



NUI Galway
OÉ Gaillimh



From Linked Data to Networked Knowledge

Prof. Stefan Decker

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WIKIPEDIA
The Free Encyclopedia

Main page
Contents
Featured content
Current events
Random article

Interaction
About Wikipedia
Community portal
Recent changes
Contact Wikipedia
Donate to Wikipedia
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Ireland
From Wikipedia, the free encyclopedia

This article is about the island in Europe. For the same name, see Republic of Ireland. For the United Kingdom, see Northern Ireland. (disambiguation).

Ireland
(pronounced [ˈaɪəˈlən] listen; Irish: *Éire*, pronounced [ˈeːɾʲə] listen; Ulster Scots: Airlann) is the third largest island in Europe and the twentieth largest island in the world.^[k] It lies to the northwest of continental Europe and is

SAVE
IRISH RUGBY

Summer Camp
International

Two to Go In B
Tag Season

IRFU TAG RUGBY



- Everything
- Images
- News
- Blogs
- Videos
- More

- The web
- Pages from Ireland
- Any time
- Latest
- All results
- Wonder wheel
- Timeline
- Sites with images
- More search tools

Ireland Search

About Ireland
Welcome to Ireland's homepage. Home of Irish weather, entertainment listings, Irish Email Login - TV Listings - Sport - Weather
www.ireland.com/ - Cached - Similar

Discover Ireland - 02:36
There's so much to choose from when you take a break in Ireland. So, where do you start? Simple, right here. Whatever you're looking for ...
www.discoverireland.ie/ - Cached - Similar

An Post Home. In Ireland, we deliver more - 2 visits - 16 Mar
An Post is a major communications provider providing a wide range of services which encompass postal, courier, retail and financial services.
www.anpost.ie/ - 16 Mar - Cached - Similar

Images for Ireland
An Post Home. In Ireland, we deliver more
An Post is a major communications provider providing a wide range of services which encompass postal, courier, retail and financial services.
www.anpost.ie/ - 16 Mar - Cached - Similar



Ireland - Wikipedia - 02:32
Ireland is the third largest island in Europe and the twentieth largest island in the world. It lies to the northwest of continental Europe and is ...
History - Government - Flora and fauna
en.wikipedia.org/wiki/Ireland - 3 hours ago - Cached - Similar

Vacation in Ireland - Official Website of Tourism Ireland
Official Website of Tourism Ireland for visitors to Ireland. Information on accommodation, maps of Ireland, Irish culture & activities in ...



dent.ie TOPICS

PHONE APP
Get the Irish Independent on your iPhone or iPod Touch

Sport Entertainment Health Lifestyle Education Travel
National News World News Today's Paper Newspapers Opinion Farming Weather

Tools

Cheryl Cole 'making good recovery'

provided you with these search results from Independent.ie archives and results may not be related to your original enquiry.

cDowell's trophy strife
Friday July 08 2010
The first time in close to three weeks since his winning Pebble Beach triumph, Graeme McDowell I don't know the whereabouts of his newest love, in trophy.

ing is becoming more popular but behind
General Irish Bank branch placed in Glenties
Revenue - Irish Tax & Customs

help you?

Business & Self Assessment Tax Practitioners Customs Tax

Business Tax Topics
Tax Payment Difficulties
International Tax
Self Assessment
VAT Rate Reduced
EU VAT Package

online?

ROS
About ROS
Login to ROS
Register for ROS
Get Desktop Apps

More
VRT for Motor Vehicles
Tax Clearance
Mortgage Interest Relief
Secure Email

More

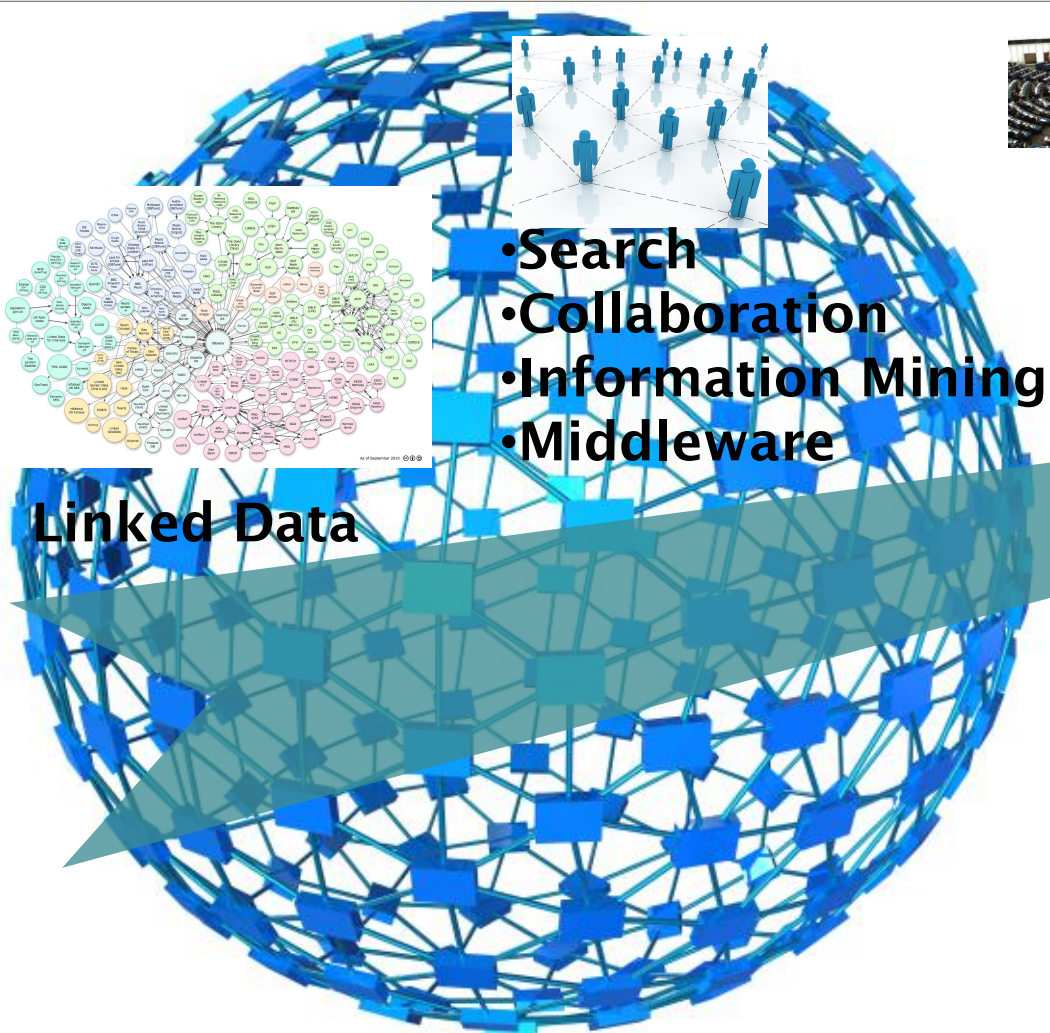
VRT for Motor Vehicles
Tax Clearance
Mortgage Interest Relief
Secure Email



- Interconnected
- Universal
- All encompassing

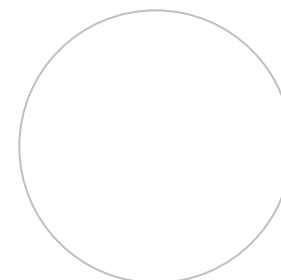
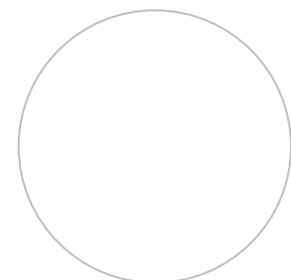


- assists humans, organisations and systems with problem solving
- enabling innovation and increased productivity



- **Application**
- Research Domains**
- **Commercialization**

- assists humans, organisations and systems with problem solving
- enabling innovation and increased productivity





What enabled the Web?

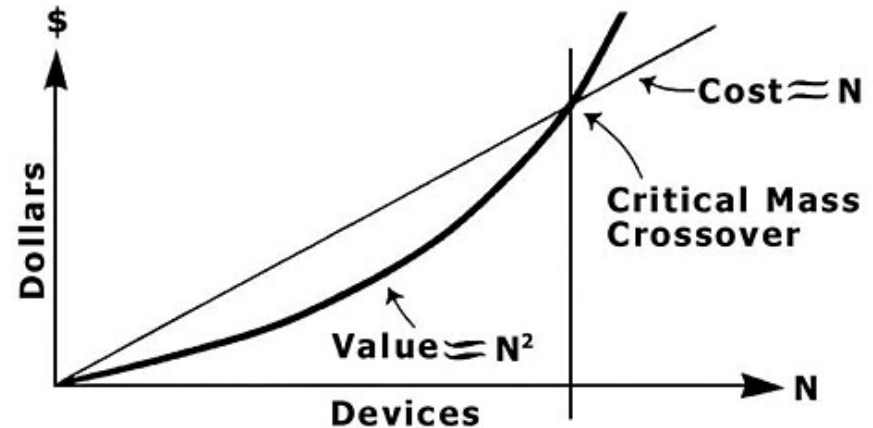


1. *Scalability*: No growth scalability problem (e.g., no back links from HTML pages)
2. *No censorship*: no lengthy permission or review process
3. *Positive feedback loop*: exploit Metcalf's Law



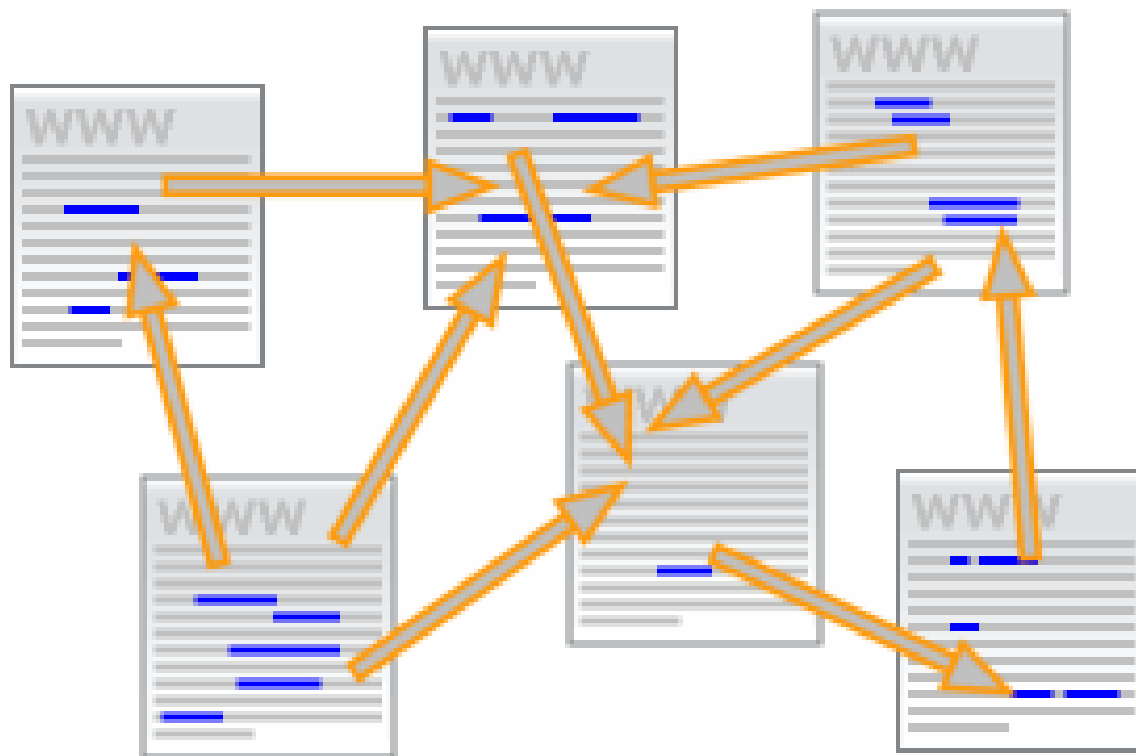
Metcalfe's law:
The value of a network is proportional to the square of the number of connected members

The Systemic Value of Compatibly Communicating Devices Grows as the Square of Their Number:



