

The Semantic Web Revolution - Unleashing the World's most Valuable Information

Wendy Hall
Nigel Shadbolt

Online Information Conference
Olympia, London
1 December 2009

The Ever Evolving World of the Web

Professor Wendy Hall
University of Southampton

<http://www.ecs.soton.ac.uk/~wh>



“As we may think”

Vannevar Bush

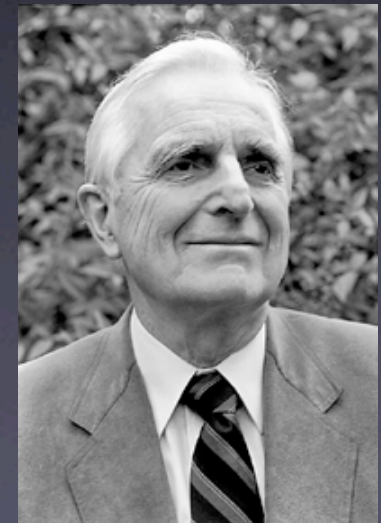
Atlantic Monthly
July 1945



Everything is deeply intertwined

Ted Nelson and Doug Engelbart

Augmenting human intellect

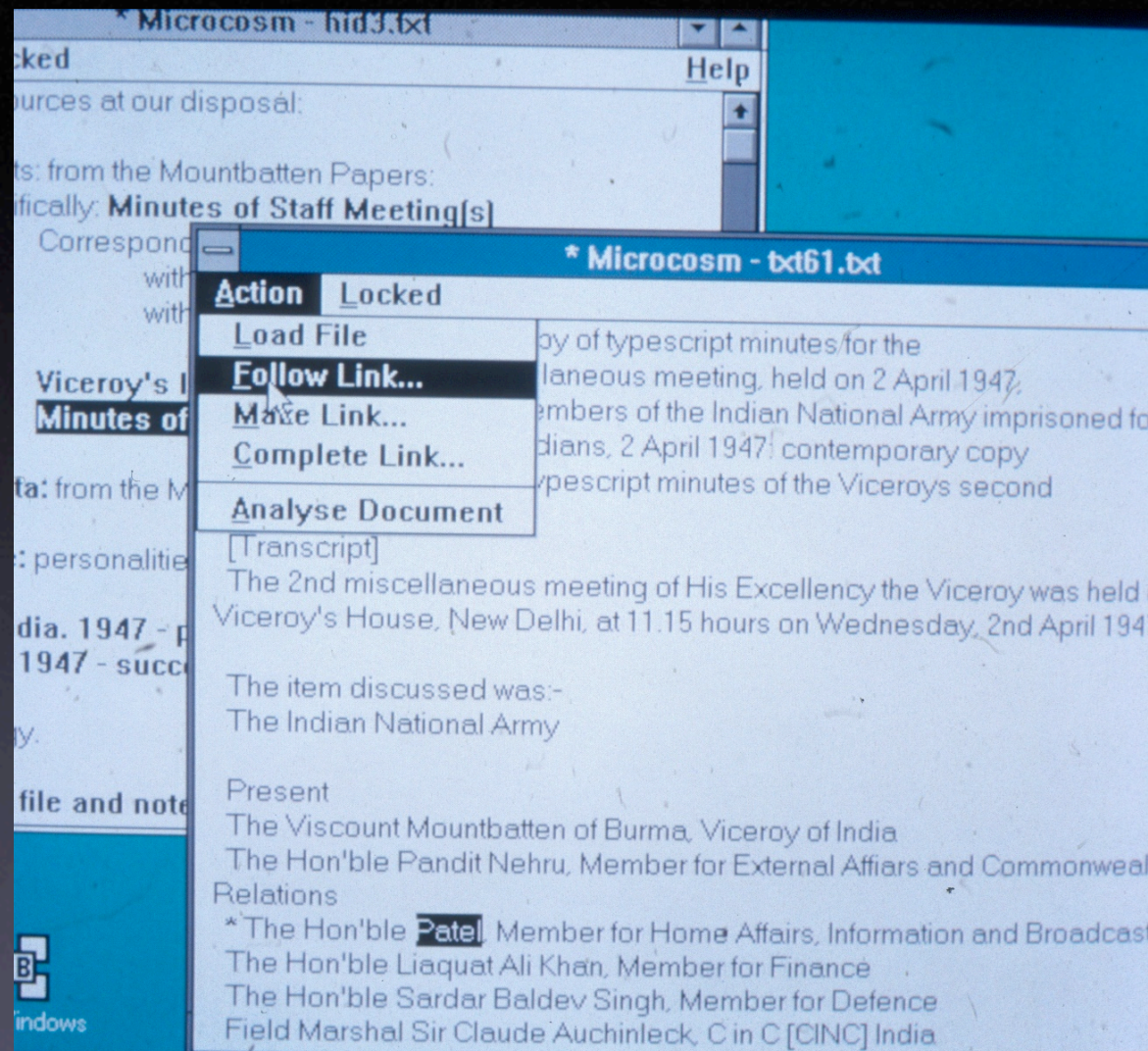




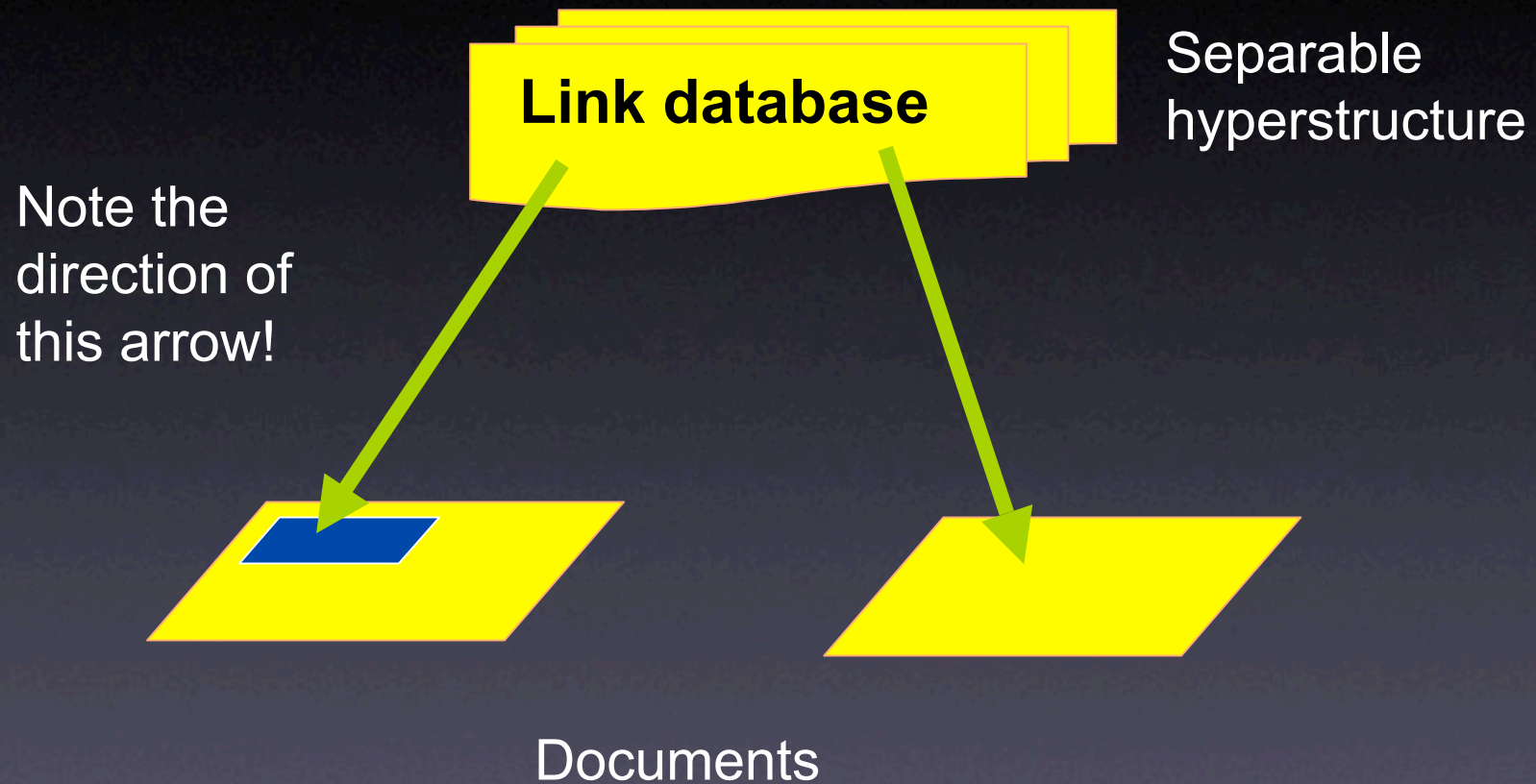
What is the connection
between Earl Mountbatten of
Burma, the University of
Southampton, and my
research career?



Microcosm: Mountbatten archive application



Linkbases



Links in Microcosm

source, destination, description

source: object | concept | context

We generated links based on metadata
description of documents in docuverse
and “it all falls out”



ECHT'90





ACM Hypertext'91

Lessons learnt:

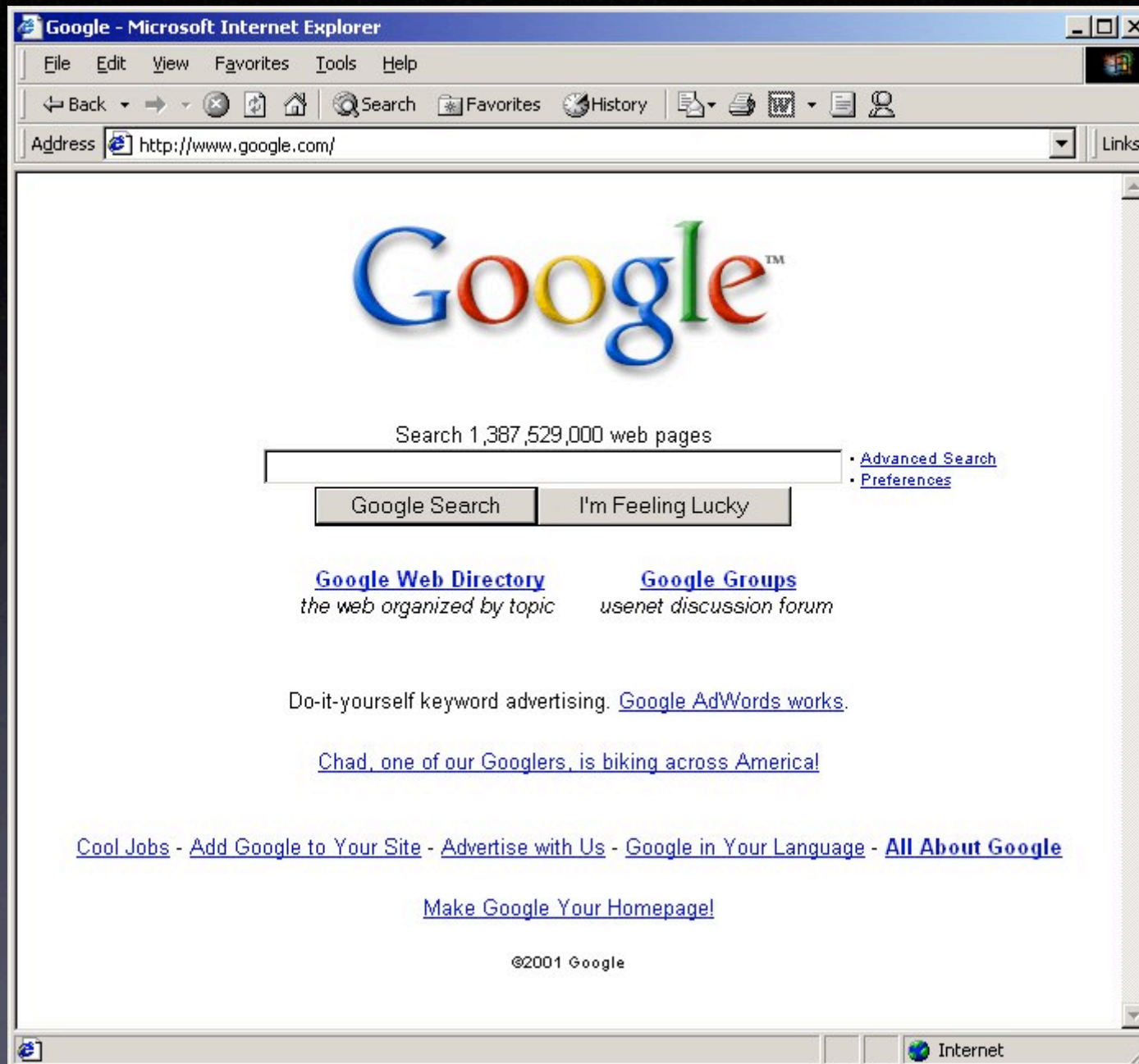
Big is beautiful:
the network is everything (tbl)

Scruffy works: let the links fail to make it scale (tbl)

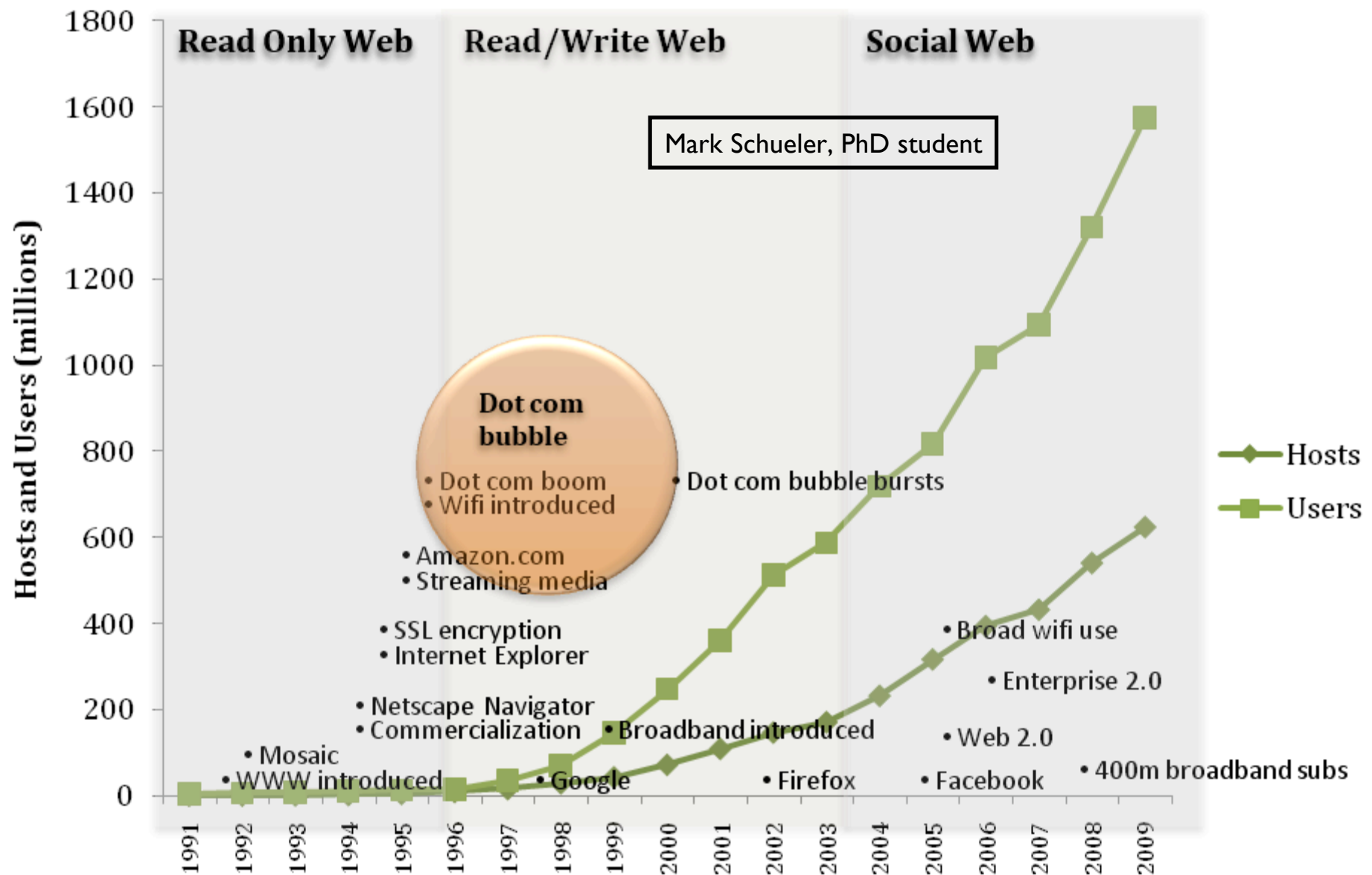
Democracy rules: open and free (tbl)

