



UNIVERSITÉ DE NANTES

SEMANTIC WEB, LINKED OPEN DATA,

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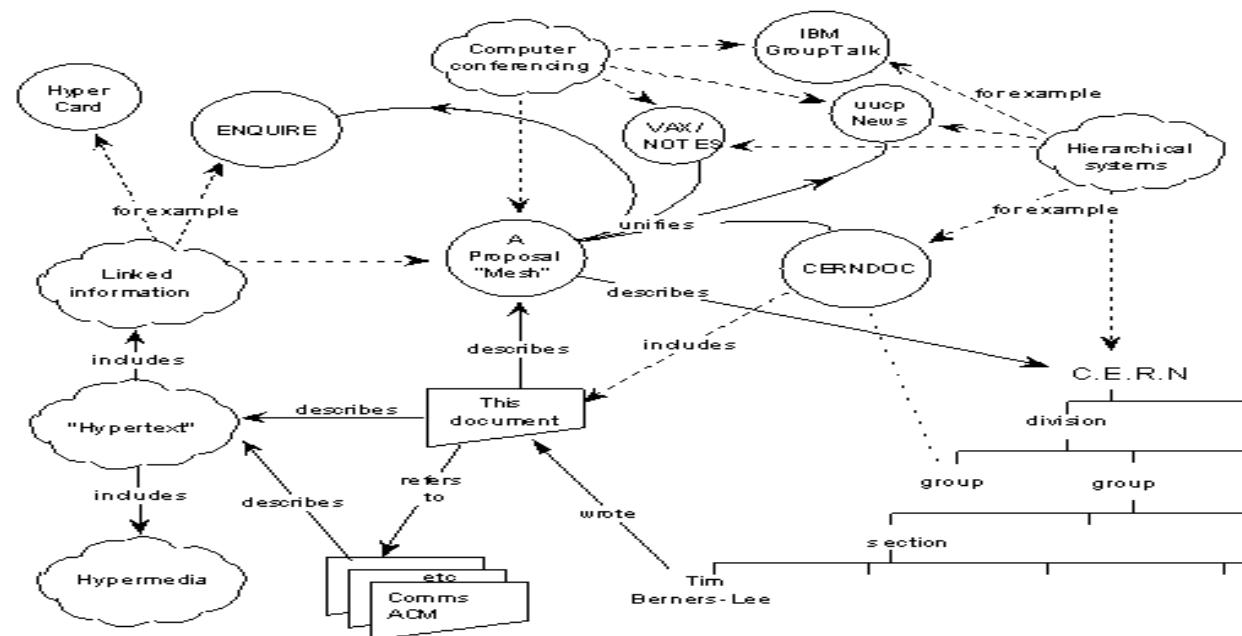
References

- Foundations of Semantic Web Technologies
- http://www.semantic-web-book.org/page/Foundations_of_Semantic_Web_Technologies
- Web data management, abiteboul et al.
 - webdam.inria.fr/Jorge
- <http://linkeddata.org/>
- Semantic Web primer book. Slides available at :
<http://www.ics.forth.gr/isl/swprimer/presentation.htm>
- Cours: <https://exmo.inrialpes.fr/teaching/sw/>
- A Short Semantic Web Tutorial:
http://videolectures.net/training06_sure_stsw/
- <http://www.w3.org>

Web 1.0



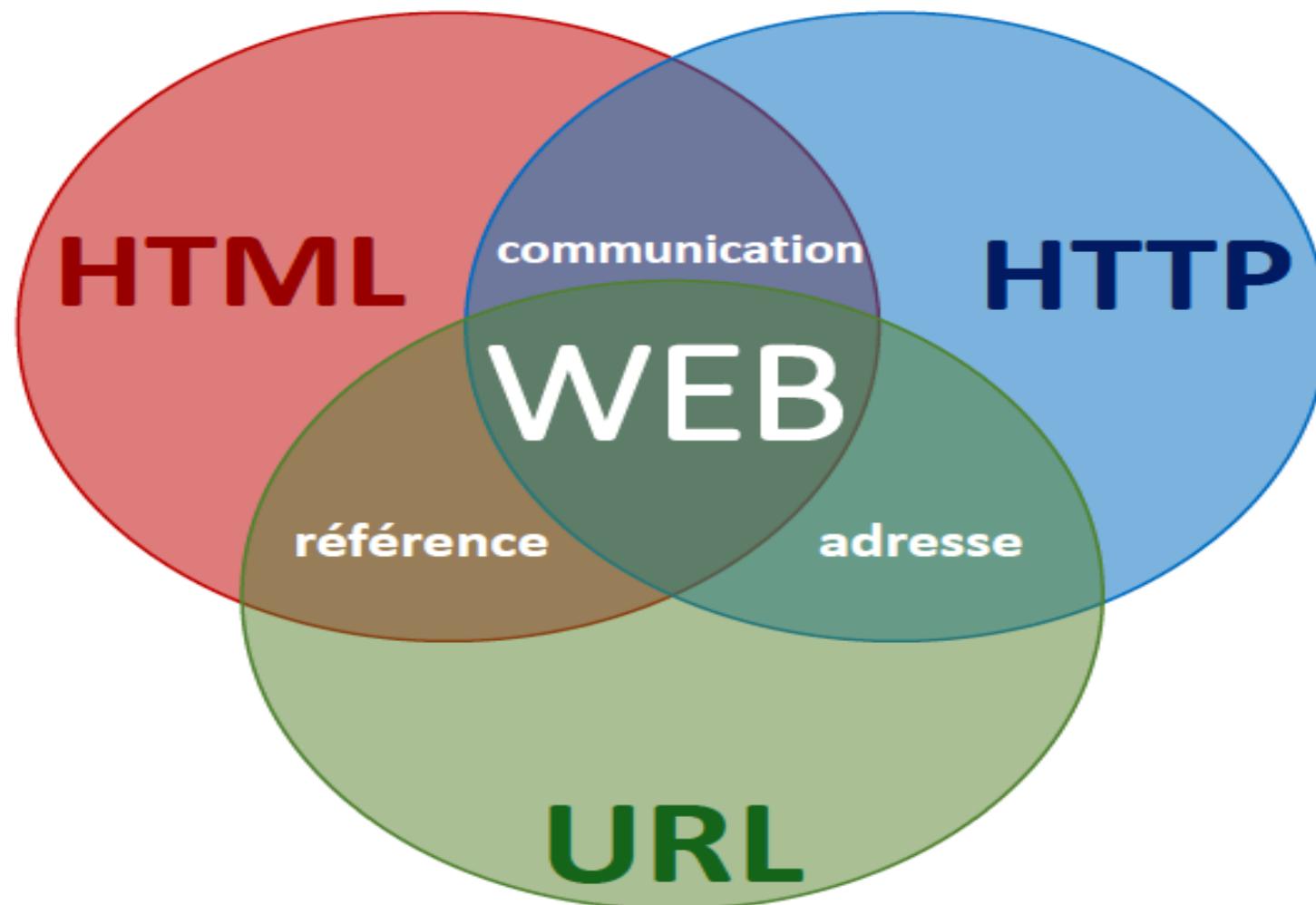
- Connecting information and getting on the net.



Information Management: A Proposal Tim Berners-Lee, CERN, March 1989, May 1990

- Collection of static pages of HTML that describe something in the world.

Web components



Web 2.0

- Called also *Social Web*
- Computers support human collaboration
- From Read to Read/write
- “*Web 2.0 is Much More About A Change In People and Society Than Technology*” -Dion Hinchcliffe,tech blogger
- A lot of produced knowledge and a lot of noise also
- Maintaining and synthesis knowledge rely on communities



navigation

- [Main page](#)
- [Contents](#)
- [Featured content](#)
- [Current events](#)
- [Random article](#)

search

[Go](#) [Search](#)

interaction

- [About Wikipedia](#)
- [Community portal](#)
- [Recent changes](#)
- [Contact Wikipedia](#)
- [Donate to Wikipedia](#)

Web 2.0

From Wikipedia, the free encyclopedia

The term "**Web 2.0**" is commonly associated with web applications which facilitate interactive [information sharing](#), [interoperability](#), [user-centered design](#)^[1] and [collaboration](#) on the [World Wide Web](#). Examples of Web 2.0 include web-based communities, hosted services, web applications, social-networking sites, video-sharing sites, [wikis](#), [blogs](#), [mashups](#) and [folksonomies](#). A Web 2.0 site allows its users to interact with other users or to change website [content](#), in contrast to non-interactive websites where users are limited to the passive viewing of information that is provided to them.

