



WEB SÉMANTIQUE ET ONTOLOGIES

WEB DES DONNÉES

DONNÉES LIÉES (LINKED DATA)

<http://lig-membres.imag.fr/genoud/teaching/coursSW/>

Philippe GENOUD – Danielle ZIEBELIN - LIG-Steamer

Prénom.Nom@imag.fr



- Certaines « diapositives » de ce cours sont issues de différentes présentations:
 - Web des données: *Données Ouvertes et Liées* – Ph. GENOUD
GdR MAGIS – Ecole de Géomatique - 29 septembre au 3 Octobre 2014 – Sète
 - Web des données: *Les Principes- Les Standards du W3C* – Ph. GENOUD
Journée Interopérabilité et Innovation – IGN-BRGM-OGC - 7 Octobre 2014 - Paris
 - What Is This Thing Called Linked Data ? – Ph. GENOUD, M. ATENCIA, J. DAVID
ACM-DocEng2015 Tutorial – 9 Septembre 2015 – Lausanne
 - Introduction au Web Sémantique – Ph. GENOUD, D. ZIEBELIN
ISS2016 – Réseau Devlog CNRS – Novembre 2016 – Toulouse
 - Cours Web sémantique Master Génie Informatique – UFR IM2AG – Université Grenoble Alpes



WEB SÉMANTIQUE ET ONTOLOGIES
WEB DES DONNÉES
DONNÉES LIÉES (LINKED DATA)

1 - INTRODUCTION AU WEB SÉMANTIQUE
et organisation du cours

Philippe GENOUD – Danielle ZIEBELIN - LIG-Steamer

Prenom.Nom@imag.fr



Pourquoi un cours web sémantique ?

- On en parle

Inria
INVENTEURS DU MONDE NUMÉRIQUE

Découvrir Inria, son Actualité, ses activités de Recherche & d'Innovation

Centre de recherche Inria Sophia Antipolis - Méditerranée

Présentation | Actualités | Recherche | Innovation

Accueil > Centre > Sophia > Agenda > MOOC sur le web sémantique

Enseignement

MOOC web sémantique et web de données

Un nouveau cours réalisé par le Moco Lab sera bientôt disponible sur la plateforme France Université Numérique. Il s'agit du MOOC Inria-uTOP « Web Sémantique et Web de données » de Fabien Gandon, Olivier Corby et Catherine Faron-Zucker, de l'équipe Wimmics (Inria, I3S, CNRS, UNS).

Plus de 2700 personnes se sont d'ores et déjà inscrites à ce cours qui débutera le 2 mars prochain!

Date : 2/03/2015 au 27/04/2015

Ce MOOC vous propose de vous former aux standards du Web de données et du Web sémantique. Il vous présentera de nombreux langages permettant d'agir sur les données du Web, tels que SPARQL, RDF, OWL, et bien d'autres.

Il s'adresse plus particulièrement aux ingénieurs en informatique et aux étudiants, notamment dans le domaine des systèmes d'information, et peut être suivi en complément d'une formation classique aux technologies de base du Web.

Partager

En savoir plus

Vidéo

Web Sémantique et Web de Données, ou comment se déploient sur le web les données liées et la sémantique de leurs schémas.

des MOOC



Knowledge Engineering with Semantic Web Technologies 2015

Dr. Harald Sack

November 2, 2015 - December 14, 2015

English

The knowledge contained in the World Wide Web is available in interlinked documents written in natural language. To make use of this knowledge,

Show course details

Enroll me for this course

Training - Epimorphics

https://www.epimorphics.com/training/

TRAINING MODULES

Epimorphics offers a range of core training courses. These cover both the fundamental principles of linked data and semantic technology solutions. All Epimorphics training is a mixture of presentation and practical activities.

- BENEFITS OF LINKED DATA**
A management-level introduction to understanding the benefits of linked data. Covers motivations, principles, practices and technologies, and the key features of linked data solutions. This course will help organisations building data strategies and developing plans to integrate and share data.
Half a day
- INTRODUCTION TO LINKED DATA**
A practically oriented introduction to the concepts, standards, technologies and tools needed to understand and implement linked data solutions. Understand key benefits of linked data, gain firsthand experience of exactly what it is and how it works, evaluate its relevance to your situation and get started with the technology. Can be taken as one or two days, the second day adds technical detail and provides more advanced practice.
1-2 days
- SPARQL (LINKED DATA QUERY LANGUAGE)**
The one day version of this course introduces core elements of using SPARQL (Linked Data Query Language) to query linked data and can be flexibly extended to cover more advanced topics including named graphs, query federation and SPARQL Update.
1-2 days
- LINKED DATA MODELLING AND ONTOLOGY DEVELOPMENT**
After a general introduction to the principles of linked data modelling, attendees are guided through the process of developing a model for a familiar domain. Using this example attendees learn how to apply common modelling patterns, ontology components and standard tools that they can reuse in their own work.
1 - 2 days
- BESPOKE LINKED DATA TRAINING & SUPPORT**
We can adapt our core training offerings to meet your specific needs and put together courses on other topics, for example 'publishing statistical data as linked open data', 'The Linked Data API and Elda'. We also offer follow up support packages to help your staff apply what they have learned.
1-3 days
- REGISTRY TRAINING**
This course provides a review of the features and facilities provided by the Reference Data Manager, together with training on its operation. It explains how to load new items, how to update existing registers and code lists, and how to query and retrieve data from the platform. It also covers how to add new users to the system and manage administrative functions.
1-3 days

Des formations en entreprise

log:lab

Société | Compétences | Services | Produits | Formations | Logiciels libres

Introduction au Web Sémantique

SEMWEB-INTRO • 1 jour

Objet

Le Web sémantique, aussi nommé Web 3.0 ou Web des données, est la suite logique du Web des documents aujourd'hui connu de tous. Il est fondé sur une vision du Web dans laquelle les machines échangent des informations exprimées dans des langages normalisés et peuvent agréger, trier et traiter des données issues de sources diverses, faisant du Web une sorte de base de données à l'échelle planétaire.

La formation proposée ici se déroule sur une journée et a pour but de permettre l'acquisition des bases techniques du Web sémantique et des repères que sont les standards de modélisation, de stockage, de publication et d'interrogation des données.

Public visé

Ce cours s'adresse aux décideurs désireux d'appréhender les concepts du Web sémantique et aux développeurs souhaitant acquérir des repères avant de se lancer dans une phase d'expérimentation ou de réalisation.

Pré-requis

Connaissance de l'architecture générale du Web et de la gestion des données au sein des systèmes d'information.

Programme

Introduction au Web Sémantique

- Qu'est ce que le Web sémantique ? définition, historique et origines, exemples

Pourquoi un cours web sémantique ?

Des technologies en cours d'adoption

DATA.GOV DATA TOPICS IMPACT APPLICATIONS DEVELOPERS CONTACT

DATA CATALOG / Datasets Organizations

Federal datasets are subject to the U.S. Federal Government **Data Policy**. Non-federal participants (e.g., universities, organizations, and tribal, state, and local governments) maintain their own data policies. Data policies influence the usefulness of the data. **Learn more** about how to search for data and use this catalog.

geospatial

Datasets ordered by Relevance

You are searching in the list of datasets. Show results in [entire Data.gov site](#).

Filter by location Clear

Enter location...

90,628 datasets found for "geospatial"

Enterprise Geospatial Information Services
Department of Homeland Security – The Enterprise Geospatial Information Services are a federal-based application and database. The MapQuest application is designed to...

HRSA Geospatial Data Warehouses
U.S. Department of Health & Human Services Geospatial Data Warehouse (HGDW) provides health resources...

Distinct Agency Names in Geospatial Metadata
State of Oklahoma – Provides a listing of the unique agency names that contain the name from the geospatial metadata catalog on geo.data.gov.

Distinct Agency Names in Geospatial Metadata
State of Hawaii – Provides a listing of the unique agency names and the name from the geospatial metadata catalog on geo.data.gov. The list was...

Distinct Agency Names in Geospatial Metadata
State of Oregon – Provides a listing of the unique agency names and the number of datasets that contain the name from the geospatial metadata catalog on geo.data.gov. The list was...

Organization Types Clear All

- Federal Government (42698)
- State (34097)
- University (8229)
- State Government (5375)
- Other (102)

Show More Organization Types

Organizations Clear All

- NSGIS GIS Inventory... (34097)
- National Oceanic an... (33170)
- Earth Data Analysis... (5535)

Geospatial display of current weather radar images (RIDGE Weather Radar)
National Weather Service, Department of Commerce – Provides GIS overlays for current weather radar results
kml/kmz

Geospatial display of current weather radar images (RIDGE Weather Radar)
State of Oregon – Provides GIS overlays for current weather radar results
CSV application/rdf+xml JSON XML

Geospatial display of current weather radar images (RIDGE Weather Radar)
State of Hawaii – Provides GIS overlays for current weather radar results
CSV application/rdf+xml JSON XML

Geospatial display of current weather radar images (RIDGE Weather Radar)
State of Oklahoma – Provides GIS overlays for current weather radar results
CSV application/rdf+xml JSON XML

application/rdf+xml

Pourquoi un cours web sémantique ?

Des technologies en cours d'adoption



The screenshot shows the homepage of the Australian Government Linked Data Working Group. At the top left is a logo consisting of a network of red dots connected by lines, with the text 'Australian Government Linked Data Working Group' next to it. To the right of the logo is the URL <http://www.linked.data.gov.au/>. Below the URL is a navigation menu with links for Home, Governance, Assistance, Showcase, Events, Groups, How To, Contact, and Join. The main heading is 'Australian Government Linked Data Working Group'. Below this is a paragraph stating that the group was established in August 2012 to meet Linked Data challenges. To the right is a section titled 'About Linked Data' with a definition of Linked Data. Below the definition is a video player showing a TED talk. On the left side of the page, there is a grey box titled 'Governance' containing text about the group's functions and a link to 'Read the MoU'. At the bottom of the page, there is a partially visible paragraph starting with 'As Linked Data technologies advance...'

Australian Government Linked Data Working Group

<http://www.linked.data.gov.au/>

[Home](#) | [Governance](#) | [Assistance](#) | [Showcase](#) | [Events](#) | [Groups](#) | [How To](#) | [Contact](#) | [Join](#)

Australian Government Linked Data Working Group

The Australian Government Linked Data Working Group was established in August 2012 to meet the Linked Data challenges facing the Australian government.

Governance

This Working Group is informal but some of its functions are recognised by multiple agencies, in particular a Memorandum of Understanding is in effect between 6 agencies ([DTA](#), [BoM](#), [CSIRO](#), [Dept. Finance](#), [GA & NAA](#)) which reserves the use of this web address, linked.data.gov.au, for Linked Data resources.

