

# ONLINE LEARNING AND LINKED DATA - LESSONS LEARNED AND BEST PRACTICES

<http://www.euclid-project.eu/events/online-learning-and-linked-data-www2014>



## Tutorial at the 23rd International World Wide Web Conference WWW 2014

Co-organised by the **EUCLID** and **LinkedUp** projects





# Linked Data as enabler for Open Education

**Stefan Dietze**

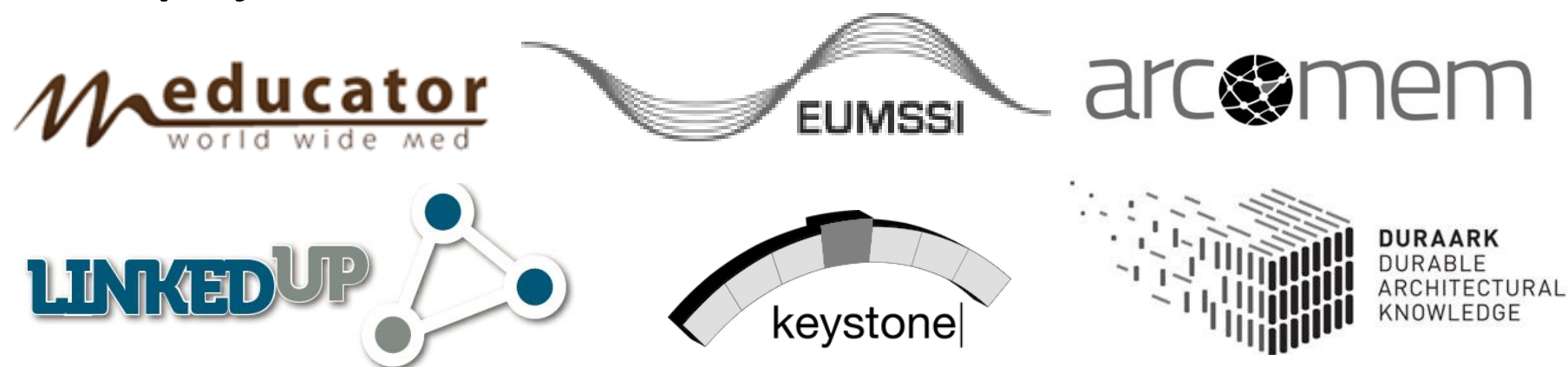
(L3S Research Center, DE,  
@stefandietze,  
<http://purl.org/dietze>)

# Introduction

## Research areas

- Web science, Information Retrieval, Semantic Web & Linked Data, data & knowledge integration (mapping, classification, interlinking)
- Application domains: education/TEL, Web archiving, ...

## Some projects



## (Linked) Web data & education

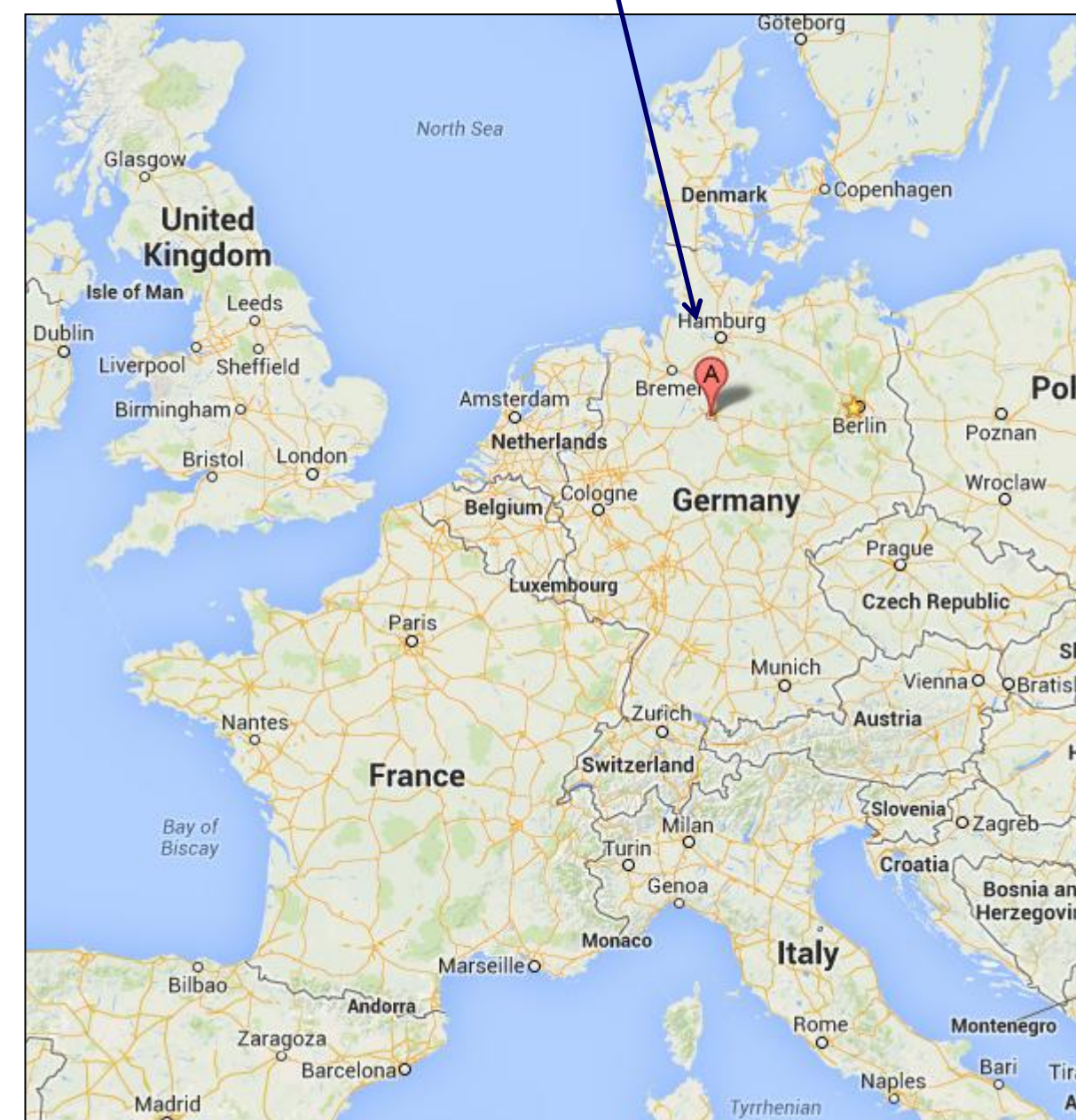
- Early activities in the field: tutorials, workshops, competitions (LILE – Linked Learning, LAK Data Challenge...)
- <http://linkededucation.org> & <http://linkeduniversities.org>



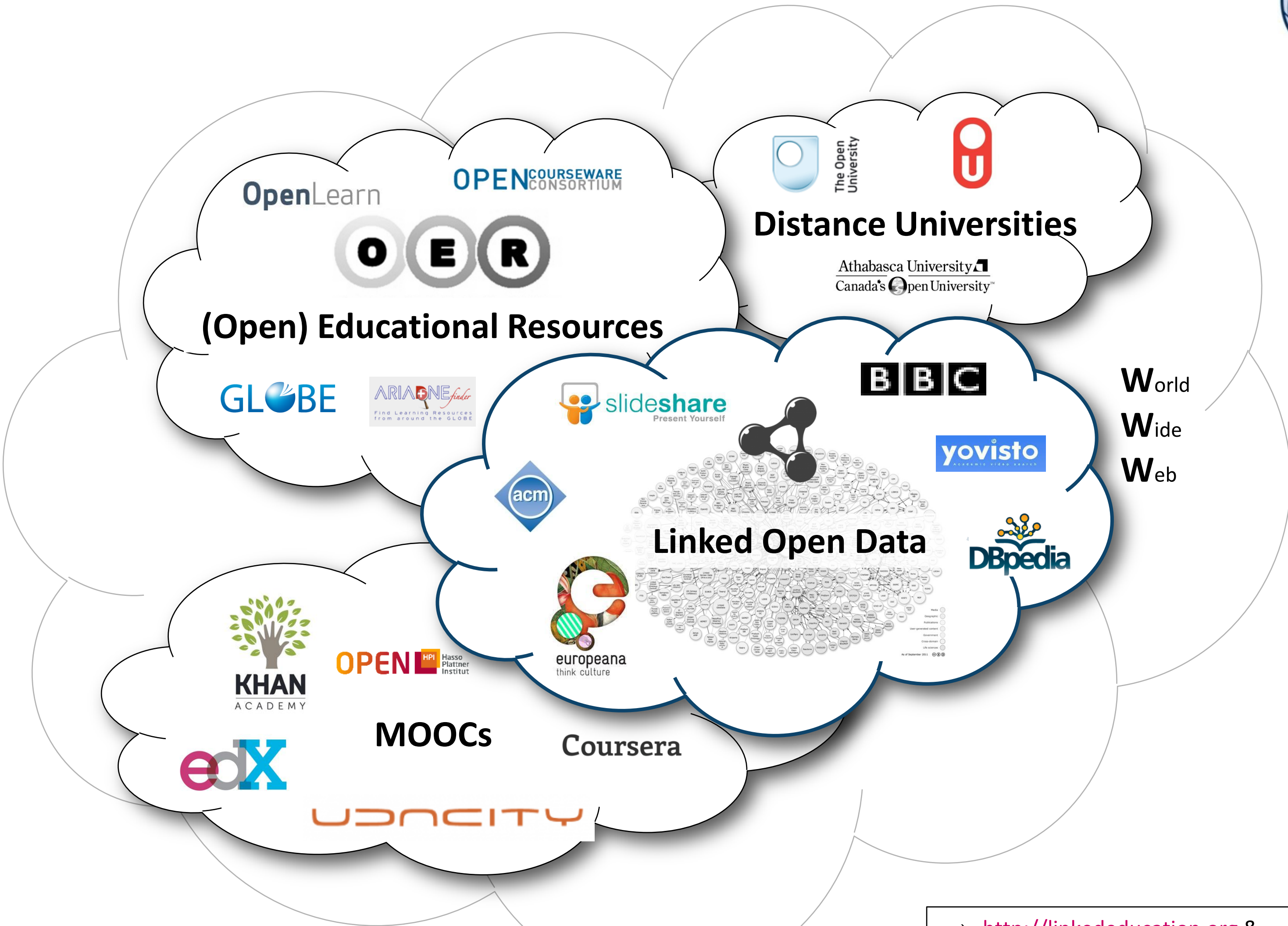
See also: <http://purl.org/dietze>



<http://www.l3s.de/>



# Educational Data/Resources on the Web

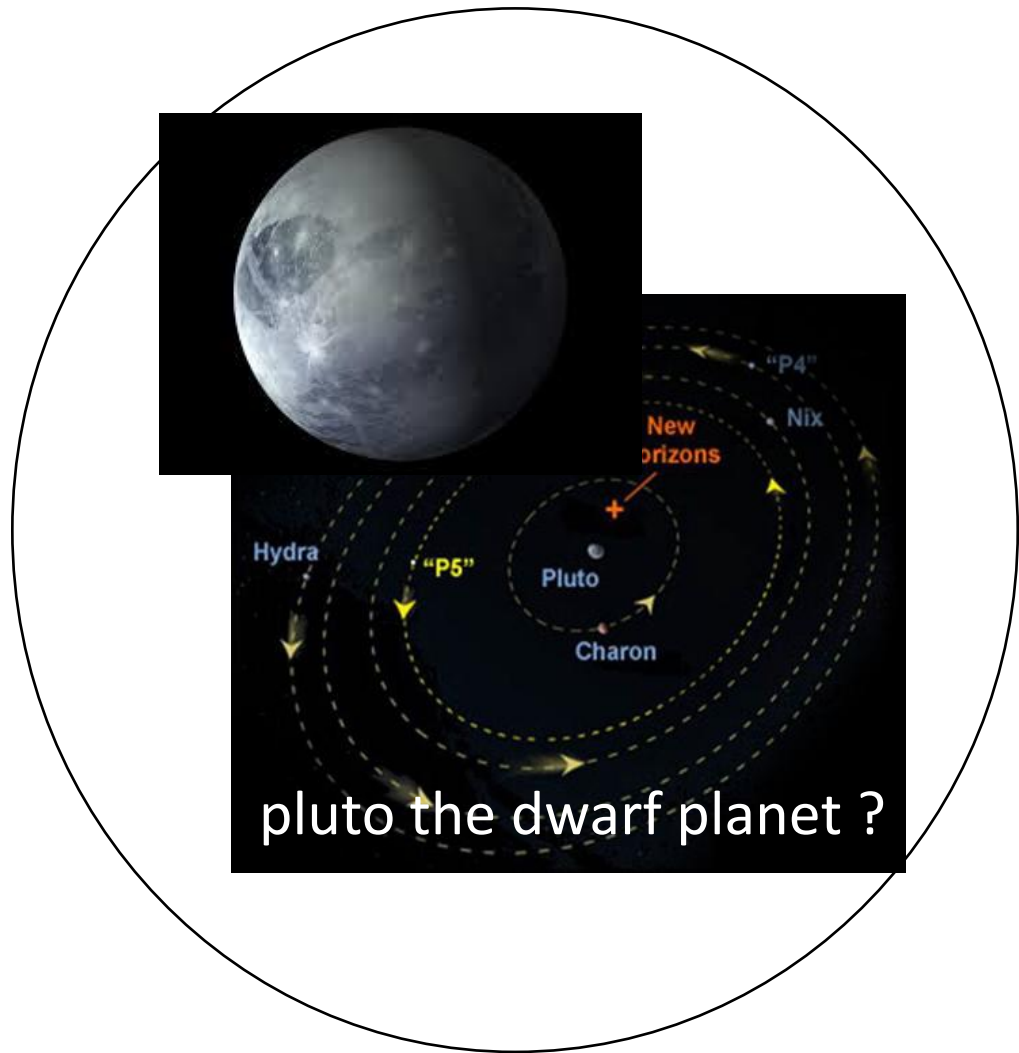


⇒ <http://linkededucation.org> &

⇒ <http://linkeduniversities.org>



# Linked Data: Pluto & the seven Dwarfs?



**Pluto (Disney)**  
From Wikipedia, the free encyclopedia

Pluto, also called **Pluto the Pup**, is a cartoon character created in 1930 by Walt Disney Productions. He is mustard-colored, medium-sized, short-haired dog with black ears. Unlike Goofy, Pluto is not anthropomorphic beyond some characteristics such as facial expression, though he did speak for a short portion of his history.<sup>[1]</sup> He is Mickey Mouse's pet. Officially a mixed-breed dog,<sup>[2]</sup> Pluto is clearly modeled on the English Pointer breed, most evident in the film "The Pointer". The prominent Disney artist Norm Ferguson owned an English Pointer.<sup>[3]</sup> Together with Mickey Mouse, Minnie Mouse, Donald Duck, Daisy Duck and Goofy, Pluto is one of the "Sensational Six"—the biggest stars in the Disney universe.<sup>[4]</sup> Though all six are non-human animals, Pluto alone is not dressed as a human.<sup>[5]</sup>

Pluto debuted in animated cartoons and appeared in 24 *Mickey Mouse* films before receiving his own series in 1937. All together Pluto appeared in 89 short films between 1930 and 1953. Several of these were nominated for an Academy Award, including *The Pointer* (1930), *The Chain Gang* (1930) (unnamed), and *The Picnic* (1930) (as Pluto).

**First appearance**

- The Chain Gang* (1930) (unnamed)
- The Picnic* (1930) (as Pluto)

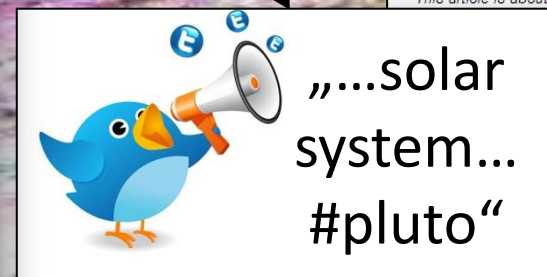
**Pluto**  
From Wikipedia, the free encyclopedia  
(Redirected from 134340 Pluto)

*This article is about the dwarf planet. For other uses, see Pluto (disambiguation).*

134340 Pluto, is known dwarf planet (after Eris) and the largest body observed in the Kuiper belt. Originally discovered from the Sun, it is a dwarf planet because it is not massive enough to clear its orbit. It is relatively small, approximately one-sixth the mass of the Earth's Moon and one-third its volume. It has an eccentric and highly inclined orbit that takes it from 30 to 49 AU from the Sun.

**Pluto ♇**

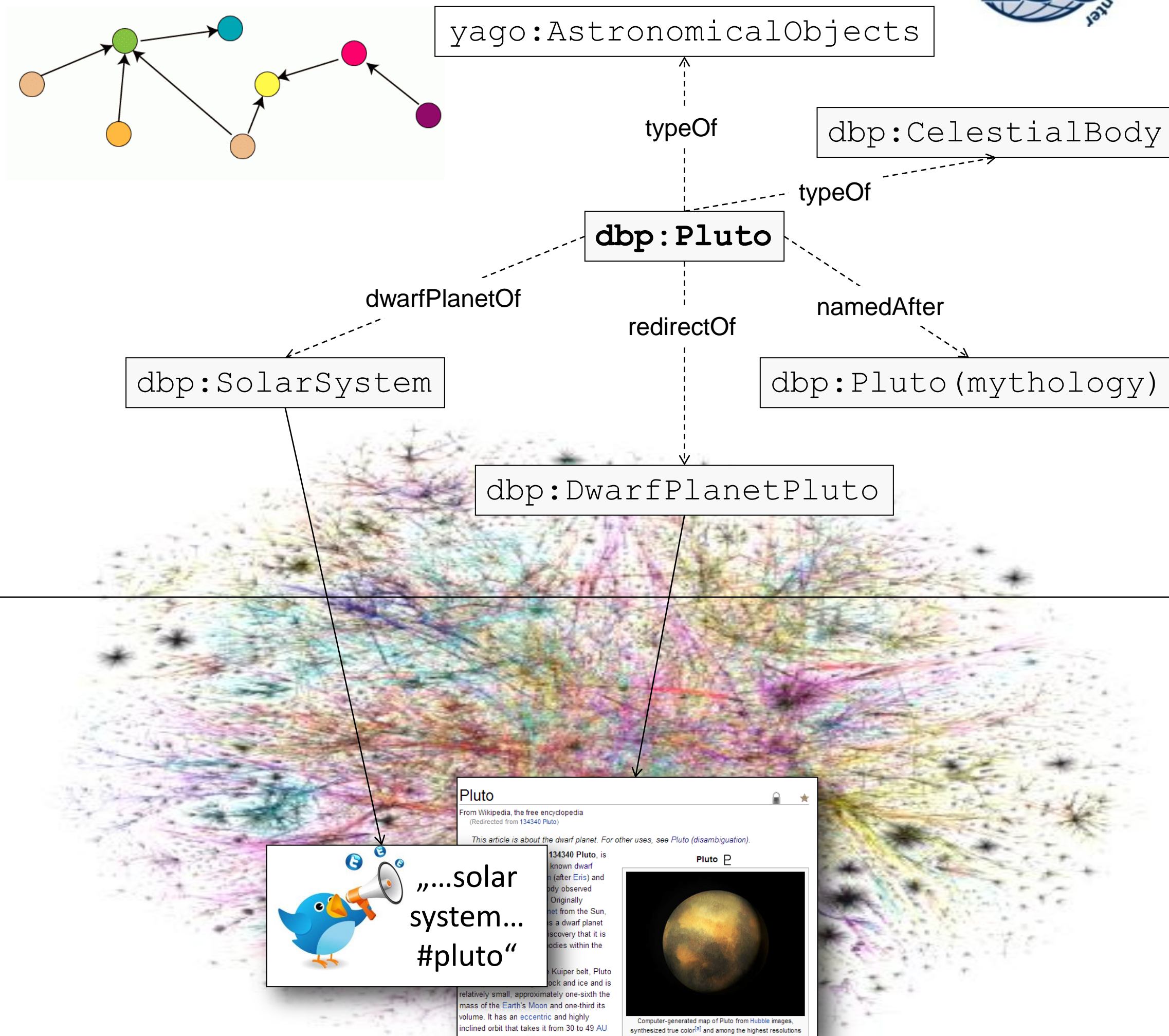
Computer-generated map of Pluto from Hubble images, synthesized true color<sup>[2]</sup> and among the highest resolutions.



