An Introduction to the Potential of Linked Data -

RKBExplorer, ResearchSpace and sameAs.org

Kultivate Project, Linked Data Workshop
HEFCE, Centre Point, 12th December 2011

Hugh Glaser

Seme4 Limited and University of Southampton, UK

UNIVERSITY OF
Southampton
School of Electronics
and Computer Science

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Linked Data – some motivation

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The New York Times

Linked Open Data BETA

Search data.nytimes.com
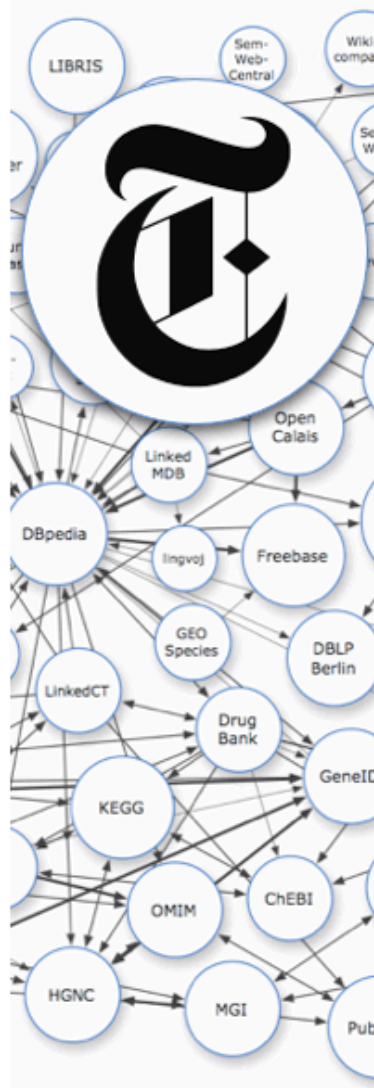
data.nytimes.com

For the last 150 years, The New York Times has maintained one of the most authoritative news vocabularies ever developed. In 2009, we began to publish this vocabulary as linked open data.

The Data

As of 13 January 2010, The New York Times has published approximately ,10,000 subject headings as linked open data under a CC BY license. We provide both RDF documents and a human-friendly HTML versions. The table below gives a breakdown of the various tag types and mapping strategies on data.nytimes.com.

Type	Manually Mapped Tags	Automatically Mapped Tags	Total
People	4,978	0	4,978
Organizations	1,489	1,592	3,081
Locations	1,910	0	1,910
			9,969

Browse individual data records:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

SKOS Files

Download all of the data records as SKOS Files.

· People
· Organizations
· Locations

Using Our Linked Data

Want to learn more about the nuts and bolts of our RDF documents? This page provides technical documentation. This blog post provides step-by-step instructions for building your own NYT Linked Data Application.

Single (8) ▾   And ▾   same as   sameas ▾   South America Stuff ▾   iPhone ▾   ECS ▾   UoS ▾   DH ▾   ReSIST ▾   MacOS X ▾   Football ▾   RKB ▾   ENT ▾   iPhone App ▾   »

Linked Data | data.gov.uk   for Ordnance Survey Linked Data...   +

Ordnance Survey – Great Britain's national mapping agency   See **all** our sites   Login

Ordnance Survey®

home   business   leisure   map shop   explore   magazine   education   about us   data

Ordnance Survey Linked Data.

A description of the resource identified by **http://data.ordnancesurvey.co.uk/**

Title	Ordnance Survey Linked Data.
Description	Ordnance Survey is Great Britain's national mapping agency, providing the most accurate and up-to-date geographic data, relied on by government, business and individuals. OS OpenData is the opening up of Ordnance Survey data as part of the drive to increase innovation and support the "Making Public Data Public" initiative. As part of this initiative Ordnance Survey has published a number of its products as Linked Data. Linked Data is a growing part of the Web where data is published on the Web and then linked to other published data in much the same way that web pages are interlinked using hypertext. The term Linked Data is used to describe a method of exposing, sharing, and connecting data via URIs on the Web. To find more Linked Data published as part of this initiative please go to data.gov.uk . If you are not familiar with Linked Data, OS OpenData products are also available in alternative formats from the OS OpenData website. Ordnance Survey can provide support for the Ordnance Survey OpenData products, but cannot give advice or support on using RDF, SPARQL or SPARQL Endpoints. Ordnance Survey has published three separate linked data resources: the 1:50 000 Scale Gazetteer, Code-Point Open and the administrative geography gazetteer for Great Britain.
Creator	Ordnance Survey
Publisher	Ordnance Survey
Date issued	2010-10-25
Example resource	SO16 4GU Portswood Southampton Southampton, Abstract Geometry Southampton, Itchen The County of Hampshire The City of Southampton Southampton Common
SPARQL endpoint	Sparql
URI lookup point	Meta?about=
Vocabulary used	Spatial Relations Ontology The administrative geography and civil voting area ontology Geometry Ontology FOAF OWL Gazetteer Ontology Postcode Ontology
URI regex pattern	http://data.ordnancesurvey.co.uk/id/.+
See also	Semantic.html
Coverage	England Scotland Wales

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Iron Maiden

PLAYED MOST ON **BBC RADIO** **6music**

Formed 1975.
English heavy metal band

Robert Knight/Redferns

Now On The BBC

Bruce Dickinsons's Friday Rock Show

Bruce plays brand new and classic metal with an array of top flight guests on 6 Music

BBC RADIO 6

Biography

Iron Maiden are an English heavy metal band from Leyton in East London, formed in 1975. The band is directed by founder, bassist and songwriter Steve Harris. Since their inception, the group has released a collective total of thirty albums: fourteen studio albums, seven live albums, four EPs and five compilations.

Pioneers of the New Wave of British Heavy Metal, with such an original sound they achieved success during the early 1980s and after several lineup changes, went on to release a series of platinum and gold albums. These include the US platinum-selling landmarks The Number of the

Latest Tracks Played On The BBC

Run To The Hills
BBC 6 Music | Lauren Laverne 08/04/2010   ▶

Run To The Hills (Live at Maida Vale)
BBC Radio 1 | Dev 02/04/2010   ▶

Aces High
BBC 6 Music | Jon Holmes 27/02/2010   ▶

BBC   Sign in   News | Sport | Weather | iPlayer | TV | Radio | More ▾   Search the BBC

BBC Internet Blog

« Previous | Main | Next »

BBC World Cup 2010 dynamic semantic publishing

Post categories: **World Cup**, **linked data**, **metadata**, **semantic**, **semantic web**, **web publishing**

Jem Rayfield | 10:00 UK time, Monday, 12 July 2010

The **World Cup 2010 website** is a significant step change in the way that content is published. From first using the site, the most striking changes are the horizontal navigation and the larger, format high-quality video. As you navigate through the site it becomes apparent that this is a far deeper and richer use of content than can be achieved through traditional CMS-driven publishing solutions.

The site features 700-plus team, group and player pages, which are powered by a high-performance dynamic semantic publishing framework. This framework facilitates the publication of automated metadata-driven web pages that are light-touch, requiring minimal journalistic management, as they automatically aggregate and render links to relevant stories.

Jump to more content from this blog ▾

About this blog

Staff from the BBC's online and technology teams talk about BBC Online, BBC iPlayer, and the BBC's digital and mobile services. The blog is reactively moderated. Posts are normally closed for comment after three months. Your host is Nick Reynolds (NR).

Subscribe to BBC Internet Blog

You can stay up to date with BBC Internet Blog via these feeds.

BBC Internet Blog Feed (RSS)
BBC Internet Blog Feed (ATOM)

If you aren't sure what RSS is you'll find **our beginner's guide to RSS** useful.

BBC on Blogs

- **BBC iPlayer Gets More S4C VOD, Will Also Link Out**
  From paidContent (NR)

- **Whatever happened to surround sound for streaming Radio?**

http://apps.seme4.com/see-uk/#/burglary/by-population/ward/OX1%203QG

See UK :: Burglary (normalised by Population) at Ward level

Visualise

Burglary ▾

Search by postcode...

normalised
- ● by Population
- ○ by Area
- ○ actual values

zoom
- ● Ward
- ○ County
- ○ Region

North :: 1.1 burglaries per 1000 people

Summertown (0.85)
St. Margaret's (0.73)
Wolvercote (1.4)
North Hinksey and Wytham (0.00)
Jericho and Osney (0.62)
Hinksey Park (0.95)
Iffley Fields (1.1)

Forest Hill and Holton (0.00)
Marston (0.93)
Headington Hill and Northway (0.00)
Barton and Sandhills (0.83)
Holywell (1.3)
St. Clement's (1.0)
St. Mary's (1.5)
North (1.1)
Carfax (1.5)

The picture is centred on **North**, and the circles get further away.
Colour indicates the "worst" (red) and "best" (green) areas from those shown.
Things can be viewed as a raw value, or normalised by population or area.

Sorry that many of the datasets lack data outside England and Wales - when it is published, we will be pleased to include it.

Find out **more about this visualisation**.

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OS OpenSpace ®   © Crown copyright and database rights 2011 Ordnance Survey. End User Licence Agreement

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School of Electronics
and Computer Science

Vague but exciting ...

CERN DD/OC

Information Management: A Proposal

Tim Berners-Lee, CERN/DD

March 1989

http://www.w3.org/History/1989/proposal.html

Information Management: A Proposal

Abstract

This proposal concerns the management of general information about accelerators and experiments at CERN. It discusses the problems of loss of information about complex evolving systems and derives a solution based on a distributed hypertext sytstem.