The term is closely associated with [Tim O'Reilly](#) because of the [O'Reilly Media](#) Web 2.0 conference in 2004.^{[2][3]} Although the term suggests a new version of the [World Wide Web](#), it does not refer to an update to any technical specifications, but rather to cumulative changes in the ways [software developers](#) and [end-users](#) use the Web. Whether Web 2.0 is qualitatively different from prior web technologies has been challenged by World Wide Web inventor [Tim Berners-Lee](#) who called the term a "piece of jargon"^[4].



A [tag cloud](#) (a typical Web 2.0 phenomenon in itself) presenting Web 2.0 [themes](#)

Web 3.0

- Called also : Semantic Web
- Tim Berners-Lee, 2001
- An extension of Web 1.0
- "The **Semantic Web** is an extension of the current web in which information is given well-defined **meaning**, better enabling computers and people to **work in co-operation**.
"



[Berners-Lee et al., Scientific American 2001]

- From Web of document to Web of data
- Connect data on the web



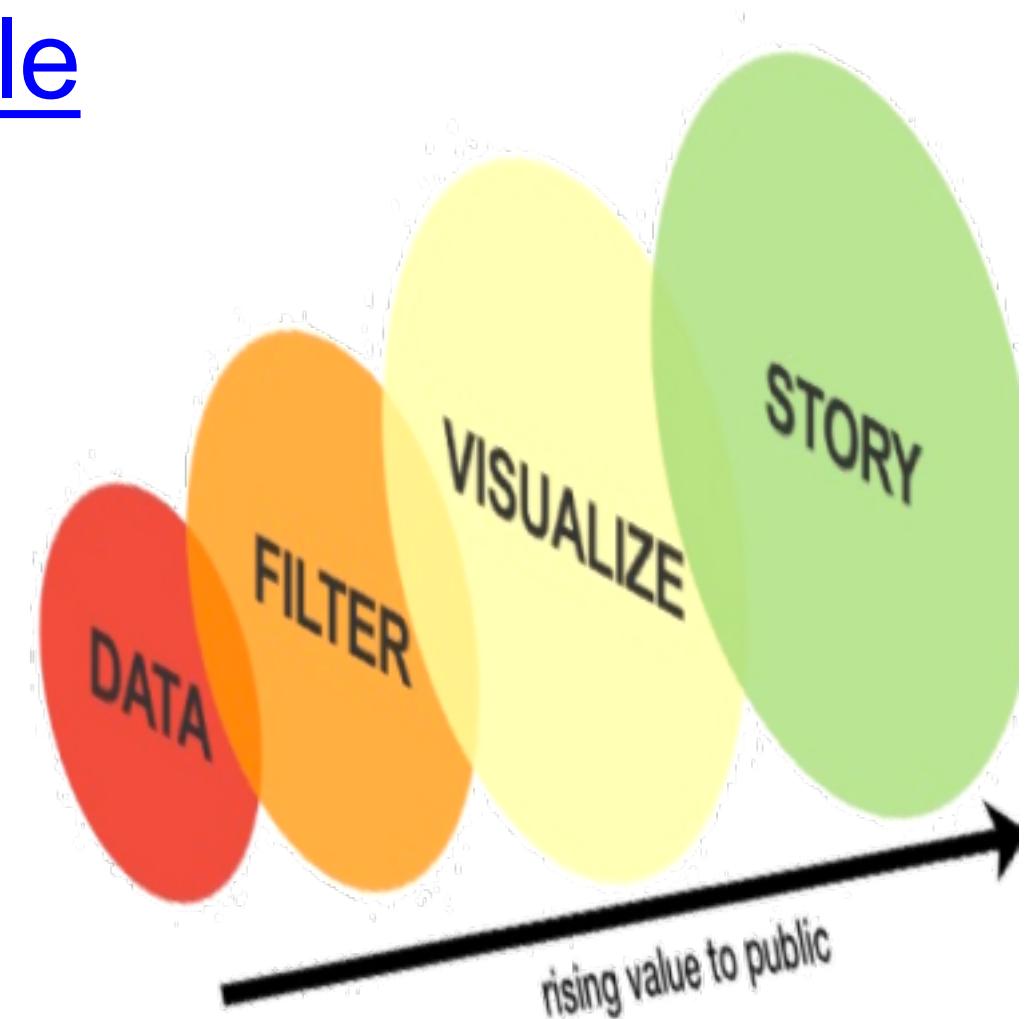
I'm a local open data developer...

- Name and address of **Hotel** in **Nantes** speaking **Spanish** at reception ?
- Name and address of **Libraries** in **Carquefou** and their opening days and hours ?
- Mayor of **Carquefou** and starting time, population of **Carquefou** ?



So you are a local open data developer?

1. Go on: [lodpaddle](#)
[sparql endpoint](#)
2. ask your query
3. And visualize
answers...



Name and address of Hotel in Nantes speaking Spanish at reception

```
PREFIX foaf: <http://xmlins.com/foaf/0.1/>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX dbowl: <http://dbpedia.org/ontology/>
PREFIX dbprop: <http://dbpedia.org/property/>
```

```
SELECT distinct(STR(?name) AS ?HotelName), STR(?ad) AS
?AddressHotel
FROM <http://lodpaddle.univ-nantes.fr/Hotel>
WHERE {
    ?s foaf:name ?name .
    ?s dbprop:town <http://dbpedia.org/resource/Nantes> .
    ?s dbprop:location ?ad.
    ?s dbowl:language ?o .
    Filter(?o="espagnol"^^xsd:string and ?ad
!="undefined"^^xsd:string)
}
```



HotelName	AddressHotel
AMIRAL	26 bis, Rue Scribe
STARS	3 rue du Petit Chatelier
KYRIAD NANTES GARE	8 Allée du Commandant Charcot
LA PEROUSE	3 Allée Duquesne
SAINT PATRICK	7 Rue Saint Nicolas
HOTEL MERCURE NANTES CENTRAL	4 Rue du Couëdic
COMFORT HOTEL NANTES ASTORIA	4, allée du commandant Charcot
IBIS STYLE NANTES PLACE GRASLIN	5, rue du Chapeau Rouge
HOTEL DE LA GARE - CITOTEL	5, Allée du Commandant Charcot
POMMERAYE	2, Rue Boileau
SURCOUF (LE)	38, Rue de Richebourg
CHATEAU (DU)	5, Place de la Duchesse Anne
RENOVA	11, Rue Beauregard
SAINT YVES	154, Rue du Général Buat
CAMPANILE NANTES CENTRE SAINT JACQUES	16 boulevard Emile Gabory

Web Images Videos News Maps More Search tools

About 8,670,000 results (0.67 seconds)

[Hotel De La Gare De Nantes Citotel , Nantes, France - 53 Gu...](#)

[www.booking.com](#) › France › Pays de la Loire › Nantes

Rating: 7.4/10 - 53 reviews

Destination/Hotel Name: ... ibis Styles Nantes Centre Place Royale is in a better location, with a guest score of 9.3; Kyriad Nantes ... The Hotel Nantes Citotel has a 24-hour reception and offers an airport shuttle to Nantes Aquitaine Airport, 5 miles away. ... We speak your language! ... French , Spanish , English , German.

[Hotel Balladins Nantes Saint Herblain , Saint-Herblain, Franc...](#)

[www.booking.com](#) › France › Pays de la Loire › Saint-Herblain

Rating: 8.3/10 - 456 reviews

This hotel is located on the Nantes - St Nazaire highway, close to the Zenith and Nord-Laënnec hospital. ... Destination/Hotel Name: ... Clean Free secure parking Very helpful at reception Speak English Great location near shopping Kuwaiti Dinar, Lithuanian Litas, Malaysian Ringgit, Mexican Peso, Moldovan Leu ...

[De France Oceania Hotels in Nantes - 3 Stars Hotel | HRS](#)

[www.hrs.com](#) › HRS Search hotel › Nantes

Rating: 5.6/10 - 1 vote

1 real hotel reviews > Reservations free of charge. ... fair complex 0,4 Last name CITE DES CONGRES; Reception (lobby); Elevator; Hotel-owned car park; Car ...

[Hotel De Nantes Paris, France - Hotel Deals, Reviews and P...](#)

[www.venere.com](#) › france hotels › paris hotels › montparnasse , paris

Rating: 7.1/10 - 64 votes

Read hotel reviews, find Hotel De Nantes on a map of Paris and book your stay! ... Italiano · Deutsch · Español · Français · Nederlands · Norsk · Svenska · 日本語 · 中文 The man on reception when we arrived was extremely friendly and helpful ... The staff are very friendly and helpful - Thibult speaks good English but you ...