# “A little semantics goes a long way” (J. Hendler<sup>1</sup>)

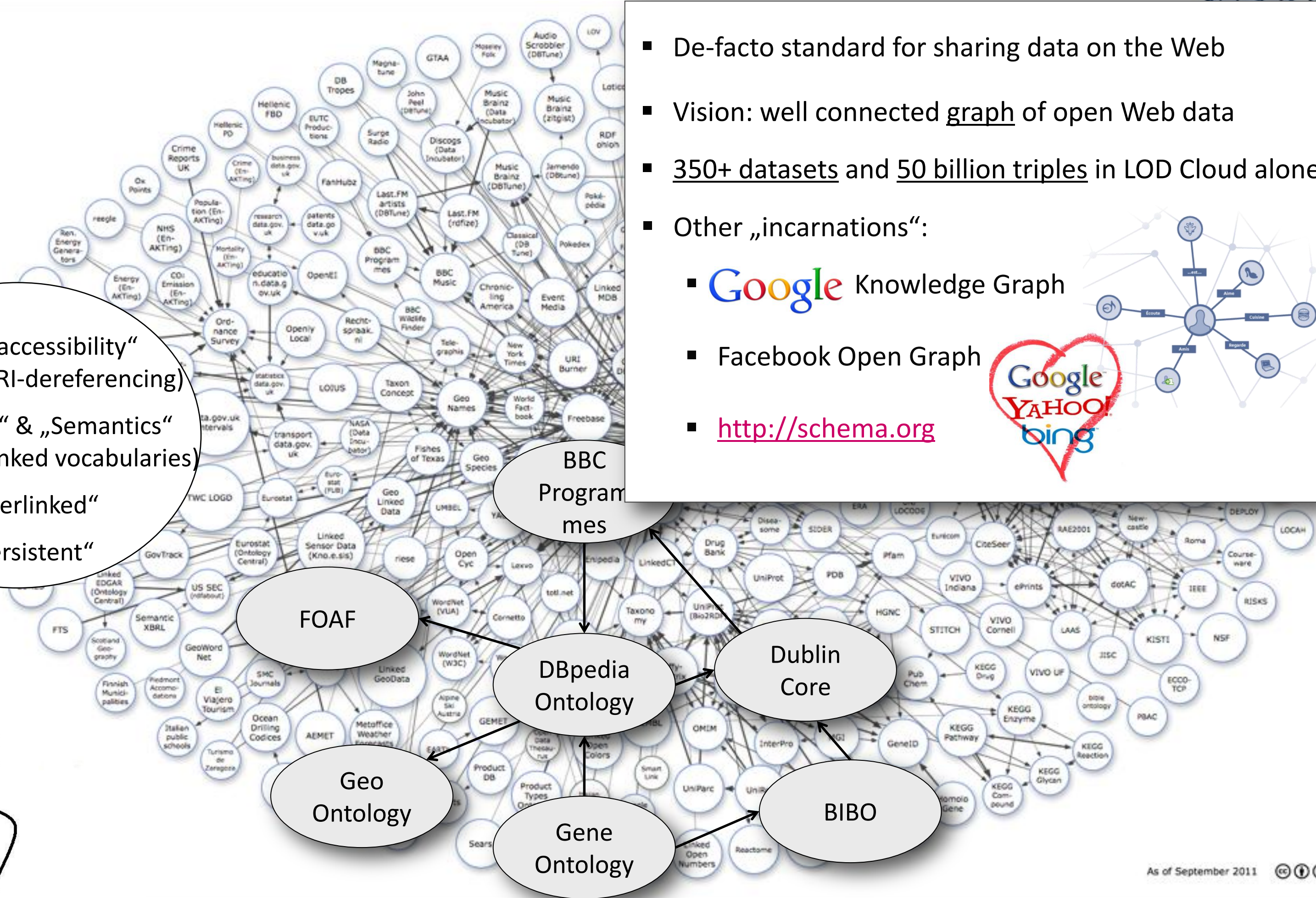
## Semantic Web

- Adding meaning through shared vocabularies and schemas (eg DBpedia)
- W3C standards RDF & SPARQL for data & knowledge representation and querying
- Persistent URIs to reference & interlink data on the Web

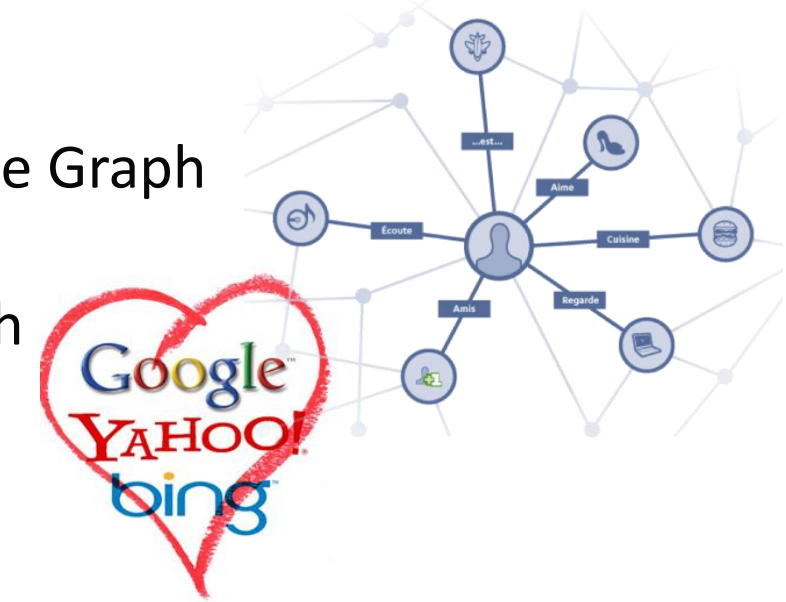


<sup>1</sup> Hendler, J., The Dark Side of the Semantic Web, IEEE Intelligent Systems, Jan/Feb 2007

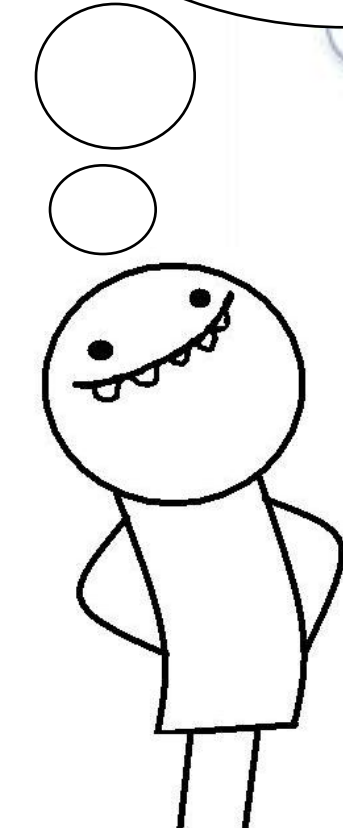
# Semantic Web / Linked Data



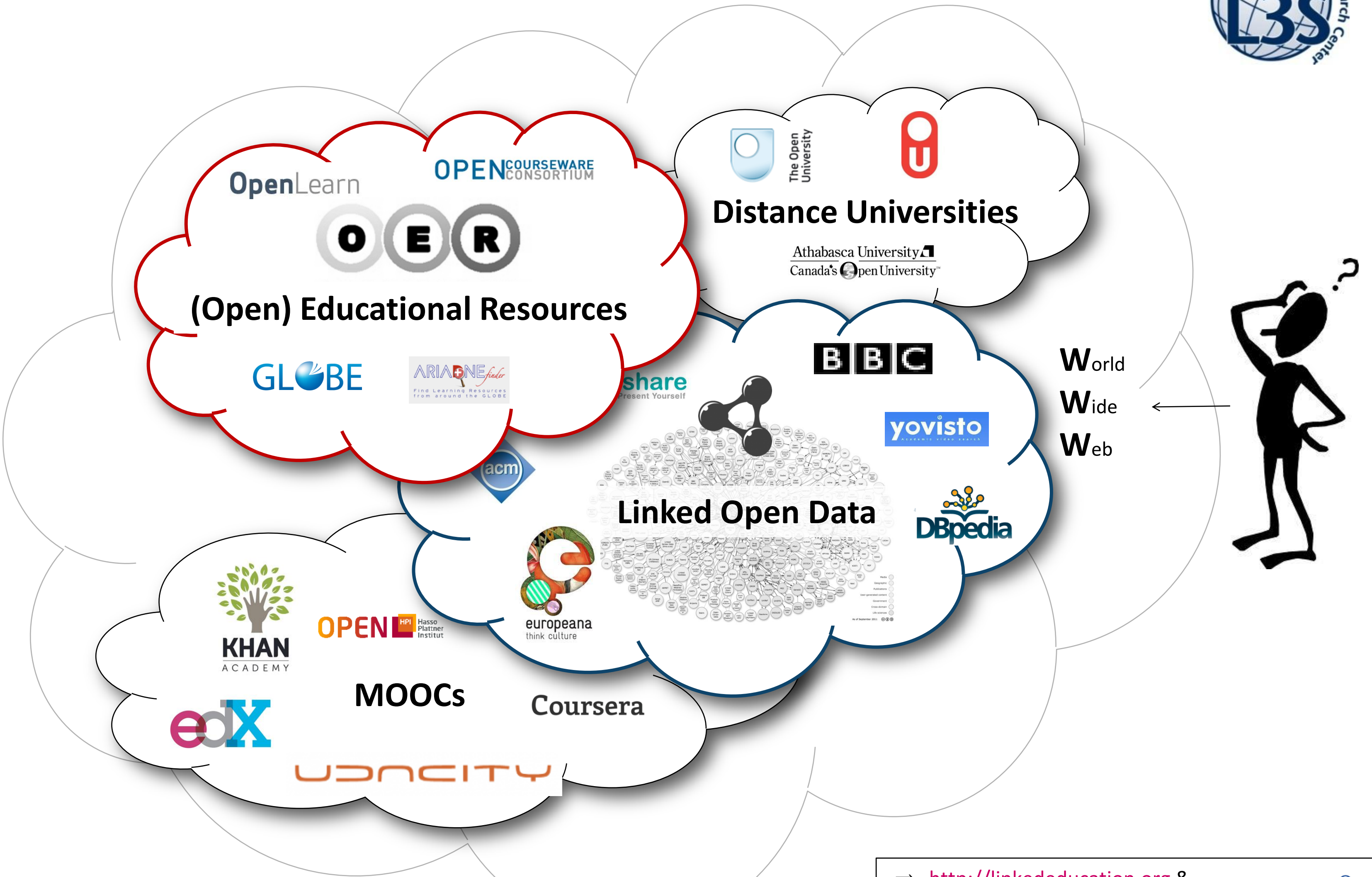
- De-facto standard for sharing data on the Web
- Vision: well connected graph of open Web data
- 350+ datasets and 50 billion triples in LOD Cloud alone
- Other „incarnations“:
  - Google Knowledge Graph
  - Facebook Open Graph
  - <http://schema.org>



- „HTTP-accessibility“ (SPARQL, URI-dereferencing)
- „Structure“ & „Semantics“ (= => shared/linked vocabularies)
  - „Interlinked“
  - „Persistent“



# Actually, how "open" is open educational data?



⇒ <http://linkededucation.org> &

⇒ <http://linkeduniversities.org>





# Educational schemas/vocabularies – a case of „XKCD927“?

<https://xkcd.com/927/>

eg OER schemas, vocabularies, interfaces etc



HOW STANDARDS PROLIFERATE:  
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC)

SITUATION:  
THERE ARE  
14 COMPETING  
STANDARDS.

14?! RIDICULOUS!  
WE NEED TO DEVELOP  
ONE UNIVERSAL STANDARD  
THAT COVERS EVERYONE'S  
USE CASES.

YEAH!



SOON:

SITUATION:  
THERE ARE  
15 COMPETING  
STANDARDS.

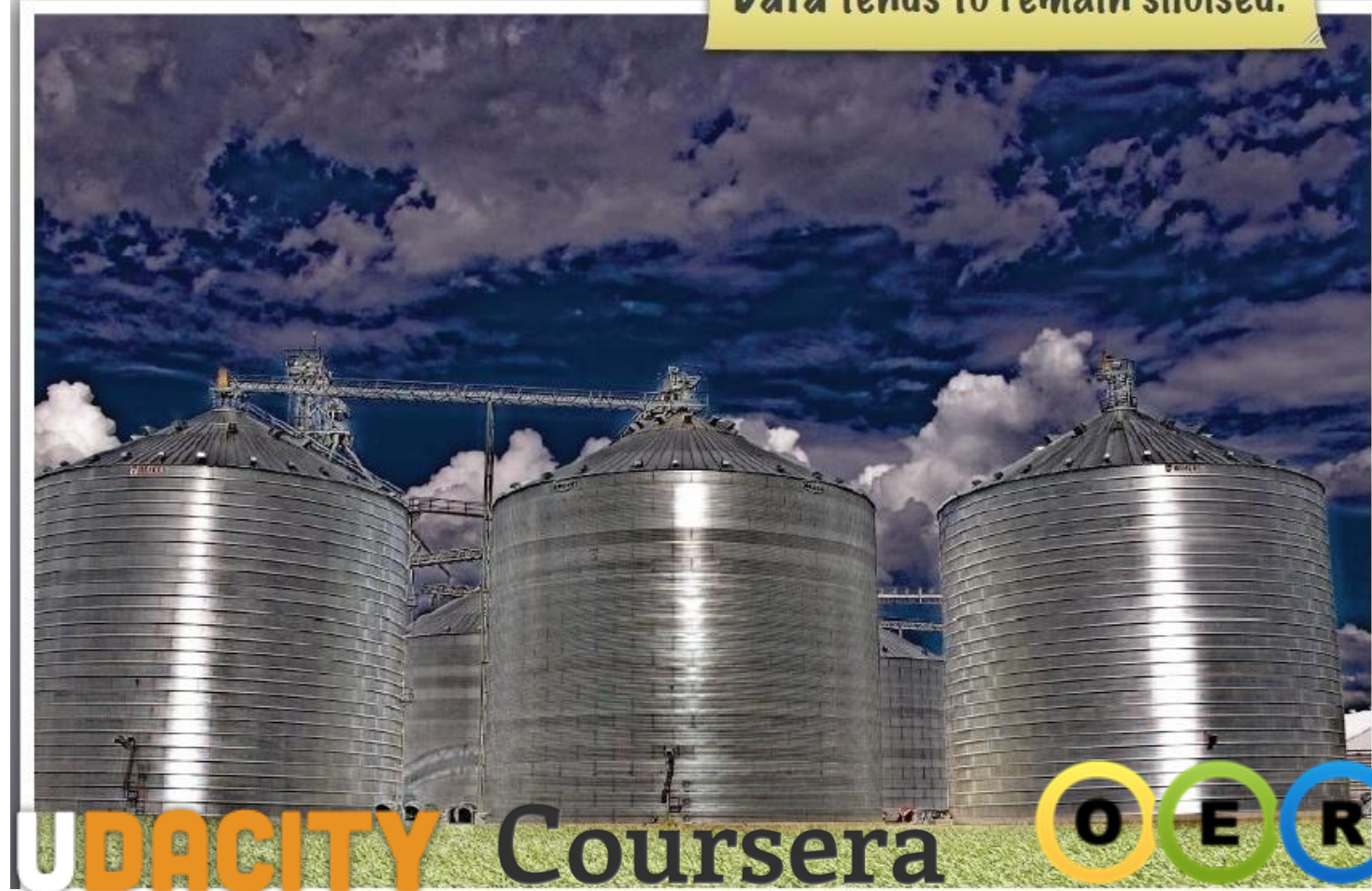
# Actually, how “open” is open educational data?

Just a short while ago...

## Educational Data on the Web

- **Open Educational Resource (OER) metadata & MOOC collections** (e.g. OCW, OpenLearn, Merlot, Coursera)
- **Competing Web interfaces** (e.g. OAI-PMH, SOAP, REST)
- **Competing metadata standards** (e.g. IEEE LOM, ADL SCORM, DC...) & **taxonomies & exchange formats** (JSON, RDF, XML)
- **Issues: heterogeneity & lack of interoperability**

Data tends to remain siloised.



UDACITY

Coursera



OpenLearn

OPEN COURSEWARE CONSORTIUM

COMMONS  
OPEN EDUCATIONAL RESOURCES

# Actually, how “open” is open educational data?

## Educational Data & Linked Data?

### Educational Data on the Web

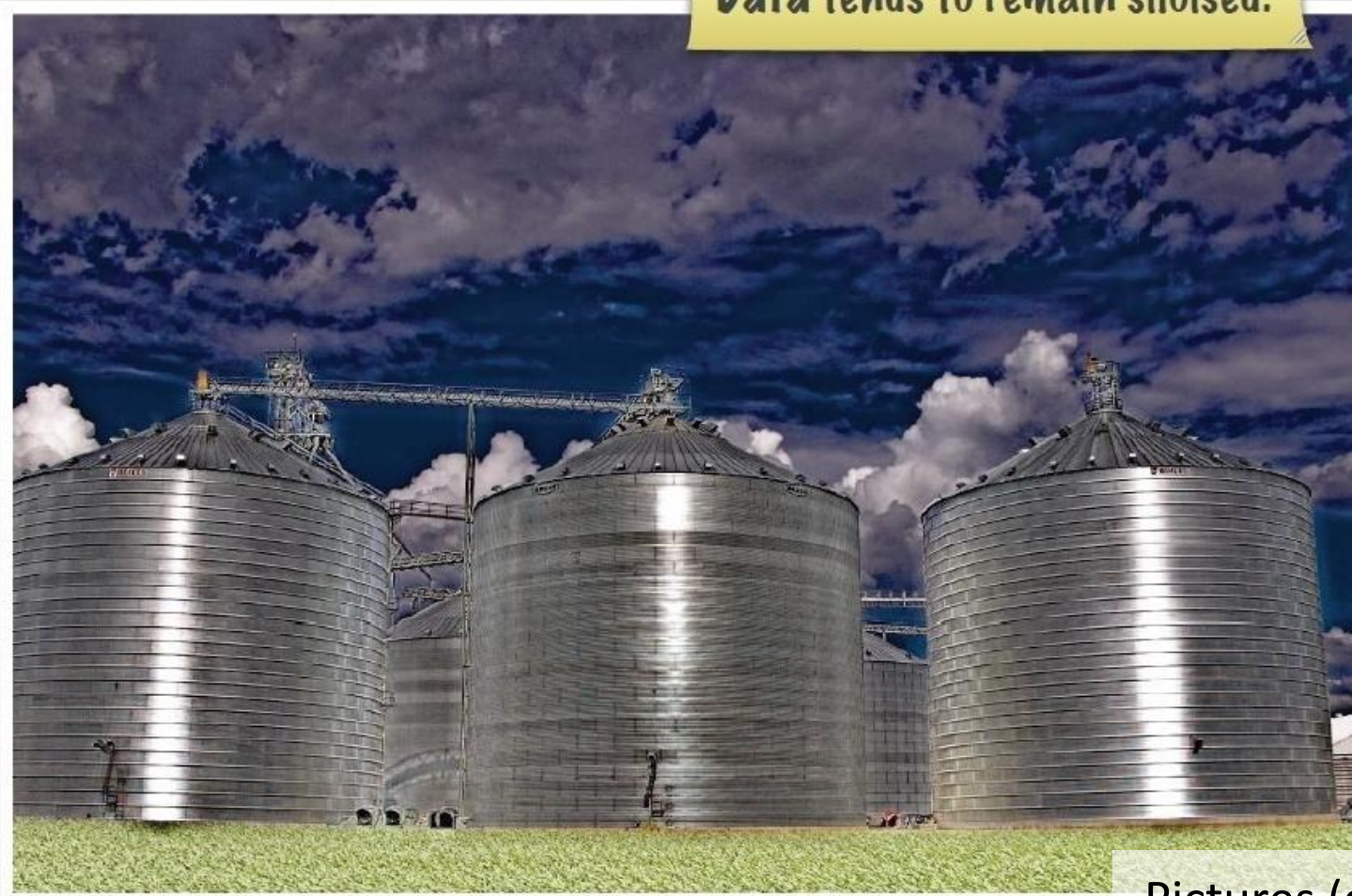
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### Linked (Open) Data

- **Vision: well connected graph of open Web data**
- **W3C standards** (RDF, SPARQL) to expose data, URIs to interlink datasets
- **Linking of schemas, vocabularies, data => interoperability**

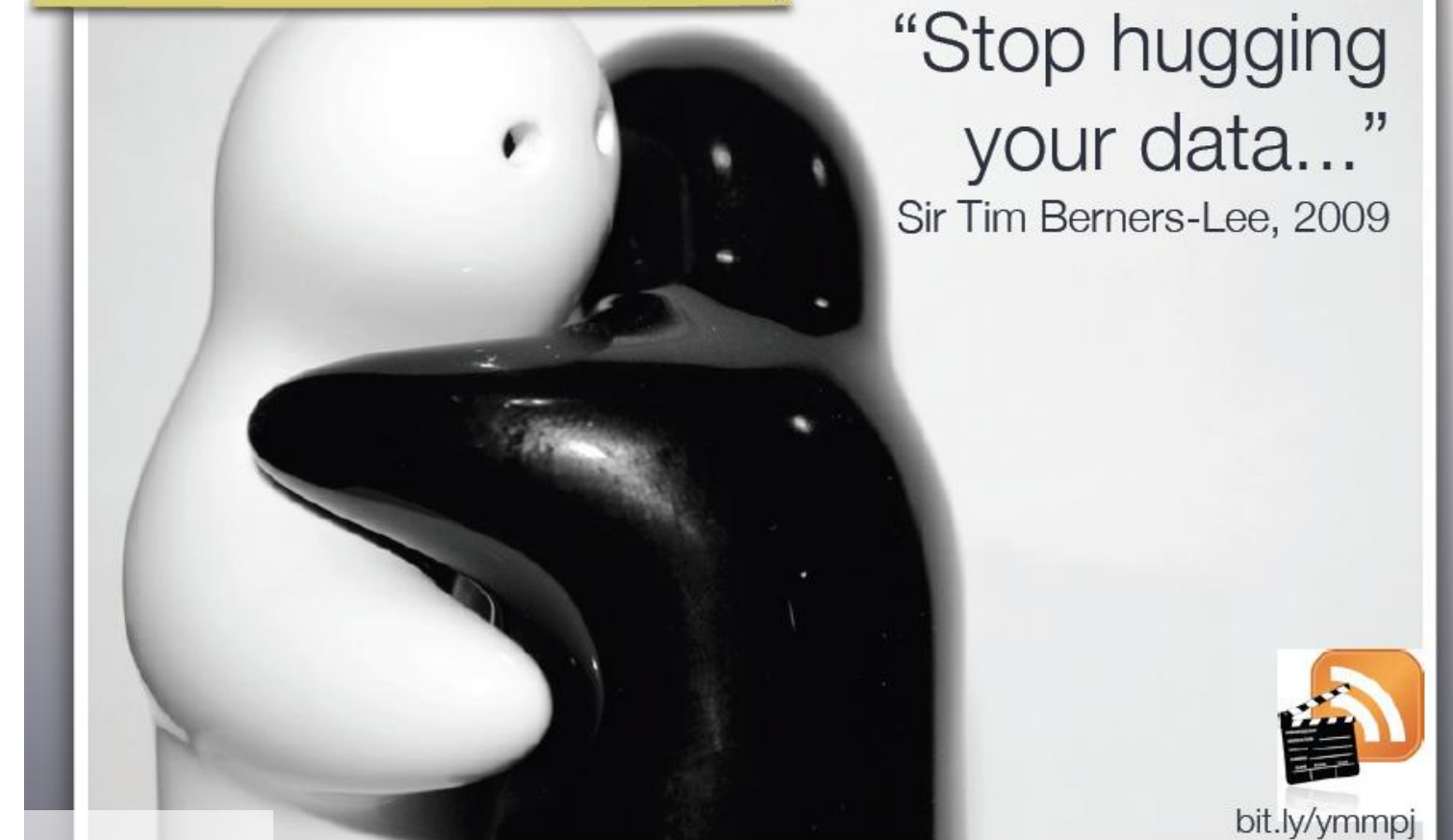


Data tends to remain siloed.