Keywords: Hypertext, Computer conferencing, Document retrieval, Information management, Project control

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Generic browser

Hypertext Server

Dummy hypertext server makes existing database look like hypertext to the browse

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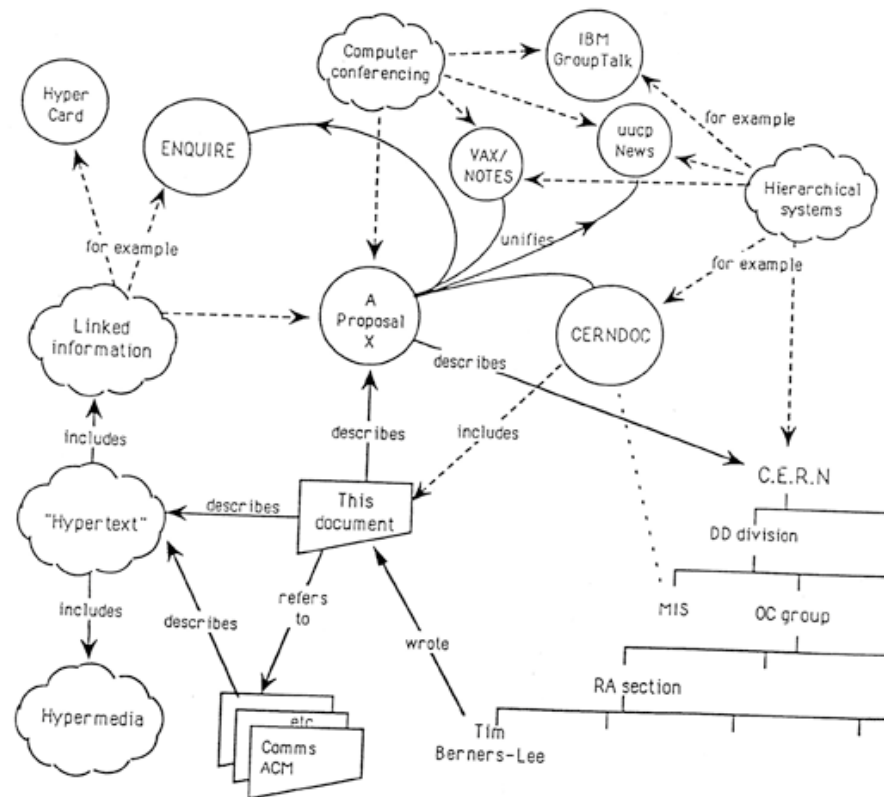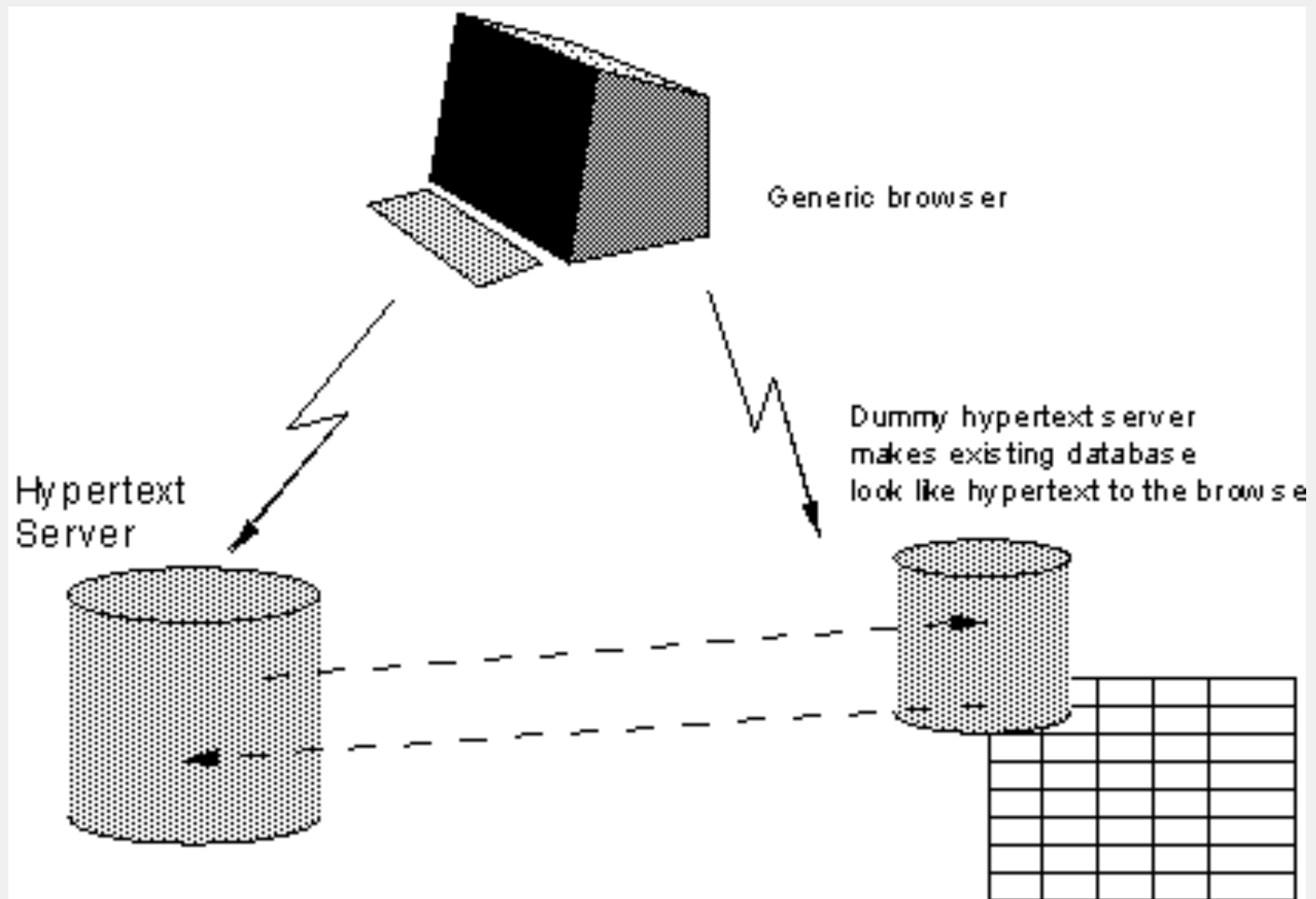
- **"The ability of the semantic web to cheaply but effectively integrate data and breakdown data silos provides museums with a long awaited opportunity to present a richer, more informative and interesting picture."**

  » Dominic Oldman, British Museum

Seme4.com

British Museum – Search object details

http://www.britishmuseum.org/research/search_the_collection_database/search_object_detail   Reader

lod diagram

Single (8) ▾ And ▾ same as sameas ▾ South America Stuff ▾ iPhone ▾ ECS ▾ UoS ▾ DH ▾ ReSIST ▾ MacOS X ▾ Football ▾ RKB ▾ ENT ▾ iPhone App ▾

British Museum – Search object …

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Search

The Rosetta Stone

AN16456004

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🔍 **Larger image**

📰 **Use digital image**

🖨 **Print record**

Side: right   Side : left   Full: Front

See all views (5) ▾

Department: Ancient Egypt & Sudan

Registration number: .24

BM/Big number: 24

Additional IDs
BS.24

Bibliographic reference

Object types
stela (**all objects**)

Title (object)
The Rosetta Stone
Materials
granodiorite (**all objects**)
Place (findspot)
Excavated/Findspot Fort Saint Julien (**all objects**)
Date
196BC
Period/Culture
Ptolemaic (**scope note** | **all objects**)

Description
Part of grey and pink granodiorite stela bearing priestly decree concerning Ptolemy V in three blocks of text: Hieroglyphic (14 lines), Demotic (32 lines) and Greek (53 lines).

Inscriptions
Inscription Type: inscription
Inscription Language: Greek

Inscription Type: inscription
Inscription Script: hieroglyphic
Inscription Language:
Inscription Comment: The inscription is a decree passed by a council of priests, one of a series that affirm the royal cult of the 13 year-old Ptolemy V on the first anniversary of his coronation.

Inscription Type: inscription
Inscription Script: demotic
Inscription Language:

Dimensions
Length: 112.3 centimetres (max)
Width: 75.7 centimetres
Thickness: 28.4 centimetres

More about object	Conservation

Condition
fair (incomplete)

Curator's comments
Compass text:

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The Rosetta Stone

AN16456004

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🔍 **Larger image**

📓 **Use digital image**

🖨️ **Print record**

Side: right   Side : left   Full: Front

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More about object   **Conservation**

June 1999 – Temporary Exhibition ➕

April 1992 – Examination ➕

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British Museum – Search object details

◄ ► ⬚ + 🏛 http://www.britishmuseum.org/research/search_the_collection_database/search_object_detail   Reader ⟳   🔍 lod diagram   ⊙

📖 Single (8)▼ And▼ same as sameas▼ South America Stuff▼ iPhone▼ ECS▼ UoS▼ DH▼ ReSIST▼ MacOS X▼ Football▼ RKB▼ ENT▼ iPhone App▼   »

🏛 British Museum – Search object ...   +

AN16456004

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🔍 **Larger image**

🖼 **Use digital image**

🖨 **Print record**

Side: right   Side : left   Full: Front

See all views (5) ▾

Department: Ancient Egypt & Sudan

Registration number: .24

BM/Big number: 24

Additional IDs
BS.24

Bibliographic reference
Strudwick N 2006 pp.298-299

Location:
G4/CSE

📷 **Commission photography**

◄ **Back to search results**

◄ **Back to search**

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Thickness: 28.4 centimetres

More about object	**Conservation**

June 1999 – Temporary Exhibition ▬

Treatment date
24 June 1999

Reason for treatment
Temporary Exhibition

Treatment proposal
1. Test clean return edges; 2. Clean and prepare for "Rosetta Stone, Cracking Codes and Decipherment" exhibition.