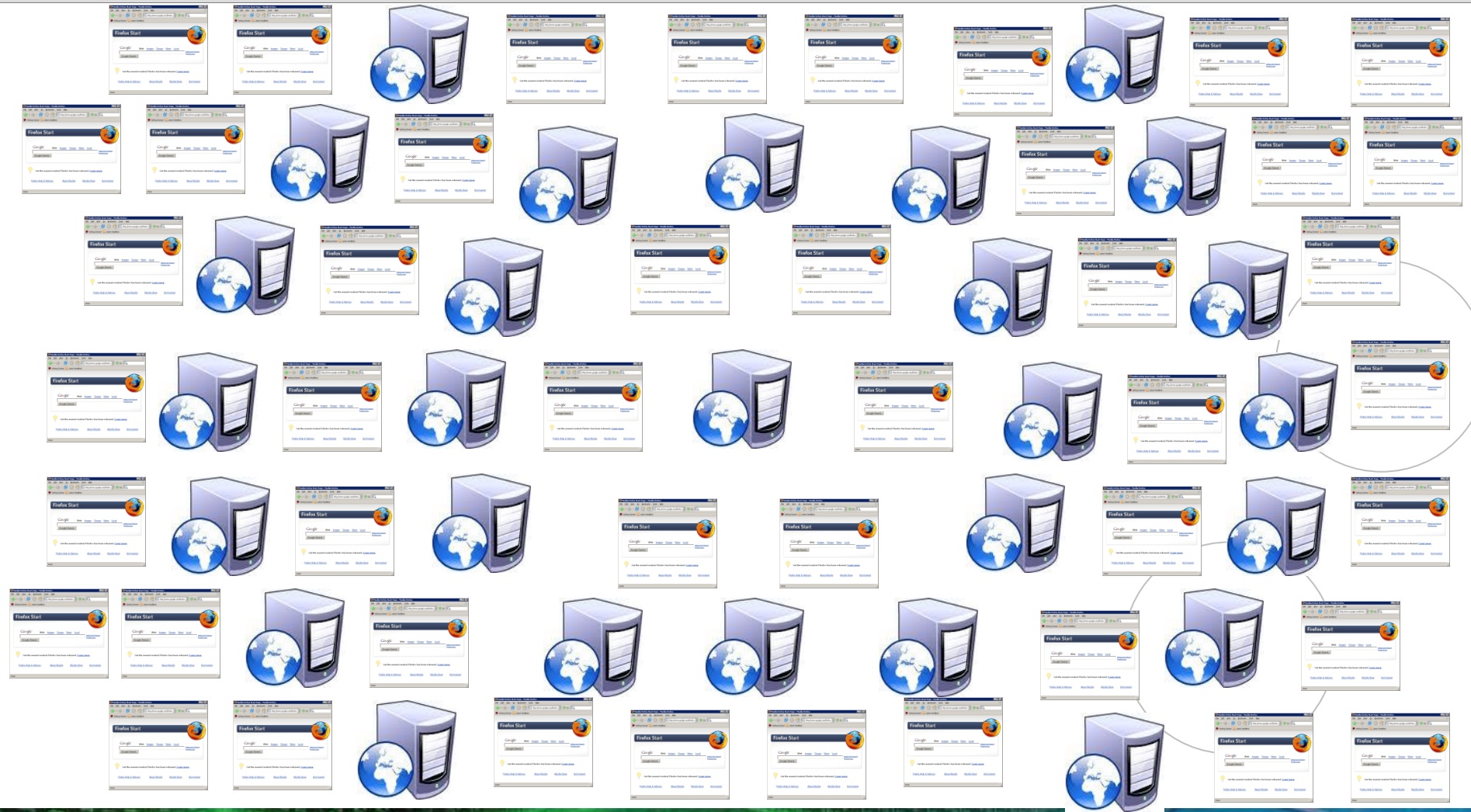


Metcalfe's Law 1: Links





Metcalfe's Law 2





licensed under  Attribution-NonCommercial-ShareAlike 2.0 Germany | Ludwig Gatzke | <http://flickr.com/photos/stabilo-boss/>



1. *Scalability*. No centralized infrastructure (e.g., a central object repository) required.
2. *No censorship*. It must be possible to publish data without having to ask for prior permission.
3. *Positive feedback loop*. Similar to the World Wide Web it must be possible to exploit Metcalfe's Law.



1. *Global Object Identity*.
2. *Composability*: The value of data can be increased if it can be combined with other data. Composability has a number of consequences:
 1. Data format must be *schema-less*. (Combined data originating from different sources unlikely to conform to a schema)
 2. Data format must be *self-describing*
 3. Data format must be “*object centric*”. In order to integrate information about different entities data must be related to these entities.
 4. Data format at least to be *graph-based*. The composition of multiple object-centric data sources results in a graph in the general case

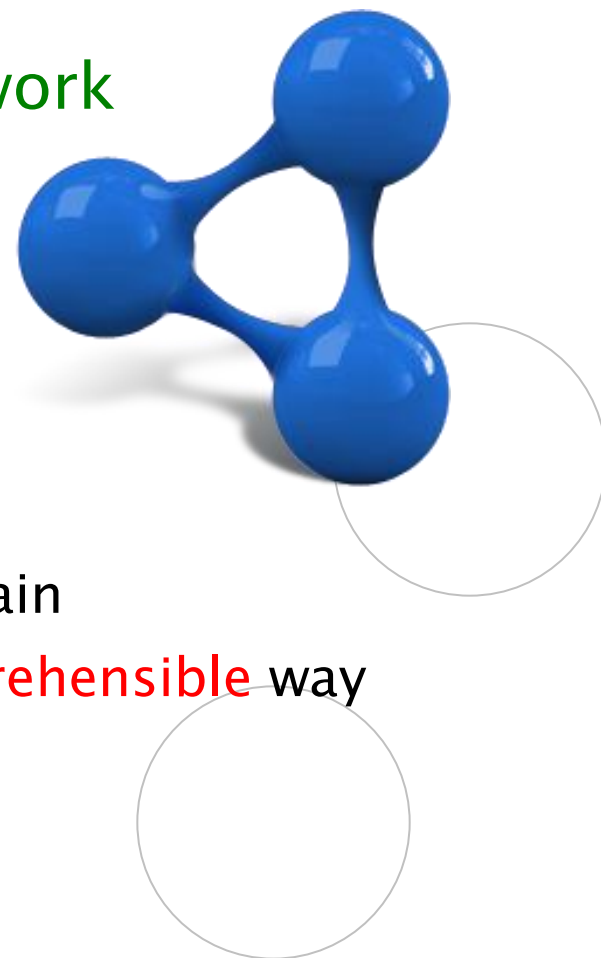


Two Key Ingredients



1. RDF – Resource Description Framework Graph based Data – nodes and arcs

- Identifies objects (URIs)
- Interlink information (Relationships)



2. Vocabularies (Ontologies)

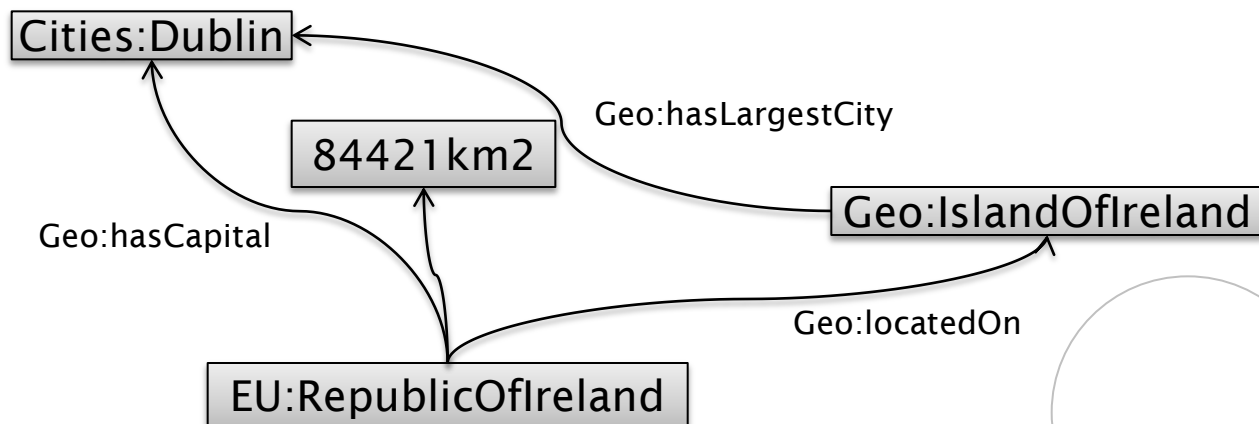
- provide **shared understanding** of a domain
- organise knowledge in a **machine-comprehensible** way
- give an exploitable **meaning** to the **data**



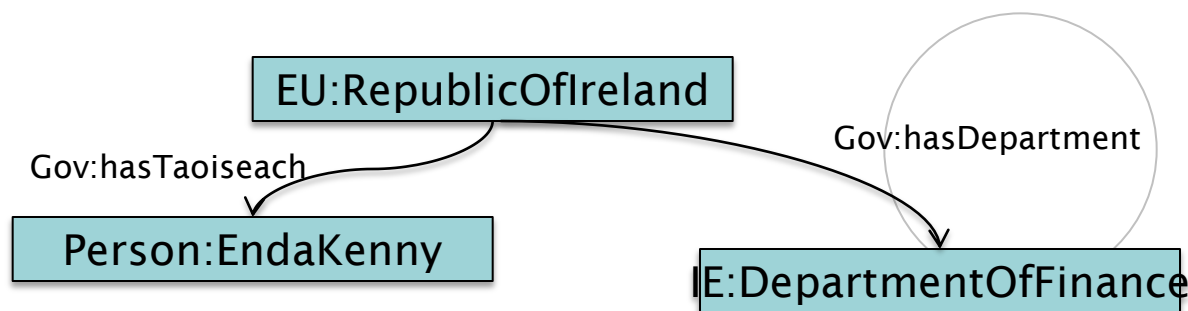
Why Graphs and Ontologies?



