

The Web of Linked Data

A logical next evolution step

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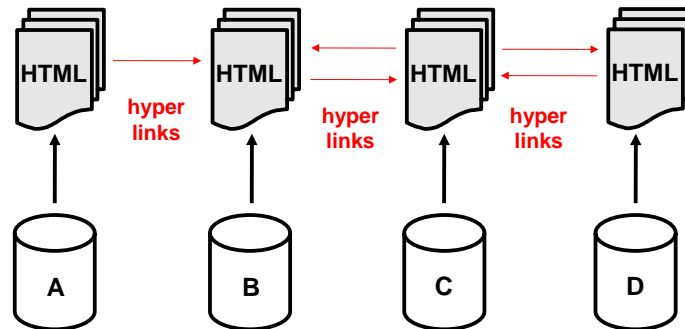
Barcelona. May 22, 2008

Overview

- 1. From a Web of Documents to a Web of Data**
 - Web APIs, Microformats, Linked Data
- 2. Linked Data Deployment on the Web**
 - What data is out there?
- 3. Applications**
 - What is being done with the data?

The Web of Documents

The Web is a global information space
build on open standards and hyperlinks.



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Shortcomings

As Web content is only loosely structured it is
difficult for applications to do smart things with it.

■ Querying

- Which speakers from bdigital have also spoken at WWW in Beijing?

■ Data Integration

- Give me all job offers for IT-consultants in Berlin.

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Solution

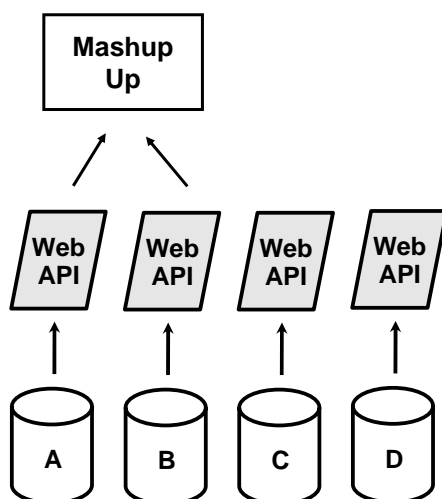
**Increase the structure of Web content.
Publish structured data directly on the Web.**

Different Approaches

1. Web APIs
2. Microformats
3. Linked Data

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Web APIs and Mashups



Shortcomings

1. Mashups are based on a fixed set of data sources.
2. You can not set hyperlinks between data objects.

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Web APIs slice the Web into separate data silos



Image: Bob Jagendorf, <http://flickr.com/photos/darwinbell/>, CC-BY

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Microformats



- Embed structured data into HTML pages.
- hCard, hCalender, hReview, XFN, ...

```
<div class="vevent">  
  <span class="summary">bdigital</span>  
  <abbr class="dtstart" title="2008-05-20">May 20</abbr> -  
  <abbr class="dtend" title="2007-05-22">22</abbr>  
</div>
```

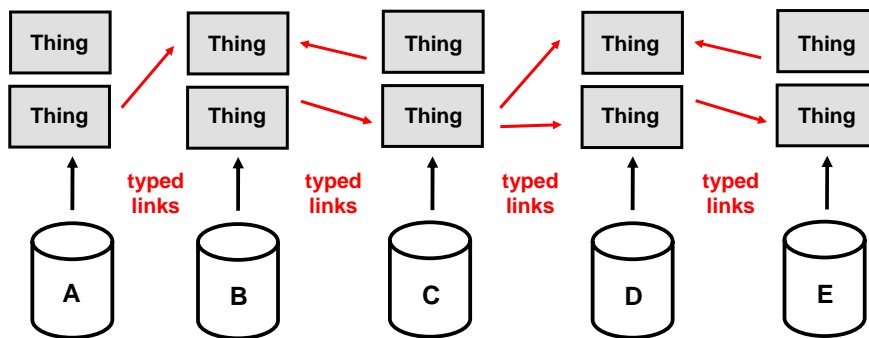
- Shortcomings
 - Only a fixed set of microformats exist.
 - No way to connect data items.