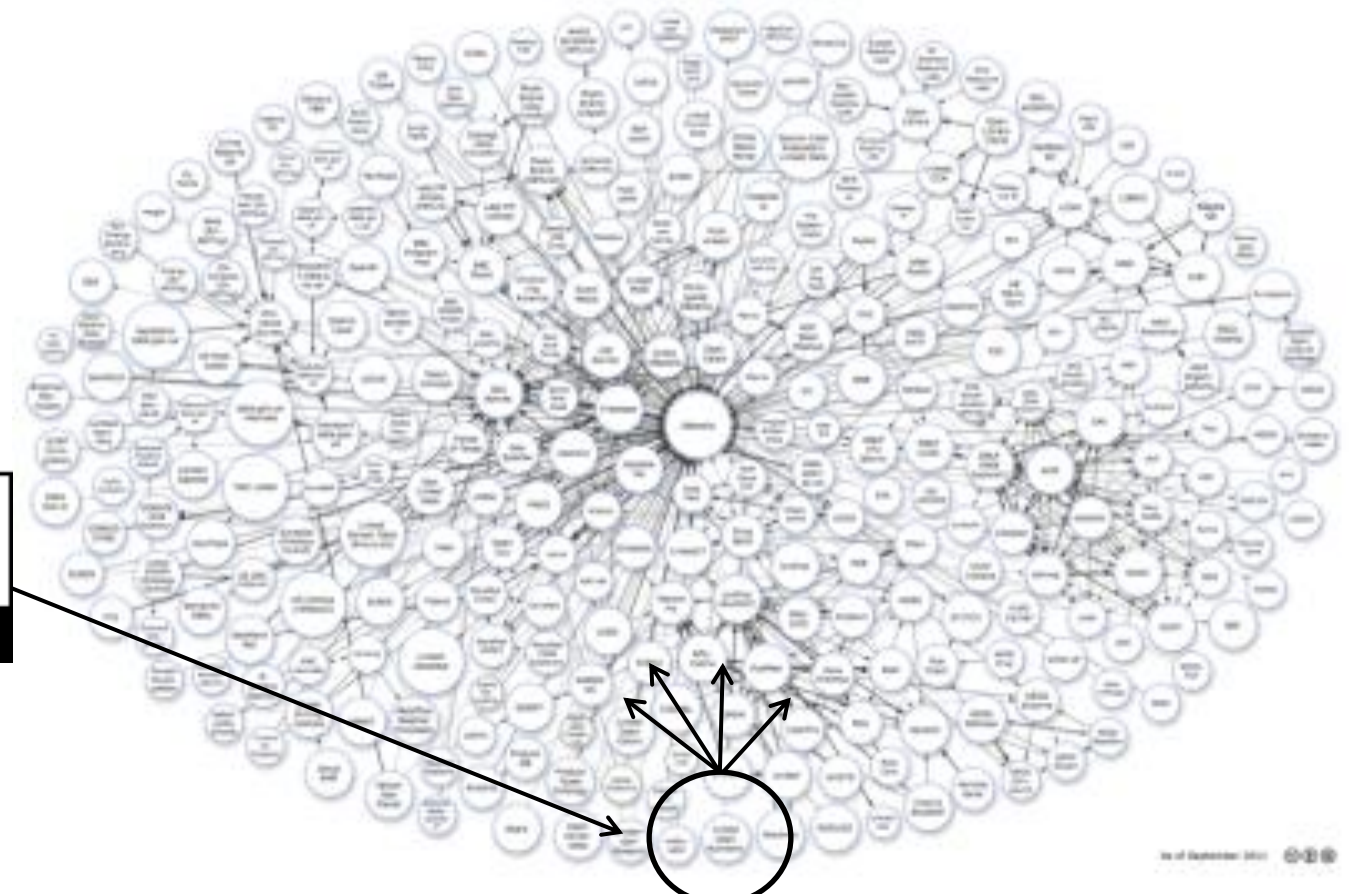
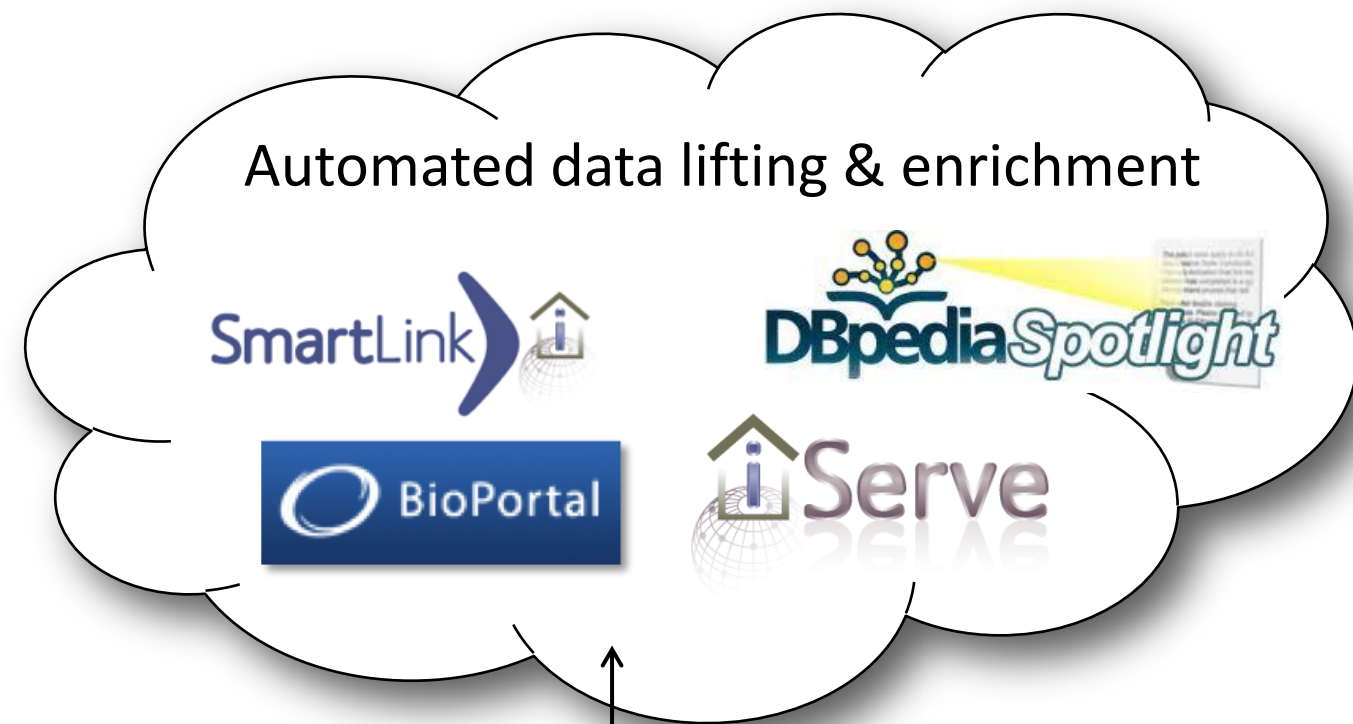
Pictures (c) by Paul Miller

wider movement towards 'Open' Data

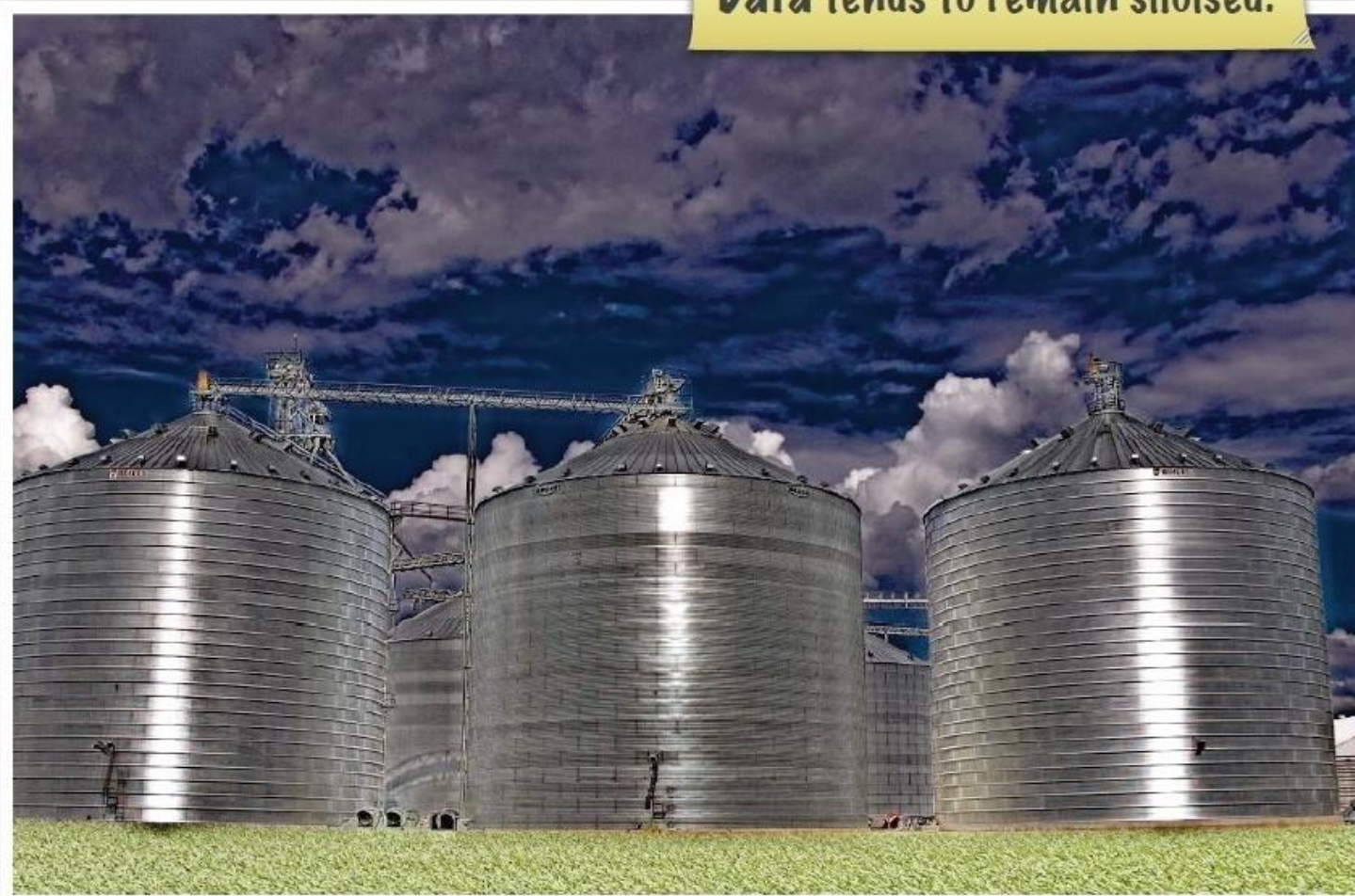


# A shorter while ago

## Bringing OER into the LOD landscape



Data tends to remain siloed.



**meducator**  
world wide med

- <http://datahub.io/dataset/meducator>
- Manually curated and automatically exported & enriched OER from variety of sources
- > 35000 triples so far
- > enrichments to DBpedia & Bioportal ontologies
- APIs used by several applications

# Using LD in (medical) educational applications

http://metamorphosis.med.duth.gr

## Recommending educational resources across repositories



The screenshot shows the metamorphosis+ website interface. At the top, there is a navigation bar with the site logo, a search bar containing 'ECG', and a 'LOGOUT' button. Below the navigation bar is a dark blue bar with various icons representing user profile, search, and social features. The main content area is titled 'Search for educational resources' and shows search results for 'ECG'. The results are displayed in a table format with columns for resource details and metadata. A callout box on the right side of the image contains text explaining the use of LD for integrating educational resources from various repositories.

Using LD for integrating educational resources from range of universities and OER repositories (eg Open Learn, Open Courseware etc)

Title:	Author(s):	Added by:	License:	Resource creation date:	Metadata creation date:	Resource language:	Metadata language:
Complete heart block	Alan Rice	Evangelia Mitsopoulou	Attribution-Non-Commercial-No-Derivatives	2010-01-01	2010-06-15	English	English
Complete heart block Repurposed	Alan Rice	Evangelia Mitsopoulou	Attribution-Non-Commercial-Share-Alike	2010-01-01	2010-06-14	English	English
ECG Patient case 1001 chest and limb leads	Timo Kuusi	Jarkko Mylläri	Attribution-Non-Commercial-Share-Alike	2010-04-19	2010-04-27	[unspecified]	English
ECG Patient case 1001 description	Timo Kuusi	Jarkko Mylläri	Attribution-Non-Commercial-Share-Alike	2010-04-19	2010-04-27	English	English

# “Structured” descriptions of OER?

http://metamorphosis.med.duth.gr



```
<mdc:Resource rdf:about="http://pu
<mdc:identifier>
  http://www.med.helsinki.fi/tuke/r
</mdc:identifier>
<mdc:title> Patient case 1012 viral infections and HPV </mdc:title>
<mdc:rights rdf:resource="http://purl.org/meducator/licenses/Attribution-Non-Comm
<mdc:metadataLanguage>English</mdc:metadataLanguage>
```

Metadata of educational resource (virtual patient) lifted into RDF

Search for educational resources

New search Search by: "ECG"

Search type: *basic* [close this search]  
Search by: ECG

The search returned: 38 results. Displaying results from 1 to 10. Sort by: [title](#)  
Page: 1 2 3 4

Title:	Complete heart block	Resource creation date:	2010-01-01
Author(s):	Alan Rice	Metadata creation date:	2010-06-15
Added by:	Evangelia Mitsopoulou	Resource language:	English
License:	Attribution-Non-Commercial-No-Derivatives	Metadata language:	English
<a href="#">View resource profile</a>   <a href="#">Add to favorites</a>			
Title:	Complete heart block Repurposed	Resource creation date:	2010-01-01
Author(s):	Alan Rice	Metadata creation date:	2010-06-14
Added by:	Evangelia Mitsopoulou	Resource language:	English
License:	Attribution-Non-Commercial-Share-Alike	Metadata language:	English
<a href="#">View resource profile</a>   <a href="#">Add to favorites</a>			
Title:	ECG Patient case 1001 chest and limb leads	Resource creation date:	2010-04-19
Author(s):	Timo Kuusi	Metadata creation date:	2010-04-27
Added by:	Jarkko Mylläri	Resource language:	[unspecified]
License:	Attribution-Non-Commercial-Share-Alike	Metadata language:	English
<a href="#">View resource profile</a>   <a href="#">Add to favorites</a>			
Title:	ECG Patient case 1001 description	Resource creation date:	2010-04-19
Author(s):	Timo Kuusi	Metadata creation date:	2010-04-27
Added by:	Jarkko Mylläri	Resource language:	English
License:	Attribution-Non-Commercial-Share-Alike	Metadata language:	English
<a href="#">View resource profile</a>   <a href="#">Add to favorites</a>			

# Making sense of (medical) educational resources


```
<mdc:Resource rdf:about="http://purl.org/meducator/resources/25a8c581-66d7-4186-9...>
  <mdc:identifier>
    http://www.med.helsinki.fi/tuke/meducator/Kansio_1004/Patient%201004.pdf
  </mdc:identifier>
  <mdc:title> Patient case 1012 viral infections and HPV </mdc:title>
  <mdc:rights rdf:resource="http://purl.org/meducator/licenses/Attribution-Non-Comm...>
  <mdc:metadataLanguage>English</mdc:metadataLanguage>
```

## HPV (disambiguation)

From Wikipedia, the free encyclopedia

HPV may refer to:

- Human papillomavirus, a virus which causes warts
- Human Powered Vehicle, a land, water, or air vehicle
- High Production Volume Chemicals
- Hypoxic pulmonary vasoconstriction, a medical condition
- Health Purchasing Victoria
- Hepatic portal vein



WIKIPEDIA The Free Encyclopedia

Article Talk

Wiki Loves Monuments

### Hepatic portal vein

From Wikipedia, the free encyclopedia

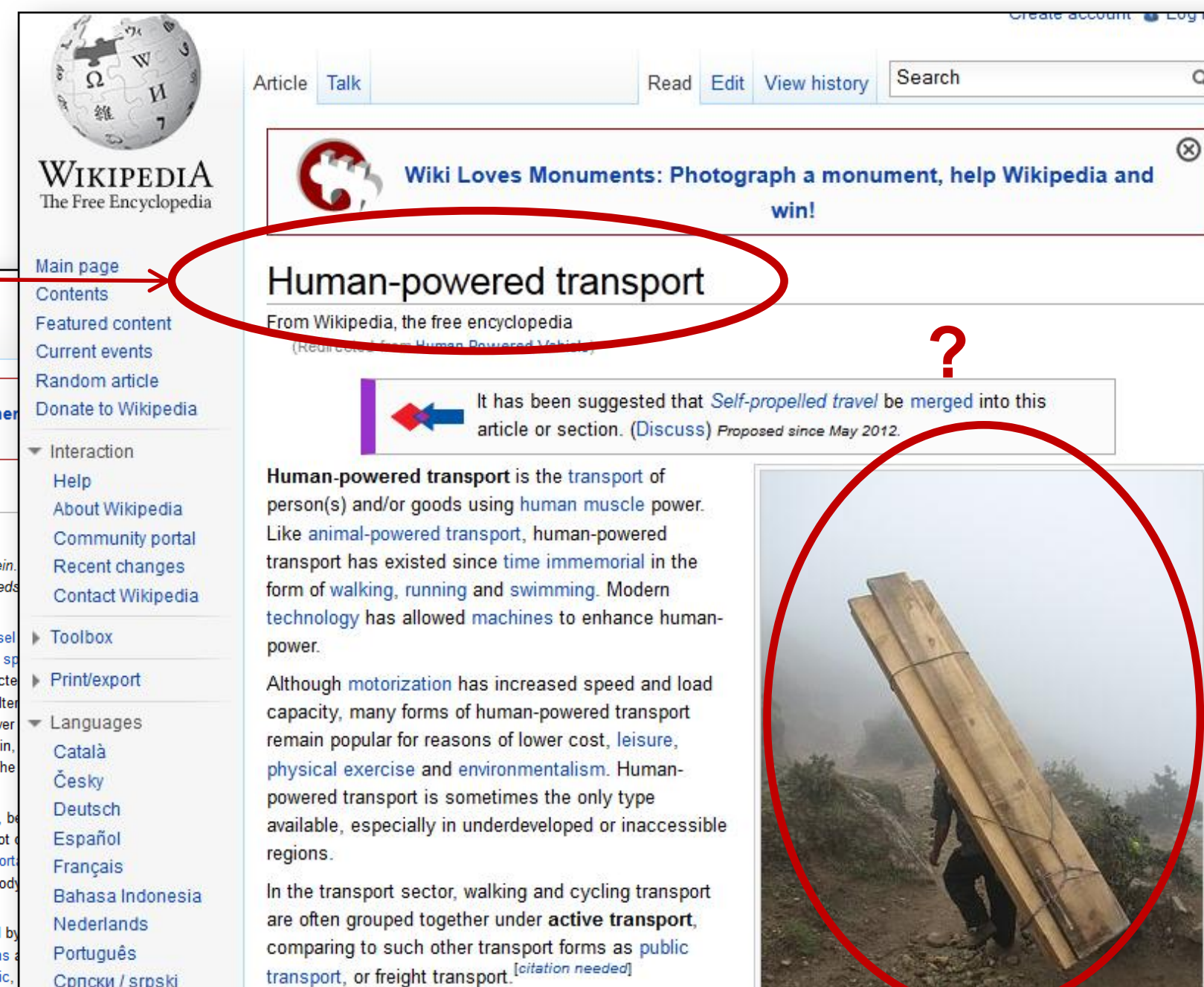
*This page is the redirect for portal vein, which connects two systems of capillary beds in the body.*

The **hepatic portal vein** is a blood vessel that carries blood from the gastrointestinal tract and spleen to the liver. The blood is rich in nutrients that were extracted from the food. The liver processes these nutrients; it also filters out toxins that have been ingested with the food. The liver then sends the blood through the hepatic portal vein, which joins the inferior vena cava, to the heart in the hepatic veins.