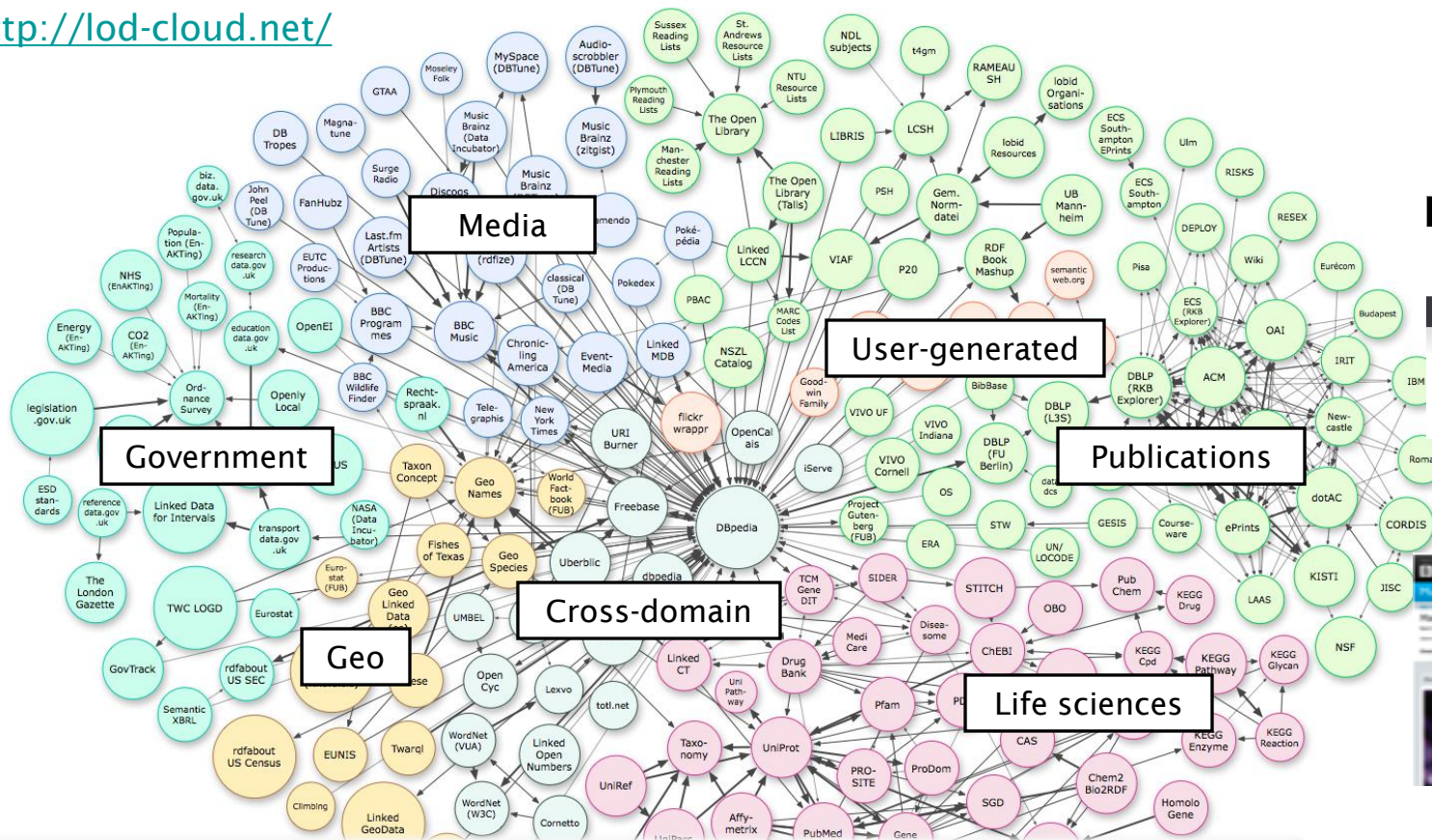
Wikipedia.org



Gov.ie



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

 HM Government

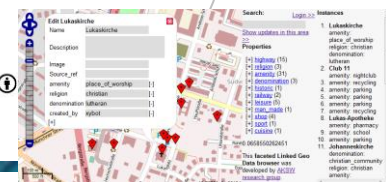
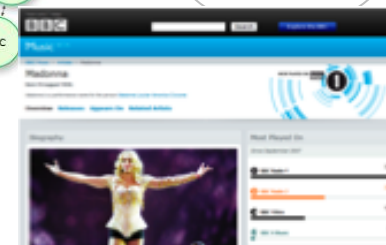
data.gov.uk 

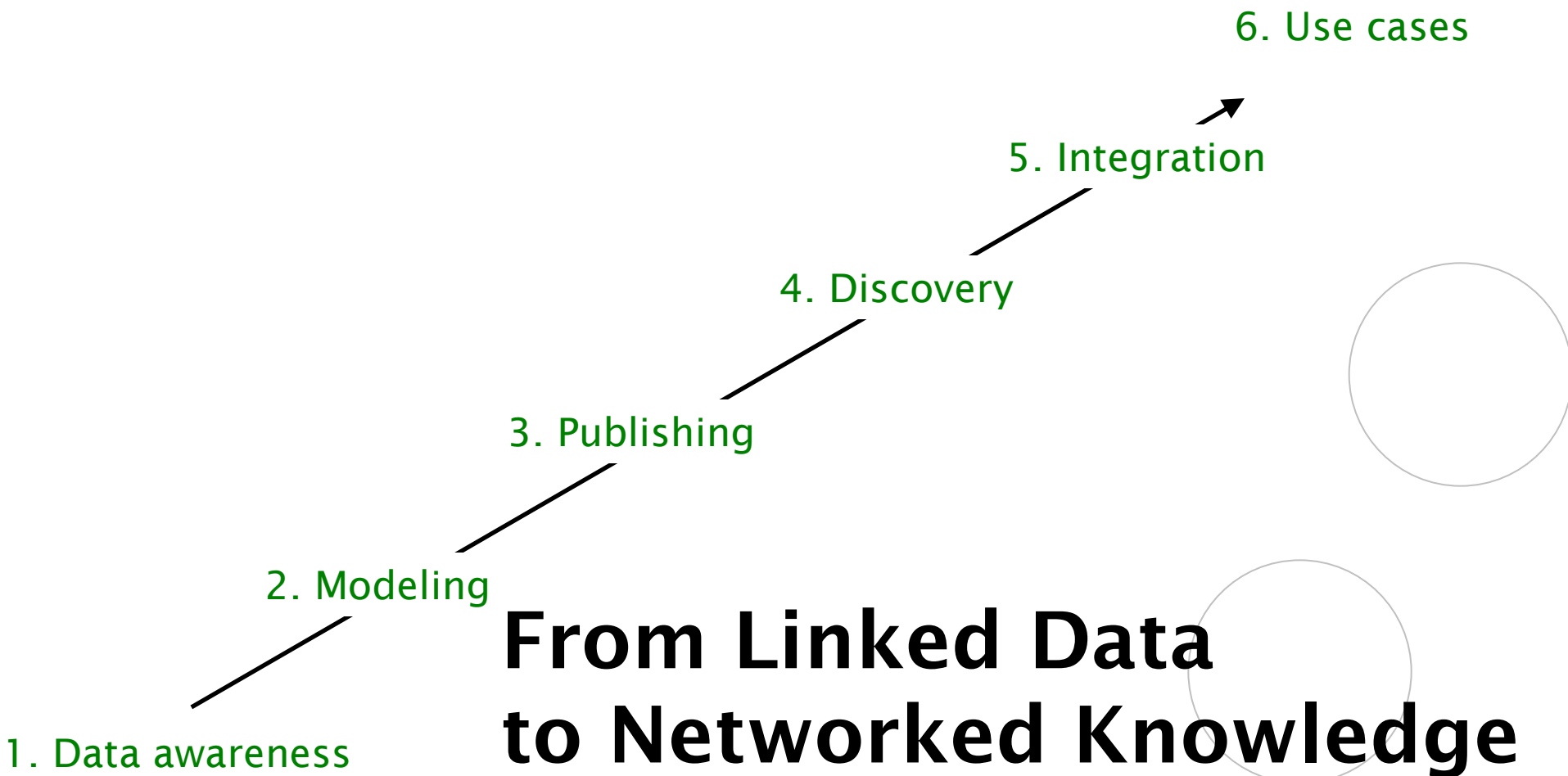
[Home](#)
[Data](#)
[Apps](#)
[Ideas](#)
[Forum](#)
[Wiki](#)

Transparency is at the heart of this Government.
Data.gov.uk is home to national & local data for
free re-use.

Over **200** open data sets with more than **25 billion facts**,
interlinked by **400 million** typed links, doubling every 10 month!

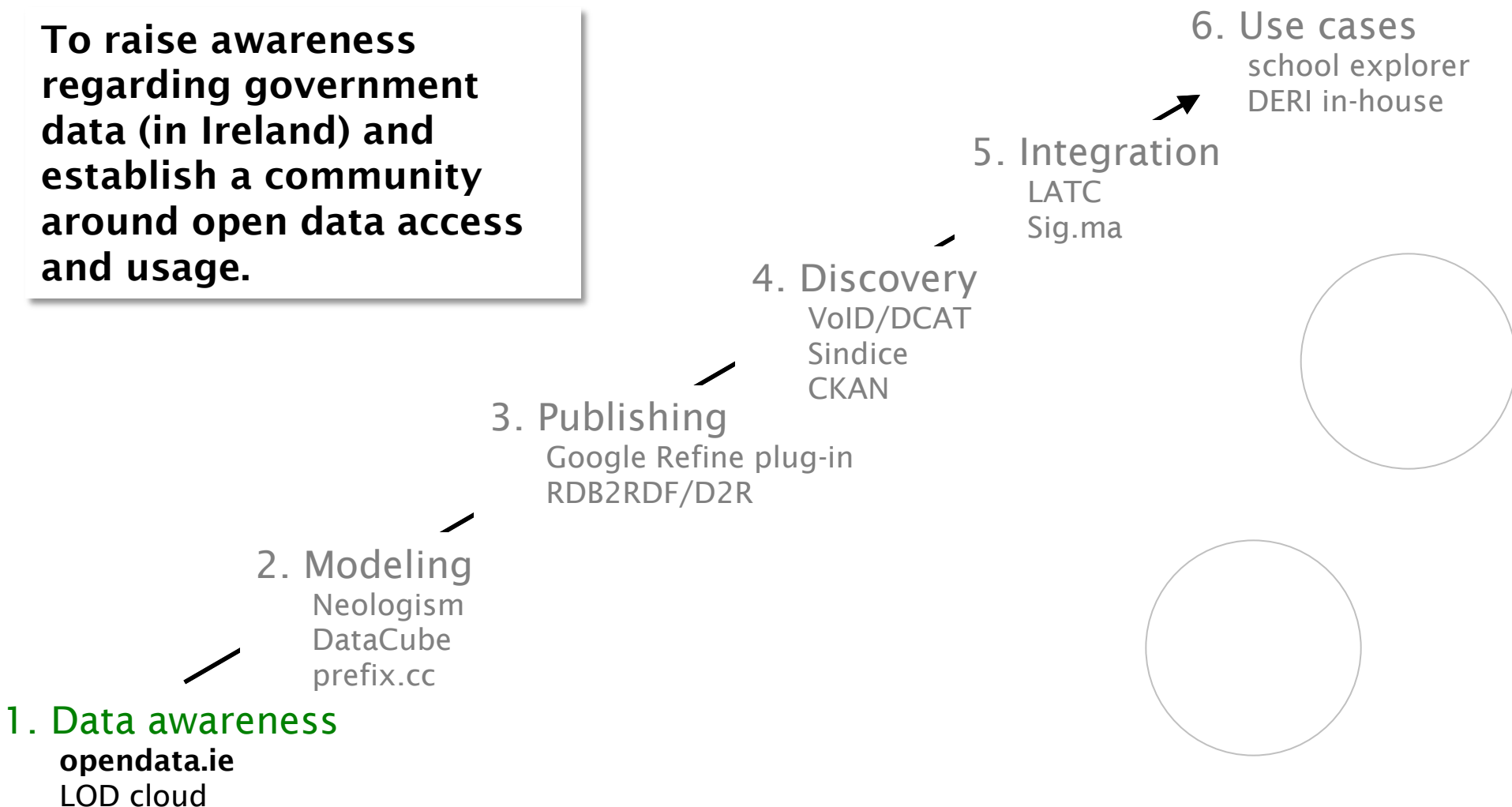
Linking Open Data cloud diagram, by Richard Cyganiak and Anja Jentzsch.







**To raise awareness
regarding government
data (in Ireland) and
establish a community
around open data access
and usage.**





Welcome to CKAN Ireland

CKAN Ireland is an **open registry** of data and content packages. Harnessing the CKAN software, this site makes it easy to find, share and reuse content and data, especially in ways that are machine automatable.

264 registered data packages available.

E.g. 'geo', 'shakespeare', 'science'

Filters: ☐ open license ☐ downloadable

Top Tags

disability qnhs income certificate electricity saps household exports s
fuel **employment** sapmap **education** w
transport balance agriculture agricultural loans injury
construction **health** gas farming insurance water deaths tr
energy **capital** work hospital consumption census nationality
accounts housing sap illness births map family goods social **financial**
population labour

More information

- [About](#)
- [API](#)
- [User Guide](#)
- [Statistics](#)
- [CKAN development](#)

Irish Data Catalog



opendata.ie

[HOW TO ENGAGE ...](#)[DATA](#)[APPLICATIONS](#)[FAQ](#)[ABOUT](#)

Planning Applications to Galway City Council

Posts from Open Data Ireland

Blog roll

- [KildareStreet news](#)
- [The Story](#)
- [Jolitics Blog](#)
- [Irish Election](#)
- [Gavin Sheridan](#)
- [Open Knowledge Foundation](#)
- [EchoLibre](#)
- [LiDRC blog](#)

Open data is...

- Information about our country and our government.
- Published on the web, under an open license.
- In a machine-readable format.