But we lost (for a time) conceptual and contextual linking – the
Web is a strangely linkless world

Missing links – search engines fill the gap

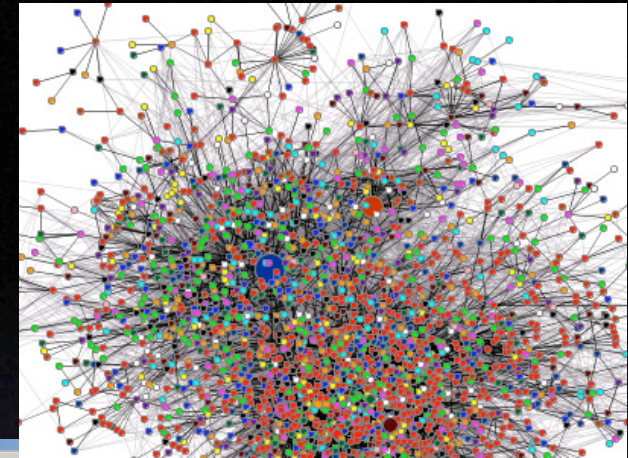


Internet Growth - Usage Phases - Tech Events



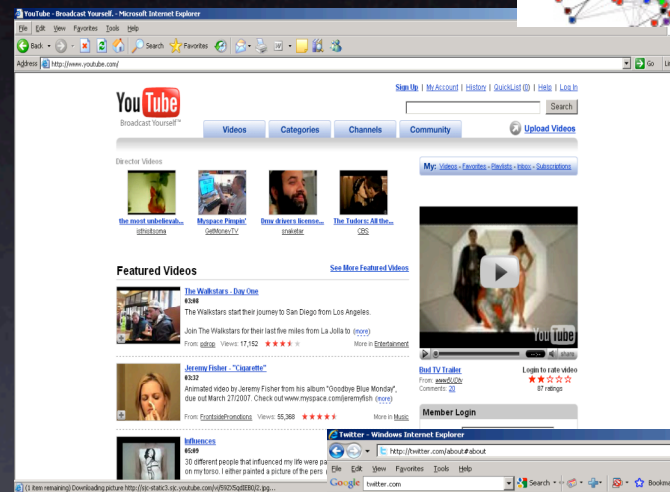
Note - events shown relate to the time axis only.

Web 2.0



- Wiki's
- Blogs
- Folksonomies
- Flickr
- YouTube
- MySpace
- Facebook
- Second Life
- Twitter

Blogosphere



Wikipedia, the free encyclopedia - Windows Internet Explorer

http://en.wikipedia.org/wiki/Main_Page

File Edit View Favorites Tools Help

Google Wikipedia Search + Bookmarks Check Translate AutoFill Wikipedia Sign In

Wikipedia, the free ency... realtimecollisiondetection.ne...

Try Beta Log in / create account

main page discussion view source history

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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
- Help

toolbox

- What links here
- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link

Welcome to Wikipedia,
the free encyclopedia that anyone can edit.

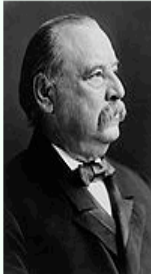
3,102,741 articles in English

Who is tweeting this morning?

Overview · Editing · Questions · Help

Contents · Categories · Featured content · A–Z index

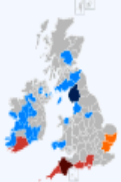
Today's featured article

 **Grover Cleveland** (1837–1908) was both the 22nd and 24th President of the United States. Cleveland is the only President to serve two non-consecutive terms (1885–1889 and 1893–1897) and therefore is the only individual to be counted twice in the numbering of the presidents. He was the winner of the popular vote for President three times—in 1884, 1888, and 1892—and was the only Democrat elected to the Presidency in the era of Republican political domination that lasted from 1860 to 1912. Cleveland's admirers praise him for his honesty, independence, integrity, and commitment to the principles of classical liberalism. As a leader of the Bourbon Democrats, he opposed imperialism, taxes, subsidies and inflationary policies, but as a reformer he also worked against corruption, patronage, and bossism. Critics complained that he had little imagination and seemed overwhelmed by the nation's economic disasters—depressions and strikes—in his second term. Even so, his reputation for honesty and good character survived the troubles of his second term. (more...)

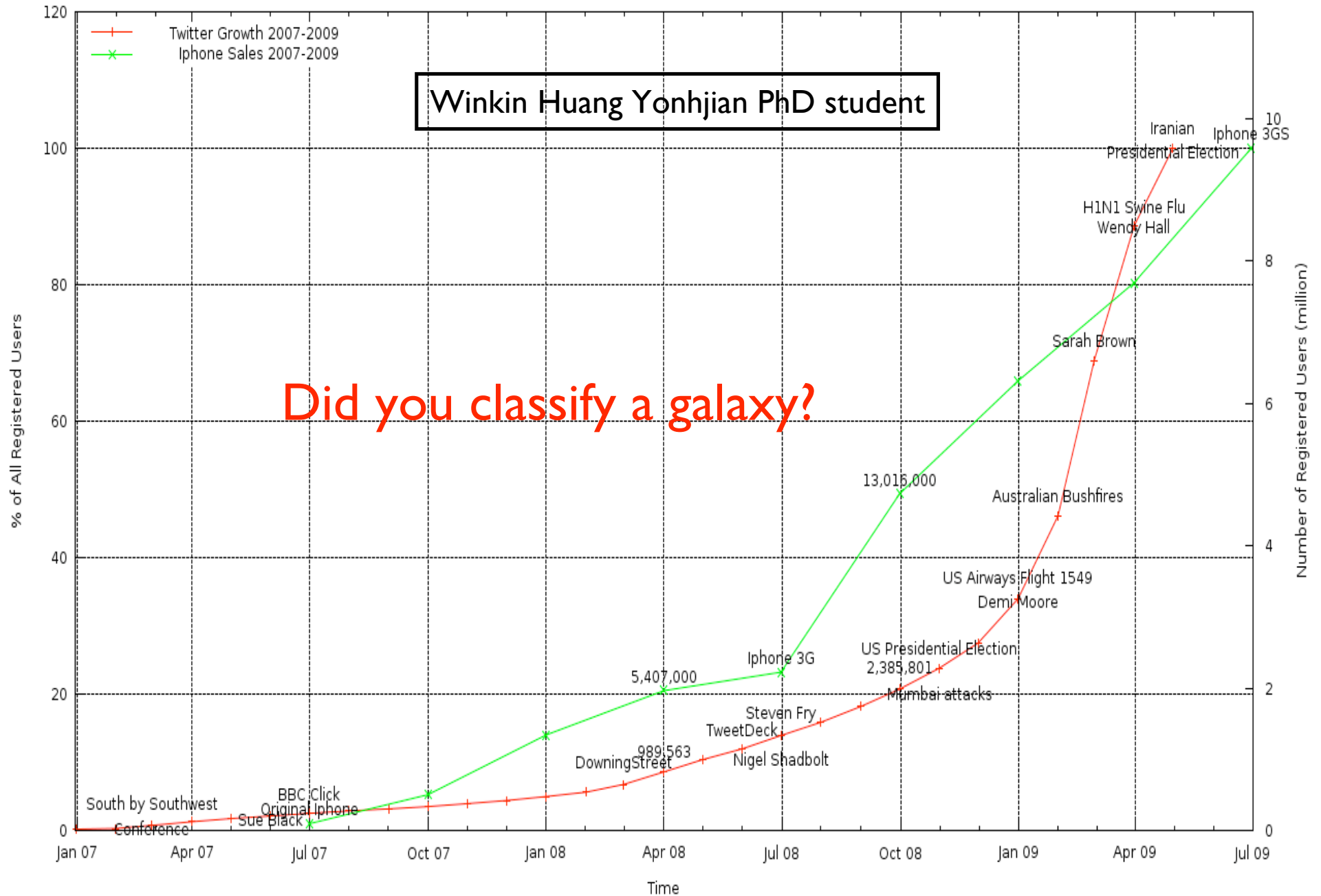
Recently featured: Werner Mölders – Electron – Han Dynasty

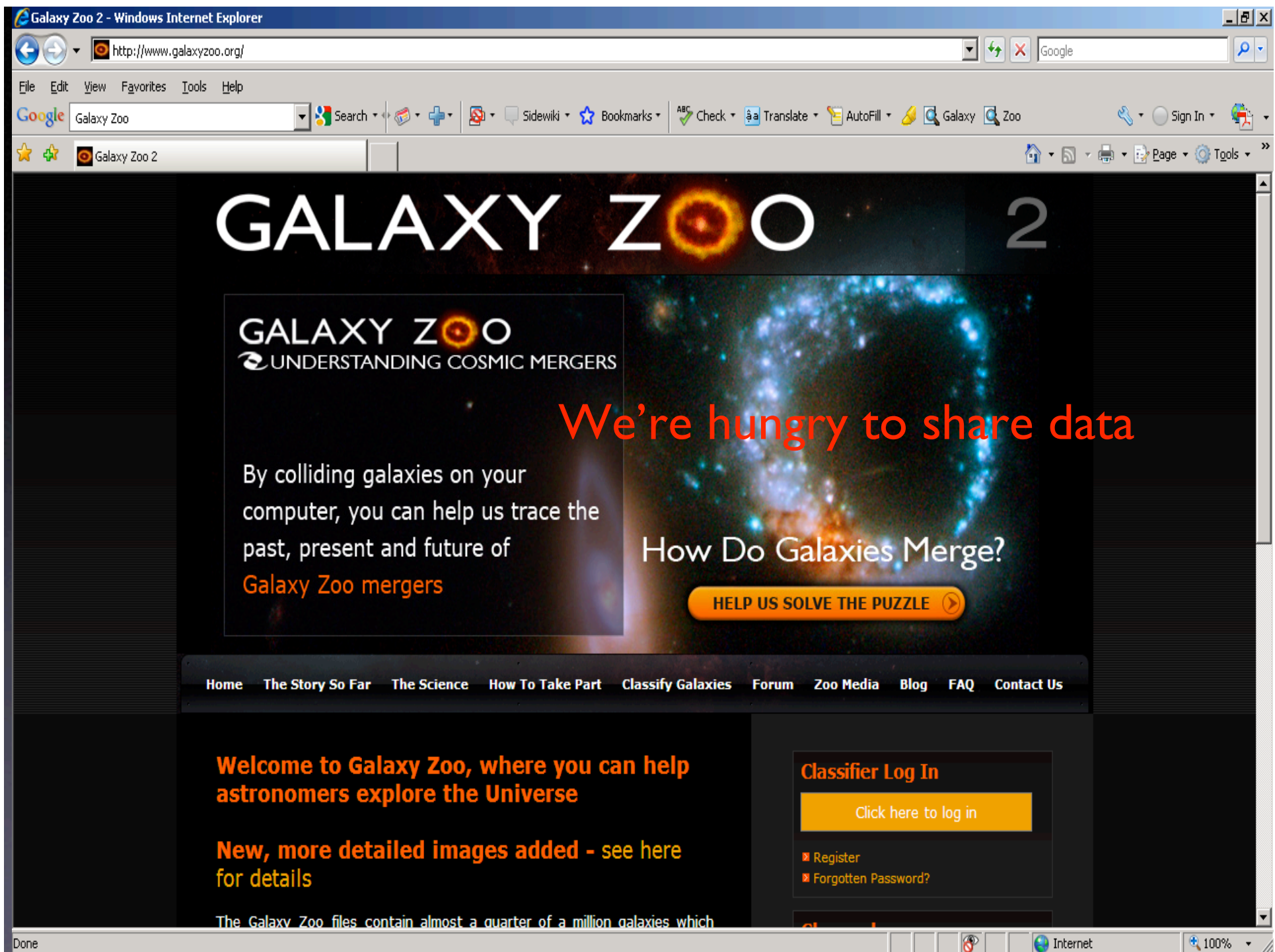
In the news

- At least 104 people are killed in a **mine explosion** in Heilongjiang, People's Republic of China.
- Continued flooding** affecting Great Britain and Ireland (affected areas pictured) results in two deaths.
- Egypt **recalls** its ambassador to Algeria in a dispute following a qualifying match between the nations for the 2010 FIFA World Cup.
- Prime Minister of Belgium **Herman Van Rompuy** is chosen as the first permanent President of the European Council.
- British politician **Catherine Ashton** is selected as the first High Representative of the European Union for Foreign Affairs and Security Policy.
- A United States district court **finds** the Army Corps of Engineers was negligent in maintaining New Orleans levees that contributed to flooding during Hurricane Katrina.



