

Semantic Web Activities @ W3C

Ivan Herman

2012-05-30

(Changing slide set, re-used and a copy frozen for a specific presentation)

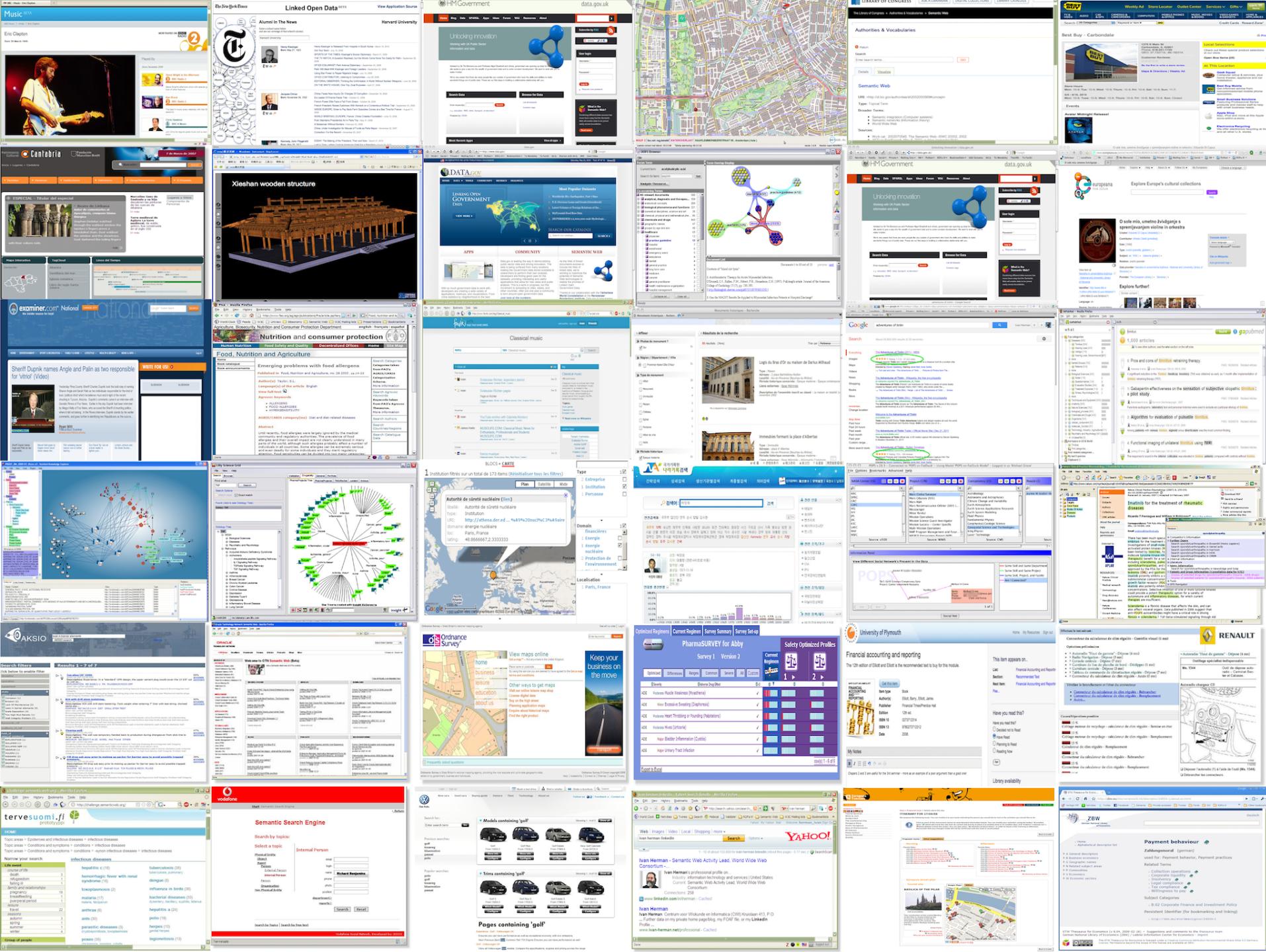


Before going into details...

What does the term “Semantic Web” mean to people?



衆瞽
摸象之圖



For some people, Semantic (Web) is...