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Linked Data

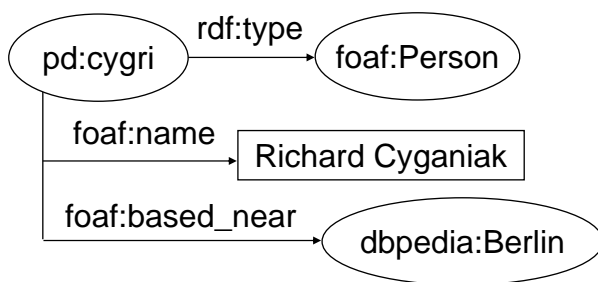


Use Semantic Web technologies to set links between data from one data source to data within other data sources.



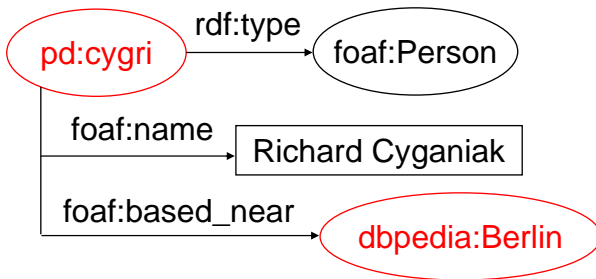
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The RDF Data Model



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Data objects are identified with HTTP URIs

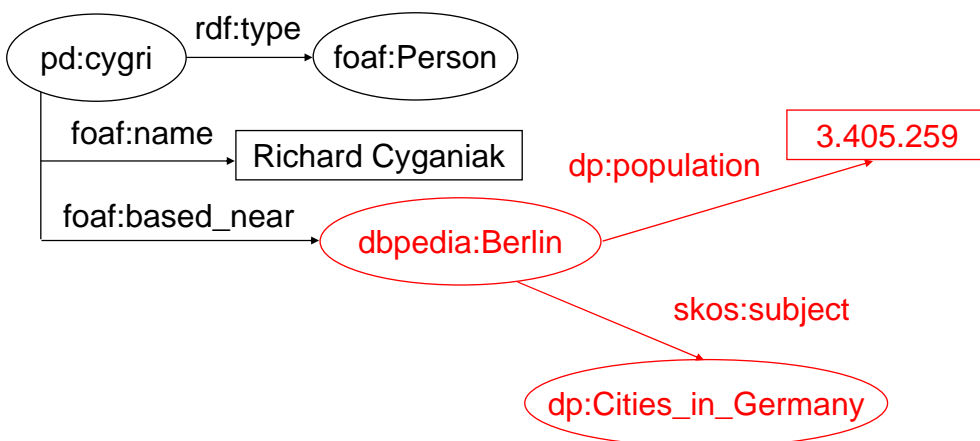


pd:cygri = <http://richard.cyganiak.de/foaf.rdf#cygri>

dbpedia:Berlin = <http://dbpedia.org/resource/Berlin>

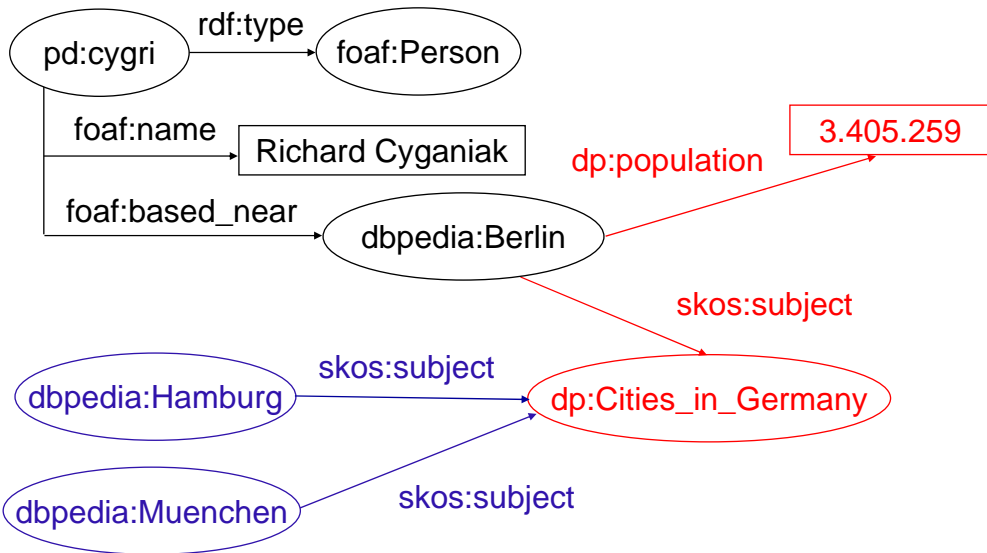
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Dereferencing URIs over the Web