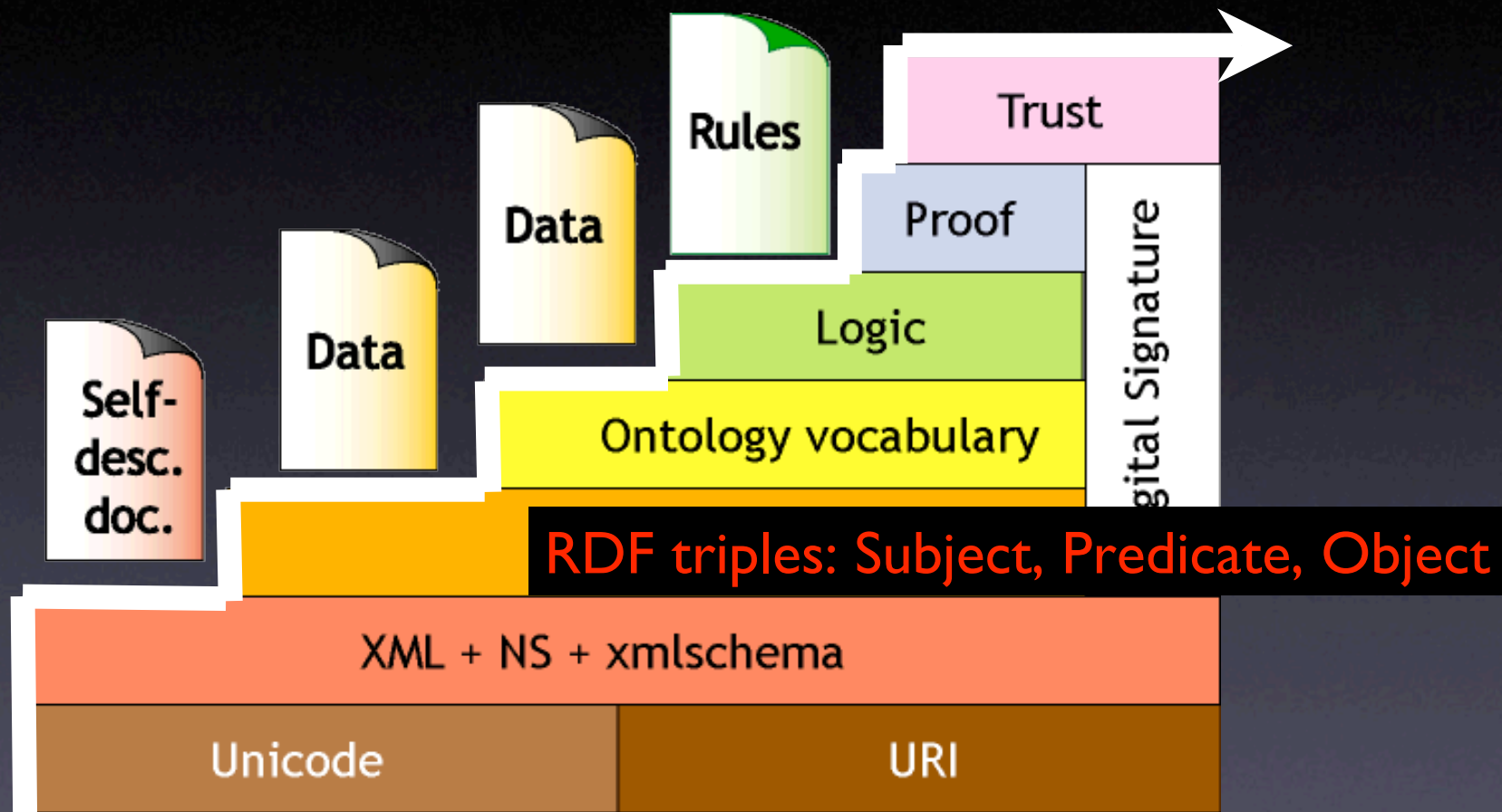
Timeline of Twitter Growth





The Semantic Web: A Web of Linked Data

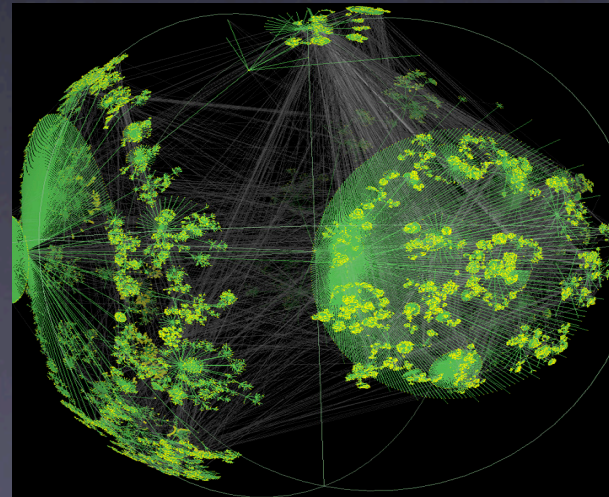
The Semantic Web



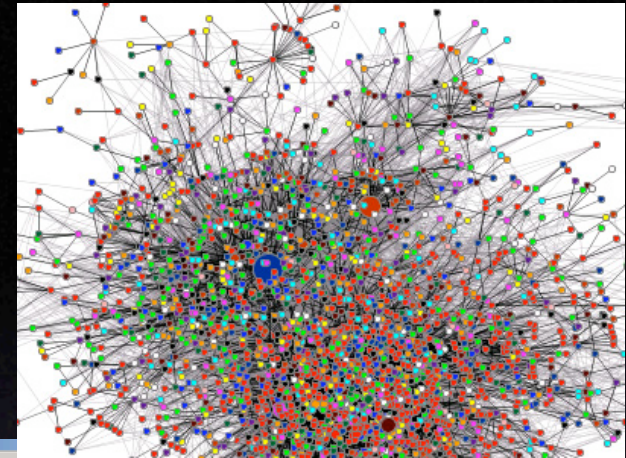
Semantic Web LayerCake (Berners-Lee, 99; Swartz-Hendler, 2001)

Web 1.0

A Web of Documents

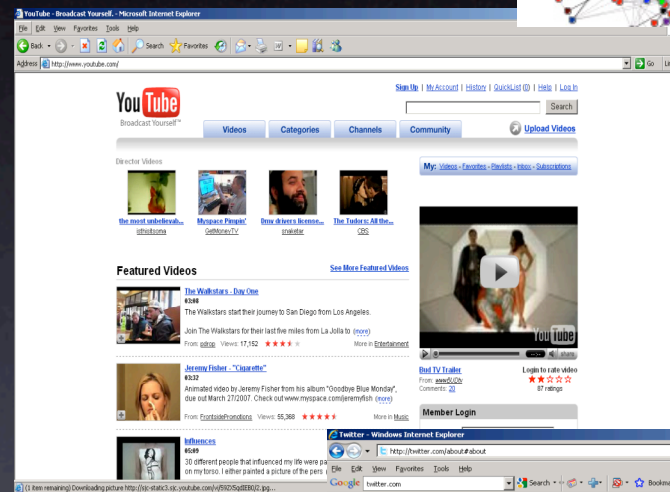


Web 2.0



- Wiki's
- Blogs
- Folksonomies
- Flickr
- YouTube
- MySpace
- Facebook
- Second Life
- Twitter

Blogosphere



Tomorrow the Web of Linked Data

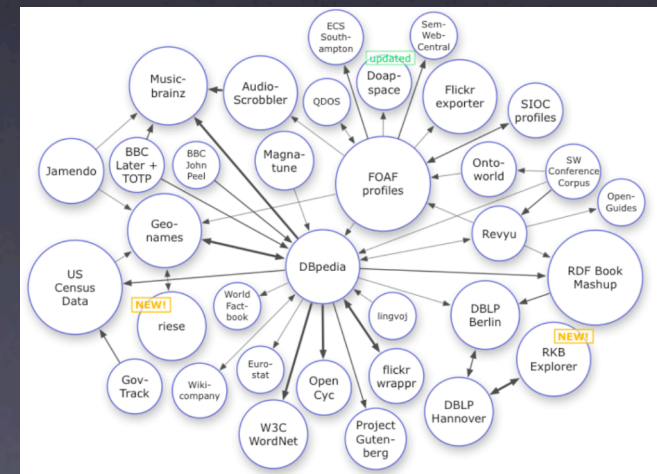
We're eager to share data for all sorts of reasons

What are the implications for business?

What are social and policy implications?

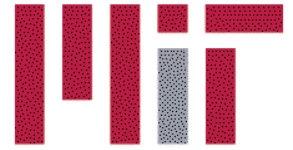
What will we do with it?

Web 3.0?



Can we develop a
theory of tipping
points?

UNIVERSITY OF
Southampton



School of Electronics
and Computer Science



WSRI

web science research initiative

Introduction

our motivation

- the Web has been transformational
- we need to understand it
- anticipate future developments
- identify opportunities and threats
- we have established a new discipline: Web Science



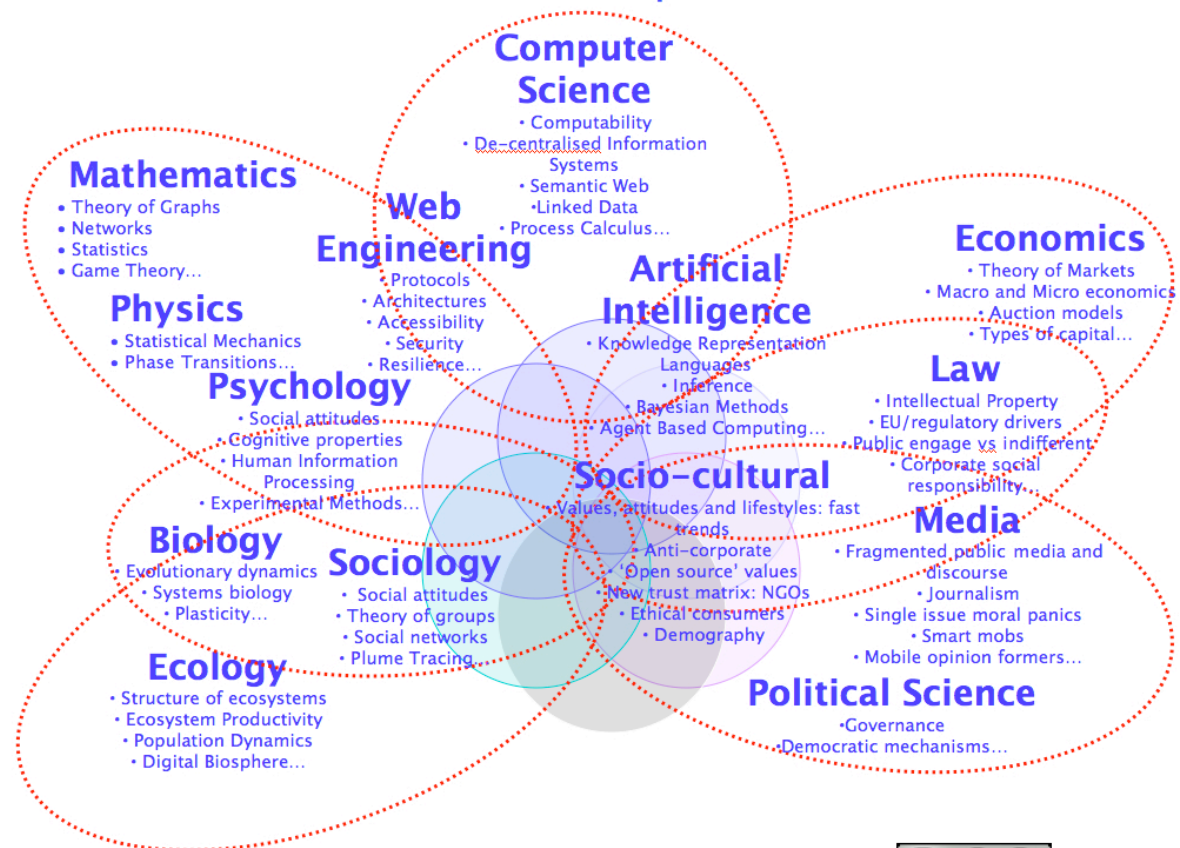
research / thought leadership / insight



Web Science

is {inter|multi|trans}disciplinary

Web Science: Components

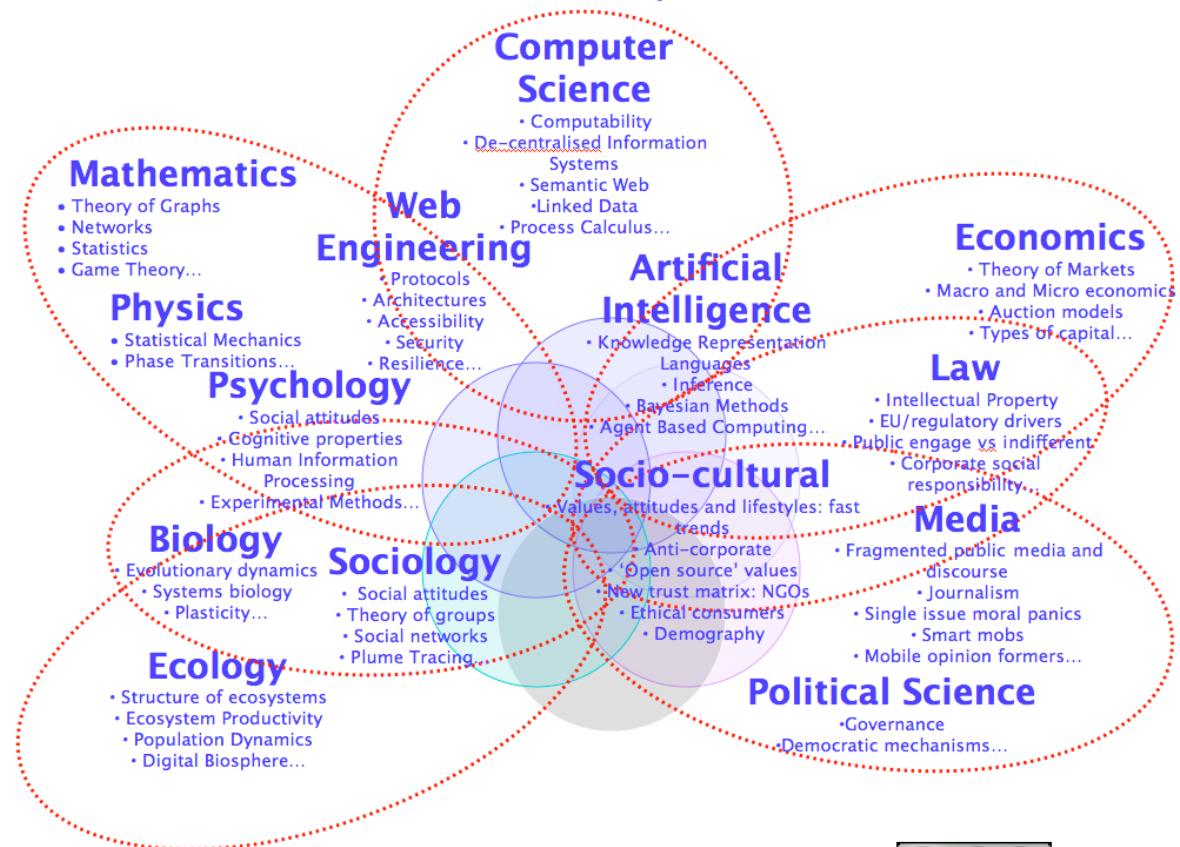


Web Science is about additionality

Not the union of the
disciplines

But more than their
intersection

Web Science: Components



Web Science - Examples

Wikipedia - Collective Intelligence

- What is its structure?
- How stable is it?
- Why do people contribute?
- What lessons does it offer?