[Read the MoU](#)

About Linked Data

"*Linked Data*" refers to a set of standards, practices, and tools for publishing and linking structured data on the Web. Data that is Linked Data is linked to other data and can in turn be linked from other data. It is data that is published in a machine-readable way because all data is explicitly described in meaning and in format. For data publishers, it aims to efficiently maximise the capacity for interoperability and correct interpretation of published data. For data consumers it aims to maximise the efficient and correct re-use of data.

As Linked Data technologies advance and become commonplace, it will be necessary for Government to become responsive to the demands of its citizens, as well as its own entities. Developing

<http://www.insee.fr/fr/methodes/default.asp?page=xml/xml.htm>

Institut national de la statistique et des études économiques
Mesurer pour comprendre

Mobile | Actualités | Agendas | Contactez-nous | Aide

Chercher sur le site

Accueil | Thèmes | Bases de données | Publications et services | Régions | Définitions et méthodes | Accès par

Définitions et méthodes

- Nomenclatures
- Définitions
- Sources et méthodes
- Grilles d'analyse
- Code officiel géographique, zonages d'études
- Outils statistiques
- Données RDF et espace XML

Accueil > Définitions et méthodes > Données RDF et espace XML

Données RDF et espace XML

Données au format RDF

L'Insee publie dans cette section des données modélisées selon le standard RDF du web sémantique. Cette formalisation facilite l'utilisation automatique des données par les applications compatibles avec ces nouvelles technologies. Pour plus d'information sur le web sémantique, on pourra consulter le site du W3C.

Les données suivantes sont disponibles :

- Données géographiques** : données issues du Code officiel géographique (COG) concernant les régions, les départements, les arrondissements, les cantons et les communes.
- Codes et nomenclatures** : nomenclature d'activités française (NAF), nomenclature des professions et catégories professionnelles (PCS).
- Données de population** : populations légales issues du Recensement.

D'autres données seront publiées dans les prochains mois.

Toutes les données RDF peuvent être interrogées dynamiquement grâce au langage d'interrogation SPARQL. Le point d'entrée SPARQL se trouve à l'adresse <http://rdf.insee.fr/sparql>.

Accéder à l'espace RDF de l'Insee

<http://eurostat.linked-statistics.org/>

Overview · Usage · Dataspace · Support

Eurostat - Linked Data

This is a [Linked Data](#) version of the Eurostat data with the goal to provide 5 star Linked Open Data on the European level, in a contextually rich and up-to-date manner, useful for ETL-style business analysis or data warehousing purposes with benefits including but not limited to:

- It allows for a straight-forward comparison of statistical indicators across EU countries.
- Through providing context for statistics it facilitates the interpretation process.
- Enables you to re-use observations in a fine-grained way.

Overview

The following data is available

- <http://eurostat.linked-statistics.org/>
- <http://eurostat.linked-statistics.org/>
- <http://eurostat.linked-statistics.org/>

Via our SPARQL endpoint you

<http://www.bbc.co.uk/nature/feedsanddata>

Cookies on the BBC website

The BBC has updated its cookie policy. We use cookies to ensure that we give you the best experience on our website. This includes cookies from third party social media websites if you visit a page which contains embedded content from social media. Such third party cookies may track your use of the BBC website. We and our partners also use cookies to ensure we show you advertising that is relevant to you. If you continue without changing your settings, we'll assume that you are happy to receive all cookies on the BBC website. However, you can change your cookie settings at any time.

Continue
Change settings
Find out more

BBC News Sport Weather Shop More Search

This page was last updated in October 2014.
We've left it here for reference [More information](#)

NATURE CONTACT

Home | News | Features | Video collections | Wildlife | Prehistoric life | Places | FAQs

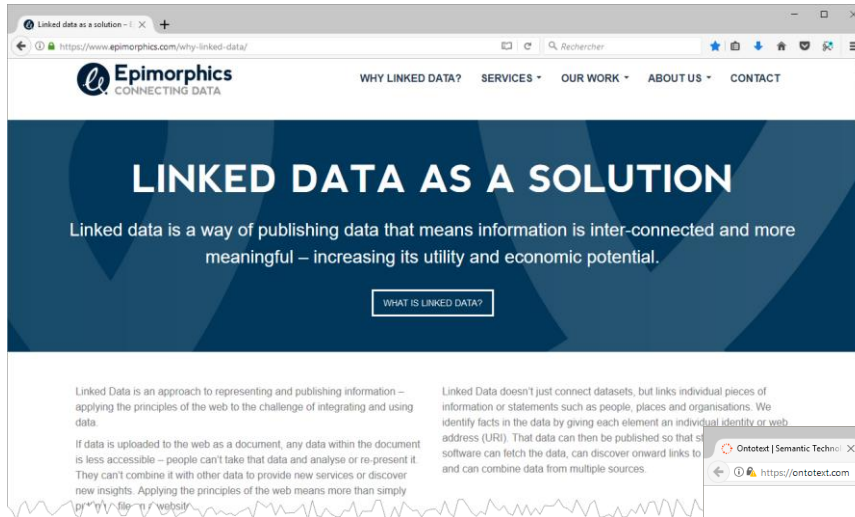
Feeds and data

In addition to the standard web pages we are also publishing some of the information behind Wildlife Finder as RSS and RDF and providing semantic mark-up in the form of microformats.

• • •

Pourquoi un cours web sémantique ?

- *des entreprises spécialisées*



Epimorphics
CONNECTING DATA

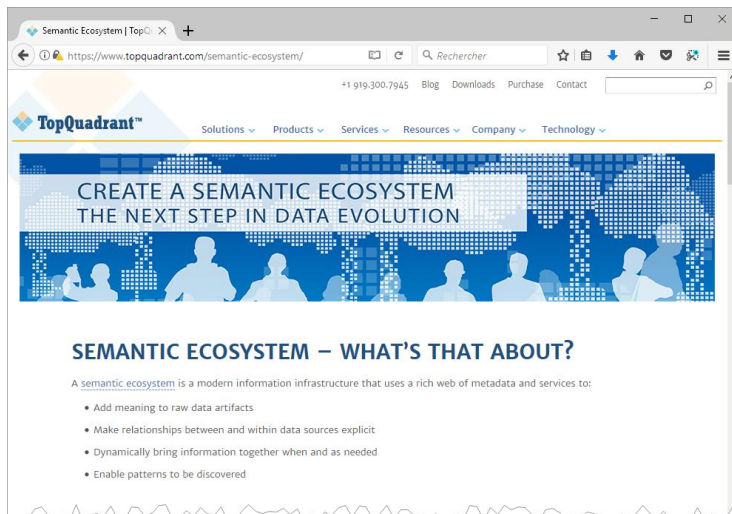
LINKED DATA AS A SOLUTION

Linked data is a way of publishing data that means information is inter-connected and more meaningful – increasing its utility and economic potential.

WHAT IS LINKED DATA?

Linked Data is an approach to representing and publishing information – applying the principles of the web to the challenge of integrating and using data.

Linked Data doesn't just connect datasets, but links individual pieces of information or statements such as people, places and organisations. We identify facts in the data by giving each element an individual identity or web address (URI). That data can then be published so that software can fetch the data, can discover onward links to and can combine data from multiple sources.



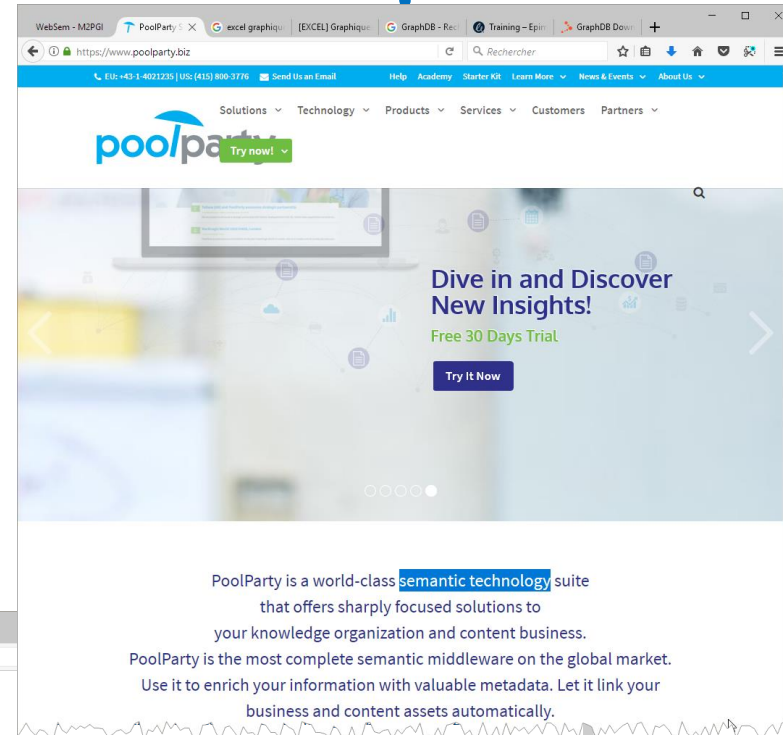
TopQuadrant™

CREATE A SEMANTIC ECOSYSTEM THE NEXT STEP IN DATA EVOLUTION

SEMANTIC ECOSYSTEM – WHAT'S THAT ABOUT?

A semantic ecosystem is a modern information infrastructure that uses a rich web of metadata and services to:

- Add meaning to raw data artifacts
- Make relationships between and within data sources explicit
- Dynamically bring information together when and as needed
- Enable patterns to be discovered



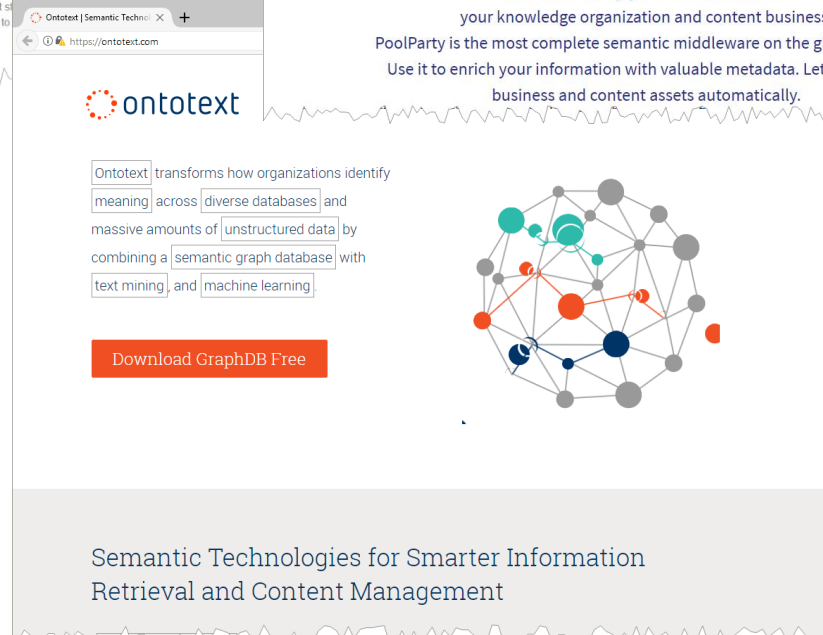
poolparty

Dive in and Discover New Insights!