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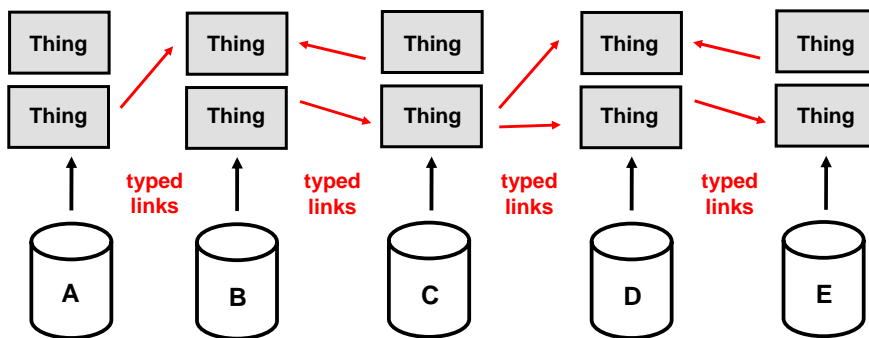
Dereferencing URIs over the Web



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2. Linked Data Deployment on the Web

■ Is this real?



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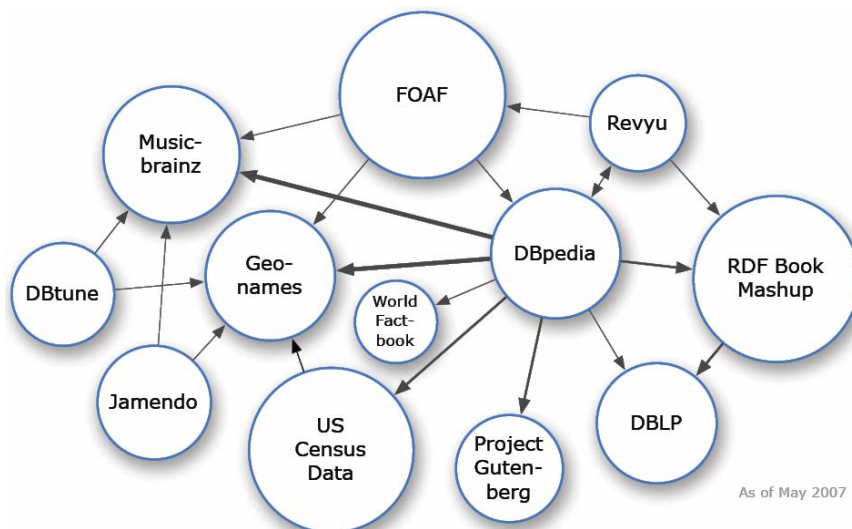
W3C Linking Open Data Project



- **Community effort to**
 - **publish existing open license datasets as Linked Data on the Web**
 - **interlink things between different data sources**

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LOD Datasets on the Web: May 2007