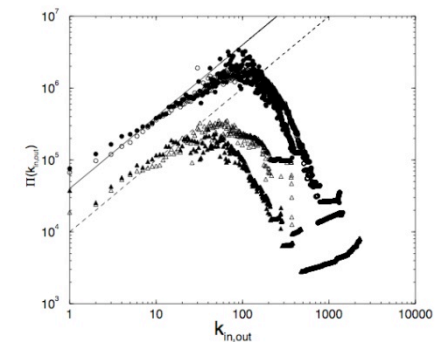
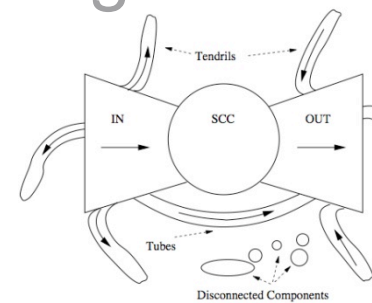


FIG. 1: The shape of the Wikipedia network

Motivation	Question example
Protective	"By writing/editing in Wikipedia I feel less lonely."
Values	"I feel it is important to help others."
Career	"I can make new contacts that might help my business or career."
Social	"People I'm close to want me to write/edit in Wikipedia."
Understanding	"Writing/editing in Wikipedia allows me to gain a new perspective on things."
Enhancement	"Writing/editing in Wikipedia makes me feel needed."
Fun	"Writing/editing in Wikipedia is fun."
Ideology	"I think information should be free."

research / thought leadership / insight

Web Science - Examples

Linked data

- Adding a Web of data to the Web of documents
- Methods for linking data
- Role of the Semantic Web
- Micro principles to macro macro phenomena
- Unanticipated reuse

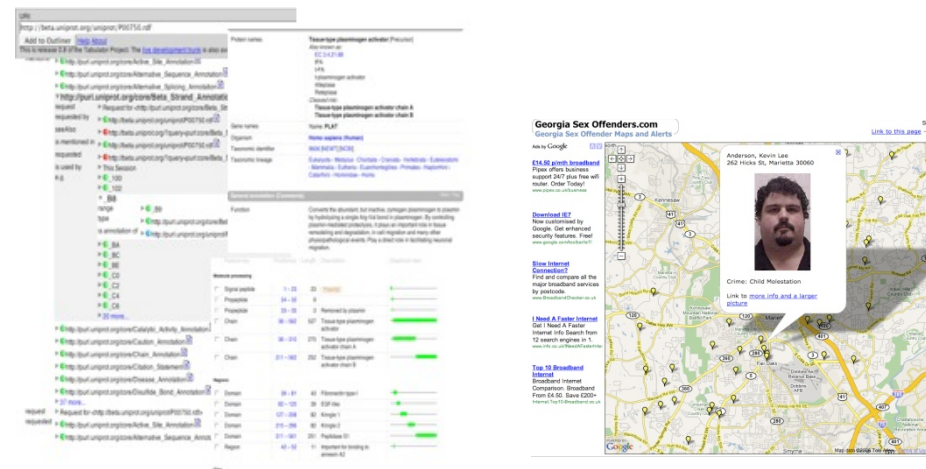


Figure 8 Browsing the Structured Data Web for Proteomics

research / thought leadership / insight



www.webscience.org

Tipping points?

**David Peterson**

David Peterson has been a web developer since the early years - 1995. He works in the [steamy tropics](#) and is trying to kick start the Semantic Web down under. Not only that, but he is an Advisory Committee representative to the W3C, wow. His wonderful family, making lovely photographs and searching for the perfect espresso keeps him happy.

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[Open Source Image Editors ... for Designers? »](#)

Obama's Groundbreaking use of the Semantic Web

by [David Peterson](#)

In a revolutionary move, Obama's administration is set to utilise next generation web technologies to bring an unprecedented level of transparency to government. In this case it will shed light on how the roughly US \$800 billion dollar economic stimulus will be spent. The recently launched [recovery.gov](#) website (powered by nothing other than Drupal) brought with it the promise that citizens would be able to view where the money was going and how it was going to be spent.

To enable the citizen masher to do their wizardry, the administration will be opening up a veritable candy store of goodies: [Semantic Web](#), [RDF](#), [Linked Data](#), [SPARQL](#), [RDFa](#), [SIOC](#), [ATOM](#), [RESTful](#) APIs, JSON, Widgets, [Wikis](#), XForms, P2P Networks. Wow. They only forgot the lions and tigers and bears oh my... This is an unbelievable stack of technology. I didn't think the government even knew what an RSS feed was :)

PM welcomes Sir Tim Berners-Lee to Downing Street | Number10.gov.uk - Windows Internet Explorer

http://www.number10.gov.uk/Page20595

Google

File Edit View Favorites Tools Help

Google number 10 Search

Check Translate AutoFill number 10

Sign In

PM welcomes Sir Tim Berners-Lee to Downing Street | ...

Page Tools

Number10.gov.uk

The official site of the Prime Minister's Office

10

Home News Communicate Meet the PM History and Tour Number 10 TV

Enter search terms Go

Home > PM welcomes Sir Tim Berners-Lee to Downing Street

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October 2009

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26	27	28	29	30	31	

« Sep

Tuesday 15 September 2009

PM welcomes Sir Tim Berners-Lee to Downing Street

The Prime Minister welcomed the creator of the World Wide Web, Sir Tim Berners-Lee, and Professor of Artificial Intelligence at the University of Southampton, Nigel Shadbolt, to Downing Street this morning.



Mr Berners-Lee and Mr Shadbolt presented an update to Cabinet on their work advising the Government on how to make data more accessible to the public.

Gordon Brown has already spoken publicly about his aim of making the UK a world leader in opening up government information on the internet, an important element of Building Britain's Future.

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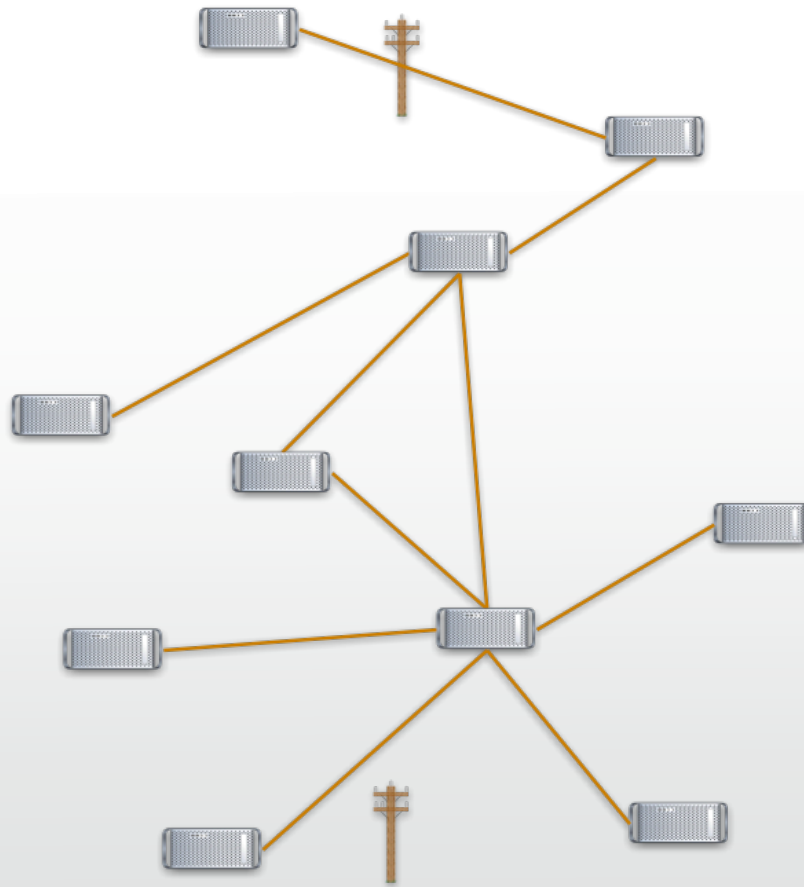
Internet 100%