Free 30 Days Trial

Try It Now


PoolParty is a world-class semantic technology suite that offers sharply focused solutions to your knowledge organization and content business. PoolParty is the most complete semantic middleware on the global market. Use it to enrich your information with valuable metadata. Let it link your business and content assets automatically.



ontotext

Ontotext transforms how organizations identify meaning across diverse databases and massive amounts of unstructured data by combining a semantic graph database with text mining and machine learning.

Download GraphDB Free



Semantic Technologies for Smarter Information Retrieval and Content Management

Pourquoi un cours web sémantique ?

Des offres d'emploi...

Jobs / Job

VISEO

Viseo

France, Grenoble

Apply for 20 days left

ou de stages...

Stage Recherche Master Informatique M2
LIUPPA – Equipe T21
2019-2020

Contexte général

Dans le cadre du projet de recherche FEDER TOVPR (inventaire du patrimoine de villégiature dans les Pyrénées), nous avons pour objectif de valoriser le patrimoine culturel matériel et immatériel de la villégiature et du thermalisme inventorié dans la « zone mas Pyrénées françaises. Nous visons d'une part la conception d'applications mobiles qui aideront les utilisateurs (experts et non experts) à accéder aux informations relatives à ce patrimoine culturel. D'autre part, nous envisageons la publication automatique de données d'inventaire réalisées sur Wikipedia.

Objectifs

Nous souhaitons concevoir et développer un système logiciel capable de publier automatiquement des articles Wikipedia à partir de données collectées par des experts dans nos bases de données. A cette fin, une analyse détaillée des mécanismes de publication en œuvre dans l'univers Wikimedia devra être menée : étude de Wikidata, de WikiCommons et de Wikipedia.

De façon plus précise, les étapes :

Etat de l'art sur les technologies liées à la gestion des liens entre les données (Linked Open Data)
Compréhension des mécanismes de publication sur Wikidata, de WikiCommons, Wikipedia)
Appropriation et développement des outils nécessaires à la gestion des liens entre les 3 univers (Wikipedia, WikiCommons, Wikidata, publication automatique d'images sur Wikidata, publication automatique d'articles sur Wikipedia à la gestion des liens entre les 3 univers)

Compétences (Linked Open Data)

Nous recherchons un candidat possédant un bon niveau de programmation et un esprit d'équipe.

Divers

Durée : 5 mois ; Début : à définir ; Localisation : LIUPPA - Pau

Comment candidater

Envoyer un CV ainsi que vos coordonnées des deux dernières années à marie-noelle.bessagnet@univ-pau.fr, christian.sallaberry@univ-pau.fr, pau.fr, philippe.roose@univ-pau.fr.

19/09/2019

Description du poste

Ingenieur en développement de systèmes d'information



Contexte :

Le système d'information OpenSILEX (<http://www.opensilex.org>) est développé à l'INRA. Il aide à répondre aux défis majeurs de l'agriculture : produire des aliments sains, réduire l'impact environnemental ou encore s'adapter au changement climatique.

OpenSILEX est un logiciel « open source » avec une communauté internationale grandissante. Dans ce contexte dynamique, la personne recrutée intégrera l'équipe de développement de l'unité INRA MISTEA (Mathématiques Informatique Statistiques pour l'Environnement et l'Agronomie).

Missions :

La personne recrutée sera responsable de la conception, du développement, des tests et de l'intégration de solutions innovantes dans OpenSILEX.

Plus précisément :

- prendre part à la structuration et la valorisation de données massives (capteur, drones, analyse d'images, etc.)
- élaboration d'outils de visualisation
- élaboration de Web services d'écologie
- participation à des formations de développement

Connaissances et compétences attendues

- langage Java maîtrisé et langages de programmation
- Web services REST appréciés
- langages du Web Sémantique (RDF, OWL, SPARQL)

La personne recrutée sera amenée à travailler avec des acteurs externes du domaine. Un bon relationnel est donc un atout.



01/10/2019

Ingenieur en Intelligence Artificielle H/F (Semantic Web)

Descriptif du poste

La société Viasema recherche un ingénieur ayant une parfaite compréhension des enjeux liés à la mise en œuvre des technologies du Web Sémantique.

Profil recherché

Tous les profils sont susceptibles de nous intéresser mais évidemment, si vous matchez avec les critères suivants, vous partez avec un longueur d'avance :

- Aptitude à apprendre rapidement de nouvelles technologies et à se familiariser avec de nouveaux domaines d'activité.
- Le candidat doit en priorité maîtriser les technologies du Web sémantique (RDF/OWL, SPARQL...), les ontologies classiques comme SKOS, FRBR, Web Annotation, Schema.org...ainsi que les outils associés.
- Au delà des compétences techniques, nous recherchons un candidat très autonome et rigoureux, mais aussi bon vulgarisateur et capable d'être force de proposition auprès des équipes techniques comme des utilisateurs finaux ou de la direction.

Java Software Engineer for Machine Learning and Semantic Technologies

Semantic Web Company | Wien, Austria

€45k - 85k Visa sponsor Paid relocation

Overview Company Developer Culture More Jobs

About this job

Job type: Full-time

Experience level: Junior, Mid-Level, Senior

Role: Backend Developer

Industry: Artificial Intelligence, Information Technology, Machine Learning

Company size: 51-200 people

Company type: Private

Technologies

spring-mvc java

...ing provider of software and services in the areas of Machine Learning, Natural Language Processing, and PoolParty Software Platform is used in large companies and NGOs around the globe to extract meaning

Intelligence and innovation and rewards strong growth opportunities. We offer great work-life balance and fun. If you are interested in this role anywhere, please apply here. [Create alert](#)

Background More

Sort by: matches

Technologies 6d ago

ntic Technologies 6d ago

artificial-intelligence machine-learning semantic-web spring-mvc java

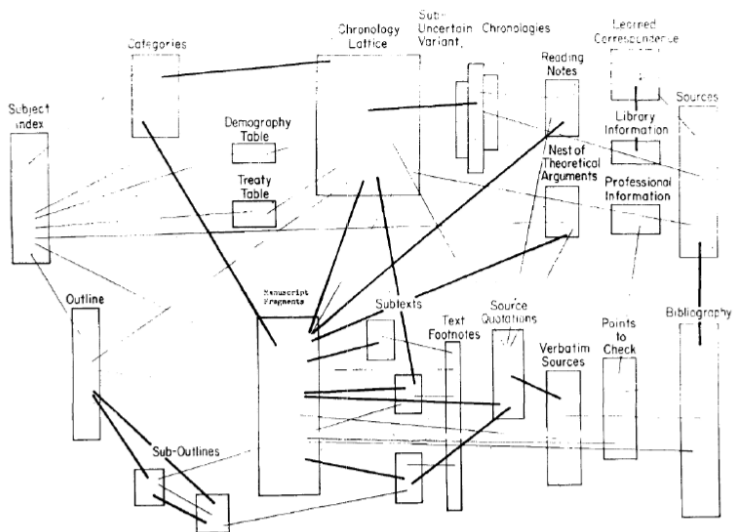
WEB Foundations*

1. Link together digital documents



Ted Nelson

Hypertexte - Hypermedia



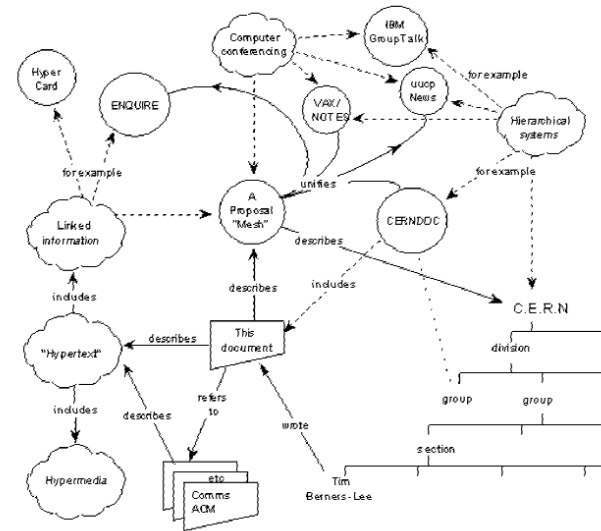
Complex information processing: a file structure for the complex, the changing and the indeterminate, T. H. Nelson, ACM, 1965

2. Link through the network



Tim Berners-Lee

Identify and link over the internet



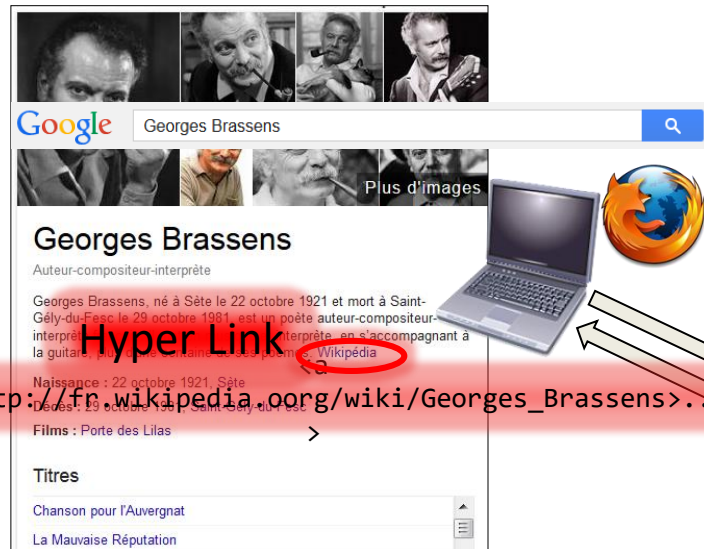
Information Management: A Proposal
Tim Berners-Lee, CERN, March 1989, May 1990

*Slide Inspired from MOOC : Web sémantique et Web de données – Fabien Gandon – FUN 2015

The WEB: a Success-Story

- WEB : a single global information space combining simplicity with decentralization and openness,
- Success of the Web is based on an distributed architecture built on a small set of simple **standards**
 - a globally unique identification mechanism: Uniform Resource Identifiers (URIs) and now Internationalized Resource Identifier (IRIs)
 - universal access mechanism: Hypertext Transfer Protocol (HTTP) protocol
 - a widely used content format : Hypertext Markup Language (HTML)
 - possibility of setting hyperlinks between Web documents that may reside on different Web servers

WEB architecture



www.google.fr



fr.wikipedia.org

URL

Request URL: `https://www.google.com/search?q=Georges+Brassens`
Request method: GET

HTTP

<Status code: 200 OK
<html>
<head>...</head>
<body>
...
</body>
</html>

HTML

Request URL: `http://fr.wikipedia.org/wiki/Georges_Brassens`
Request method: GET

Status code: 200 OK
<!DOCTYPE html>
<html lang="fr">
<head>
<meta charset="UTF-8" />
<title>Georges Brassens – Wikipédia</title>
</head>
<body>
...
</body>
</html>

href="http://fr.wikipedia.org/wiki/Georges_Brassens>...