The hepatic portal vein is not a true vein, but a portal vein. It carries blood to capillary beds in the liver and not to the rest of the body. It is a major component of the hepatic portal system, which is one of the two portal venous systems in the body. The other is the hypophyseal portal system.

The hepatic portal vein is usually formed by the union of the superior mesenteric and splenic veins. It carries blood from the inferior mesenteric, gastric, and pancreaticoduodenal veins.

Conditions involving the hepatic portal vein cause considerable morbidity and mortality.



WIKIPEDIA The Free Encyclopedia

Article Talk

Read Edit View history Search

Wiki Loves Monuments: Photograph a monument, help Wikipedia and win!

### Human-powered transport

From Wikipedia, the free encyclopedia


(Redirected from Human Powered Vehicle)

It has been suggested that *Self-propelled travel* be merged into this article or section. (Discuss) Proposed since May 2012.

**Human-powered transport** is the transport of person(s) and/or goods using human muscle power. Like animal-powered transport, human-powered transport has existed since time immemorial in the form of walking, running and swimming. Modern technology has allowed machines to enhance human power.

Although motorization has increased speed and load capacity, many forms of human-powered transport remain popular for reasons of lower cost, leisure, physical exercise and environmentalism. Human-powered transport is sometimes the only type available, especially in underdeveloped or inaccessible regions.

In the transport sector, walking and cycling transport are often grouped together under **active transport**, comparing to such other transport forms as public transport, or freight transport.<sup>[*citation needed*]</sup>



# Adding semantics to OER descriptions



```

- <mdc:Resource rdf:about="http://purl.org/meducator/resources/25a8c581-66d7-4186-9
- <mdc:identifier>
  http://www.med.helsinki.fi/tuke/meducator/Kansio_1004/Patient%201004.pdf
</mdc:identifier>
<mdc:title>Patient case 1012 viral infections and HPV </mdc:title>
<mdc:rights rdf:resource="http://purl.org/meducator/licenses/Attribution-Non-Comm
<mdc:metadataLanguage>English</mdc:metadataLanguage>
  
```

Entity recognition (NER)  
& disambiguation, via



## HPV (disambiguation)

From Wikipedia, the free encyclopedia

HPV may refer to:

- Human papillomavirus, a virus which causes warts
- Human Powered Vehicle, a land, water or air vehicle powered by a person
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WIKIPEDIA  
The Free Encyclopedia

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Main page  
Contents  
Featured content  
Current events  
Random article  
Donate to Wikipedia

## Human papillomavirus

From Wikipedia, the free encyclopedia

"HPV" redirects here. For other uses, see HPV (disambiguation).  
The *Papillomavirus* article describes the general biological features of human and animal papillomaviruses.

---

**About: Human papillomavirus**

An Entity of Type : [disease](#), from Named Graph : <http://dbpedia.org>, within Data Space : [dbpedia.org](#)

---

Human papillomavirus (HPV) is a virus from the papillomavirus family that is capable of infecting humans. Like all papillomaviruses, HPVs establish productive infections only in keratinocytes of the skin or mucous membranes. While the majority of the known types of HPV cause no symptoms in most people, some types can cause warts (verrucae), while others can – in a minority of cases – lead to cancers of the cervix, vulva, vagina, penis, oropharynx and anus.

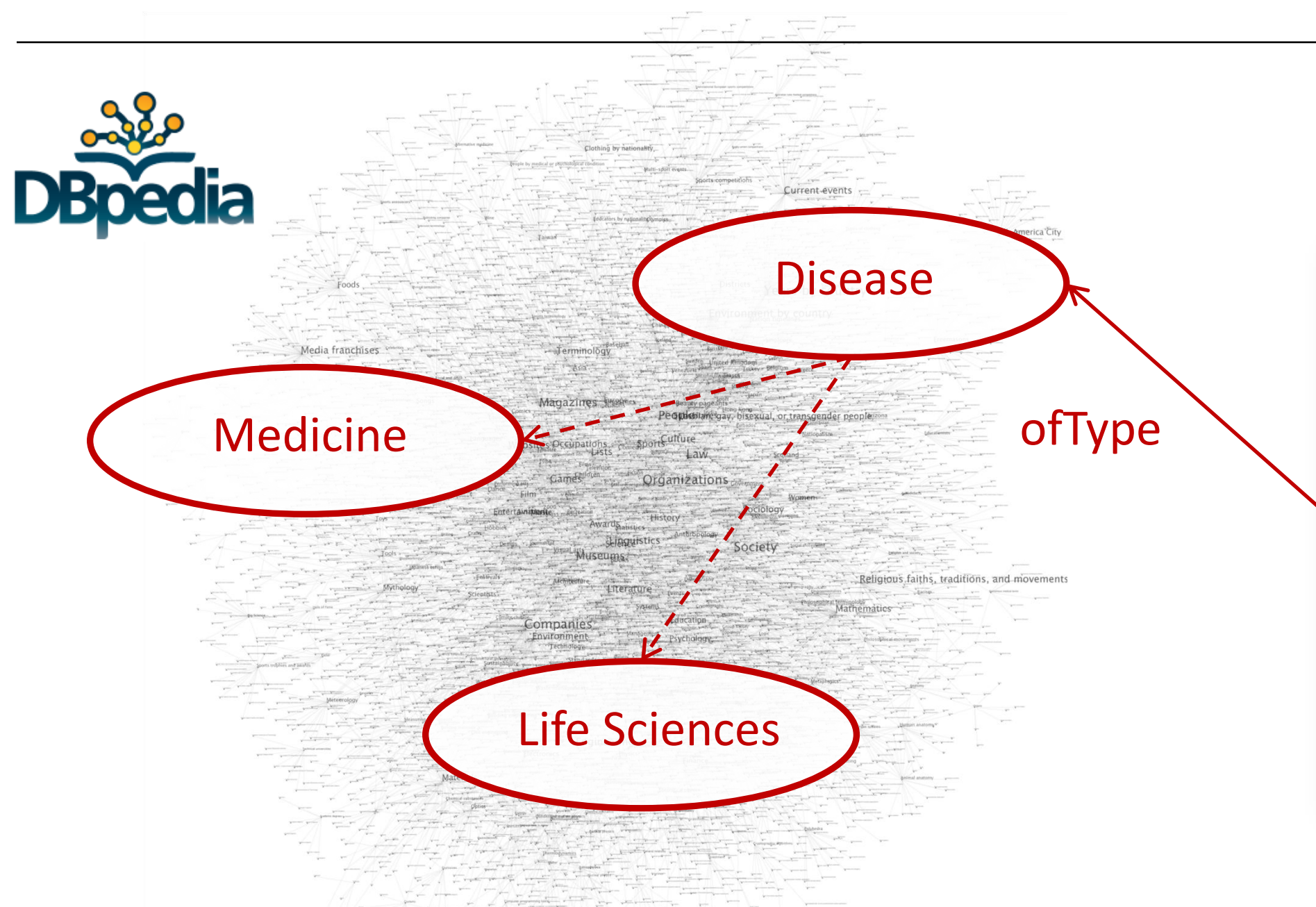
Property	Value
dbpedia-owl:abstract	<ul style="list-style-type: none"> <li>• Virus del papil·loma humà (VPH) és una expressió genèrica que designa els virus que infecten la pell i mucoses a humans i altres animals. Poden provocar càncer de coll uterí, càncer de gola i alguns tipus de càncer. Es transmet per contacte directe genitals i alguns tipus de càncer. Es transmet per contacte directe genitals i alguns tipus de càncer. Es transmet per contacte directe genitals i alguns tipus de càncer. Es transmet per contacte directe genitals i alguns tipus de càncer.</li> <li>• Lidský papilomavirus (ve zkratce HPV z anglického Human papillomavirus)</li> </ul>