- ▶ A system manipulating and analyzing knowledge bases
 - e.g., via big ontologies, vocabularies
 - Google's Knowledge Graph?
- ▶ Improve search by adding structure to embedded data
- ▶ A means to *integrate* many different pieces of data
- ▶ Integrate data-oriented applications
- ▶ And a mixture of all these...

http://ai.bjut.edu.cn/WebAA4/openVRML.jsp?vrml=e29cda60-f9ad-4ba8-a6ac-29a95a5d4f37.wrl Live Search

文件(F) 编辑(E) 查看(V) 收藏夹(B) 工具(T) 帮助(H) Norton AntiVirus 转换 选择

vrml展示页面

Xieshan wooden structure

walk

fly

study

plan

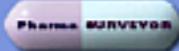
pan

turn

roll

CORTONA VRML CLIENT

goto align view restore fit

[Optimized Regimens](#)[Current Regimen](#)[Survey Summary](#)[Survey Set-up](#)

PharmaSURVEY for Abby

Survey 1 Version 2

Current
Regimen

Safety Optimized Profiles



1 ►



2 ►

Severity		Adverse Drug Effect		v2	▼	▼	▼
ADE	Moderate Muscle Weakness (Myasthenia)			✓			
ADE	Minor Excessive Sweating (Diaphoresis)			✓			
ADE	Moderate Heart Throbbing or Pounding (Palpitations)			✓			
ADE	Moderate Hives (Urticaria)			✓			
ADE	Major Bladder Inflammation (Cystitis)			✓			
ADE	Major Urinary Tract Infection			✓			

row(s) 1 - 6 of 6

[Export to Excel](#)

MUSIC BETA

GENRES ARTISTS REVIEWS NEWS BLOG

QUICK FIND

 Enter an artist name ...

BBC Music > Artists > Eric Clapton

Eric Clapton

Born 30 March 1945.

MOST PLAYED ON BBC RADIO

Biography

Eric Patrick Clapton, CBE (born 30 March 1945) is an English blues-rock guitarist, singer, songwriter and composer. Clapton has been inducted into the Rock and Roll Hall of Fame as a solo performer, as a member of rock bands; the Yardbirds and Cream. Clapton is the only person ever to be inducted three times. Often viewed by critics and fans alike as one of the most important and influential guitarists of all time, Clapton was ranked fourth in Rolling Stone magazine's list of the "100 Greatest Guitarists of All Time" and #53 on their list of the Immortals: 100 Greatest Artists of All Time.

Latest Tracks Played On The BBC

Promises

BBC Radio 2 | [Ken Bruce 22/02/2010](#)

Bad Love

BBC Radio 2 | [Alex Lester 22/02/2010](#)

Lay Down Sally

BBC Radio 2 | [Chris Evans Breakfast 18/02/2010](#)

I Ain't Gonna Stand For It

BBC Radio 2 | [Alex Lester 15/02/2010](#)

Wonderful Tonight

BBC Radio 2 | [Ken Bruce 10/02/2010](#)

Audio Previews From Latest Album Review



Me And Mr Johnson

8 Milkcow's Calf Blues

10 Come on in My Kitchen



Netvibes ▾ Feedly Social ▾ Private ▾ Mailing lists ▾ SW ▾ Python ▾ RDFa it! ▾ Bookmarklets ▾ Add Zemanta bit.ly To Mendeley TinyURL To Faviki Dokuwiki

In this focus, he is credited as an innovator in a wide variety of genres. These include blues-rock (with John Mayall & the Bluesbreakers and The Yardbirds) and psychedelic rock (with Cream). Clapton's chart success was not limited to the blues, with chart-toppers in Delta Blues (Me and Mr. Johnson), pop ("Change the World") and reggae (Bob Marley's "I Shot the Sheriff") (He is often credited for bringing reggae and Bob Marley to the mainstream.) Two of his most successful recordings were the hit love song "Layla", which he played with the band Derek and the Dominos, and Robert Johnson's "Crossroads", which has been his staple song since his days with Cream.