[Read more »](#)

New Irish Data

[World Bank data](#)

[List of all schools](#)

[Oireachtas Bills](#)

Help free Ireland

[Advocate for](#)

[You can get in to](#)

[Add pointers](#)

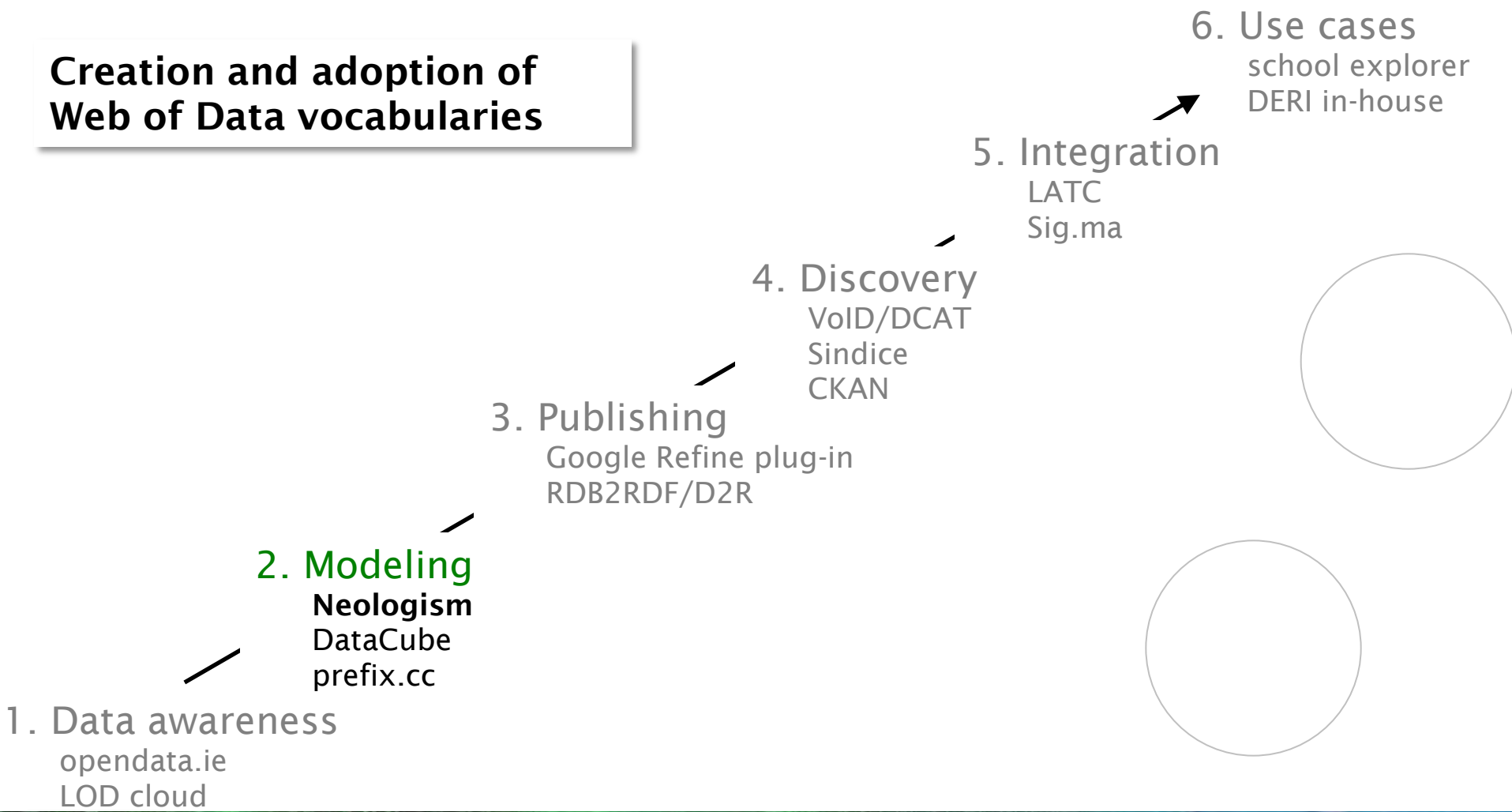
[Add links to Web sites that contain important information.](#)

[Get data into the Irish datastore](#)

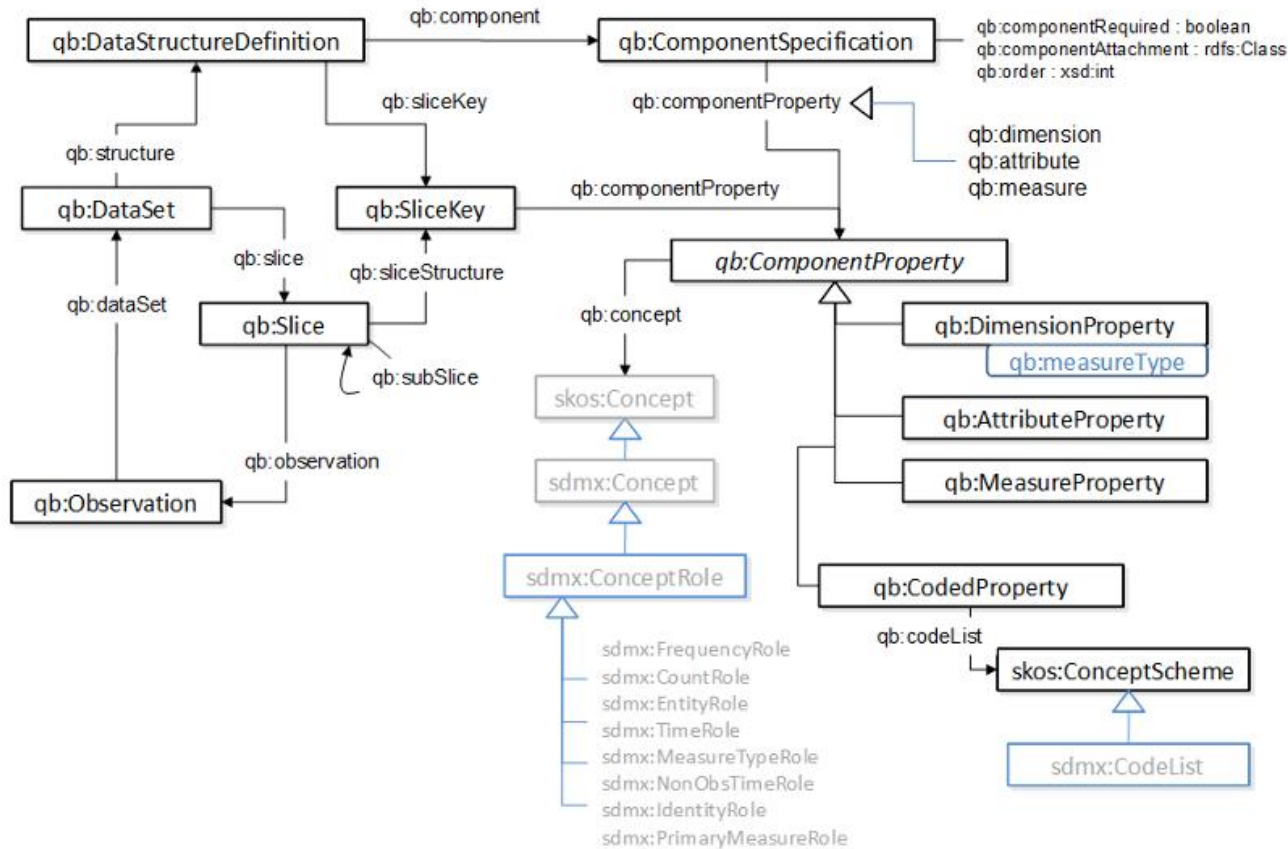
Irish Data Communit



Creation and adoption of Web of Data vocabularies

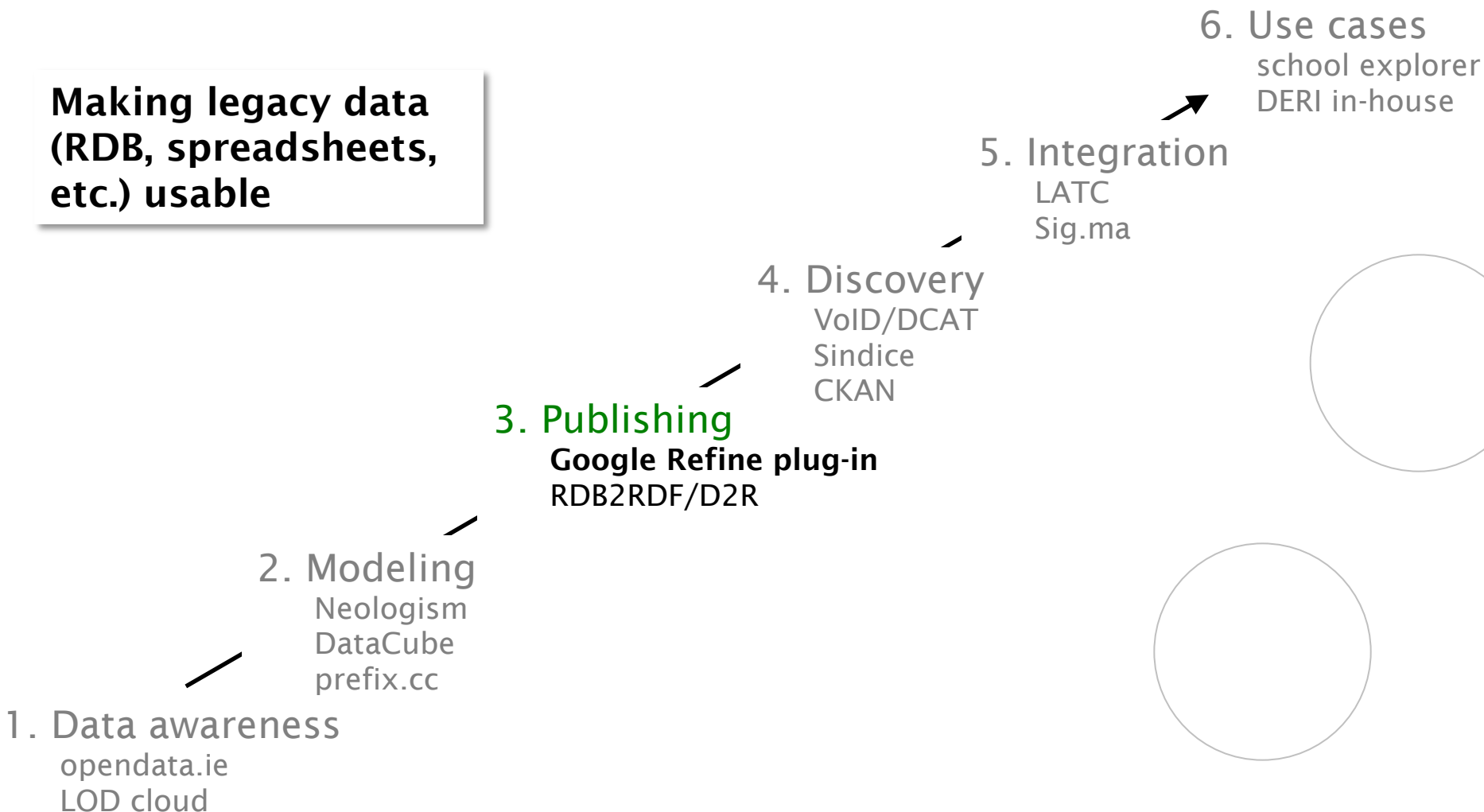


<http://linked-statistics.org/datacube/>





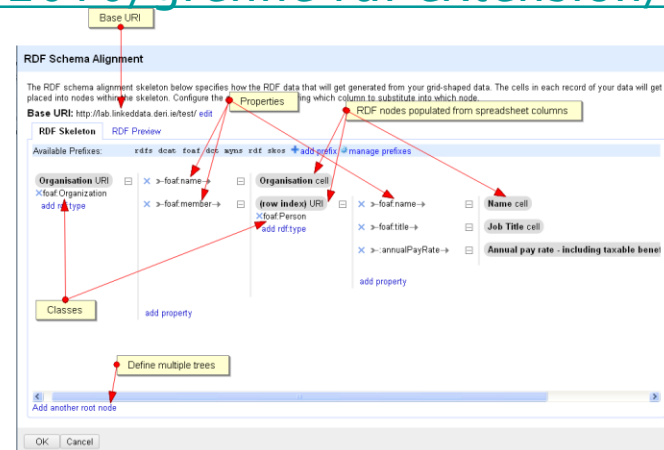
**Making legacy data
(RDB, spreadsheets,
etc.) usable**