The Pragmatic Semantic Web: The Emergence of the Linked Web of Data

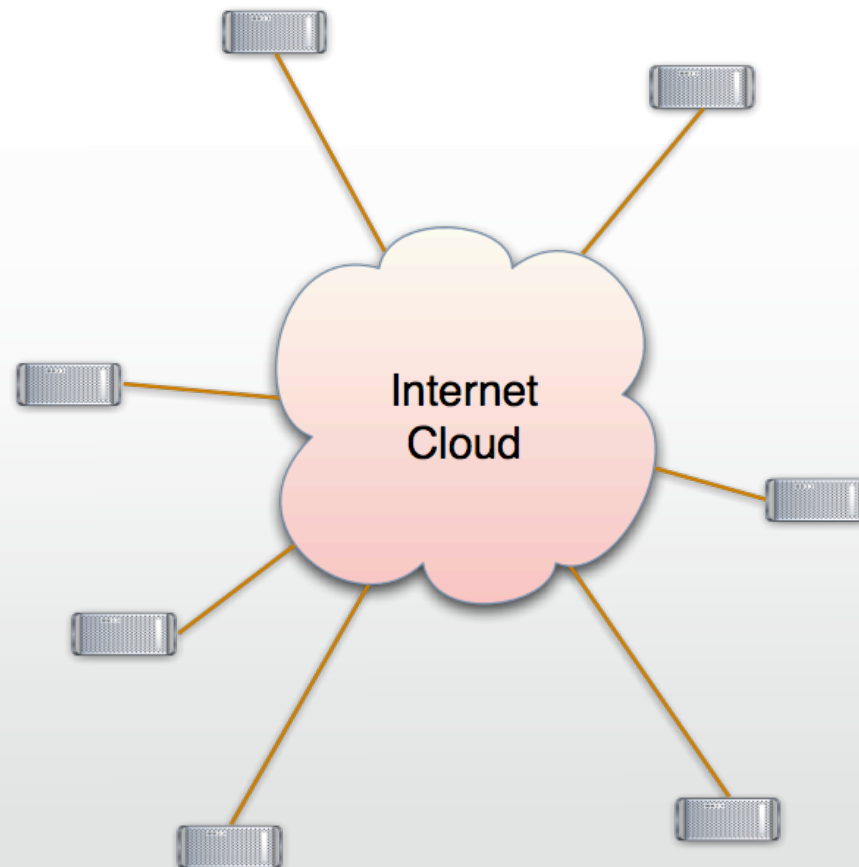
Nigel Shadbolt

Online Information Conference
Olympia, London
1 December 2009

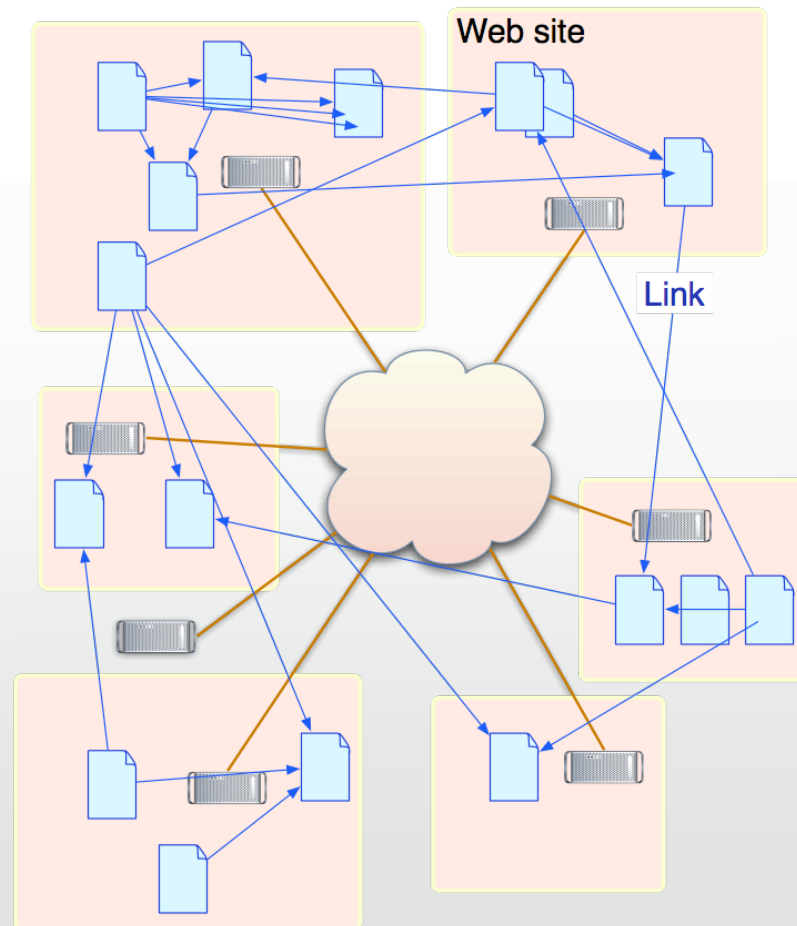
When the Network was Physical



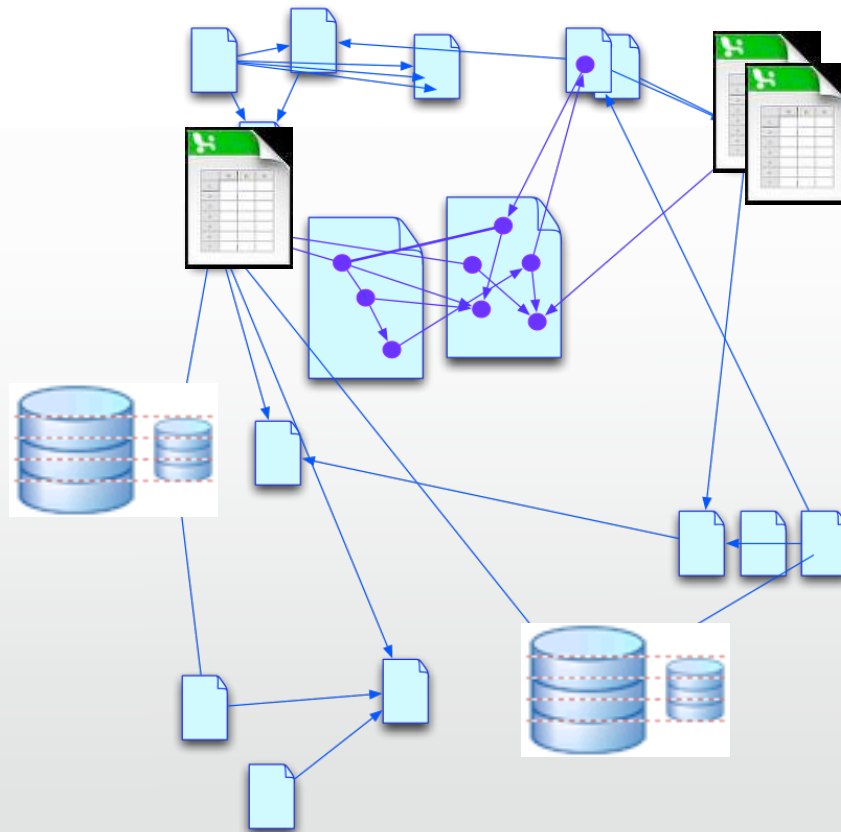
When the Network was Abstracted



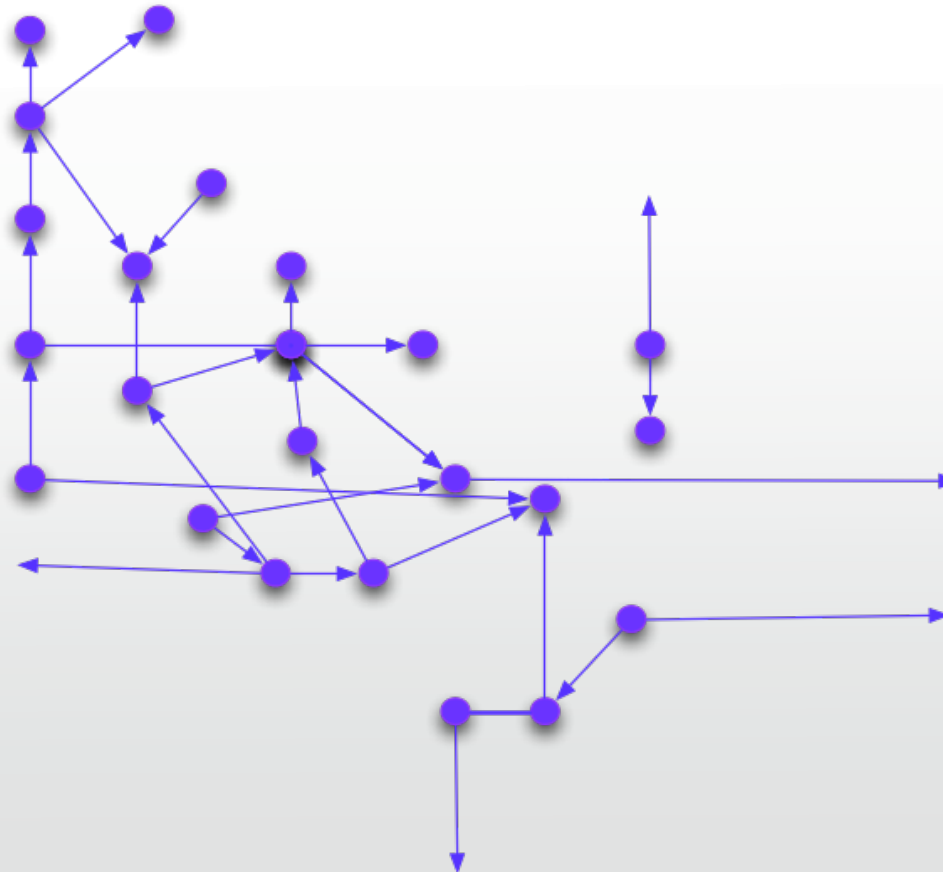
When the Network was Abstracted Again



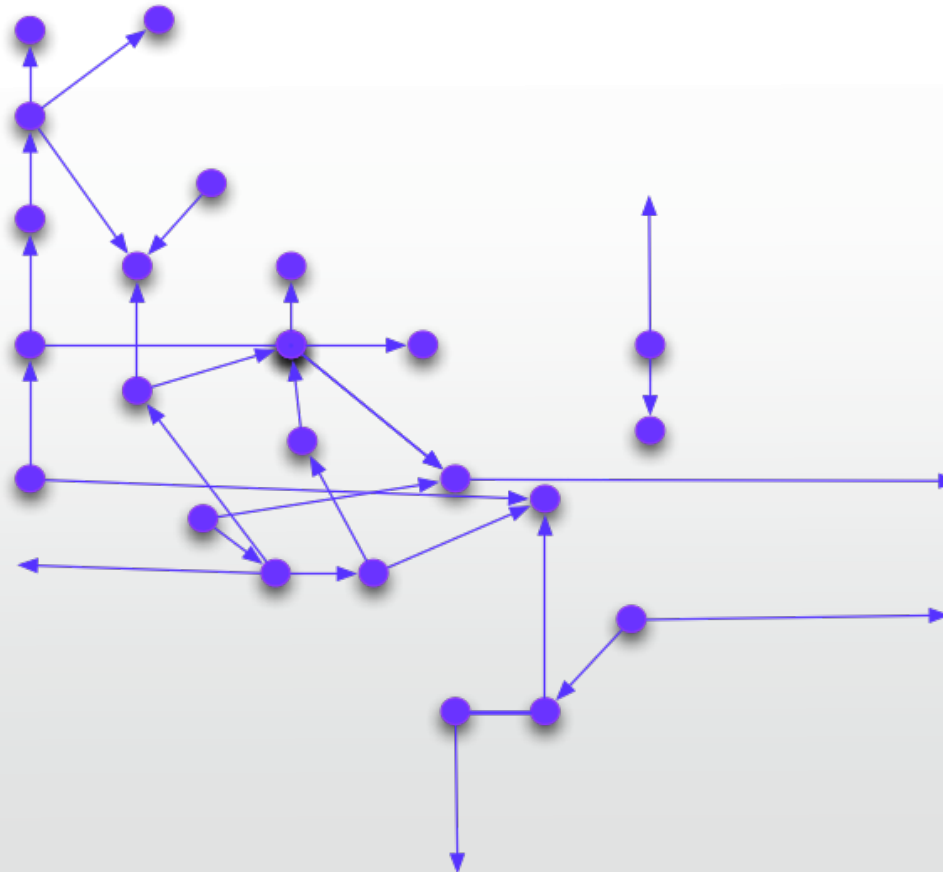
When the Network is Abstracted Again



This is the Web of Linked Data



This is the Pragmatic Semantic Web



Linking Data

<http://www2002.org>



WWW 2002
THE ELEVENTH INTERNATIONAL
WORLD WIDE WEB CONFERENCE

Sheraton Waikiki Hotel
Honolulu, Hawaii, USA
7-11 May 2002

CONFERENCE ORGANIZERS



International World Wide
Web Conference Committee

HAWAII

1 LOCATION. 5 DAYS. LEARN. INTERACT.

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On 7-11 May 2002, Honolulu, Hawaii will provide the backdrop for The Eleventh International World Wide Web Conference. This prestigious series of the International World Wide Web Conference Committee (IW³C²) attracts participants from around the world, and it provides a public forum for the World Wide Web Consortium (W3C) through the annual W3C track.

The conference is being organized by the International World Wide Web Conference Committee (IW³C²), the University of Hawaii and the Pacific Telecommunications Council (PTC).

FEATURED SPEAKERS (CONFIRMED)

 <p>Tim Berners-Lee, inventor of the World Wide Web and Director of the W3C who now holds the 3Com Founders chair at the Laboratory for Computer Science (LCS) at the Massachusetts Institute of Technology (MIT).</p>	 <p>Richard A. DeMillo, vice president and chief technology officer for Hewlett-Packard Company.</p>
 <p>Ian Foster, guru of "Grid Computing", associate</p>	 <p>McArthur Prize Winner,</p>

In a way that machines can “understand”....