[Read more at Wikipedia...](#)

WIKIPEDIA

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Links & Information

LINKS

[Official homepage at ericclapton.com](#)

[Fanpage at whereseric.com](#)

[Wikipedia article on Eric Clapton](#)

[MySpace at myspace.com/ericclapton](#)

[Last.fm page on Eric Clapton](#)

[MusicBrainz entry on Eric Clapton](#)

MEMBER OF [Derek and the Dominos](#), [Blind Faith](#) (1968–1969), [Cream](#) (1966–1968), [John Mayall & The Bluesbreakers](#) (1965–1966), [The Yardbirds](#) (1963–1965)

COLLABORATED ON [J.J. Cale & Eric Clapton](#), [Eric Clapton & The Immediate All Stars](#), [Eric Clapton & The Impressions](#), [Eric Clapton & Jimmy Page](#), [Eric Clapton & David Sanborn](#), [Eric Clapton & Stan Webb's Chicken Shack](#), [Eric Clapton & The Powerhouse](#), [Eric Clapton & Stevie Ray Vaughan](#), [Eric Clapton & Marc Shaiman](#), [The Dirty Mac](#), [Bob Dylan](#), [Roger McGuinn](#), [Tom Petty](#), [Neil Young](#), [Eric Clapton & George Harrison](#), [Jimmie Vaughan](#), [Eric Clapton](#), [Bonnie Raitt](#), [Robert Cray](#), [B.B. King](#), [Buddy Guy](#), [Dr. John & Art Neville](#), [Elton John & Eric Clapton](#), [Michael Kamen](#), [Eric Clapton and David Sanborn](#), [B.B. King & Eric Clapton](#), [Mark Knopfler & Eric Clapton](#), [Paul McCartney & Eric Clapton](#), [Sting with Eric Clapton](#), [Steve Winwood & Eric Clapton](#)

Links & information come from [MusicBrainz](#). You can add or edit information about [Eric Clapton](#) at [musicbrainz.org](#). Find out more about [our use of this data](#). The BBC is not responsible for the content of external sites

Latest News Stories

Played By

Since December 2008



Alex Lester
2 BBC Radio 2



Steve Wright in the Afternoon
2 BBC Radio 2



Sarah Kennedy
2 BBC Radio 2



Wake Up to Wogan
2 BBC Radio 2



Ken Bruce
2 BBC Radio 2



Steve Wright's Sunday Love Songs
2 BBC Radio 2



Jeremy Vine
2 BBC Radio 2

Information displayed about artists played on BBC programmes is incomplete
[out more about this artist play count information](#).

The Telegraph

Monday 09 April 2012

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Oscars 2012: The Artist, review

The Artist, an utterly beguiling silent, black-and-white celebration of early Hollywood won Best Picture at the Oscars 2012.