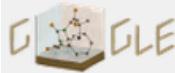
[Quality Suites Nantes Atlantique \(France\) - Hotel Reviews ...](#)

[www.tripadvisor.com](#) › ... › Loire-Atlantique › Nantes › Nantes Hotels

Rating: 3 - 84 reviews - Price range: \$

Quality Suites Nantes Atlantique, Nantes: See 84 traveler reviews, 29 candid photos, and ... "Don't be fooled by the name..." ... It always amuses me when you ask for a town map at reception and when they point out the hotel location they are ... I don't expect a wide range of English speaking TV stations, this one had none.

[Quality by name only. - Quality Suites Nantes Atlantique, Nan...](#)



pharrell williams



Web Images Vidéos Actualités Maps Plus ▾ Outils de recherche

Environ 244 000 000 résultats (0,38 secondes)

Pharrell Williams - G I R L

pharrellwilliams.com/ Traduire cette page

Grammy Award winning musician/entrepreneur **Pharrell Williams** is a creative force, using music, fashion, and design to express his distinctive style.

Pharrell Williams — Wikipédia

fr.wikipedia.org/wiki/Pharrell_Williams

Pharrell Williams, ou tout simplement Pharrell, est un auteur-compositeur-interprète, rappeur, producteur et styliste américain, né le 5 avril 1973 à Virginia Beach ...
[GIRL - NERD - Happy - Discographie de Pharrell ...](#)

Pharrell Williams - Happy (Official Music Video) - YouTube



www.youtube.com/watch?v=y6Sxv-sUYtM

22 nov. 2013 - Ajouté par iamOTHER

Get Pharrell's new album G I R L with 10 Brand New Tracks on iTunes: <http://smarturl.it/GIRLitunes> Get ...

Actualités correspondant à pharrell williams



Chaussons Mickey, chaussettes Bob L'éponge... les ...

TF1 - De Julie Caron - il y a 4 heures

On peut être une star de la chanson de renommée mondiale et avoir des secrets un peu gênants. **Pharrell Williams** le sait bien... Le chanteur ...

VIDÉO. "Happy" de Pharrell Williams chanté par le méchant ...

Le Huffington Post - il y a 2 jours

Quand les Iraniens reprennent « Happy » de Pharrell Williams

Le Monde - il y a 6 jours

Plus d'actualités pour "pharrell williams"

Pharrell Williams | Facebook

<https://www.facebook.com/Pharrell> Traduire cette page



[Plus d'images](#)

Pharrell Williams

[Suivre](#)

64 078 abonnés sur Google+

Pharrell Williams, ou tout simplement Pharrell, est un auteur-compositeur-interprète, rappeur, producteur et styliste américain, né le 5 avril 1973 à Virginia Beach, Virginie, États-Unis. [Wikipédia](#)

Naissance : 5 avril 1973 (41 ans), Virginia Beach, Virginie, États-Unis

Épouse : Helen Lasichanh (m. 2013)

Albums : In My Mind, Out of My Mind, In My Mind: The Prequel, The Amazing Spider-Man 2, G I R L

Parents : Pharoah Williams, Carolyn Williams

Distinctions et récompenses : Grammy Award de l'album de l'année, plus...

Titres

[Happy](#)

[Marilyn Monroe](#)

[My Enemy](#)

[Come Get It Bae](#)

[Gust of Wind](#)

capital west europe


[≡ Examples](#) [Random](#)
Input interpretation:
[Western Europe](#) [capital city](#)
Summary:

Amsterdam, Noord-Holland | Andorra la Vella | Athens, Attiki | Berlin | Bern | Brussels | Copenhagen | Douglas | Dublin | Gibraltar | Lisbon, Lisboa | London, Greater London | Luxemburg, Luxembourg | Madrid | Monaco-Ville, Monaco | Oslo | Paris, Ile-de-France | Reykjavik, Hofudhborgarsvaedhi | Rome, Lazio | Saint Peter Port | San Marino | Stockholm | Torshavn, Strømø | Vaduz | Valletta | Vatican City | Vienna

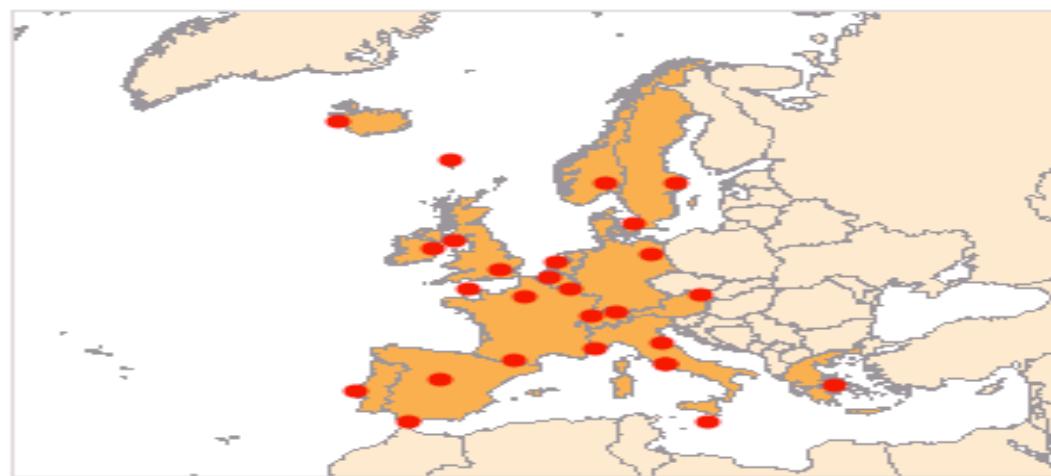
Populations:

city population	total	27.66 million people
	median	517 802 people (country rank: 1 st)
	lowest	826 people (country rank: 1 st) (2009 estimate) (Vatican City)
	highest	7.754 million people (country rank: 1 st) (2009 estimate) (London, Greater London)
metro area population	median	2.635 million people
	highest	12.58 million people (London metro area) (2007 estimate) (London, Greater London)
	lowest	846 584 people (Oslo metro area) (2007 estimate) (Oslo)
distribution		

Location:

Show shortest tour

Show coordinates



Distances:

Show non-metric

Show all distances

	distance	flight time
Vienna to Luxemburg	767 km (kilometers)	50 minutes
Luxemburg to Dublin	952 km (kilometers)	1 hour 5 minutes
Dublin to Lisbon	1639 km (kilometers)	1 hour 50 minutes
Lisbon to Andorra la Vella	994 km (kilometers)	1 hour 5 minutes
Andorra la Vella to Brussels	950 km (kilometers)	1 hour 5 minutes
Brussels to Copenhagen	770 km (kilometers)	50 minutes
Copenhagen to Torshavn	1315 km (kilometers)	1 hour 30 minutes
Torshavn to Paris	1573 km (kilometers)	1 hour 45 minutes
Paris to Berlin	879 km (kilometers)	1 hour
Berlin to Gibraltar	2340 km (kilometers)	2 hours 40 minutes
Gibraltar to Athens	2584 km (kilometers)	2 hours 55 minutes

Search results

For search options, see [Help:Searching](#).

capitals west europe

[Content pages](#) [Multimedia](#) [Help and Project pages](#) [Everything](#) [Advanced](#)

Results 1–20 of 1,866 for **capitals west europe**

Search in namespaces:

Check: All None

- | | | | | | |
|--|---|------------------------------------|---|---------------------------------|--------------------------------------|
| <input checked="" type="checkbox"/> Article | <input type="checkbox"/> Talk | <input type="checkbox"/> MediaWiki | <input type="checkbox"/> MediaWiki talk | <input type="checkbox"/> Portal | <input type="checkbox"/> Portal talk |
| <input type="checkbox"/> User | <input type="checkbox"/> User talk | <input type="checkbox"/> Template | <input type="checkbox"/> Template talk | <input type="checkbox"/> Book | <input type="checkbox"/> Book talk |
| <input type="checkbox"/> Wikipedia | <input type="checkbox"/> Wikipedia talk | <input type="checkbox"/> Help | <input type="checkbox"/> Help talk | | |
| <input type="checkbox"/> File | <input type="checkbox"/> File talk | <input type="checkbox"/> Category | <input type="checkbox"/> Category talk | | |
| <input checked="" type="checkbox"/> List redirects | | | | | |

The page "**Capitals west europe**" does not exist. You can [ask for it to be created](#), but consider checking the search results below to see whether the topic is already covered.

For search help, please visit [Help:Searching](#).

[European route E92](#)

European route E 92 is an A-Class European route , crossing the Greek peripheries

... following local **capitals** (direction **west-east**): ...

[1,007 B \(87 words\)](#) - 17:27, 9 August 2011

[Western Europe](#) (redirect from [West Europe](#))

Western Europe is a loose term for the collection of countries in the western most ...

divided strictly into the **West** and the East is sometimes ...