<http://www2002.org>

WWW 2002

**THE ELEVENTH INTERNATIONAL
WORLD WIDE WEB CONFERENCE**

This is a type of object event and this is its title

This is the URL of the web page for the event

This is a type of object photograph and the photograph is of Tim Berners-Lee

Tim Berners-Lee is an invited speaker at the event

```
<owl:Class rdf:ID="Conference">
<rdfs:subClassOf rdf:resource="#Meeting-Taking-Place"/>
<rdfs:subClassOf rdf:resource="#Publication-Type-Event"/>
-<rdfs:subClassOf>
-<owl:Restriction>
<owl:onProperty rdf:resource="#published-proceedings"/>
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James S. Galletta, associate

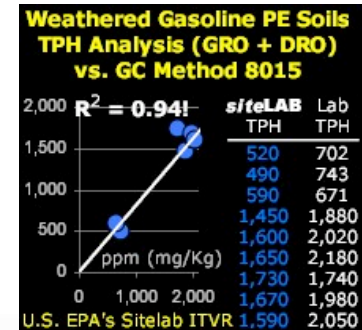
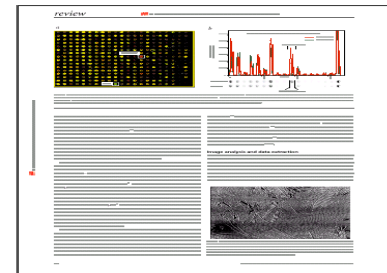
James S. Galletta, associate

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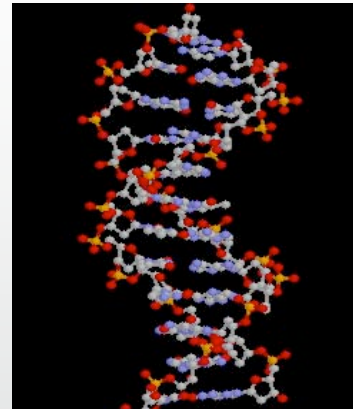
James S. Galletta, associate

Can mark up and link any resource...

- Publications...
- Multimedia...
- Databases...
- Scientific structures...
- Workflow...
- People...



Web data set (XHTML)



Technical Principles

The four micro principles of the Semantic Web

1. All entities of interest, such as information resources, real-world objects, and vocabulary terms should be identified by URI references.
2. URI references should be dereferenceable, meaning that an application can look up a URI over the HTTP protocol and retrieve RDF data about the identified resource.
3. Data should be provided using the RDF/XML syntax
4. Data should be interlinked with other data.

The Semantic Web Revisited

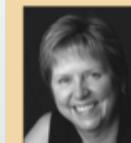
Nigel Shadbolt and Wendy Hall, *University of Southampton*
Tim Berners-Lee, *Massachusetts Institute of Technology*



Nigel Shadbolt is a professor of artificial intelligence in the School of Electronics and Computer Science at Southampton University. Contact him at nrs@ecs.soton.ac.uk.



Tim Berners-Lee is the director of the World Wide Web Consortium, a senior researcher at the Massachusetts Institute of Technology's Computer Science and Artificial Intelligence Laboratory, and a professor of computer science in the Department of Electronics and Computer Science at Southampton University. Contact him at timbl@w3.org.



Wendy Hall is a professor of computer science in the School of Electronics and Computer Science at Southampton University. Contact her at wh@ecs.soton.ac.uk.

Principle 1: URIs

- Uniform Resource identifier
- A Web based identifier
- You can dereference them – get something back
- Information about objects, relations, properties and values

<http://id.ecs.soton.ac.uk/person/2686>

<http://rdf.ecs.soton.ac.uk/person/2686>

<http://rdf.ecs.soton.ac.uk/project/464>

<http://rdf.ecs.soton.ac.uk/publication/11065>

<http://education.data.gov.uk/doc/school/120805>

<http://southampton.rkbexplorer.com/id/person-02686>

http://dbpedia.org/resource/Nigel_Shadbolt

Principle 2: Dereferencable

- Uniform Resource identifier
- A Web based identifier
- You can dereference them – get something back
- Information about objects, relations, properties and values

▼ Southampton ECS People: Professor Nigel R Shadbolt		
Southampton ECS People: Professor Nigel R Shadbolt	Description	This rdf document contains information about a person Southampton.
Nigel Shadbolt	Source	http://www.ecs.soton.ac.uk/people/nrs
	Title	Southampton ECS People: Professor Nigel R Shadbolt
	Date Created	2009-11-26T10:53:20Z
	type	Ontology
	label	Southampton ECS People: Professor Nigel R Shadbolt
	Appellation	Professor
	Family Name	Shadbolt
	Full Name	Professor Nigel R Shadbolt
	Given Name	Nigel R
	Role	http://id.ecs.soton.ac.uk/role/2686
	member Of	http://id.ecs.soton.ac.uk/project/221
		http://id.ecs.soton.ac.uk/project/293
		http://id.ecs.soton.ac.uk/project/312
		http://id.ecs.soton.ac.uk/project/353
		http://id.ecs.soton.ac.uk/project/361
		http://id.ecs.soton.ac.uk/project/381
		http://id.ecs.soton.ac.uk/project/395
		http://id.ecs.soton.ac.uk/project/443
		http://id.ecs.soton.ac.uk/project/44
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		http://id.ecs.soton.ac.uk/project/464
		http://id.ecs.soton.ac.uk/project/465
		http://id.ecs.soton.ac.uk/project/466
		http://id.ecs.soton.ac.uk/project/467
		http://id.ecs.soton.ac.uk/project/508
		http://id.ecs.soton.ac.uk/project/623
		http://id.ecs.soton.ac.uk/project/629
		http://id.ecs.soton.ac.uk/project/630
		Person
	type	Shadbolt
	family name	Nigel R
	givenname	http://users.ecs.soton.ac.uk/nrs/
	homepage	http://www.ecs.soton.ac.uk/image.php?id=person_268
	img	http://www.ecs.soton.ac.uk/image.php?id=person_268&checksum=6c2158b33a0c10e328ec62f9ed1cc73
	mbox	mailto:nrs@ecs.soton.ac.uk
	name	Professor Nigel R Shadbolt

Principle 3: RDF back

- Uniform Resource identifier
- A Web based identifier
- You can dereference them – get something back
- Information about objects, relations, properties and values

▼ Southampton ECS Projects: MIMEX: Multivariant Information Management and Exploitation

Southampton ECS Projects: MIMEX: Multivariant Information Management and Exploitation	Description	This rdf document contains information about a University of Southampton.
	Source	http://www.ecs.soton.ac.uk/research/projects/4
	Title	Southampton ECS Projects: MIMEX: Multivariant
	Date Created	2009-11-26T10:58:31Z
	type	Ontology
	label	Southampton ECS Projects: MIMEX: Multivariant