# One simple link – lots of knowledge/semantics

```

- <mdc:Resource rdf:about="http://purl.org/meducator/resources/25a8c581-66d7-4186-9
- <mdc:identifier>
  http://www.med.helsinki.fi/tuke/meducator/Kansio_1004/Patient%201004.pdf
</mdc:identifier>
<mdc:title>Patient case 1012 viral infections and HPV </mdc:title>
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```

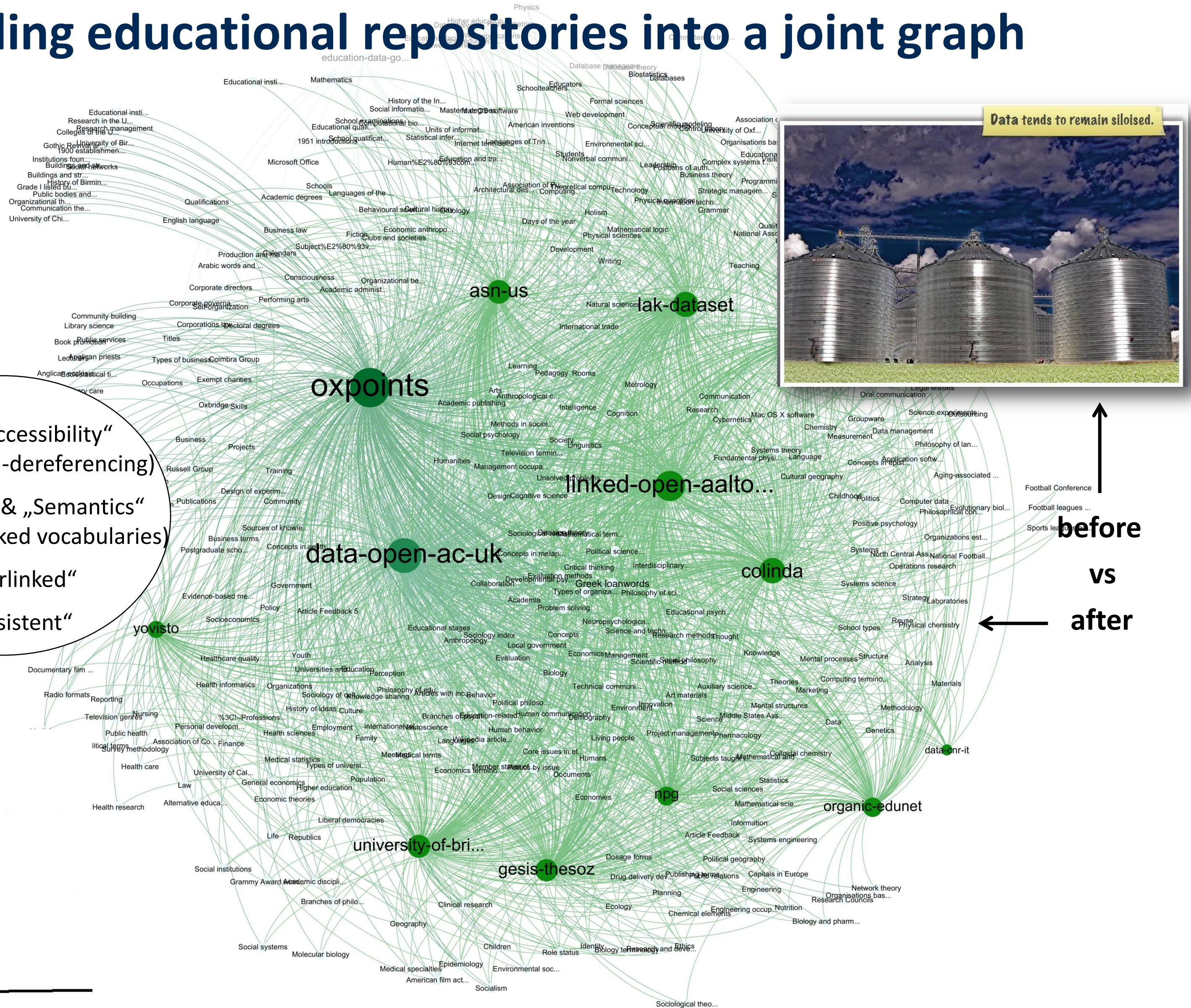


**About: Human papillomavirus**  
 An Entity of Type : [disease](#), from Named Graph : <http://dbpedia.org>, within Data Space : [dbpedia.org](#)

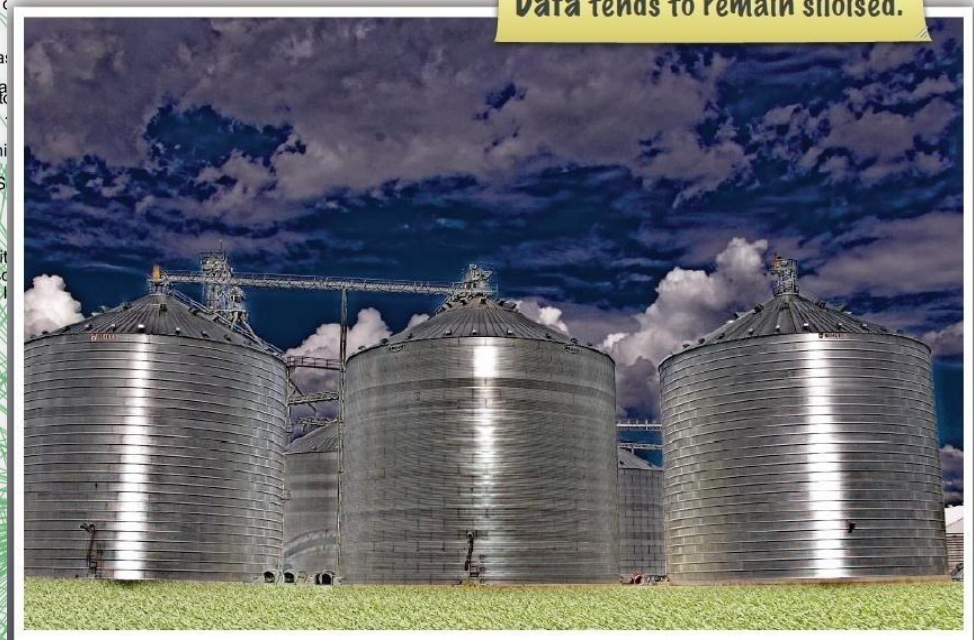
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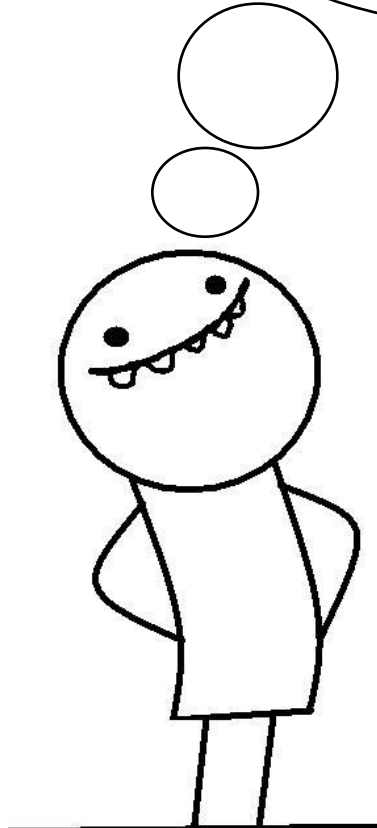
# Embedding educational repositories into a joint graph



Data tends to remain siloed.



- „HTTP-accessibility“ (SPARQL, URI-dereferencing)
- „Structure“ & „Semantics“ (= > shared/linked vocabularies)
  - „Interlinked“
  - „Persistent“



↑  
before  
vs  
← after

# Linked Data for Learning – How is it useful?

## 1. Linked Data for data sharing, enrichment and interpretation

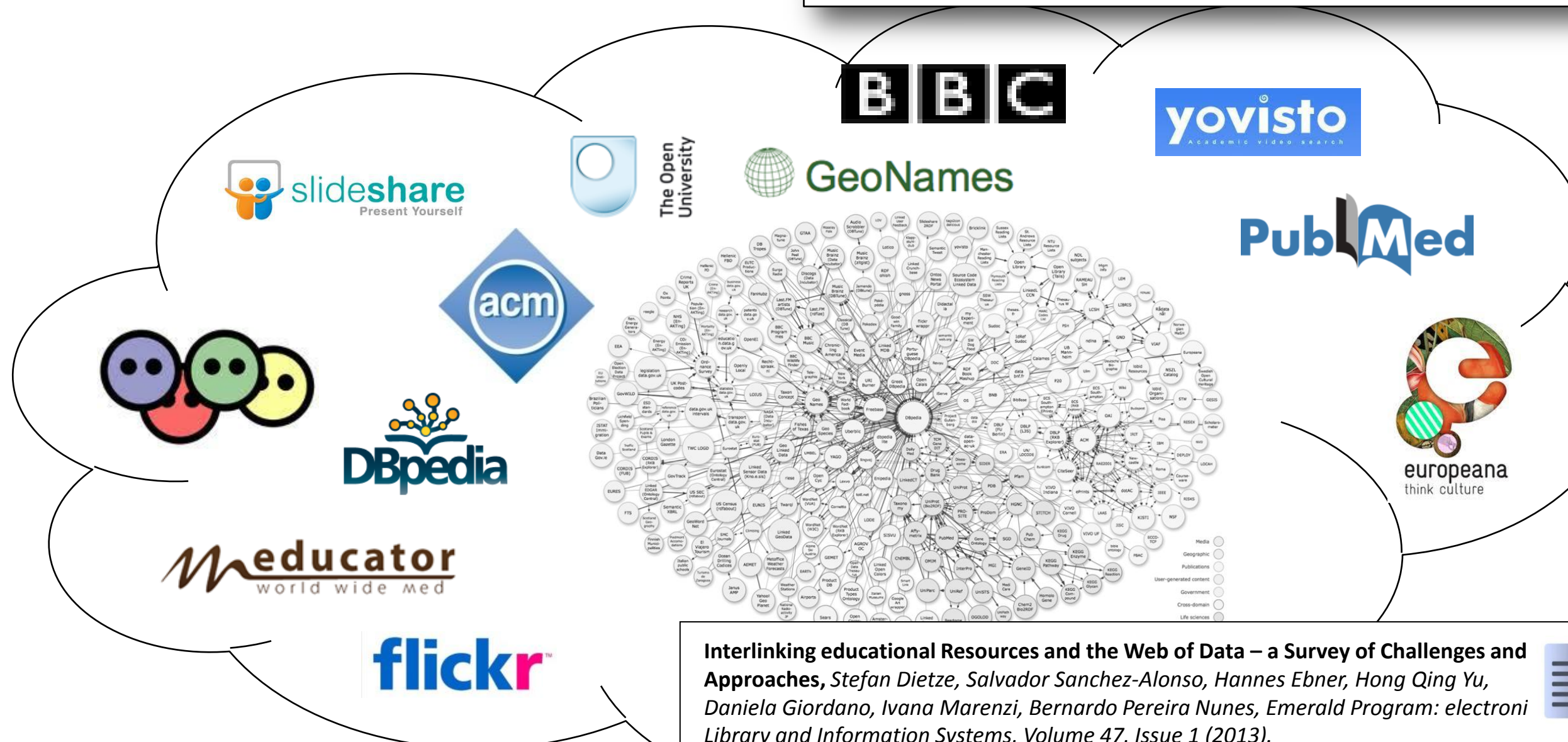
- RDF, SPARQL & shared vocabularies to improve interoperability of learning/user data
- facilitate OER reuse vision across isolated platforms

## 2. Linked Data as body of knowledge for learning & education

- Vast amount of publicly available resources and data
- Dedicated OER and university data + „knowledge resources“ (from DBpedia to Slideshare)

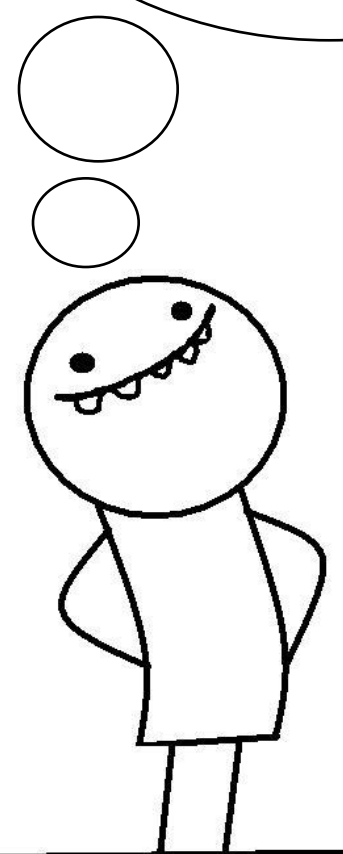
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⇒ <http://linkeduniversities.org>



**Interlinking educational Resources and the Web of Data – a Survey of Challenges and Approaches**, Stefan Dietze, Salvador Sanchez-Alonso, Hannes Ebner, Hong Qing Yu, Daniela Giordano, Ivana Marenzi, Bernardo Pereira Nunes, Emerald Program: electronic Library and Information Systems, Volume 47, Issue 1 (2013).

**Linked Data for Open and Distance Learning**, Mathieu d'Aquin, report for the Common Wealth of Learning,



# “LinkedUp” – Linking Web Data (for Education)

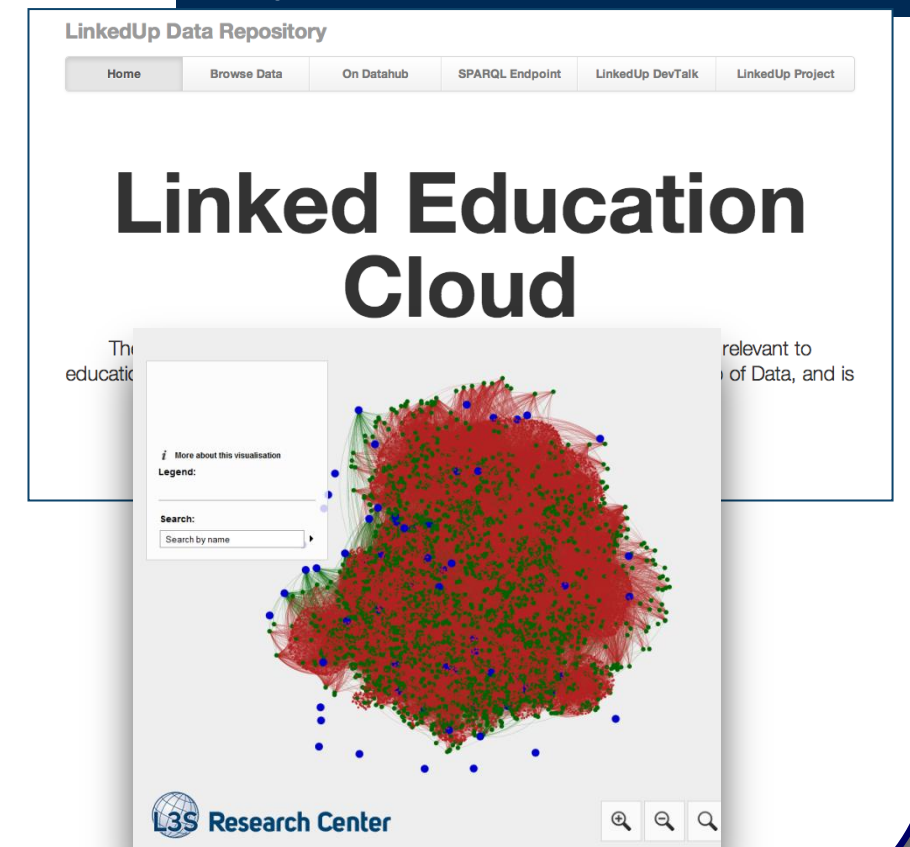
European project aimed at advancing take-up of open data and related technologies

<http://linkedup-project.eu>

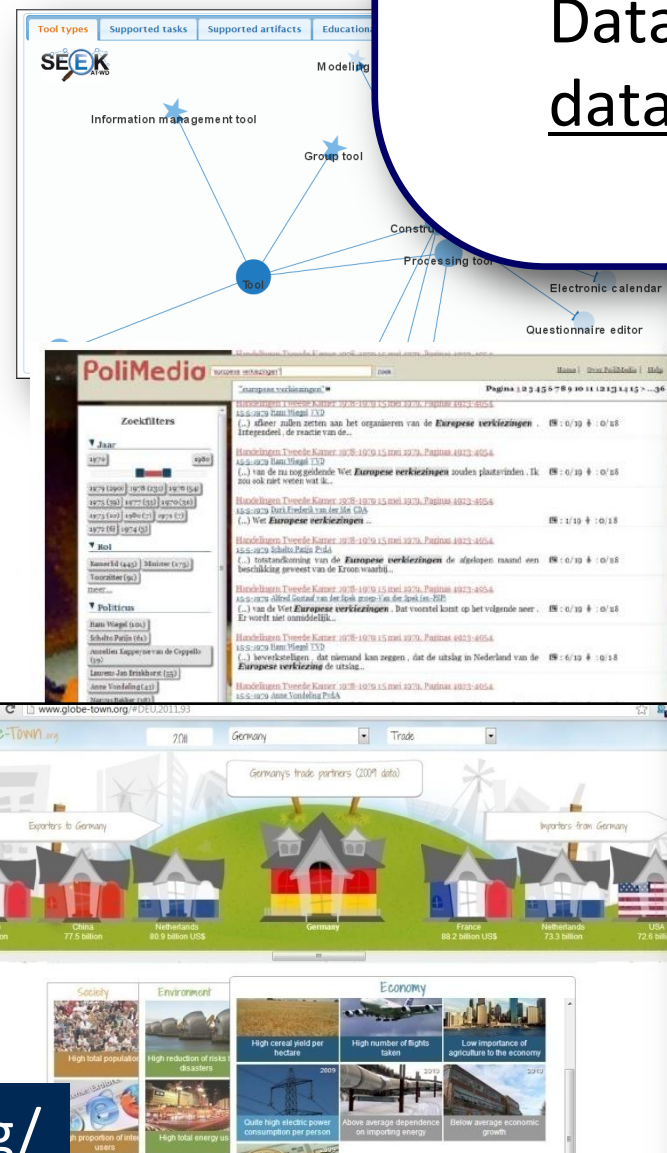
## Data curation & profiling

- Collecting & exposing open data of educational relevance => LinkedUp Data Catalog
- Profiling and linking of Web Data => profiles of educational datasets

<http://data.linkededucation.org>



## „Success models“: data & applications



- LinkedUp Challenge to identify innovative tools & applications
- Evaluation methods and approaches



<http://www.linkedup-challenge.org/>

## Technology transfer & community-building

- Disseminating knowledge & building communities (educators, computer scientists, data engineers)
- Gathering stakeholder feedback: use cases, and requirements



<http://linkedup-project.eu/events>

<http://linkedup-challenge.org/#usecases>

# Who we are



## LinkedUp Advisory Board



Sören Auer - University of Leipzig, Germany



Balaji Venkataraman - Commonwealth of Learning, Canada



Dan Brickley - Google, United Kingdom



Philippe Cudre-Mauroux - EPFL, Switzerland

## LinkedUp Network

## LinkedUp Consortium



Athabasca University  
Canada's Open University



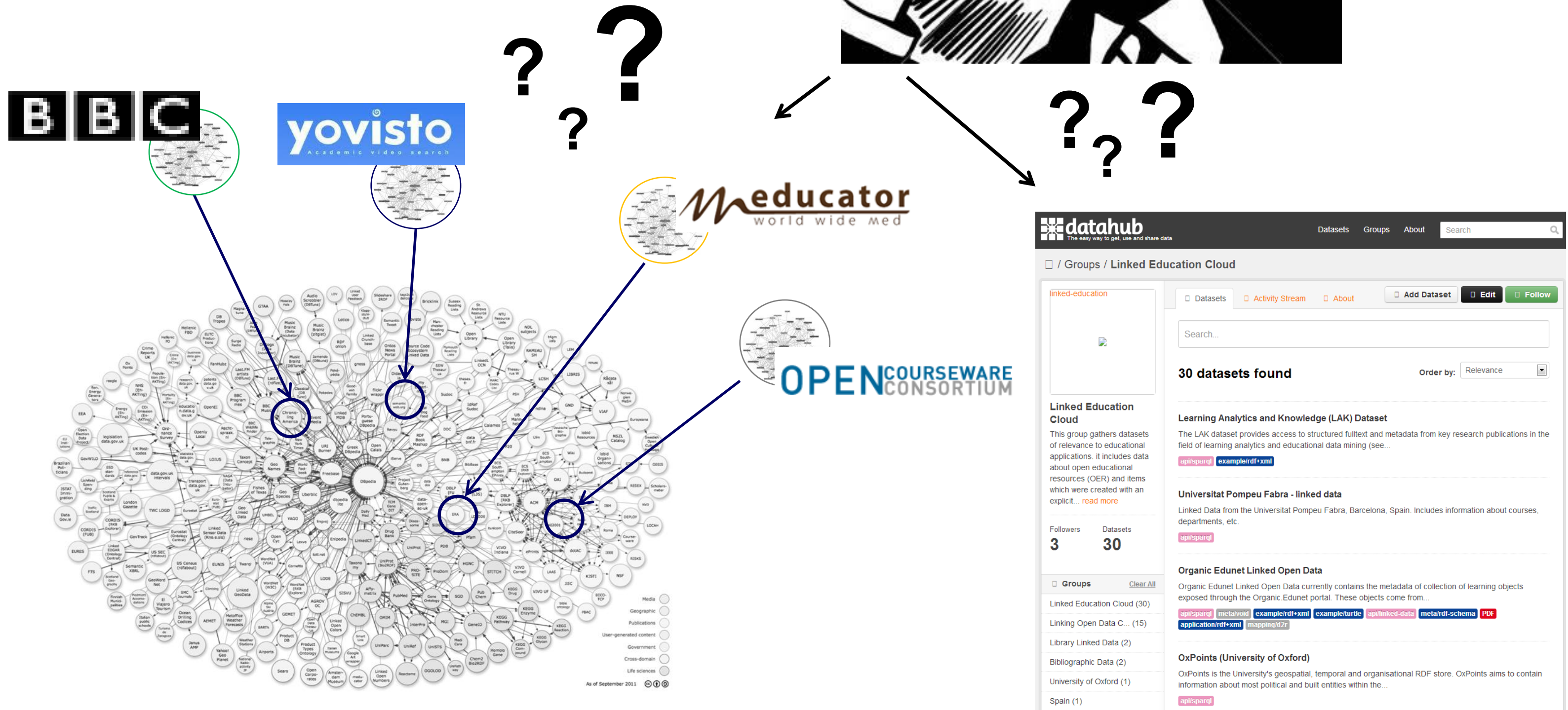
UNIVERSITÄT LEIPZIG



Stefan Dietze

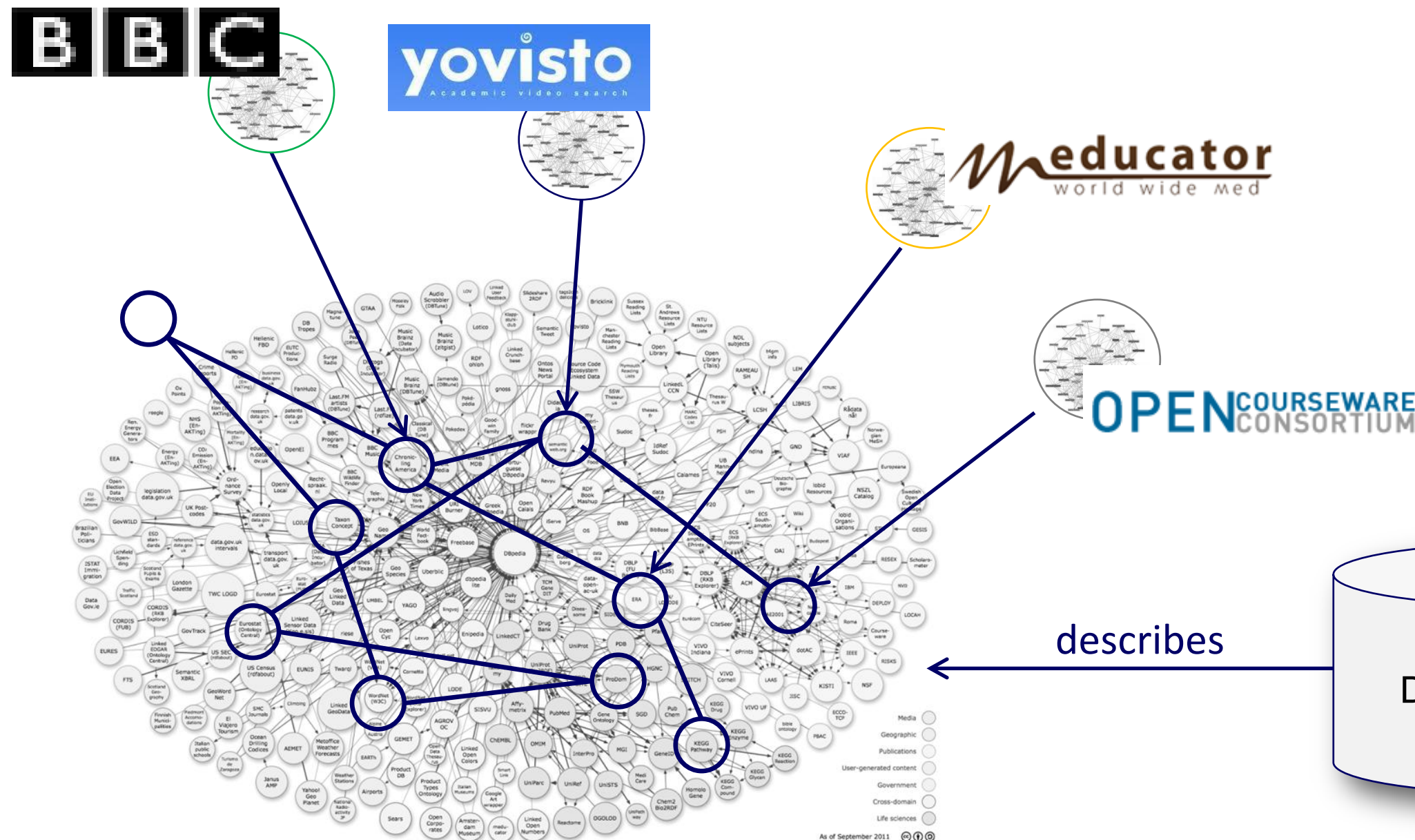
# Too many/diverse datasets, too little information

- Which datasets are **useful & trustworthy** for case XY (eg „learning about the solar system“)?
- Which **topics** (eg „Astronomy“) are covered?
- Accessibility/reliability?
- Which datasets **describe/offer videos** (slides, publications, statistics etc)?

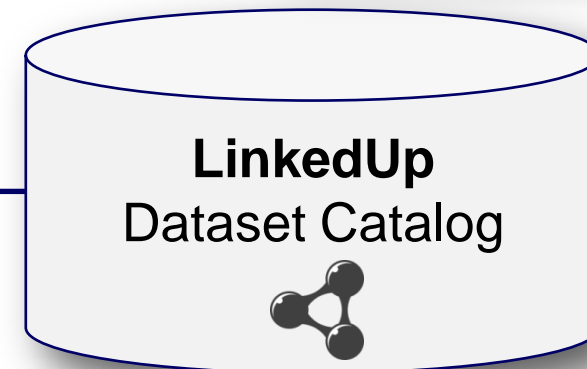


# Curating a catalog of data for education

- Which datasets are **useful & trustworthy** for case XY (eg „learning about the solar system“)?
- Which **topics** (eg „Astronomy“) are covered?
- Accessibility/reliability?
- Which datasets **describe/offer videos** (slides, publications, statistics etc)?



- **Catalog of data (LinkedUp Catalog):** classification of datasets according to resource types, disciplines/topics, data quality, accessibility, etc
- Infrastructure for **distributed/federated querying**

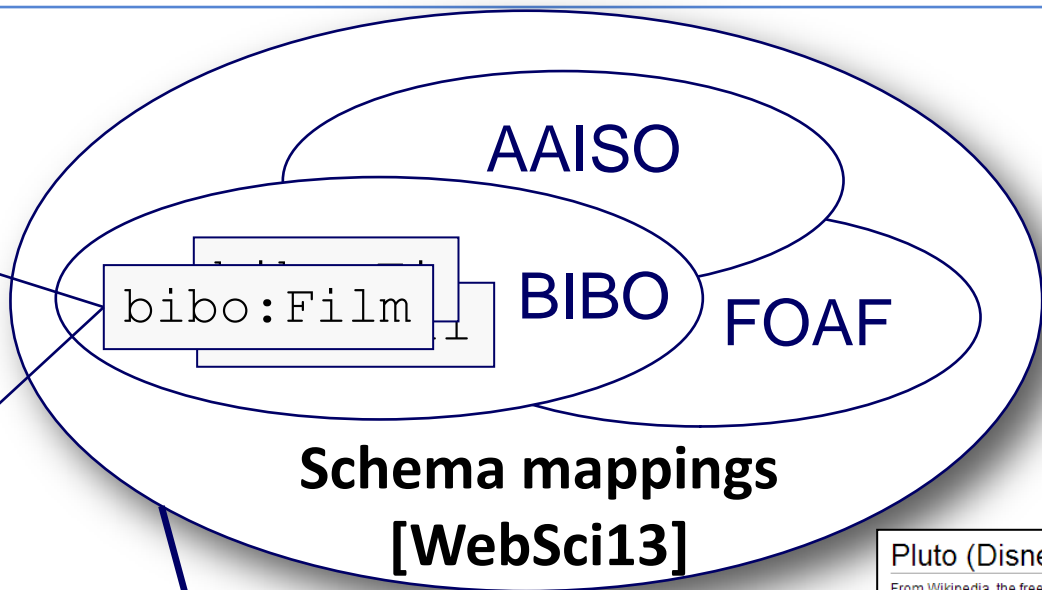


describes

# Building a registry for educational datasets

```

    po:Programme
    BBC Programme
    <po:Programme ...>
    <po:Series>Wonders of the Solar System</..>
    <po:Actor>Brian Cox</...>
    </po:Programme...>
  
```



contains