★★★★★



To attend an Info
Session or Masterclass
Or download a brochure

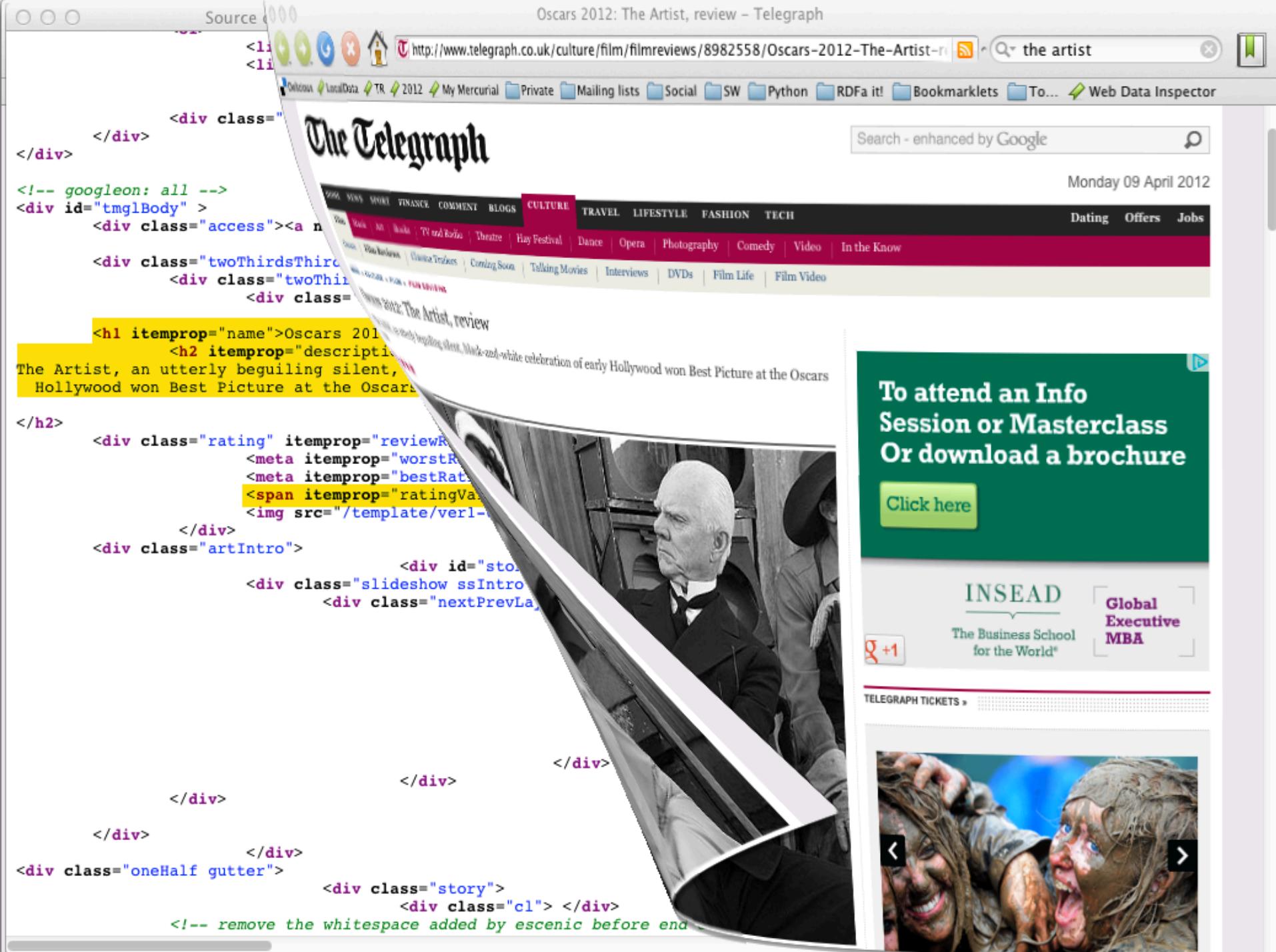
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News

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More

Amsterdam

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Any time

Past hour

Past 24 hours

Past week

Past month

Past year

Custom range...

More search tools

The Artist showtimes for Amsterdam

[Pathé Tuschinski](#) - Reguliersbreestraat 26-34, Amsterdam - [Map](#)
11:50 - 14:05 - 19:10

[Filmtheater "De Uitkijk"](#) - Prinsengracht 452, Amsterdam - [Map](#)
12:15 - 19:00 - 21:15

[Filmtheater Rialto](#) - Ceintuurbaan 338, Amsterdam - [Map](#)
12:45

[+ Show more theaters](#)

The Artist (2011) - IMDb

www.imdb.com/title/tt1655442/

Silent **movie** star George Valentin bemoans the coming era of talking ... Still of Jean Dujardin and Missi Pyle in **The Artist** Still of Bérénice Bejo in **The Artist** Reem ...

↳ [Full cast and crew - The Artist Trailer \(Official ... - Bérénice Bejo - Jean Dujardin](#)

The Artist (film) - Wikipedia, the free encyclopedia

[en.wikipedia.org/wiki/The_Artist_\(film\)](http://en.wikipedia.org/wiki/The_Artist_(film))

The Artist is a 2011 French romantic comedy drama in the style of a black-and-white silent film written and directed by Michel Hazanavicius, starring Jean ...

↳ [Jean Dujardin - Bérénice Bejo - Uggie - Diegesis](#)

The Artist Trailer 2011 HD - YouTube

www.youtube.com/watch?v=O8K9AZcSQJE

25 Aug 2011 - 3 min - Uploaded by TrailersApplecom

I love how George Clooney, and Brad Pitt, lost the Best actor catagory to this **film**. It just shows that there is ...