http://id.ecs.soton.ac.uk/project/443	associated With	http://id.ecs.soton.ac.uk/UoS
		Name General Dynamics
		type Organization
		Name University of Cardi
		type Organization
		Name Ministry of Defenc
		type Organization
	associated With Unit	http://id.ecs.soton.ac.uk/UoS/ECS
	Name	MIMEX: Multivariant Information Management
	Theme	http://id.ecs.soton.ac.uk/theme/106
		http://id.ecs.soton.ac.uk/theme/127
		http://id.ecs.soton.ac.uk/theme/130
		http://id.ecs.soton.ac.uk/theme/38
		http://id.ecs.soton.ac.uk/theme/66
	Web Page	https://www.edefence.org/mimex
	run By Group	http://id.ecs.soton.ac.uk/group/iam
	begins	in Calendar Clock
		day
		hour
		minute
		month
		year
		type
		in Calendar Clock Data Type
		type
		Instant
	ends	in Calendar Clock
		day
		hour
		minute
		month
		year
		type
		in Calendar Clock Data Type
		type
		Instant

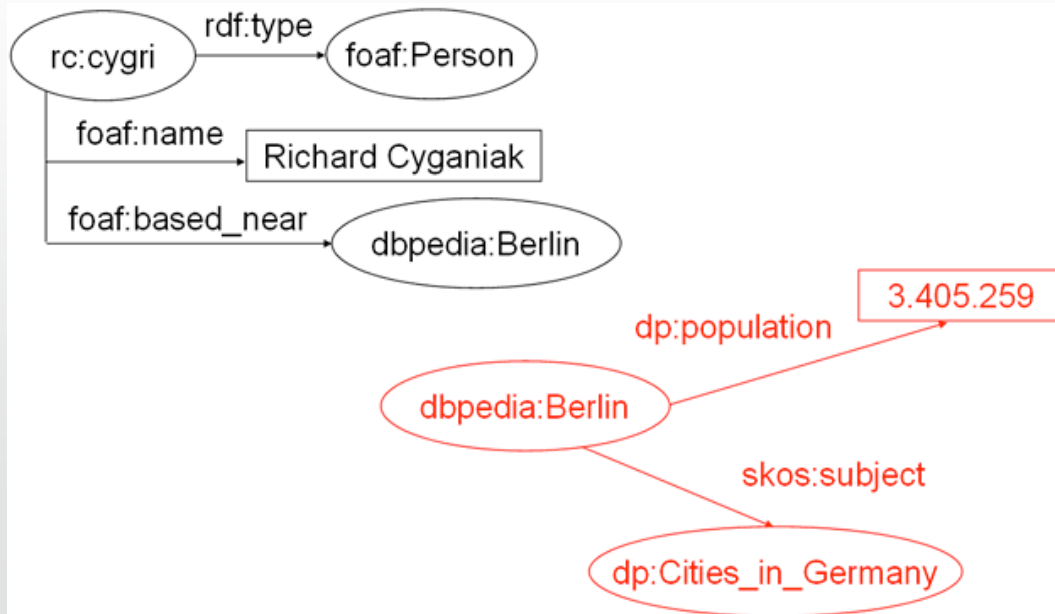
What is a RDF?

- Statements about resources in the form of subject-predicate-object
- A knowledge representation language for the Web
- Represents information as sets of triples
- Every element of a triple can be a URI or literal
- Sets of RDF triples can be represented as graphs

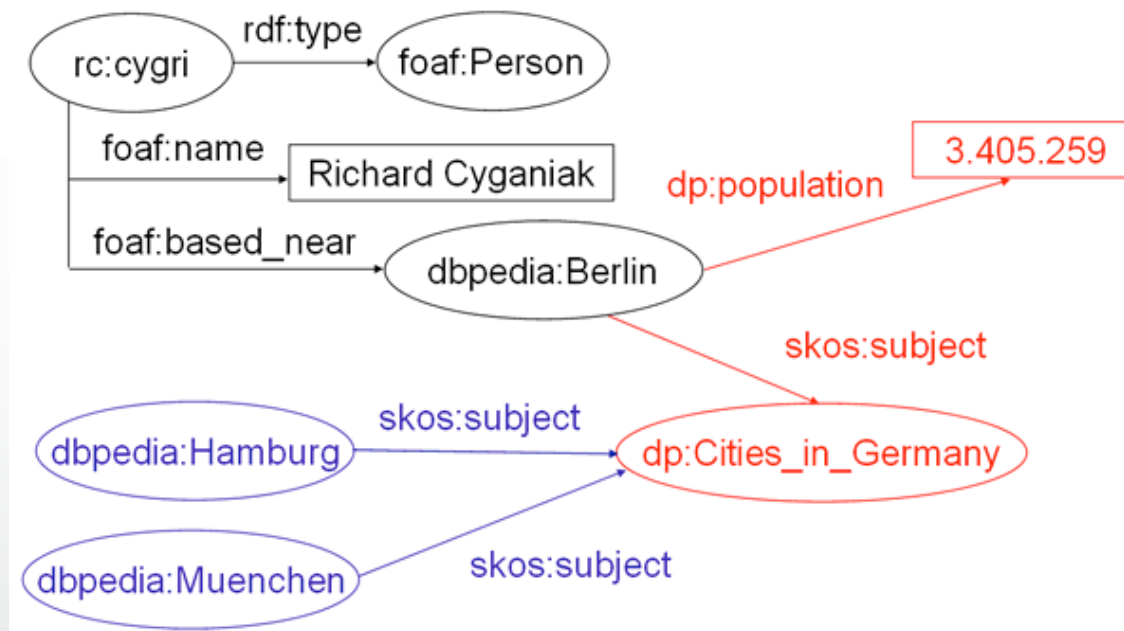
rc:cygri	rdf:type	foaf:Person.
rc:cygri	foaf:name	"Richard Cyganiak" .
rc:cygri	foaf:based_near	dbpedia:Berlin .
dbpedia:Berlin	dp:population	"3,405,259"
dpedia:Berlin	skos:subject	dp:Cities_in_Germany.

What is a RDF?

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Principle 4: Link data



Principle 4: Link data

<http://rdf.ecs.soton.ac.uk/person/2686>

<http://southampton.rkbexplorer.com/id/person-02686>

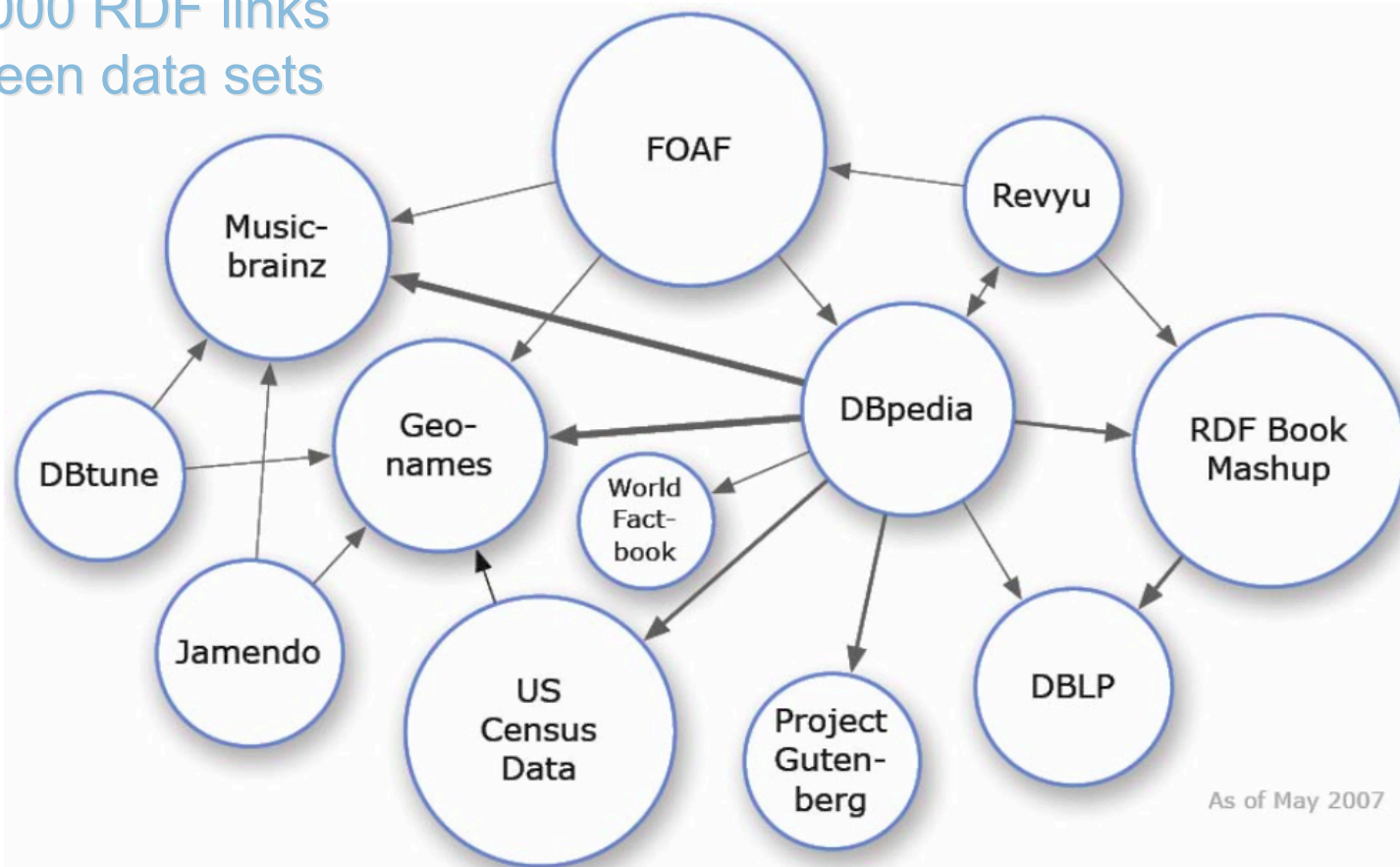
http://dbpedia.org/resource/Nigel_Shadbolt

The screenshot displays the SIG.MA Semantic Informa Mashup interface, which is a web application for exploring semantic data. The interface is divided into several sections:

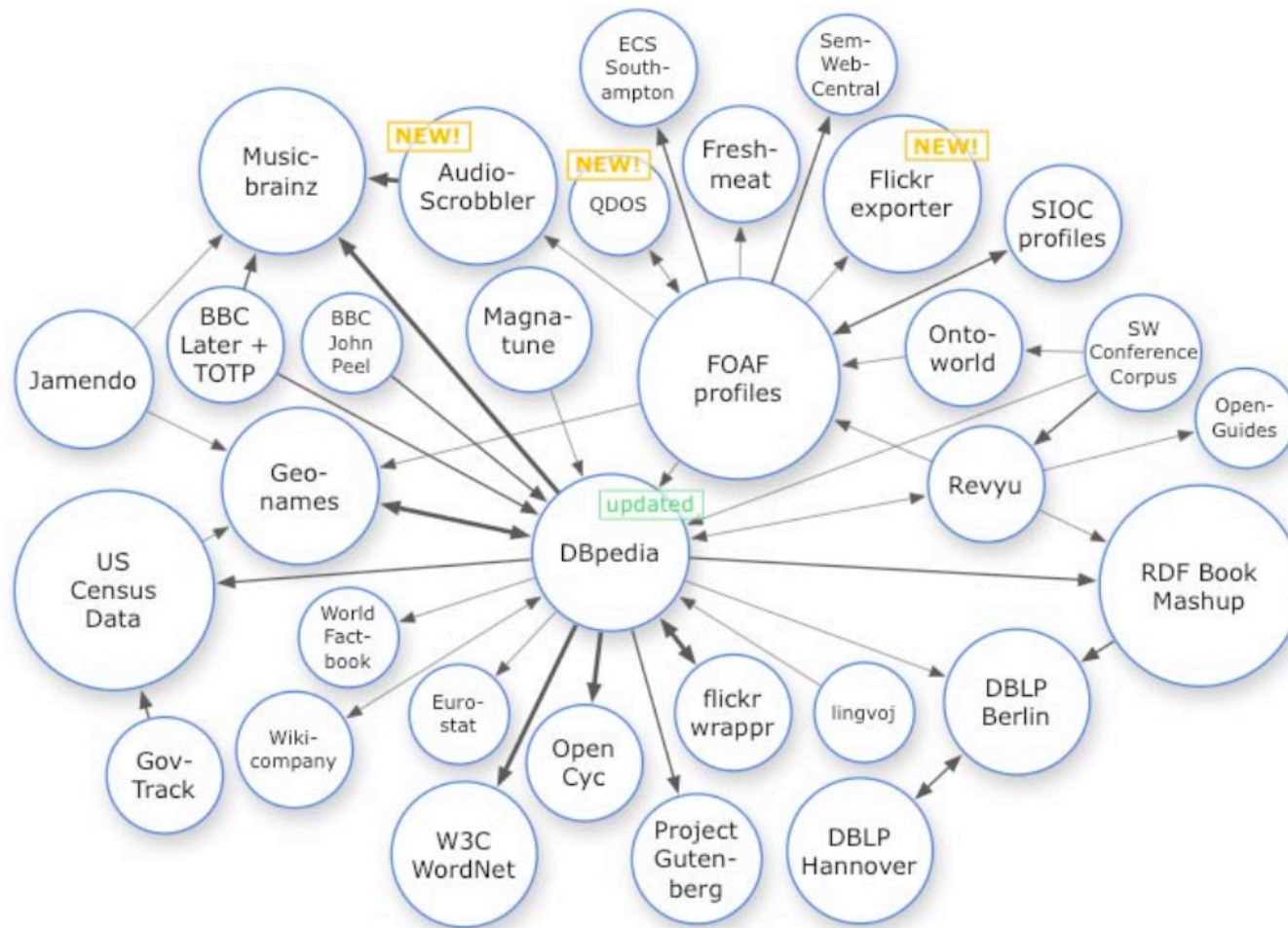
- Header:** The top of the page features the SIG.MA logo and navigation links for Help, About, and Forum.
- Search Bar:** A search bar is located at the top, with the URL <http://southampton.rkbexplorer.com/id/perso> entered. Buttons for "Add More Info", "Start New", "Options", and "Use it" are visible.
- Profile Section:** The main content area displays the profile of Nigel R Shadbolt. It includes fields for "given name: Nigel R [1]", "family name: Shadbolt [1]", and "is creator of: AKT Selected Papers 2004 [2]". Below these, a list of related documents is shown, including "INSTRUCTA-Phase II [3]", "Techniques of Temporal Representation [4]", "Research & Development in Expert Systems VI [5,6]", "Expert Systems - A Natural History [9]", "Report of the 8th Workshop of the Planning Special Interest Group [7]", "Processing Reference [8]", "Expert Systems in the Financial Industries [9]", "Intelligent Interfaces [10]", "Preliminary Report of the Workshop on Teaching AI in Departments of Psychology [11]", "A Framework for Research in Cognitive Science [12]", "Living Documents [13]", "Tempus Fugit I: Representing Time and Change [14]", "Hypermedia for knowledge engineering [15]", "Human Sciences Technology Audit [16]", "Final Report of the 9th Workshop of The UK Planning Special Interest Group [17]", "Knowledge Technologies [18]", "Education and Human-Computer Interaction [19]", and "Knowledge Technologies and the Semantic Web [20]". A button "show 282 more values" is also present.
- Sources List:** A sidebar on the right lists 20 sources, each with a title, a count of facts, and a date. The sources include "Nigel R Shadbolt 316 facts | 2009-09-17", "AKT Selected Papers 2004 4 facts | 2009-09-17", "INSTRUCTA-Phase II 3 facts | 2009-09-17", "Techniques of Temporal Representation 3 facts | 2009-09-17", "Expert Systems - A Natural History 5 facts | 2009-09-17", "Research and Development... 3 facts | 2009-09-17", "Report of the 8th Workshop... 3 facts | 2009-09-17", "Processing Reference 3 facts | 2009-09-17", "Expert Systems in the Financial... 3 facts | 2009-09-17", "Intelligent Interfaces 3 facts | 2009-09-17", "Preliminary Report of the... 3 facts | 2009-09-17", "A Framework for Research... 3 facts | 2009-09-17", "Living Documents 3 facts | 2009-09-17", "Tempus Fugit I: Represent... 3 facts | 2009-09-17", and "Hypermedia for knowledge... 3 facts | 2009-09-17".
- Footer:** The bottom of the page contains a footer with navigation links (Next, Previous, Highlight all, Match case, Phrase not found) and a button "add source url".

Linked Data on the Web: May 2007

500 Million RDF Triples
120,000 RDF links
between data sets

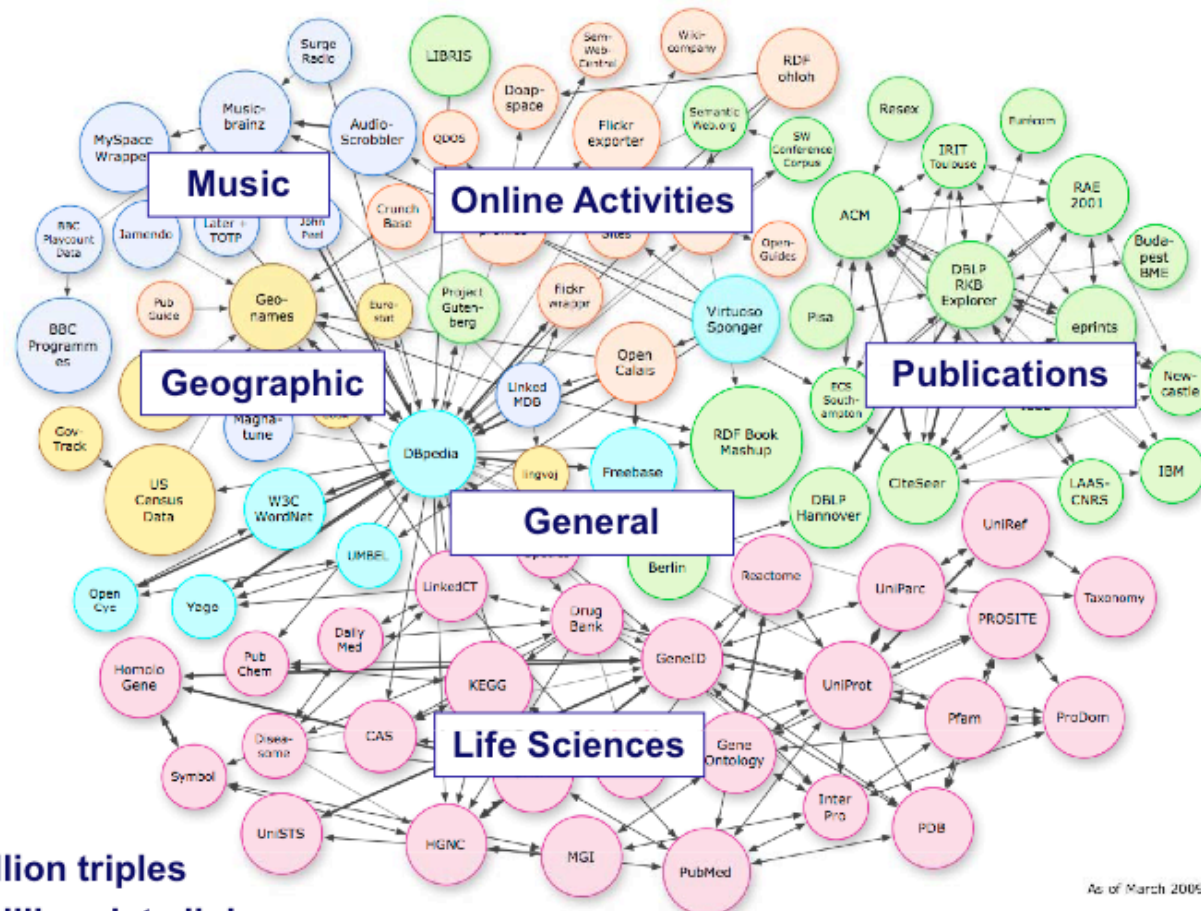


Linked Data on the Web: February 2008



Linked Data on the Web: March 2009

LOD Datasets on the Web: March 2009



What is a SPARQL?

- A data access language for RDF triples on the Web
- Queries across diverse data sources, whether the data is stored natively as RDF or viewed as RDF via middleware
- SPARQL contains capabilities for querying required and optional graph patterns along with their conjunctions and disjunctions

The screenshot shows the SPARQL Explorer interface for dbpedia.org. The query is a SELECT statement that filters for persons born in London and died before 1800. The results are displayed in a table with columns for name, birth, death, and person.

SPARQL:

```
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX rdfa: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX dc: <http://purl.org/dc/elements/1.1/>
PREFIX : <http://dbpedia.org/resource/>
PREFIX dbpedia: <http://dbpedia.org/property/>
PREFIX dbpedia: <http://dbpedia.org/>
PREFIX skos: <http://www.w3.org/2004/02/skos/core#>

PREFIX dbo: <http://dbpedia.org/ontology/>

SELECT ?name ?birth ?death ?person WHERE {
  ?person dbpedia:birthPlace <http://dbpedia.org/resource/London> .
  ?person dbo:birthDate ?birth .
  ?person foaf:name ?name .
  ?person dbo:deathDate ?death
  FILTER (?birth < "1800-01-01"^^xsd:date) .
}

ORDER BY ?name
```

SPARQL results:

name	birth	death	person
"<small>Countess of Chatham"	"1720-11-08"^^xsd:date	"1803-04-09"^^xsd:date	:Hester_Pitt%2C_Countess_of_Chatham
"Aaron Hart"	"1724-08-16"^^xsd:date	"1800-12-28"^^xsd:date	:Aaron_Hart_%2Bbusinessman%29
"Alexander Pope"	"1688-05-21"^^xsd:date	"1744-05-30"^^xsd:date	:Alexander_Pope
"Alexander Schomberg"	"1720-01-01T00:00:00-05:00"^^xsd:gYear	"1804-01-01T00:00:00-05:00"^^xsd:gYear	:Alexander_Schomberg
"Anne Killigrew"	"1660-01-01T00:00:00-05:00"^^xsd:gYear	"1685-06-16"^^xsd:date	:Anne_Killigrew
"Aubrey George Spencer"	"1795-02-12"^^xsd:date	"1872-02-24"^^xsd:date	:Aubrey_George_Spencer
"Ben Jonson"	"1572-06-11"^^xsd:date	"1637-08-06"^^xsd:date	:Ben_Jonson
"Benjamin Aislable"	"1774-01-01T00:00:00-05:00"^^xsd:gYear	"2"	:Benjamin_Aislable
"Benjamin Aislable"	"1774-01-01T00:00:00-05:00"^^xsd:gYear	"6"	:Benjamin_Aislable
"Benjamin Aislable"	"1774-01-01T00:00:00-05:00"^^xsd:gYear	"1842-01-01T00:00:00-05:00"^^xsd:gYear	:Benjamin_Aislable
"Benjamin Aislable"	"1774-01-01T00:00:00-05:00"^^xsd:gYear	"1809-01-01T00:00:00-05:00"^^xsd:gYear	:Benjamin_Bathurst_%2Bdiomat%29

Linked Data in Government: A Tipping Point?

- Berners-Lee and Shadbolt - HMG Information Advisors
- Context - PoI Taskforce
- Previous work with OPSI
- Strategic Drivers
 - Transparency and accountability
 - Economic and Social Value
 - Public Service Improvement
 - New Industries New Jobs



Key Elements of our ToR

1. Establish single point of access for all public UK datasets - data.gov.uk
2. Specific proposals to implement and extend to wider public sector PSI principle
 - Select and implement common standards for release of public data
 - Select, develop and implement common terms for data where necessary
 - Develop licenses - CC variants
 - Support exploitation and publication of distributed and decentralised information assets
 - Potential for reform of info regulatory framework

Progress to date

- Top down
 - Ministerial
 - CIO/CTOs
 - Engaged key data holders
- Middle Out
 - Civil Servants
 - Inventory of Information Assets
- Bottom up
 - Engaging with developer community
 - Cross Gov URI workshops
 - data.gov.uk
- Dissemination

The screenshot shows the Number10.gov.uk website. The header includes the site name and a navigation bar with links: Home, News, Communicate, Meet the PM, History and Tour, and Number 10 TV. A search bar is also present. The main content area features a news article titled "Ordnance Survey to open up data - PM" dated Tuesday 17 November 2009. The article text states that the Prime Minister has announced that the public will have more access to Ordnance Survey maps from next year, as part of a government drive to open up data to improve transparency. It lists two bullet points: "Communities and Local Government website" and "Read more about the Make Public Data Public project". A quote from Mr. Brown is included: "I think we're on the verge of a revolution that can transform public services and the public sector. I'm speaking very specifically about how government can change to meet the needs of the times. I think we are determined to be the first government in the world to open up public information in a way that is far more accessible to the general public." The article also mentions that Gordon Brown said Smarter Government will help secure necessary efficiencies while building on the public services already available. On the left side of the page, there is a calendar for November 2009 and a list of links: Latest News, Speeches and Transcripts, Statements and Articles, Prime Minister's Questions, Press Briefings, Press Notices, and Webchats. On the right side, there is a Newsletter sign-up box, a "Around the Web" section with a Flickr link, and a "Latest Videos" section featuring a video titled "The Cabinet in the East Midlands" from Thursday, November 26, 2009.

Progress to date


- Top down
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- Bottom up
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 - data.gov.uk
- Dissemination



data.gov.uk

- Currently under development scrutiny and extension
 - Over 1100 datasets
 - Over 1000 registered developers
 - The beginning of linked data
- Beta service to be released January 2010
- Access to OS from April 2010
- Clear schedule of release from Gov Depts thereafter

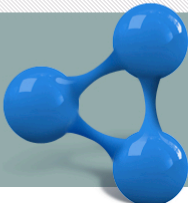
data.gov.uk

 HM Government hmg.gov.uk/data

[Home](#) [Data](#) [Blog](#) [Apps](#) [Ideas](#) [Resources](#) [About](#)

Unlocking innovation

Working with UK Public Sector information and data



Advised by Sir Tim Berners-Lee and Professor Nigel Shadbolt and others, we are opening up government data for reuse. This is a preview of what a public site could look like. We want to work with you to make it better.

We're very aware that there are more people like you outside of government who have the skills and abilities to make wonderful things out of public data. These are our first steps in building a collaborative relationship with you.

Search Data

To list all datasets, search without any keywords.

Enter keyword(s) [Search](#)

e.g. nhs, traffic, local authority, uk, XML

Powered by: [CKAN](#)


Featured Data


Education and training participation: 16-18 year olds


Continuing participation in education and training by 16 and 17 year olds in each local...

Tags: [education](#) [training](#) [DCSF](#)

Most Recent Apps

 **PlanningAlerts**
PlanningAlerts.com is a

 **FillThatHole**
This site provides a single

 **Where Can I Live?**
An app to tell you where

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What is the Semantic Web?

Combining different data sources has never been easy but the Semantic Web will enable data to be joined easily across boundaries.

[Read more](#)

Digital Engagement Twitter stream



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Search data.gov.uk

Search Data Feeds

Search Data

To list all datasets, search without any keywords.

Enter keyword(s)

e.g. nhs, traffic, local authority, uk, XML

Powered by: [CKAN](#)

Packages

[alcohol_profile_-_alcohol-attributable_hospital_admission_females_2005](#)

Title: Alcohol Profile: Alcohol-attributable hospital admission, females
Description: Persons admitted to hospital due to alcohol attributable conditions (females), crude rate per 100,000 population
Source: NWPHO from Hospital Episodes...
Tags: office_for_national_statistics england alcohol hospital

[alcohol_profile_-_alcohol-attributable_hospital_admission_males_2005](#)

Title: Alcohol Profile: Alcohol-attributable hospital admission, males
Description: Persons admitted to hospital due to alcohol attributable conditions (males), crude rate per 100,000 population
Source: NWPHO from Hospital Episodes S...
Tags: office_for_national_statistics england alcohol hospital

[alcohol_profile_-_alcohol_attributable_incapacity_benefit_claimants_2005](#)

Title: Alcohol Profile: Alcohol attributable Incapacity Benefit claimants
Description: The number of claimants of Incapacity Benefit or Severe Disablement Allowance whose main medical reason is alcoholism per 100,000 working age populati...
Tags: department_for_work_and_pensions office_for_national_statistics england benefit alcohol

[alcohol_profile_-_alcohol-attributable_mortality_-_females_2005](#)


Title: Alcohol Profile: Alcohol-attributable mortality - females
Description: Deaths from alcohol-attributable conditions (all ages), directly standardised rate per 100,000 population
Source: NWPHO from Office for National Stat...
Tags: office_for_national_statistics england alcohol mortality

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[Read more](#)

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[Submit your app](#)

Featured blogs



Alastair Dant (left) / David McCandless (right)

£ Massive Outgoings

Cost for average British taxpayer per day

GOVERNMENTS



ESSENTIALS

NHS



£9.05

Schools



£2.56

Defence



£3.99

TRAVEL

Roads



£3.10

LRT



£0.14

BANKING CHARGES

Recapitalisations



£9.23

SECURITY

Police



£0.53

Prisons



£0.19

Afghanistan



£0.32

GOING OUT

Arts



£0.04

Museums



£0.03

HELPING OTHERS

Child support



£1.86

Job Seekers



£0.25

Housing benefit



£1.52

Disability benefit



£1.44

Pensions



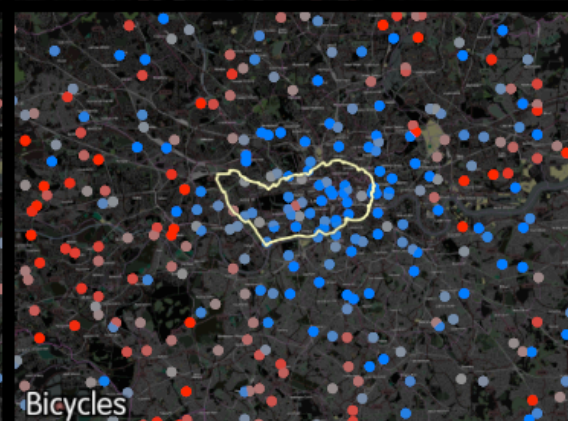
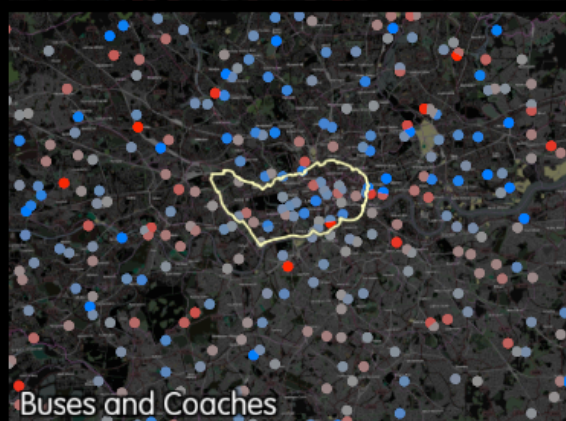
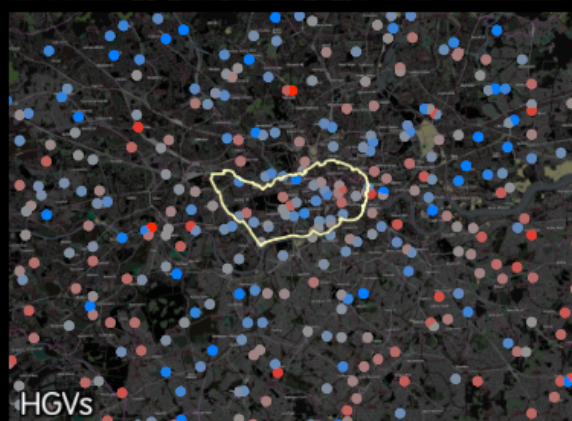
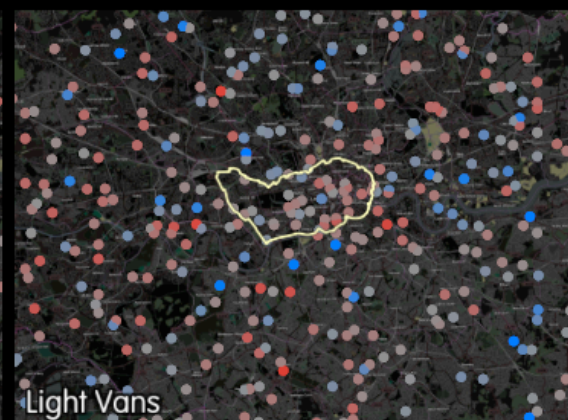
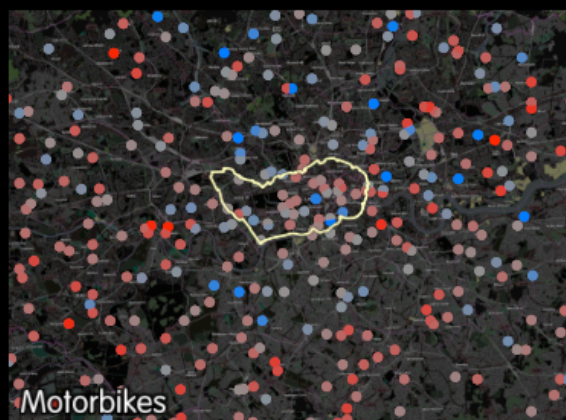
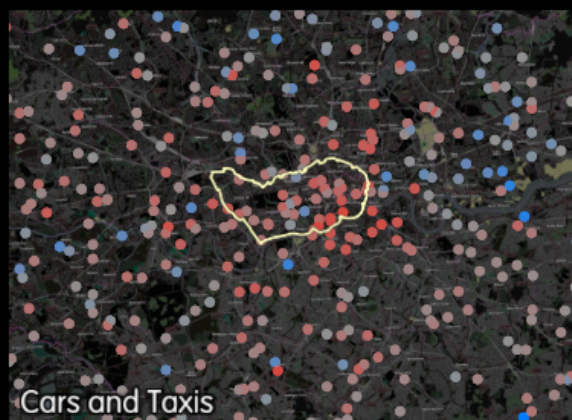
£5.55

Overseas aid



£0.43

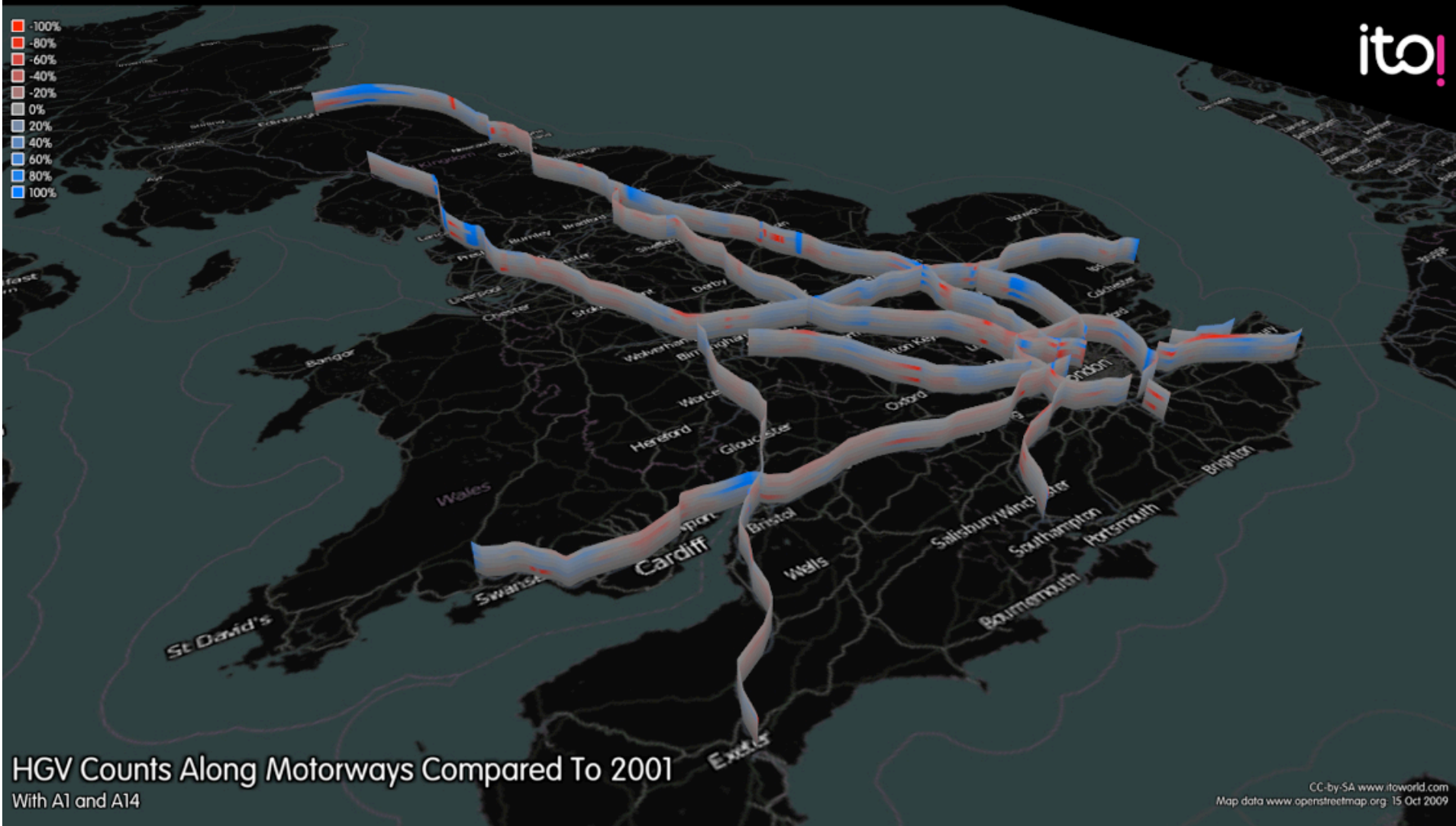
David McCandless



2008 London Counts Compared To 2001

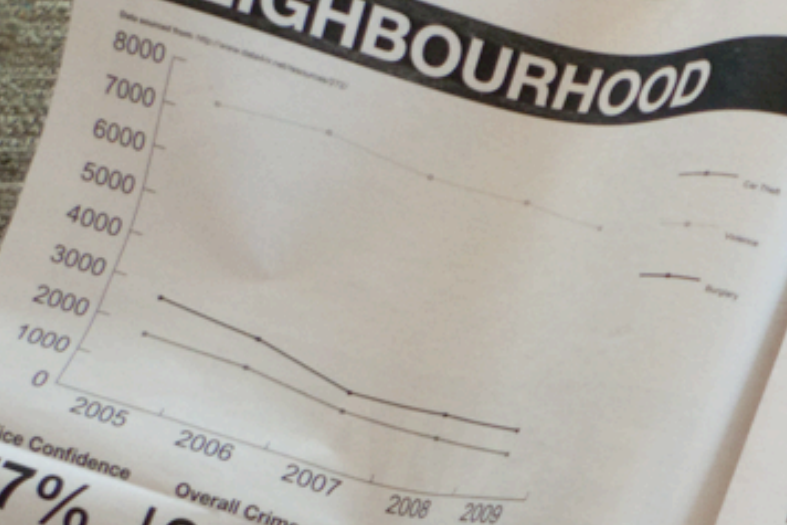
CC-by-SA www.itoworld.com
Map data www.openstreetmap.org: 15 Oct 2009

Chris Osborne





NEIGHBOURHOOD



Police Confidence
77%

Overall Crime
↓39%

Gun Crime
↓37%

Knife Crime
↓17%

Robbery
↓14%

Theft
↓13%

Woundings
↓20%

10000
 fewer crime victims

Summary
 Hackney Police and the Council work very closely to tackle and prevent crime in the borough. Seventy seven per cent of residents now have confidence in Hackney's Police, according to the British Crime Survey, a rise of 55 per cent in less than two years.

The survey also reveals that crime in Hackney has dropped 36.5 per cent over five years, the second largest drop of all London boroughs. Last year, there were ten thousand fewer victims of crime in Hackney than five years ago.

In 2008/09, gun crime was reduced by over 37 per cent and knife crime by 17 per cent. Youth crime also fell by 10 per cent. Satisfaction with the Police and the Fire Brigade are six per cent above the London average.

— Hackney Council

ALLOTMENTS

- 1 St John's Road
Entrance at rear of 57 St John's Road
- 2 Acker Terrace
Entrance at north end of Church Road
- 3 Springdale Road
Entrance between 40 and 44 Springdale Road
- 4 Church Walk
Entrance at south end of Church Walk
- 5 Queensbridge Road
At rear of 205 Queensbridge Road
- 6 Manor Gardens
Western Road
- 7 Overbury Street
Corner of Overbury Street and Russell Road
- 8 Leaside Road
Entrance at west side of railway bridge over Leaside Road
- 9 Spring Lane
Entrance at side of River Lee
- 10 Spring Hill
North west corner of sports field



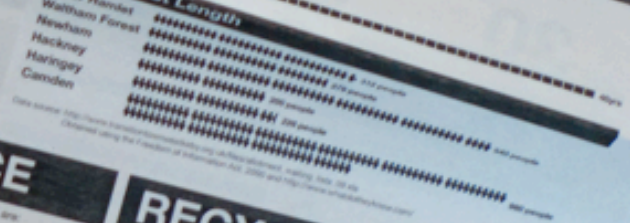
Allotment Plots

Tower Hamlet	282	Waltham Forest	1,382
Newham	415	Hackney	113
Haringey	1,715	Camden	195

Waiting List Time

Tower Hamlet	18 yrs
Waltham Forest	18 yrs
Newham	18 yrs
Hackney	18 yrs
Haringey	18 yrs
Camden	18 yrs

Waiting List Length

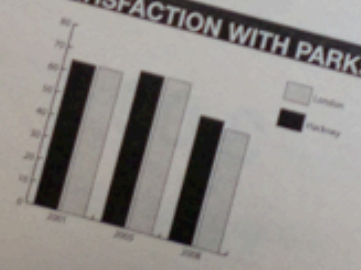


GREEN SPACE

23%
 by land area in Hackney

- Your nearest parks are:
- Hackney Marshes (10 mins east)
 - Victoria Park (15 mins south west)
 - London Fields (20 mins south west)

% SATISFACTION WITH PARKS



RECYCLING

Your nearest Recycling and Reuse Center is on South Access Road, Walthamstow, E17 (via Marsh House Avenue, near Low Hall Manor Business Centre).

Open every day of the year, except on 25 December, 26 December and 1 January. Open from 8.30am to 5.15pm. South Access Road is for mixed, bulky household waste and trade waste. This site does not accept:

If you intend to use a van to bring your waste please call 020 8509 3664 at least 24 hours prior to visiting the site. Vans are only allowed to the site between 6.30am and 4pm Monday to Saturday.

You can recycle the following items at this site:

- Bicycles
- Car batteries
- Cardboard
- Computers and printers
- Cooking oil
- Electrical items
- Engine oil
- Food/drink cans and foil
- Furniture in good condition
- Garden waste
- Gas bottles
- Glass bottles and jars
- Hardcore/rubble
- Household batteries
- Long life light bulbs
- Metal
- Mobile telephones
- Paper
- Plasterboard
- Plastic bottles
- Reusable

TRAVEL TIMES

Times are based on TfL Journey Planner for a journey arriving at 9:30am

Oxford Circus

41 mins



42 mins

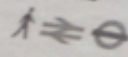


Tottenham Court Road

37 mins



47 mins



King's Cross

30 mins



35 mins



Victoria

51 mins

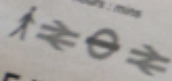


45 mins



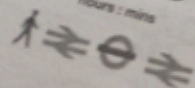
Manchester

2:44 hours : mins



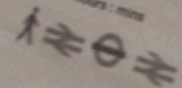
Paris

3:00 hours : mins



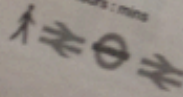
Edinburgh

5:00 hours : mins



Bristol

3:00 hours : mins



LOCAL TRANSPORT



Route finder

Start: Tottenham Court Road

236 Tottenham Court Road

242 Tottenham Court Road

276 Tottenham Court Road

308 Tottenham Court Road

458 Tottenham Court Road

Destination finder

Destination	Bus route	Bus stop
Regent Street	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100	Regent Street

For free cycle training in Hackney, call 020 8356 2897



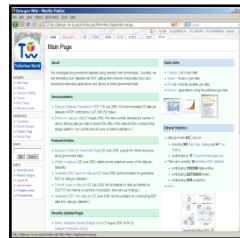
ito!

Semantic Web Architecture for US Gov Data

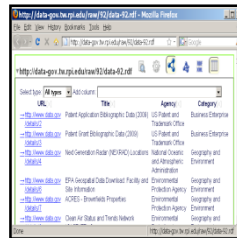
View & Use Data

Link & Enrich Data

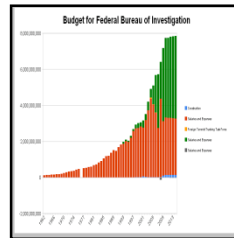
Convert Data



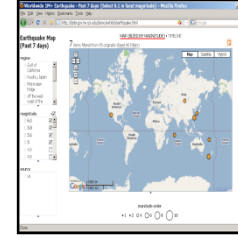
↑ Sem Wiki



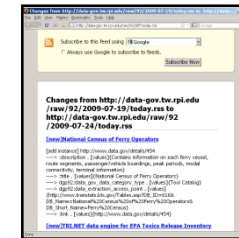
↑ Tabulator



↑ Google Viz



↑ MIT Exhibit



↑ RSS 1.0



↑ tagCloud

XSLT Service

Diff Service

Link Annotator

RSS Generator

...

Data Processors
(Web Services & Analyzers)

SPARQL End Point

SPARQL Web Service

RDF/XML

RDF/XML

GOV data
(RDF)

Linked
Data

CSV
XSL
...

DATA.GOV

Challenges to free Public Data

- Cultural & Organisational
 - Data hugging
 - We have released it - sort of...
 - License impediments
- Worries about
 - Confidentiality
 - How it will be Interpreted
 - QoI
 - Lost value
 - Disrupted workflow
 - New IT procurement
- Importance of local authority and other public bodies
- Capability
 - What assets have we got (no duty to hold register of public non-personal datasets)
 - Who can do this work
 - How to share best practice
 - Minting URIs
- Policy
 - Extending the principle to all public sector bodies
 - Consistency in what is published, how it is licensed and its format
 - Range of exceptions do need to be appreciated
 - Confidentiality, accuracy, liability and reputation

Why does this matter to you

- Supports information interoperability
- The Sum is greater than the parts
- Exploitation of
 - open data
 - open standards
- Can apply to data intranets as well as extranets
- Publishing, news, media, content services all classic examples where there is heterogeneous information that could be shared, linked, mapped and enriched using this approach



Thank you

- Any further information or follow up on the research questions please email

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- For advice and help on applied and practical linked data projects see also

www.seme4.com