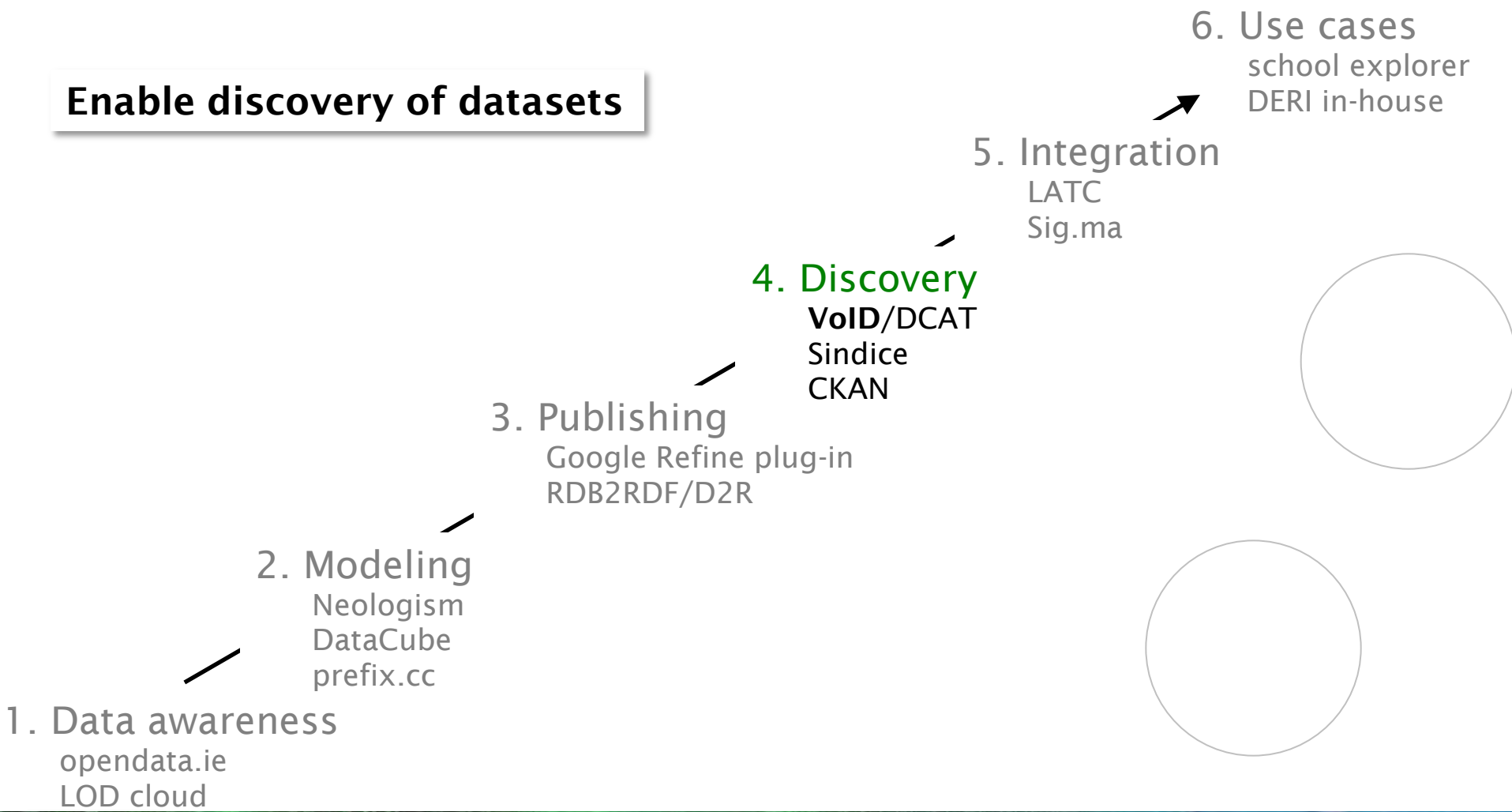
<http://lab.linkeddata.deri.ie/2010/grefine-rdf-extension/>

- 1 • Machine-readable catalogues
- 2 • Data clean up
- 3 • Reconciliation
- 4 • Conversion to RDF & interlinking
- 5 • Sharing

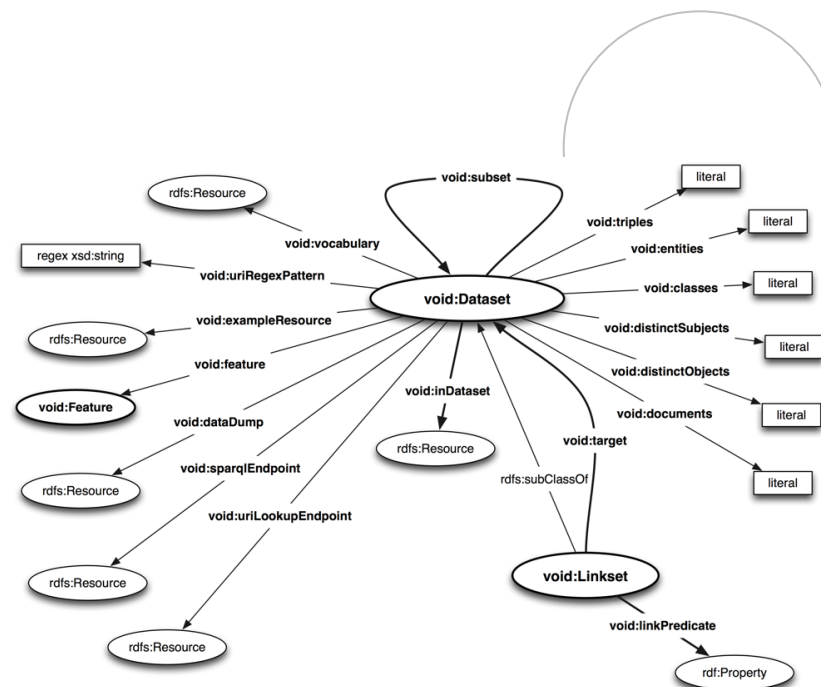




Enable discovery of datasets

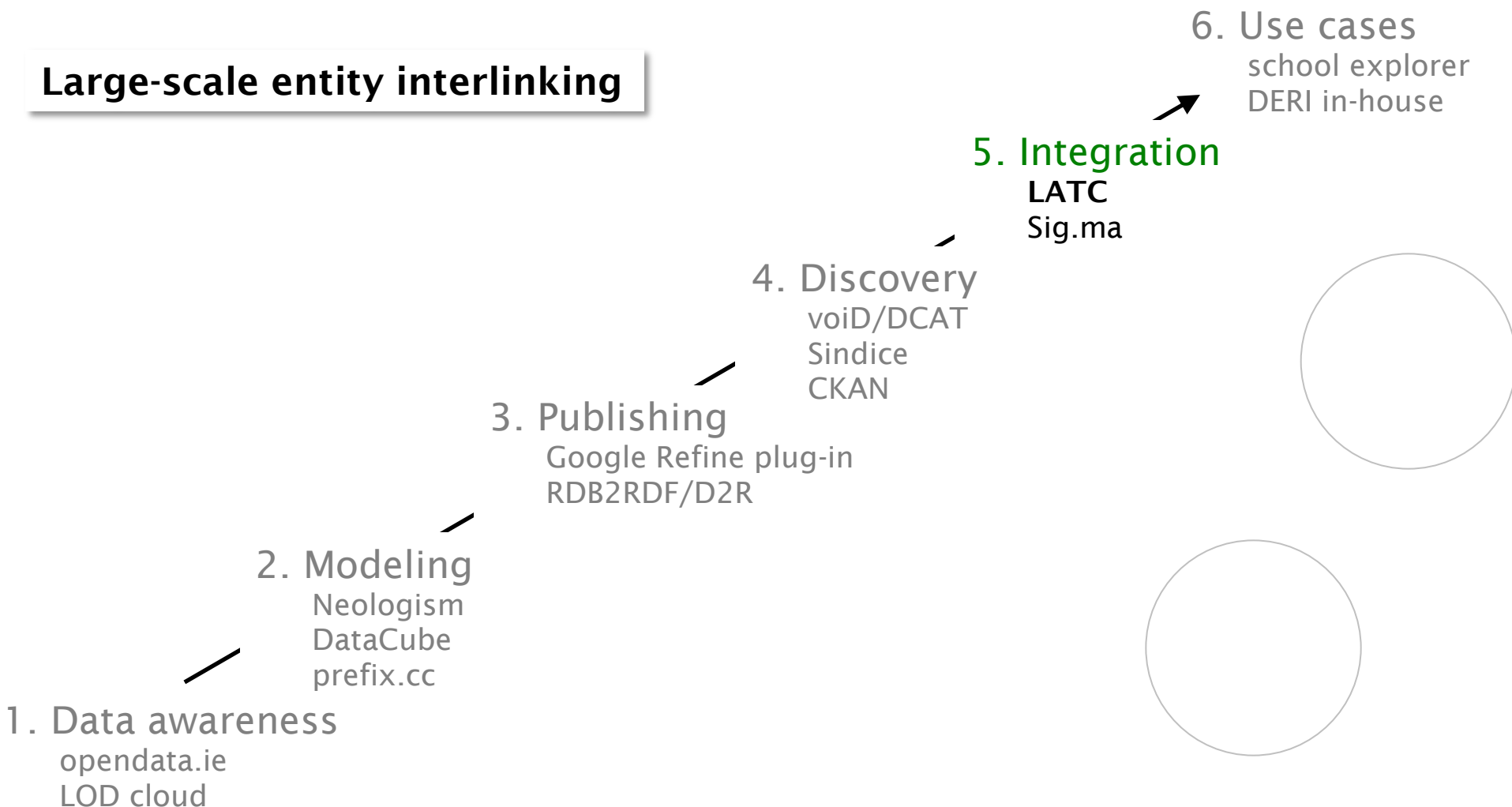


- Model for dataset description (VoID vocabulary)
- Users in industry and governments
- Published at W3C
<http://www.w3.org/TR/void>
- Significant uptake in research





Large-scale entity interlinking



■ Open Questions

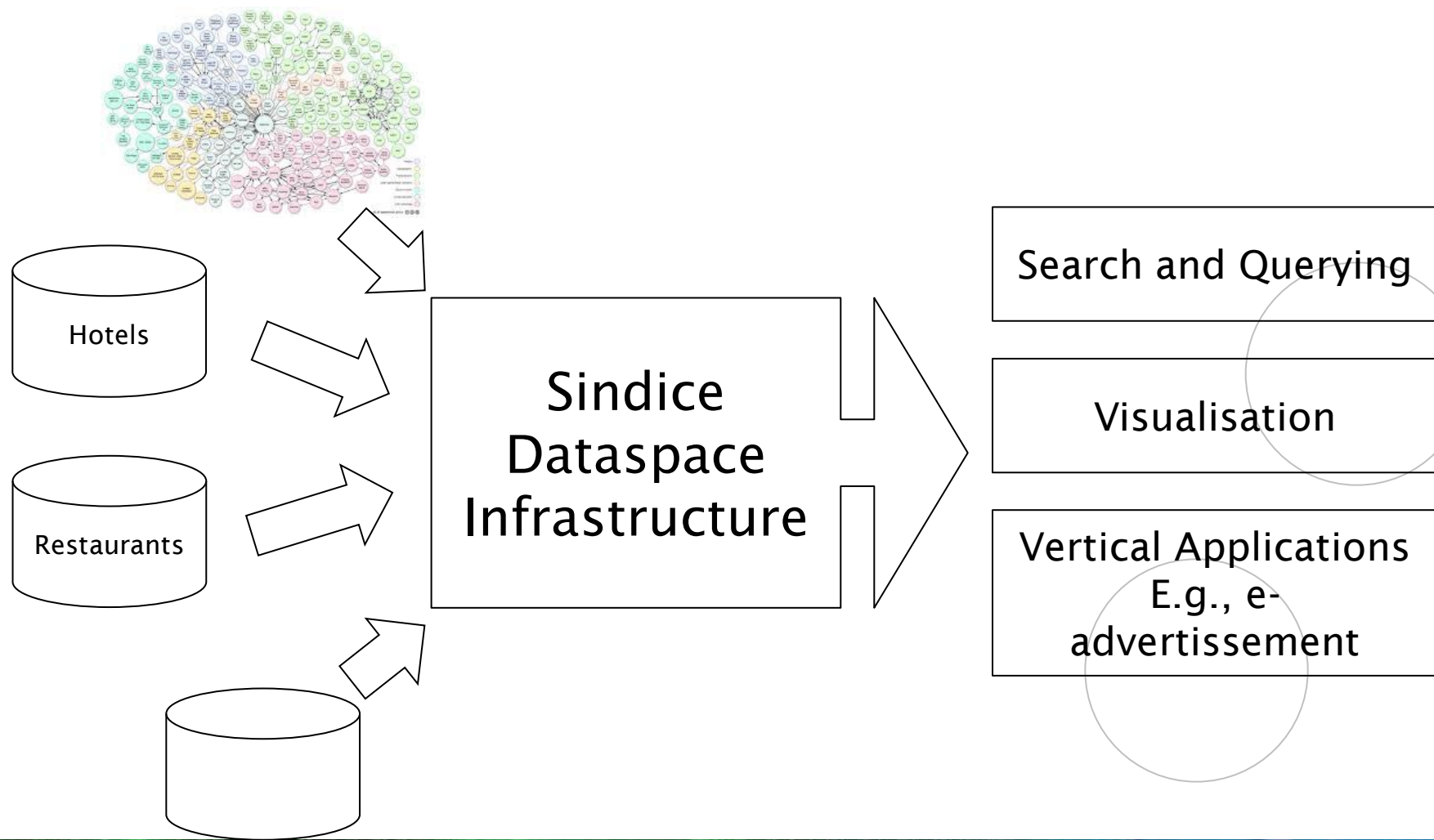
- How to find sources that describe topics and entities of interest ?
- How to cleanse and transform said data to fit one's needs ?
- How to visualize, verify, and consume said data for creating new competitive advantages for my business ?