[More videos for the artist movie »](#)

Oscars 2012: The Artist, review - Telegraph

www.telegraph.co.uk/Culture/Film/Film_Reviews

★★★★★ Review by Robbie Collin

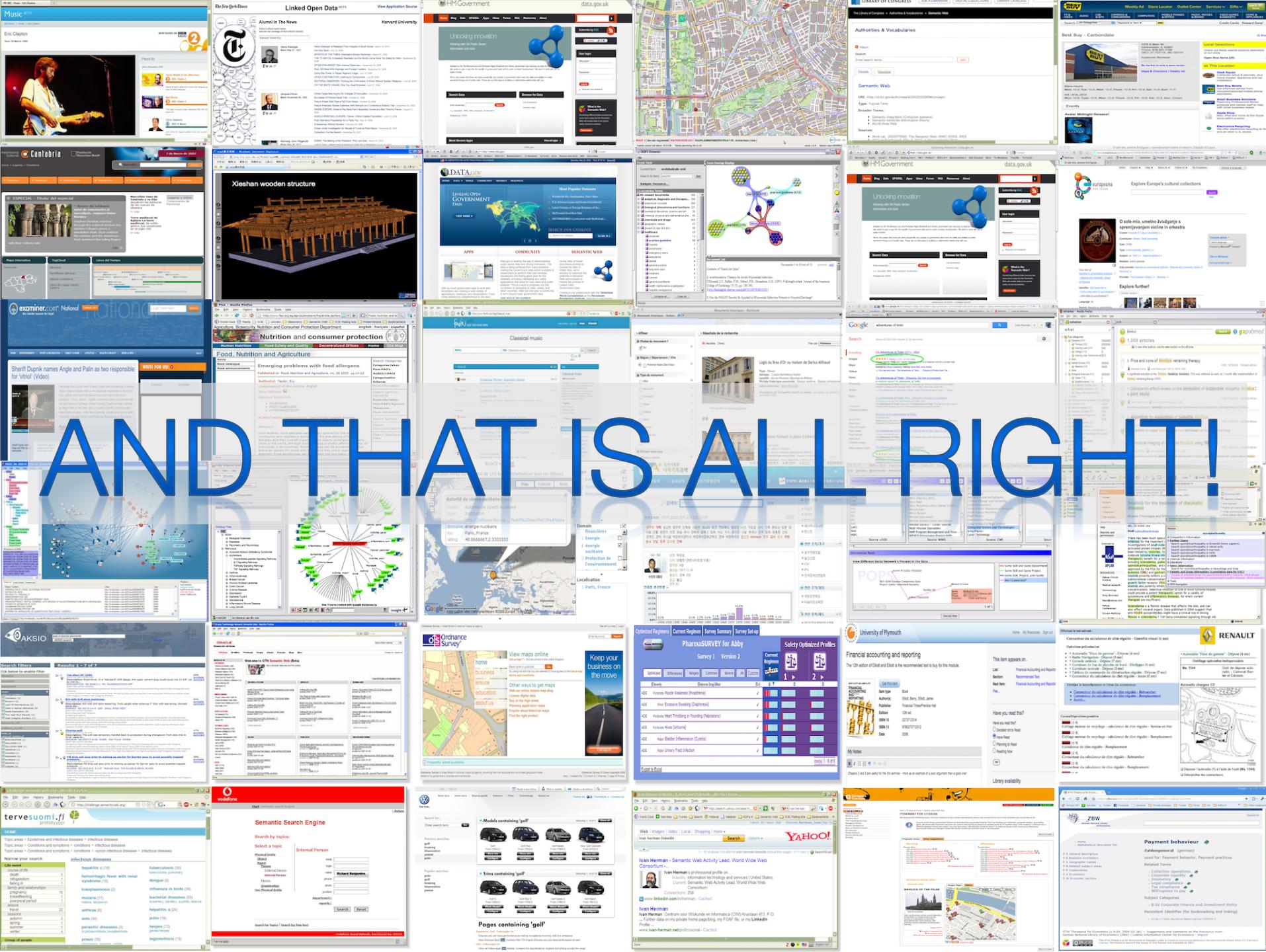
27 Feb 2012 – **The Artist**, the final **film** to be released in 2011 and also the most heart-swellingly joyful one, is a silent **movie**, screened in black and white and ...