[18 KB \(1,889 words\)](#) - 22:14, 12 November 2011

[Capital \(architecture\)](#) (section [Post-classical European capitals](#))

These form the three principal types on which all **capitals** are based ... Post-classical

European capitals Eastern **capitals**: [File:Capital-From-](#) ...

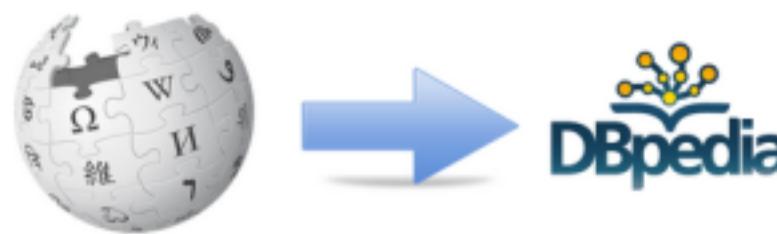
[13 KB \(1,862 words\)](#) - 01:03, 29 October 2011

[Georgia \(U.S. state\)](#) (section [Capitals](#))

on the **west** by Alabama ; and on the north by Tennessee and North ... **Capitals**:

Georgia has had five official state **capitals** : colonial Savannah ...

[95 KB \(12,080 words\)](#) - 16:29, 30 November 2011



← → ⌂ ⌂ dbpedia.org/sparql

Virtuoso SPARQL Query Editor

Default Data Set Name (Graph IRI)
`http://dbpedia.org`

Query Text

```
PREFIX dbo:<http://dbpedia.org/ontology/>
PREFIX dc:<http://purl.org/dc/terms/>

Select ?country ?capital
Where {
    ?country dbo:capital ?capital .
    ?country dc:subject <http://dbpedia.org/resource/Category:Western_Europe>
}
```

(Security restrictions of this server do not allow you to retrieve remote RDF data, see [details](#).)

Results Format:

Execution timeout: milliseconds (values less than 1000 are ignored)

Options: Strict checking of void variables

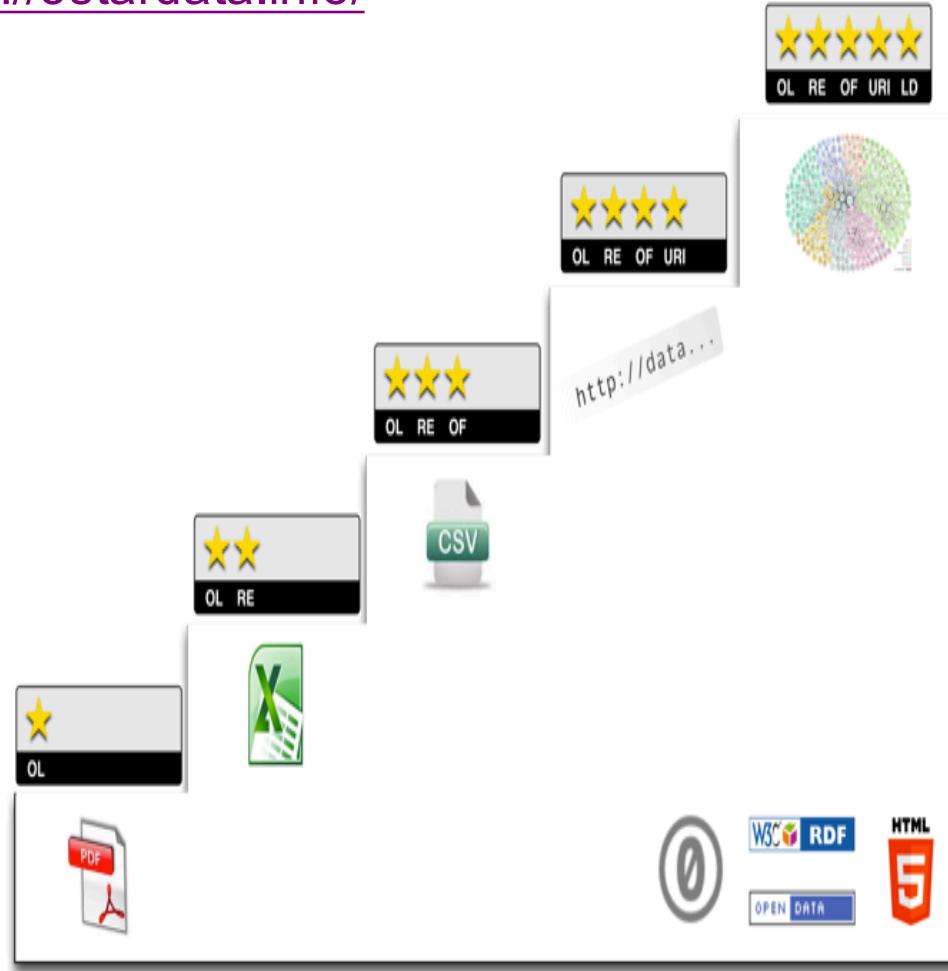
(The result can only be sent back to browser, not saved on the server, see [details](#))

country	capital
http://dbpedia.org/resource/Principality_of_Sealand	http://dbpedia.org/resource/HM_Fort_Roughs
http://dbpedia.org/resource/England	http://dbpedia.org/resource/London
http://dbpedia.org/resource/Northern_Ireland	http://dbpedia.org/resource/Belfast
http://dbpedia.org/resource/Scotland	http://dbpedia.org/resource/Edinburgh
http://dbpedia.org/resource/Wales	http://dbpedia.org/resource/Cardiff
http://dbpedia.org/resource/Germany	http://dbpedia.org/resource/Berlin
http://dbpedia.org/resource/Gibraltar	http://dbpedia.org/resource/Gibraltar_national_football_team
http://dbpedia.org/resource/Iceland	http://dbpedia.org/resource/Reykjavík
http://dbpedia.org/resource/Luxembourg	http://dbpedia.org/resource/Luxembourg_(city)
http://dbpedia.org/resource/Monaco	http://dbpedia.org/resource/Monaco-Ville
http://dbpedia.org/resource/Netherlands	http://dbpedia.org/resource/Amsterdam
http://dbpedia.org/resource/United_Kingdom	http://dbpedia.org/resource/London
http://dbpedia.org/resource/Republic_of_Ireland	http://dbpedia.org/resource/Dublin