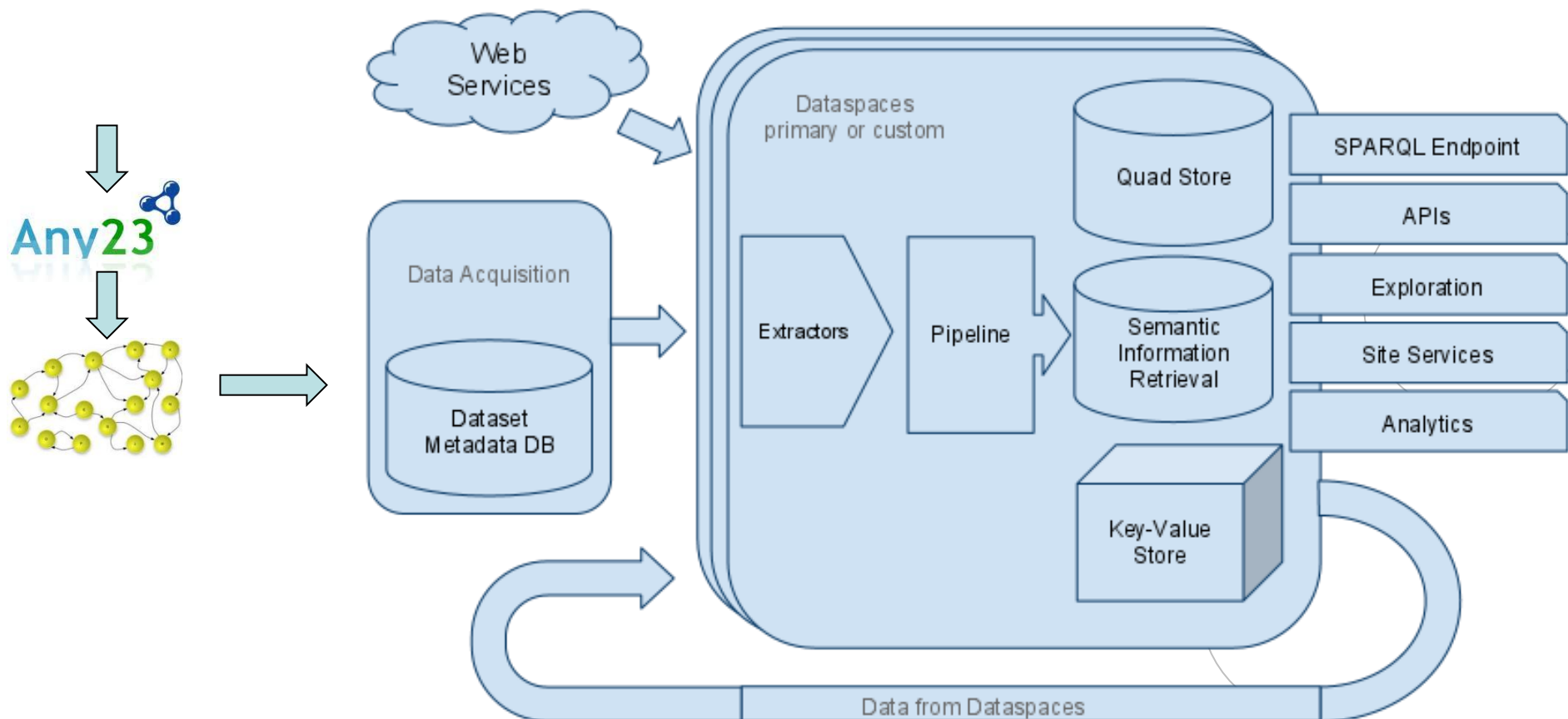
■ Building a “Dataspace” infrastructure to

- Make data access easier
 - Search and Exploration
- Make data exploitation easier
 - Integration and Reuse



Dataspace Example: Irish Tourism



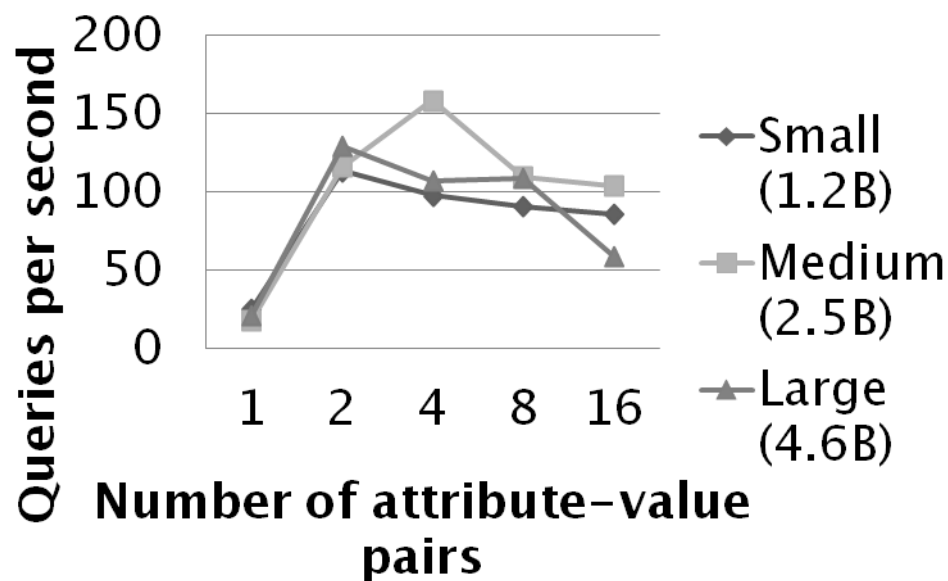


Semantic Information Retrieval Engine

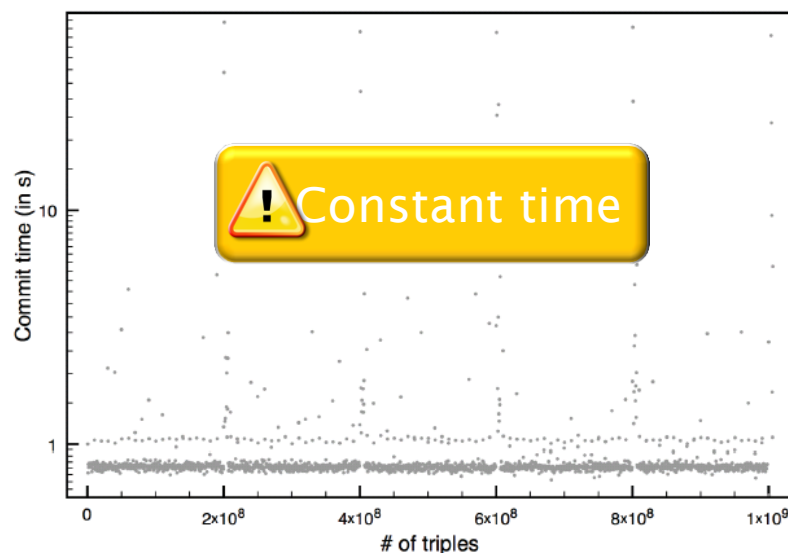


Data Structure / Compression / Query Processing:

Query Rate



- Data structure for semi-structured inverted indexes
- High-performance compression technique





Cloud Scalable Dataspace Infrastructure





Sindice
THE SEMANTIC WEB INDEX

Version: 1.5.46

Sindice - Data Web Services

Billion pieces of reusable information can already be found across hundreds of millions web pages which embed RDF and Microformats. Start consuming this data today with Sindice Data Web services.

[LEARN MORE →](#)

Search **Submit** **Inspector Tool**

Search: ☒ term ☐ property ☐ advanced ☐ SIG.MA

Type one or more keywords or URI [SEARCH](#)

Examples: [tim berners lee](#) (by URI), [michele](#), [deri](#)
Searching on about 122.39 million documents.

LATEST DATA

11:03:13 (sigma) [11 triples](#) <http://semantic.eurobau.com...00946g505p525.rdf>
11:03:13 (sigma) [57 triples](#) http://www.freezebox.net...9_11_01_archive.html
11:03:12 (site_manager) [2 triples](#) <http://www.freebase.com...sic/album/genre>
11:03:12 (site_manager) [2 triples](#) <http://www.freebase.com...episode/writer>

HIGHLIGHTS

Anything to Triples [Any23](#)

Introduction

Anything to Triples (any23) is a library and web service that converts data in RDF format from a variety of Web document following input formats:
Anything to Triples. New version - **Now available**

SINDICE TWEET [Follow us](#)

Tue Sep 07 09:49:30 2010 Sindice participates in the new eu LOD2 project, 4 years long, just started. <http://lod2.eu> Truly great competences in the consortium

SINDICE BLOG [Feed](#)

Sindice now supports Efficient Data discovery and Sync **JUL 09, 2010**
So far semantic web search engines and semantic aggregation services have been inserting datasets by hand or have been based on "ran...
([More →](#))

Sindice planned downtime this weekend **JUN 09, 2010**
HiDue to an expansion of one of our datacentres (and the electrical work that this implies), Sindice and related services such as sig.w...
([More →](#))



Giovanni Tummarello

Add More Info

Start New

Order

Options

Use it

Giovanni Tummarello

picture:



[8,9,10,11,12,18,19,21,24,28]



[25]

title: Dr [21,24,25,28]

given name: Giovanni [3,4,8,9,10,11,12,18,19,25]

family name: Tummarello [3,4,8,9,10,11,12,18,19,21,24,25,28]

is creator of: [A Node Indexing Scheme for Web Entity Retrieval](#) [3,4]

[Hierarchical Link Analysis for Ranking Web Data](#) [3,4]

[ESWC 2006 Demo: DBin - enabling SW P2P communities](#) [3,4]

[Rapid Prototyping of Semantic Mash-Ups through Semantic Web Pipes](#) [3,4]

[Context Dependent Reasoning for Semantic Documents in Sindice](#) [3,4]

[An Entity Name System for Linking Semantic Web Data](#) [3,4]

[Semantic Sitemaps: Efficient and Flexible Access to Datasets on the Semantic Web](#) [3,4,20,30]

[Sindice.com: Weaving the Open Linked Data](#) [3,4,5,6,7,13,14,15,16]

[RDFSyc: efficient remote synchronization of RDF models](#) [3,4,5,6,7,13,14,15,16]

[Exposing Large Datasets with Semantic Sitemaps](#) [5,6,7,13,14,15,16]

[Enabling Semantic Web communities with DBin: an overview](#) [5,6,7,13,14,15,16]

show 100 more values

Sources (30)

Approved (0)

Rejected (0)

1 [Giovanni Tummarello](#) 80 facts | 2010-12-28
http://dblp.l3s.de/d2r/resource/authors/Giovanni_Tu...