Hyper Link

Web standardization



- 1994 creation of the W3C
- International consortium, around 400 Members
- Standardization of core Web technologies, publication of guidelines, technical notes, etc.

Standardization activities <https://www.w3.org/standards/>

Based on a transparent and public Process
<https://www.w3.org/2019/Process-20190301/>

STANDARDS PARTICIPATE MEMBERSHIP ABOUT W3C

W3C > Standards

STANDARDS

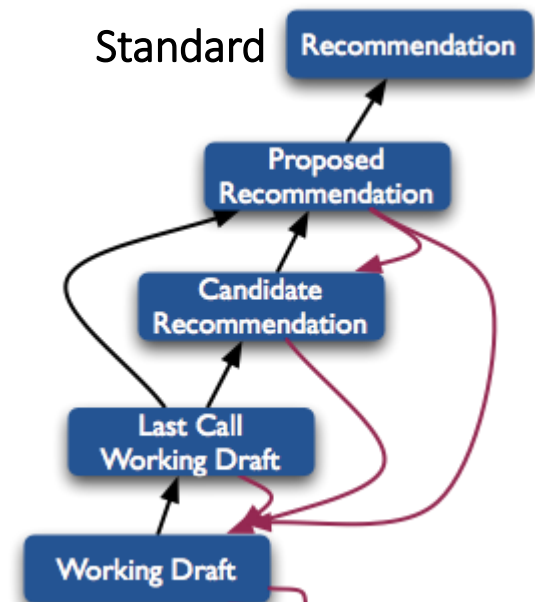
W3C standards define an Open Web Platform for application development that has the unprecedented potential to enable developers to build rich interactive experiences, powered by vast data stores, that are available on any device. Although the boundaries of the platform continue to evolve, industry leaders speak nearly in unison about how HTML5 will be the cornerstone for this platform. But the full strength of the platform relies on many more technologies that W3C and its partners are creating, including CSS, SVG, WOFF, the Semantic Web stack, XML, and a variety of APIs.

W3C develops these technical specifications and guidelines through a process designed to maximize consensus about the content of a technical report, to ensure high technical and editorial quality, and to earn endorsement by W3C and the broader community.

If you are learning about Web technology, you may wish to start with the introduction below, and follow links for greater detail.

- Web Design and Applications** Web Design and Applications involve the standards for building and Rendering Web pages, including HTML, CSS, SVG, Ajax, and other technologies for Web Applications ("WebApps"). This section also includes information on how to make pages accessible to people with disabilities (WCAG), to internationalize them, and make them work on mobile devices.
- Web of Devices** W3C is focusing on technologies to enable Web access anywhere, anytime, using any device. This includes Web access from mobile phones and other mobile devices as well as use of Web technology in consumer electronics, printers, interactive television, and even automobiles.
- Web Architecture** Web Architecture focuses on the foundation technologies and principles which sustain the Web, including URIs and HTTP.
- Semantic Web** In addition to the classic "Web of documents" W3C is helping to build a technology stack to support a "Web of data," the sort of data you find in databases. The ultimate goal of the Web of data is to enable computers to do more useful work and to develop systems that can support trusted interactions over the network. The term "Semantic Web" refers to W3C's vision of the Web of linked data. Semantic Web technologies enable people to create data stores on the Web, build vocabularies, and write rules for handling data. Linked data are empowered by technologies such as RDF, SPARQL, OWL, and SKOS.
- XML Technology** XML Technologies including XML, XML Namespaces, XML Schema, XSLT, Efficient XML Interchange (EXI), and other related standards.
- Web of Services** Web of Services refers to message-based design frequently found on the Web and in enterprise software. The Web of Services is based on technologies such as HTTP, XML, SOAP, WSDL, SPARQL, and others.
- Browsers and Authoring Tools** The web's usefulness and growth depends on its universality. We should be able to publish regardless of the software we use, the computer we have, the language we speak, whether we are wired or wireless, regardless of our sensory or interaction modes. We should be able to access the web from any kind of hardware that can connect to the Internet – stationary or mobile, small or large. W3C facilitates this listening and blending via international web standards. These standards ensure that all the crazy brilliance continues to improve a web that is open to us all.

Questions About Standards?



<http://www.w3.org/2013/dd-epasorg.htm#%288%29>

Technical reports, notes, recommendations
<https://www.w3.org/TR/>

Web evolution

Web 1.0

Web 2.0

Web 3.0

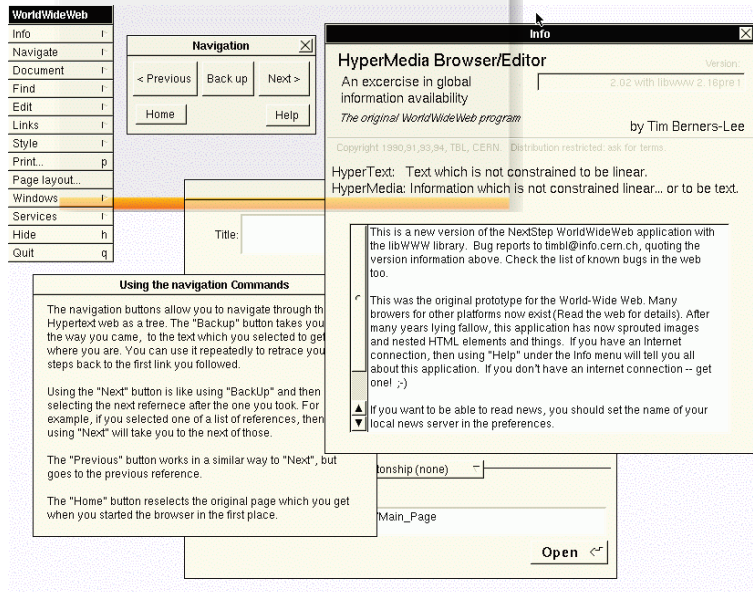
Web evolution

Web 1.0

- Utilisateur passif
- Essentiellement pro
- Réservé aux experts
- Guerre des navigateurs
- Contenu statique
- Formulaires
- Recherche par mots-clés

Web 2.0

Web 3.0



*d'après le cours Technologie du Web – A. Hombiat - Licence Professionnelle Études Statistiques et Systèmes d'Information Géographique (ESSIG) – UPMF - 2015

Web evolution

Web 1.0

- Utilisateur passif
- Essentiellement pro
- Réservé aux experts
- Guerre des navigateurs
- Contenu statique
- Formulaire
- Recherche par mots-clés

Web 2.0

- Utilisateur acteur (Blogs, Wikis, Réseaux sociaux, Podcasts, etc.)
- Ouvert aux profanes (CMS)
- Syndication du contenu (RSS, Atom)
- Tags et folksonomies
- Contenu dynamique
- Collaboration et partage
- Recherche par mots-clés

Web 3.0

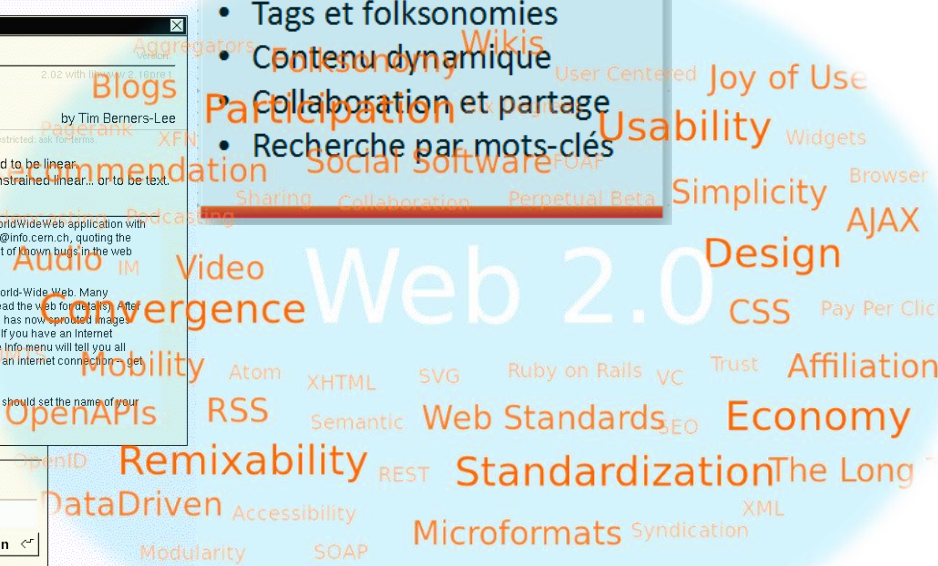
Using the navigation Commands

The navigation buttons allow you to navigate through the Hypertext web as a tree. The "BackUp" button takes you the way you came, to the text which you selected to get where you are. You can use it repeatedly to retrace your steps back to the first link you followed.

Using the "Next" button is like using "BackUp" and then selecting the next reference after the one you took. For example, if you selected one of a list of references, then using "Next" will take you to the next of those.

The "Previous" button works in a similar way to "Next", but goes to the previous reference.

The "Home" button resets the original page which you get when you started the browser in the first place.