Condition
Object coated with protective treatment - identified as carnauba wax, hand-grease and dirt. Inscription bears traces of hard pink material, principally near edges and at corners. It closely matches the pink granite vein for colour and is covered in places by black printers ink - see anaylsis report. Inscription was painted with water-based white Plaka gouache, by Carol Andrews in 1982 to replace white powder. (White powder was probably modelling clay applied as a slip over entire surface; the excess would have been removed with a cloth). White powder [clay] continued to inhabit areas of damage. Returns at either side have white deposit with pronounced horizontal directionality, but areas of damage do not have this deposit. (This is possibly gypsum plaster, spilled during casting of the inscription in Egypt). Also found: traces of reddish compacted clay on back and returns and a looser whitish material under cross-members of old mount, but elsewhere consolidated and turned brown by carnauba wax. Text painted in white on left return: "CAPTURED IN EGYPT BY THE BRITISH ARMY IN 1801"; on right return: "PRESENTED BY KING GEORGE III".

Treatment details
Samples were taken of: pink material and printers ink in inscription; surface coating from various locations; white deposit on returns; reddish compacted clay on back and returns; loose whitish

British Museum

- **That was a while ago**
  - Science data
  - Conservation data
  - Linked to the Catalogue
  - Live on the web site

- **Then**
  - Catalogue (CIDOC/CRM)

- **ResearchSpace.org**
  - More institutions
  - Research environment

Seme4.com

http://bm2.rkbexplorer.com/demo/

ResearchSpace Search/Annotatio...

Search for objects of type [stela ⬍] created between: [400] [BC ⬍] and [200] [BC ⬍] and discovered in: [Egypt ⬍] [search]

4 exact matches found:

Round-topped limestone stela (222BC-204BC)

Round-topped limestone stela divided into five registers (400BC)

Fragment from the lower part of a painted sandstone stela (4thC BC(late))

Upper part of a painted round-topped sandstone stela (4thC BC(late))

object ID: http://bm2.rkbexplorer.com/id/object/YCA56669

Details

Owner: The British Museum
Physical description: Upper part of a painted round-topped sandstone stela: beneath a winged sun-disc with pendant uraei and heaven sign, Alexander the Great is depicted as pharaoh, offering two vessels of wine to the sacred Buchis bull, supported on a plinth. Parts of six lines of hieroglyphic text are preserved, recording the death of the sacred bull in the fourth year of Alexander, and noting that it was alive during the reign of Darius (III), who controlled Egypt from 336 BC until the conquest of Alexander in 332 BC. Part of the lower part of the stela bearing six rows of Hieroglyphic text has been re-affixed; this was originally registered separately as 1929,1016.202 (EA 1719).

Image

Annotation list: [view/edit] [delete] [view/edit] [delete]

note	created	related object
The lower part is actually referenced as another object in the British Museum collection.	27/01/2011	view object
Winged sun-disc.	27/01/2011	

Conservation

Remove and investigate the makeup between the two fragments (1929 10-16 167 & 1927 10-16 202). The fill between the two fragments should be recessed and retouched to match the surrounding stone. Investigate the consolident that has been used on the lower fragment, this has caused the stone to darken comparative to the upper fragment. Fill and cap the laminations to the surface of the stone, take care not to mask any of the text when filling. Remove the white material on the surface (modern paint/plaster) from the upper fragment. Remove the number from the front of

Science

Title: The Identification of Egyptian Limestone Sculpture likely to Deteriorate
Reason: Conservation Research Lab Report

Our Example: RKB and RKBExplorer

- **RKB (ReSIST Knowledge Base) and RKBExplorer**

- **Knowledge-enabled infrastructure for cooperation in research into resilient systems**

- **Reasonably mature system**
  - Actually essentially unchanged in 5 years
  - Still running (even though) unfunded

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RKBExplorer.com – a person

Or a paper

Or a couple of people

And how they are linked

And why are they linked?

Update in Action

Before and after inserting apaper in the Southampton ePrints repository and RKB has noticed

Note the position of Les Carr in Hugh's related People

22

Seme4.com

One of Many KBs, including other ePrints

acm.rkbexplorer.com
budapest.rkbexplorer.com
citeseer.rkbexplorer.com
cordis.rkbexplorer.com
courseware.rkbexplorer.com
darmstadt.rkbexplorer.com
dblp.rkbexplorer.com
dbpedia.org
deepblue.rkbexplorer.com
deploy.rkbexplorer.com
epsrc.rkbexplorer.com
eurecom.rkbexplorer.com
ft.rkbexplorer.com
ibm.rkbexplorer.com
ieee.rkbexplorer.com
irit.rkbexplorer.com

italy.rkbexplorer.com
kaunas.rkbexplorer.com
kisti.rkbexplorer.com
laas.rkbexplorer.com
lisbon.rkbexplorer.com
newcastle.rkbexplorer.com
nsf.rkbexplorer.com
pisa.rkbexplorer.com
rae2001.rkbexplorer.com
resex.rkbexplorer.com
roma.rkbexplorer.com
southampton.rkbexplorer.com
ulm.rkbexplorer.com
unlocode.rkbexplorer.com
wiki.rkbexplorer.com
xxx.yyy.zzz

Range from a few 100 to more than 10,000,000 "facts"

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◀ ▶ + 🔵 http://www.google.com/ig?refresh=1   ⟳   Q▾ Google

📖 ⊞ **iPhone▾**   **Single (50)▾**   **And▾**   **ECS▾**   **UoS▾**   **DH▾**   **ReSIST▾**   **MacOS X▾**   **Football▾**   **RKB▾**   **iPhone App▾**   **dwb▾**   **Benny Uni▾**   **Air▾**   **Canada▾**   **P▾**   **SWC▾**   **GPS▾**   **IPK▾**   »

iGoogle   +

Web   Images   Videos   Maps   News   Shopping   Gmail   more ▼   **hugh.glaser@gmail.com** | Classic Home | My Account | Sign out

iGoogle™

[search box]

Advanced Search
Search Preferences
Language Tools

(Google Search) (I'm Feeling Lucky)

New! Add social gadgets to post updates and play games with friends.   Change theme from Classic | Add stuff »

⊟ **Home**   ▼

Weather
Gmail
My Gadgets
BBC News | News F...
Slashdot
Search YouTube
RKBGadget » People
RKBGadget » Project
Google Translate

⊞ **RKBGadgets**

Updates
Friends

⊟ **Chat**

Search, add, or invite
🟢 Hugh Glaser
   Set status here ▼

Chat with friends in undefined! ⊠

Rather stay offline?
Sign out of chat.

🟠 Christopher Gutte
   new splashurl.net f
🟠 Valanto Kousetti
⚪ Andrew Landells
⚪ Joyce Lewis

Options ▼   Add friends

Google Translate   ▽ ▢

[Enter text to translate here]

[Detect langu ▾] » [English ▾] (Translate)

Translate Homepage | Dictionary Homepage

RKBGadget » People   ▽ ▢

[Berners-Lee]

(Search) (Reset)

Found 3 results for "Berners-Lee"

M Berners-Lee   Mary Lee Berners-Lee   **Tim Berners-Lee**

Tim Berners-Lee ⬈

Full Name:
Tim Berners-Lee ⬈

Email Address:
timbl@w3.org

Web Address:
http://en.wikipedia.org/wiki/Tim_Berners-Lee ⬈

My Gadgets   ▽ ▢

Gadget   Inlined Cached
dictionary.xml   ☐   ☑
person.xml

RKBGadget » Project   ▽ ▢

[search box]

(Search) (Reset)

KNOWLEDGE WEB ⬈

Title:
Realizing the semantic web

Other Names:
KNOWLEDGE WEB

Project Overview:
The current World Wide Web (WWW) is, by its function, the syntactic web where structure of the content has been presented while the content itself is inaccessible to computers. The next generation of the Web (the Semantic Web) aims to alleviate such problem and provide specific solutions targeted the

---

BBC News | News Front Page | World Edition   ▽ ▢

⊞ Afghan poll media blackout urged
⊞ US Colombia deal 'not a threat'
⊞ Sony cuts price of PS3 consoles
⊞ Honduras expels Argentine envoys
⊞ US journalist Robert Novak dies
⊞ Turnaround 'will not be simple'
⊞ Russia detains ship 'hijackers'
⊞ New Israeli settlements 'on hold'
⊞ Jackson to be buried on birthday

Weather   ▽ ▢

Southampton, England

☀ 13°C   Current: Clear
Wind: SE at 3 km/h
Humidity: 94%

Tue   Wed   Thu   Fri
☀   ☀   🌧   ⛅
21° | 13°   24° | 16°   20° | 11°   18° | 9°

Search YouTube   ▽ ▢

You Tube™   [search box]