2 [RDF Description of Giova...](#) 80 facts | 2010-12-28
http://dblp.l3s.de/d2r/data/authors/Giovanni_Tummar...

3 [Untitled document](#) 44 facts | 2010-12-28
<http://data.semanticweb.org/person/giovanni-tummarello>

4 [Giovanni Tummarello](#) 44 facts | 2010-12-23
<http://data.semanticweb.org/person/giovanni-tummarello>

5 [Giovanni Tummarello](#) 38 facts | 2010-12-28
http://semanticweb.org/id/Giovanni_Tummarello

6 [Untitled document](#) 38 facts | 2010-12-23
<http://ontoworld.org/wiki/Special:ExportRDF/Giovann...>

7 [Untitled document](#) 38 facts | 2010-12-23
<http://ontoworld.org/wiki/Special:URIResolver/Giova...>

8 [FOAF Description for Pao...](#) 11 facts | 2010-07-20
 <http://www.dit.unitn.it/~bouquet/foaf.rdf>

9 [FOAF Description for Pao...](#) 11 facts | 2010-11-25
 <http://dit.unitn.it/%7Ebouquet/foaf.rdf>

10 [FOAF Description for Pao...](#) 11 facts | 2010-07-26
 <http://disi.unitn.eu/~bouquet/foaf.rdf>

11 [FOAF Description for Pao...](#) 11 facts | 2010-09-03
 <http://disi.unitn.it/%7Ebouquet/foaf.rdf>

12 [FOAF Description for Pao...](#) 11 facts | 2010-09-03
 <http://dit.unitn.it/~bouquet/foaf.rdf>

13 [Untitled document](#) 38 facts | 2010-12-23
<http://semanticweb.org/wiki/Special:ExportRDF/Giova...>

14 [Untitled document](#) 38 facts | 2010-12-28

BETA
Please report on our forum

Example widget

Title:
Trade

RImage:



Starring:

Kevin Kline
Alicja Bachleda

Budget:

\$12,000,000
(estimated)

Runtime:

119 mins.

Powered by Sindice

Home Widgets Search Please report on our forum About

indice
Site Services

"Got an / Like It button(*)? 1 Like 8
You are 1 click away to leverage the entire Web of Data
(for your needs specific visitor needs)."

Sindice Site Services - for website owners

Sindice Widgets

Get Web Data Powered widgets to deliver highly valuable extra information and power smart recommendations across your pages.

Example widget

Title: More Info About Book

Trade: Books

RImage:

Starring: Kevin Kline, Alicja Bachleda

Budget: \$12,000,000 (estimated)

Runtime: 119 mins.

Powered by Sindice



BETA
please report on our forum



Home Widgets Search [Please report on our forum](#) [About](#)

DEMO.SINDICE.NET - Data Site Search


Show query

TILES • TABLE

6 get_more_info_about_movie_exhibit


sorted by: [labels](#); [then by...](#) • ☒ grouped as sorted

1.

Title: 10,000 BC
RImage: 


Starring: Steven Strait
Writer: Harald Kloser
Director: Roland Emmerich
Budget: 105000000
Runtime: 109 min.

2.

Title: The Day After Tomorrow
RImage: 


Starring: Jake Gyllenhaal
Writer: Roland Emmerich
Director: Roland Emmerich
Budget: \$125,000,000 (estimated)
Runtime: 124 mins.

3.


Title: Alien 3
RImage: 

Starring: Sigourney Weaver
Writer: Dan O'Bannon
Director: David Fincher
Budget: 50000000
Runtime: Theatrical Cut: 114 min. Special Edition: 144 min.


4.

Title: Alien Resurrection
RImage: 

5.

Title: The Thirteenth Floor
RImage: 

6.

Title: Aliens
RImage: 



Title

- 1 [10,000 BC](#)
- 1 [Alien 3](#)
- 1 [Alien Resurrection](#)
- 1 [Aliens](#)
- 1 [The Day After Tomorrow](#)
- 1 [The Thirteenth Floor](#)

Starring

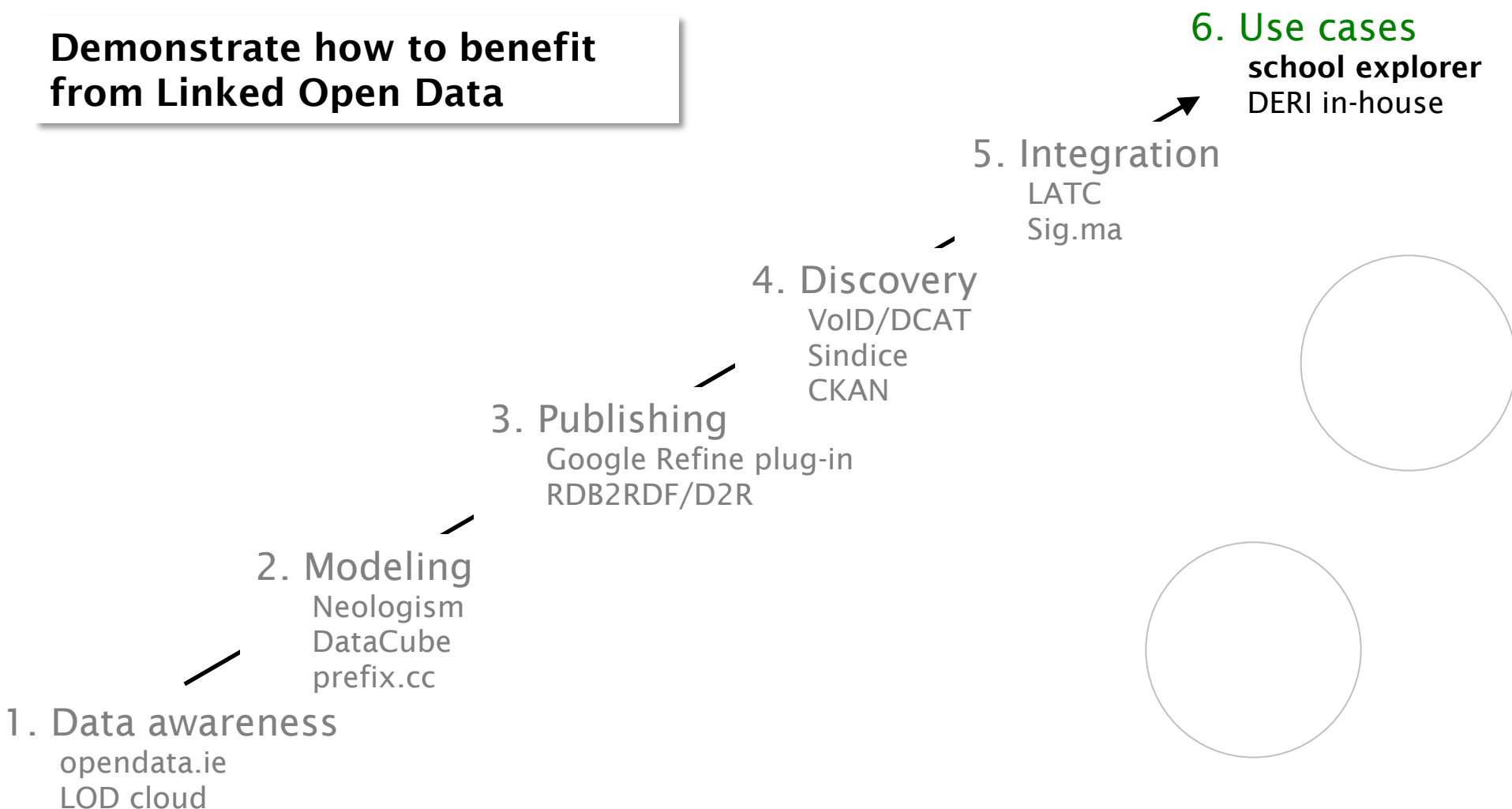
- 1 [Armin Mueller-Stahl](#)
- 1 [Jake Gyllenhaal](#)
- 3 [Sigourney Weaver](#)
- 1 [Steven Strait](#)

Writer

- 2 [Dan O'Bannon](#)
- 1 [Daniel F. Galouye](#)
- 1 [Harald Kloser](#)
- 1 [James Cameron](#)
- 1 [Roland Emmerich](#)



Demonstrate how to benefit from Linked Open Data





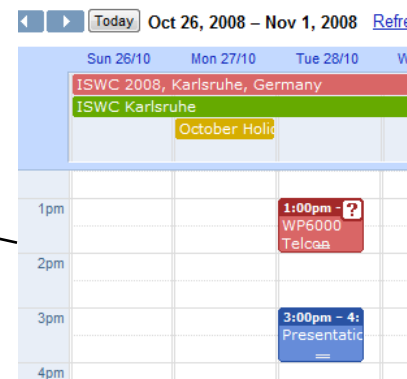
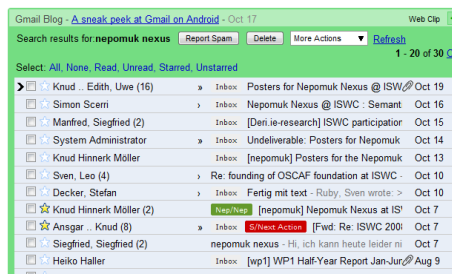
Human burden to hold everything together



Organising a project showcase at a conference:
involved Documents, contacts, time-schedule

E-Emails

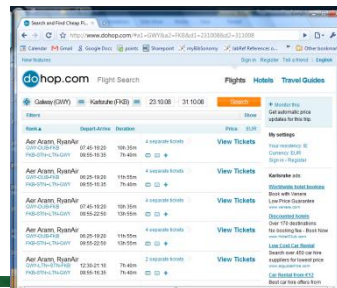
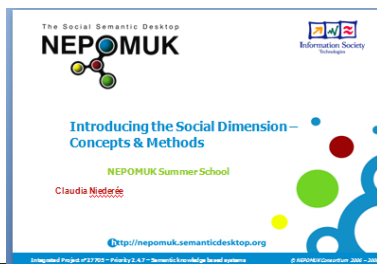
Time Schedule

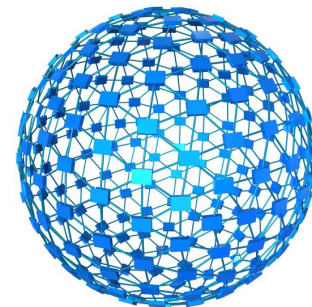


Meeting Presentations

Travel Website

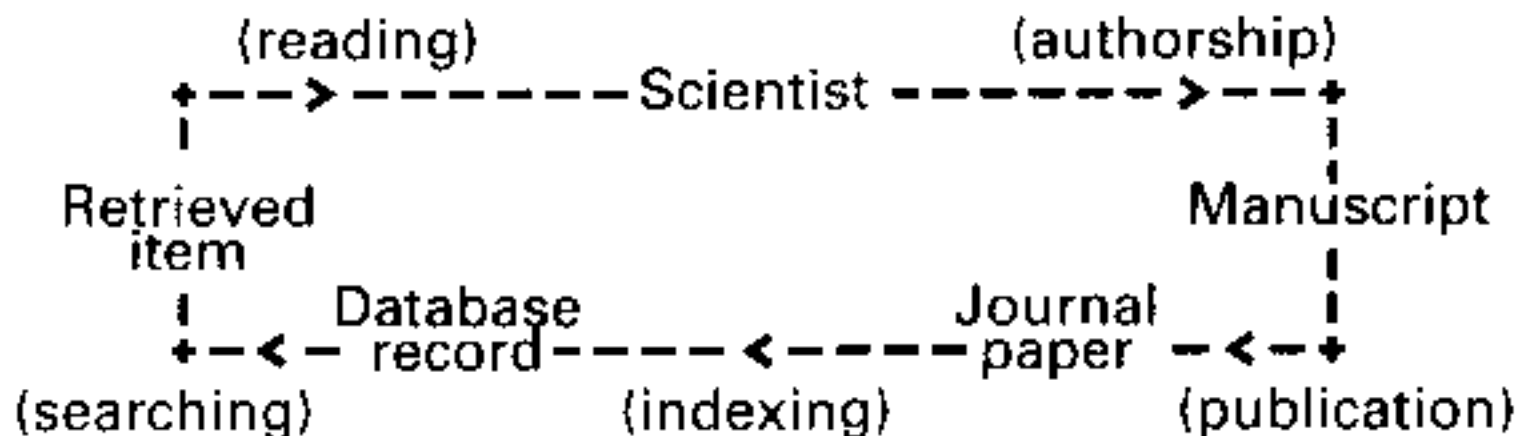
Conference Website





What are the sweet spots in this continuum?