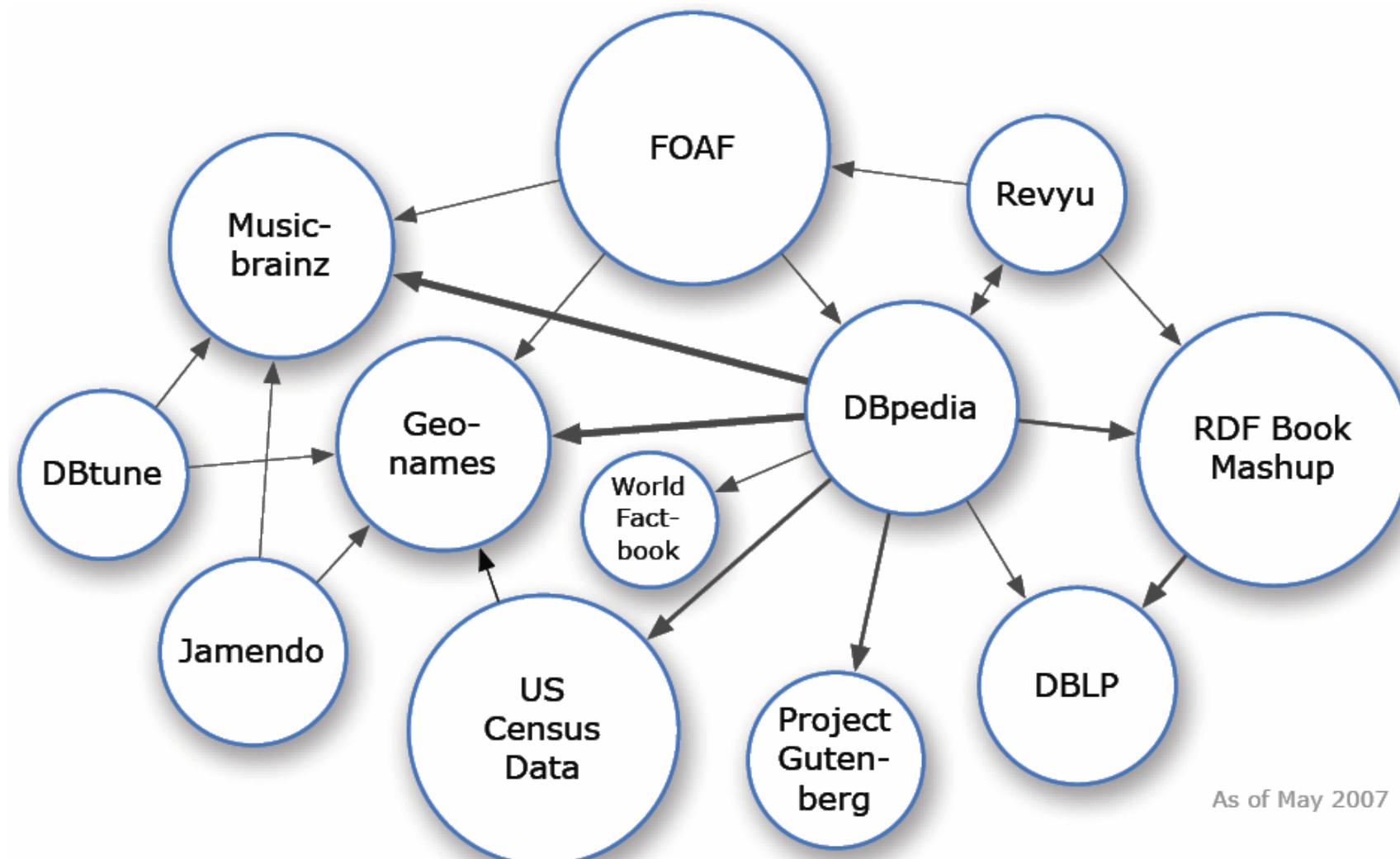
country	capital
http://dbpedia.org/resource/United_Kingdom	http://dbpedia.org/resource/London
http://dbpedia.org/resource/Belgium	http://dbpedia.org/resource/Brussels
http://dbpedia.org/resource/England	http://dbpedia.org/resource/London
http://dbpedia.org/resource/Germany	http://dbpedia.org/resource/Berlin
http://dbpedia.org/resource/Iceland	http://dbpedia.org/resource/Reykjav%C3%ADk
http://dbpedia.org/resource/Luxembourg	http://dbpedia.org/resource/Luxembourg_(city)
http://dbpedia.org/resource/Monaco	http://dbpedia.org/resource/Monaco-Ville
http://dbpedia.org/resource/Netherlands	http://dbpedia.org/resource/Amsterdam
http://dbpedia.org/resource/Northern_Ireland	http://dbpedia.org/resource/Belfast
http://dbpedia.org/resource/Principality_of_Sealand	http://dbpedia.org/resource/HM_Fort_Roughs
http://dbpedia.org/resource/Republic_of_Ireland	http://dbpedia.org/resource/Dublin
http://dbpedia.org/resource/Scotland	http://dbpedia.org/resource/Edinburgh
http://dbpedia.org/resource/Spain	http://dbpedia.org/resource/Madrid
http://dbpedia.org/resource/Wales	http://dbpedia.org/resource/Cardiff
http://dbpedia.org/resource/France	http://dbpedia.org/resource/Paris
http://dbpedia.org/resource/Gibraltar	http://dbpedia.org/resource/Gibraltar_national_football_team