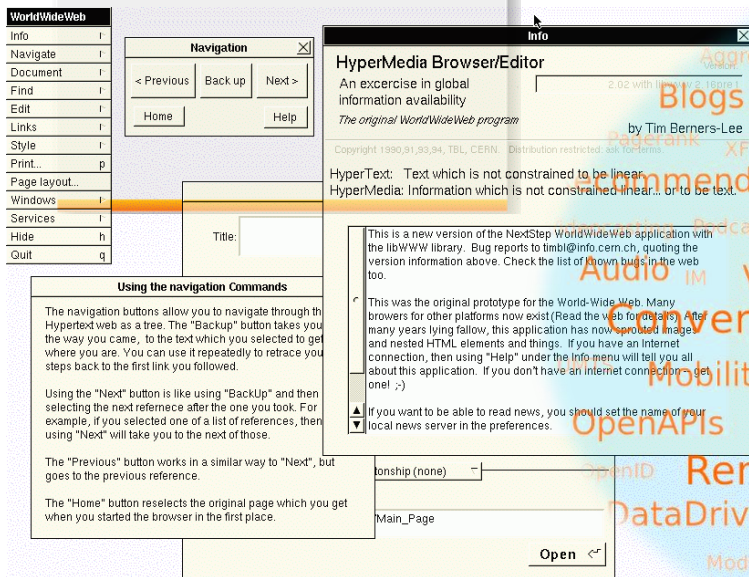


*d'après le cours Technologie du Web – A. Hombiat - Licence Professionnelle Études Statistiques et Systèmes d'Information Géographique (ESSIG) – UPMF - 2015

Web evolution

Web 1.0

- Utilisateur passif
- Essentiellement pro
- Réservé aux experts
- Guerre des navigateurs
- Contenu statique
- Formulaire
- Recherche par mots-clés



Web 2.0

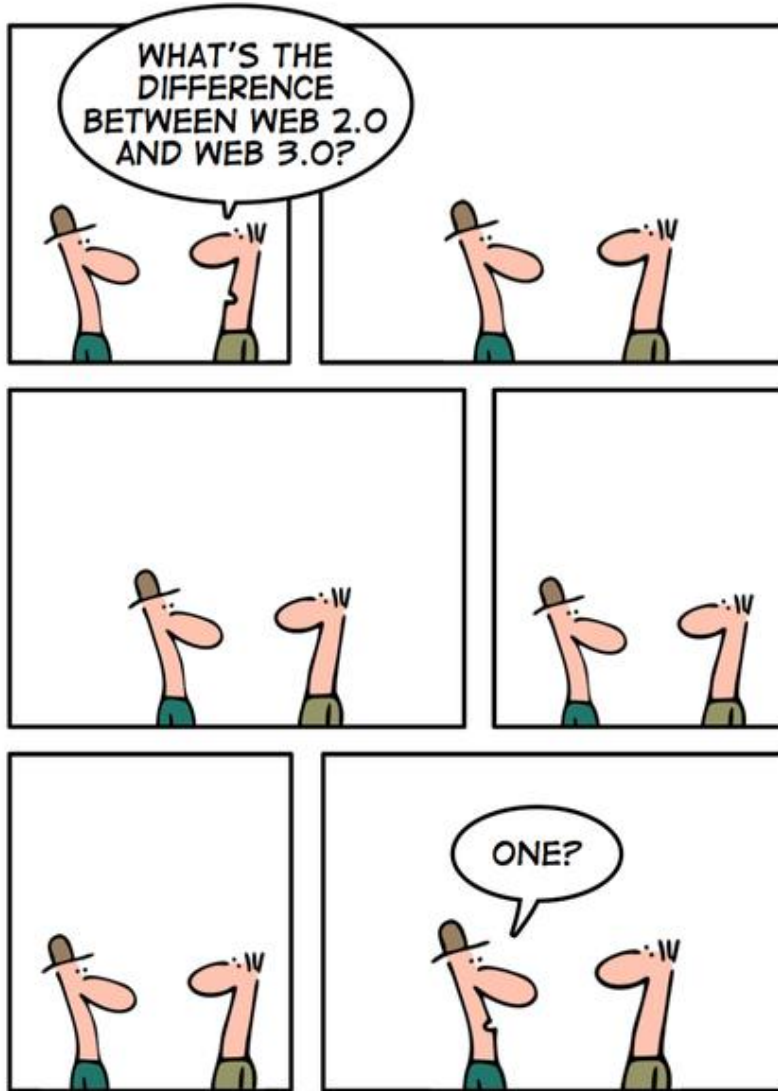
- Utilisateur acteur (Blogs, Wikis, Réseaux sociaux, Podcasts, etc.)
- Ouvert aux profanes (CMS)
- Syndication du contenu (RSS, Atom)
- Tags et folksonomies
- Contenu dynamique
- Collaboration et partage
- Recherche par mots-clés

Web 3.0



*d'après le cours Technologie du Web – A. Hombiat - Licence Professionnelle Études Statistiques et Systèmes d'Information Géographique (ESSIG) – UPMF - 2015

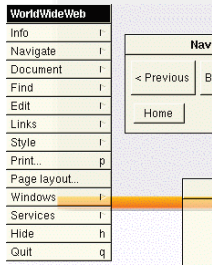
Web evolution



IT IS THAT EASY

WorldWideWeb

- Utilisat
- Essenti
- Réserv
- Guerre
- Conten
- Formul
- Recher



Using the navigati

The navigation buttons allow you to traverse a Hypertext web as a tree. The "Back" button goes back the way you came, to the text where you are. You can use it repeatedly to go back to the first link you followed.

Using the "Next" button is like using the "Back" button. It selects the next reference after the one you selected. For example, if you selected one of a list of links, using "Next" will take you to the next link in the list.

The "Previous" button works in a similar way. It goes to the previous reference.

The "Home" button reselects the first link you selected when you started the browser in this window.



*d'après le cou

: Systèmes d'Information Géographique (ESSIG) – UPMF - 2015

Web evolution

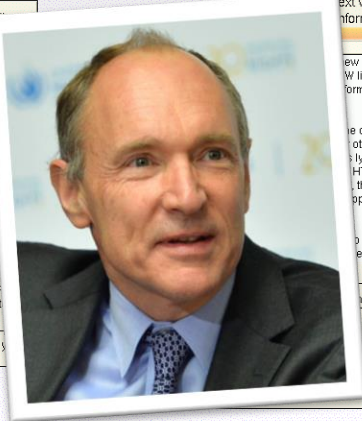
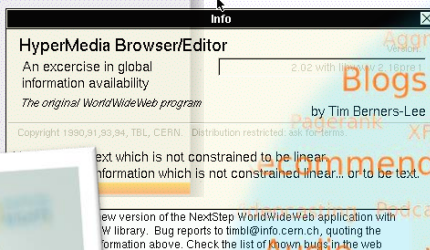
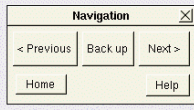
Web 1.0

- Utilisateur passif
- Essentiellement pro
- Réservé aux experts
- Guerre des navigateurs
- Contenu statique
- Formulaires
- Recherche par mots-clés

Web 2.0

- Utilisateur acteur (Blogs, Wikis, Réseaux sociaux, Podcasts, etc.)
- Ouvert aux profanes (CMS)
- Syndication du contenu (RSS, Atom)
- Tags et folksonomies
- Contenu dynamique
- Collaboration et partage
- Recherche par mots-clés

Web 3.0



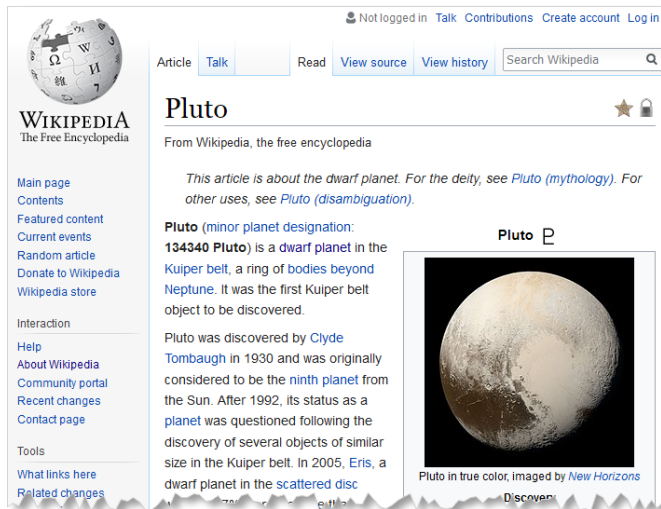
"The **web of human-readable document** is being merged with a **web of machine understandable data**. The potential of the mixture of humans and **machines** working together and communication through the web could be immense."

Tim Berners-Lee, [The World Wide Web: A very short personal history, May 1998](http://www.w3.org/People/Berners-Lee/ShortHistory.html)
<http://www.w3.org/People/Berners-Lee/ShortHistory.html>

From Web of Documents to Web of Data

"The **web of human-readable document** is being merged with a **web of machine understandable data**."

- The traditional web (Web of Documents) is for humans
 - based on the HTML markup language
 - HTML describes
 - what information is presented + how it's presented in conjunction with CSS
 - how information is linked
 - but not what the information means
 - meaning (semantics) of information is derived from available information



From Web of Documents to Web of Data

"The web of human-readable document is being merged with a web of machine understandable data."