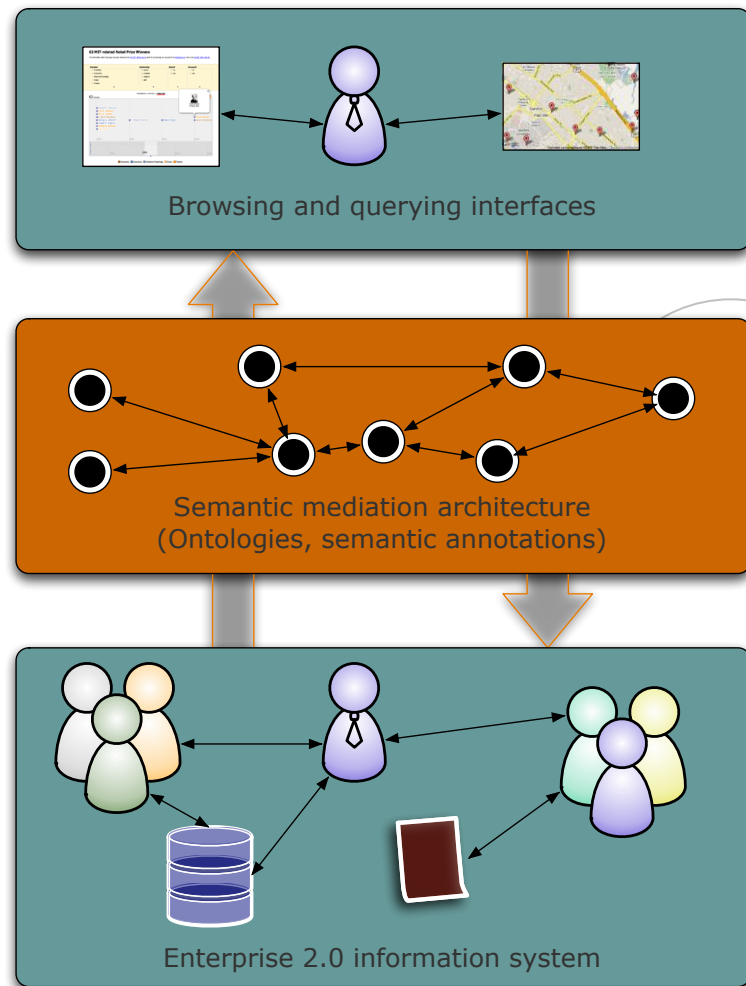
- Scientific Communication
- Enterprise Data
- Collaboration



The process of scientific communication

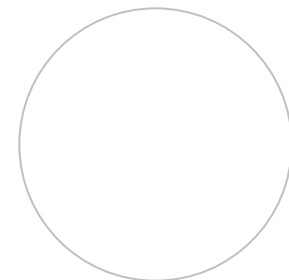
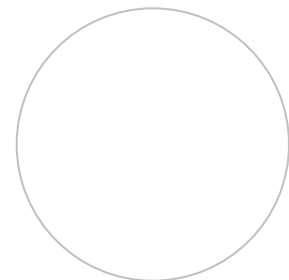
■ Lightweight semantics and Linked Data on top of existing well-know applications

- User-driven semantics
- Combined with advanced browsing and querying interface





Exploiting and enhancing Linked Data: Semantic Collaboration

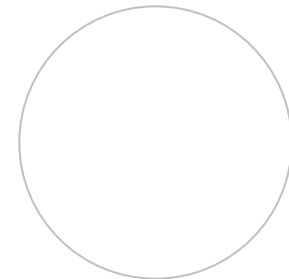




Vision: Networked Collaborative Knowledge

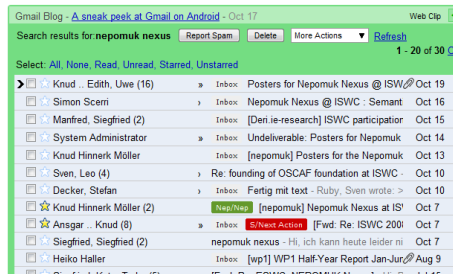


- Free the Silos - Bridge the Islands
- Interconnected Knowledge
- Ensure local and global Collaboration





E-Emails



Model PIMO

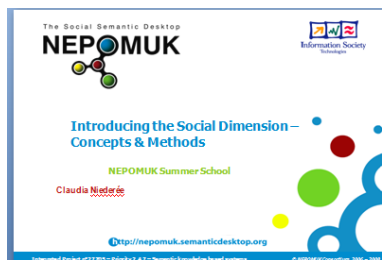


Time Schedule

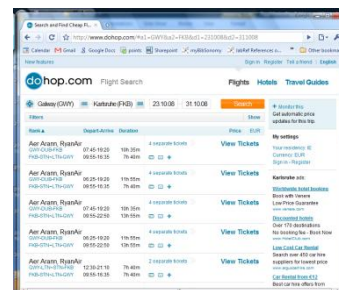
Today Oct 26, 2008 – Nov 1, 2008 Refr

Sun 26/10	Mon 27/10	Tue 28/10	Wed 29/10
ISWC 2008, Karlsruhe, Germany			
ISWC Karlsruhe			
October Holiday			
1pm		1:00pm - ? WP6000 Telcga	
2pm			
3pm		3:00pm - 4: Presentatio	
4pm			

Meeting Presentations



Travel Website



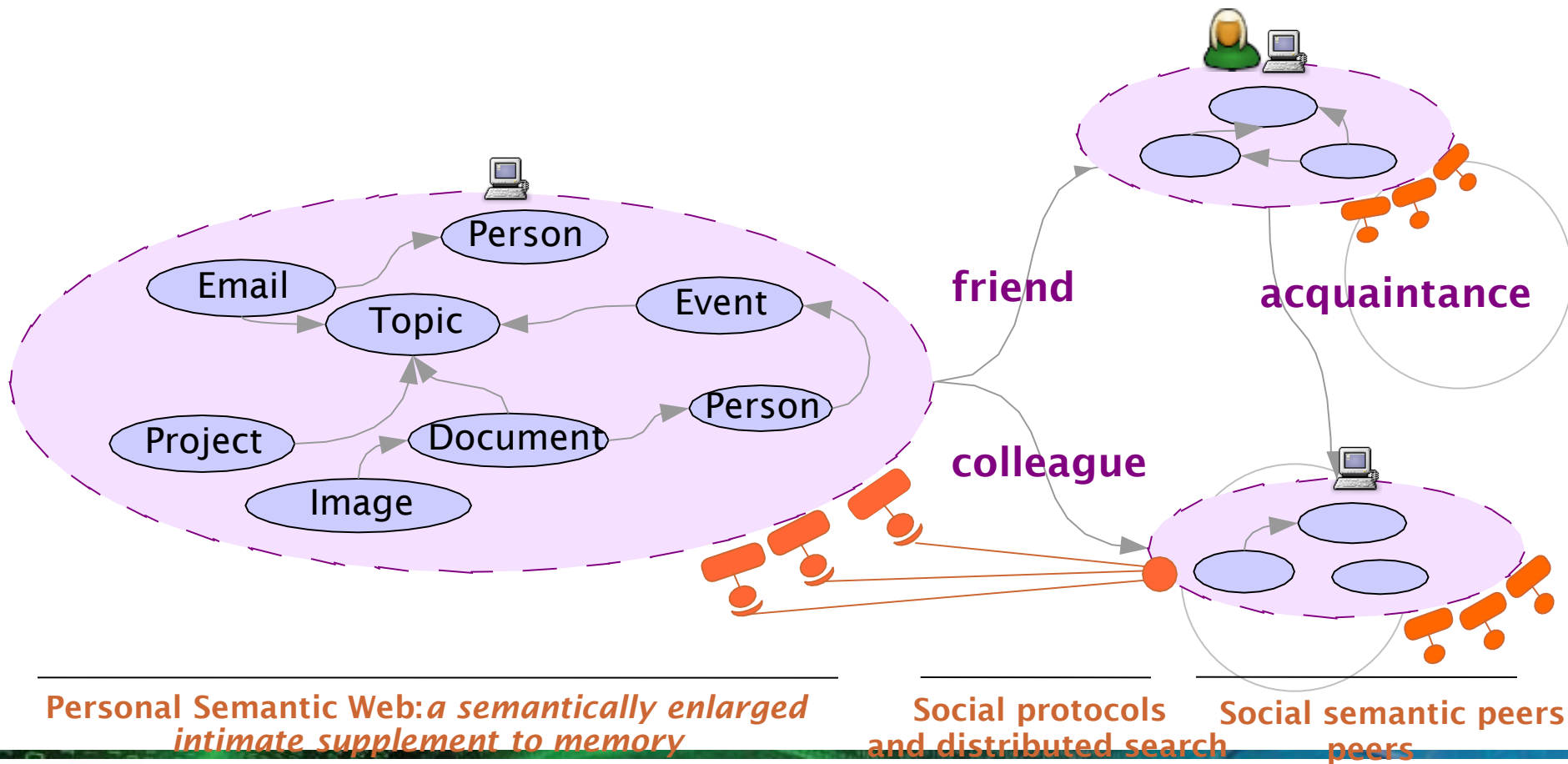
Conference Website



Interconnect disperse Information

<http://www.semanticdesktop.org/ontologies/>

red knowledge





Saffron

Extracting the Valuable Threads of Expertise

Saffron

search help





Ian Horrocks



Ian Horrocks

Oxford University Computing Laboratory
Homepage



Topics

more >>

- | | | | |
|---|------------------------------|----|-----------------------------------|
| 1 | OBO | 6 | OBO parsers using automated tools |
| 2 | enhanced traversal algorithm | 7 | OBO language |
| 3 | OBO ontologies | 8 | Semantic Web |
| 4 | subsumption tests | 9 | life sciences |
| 5 | Description Logics | 10 | OWL DL |

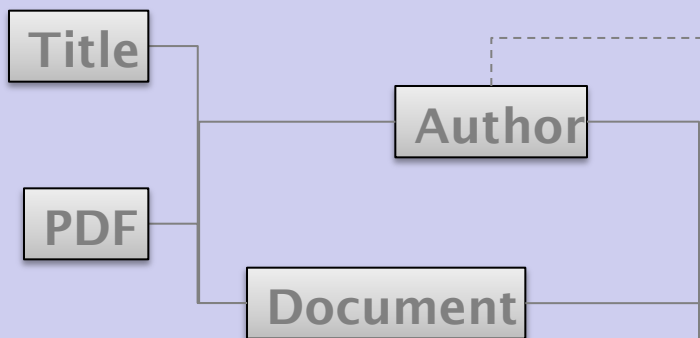
Publications

more >>

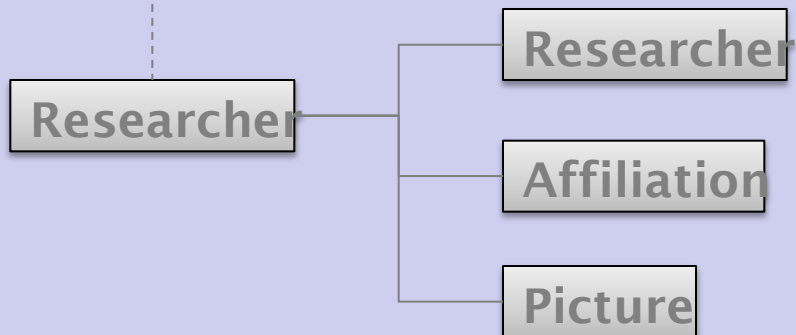
- 1 OBO and OWL: Leveraging Semantic Web Technologies for the Life Sciences
- 2 Exploiting Partial Information in Taxonomy Construction
- 3 Efficient Query Answering for OWL 2
- 4 The OBO to OWL mapping, GO to OWL 1.1!
- 5 Extracting Modules from Ontologies: A Logic-based Approach
- 6 Adding Integrity Constraints to OWL



Linking Objects in Saffron



LOD - Semantic Web Dog Food



LOD - OntoWiki, FOAF

ExpertiseTopic

Natural Language Processing

Topic

Topic

LOD - DBpedia



Changing the World..