Require 5stars Data

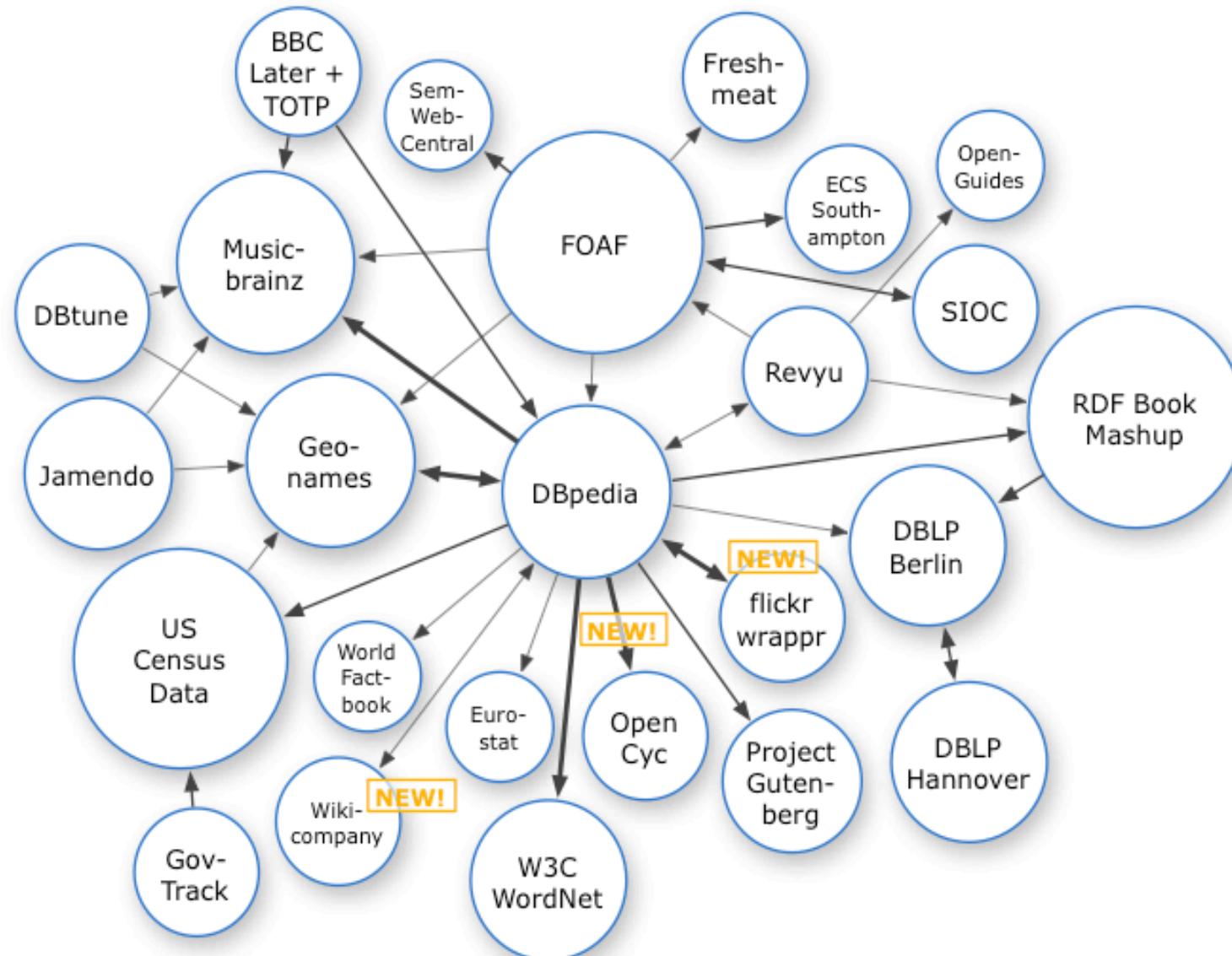
<http://5stardata.info/>

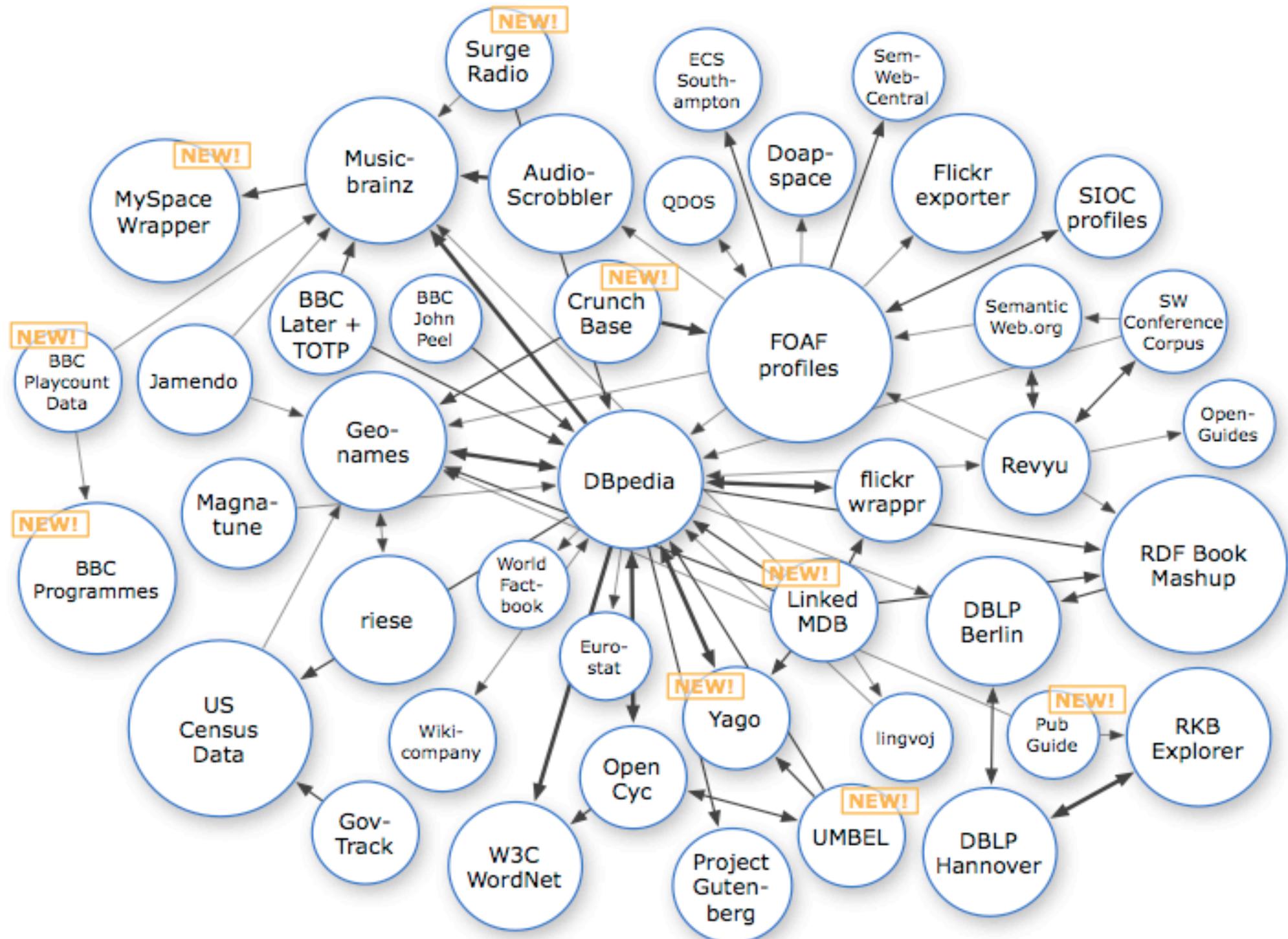


Linked Data - Connect Distributed Data across the Web

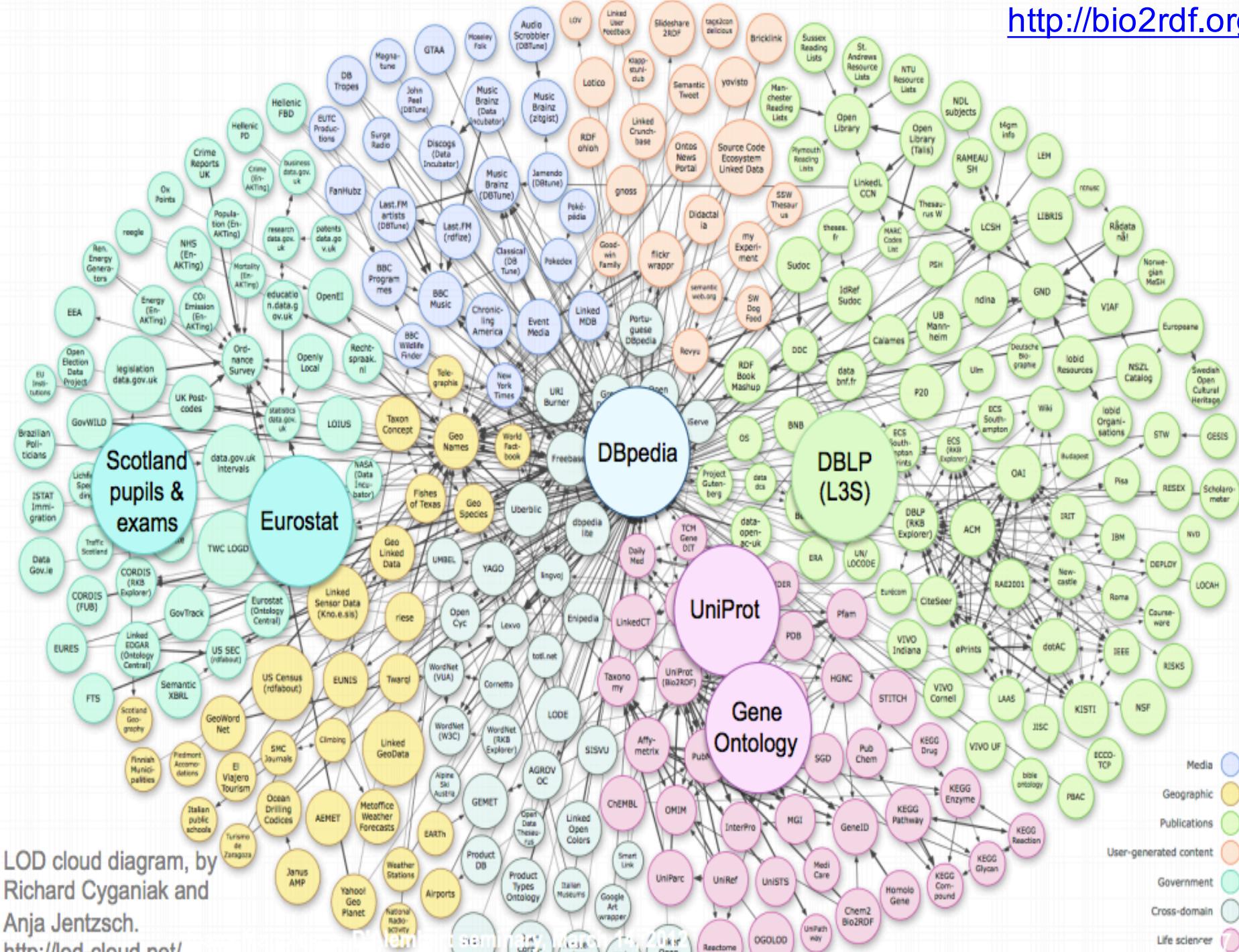


October 2007

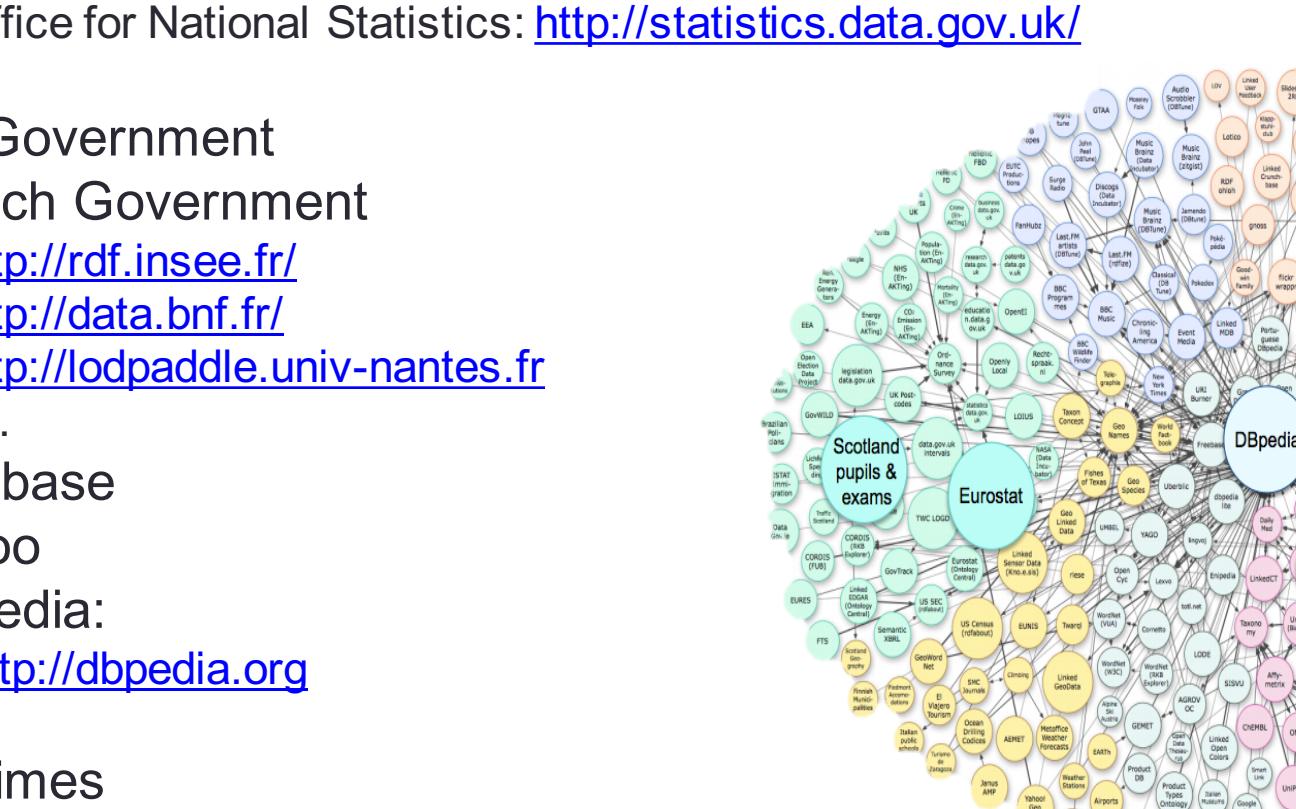


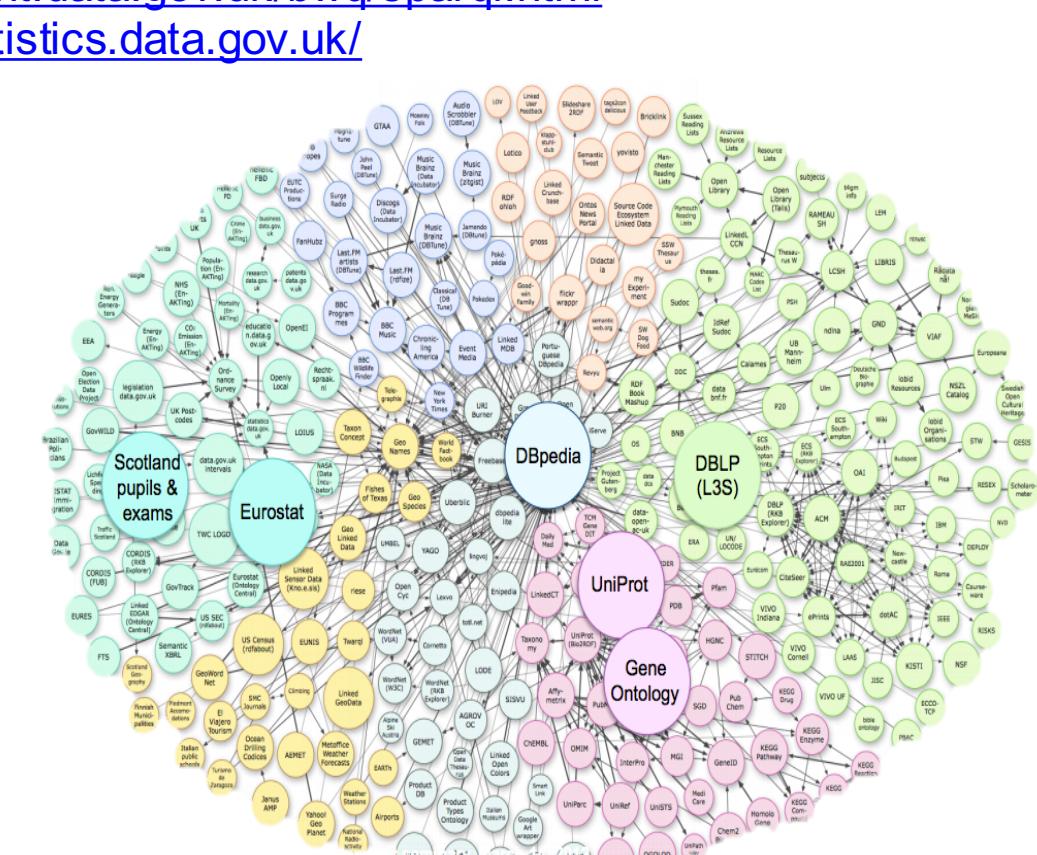


As of September 2008



Linked Data Publishers

- UK Government
 - Environment Agency: <http://environment.data.gov.uk/bwq/sparql.html>
 - Office for National Statistics: <http://statistics.data.gov.uk/>
 - US Government
 - French Government
 - <http://rdf.insee.fr/>
 - <http://data.bnf.fr/>
 - <http://lodpaddle.univ-nantes.fr>
 -
 - Freebase
 - Yagoo
 - DBpedia:
 - <Http://dbpedia.org>
 - NYTimes
 - BCC



Web 4.0

- Semantic wikis allow community to produce formalized knowledge and natural language "knowledge"
 - Mix of structured, machine-readable data and unstructured data from human input
- Writing and using formal knowledge take place in the same system allowing instance gratification

Semantic wikis

Content of wiki page of "France"	Content of semantic wiki page of "France"
France is located in [Europe]	France is located in [locatedIn::Europe]
The capital of France is [Paris]	The capital of France is [hasCapital:: Paris]

- Semantic query:
 - [[locatedIn::Europe]][[hasCapital::Paris]]
- Return the page: "France"
- Semantic wikis are used as knowledge base for humans and machines

semantic-mediawiki.org

Applications Appels des « accélér FI-PPP Phase 3 | Dig Informatique | Wand White House-MIT Bi Hudiksvall - Wikipedia CPS 296.1: Topics in Sgvizler development SPARQL Endpoints Autres favoris Create account Log in

SMW
Semantic MediaWiki

Main page
Introduction
User manual
Admin manual
Community portal
Recent changes
Register your wiki

Links
Report a bug
Source code
Code documentation
MediaWiki
OSDA

Tools

Page Discussion

View View source History Search

SMWCon Fall 2014
October 1-3 in Vienna, Austria
Do not forget to register.