"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 cooperation"

Tim Berners-Lee, James Hendler and Ora Lassila, *The Semantic Web*
Scientific American, 284(5), pp 34-43 (2001)

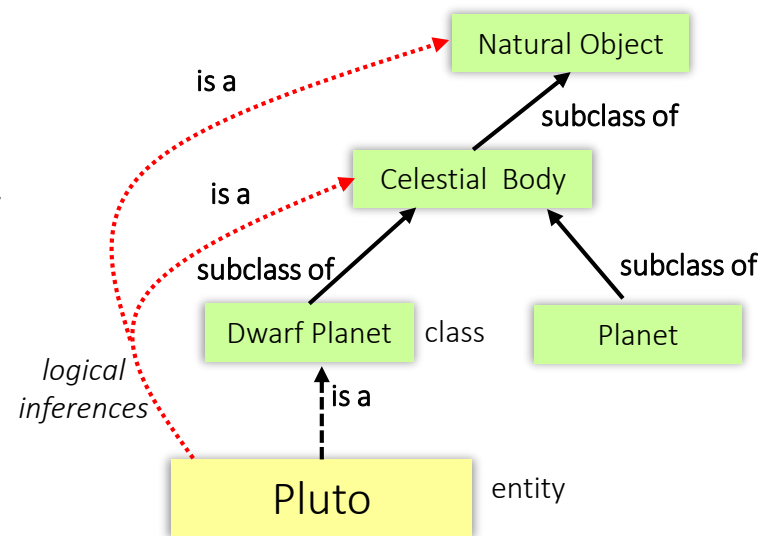


- The Semantic Web (Web of Data) is for machines

- meaning of entities is defined explicitly using formal (structured) and standardized knowledge representations (ontologies)

→ possibility to

- process the meaning of information automatically
- automatically deduce implicit information from existing data
- relate and integrate heterogeneous data



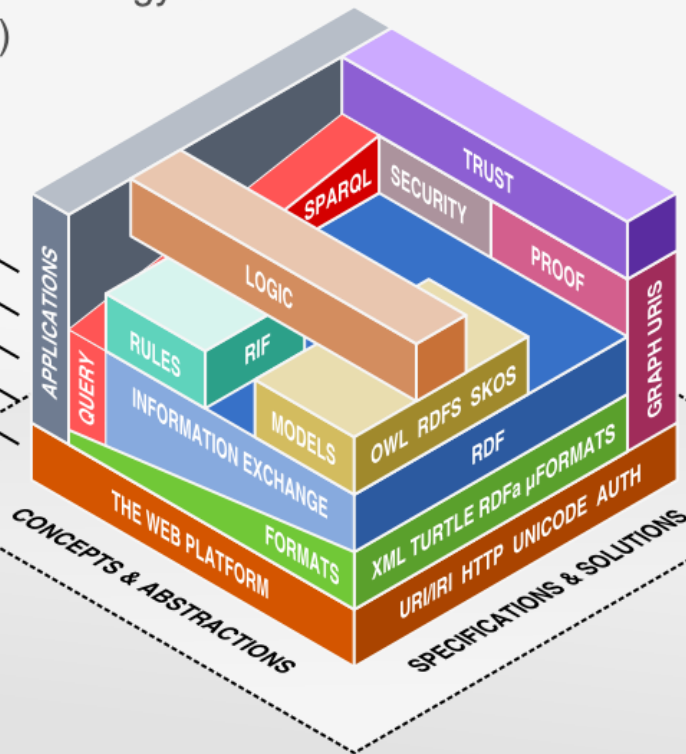
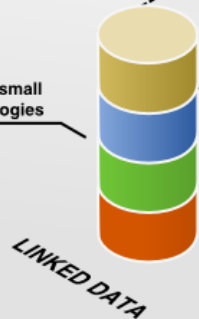
From Web of Documents to Web of Data

- Semantic web standards

The Semantic Web Technology Stack (not a piece of cake...)

- Most apps use only a subset of the stack
- Querying allows fine-grained data access
- Standardized information exchange is key
- Formats are necessary, but not too important
- The Semantic Web is based on the Web

Linked Data uses a small selection of technologies



W3C SEMANTIC WEB ACTIVITY

On this page → publications, interviews presentations active groups completed groups past groups



The Semantic Web is a web of data. There is lots of data we all use every day, and it is not part of the web. I can see my bank statements on the web, and my photographs, and I can see my appointments in a calendar. But can I see my photos in a calendar to see what I was doing when I took them? Can I see bank statement lines in a calendar?

Why not? Because we don't have a web of data. Because data is controlled by applications, and each application keeps it to itself.

The Semantic Web is about two things. It is about common formats for integration and combination of data drawn from diverse sources, where on the original Web mainly concentrated on the interchange of documents. It is also about language for recording how the data relates to real world objects. That allows a person, or a machine, to start off in one database, and then move through an unending set of databases which are connected not by wires but by being about the same thing.

What is the Semantic Web?

The **Semantic Web** provides a common framework that allows **data** to be shared and reused across application, enterprise, and community boundaries. It is a collaborative effort led by W3C with participation from a large number of researchers and industrial partners. It is based on the Resource Description Framework (RDF). See also the separate [FAQ](#) for further information.

Warning: this Activity has been subsumed, in December 2013, by the [W3C Data Activity](#). That activity has a larger scope; new or current Working and Interest Groups related to "traditional" Semantic Web technologies are now part of that Activity.

The current page has been frozen on the 11th December, 2013.

<https://www.w3.org/2013/data/>

<http://www.bnode.org/blog/tag/layer%20cake> (Benjamin Nowack)

From Web of Documents to Web of Data

- Web can be seen as a (very) large distributed database (knowledge base) of information accessible to machines.

The Data Activity recognizes and works to overcome this diversity to facilitate potentially **Web-scale data integration and processing**. It does this by providing **standard** data exchange formats, models, tools, and guidance.

The screenshot shows the W3C Data Activity website. The main heading is "W3C DATA ACTIVITY Building the Web of Data". Below this, a paragraph states: "More and more Web applications provide a means of accessing data. From simple visualizations to sophisticated interactive tools, there is a growing reliance on the availability of data which can be 'big' or 'small', of diverse origin, and in different formats; it is usually published without prior coordination with other publishers — let alone with precise modeling or common vocabularies. The Data Activity recognizes and works to overcome this diversity to facilitate potentially Web-scale data integration and processing. It does this by providing standard data exchange formats, models, tools, and guidance." This paragraph is highlighted in a light green box. Below it, a red box contains the text: "The overall vision of the Data Activity is that people and organizations should be able to share data as far as possible using their existing tools and working practices but in a way that enables others to derive and add value, and to utilize it in ways that suit them. Achieving that requires a focus not just on the interoperability of data but of communities." To the right, a sidebar titled "New W3C Documents" lists several publications, including "CSV on the Web: Metadata Vocabulary for Tabular Data and other updates" and "Data on the Web Best Practices".

people and organizations should be able to share data as far as possible using their existing tools and working practices **but in a way that enables others to derive and add value, and to utilize it in ways that suit them**

From Web of Documents to Web of Data

<https://www.w3.org/2013/data/> (sept. 2019)

W3C DATA ACTIVITY *Building the Web of Data*



Data is increasingly important to society and W3C has a mature suite of Web standards with plans for further work on making it easier for average developers to work with graph data and knowledge graphs. Linked Data is about the use of URIs as names for things, the ability to dereference these URIs to get further information and to include links to other data. There are ever increasing sources of [Linked Open Data](#) on the Web, as well as data services that are restricted to the suppliers and consumers of those services.

The digital transformation of industry is seeking to exploit advanced digital technologies. This will facilitate businesses to integrate horizontally along the supply and value chains, and vertically from the factory floor to the office floor. W3C is seeking to make it easier to support enterprise wide data management and governance, reflecting the strategic importance of data to modern businesses.

Traditional approaches to data have focused on tabular databases (SQL/RDBMS), Comma Separated Value (CSV) files, and data embedded in PDF documents and spreadsheets. We're now in midst of a major shift to graph data with nodes and labelled directed links between them. Graph data is:

- Faster than using SQL and associated JOIN operations
- Better suited to integrating data from heterogeneous sources
- Better suited to situations where the data model is evolving



RDF is W3C's framework for graph data, and there is extensive work at W3C and elsewhere on vocabularies for a wide variety of application domains. W3C recently held a [workshop on graph data](#) to bring together practitioners from different communities, including SQL/RDBMS, Property Graphs, RDF, the Semantic Web and Linked Data. We're now in the process of launching a Graph Standardization Business Group to provide a business perspective with use cases and requirements, to coordinate technical standards work and liaisons with external organizations. Currently active technical standards groups include the [SQL:LD Working Group](#).



Data is increasingly important to society and W3C has a mature suite of Web standards with plans for further work on making it easier for average developers to work with graph data and knowledge graphs.

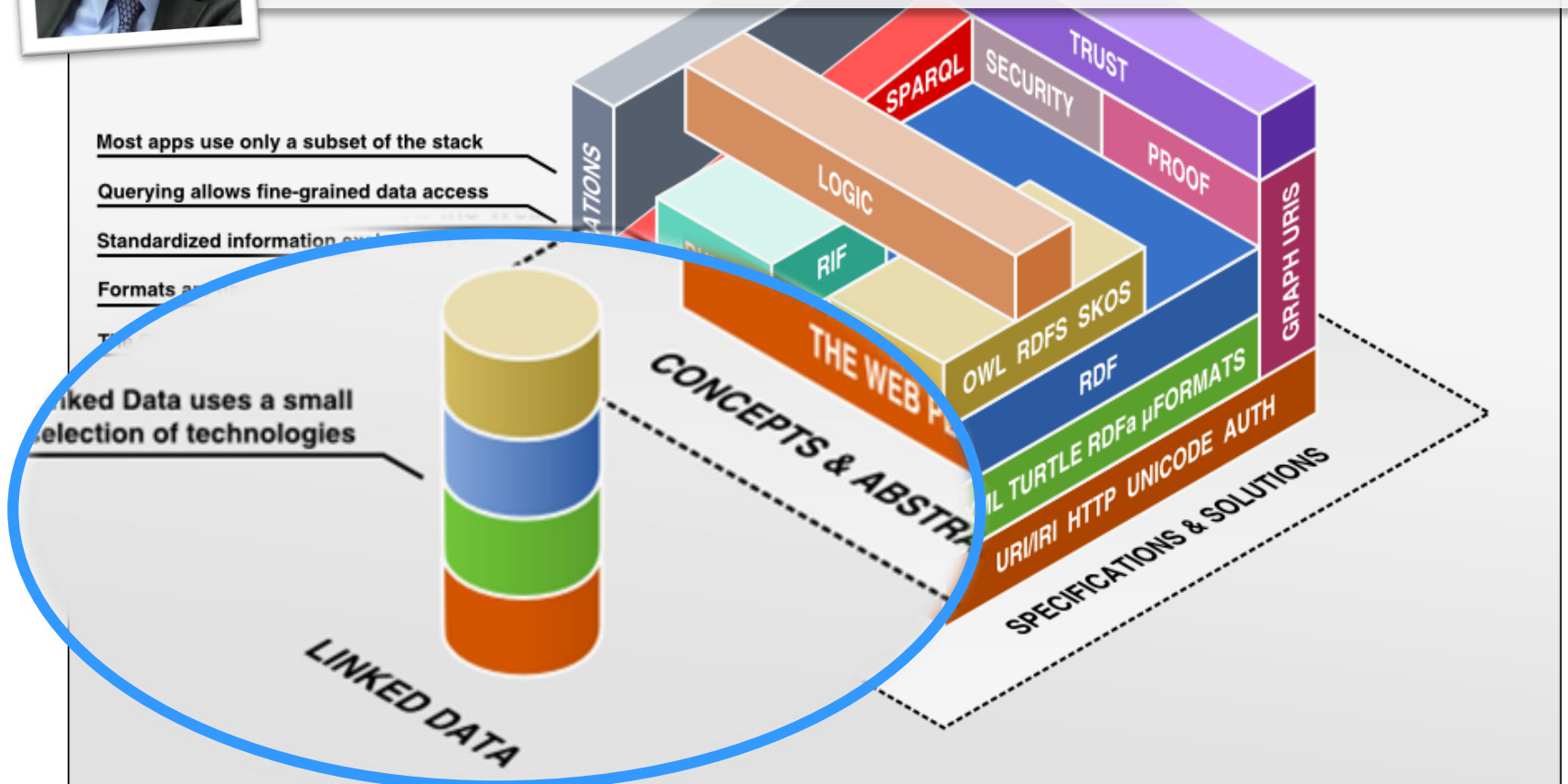
Traditional approaches to data have focused on tabular databases (SQL/RDBMS), Comma Separated Value (CSV) files, and data embedded in PDF documents and spreadsheets. **We're now in midst of a major shift to graph data with nodes and labelled directed links between them.**

Linked Data



"The Semantic Web isn't just about putting data on the web. It is about making links, so that a person or machine can explore the web of data. With linked data, when you have some of it, you can find other, related, data."