[The Artist is the perfect **film** about Hollywood | Hadley Freeman](#)

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And that is all right!



- ▶ We have to acknowledge that the field has grown and has become multi-faceted
- ▶ All different “views” have their success stories
- ▶ There are also no clear and water-proof boundaries between the different views
- ▶ The question is: where is the emphasis?

An obvious trend: Data on the Web

- ▶ There are more and more data on the Web
 - government data, health related data, general knowledge, company information, flight information, restaurants,...
- ▶ More and more applications rely on the availability of that data

A photograph of two large, cylindrical industrial silos made of corrugated metal. They are situated on a stone foundation. The silo on the right has a green metal walkway attached to its side. The background is a clear blue sky.

But: we do not want that!

Imagine...

- ▶ A “Web” where
 - documents are available for download on the Internet
 - but there would be no hyperlinks among them

CoCoDat - Collation of Cortical Data - Mozilla Firefox

File Edit View History Bookmarks Tools Help

CoCoMac DATABASES ORT EXAMPLES

<http://www.cocomac.org>

CoCoDat: Collation of Cortical [and microcircuitry] Data

CoCoDat is a microcircuitry database that published experimental reports. The data and cellular compartment), as well as the

- Morphology
- Firing properties
- Ionic currents
- Ionic conductances
- Synaptic currents
- Connectivity

The database is available for download using data tables but also a Search Board with p manual or automatic relaxation of the sea

- Brain region
- Layer
- Neuron type

<http://www.cocomac.org/cocodat/catalyzer/index.html>

Cell Centered Database - Mozilla Firefox

File Edit View History Bookmarks Tools Help

<http://ccdb.ucsd.edu/sand/main?event=gallery&action=show&dpl=1>

Cell Centered Database™
National Center for Microscopy and Imaging Research **Gallery**

Data | Search | Gallery | Dictionary | Publications | MyCCDB | Data Download | Contact us | Help

2D image | Reconstruction | Segmentation | Animation

NeuronDB = Thalamic relay neuron - Overview (A) () - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Back Mode: **Overview** Data/Search plus Connectivity plus Classical References/Notes Models

Region: Distal equivalent dendrite Middle equivalent dendrite Proximal equivalent dendrite Soma Axon hillock Axon fiber Axon terminal All Compartments

Properties: Receptors Channels Transmitters **All Properties**

Interoperation: Gene and Chromosome Experimental Data (neurodatabase.org) Microscopy Data (CCDB)

Neuron type: principal Organism: Vertebrates

1. Equivalent dendrite
2. Distal equivalent dendrite
3. Middle equivalent dendrite
4. Proximal equivalent dendrite
5. Soma