Best Silverlight Apps
Zingals uses Silverlight apps to enhance user experience. READ
Ads by Google

◀◀ ▷▷ Confucius Quotes   Zytu

Gmail   ▽ ▢

http://www.dotac.info/explorer/#project/http://jisc.rkbexplorer.com/id/project-279

Google   1P

News   WRPMO   ENT▾   sameas▾   iPhone▾   Single (24)▾   And▾   ECS▾   UoS▾   DH▾   ReSIST▾   MacOS X▾   Football▾   RKB▾   iPhone App▾   dwb▾   Benny Uni▾   Air▾   Canada▾   P▾   SWC▾   GPS▾   IPK▾   »

MyExperiment :: dotAC Explorer

MyExperiment

Search...

dot AC
.info

Location of Project Members

Map | Satellite | **Terrain**

Aberdeen
Dundee
Edinburgh
South Bank
Glasgow
Londonderry / Derry
Belfast
Newcastle Upon Tyne
Sunderland
Middlesbrough
Darlington
English Channel
Isle of Man
Port Saint Mary
Preston   Leeds   Hull
St Helens   Manchester   Grimsby
Liverpool
Dublin
Kish Bank
Stoke-on-Trent
Nottingham
Wells Harbour
Vliestroom
Marsdiep
Wexford Harbour
Wolverhampton   Leicester   Peterborough   Norwich
Alkmaar
Rosslare Harbour
Birmingham   Northampton
Amsterdam
Cork Harbour
Gloucester   Luton   Chelmsford   Ipswich
Den Haag
Swansea   Bristol   Swindon   London   Southend-on-Sea   Rotterdam
Cardiff   Reading   Woking   Gillingham   Dunkerque   Brugge   Eindhove
Exeter   Bournemouth   Southampton   Brighton   Calais   Brussel Bruxelles   België Belgique
Plymouth   Portsmouth   Eastbourne   La Hern   Lille
Portland Harbour   La Ternoise   Aire   Lié

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100 mi
100 km
Hand Deeps
Map data ©2010 Tele Atlas   Terms of Use

Details

Names:
MyExperiment

Starts:
01/03/2007

Ends:
31/03/2009

Web Address:
http://www.myexperiment.org/

Description:
The myExperiment Virtual Research Environment enables you and your research

Project Members

Carole Goble   ?

Danius Michaelides   ?

David De Roure   ?

Frederique VanTill   ?

Participating Organisations

University of Southampton   ?

Related JISC Projects

Meeting Memory Technology Informing Collaboration   ?

myExperiement Repository Enhancement   ?

Collaborative Orthopaedic Research Environment   ?

Internet-Based Behavioural Research   ?
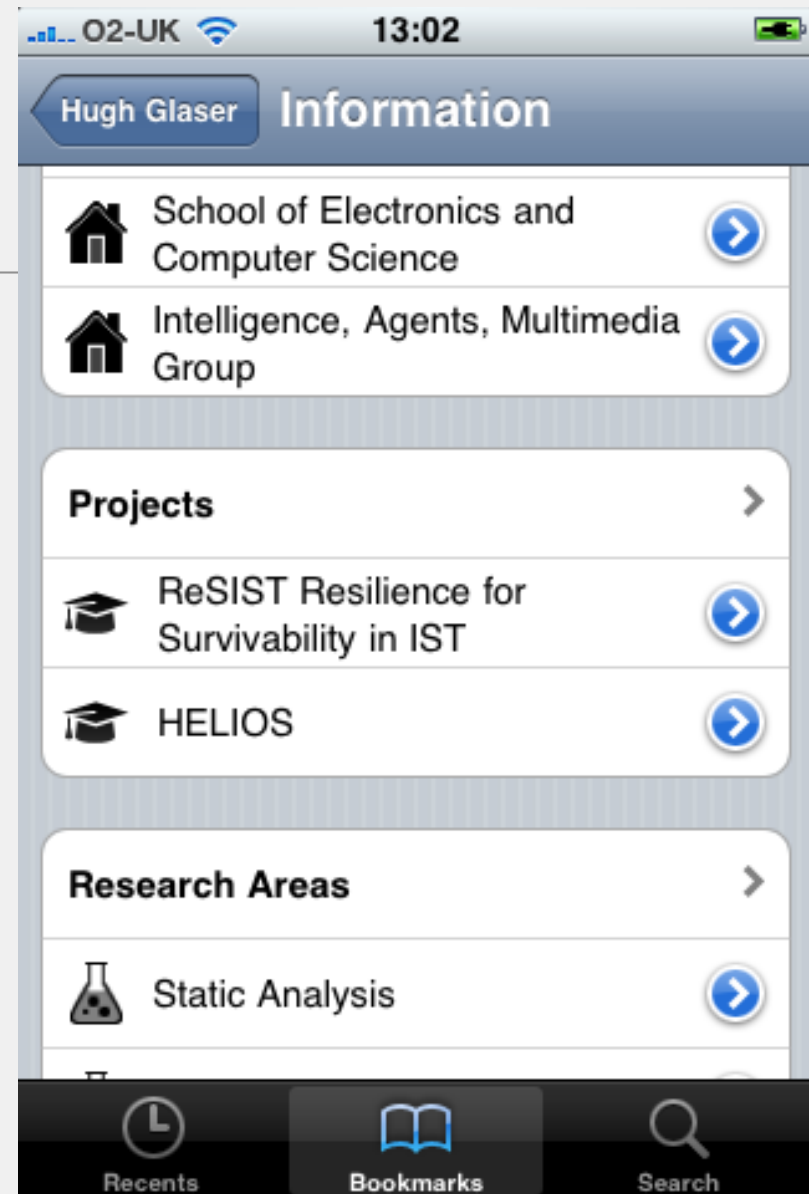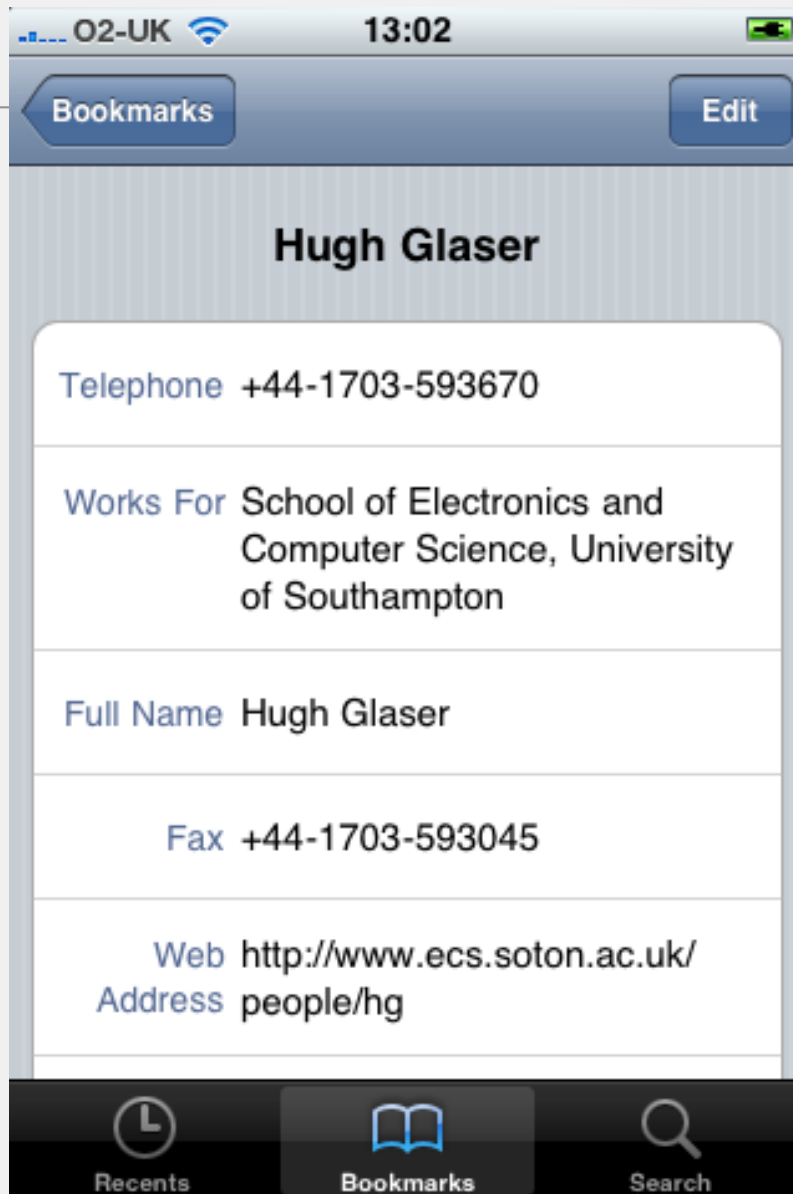
Virtual Research Integration Collaboration   ?

Building Research and Innovation Networks   ?