Semantic MediaWiki (SMW) is a free, open-source extension to [MediaWiki](#) – the wiki software that powers [Wikipedia](#) – that lets you store and query data within the wiki's pages. Semantic MediaWiki is also a full-fledged framework, in conjunction with many spinoff extensions, that can turn a wiki into a powerful and flexible knowledge management system. All data created within SMW can easily be published via the [Semantic Web](#), allowing other systems to use this data seamlessly.

More about Semantic MediaWiki

- Introduction to SMW
- FAQ
- Talks and publications
- Testimonials

Wiki of the Month - September 2014

Funtoo Linux is a Linux-based operating system that is a variant of Gentoo Linux.

- Read more about Funtoo Linux
- View previous wikis of the month
- Nominate a site as wiki of the month

Installation

- Administrator manual
- Installation
- Configuration
- Related extensions

Usage

- User manual
- SMW reference
- Try out SMW online
- Reporting bugs and wishes

User community

- Getting support (Mailing lists)
- SMW Community Wiki
- List of SMW-using wikis
- SMWCon, the Semantic MediaWiki Conference

The SMW project

- About the project
- Version history
- Development roadmap
- Programmer's guide

News

RSS • Atom

- 4 August 2014: Semantic MediaWiki 2.0 released
- 18 April 2014: Semantic MediaWiki 1.9.2 released
- 9 February 2014: Semantic MediaWiki 1.9.1 released

Kolflow

- ▶ Home
- ▶ Participants
- ▶ Deliverables
- ▶ Tasks
- ▶ Events
- ▶ Publications
- ▶ Software
- ▶ Job Positions

Meetings Quick Links

- ▶ Nantes 21/02/11
- ▶ Lyon 6/10/11
- ▶ Sophia 22/03/12
- ▶ Nancy 20/09/12
- ▶ Nantes 21/03/13
- ▶ Lyon 7/11/13
- ▶ Nice 22/05/14

Tasks

- ▶ Task 1
- ▶ Task 2
- ▶ Task 3
- ▶ Task 4
- ▶ Task 5
- ▶ Task 6

Teams

- ▶ Edelweiss (Sophia)
- ▶ GDD (Nantes)
- ▶ Orpailleur (Nancy)
- ▶ Silex (Lyon)



The Kolflow is a 3-years basic research project taking place from 1 February 2011 extended to 31 October 2014, funded by [French National Agency for Research \(ANR\)](#), program [ANR CONTINT\(ANR-10-CORD-0021\)](#). The aim of the project is investigation on Man-machine collaboration in continuous knowledge-construction flows. Kolflow partners are [GDD \(LINA\)](#), [Orpailleur \(LORIA\)](#), [Silex \(LIRIS\)](#), [Wimmics \(INRIA\)](#). The coordinator of Kolflow is [Pascal Molli](#), Full Professor at [University of Nantes](#) and Head of [GDD](#) team at [LINA](#).