Show other Show other Show other Show other Show other Show other

Z PIP logged out

W3C Semantic Web

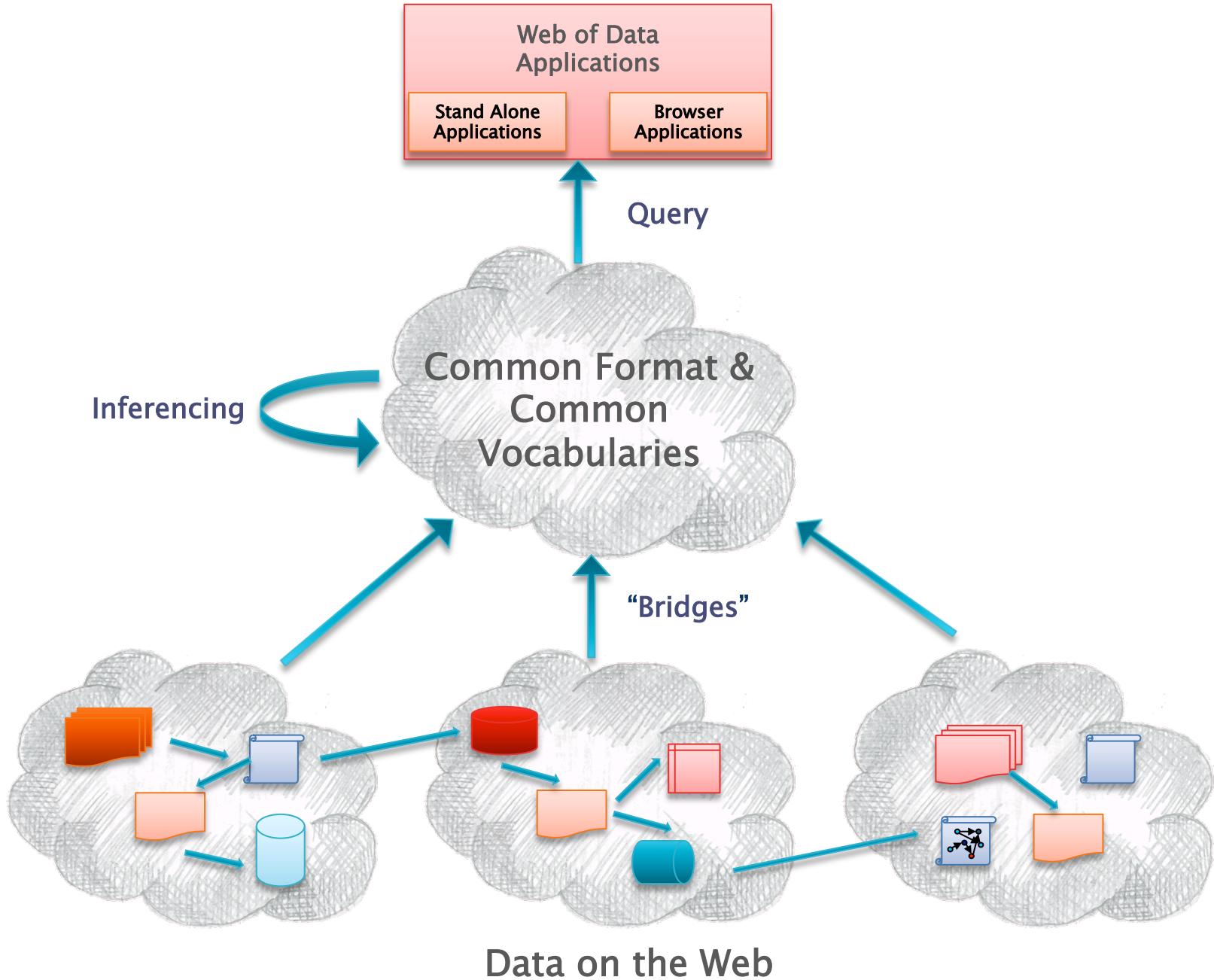
Data on the Web is not enough...

- ▶ We need a proper infrastructure for a real Web of Data
 - data is available on the Web
 - accessible via standard Web technologies
 - data are *interlinked over the Web*
 - the terms used for linkage are well defined
- ▶ I.e.: data can be integrated over the Web