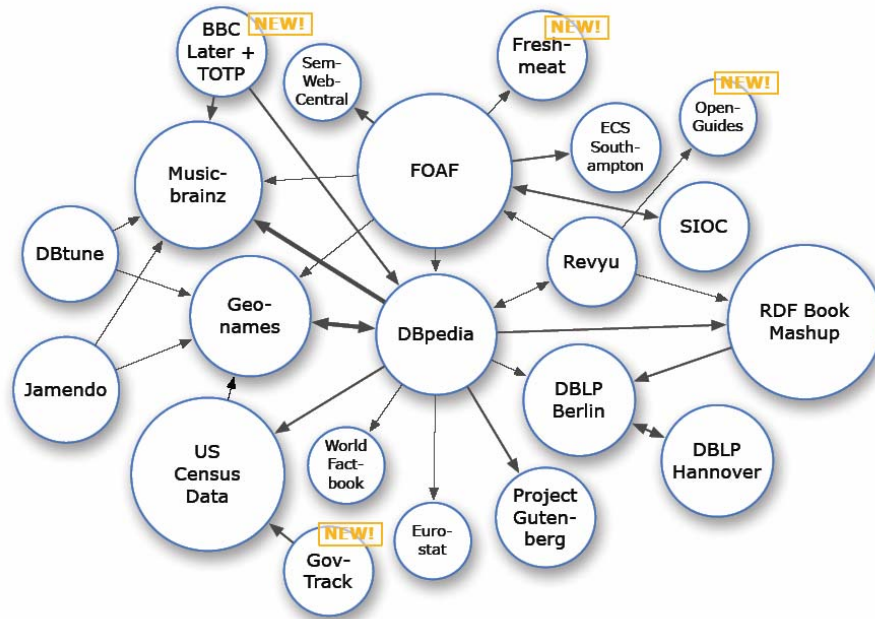


As of May 2007

- **Over 500 million RDF triples**
- **Around 120,000 links between datasets**

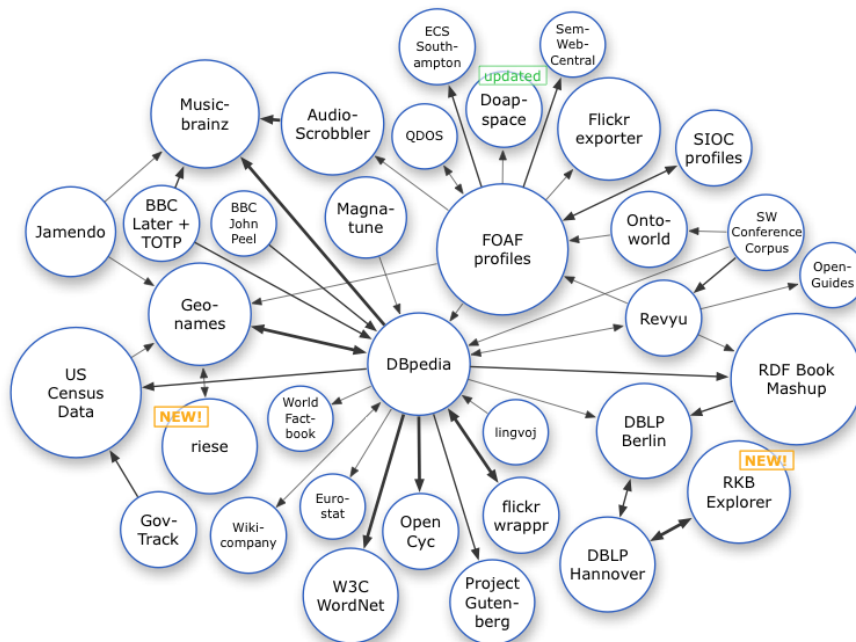
Christian Bizer: The Web of Linked Data (5/22/2008)

LOD Datasets on the Web: August 2007



Christian Bizer: The Web of Linked Data (5/22/2008)

LOD Datasets on the Web: April 2008



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Triple Count

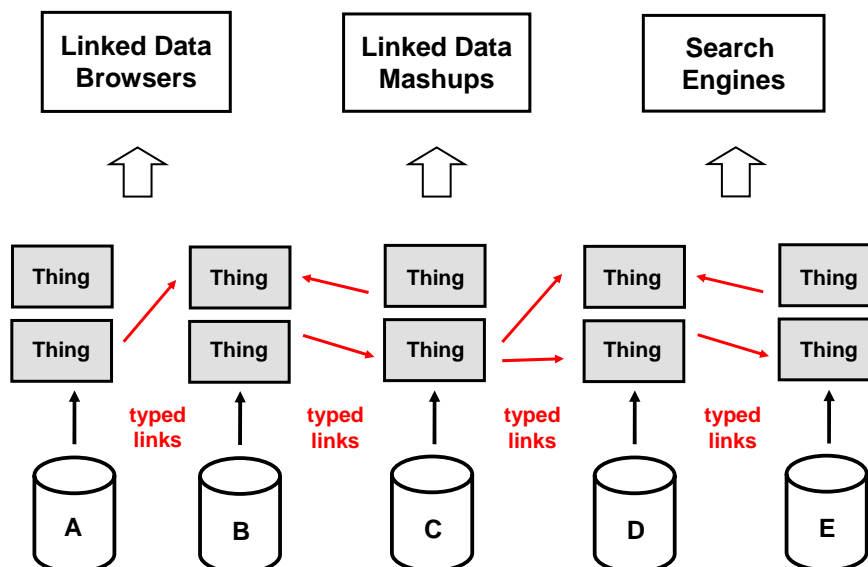
- More than 2 billion RDF triples
- More than 3 million links between datasets.
(rough estimates)

