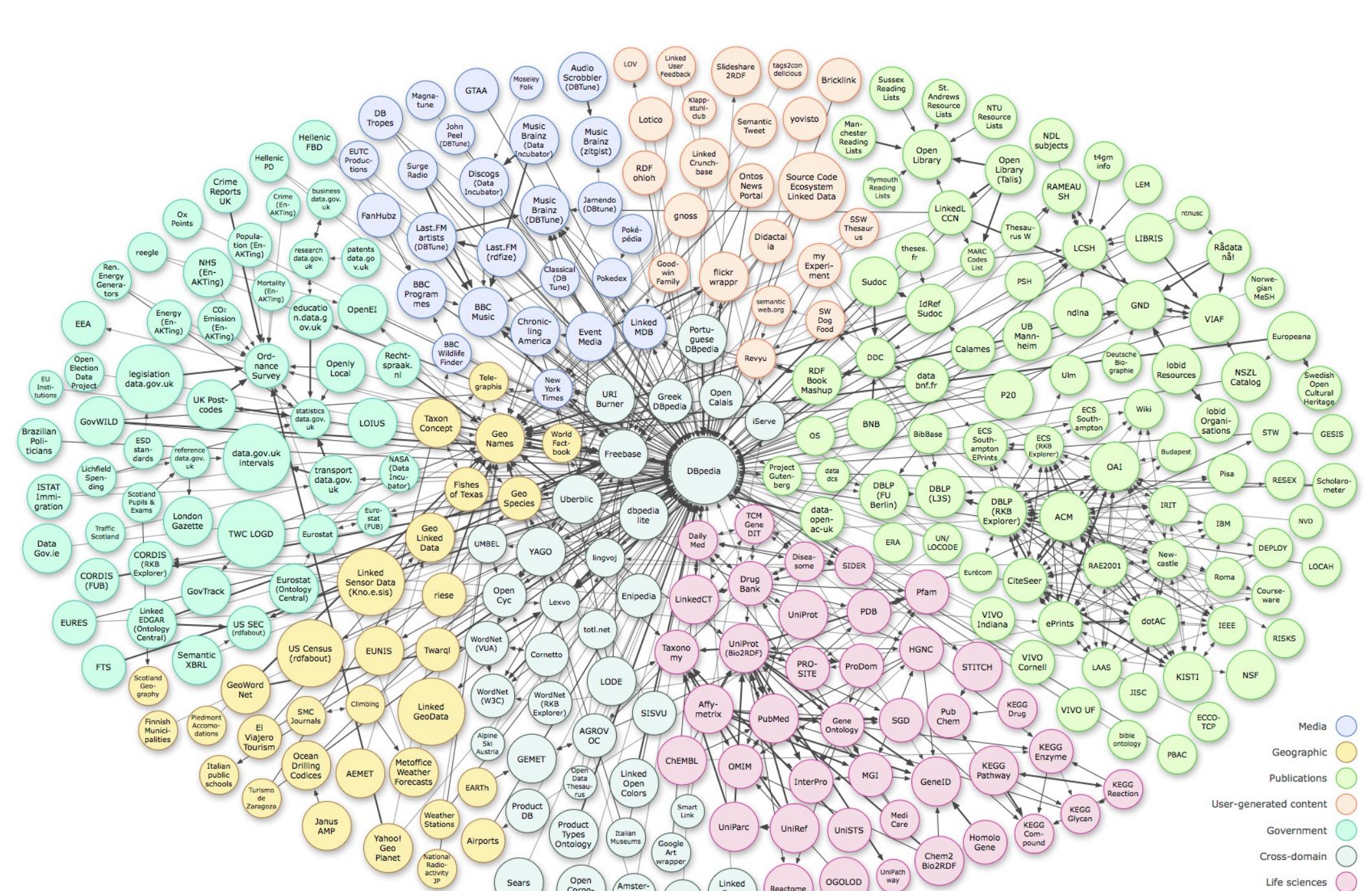


As of September 2008



As of July 2009





As of September 2011



Referencias

- Tom Heath and Christian Bizer (2011) *Linked Data: Evolving the Web into a Global Data Space.*
<http://linkeddatabook.com/editions/1.0/>
- W3C, *Best Practice Recipes for Publishing RDF Vocabularies*,
<http://www.w3.org/TR/swbp-vocab-pub/>
- W3C, *Cool URIs for the Semantic Web*,
<http://www.w3.org/TR/cooluris/>
- Juan Sequeda, Daniel P. Miranker, *Linked Data Tutorial*, Semantic Technology Conference 2012,
<http://www.slideshare.net/juansequeda/linked-data-tutorial-at-semtech-2012>
- Tom Heath, *Linked Data - Connect Distributed Data across the Web* <http://linkeddata.org>

Gracias

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