Publications

iPhone App

Seme4.com

Semantic Web is not "All or Nothing"

Q▾ Google

UNIVERSITY OF Southampton

🔍 Search Enter keywords here **go**

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University of Southampton > ECS > People > **Professor David C De Roure**

Professor David C De Roure
School of Electronics and Computer Science

Professor David C De Roure

University of Southampton
Southampton
SO17 1BJ
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URI: http://id.ecs.soton.ac.uk/person/47 [browse]

Professor David C De Roure

Interests: agent-based computing, amorphous computing, arts and humanities applications, audio, autonomic computing, chemoinformatics, collaborative tools, computers and music, decentralised systems, distributed programming languages, distributed systems, dr who, e-learning, e-research, e-science, e-social science, electronic lab notebooks, electronic systems design, environmental monitoring, folksomonies, grid, grid computing, grid standards, hardware-software codesign, hypertext, information systems, intelligent sensor networks, interaction, ipv6, linux, lisp, middleware, multi user dungeons, multicast, multimedia, music, music information retrieval, nature inspired computing, open access, open hypermedia, open journals, open source, pervasive computing, provenance, rdf, recommender systems, scheme, scholarly communications, scripting languages, self-organising systems, semantic annotation, semantic grid, semantic web, sensor networks, service-oriented architectures, simulation, social networks, social tagging, surge, technology-enhanced learning, ubiquitous computing, virtual research environments, visual programming, web, web 3.0, web science, web services, web standards, workflow

The group secretary for the Intelligence, Agents, Multimedia Group is Jane Morgan.

David works with:

- Professor Dame Wendy Hall   (explain)
- Dr Danius T Michaelides   (explain)
- Dr Les A Carr   (explain)
- Dr Mark J Weal   (explain)
- Dr Don Cruickshank   (explain)
- Professor Nigel R Shadbolt   (explain)
- Kevin R Page   (explain)
- Dr Gary B Wills   (explain)
- Dr David E Millard   (explain)
- Professor Luc Moreau   (explain)
- David R Newman   (explain)
- Hugh Glaser   (explain)
- Dr Stuart E Middleton   (explain)
- Dr Nicholas Gibbins   (explain)
- Professor Nicholas Jennings   (explain)
- Professor Hugh C. Davis   (explain)
- dr monica mc schraefel   (explain)
- Ken E Meacham   (explain)
- Professor AJG "Tony" Hey   (explain)
- Dr Robert J Walters   (explain)
- Christopher Gutteridge   (explain)
- Dr Harith Alani   (explain)
- Yang Yang   (explain)
- Saad A Alahmari   (explain)

Biography

David De Roure is a Professor of Computer Science in the School of Electronics and Computer Science at the University of Southampton, UK. A founding member of the School's *Intelligence, Agents, Multimedia* Group, he leads the e-Research activities and is a Director of the Pervasive Systems Centre. Closely involved in the UK e-Science programme, David is National Strategic Director of e-Social Science, Chair of OMII-UK and a Co-Director of e-Research South. His work focuses on creating new research methods in and between multiple disciplines, and his projects draw on Web 2.0, Semantic Web and workflow technologies.

The LOD "cloud"

Linking Open Data cloud diagram, by Richard Cyganiak and Anja Jentzsch. http://lod-cloud.net/

As of September 2011

Media
Geographic
Publications
User-generated content
Government
Cross-domain
Life sciences

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Linked Data Principles

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1. Use URIs as names for things

- **Everything**
  - If you don't name something you can't talk about it
  - Things of course
  - Year of publication
  - Ideas
  - …

- **Cool URIs**
  - Think of the consumer/customer
    - https://secure.ecs.soton.ac.uk/gizmos/person_by_username.php?username=hg
    - https://secure.ecs.soton.ac.uk/person/username/hg

- **RESTful Interfaces**

- **Ambiguity**
  - URIs help to avoid it, especially if you…

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2. Use HTTP URIs so that people can look up those names

- **HTTP URI names come with an excellent look up mechanism**

- **And ownership, etc.**

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3. When someone looks up a URI, provide useful information, using the standards (RDF, SPARQL)

- **So they know what you mean**

- **Deliver some human readable data**
  – html

- **Deliver some machine processable data**
  – RDF
  – JSON
  – CSV
  – text

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RDF (Resource Description Framework)

"Hugh Glaser works for the University of Southampton"

```
person-00021
   name
        "Hugh Glaser"

person-00021
   works-for
        Southampton_University


Southampton_University
   label
        "The University of Southampton"
```

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How to Publish Linked Data on the Web:- http://www4.wiwiss.fu-berlin.de/bizer/pub/LinkedDataTutorial/

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RDF (Resource Description Framework)

"Hugh Glaser works for the University of Southampton"

```
<http://southampton.rkbexplorer.com/id/person-00021>
   <http://xmlns.com/foaf/0.1/name>
      "Hugh Glaser" .

<http://southampton.rkbexplorer.com/id/person-00021>
   <http://aktors.org/ontology/portal#works-for>
      <http://dbpedia.org/resource/Southampton_University> .


<http://dbpedia.org/resource/Southampton_University>
   <http://www.w3.org/2000/01/rdf-schema#label>
      "The University of Southampton" .
```

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RDF (Resource Description Framework)

- **RDF Triples constitute a graph**
  - <subject-uri> <predicate-uri> <object-uri>
  - <subject-uri> <predicate-uri> "String"

- *ontologies* define vocabularies, types and relationships

- **Agreed URIs facilitate linkage between datasets**

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4. Include links to other URIs. so that they can discover more things

- **"Foreign" URIs**
  - **dbpedia:Southampton_University**

- **Equivalence**
  - owl:sameAs
  - skos:exactMatch
  - …

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Where to put the RDF?

- **In a file – this is the Web!**

- **In a store**
  - Knowledge Base
  - With a way of selecting and packaging up the RDF when a HTTP URI request comes in
  - Or querying using SPARQL
    - Similar to a Data Base and SQL

- **http://www4.wiwiss.fu-berlin.de/bizer/pub/linkeddatatutorial/**

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5 stars of Open Linked Data

- **From "Raw Data Now" to Real Value**
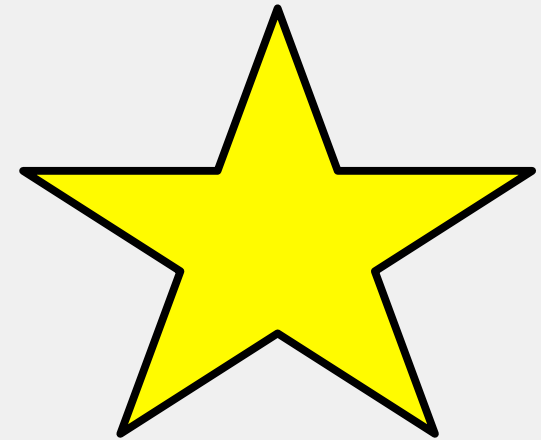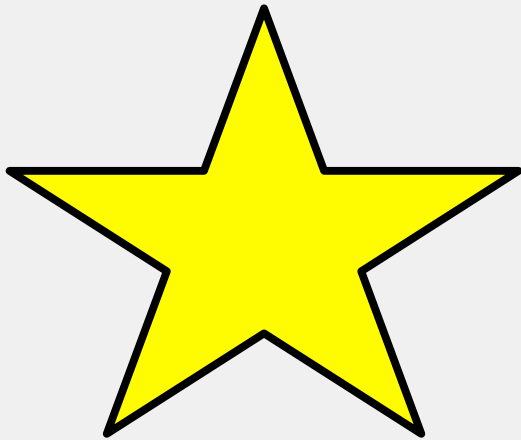
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One Star

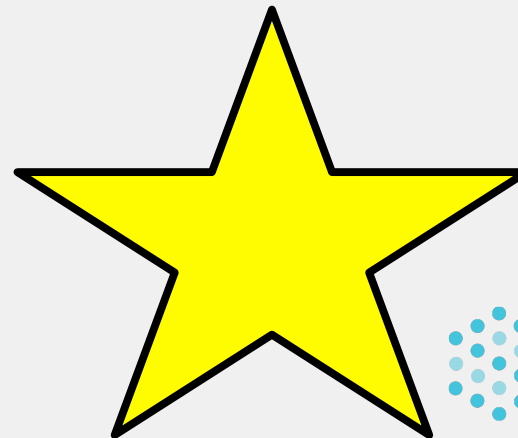Put your Data on the Web
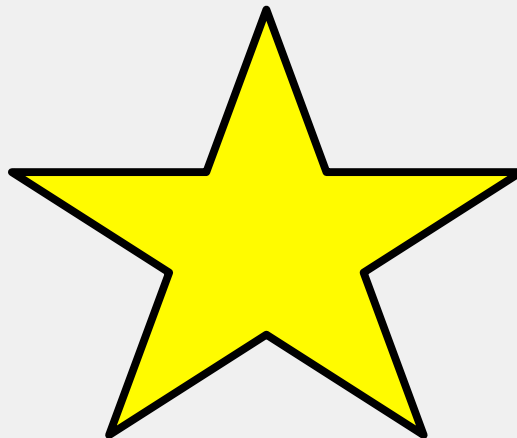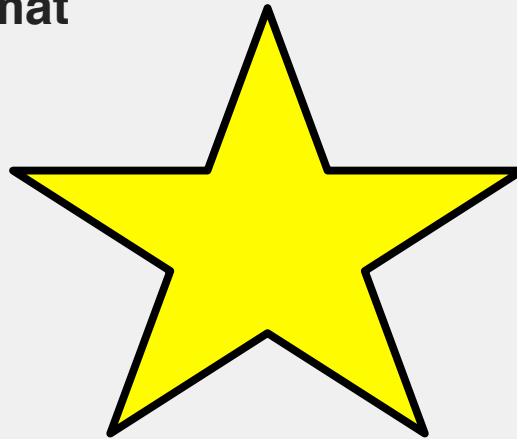
With an Open License