```

    yov:Video
    Yovisto Video
    <yo:Video ...>
    <dc:title>Pluto & the Dwarf Planets</dc:title>
    ...
    </yo:Video...>
  
```



**Entity disambiguation & linking [ESWC13]**

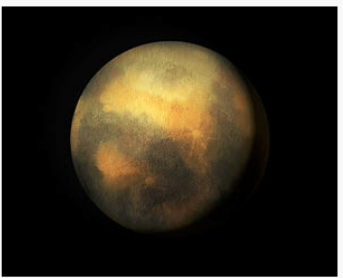
**Pluto**  
From Wikipedia, the free encyclopedia  
(Redirected from 134340 Pluto)

*This article is about the dwarf planet. For other uses, see Pluto (disambiguation).*

**Pluto**

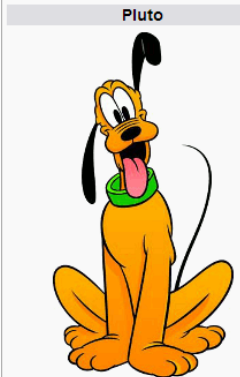
**Pluto**, formal designation **134340 Pluto**, is the second-most-massive known dwarf planet in the **Solar System** (after *Eris*) and the tenth-most-massive body observed directly orbiting the Sun.<sup>[a]</sup> Originally classified as the ninth planet from the Sun, Pluto was reclassified as a dwarf planet and plutoid owing to the discovery that it is only one of several large bodies within the Kuiper belt.<sup>[a]</sup>

Like other members of the Kuiper belt, Pluto is composed primarily of rock and ice and is relatively small, approximately one-sixth the mass of the Earth's Moon and one-third its volume. It has an eccentric and highly inclined orbit that takes it from 30 to 49 AU



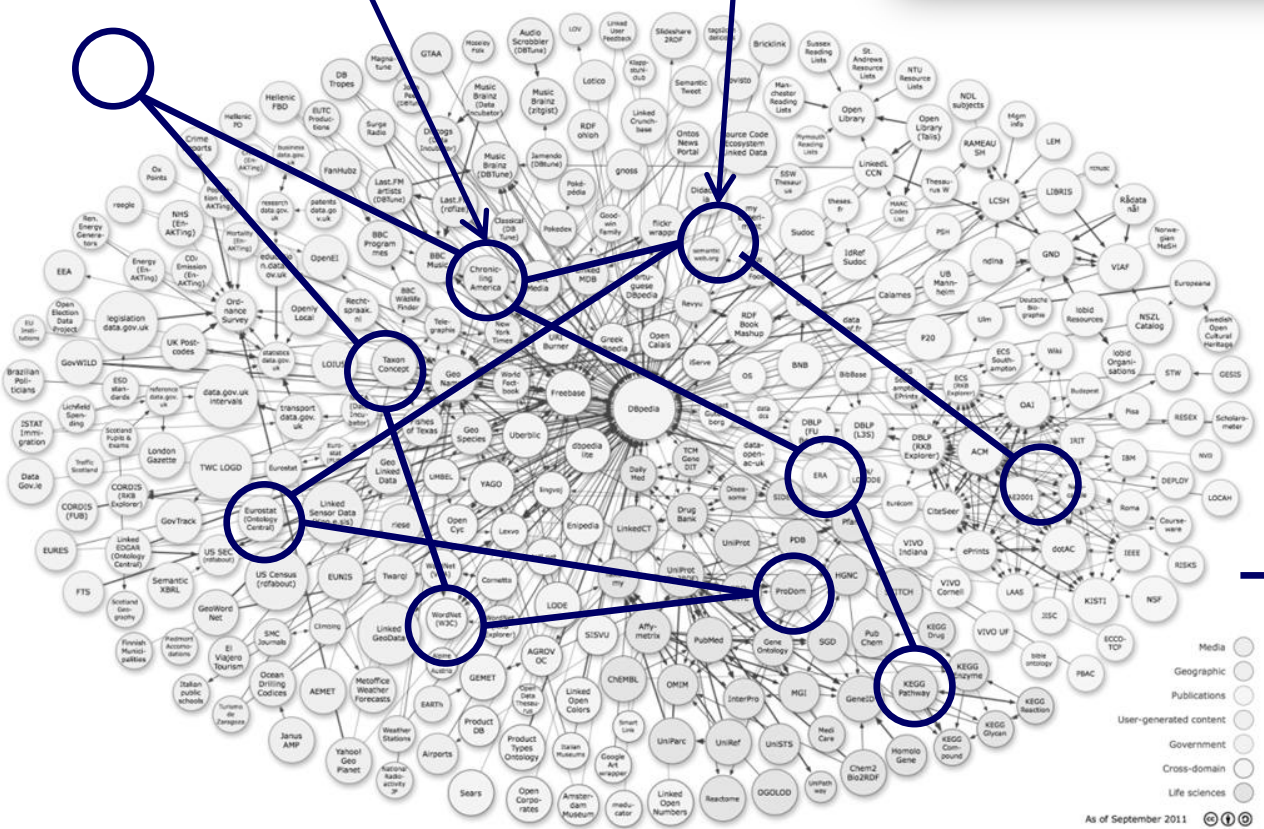
**Pluto (Disney)**  
From Wikipedia, the free encyclopedia

**Pluto**, also called **Pluto the Pup**, is a cartoon character created in 1930 by Walt Disney Productions. He is



**Pluto**

First appearance: The Chain Gang (1930) (unnamed), The Picnic (1930) (as Pluto)

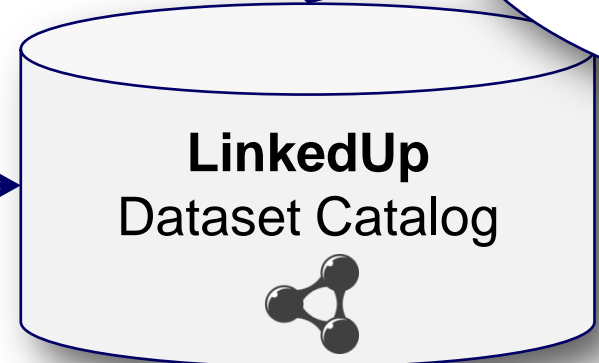


`db:Astro.Objects`

`db:Astronomy`

**Topic profile extraction [WWW13, ESCW14]**

**Dataset Metadata**





- RDF (VOID) dataset catalog: browse & query distributed datasets & mappings
- Live information about endpoint accessibility
- Federated queries using type mappings

LinkedUp Data Repository

Home Browse Data On Datahub SPARQL Endpoint LinkedUp DevTalk LinkedUp Project

# Linked Education Cloud

data.open.ac.uk, Linked Data from the Open University

<http://data.open.ac.uk/query>

(see larger graph)

LinkedUp Data Repository

Home Browse Data On Datahub SPARQL Endpoint LinkedUp DevTalk LinkedUp Project

## Learning Analytics and Knowledge (LAK) Dataset

<http://data.linkededucation.org/request/lak-conference/sparql>

The LAK dataset provides access to structured fulltext and metadata from key research publications in the field of learning analytics and educational data mining (see <http://www.solaresearch.org/resources/lak-dataset/> for details).

License	Responding	More info	Graphs	Classes	Properties
other-open	No	<a href="http://www.solaresearch.org/resources/lak-dataset/">http://www.solaresearch.org/resources/lak-dataset/</a>			

### Topics

Academic disciplines **Academic institutions** Academic institutions by type Accreditation Applied disciplines Applied mathematics **Applied sciences** Architectural elements Artificial intelligence Branches of philosophy Cognitive neuroscience Cognitive science Computer data Computer science **Computing** Consciousness Data Data management Decorative arts Digital technology **Education** Education by subject **Educational assessment and evaluation** Educational organizations Epistemology Evaluation Government Information Information science Information technology management Innovation Inquiry Interdisciplinary fields Knowledge Knowledge sharing Learning Limbic system Mathematical sciences Mental content Methodology Observation Performing arts Philosophy Philosophy of mind Problem solving Project management Research **School accreditors** Science Science studies **Scientific disciplines** Social sciences Society Statistics Systems science Technology **Universities and colleges by type** Universities by country Universities in England Value

Graphs, Classes and URI Patterns

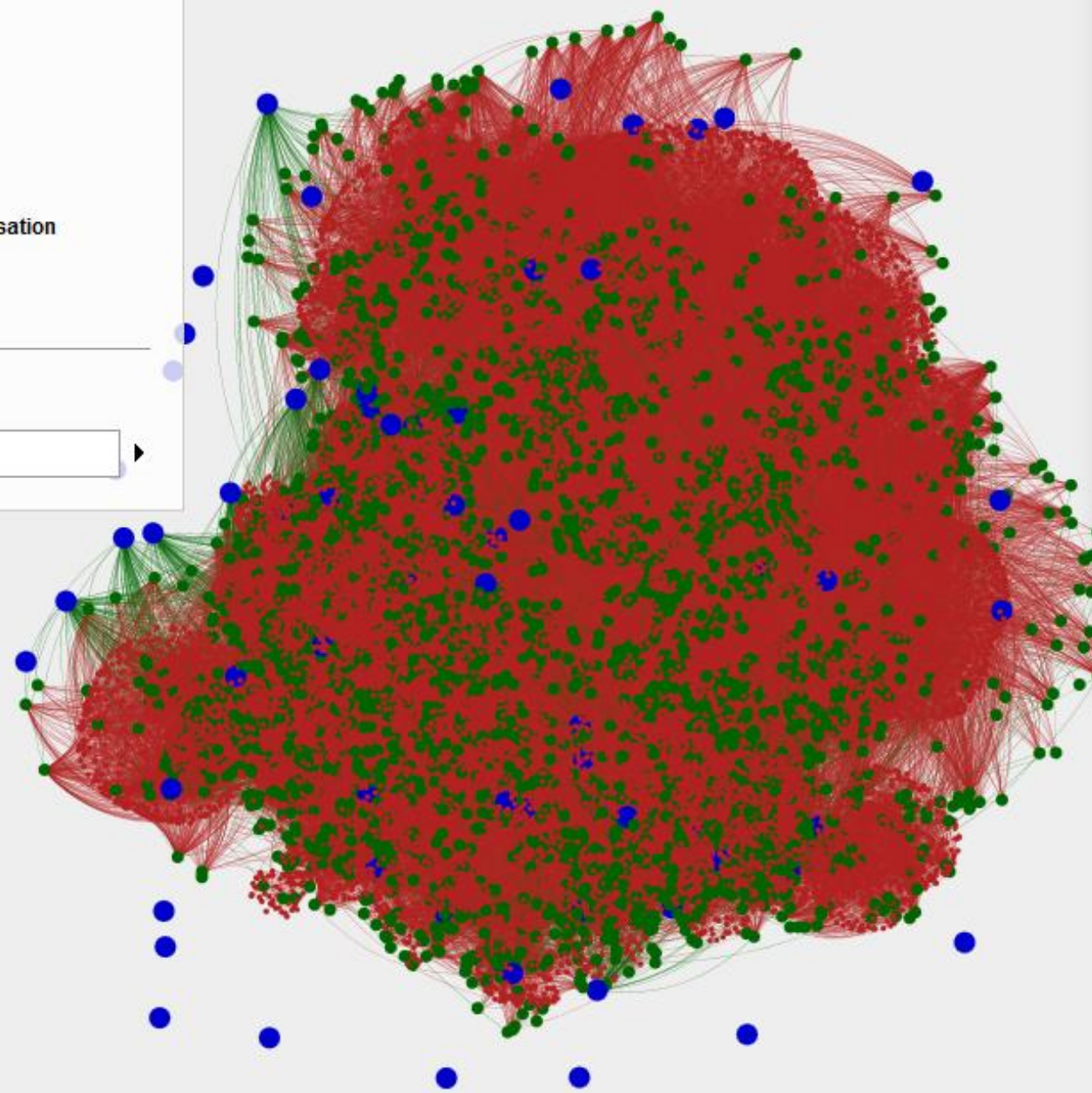
repositories of the [Open University](http://www.open.ac.uk/) and making it available for ... Course descriptions link to geonames for availability and price validity. URI from the ... Buildings are linked to their postcode in [ordnancesurvey.co.uk](http://ordnancesurvey.co.uk) Some links to

Number of graphs: 20  
 Number of classes: 79  
 Number of properties: 471

Classes	Properties
<a href="#">dool:OpenLearnExploreArt...</a>	<a href="#">dct:subject</a>
<a href="#">foaf:Document</a>	<a href="#">dbpedia:url</a>
<a href="#">skos:Concept</a>	<a href="#">rdf:type</a>
<a href="#">skos:ConceptScheme</a>	<a href="#">mediaont:locator</a>
<a href="#">geo:SpatialThing</a>	<a href="#">dct:language</a>

# Dataset profiling: exploring LOD datasets/topics

- Automatic extraction of dataset “topics” [ESWC2014]
- Visualisation & exploration of dataset-topic graph (datasets, topics, relationships)
- Includes all (responsive) datasets of LOD Cloud

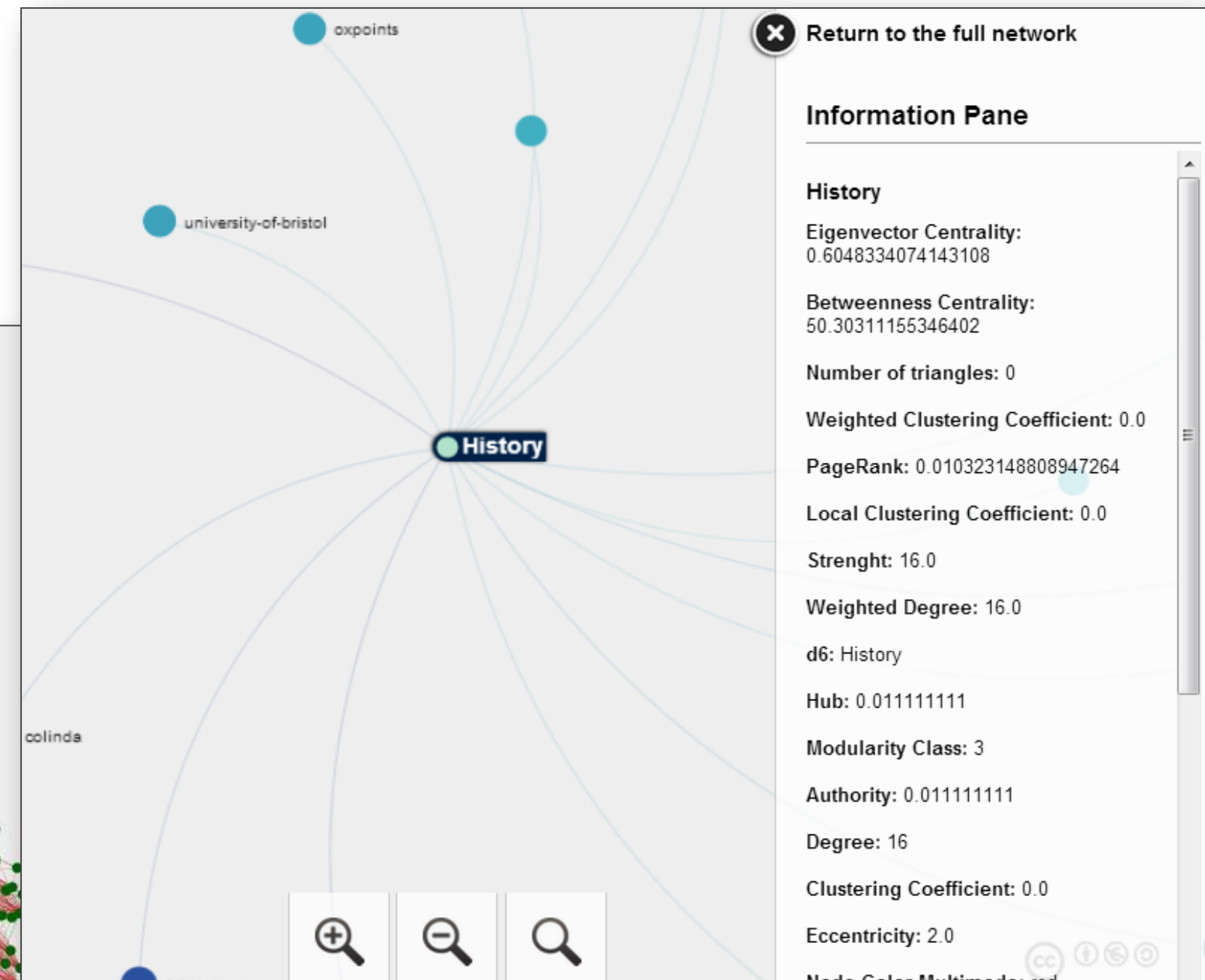


*i* More about this visualisation

Legend:

Search:

Search by name



# Type-specific exploration of dataset categories



## Dataset Profile Explorer

Classification of datasets in the LOD Cloud is highly specific to the resource types one is looking at. While one might be interested in the classification of "persons" listed in one dataset (for instance, to learn more about the origin countries of authors in DBLP), another one might be interested in the classification of topics covered by the documents (for instance disciplines of scientific publications) in the very same dataset. This can only be achieved through a type-specific categorisation of datasets, which considers both the categories associated with one dataset and the resource types these are associated with. This visualisation aims to provide a resource type-specific view on categories associated with available datasets in the Linked Open Data cloud, in particular the ones of educational relevance. Our work combines the dataset descriptions from the Linked Education Catalog with the dataset profiles generated by the Linked Data Observatory, consisting of DBpedia categories. Type mappings across all involved datasets link "documents" of all sorts to the common foaf:Document and "persons" and "organisations" to the common foaf:Agent type. Categories associated with each dataset are shown in an interactive graph, generated for the specific types only, allowing for more representative and meaningful classification and exploration of datasets.