Coming next:

- BBC Archives (millions of media items)
- Open Library Archive (millions of books)
- MySpace Data (millions of profiles)

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3. Applications



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Linked Data Browsers

- **Tabulator Browser (MIT, USA)**
- **Disco Hyperdata Browser (FU Berlin, DE)**
- **OpenLink RDF Browser (OpenLink, UK)**
- **Zitgist RDF Browser (Zitgist, USA)**
- **Humboldt (HP Labs, UK)**
- **Fenfire (DERI, Ireland)**
- **Marbles (FU Berlin, DE)**


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URI: [Add to Outliner](#) [Help](#) [About](#)

This is release 0.8 of the Tabulator Project. The [live development trunk](#) is also available.



▼ **Tim Berners-Lee**

- request
 - ▶ Request for <http://www4.wiwiss.fu-berlin.de/bookmashup/persons/Tim+Berners-Lee>
 - ▶ Request for <http://www4.wiwiss.fu-berlin.de/dblp/resource/person/100007>
- requested by
 - ▶ ● Tim Berners-Lee's FOAF file
- type
 - ▶ ● Male
 - ▶ ● Person
- label
 - ▶ Tim Berners-Lee
- seeAlso
 - ▶ ● RDF document describing: Tim Berners-Lee
 - ▶ ● RDF Description of Tim Berners-Lee
- assistant
 - ▶ ● Amy van der Hiel
- homePage
 - ▶ ● http://www.w3.org/People/Berners-Lee/
- work
 - ▶ ...
- organization
 - ▼ **World Wide Web Consortium**
 - title
 - ▶ W3C (large: includes all specs and groups)
 - type
 - ▶ ● SocialEntity
 - ▶ ● Organization
 - label
 - ▶ W3C
 - seeAlso
 - ▶ ● W3C Groups and Organizational Structure
 - ▶ ● W3C Standards and Technical Reports
 - publicHomePage
 - ▶ ● http://www.w3.org/
 - homepage
 - ▶ ● http://www.w3.org/
 - logo
 - ▶
 - name
 - ▶ World Wide Web Consortium
 - is organization of
 - ▶ ● Tim Berners-Lee
- publicHomePage
 - ▶ ● http://www.w3.org/People/Berners-Lee/


http://dbpedia.org/resource/Beijing_Capital_International_Airport Open 

Beijing Capital International Airport

<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>


- **Building** 
- **Feature** 

comment



- Der Flughafen Peking ist einer der wichtigsten Flughäfen Chinas und liegt im Nordosten Pekings. Er liegt 20 Kilometer nördlich vom Stadtzentrum, im Gebiet Shunyi. Genauer ist aber der Flughafen innerhalb des Verwaltungsgebiets des Stadtbezirks Chaoyang. 
- L'aéroport international de Pékin (code AITA : PEK ; code OACI : ZBAA) est le principal aéroport de Pékin, capitale de la République populaire de Chine. Il est situé à une vingtaine de kilomètres au nord-est du centre de la ville, dans le distict de

⋮

is sameAs of

- [Beijing Capital International Airport](#) 

depiction

⋮

Linked Data Mashups

- Domain-specific applications using Linked Data from the Web

Revyu

- Website for rating everything
- Uses Linked Data to augment ratings

Broken Flowers

Links

Homepage: <http://www.brokenflowersmovie.com/>
See Also: http://en.wikipedia.org/wiki/Broken_flowers

Tags

[bill-murray](#) [film](#) [jessica-lange](#) [jim-jarmusch](#) [julie-delpy](#) [movie](#) [sharon-stone](#)