Two Stars

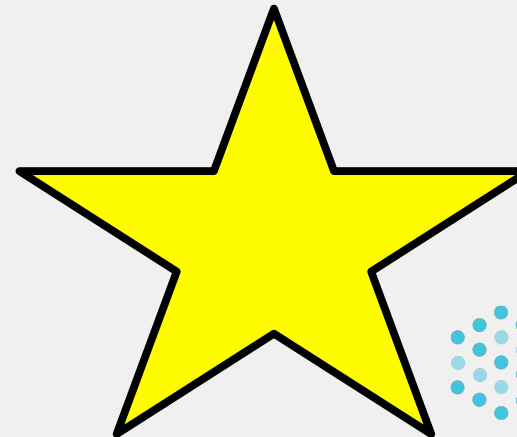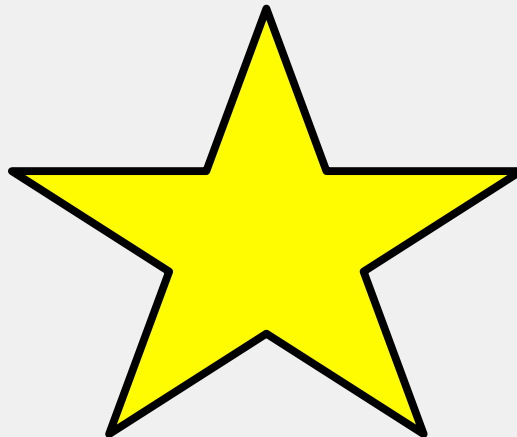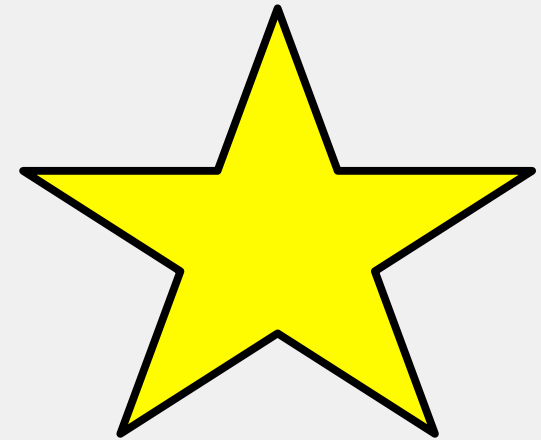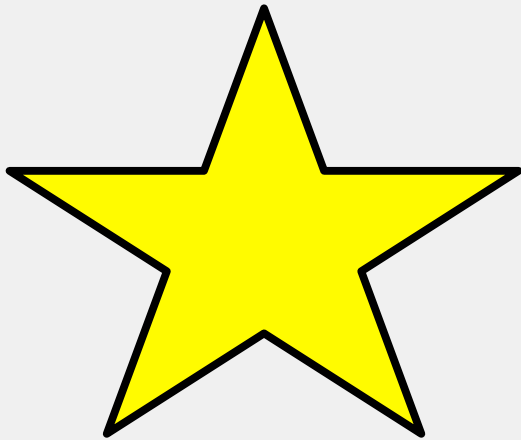**Make it Available in a Machine Readable Format**

Three Stars

Use an Open, Standard, Format
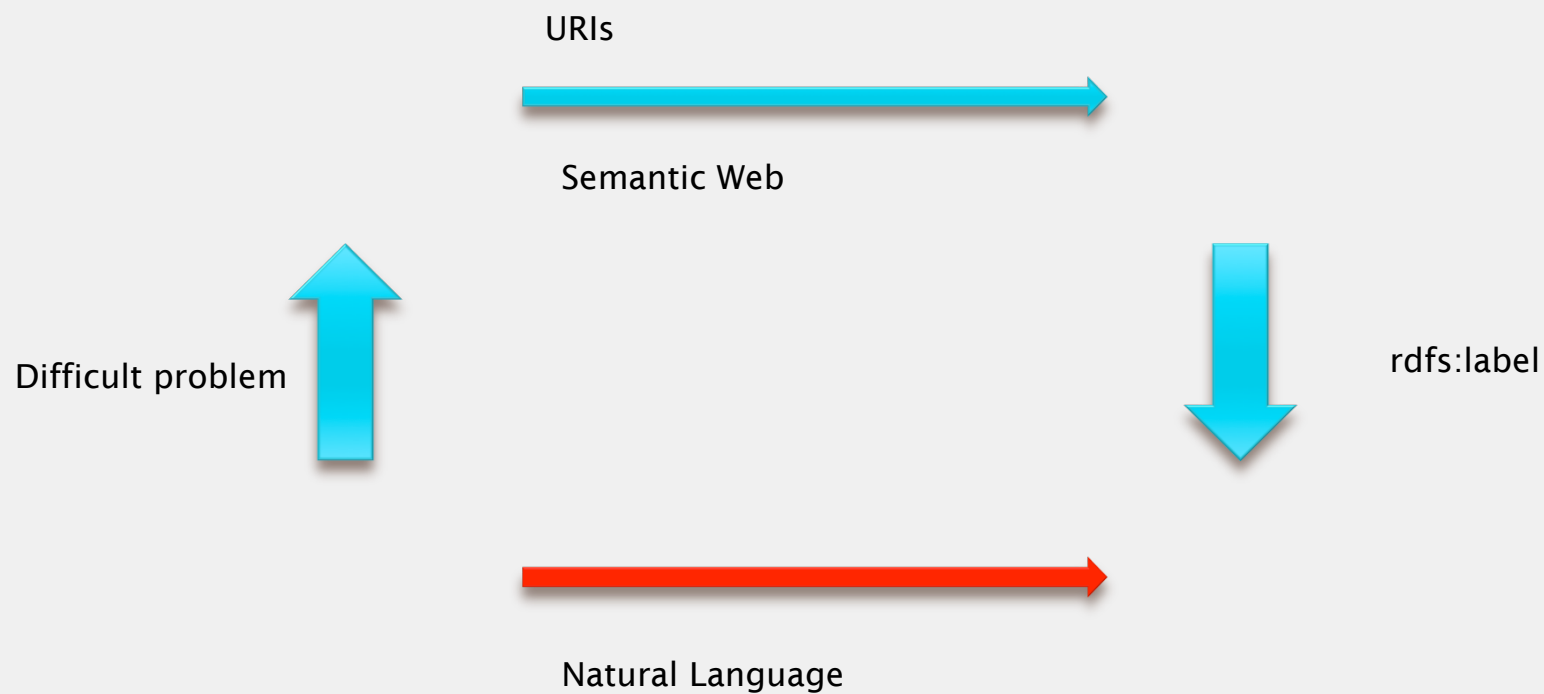
Four Stars

Use an Open, Linked Data, Format

Five Stars

Link Your Data to Other People's Data

Making Processing "safer"

URIs

Semantic Web

Difficult problem

rdfs:label

Natural Language

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Example – Presentation in HTML

Presentation in RDF

http://eprints.ecs.soton.ac.uk/id/eprint/21281

   bibo:authorList <http://eprints.ecs.soton.ac.uk/id/eprint/21281#authors>;

   bibo:presentedAt epid:event/ext-7db7153daf85bc7459505d6c30e743ff;

   dct:creator epid:person/ext-21,epid:person/ext-4860;

   dct:date "2010-06-22";

   dct:isPartOf <http://eprints.ecs.soton.ac.uk/id/repository>;

   dct:title "Linked Data: Publishing and Consuming Data on the Semantic Web"^^xsd:string;

   rdf:type
      bibo:AcademicArticle
      bibo:Article,
      ep:ConferenceItemEPrint,
      ep:EPrint;rdfs:seeAlso <http://eprints.ecs.soton.ac.uk/21281/> .