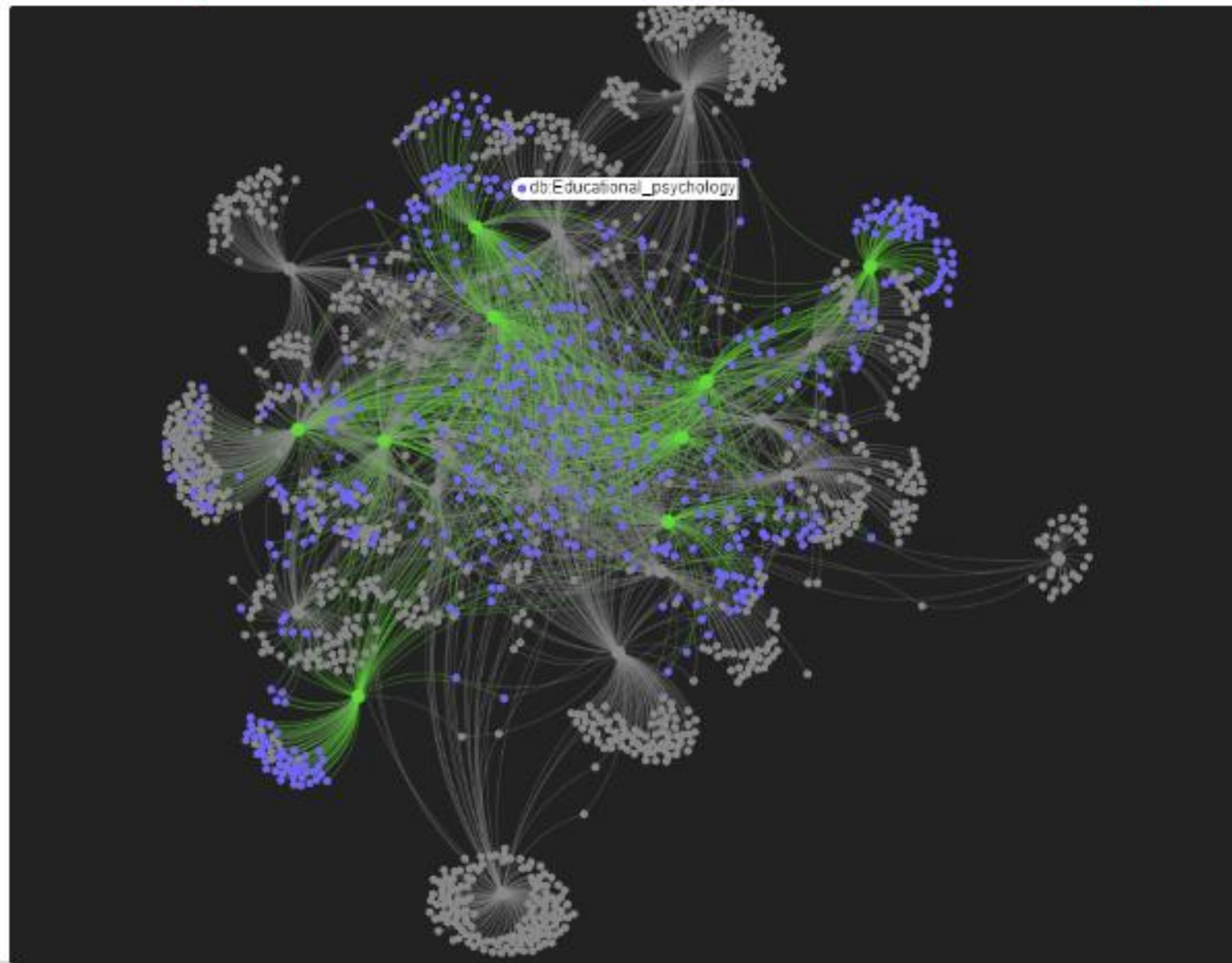
Dataset: All Resource Type: foaf:Document Resource Detailed Type: All

Score: 5.48 968 196 972 2444-14 0.0 000 206 115 555 555 556

General Details

### Learning Analytics and Knowledge (LAK) Dataset

The LAK dataset provides access to structured fulltext and metadata from key research publications in the field of learning analytics and educational data mining (see <http://lak.linkededucation.org> for details). It is regularly updated with data, for instance, from the LAK or EDM Conference series.



- Type specific views on datasets/categories
  - “Document” (foaf:document)
  - “Person “ (foaf:person)
  - “Course” (aaiso:course)
- Currently applied to datasets in LinkedUp Catalog only (as schema mappings already available here)

# LinkedUp Challenge: using open data for learning

<http://linkedup-challenge.org>



- Open Data Competition to promote tools and applications that analyse / integrate (Linked) Web data
- Organised by LinkedUp project over 2 years (“Veni”, “Vidi”, “Vici”) with 40.000 EUR awards
- Veni Competition - 22 submissions, 8 shortlisted for presentation at Open Knowledge Conference (17 September, Geneva Switzerland)



- Open Track only

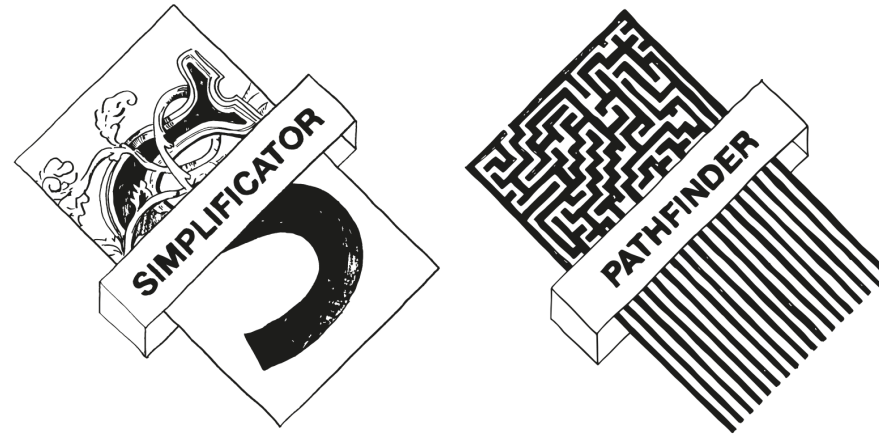
- Final events at OKCon 2013 (September 2013, Geneva)

May –September 2013



**Veni  
CHALLENGE**

- Open & focused track(s)



- Final events at ESWC2014 (May, Crete)

October 2013 – May 2014



**Vidi  
COMPETITION**

- Open track & focused tracks

?

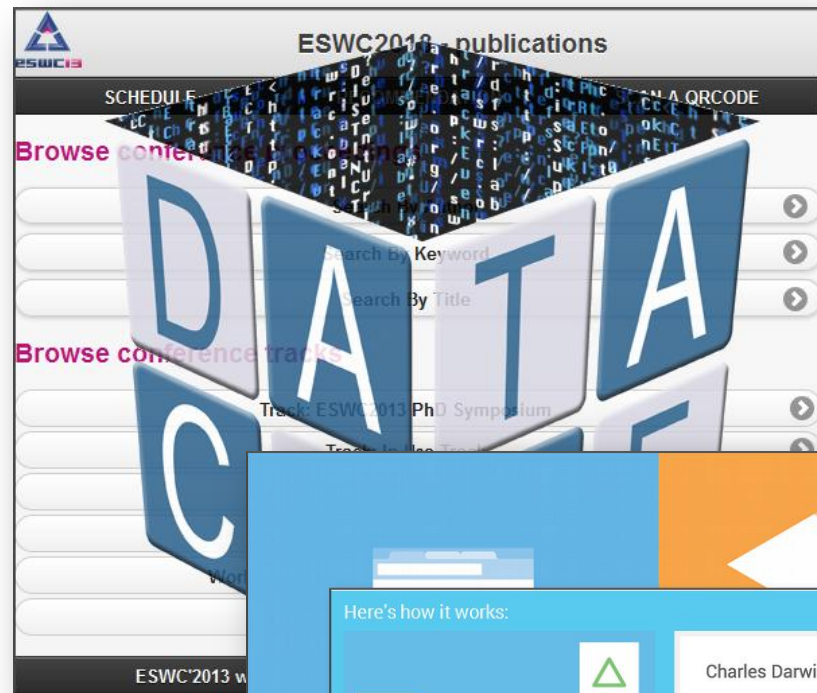
- Submission details and calls to be released soon
- Final events at ISWC2014 (October, Riva del Garda, Italy)

May 2014 – October 2014

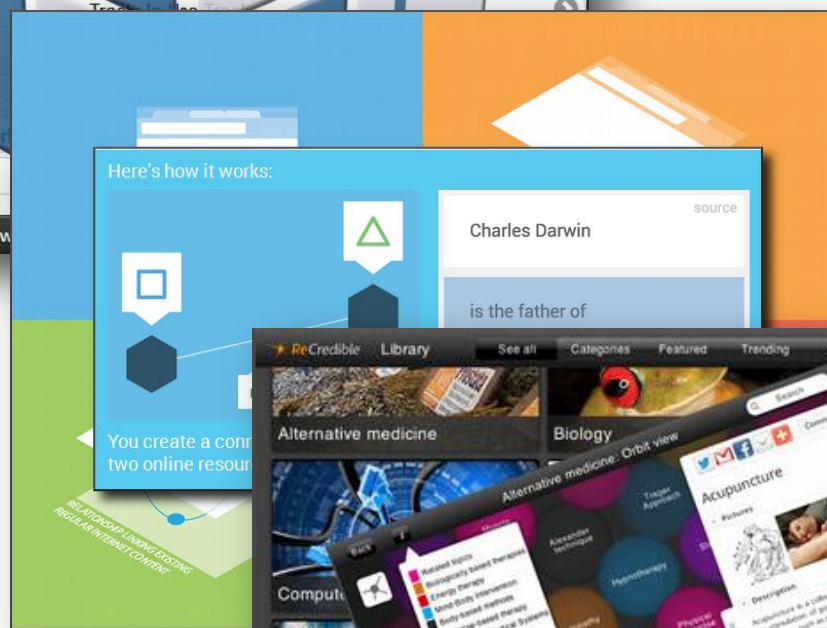


**Vici  
COMPETITION**

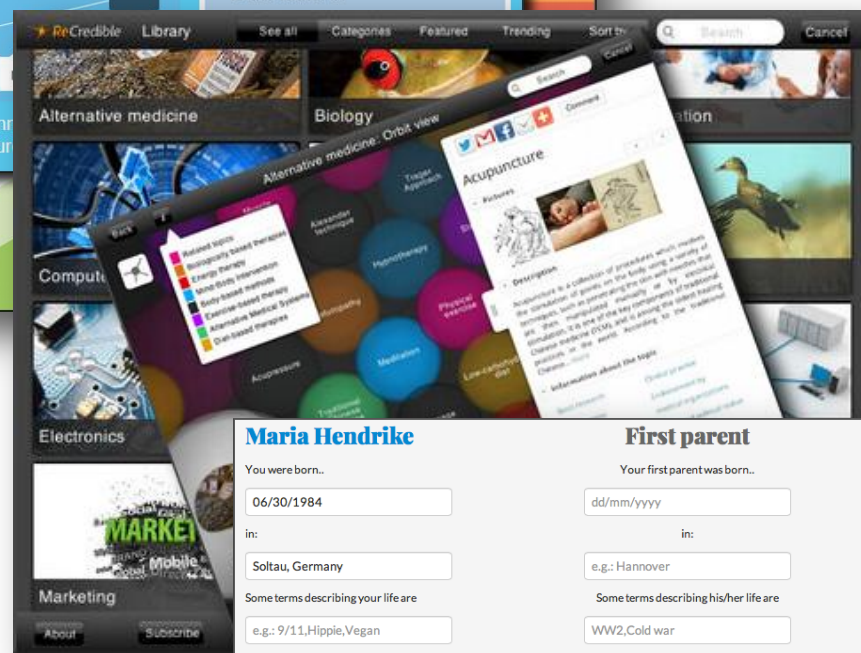
# Veni shortlist & winners



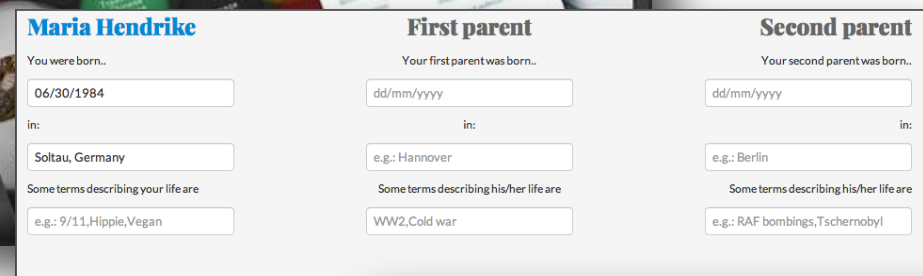
DataConf.



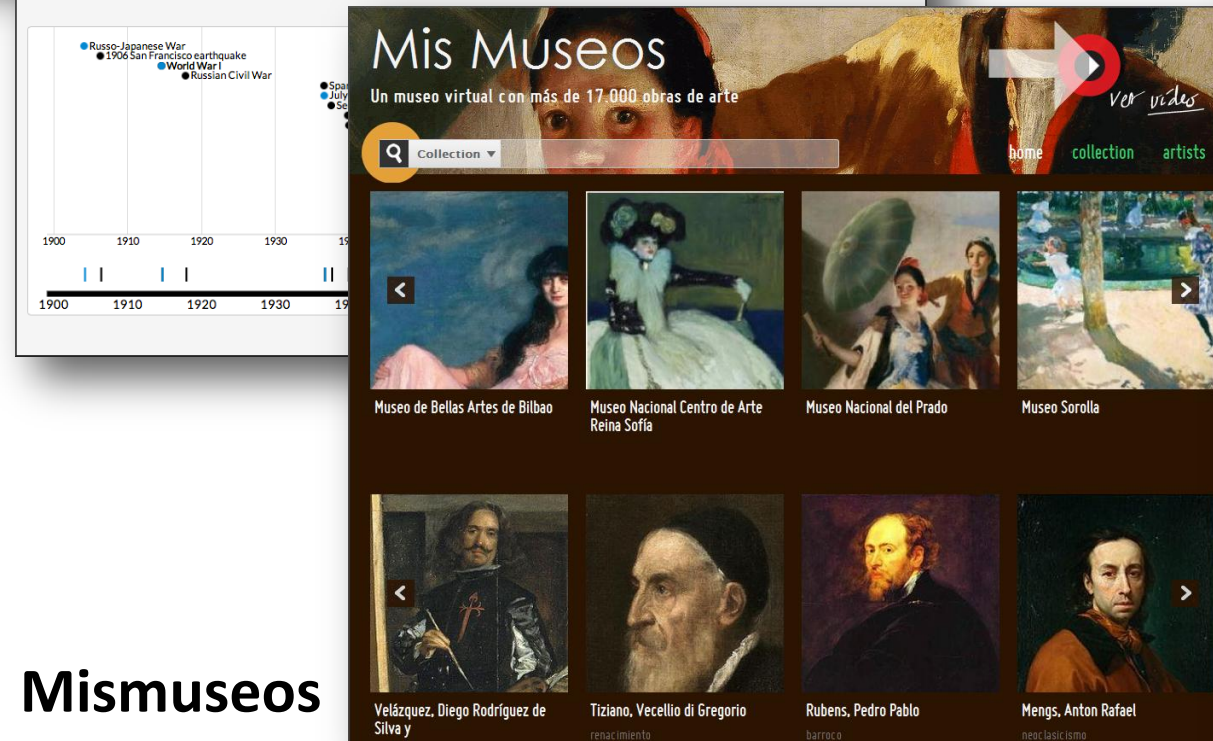
ReCredible



KnowNodes



YourHistory



Mismuseos



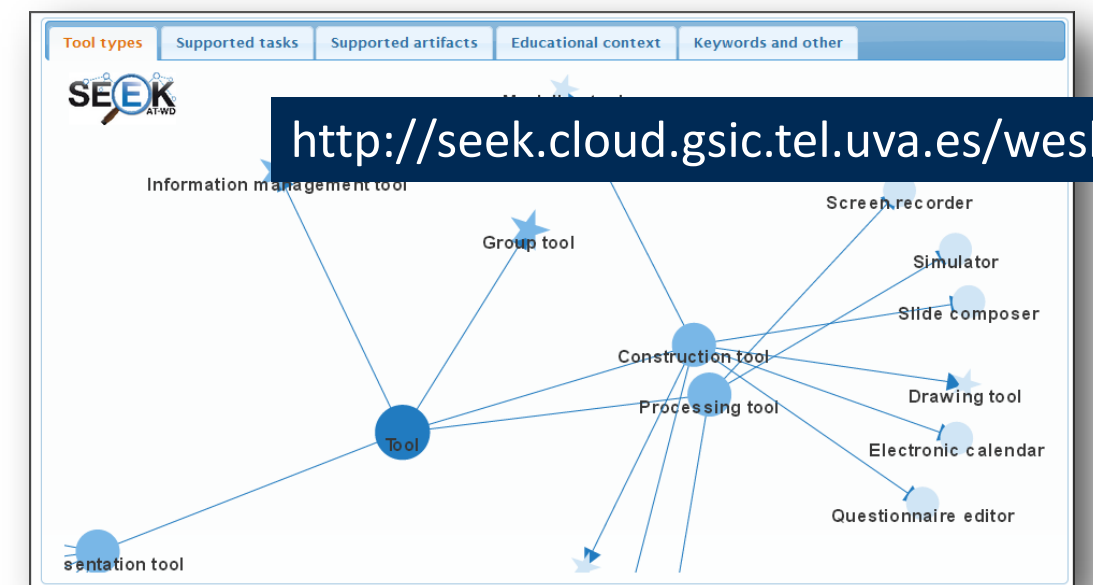
<http://www.polimedia.nl/>

PoliMedia – 1<sup>st</sup> price



<http://www.globe-town.org/>

GlobeTown - 2<sup>nd</sup> price



<http://seek.cloud.gsic.tel.uva.es/weshare/>

WeShare - 3<sup>rd</sup> price / people's choice

# 1<sup>st</sup> Place: PoliMedia

## Exploring political debates & events



- Exploration of political debates and news coverage
- Automatically generated links between transcripts debates, newspaper articles,
- Generated data available as Linked Data (<http://data.polimedia.nl>)
- Data sources: 1) newspapers in their original layout of the historical newspaper archive, and 2) radio bulletins of the Dutch National Press Agency (ANP)
  - 9000+ debates (1945 – 1995)
  - Over 3000 media links



Martijn Kleppe, Max Kemman, Henri Beunders (Erasmus Universiteit Rotterdam), Laura Hollink Damir Juric (Vrije Universiteit Amsterdam), Johan Oomen Jaap Blom (Nederlands Instituut voor Beeld en Geluid)

# 2<sup>nd</sup> Place: GlobeTown

## Open data for sustainable development



- Exploring interaction between data about **environment, economy and society** (cause and effect in complex systems)
- Diverse **open government data**:
  - SWERA renewable energy data: <http://swera.unep.net/>,
  - UN Comtrade trade data: <http://comtrade.un.org/>,
  - Country names and codes: <http://opengeocode.org>,
  - OECD statistics: <http://stats.oecd.org/>,
  - World Bank: <http://data.worldbank.org>
- Top three at Apps4Climate competition, held by the World Bank



Jack Townsend, Andrea Prieto-Vega, Richard Gomer, Will Fyson, Dom Hobson, Huw Fryer (University of Southampton, UK)



# 3<sup>rd</sup> Place/Peoples Choice: WeShare

## Exploring, annotating, rating educational ICT tools



- Social & semantic annotation application for **educational ICT tools**
- Aids educators to find tools to support teaching at all educational levels
- Gathers and enriches data from existing registries and datasets
- Currently: **approx. 7000 tool descriptions**
- Crowdsourcing: educators, tutors etc can modify and enrich data

SUMMARY OF EDUCATIONAL REVIEWS							
Rating		Area of knowledge	Course	Teaching technique	Delivery Mode	VLE	More
3/5	Review details	Computer science	MSc in IT	Exam, Lecture, Practical exercise, Tutorial	Face to face	Moodle	Context details
3/5	Review details	Educ					
4/5	Review details	Education	ICTs in education	Debate, Practical exercise	Blended	Wiki	Context details
3/5	Review details	Education	Emotions in Education	Lecture, Practical exercise	Face to face		Context details
3/5	Review details	Education	Educational research in Computers and Technology	Other, Practical exercise	Blended	Wiki	Context details
4/5	Review details	Computer science	Advanced Services Enabling Telematic Applications	Debate, Peer review, Practical exercise	Face to face		Context details
5/5	Review details	Engineering manufacturing and construction	Computers Architecture	Debate, Lecture, Peer review, Practical exercise, Tutorial	Blended	Wiki	Context details

EDUCATIONAL REVIEWS

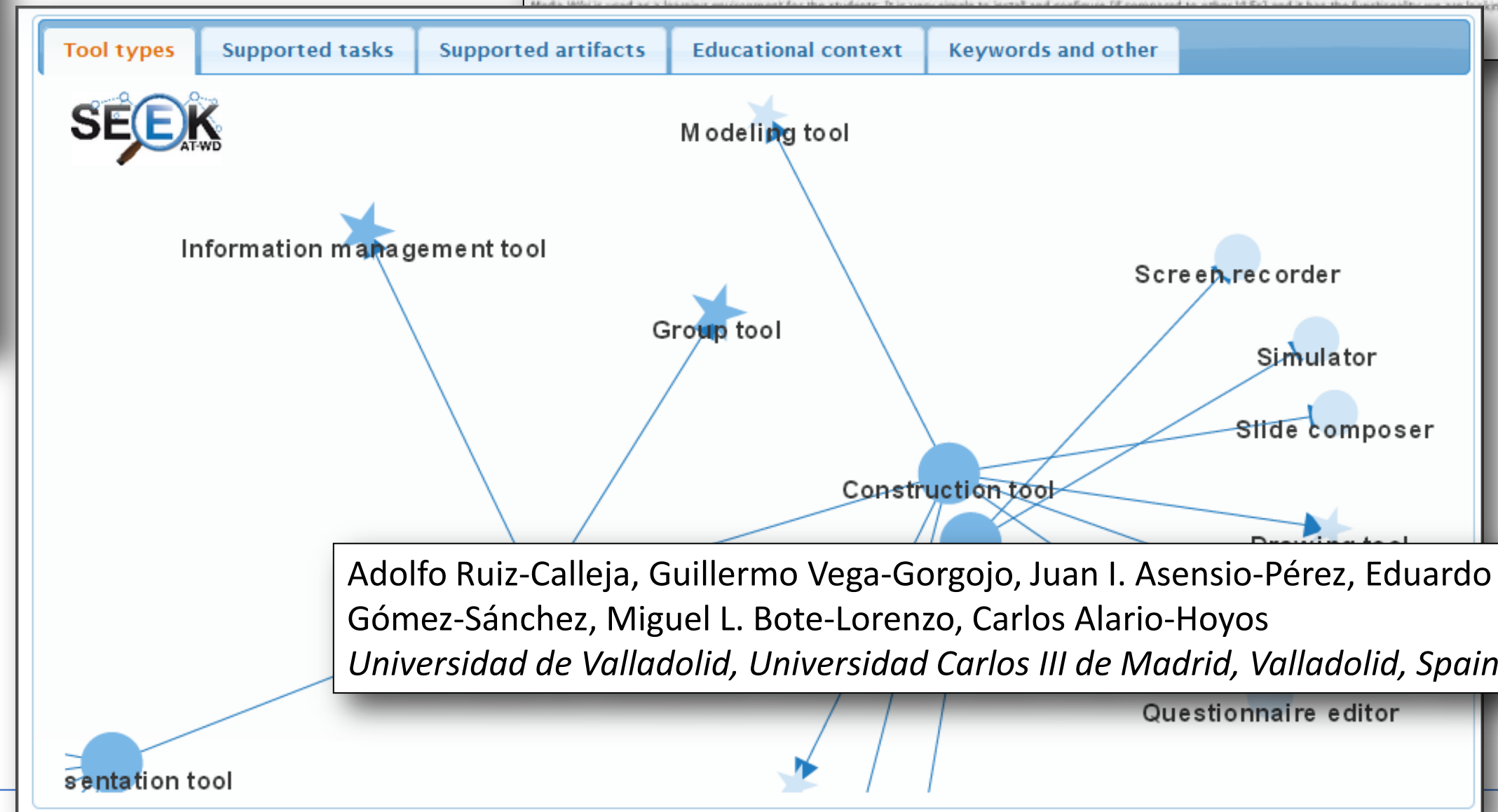
adofo

Rating:  Average: 5 (1 vote)

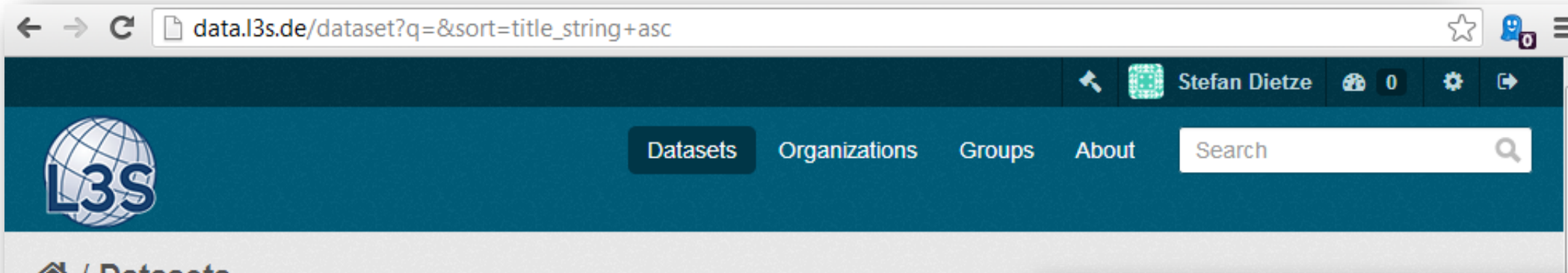
Educational context: AOSP1

General opinion of the tool:

<http://seek.cloud.gsic.tel.uva.es/weshare/>



# data.l3s.de – a DataHub for the L3S



Home / Datasets

**Organizations** [Clear All](#)

IAI - Intelligent A... (6)

Show More Organizations

**Groups** [Clear All](#)

There are no Groups that match this search

**Tags** [Clear All](#)

- sparql (4)
- lod (3)
- format-rdf (3)
- format-http (3)
- rdf (2)
- publication (2)
- lod-cloud (2)
- format-rdfs (2)
- cross-domain (2)
- tagging (1)

Show More Tags

**Formats** [Clear All](#)

- api/sparql (4)

[+ Add Dataset](#)

Search...

## 7 datasets found

**BibSonomy**  
Datasets from BibSonomy - the blue social bookmark and p  