Summary

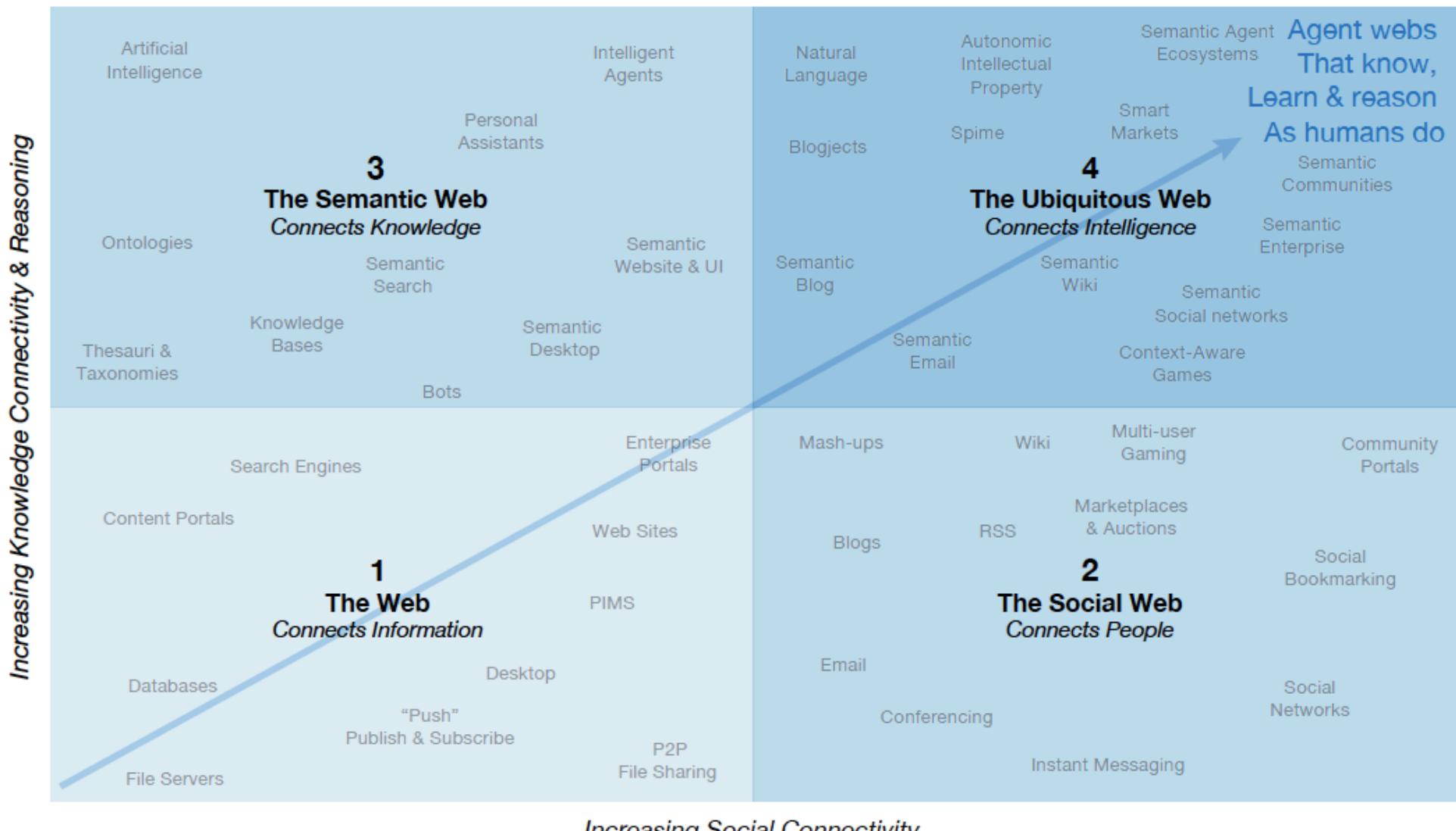
Web 2.0 is currently producing a huge amount of information. Continuously transforming this information into knowledge is a major challenge for the research community. Automated reasoning or collective intelligence are currently two representative approaches to transform content into knowledge. The Kolflow project proposes to extend collective intelligence with smart agents relying on automated reasoning. Smart agents can significantly reduce the overhead of communities in the process of continuously building knowledge. Consequently, continuous knowledge building is much more efficient.

Kolflow aims at building a social semantic space where humans collaborate with smart agents in order to produce knowledge understandable by humans and machines. Humans are able to understand the actions of smart agents. Smart agents are able to understand actions of humans. Kolflow targets the co-evolution of content and knowledge as the result of interactions of humans and machines.

If human-machine collaboration can be the key to ensure co-evolution of content and knowledge, such collaboration can fail if not managed. The Kolflow project addresses the following scientific issues:

Semantic Wave

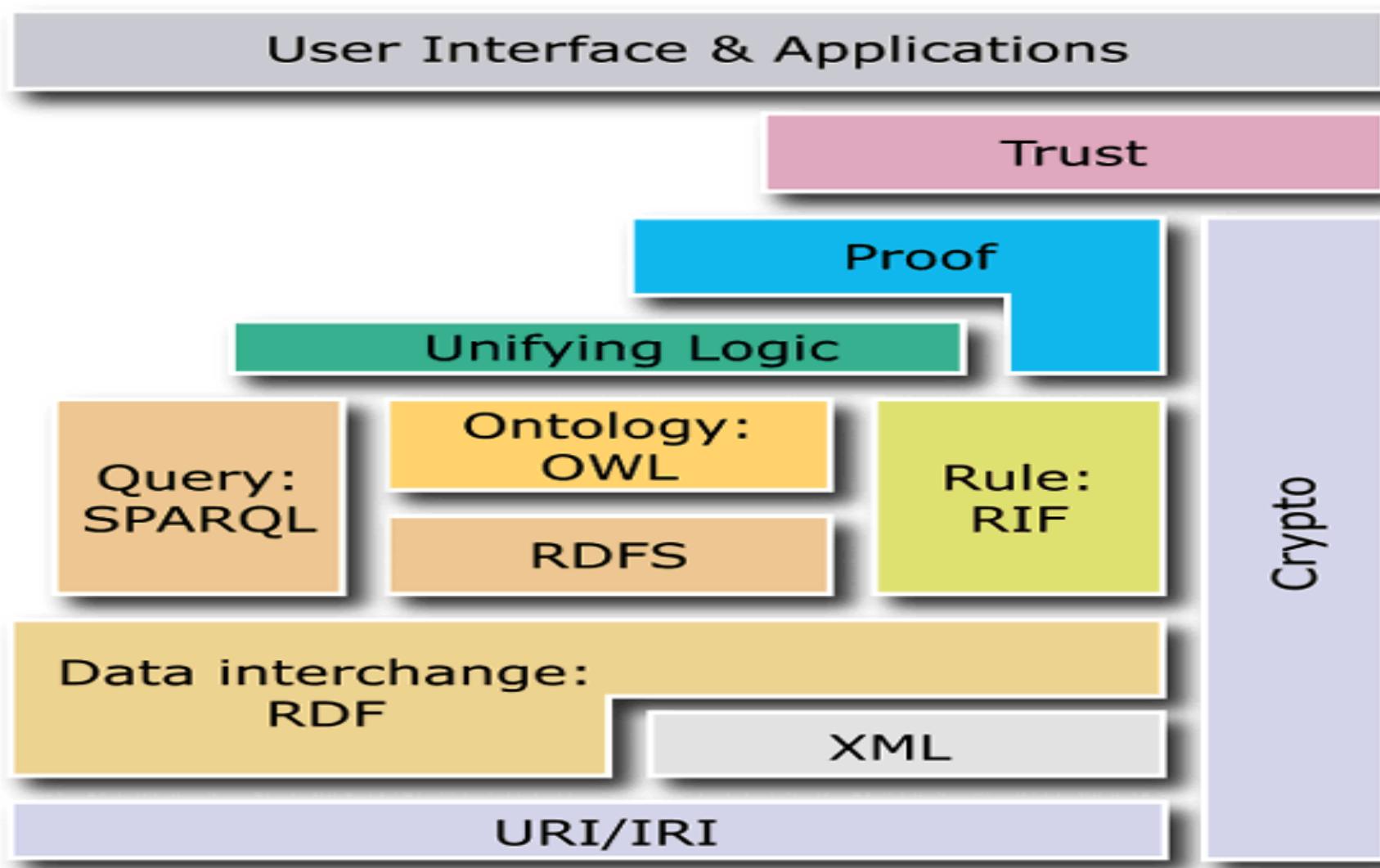
What is the Evolution of the Internet to 2020?



Source: Nova Spivak, Radar Networks; John Breslin, DERI; & Mills Davis, Project10X

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Linked Data Stack (Semantic Web Cake)



Next Lecture: Semantic Web

The Semantic Web provides standards to

- • Identify entities (URIs)
- Express facts (RDF)
- Express concepts (RDFS)
- Share vocabularies
- Describe constraints (OWL)
- Query knowledge (SPARQL)
- Link data
- Publish data (RDFa)