http://eprints.ecs.soton.ac.uk/id/eprint/21281#authors
      rdf:_1 epid:person/ext-21;
      rdf:_2 epid:person/ext-4860 .
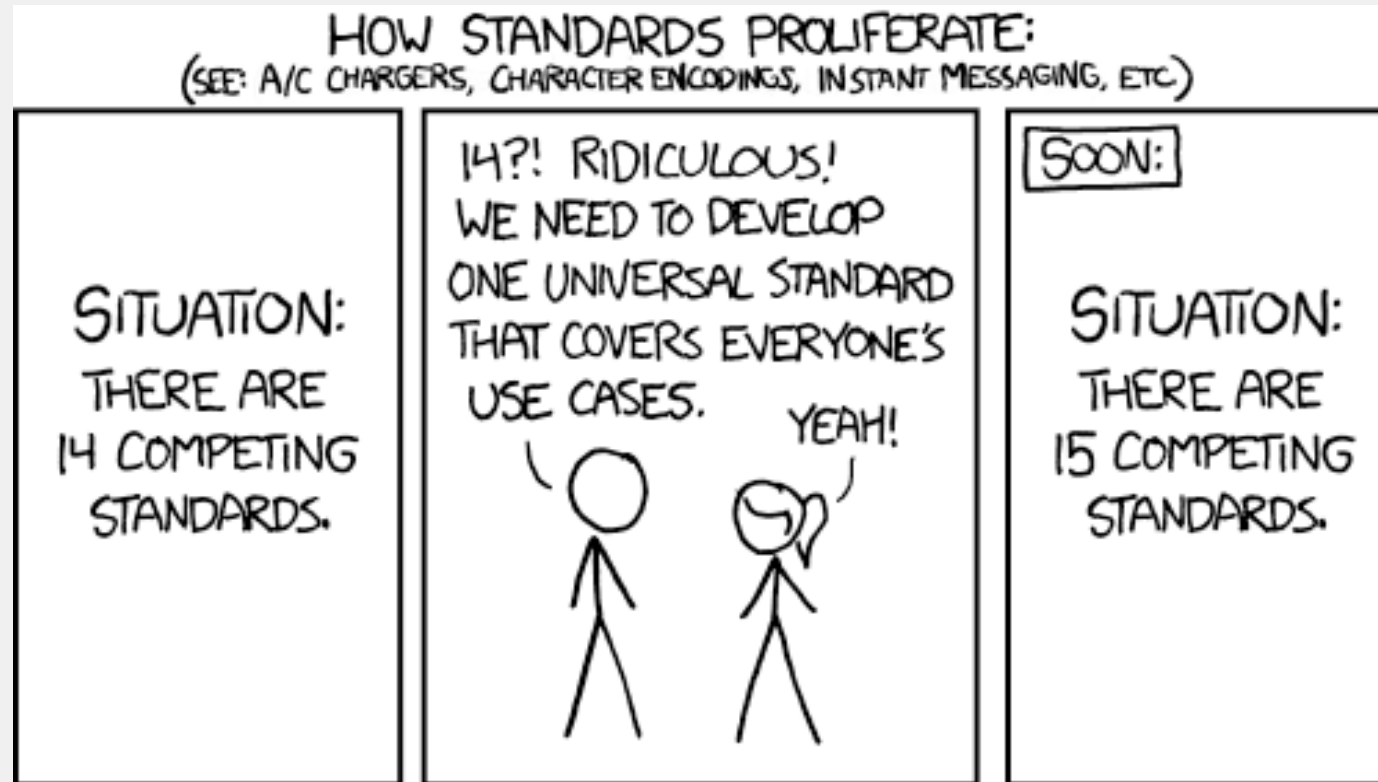
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Down & Dirty - URIs

http://imgs.xkcd.com/comics/standards.png

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http://sameas.org/

Single (8) ▾   And ▾   same as   sameas ▾   South America Stuff ▾   iPhone ▾   ECS ▾   UoS ▾   DH ▾   ReSIST ▾   MacOS X ▾   Football ▾   RKB ▾   ENT ▾   iPhone App ▾   ≫

sameAs

<sameAs>

interlinking the Web of Data

The Web of Data has many equivalent URIs. This service helps you to find co-references between different data sets. Enter a known URI, or use Sindice to search first.

<sameAs> Enter a Linked Data URI...

Sindice Enter a literal (text) search...

Why not try searching for the string "**Southampton**", (which we will look up for you on Sindice first) or finding other equivalent identifiers for **http://transport.data.gov.uk/id/local-authority/1755**?

Currently serving **39 221 073** URIs in **13 112 833** bundles!

about · contact · get the widget

(cc) ZERO

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http://sameas.org/html?uri=http%3A%2F%2Facm.rkbexplorer.com%2Fid%2Fperson-344165-529a2367

Google

Single (8) ▾ And ▾ same as sameas ▾ South America Stuff ▾ iPhone ▾ ECS ▾ UoS ▾ DH ▾ ReSIST ▾ MacOS X ▾ Football ▾ RKB ▾ ENT ▾ iPhone App ▾ »

sameAs « http://acm.rkbexplorer...

\<sameAs\>
interlinking the Web of Data

The Web of Data has many equivalent URIs.
This service helps you to find co-references
between different data sets.
Enter a known URI, or use Sindice to search first.

\<sameAs\> http://acm.rkbexplorer.com/id/person

indice Enter a literal (text) search...

Equivalent URIs for http://acm.rkbexplorer.com/id/person-344165-529a2367796b9822d610a72843a3980c –

1. http://data.semanticweb.org/person/atanas-kiryakov
2. http://acm.rkbexplorer.com/id/person-344165-529a2367796b9822d610a72843a3980c
3. http://acm.rkbexplorer.com/id/person-344165-be4c940af0b483a2d1675df9fa0bab6f
4. http://acm.rkbexplorer.com/id/person-344165-c23ba3f792faeca763400f197b89adb1
5. http://acm.rkbexplorer.com/id/person-344165-e0b9eea0f283efab1c5ae86ad61bf111
6. http://acm.rkbexplorer.com/id/person-344165-fa8e9aed948670c2accad97a4320122d
7. http://dblp.rkbexplorer.com/id/people-2ceb8136f69a235014d3d46c881a1...86ce3c9dc7
8. http://dblp.rkbexplorer.com/id/people-c9d93beb4ba98fa7318516e5fb5f9...f7185e51d3
9. http://dblp.rkbexplorer.com/id/people-c9d93beb4ba98fa7318516e5fb5f9...88ed85ab7e
10. http://dblp.rkbexplorer.com/id/people-c9d93beb4ba98fa7318516e5fb5f9...601d0b0236
11. http://dblp.rkbexplorer.com/id/people-c9d93beb4ba98fa7318516e5fb5f9...b93fb59e9f
12. http://dblp.rkbexplorer.com/id/people-c9d93beb4ba98fa7318516e5fb5f9...872498927e
13. http://dblp.rkbexplorer.com/id/people-c9d93beb4ba98fa7318516e5fb5f9...f41b54ff75
14. http://dblp.rkbexplorer.com/id/people-c9d93beb4ba98fa7318516e5fb5f9...3621e49944
15. http://dblp.rkbexplorer.com/id/people-c9d93beb4ba98fa7318516e5fb5f9...3a2580ac89
16. http://dblp.rkbexplorer.com/id/people-c9d93beb4ba98fa7318516e5fb5f9...b8848ff4e0
17. http://dblp.rkbexplorer.com/id/people-c9d93beb4ba98fa7318516e5fb5f9...6922936d8c
18. http://dblp.rkbexplorer.com/id/people-c9d93beb4ba98fa7318516e5fb5f9...c42f7e7ace
19. http://citeseer.rkbexplorer.com/id/resource-CSP162937-13aaf289f2945...80cea8e74c
20. http://citeseer.rkbexplorer.com/id/resource-CSP162937-2897e9670649a...00d1d4c62c
21. http://citeseer.rkbexplorer.com/id/resource-CSP162937-4bfe00e2ed7ef...904f25f2f2
22. http://citeseer.rkbexplorer.com/id/resource-CSP162937-64595ee407c94...7867a8505d
23. http://citeseer.rkbexplorer.com/id/resource-CSP162937-6b4779db34ec9...afd234cdc4
24. http://citeseer.rkbexplorer.com/id/resource-CSP162937-7896446de27c6...8f39db880b
25. http://citeseer.rkbexplorer.com/id/resource-CSP162937-8ac5adb3359f3...213751b546

\<sameAs\>

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What is Southampton?

http://sameas.org/html?uri=http%3A%2F%2Ftransport.data.gov.uk%2Fid%2Flocal-authority%2F1755   Google

Single (8) ▾ And ▾   same as   sameas ▾   South America Stuff ▾   iPhone ▾   ECS ▾   UoS ▾   DH ▾   ReSIST ▾   MacOS X ▾   Football ▾   RKB ▾   ENT ▾   iPhone App ▾   »

sameAs « http://transport.data.g...

13. http://dbpedia.org/resource/Southampton_City_Centre
14. http://dbpedia.org/resource/Southhampton,_England
15. http://dbpedia.org/resource/Southampton,_Hampshire
16. http://dbpedia.org/resource/Southampton_City_Council
17. http://dbpedia.org/resource/Southampton_(district)
18. http://www.okkam.org/ens/id13973975-c3dd-47e7-8e35-f09428d8723c
19. http://unlocode.rkbexplorer.com/id/GBSOU
20. http://unlocode.rkbexplorer.com/description/GBSOU
21. http://os.rkbexplorer.com/id/osr7000000000037256
22. http://d.opencalais.com/er/geo/city/ralg-geo1/8687634d-b732-c7f1-b3...3194e82d15
23. http://data.nytimes.com/N89988382777808400221
24. http://data.nytimes.com/southampton_england_geo
25. http://data.ordnancesurvey.co.uk/id/7000000000037256
26. http://linkedgeodata.org/triplify/node/285832#id
27. http://mortality.psi.enakting.org/id/Southampton
28. http://mpii.de/yago/resource/Southampton
29. http://nuts.psi.enakting.org/id/UKJ32
30. http://openlylocal.com/id/councils/377
31. http://rdf.freebase.com/ns/en.southampton
32. http://rdf.freebase.com/ns/guid.9202a8c04000641f8000000000075d87
33. http://rdf.freebase.com/ns/guid.9202a8c04000641f8000000004825363
34. http://revyu.com/tags/southampton
35. http://statistics.data.gov.uk/id/local-authority/00MS
36. http://statistics.data.gov.uk/id/local-authority/24UM
37. http://statistics.data.gov.uk/id/county?name=Southampton
38. http://statistics.data.gov.uk/id/local-authority-district/00MS
39. http://statistics.data.gov.uk/id/local-authority-district?name=Southampton
40. http://statistics.data.gov.uk/id/local-authority?name=Southampton City Council
41. http://statistics.data.gov.uk/id/local-authority-district?name=The ...outhampton
42. http://sw.cyc.com/concept/Mx4rvViRB5wpEbGdrcN5Y29ycA
43. http://sw.opencyc.org/concept/Mx4rvViRB5wpEbGdrcN5Y29ycA
44. http://sw.opencyc.org/concept/Mx4rvx6ncZwpEbGdrcN5Y29ycA
45. http://sw.opencyc.org/2008/06/10/concept/Mx4rvViRB5wpEbGdrcN5Y29ycA
46. http://sw.opencyc.org/2008/06/10/concept/Mx4rvx6ncZwpEbGdrcN5Y29ycA
47. http://sw.opencyc.org/2009/04/07/concept/Mx4rvViRB5wpEbGdrcN5Y29ycA
48. http://sw.opencyc.org/2009/04/07/concept/Mx4rvx6ncZwpEbGdrcN5Y29ycA
49. http://sw.opencyc.org/2008/06/10/concept/en/CityOfSouthamptonEngland
50. http://sw.opencyc.org/2009/04/07/concept/en/CityOfSouthamptonEngland
51. http://sw.opencyc.org/2008/06/10/concept/en/Southampton_ParishBermuda
52. http://sw.opencyc.org/2009/04/07/concept/en/Southampton_ParishBermuda
53. http://sws.geonames.org/2637487/
54. http://transport.data.gov.uk/id/local-authority/1755
55. http://transport.data.gov.uk/id/local-authority-district/1755
56. http://umbel.org/umbel/ne/wikipedia/Southampton
57. http://www.twine.com/item/1r2lcxqy-rlz