[sql](#) [XML](#) [HTML](#) [JSON](#)

**DBLP Linked Data (L3S)**  
D2R Server publishing the DBLP Bibliography Database, h  
[api/sparql](#) [RDF](#)

**Learning Analytics and Knowledge (LAK) Datas**  
The LAK dataset provides access to structured fulltext and field of learning analytics and educational data mining (see  
[api/sparql](#) [XML](#) [rdata](#)

**Named Entity Evolution Recognition test set**  
collection of named entity pairs where each named entity h  
, Cardinal Joseph Ratzinger). All terms exist in the New York  
[CSV](#)

data.l3s.de/dataset/lak

Home / Organizations / IAI - Intelligent Access to ... / Learning Analytics and ...

**Learning Analytics and Knowledge (LAK) Dataset**

Followers: 1 [Unfollow](#)

**Organization**

**IAI - Intelligent Access to Information**  
There is no description for this organization

**Social**

- Google+
- Twitter
- Facebook

**Dataset** | [Activity Stream](#) | [Related](#) | [Edit](#)

## Learning Analytics and Knowledge (LAK) Dataset

The LAK dataset provides access to structured fulltext and metadata from key research publications in the field of learning analytics and educational data mining (see <http://lak.linkededucation.org> for details). It is regularly updated with data, for instance, from the LAK or EDM Conference series.

**Data and Resources**

- SPARQL Endpoint** [Explore](#)  
No description for this resource
- Example Resource** [Explore](#)  
No description for this resource
- LAK Dataset, RData** [Explore](#)  
LAK Dataset in R format (thanks Adam Cooper) hosted on the KMI Crunch R server
- LAK Dataset, XML dump** [Explore](#)  
No description for this resource

[RDF](#) [cross-domain](#) [educational data mi...](#) [format-http](#) [format-rdf](#)  
[learning analytics](#) [linked data](#) [sparql](#) [sparql-endpoint](#)

**Additional Info**

Field	Value
Author	LAK Data Team
Maintainer	LAK Data Team
State	active
example-resource	<a href="http://data.linkededucation.org/resource/lak/confer">http://data.linkededucation.org/resource/lak/confer</a>



[ABOUT](#) [LAK DATASET](#) [LAK CHALLENGE](#) [APPLICATIONS](#) [EVENTS](#)

<http://lak.linkededucation.org/>

### About

The [LAK Dataset](#) makes publicly available machine-readable versions of research and Educational Data Mining communities, where the main goal is to facilitate research and applications. This Website provides a home for the LAK Dataset as well as the applications. It contains the latest information about the data itself as well as latest calls and up-to-date Challenges.

#### LAK Dataset (450 publications in RDF/R)

- ACM International Conference on Learning Analytics and Knowledge (LAK) (2011-13)
- International Conference on Educational Data Mining (2008-13)
- Journal of Educational Data Mining (2008-12)

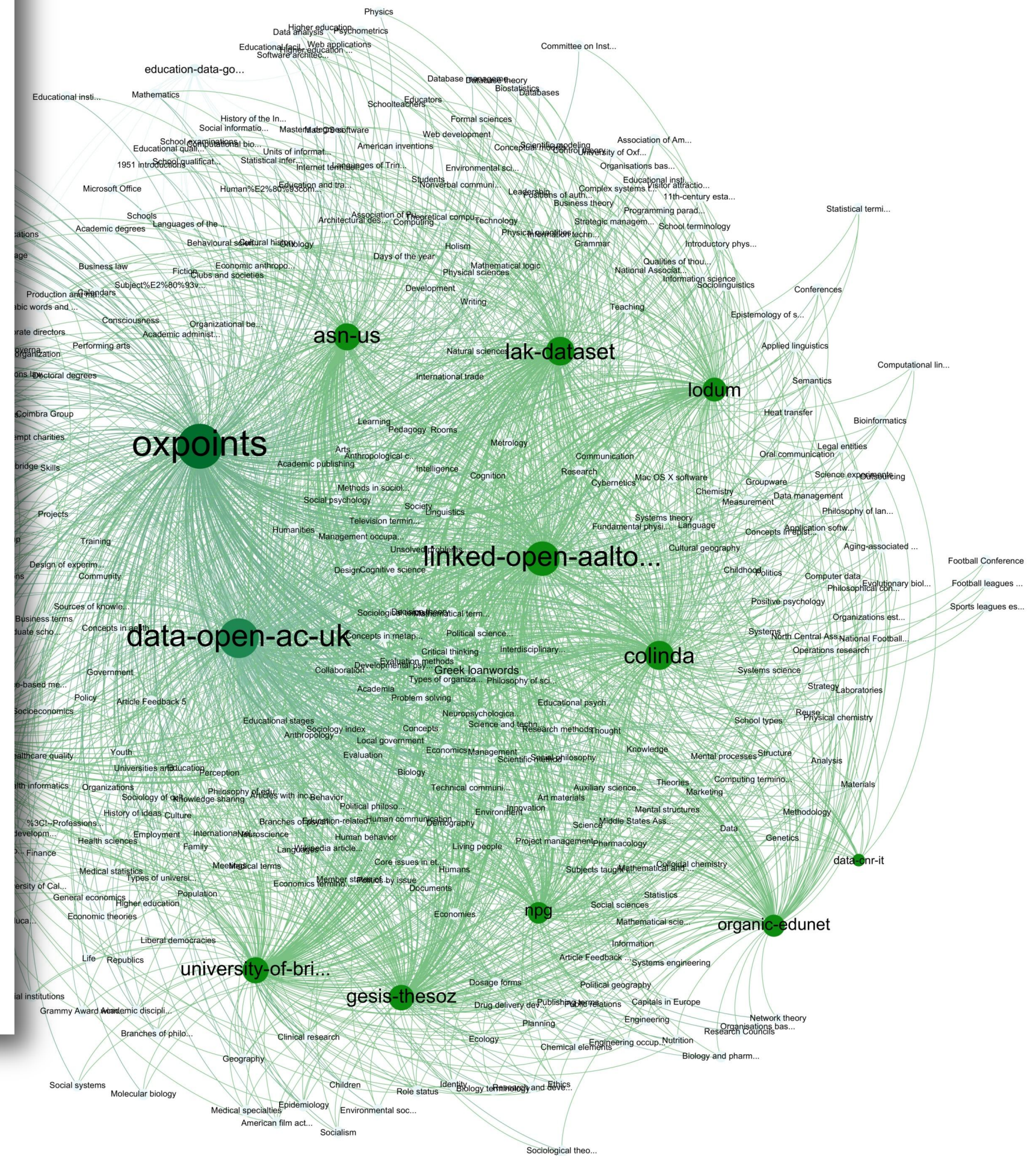
#### LAK Data Challenge

- Analyse, explore correlate the LAK Dataset
- At ACM LAK 2014 (April 2014, Indianapolis)

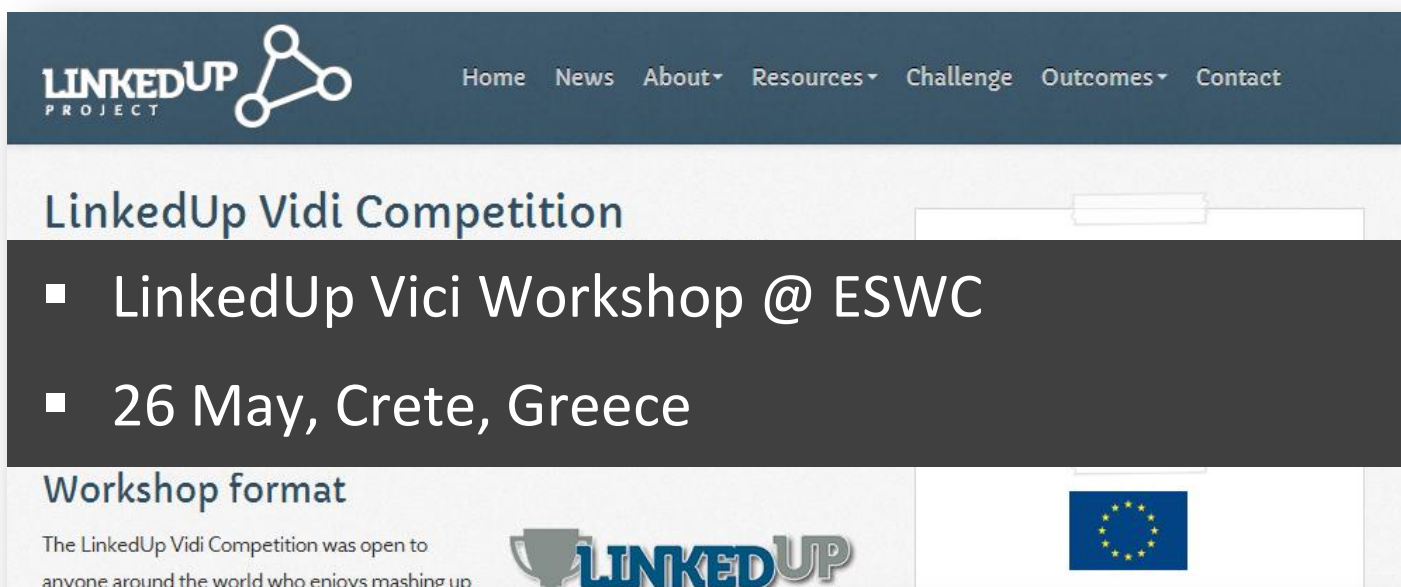


# Conclusions – “Lessons Learned”

- **Linked Data as enabler for educational resources sharing**
  - Interpretation of user & resource (meta)data
  - Understanding of learning contexts
  - Data disambiguation and integration
  - Cross-platform recommendations and analytics
- **Linked Data as body of knowledge for learning**
  - Dedicated educational/learning content
  - Repurposing of knowledge resources (social media etc)
- **Challenges**
  - Noise & diversity
  - Gap between technical community and end users /educators/learners
  - LinkedUp: technology transfer events, exploitation workshops etc
  - EUCLID



# Outlook: some events & resources



LINKEDUP PROJECT

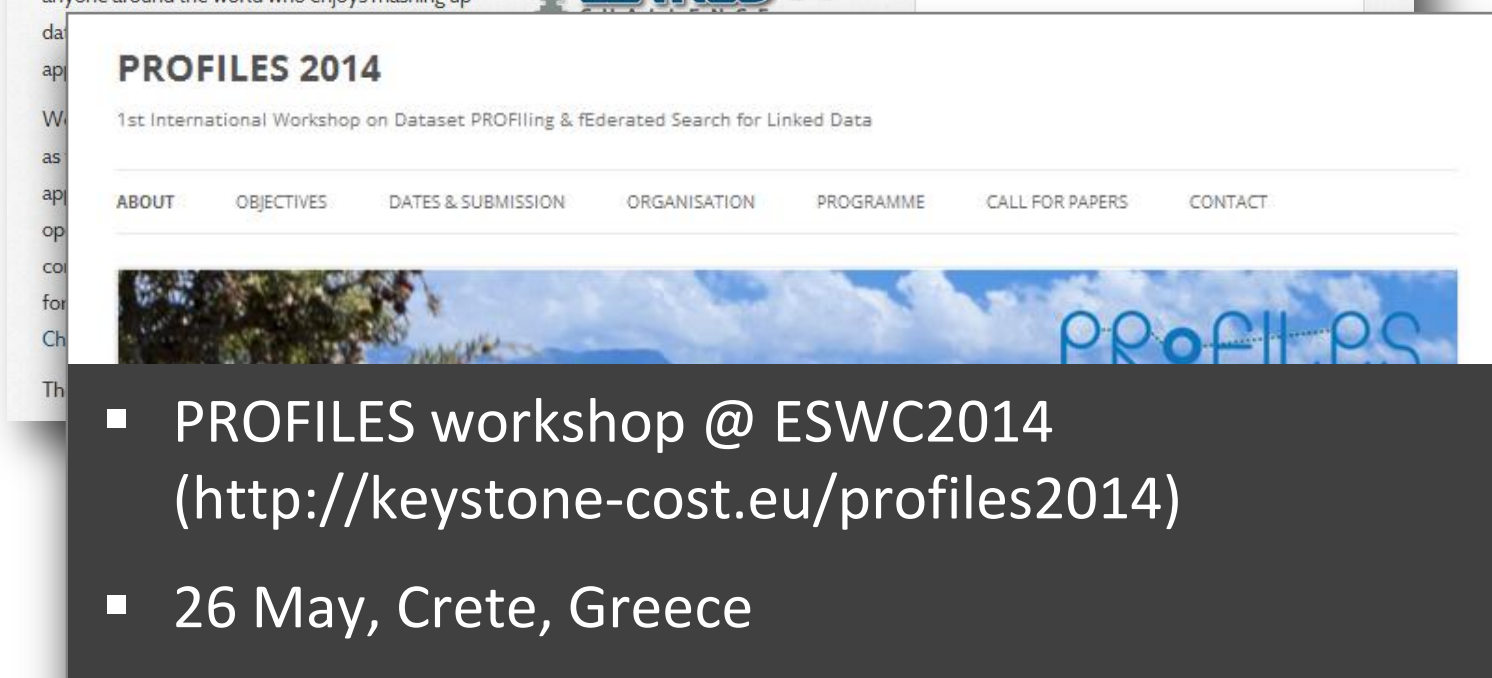


Home News About Resources Challenge Outcomes Contact

## LinkedUp Vidi Competition

- LinkedUp Vici Workshop @ ESWC
- 26 May, Crete, Greece

### Workshop format


The LinkedUp Vidi Competition was open to anyone around the world who enjoys mashing up



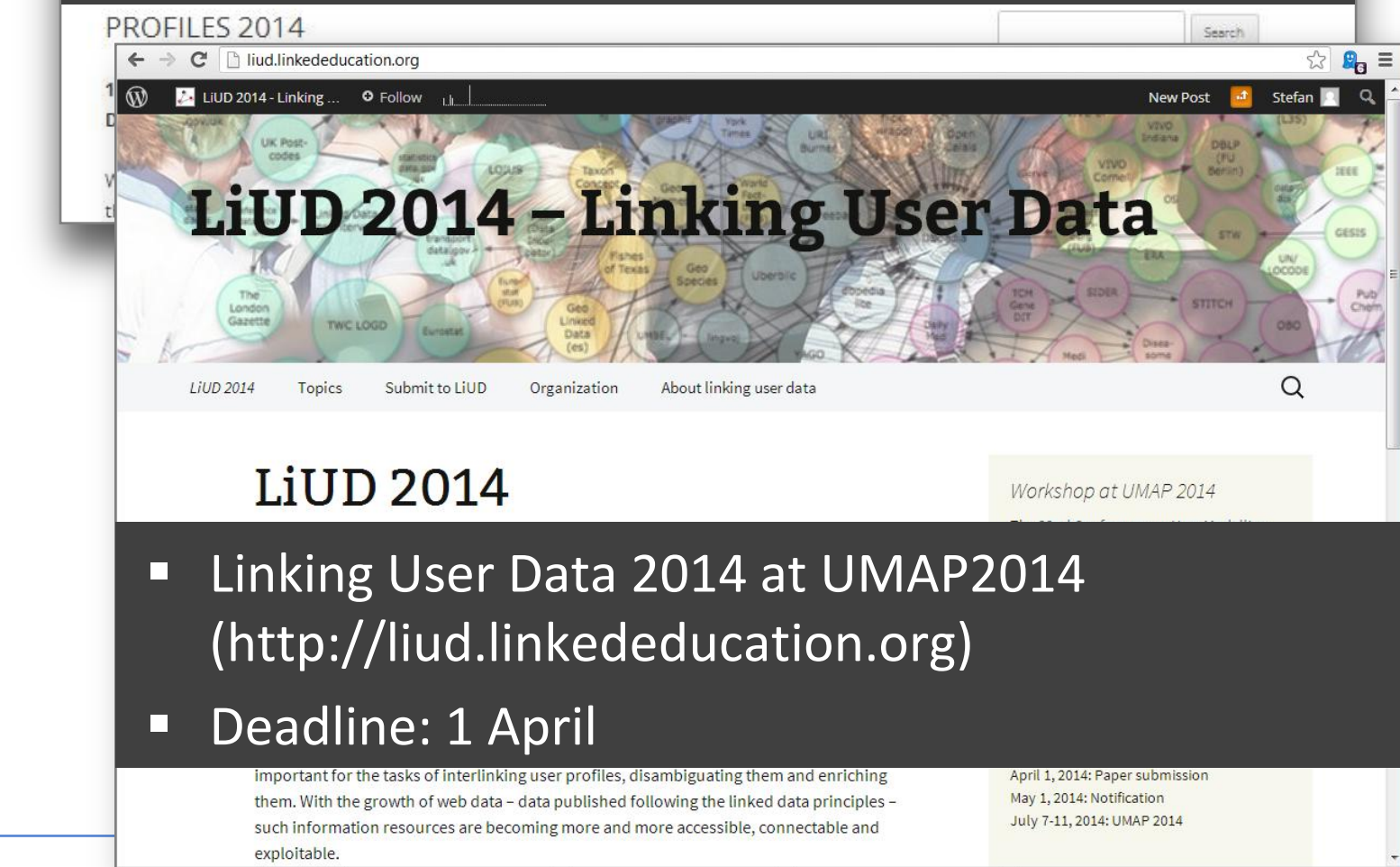
## PROFILES 2014

1st International Workshop on Dataset PROFiling & Federated Search for Linked Data

ABOUT OBJECTIVES DATES & SUBMISSION ORGANISATION PROGRAMME CALL FOR PAPERS CONTACT



- PROFILES workshop @ ESWC2014 (<http://keystone-cost.eu/profiles2014>)
- 26 May, Crete, Greece



## LiUD 2014 – Linking User Data

LiUD 2014 Topics Submit to LiUD Organization About linking user data

### LiUD 2014

Workshop at UMAP 2014

- Linking User Data 2014 at UMAP2014 (<http://liud.linkededucation.org>)
- Deadline: 1 April

important for the tasks of interlinking user profiles, disambiguating them and enriching them. With the growth of web data – data published following the linked data principles – such information resources are becoming more and more accessible, connectable and exploitable.

April 1, 2014: Paper submission  
May 1, 2014: Notification  
July 7-11, 2014: UMAP 2014



## LINKEDUP CHALLENGE

LinkedUp Challenge

### Vidi Competition

Tracks

How to enter

Data and support

FAQs

Get in touch!

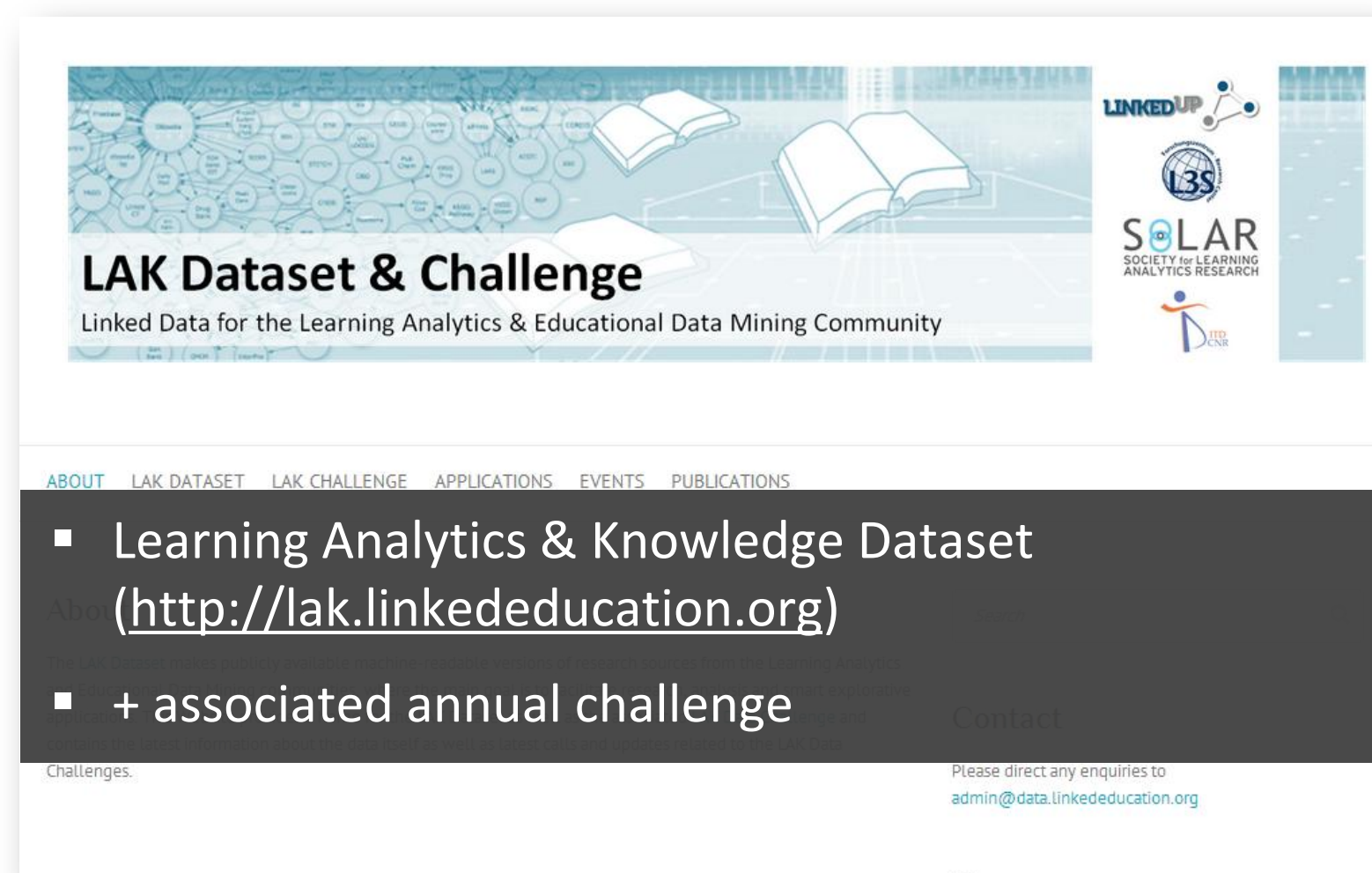
Focused Tracks

# Veni, Vidi, Vici

## Three developer competitions sponsored by the LinkedUp Project



- LinkedUp Challenge (<http://www.linkedup-challenge.org>)
- Vidi events at ESWC2014, Vici calls coming soon



## LAK Dataset & Challenge

Linked Data for the Learning Analytics & Educational Data Mining Community

ABOUT LAK DATASET LAK CHALLENGE APPLICATIONS EVENTS PUBLICATIONS

- Learning Analytics & Knowledge Dataset (<http://lak.linkededucation.org>)
- + associated annual challenge

Contact

Please direct any enquiries to [admin@data.linkededucation.org](mailto:admin@data.linkededucation.org)

## WWW

### See also (general)

- <http://linkedup-project.eu>
- <http://linkedup-challenge.org>
- <http://linkededucation.org>
- <http://data.l3s.de>
- <http://linkeduniversities.org>
- <http://purl.org/dietze>

### See also (data)

- <http://datahub.io/group/linked-education>
- <http://data.linkededucation.org>
- <http://data.linkededucation.org/linkedup/catalog/>
- <http://lak.linkededucation.org>