Reviews (1)

★★★★★ by tom on 30 Jan 2007

Broken Flowers provides a fantastic vehicle for a classic deadpan Bill Murray performance. The film centers around his character Don, who one day receives a letter from an ex-girlfriend, telling him he has a teenage son. The letter is unsigned, so (with encouragement from his neighbour) he sets off round the country, visiting each the exes who could be the mother of his son. Predictably they're all different in personality and life situation, giving plenty of raw material for awkward silences and dubious encounters. This is great viewing for any Bill Murray fans, or anyone who likes their humour intelligent and a little bit quirky. The soundtrack is also excellent, and deserves a separate review.

What do you think of Broken Flowers? [Write Your Own Review...](#)

Broken Flowers



directed by [Jim Jarmusch](#)

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DBpedia Mobile



- Geospatial entry point into the Web of Data
- Starts with DBpedia, Revyu and Flickr data



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Web of Data Search Engines

- Falcons (IWS, China)
- Sindice (DERI, Ireland)
- MicroSearch (Yahoo, Spain)
- Watson (Open University, UK)
- SWSE (DERI, Ireland)
- Swoogle (UMBC, USA)

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Falcons Object Search [Concept Search](#)


Beijing


Supports Boolean operators, quotes, and wildcard characters.


All


Artifact	Capital City	City	Document	Group
Institution	Landmark	Location	Noun Synset	Ontology
Organization	Person	Publication	Subject	System

Objects 1 - 10 of 8634 for your search **Beijing** (1.223 seconds)

Beijing 
Types: Capital, City
Labels: 北京™ || Pekin || Пекин™ || 北京市™ || Pequim || Pechino || Beijing || Pékin™ || Peking || Pekin™
<http://dbpedia.org/resource/Beijing> - [Described in 184 documents](#)


Beijing 
Types: Subject,
Labels: Beijing
<http://ontoworld.org/wiki/Special:URIResolver/Beijing> - [Described in 11 documents](#)


Beijing Guoan 
Types: Club
Labels: Beijing Hyundai || 北京国安™ || 北京国安足球俱乐部™ || Beijing Guoan
http://dbpedia.org/resource/Beijing_Guoan - [Described in 30 documents](#)

Beijing 
The declaration of this URI may be unauthorized.
Types: Capital City
Labels: Beijing
<http://lonely.org/russia#Beijing> - [Described in 5 documents](#)

YAHOO! RESEARCH *micro* **SEARCH**

Search Results Persons: 3 vCards: 35 Events: 25 Unfinished: 0 | 1 - 10 of about 22

1. [Ivan's private site](#)
<http://www.ivan-herman.net/> - 46k [Update metadata](#)
2. [Ivan Herman](#)

name: Ivan Herman
personal mailbox: <mailto:ivan@w3.org>
homepage: <http://www.ivan-herman.net>
 Ivan Herman gives a talk on behalf of the China Office entitled "What is the ... Ben Adida, Elias Torres, and Ivan Herman give a tutorial entitled "RDFa: ...
<http://www.w3.org/People/Ivan/> - 25k [Update metadata](#)
homepage
[Ivan's private site](#)
<http://www.ivan-herman.net/> - 46k [Update metadata](#)
3. [Amsterdam, the Netherlands \(the city where I live...\)](#)
 Lots of pictures taken when walking around this very ... Total images: 79 | Last update: 2008-02-16 | © JAlbum & Chameleon | Help © Ivan Herman, 2007 ...
<http://www.ivan-herman.net/Photos/Amsterdam/> - 53k [Update metadata](#)
4. [Ivan Herman](#)



Summary

- **Linked Data is a generic approach for publishing structured data on the Web.**
- **Linked Data builds on the classic architecture of the Web.**
- **The Web of Linked Data is growing rapidly.**
- **There is an increasing number of application prototypes that consume Linked Data from the Web.**

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Thanks!

References

- **W3C Linking Open Data Project Wiki**
<http://esw.w3.org/topic/SweoIG/TaskForces/CommunityProjects/LinkingOpenData>
- **Tutorial on How to Publish Linked Data on the Web**
<http://www4.wiwiss.fu-berlin.de/bizer/pub/LinkedDataTutorial/>

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