Tim Berners-Lee - 2006 <http://www.w3.org/DesignIssues/LinkedData.html>



<http://www.bnode.org/blog/tag/layer%20cake> (Benjamin Nowack)

Linked Data Principles

Tim Berners-Lee

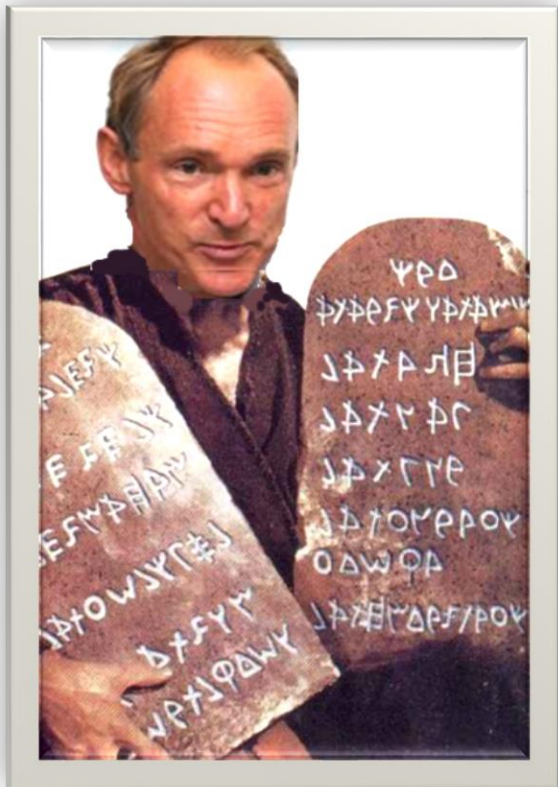
<http://www.w3.org/DesignIssues/LinkedData.html>

a set of best practices for publishing and interlinking structured data on the Web

Basic idea: to apply the general architecture of the World Wide Web to the task of sharing structured data on global scale.



1. Use **URIs** as names for things.
2. Use **HTTP URIs**, so that people can look up those names.
3. When someone looks up a URI, **provide useful information, using the standards** (RDF, SPARQL...).
4. Include **links** to other URIs, so that they **can discover more things**.



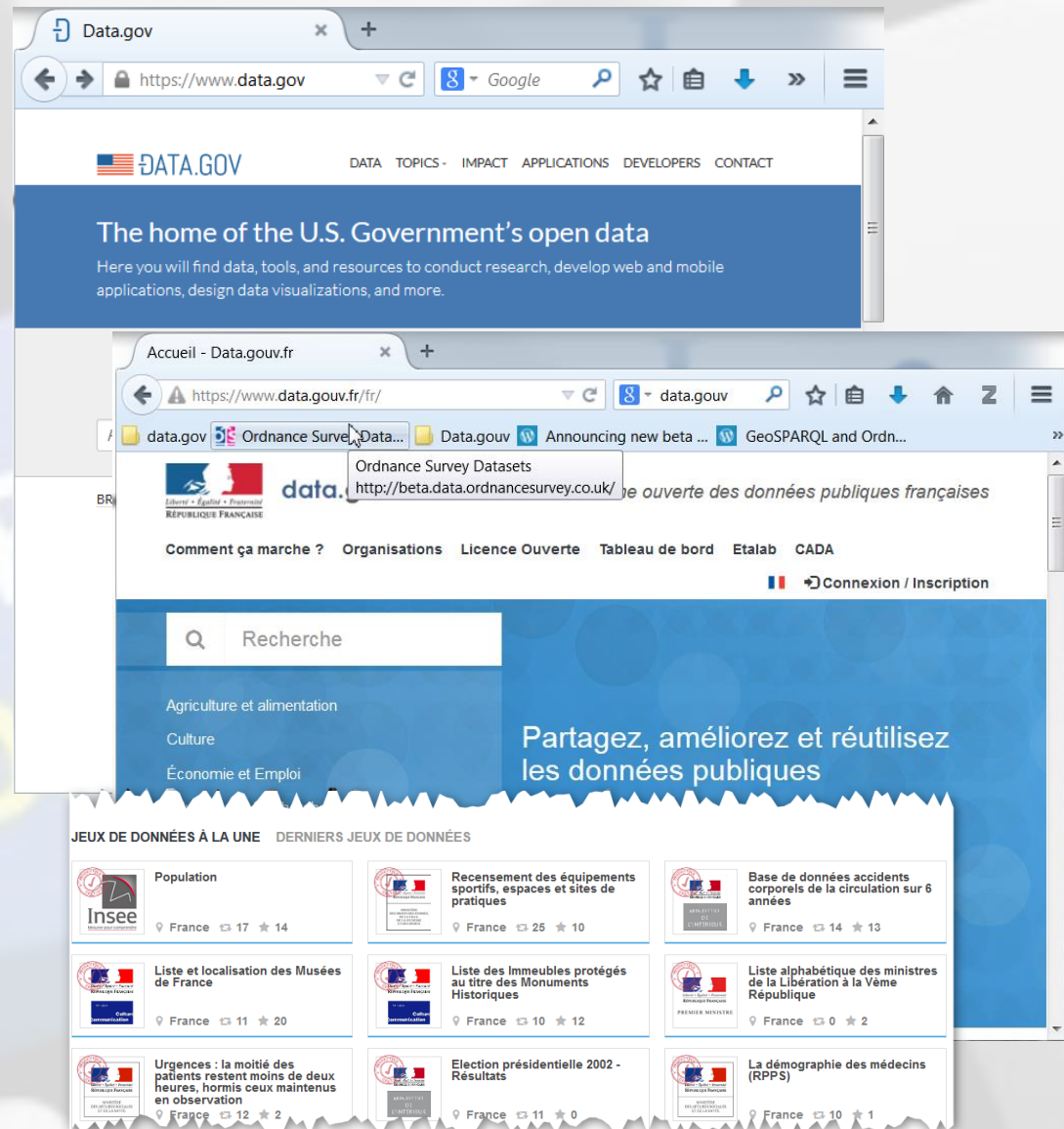
Open Data

- Open Data Movement

- “A piece of content or data is open if anyone is free to use, reuse, and redistribute it — subject only, at most, to the requirement to attribute and/or share-alike.”

<http://opendefinition.org/>

- an old idea but a recent term gaining popularity
 - with the rise of the Internet and World Wide Web
 - with the launch of open-data government initiatives such as Data.gov (USA), data.gouv.fr (FR)...



What is This Thing Called Linked Data?
M. Atencia, J. David, Ph. Genoud

From Open Data to Linked Open Data



- 2006: defines basic principles for publishing Linked Data
- 2010: added a 5 star rating system for Linked Open Data (LOD)

"in order to encourage people -- especially government data owners -- along the road to good linked data..."

Tim Berners-Lee

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

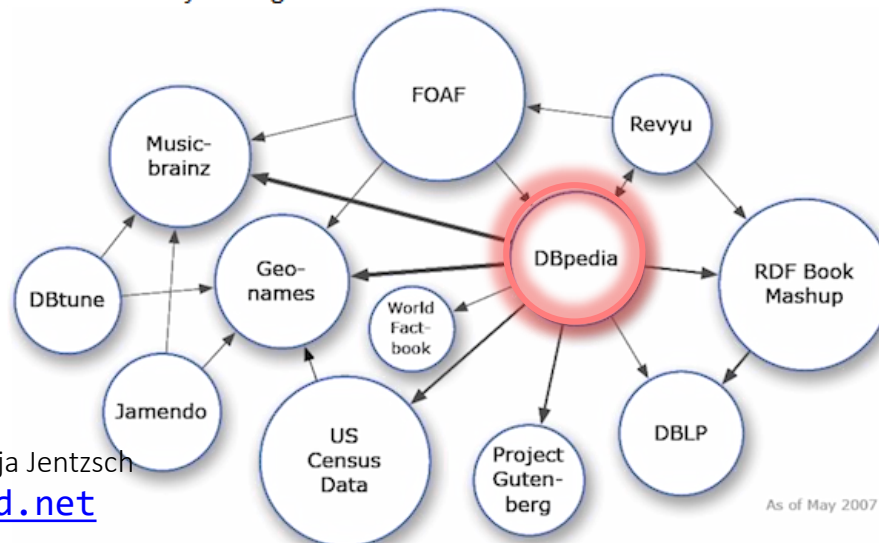


Linked Open Data (LOD)



The [Open Data Movement](#) aims at making data freely available to everyone. There are already various interesting open data sets available on the Web. Examples include [Wikipedia](#), [Wikibooks](#), [Geonames](#), [MusicBrainz](#), [WordNet](#), the [DBLP bibliography](#) and many more which are published under [Creative Commons](#) or [Talis](#) licenses.