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‹sameAs›

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◄ ► | Word | ↻ | ◎ | + | ◉ http://sameas.org/?uri=http://data.archiveshub.ac.uk/id/person/gb248/smithadan ↻ | Q⁻ Google | ◉

\<sameAs\>

interlinking the Web of Data

The Web of Data has many equivalent URIs.
This service helps you to find co-references between different data sets.
Enter a known URI, or use Sindice to search first.

\<sameAs\>   `http://data.archiveshub.ac.uk/id/pers` 🔍

🔗indice   `Enter a literal (text) search...` 🔍

Equivalent URIs for http://data.archiveshub.ac.uk/id/person/gb248/smithadam1723-1790pol...leconomist –

\<sameAs\>

1. http://dbpedia.org/resource/A_Smith
2. http://dbpedia.org/resource/Adam_Smith
3. http://dbpedia.org/resource/Adam_smith
4. http://dbpedia.org/resource/Vile_maxim
5. http://dbpedia.org/resource/Smith,_Adam
6. http://dbpedia.org/resource/Smith,_Adam
7. http://dbpedia.org/resource/Adam_Smith#Quotes
8. http://d-nb.info/gnd/118615033
9. http://data.archiveshub.ac.uk/id/person/gb248/smithadam1723-1790pol...leconomist
10. http://mpii.de/yago/resource/Adam_Smith
11. http://quotationsbook.com/author/6779
12. http://rdf.freebase.com/ns/guid.9202a8c04000641f80000000000065ab
13. http://sw.opencyc.org/2008/06/10/concept/en/AdamSmith
14. http://sw.opencyc.org/2009/04/07/concept/en/AdamSmith
15. http://sw.opencyc.org/concept/Mx4rwSxnQZwpEbGdrcN5Y29ycA
16. http://sw.opencyc.org/2008/06/10/concept/Mx4rwSxnQZwpEbGdrcN5Y29ycA
17. http://sw.opencyc.org/2009/04/07/concept/Mx4rwSxnQZwpEbGdrcN5Y29ycA
18. http://umbel.org/umbel/ne/wikipedia/Adam_Smith
19. http://viaf.org/viaf/49231791
20. http://www4.wiwiss.fu-berlin.de/gutendata/resource/people/Smith_Adam_1723-1790

rdf+xml · n3 · json · text · show fewer items

<sameAs>

interlinking the Web of Data

The Web of Data has many equivalent URIs. This service helps you to find co-references between different data sets.

<sameAs> http://d-nb.info/gnd/4126114-8

Consult the main **sameas.org** as well? ☐

Enter a known URI, or use Sindice to search first.

indice   Enter a literal (text) search...

Consult the main **sameas.org** as well? ☐

This is a sub-service of the sameAs service, and contains **only** information that is provided by a third party.

The data presented here relates to Hugh's experiment in gathering together library subject and associated data from good sources. It is likely to form part of a forthcoming project in the library area.

Equivalent URIs for http://d-nb.info/gnd/4126114-8 –

<sameAs>
1. http://bnb.data.bl.uk/id/concept/lcsh/Nazis
2. http://d-nb.info/gnd/4126114-8
3. http://id.loc.gov/authorities/sh85090140#concept
4. http://id.ndl.go.jp/auth/bsh4/00788800
5. http://id.ndl.go.jp/auth/ndlsh/00323199
6. http://stitch.cs.vu.nl/vocabularies/rameau/ark:/12148/cb13319397h
7. http://viaf.org/viaf/sourceID/LCln 79053942

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○ ○ ○   sameAs

◄ ►   +   http://sameas.org/store/freebase/   ⟳   Q⟨ Google

RSS (19)▼   Benny▼   Single▼   And▼   same as   sameas▼   South America Stuff▼   iPhone▼   ECS▼   UoS▼   DH▼   MacOS X▼   Football▼   RKB▼   ENT▼   ReSIST▼   »

sameAs

\<sameAs\>

interlinking the Web of Data

The Web of Data has many equivalent URIs. This service helps you to find co-references between different data sets.

\<sameAs\>   Enter a Linked Data URI...

Consult the main **sameas.org** as well? ☐

Enter a known URI, or use Sindice to search first.

indice   Enter a literal (text) search...

Consult the main **sameas.org** as well? ☐

This is a sub-service of the sameAs service, and contains **only** information that is provided by a third party.

The data presented here is provided by Freebase on an "as is" experimental basis.

Why not try finding equivalent identifiers for the URI http://rdf.freebase.com/ns/m.086qd?

Current statistics for this sameAs service (http://sameas.org/store/freebase/) —

```
Last data assertion    2011-10-26 05:02:30
Number of URIs         54903422
```

These services are hosted by the School of Electronics and Computer Science
at the University of Southampton (UK) in collaboration with Seme4 Limited.

Finding Co-reference

Co-Reference

- **Lots of resources with multiple URIs**
  - This is the nature of the Beast
  - Legal, Sociological and Technical reasons

- **This is a Big Problem**
  - Everything is a URI (not title, name, number…)
  - Identifying multiple URIs for one resource
  - Rejecting incorrectly conflated resources
  - Publishing
  - Using

- **Solution**
  - Co-reference is just Knowledge, but quite special, and crucial, knowledge
  - Generating a new URI is not the solution to already having too many
  - The web is anarchic – don't try to impose impossible structure on it
  - Embrace the anarchy and multiple URIs in your systems ab initio

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Co-Reference Service (CRS)

- **CRS Subsystem**

  - Find co-references

  - Store them

  - Publish them

    - Essentially:
    - $URI_i \rightarrow \{ URI_1, \ldots, URI_i, \ldots, URI_n \}$

  - Recommend a "Canon"

- **Published by the Data Publisher**

  - And possibly others

- **Middleware aggregates co-references from recognised CRSes**

- **Coldstart**
  - A serious problem
  - Nothing is linked to anything
  - Not even (reliably) within most repositories

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Concluding Remarks

- **Linked Data works pretty well**

- **RDF works pretty well**

- **RKBExplorer uses CRS services successfully**
  - Often 100s of URIs per person

- **sameAs.org turns out to be pretty useful**
  - > 10K hits/day

- **British Museum uses a CRS service for Data Fusion on its web site**

- **Don't stop at the catalogue – there is a lot of other interesting stuff**

- **Organisations can go ahead and build systems, then do the identity management**
  - Both internally and externally
  - Doing identity management first requires cross-organisation agreement, a delay of months to years
  - It then freezes the business processes to conform to the external requirement

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More Concluding Remarks

- **Worry about your co-reference**
  - Do you have strong IDs?

- **Build systems that accept the way the world is, not what you would like it to be**

- **Consume things yourself!**
  - The only way to find out if things are any good
  - Then you might be able to:

- **Provide appropriate services in appropriate formats**
  - Consumable by "normal" systems
  - This means
    - Useful – doing useful things
    - RESTful – easy to access
    - JSON – easy to process
    - …

- **A little Ontology goes a long way**

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Endnotes
http://eprints.ecs.soton.ac.uk/id/eprint/23054

- **Some URIs**
  - http://sameas.org/
  - http://sameas.org/store/kelle
  - http://www.rkbexplorer.com/
  - http://www.rkbexplorer.com/services/
  - http://apps.seme4.com/see-uk/crime/by-population/ward/OX1%203QG
  - http://www.ecs.soton.ac.uk/people/dder
  - http://www.britishmuseum.org/research/search_the_collection_database/search_object_details.aspx?objectid=117631&partid=1&searchText=YCA62958
  - http://www.dotac.info/explorer/
  - http://www.rkbexplorer.com/gadgets/

- **You are Never Alone**
  - Ian Millard
  - ReSIST Project
  - AKT Project
  - EnAKTing Project
  - 10 years of collaborators

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