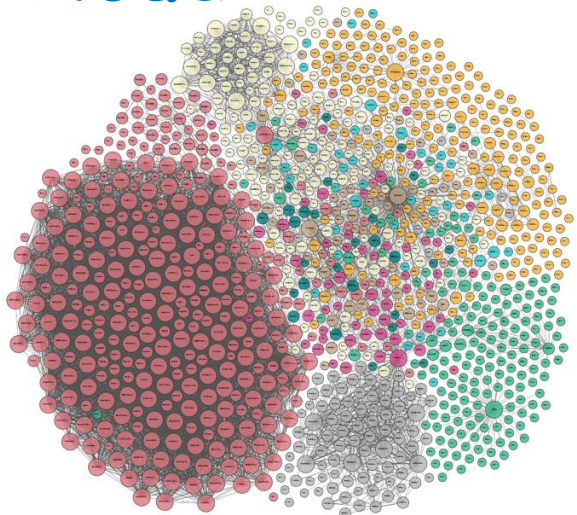
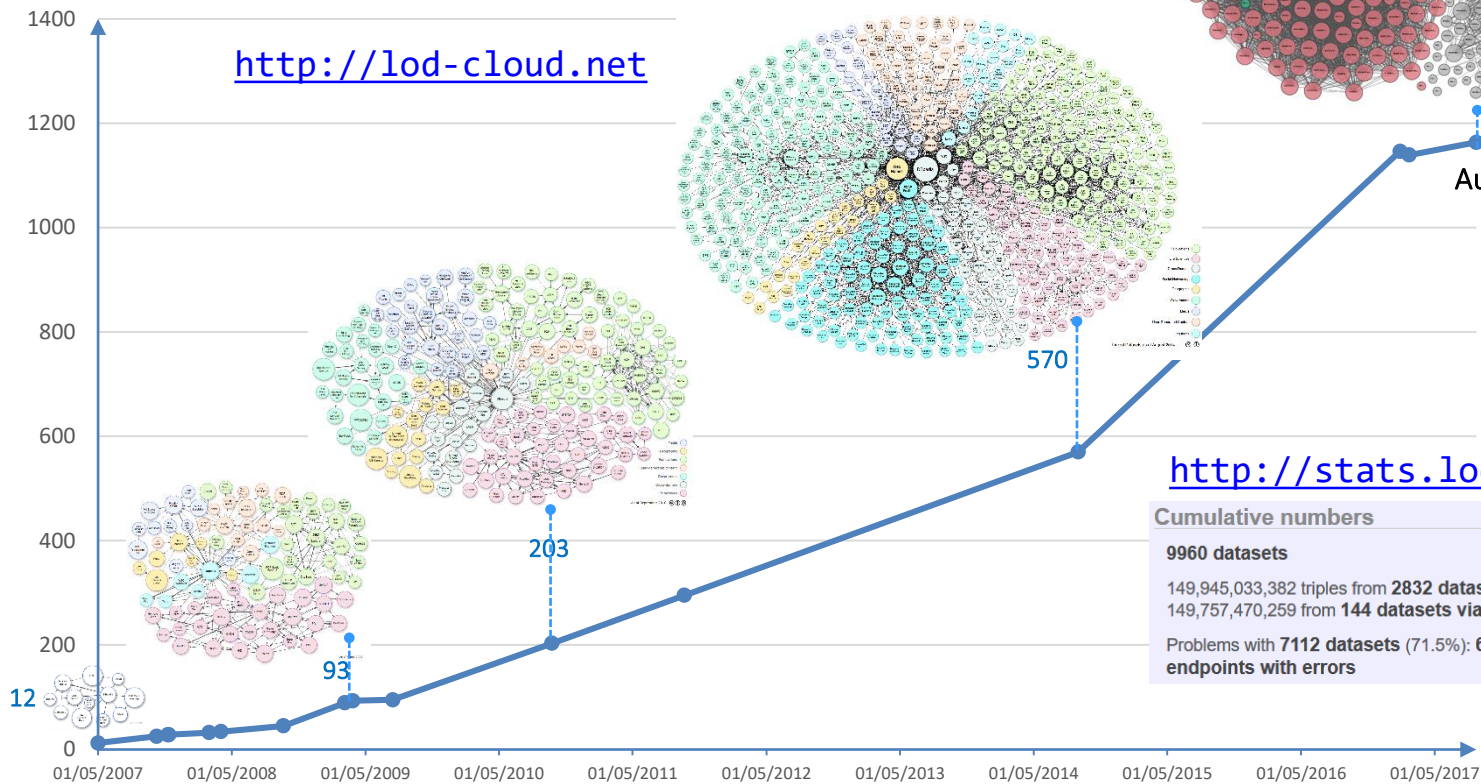
The goal of the W3C SWEQ Linking Open Data community project is to extend the Web with a data commons by publishing various open data sets as RDF on the Web and by setting RDF links between data items from different data sources.



Richard Cyganiak and Anja Jentzsch
<http://lod-cloud.net>

Linked Open Data Cloud

- Linking open data project
 - goals:
 - Use RDF to “expose” open data sets
 - Create RDF links between these datasets
 - If possible, deploy SPARQL endpoints



<http://stats.lod2.eu/>

Cumulative numbers

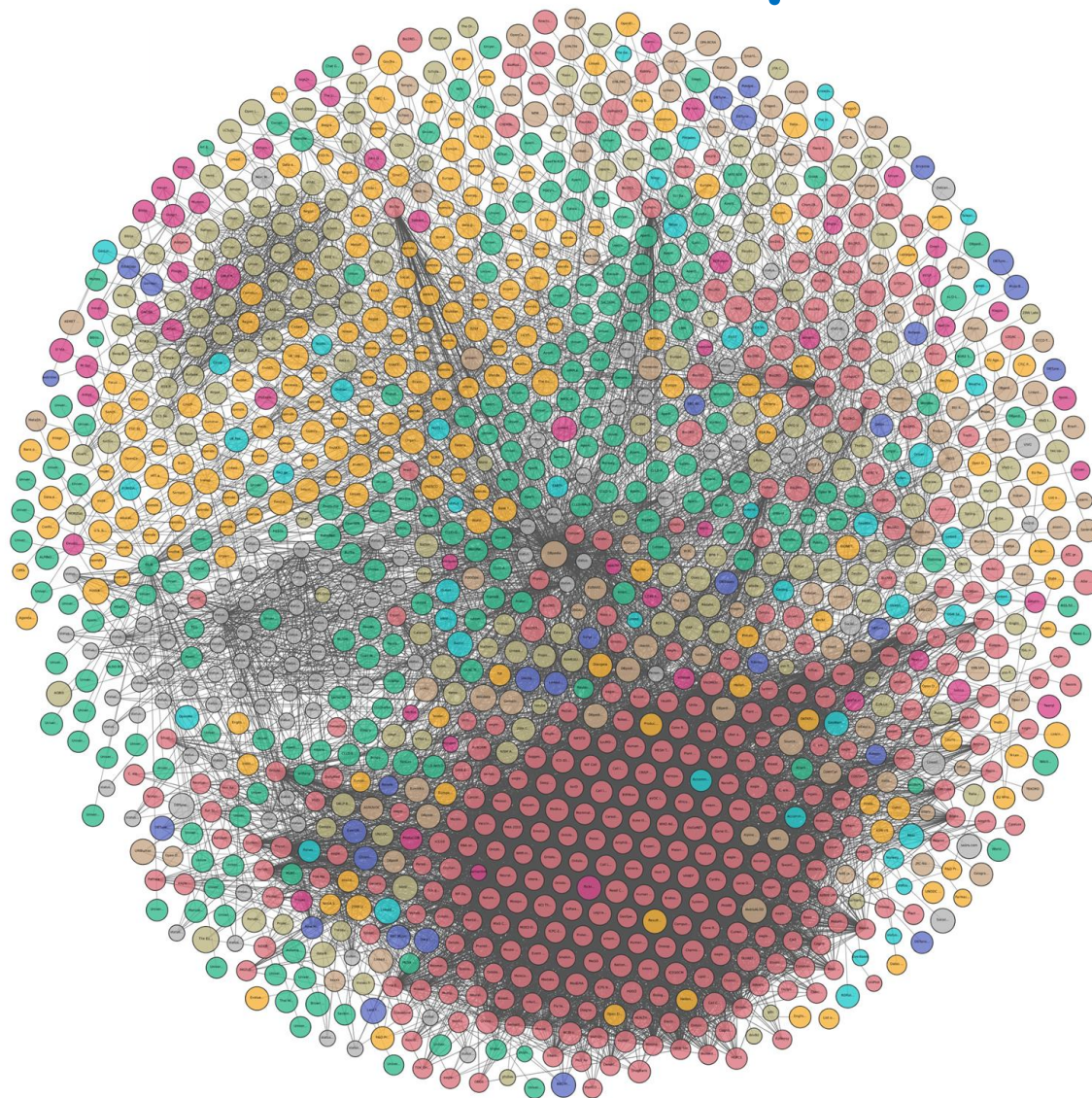
9960 datasets

149,945,033,382 triples from 2832 datasets (187,563,123 triples from 2704 dumps, 149,757,470,259 from 144 datasets via SPARQL)

Problems with 7112 datasets (71.5%): 6712 dumps having errors, 400 SPARQL endpoints with errors



Linked Open Data Cloud

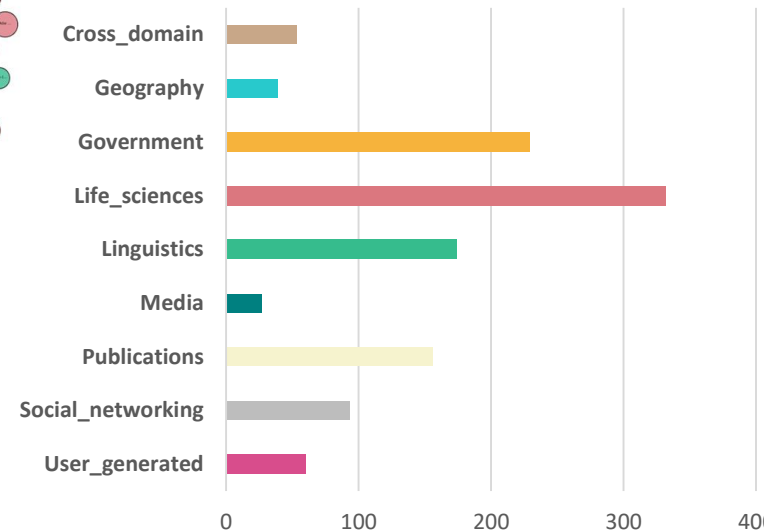


Legend



March 2019

1239 datasets



The Linked Open Data Cloud from lod-cloud.net



Linking Open Data cloud diagram 2019, by John P. McCrae, Andrejs Abele, Paul Buitelaar, Richard Cyganiak, Anja Jentzsch, Vladimir Andryushechkin, Jeremy Debattista

<http://lod-cloud.net/>

Course Objectives

- To present the common framework the Semantic Web provides to allow data to be shared and reused across application, enterprise, and community boundaries.
- To introduce the core technologies for data exchange and querying : RDF and SPARQL.
- To introduce to knowledge representation with ontology languages : RDFS - OWL

Course Outline

- Introduction
- Distributing Data on the web with RDF
 - Naming the Data : URIs (Uniform Resources Identifiers)
 - The RDF Data model
- Querying Linked Data with SPARQL
- Semantic modelling
 - RDFS
 - OWL
- Conclusion