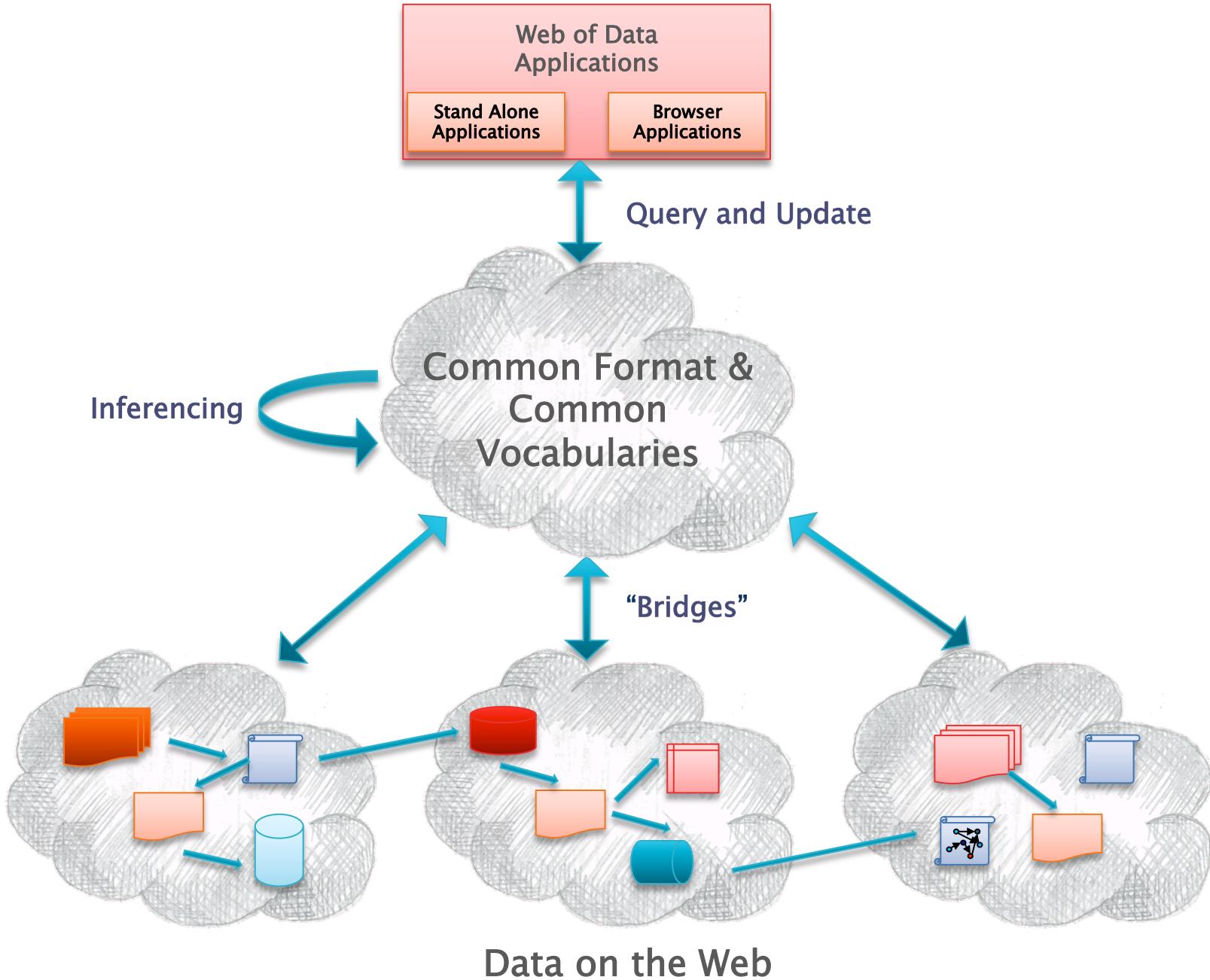
This is what we want!

Semantic Web technologies should be
at the service of such a Web of Data



On a longer term...

- ▶ Data should be easily manipulated from an application
 - i.e., read *and* write
- ▶ But this is still further down the road...





Views: desktop mobile print

STANDARDS

PARTICIPATE

MEMBERSHIP

ABOUT W3C

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W3C SEMANTIC WEB ACTIVITY

NEARBY

Activity news

Specifications

FAQ

Use Cases and Case Studies

List of Tools

On-line validators

List of Books

Semantic Web Logos and Buttons

SW Wiki

ACTIVITY RSS FEEDS

Activity news (RSS 1.0)

So... what is happening at W3C?

The Semantic Web is a web of data. There is lots of data we all use every day, and it is not part of the web. I can see my bank statements on the web, and my photographs, and I can see my appointments in a calendar. But can I see my photos in a calendar to see what I was doing when I took them? Can I see bank statement lines in a calendar?

Why not? Because we don't have a web of data. Because data is controlled by applications, and each application keeps it to itself.

The Semantic Web is about two things. It is about common formats for integration and combination of data drawn from diverse sources, where on the original Web mainly concentrated on the interchange of documents. It is also about language for recording how the data relates to real world objects. That allows a person, or a machine, to start off in one database, and then move through an unending set of databases which are connected not by wires but by being about the same thing.

[What is the Semantic Web?](#)

The **Semantic Web** provides a common framework that allows **data** to be shared and reused across application, enterprise, and community boundaries. It is a collaborative effort led by W3C with participation from a large number of researchers and industrial partners. It is based on the Resource Description Framework ([RDF](#)). See also the separate [FAQ](#) for further information.

The (almost) past

- ▶ Some technologies are, essentially, done:
 - Ontology for Media Resources
 - Media Fragments URI
 - SPARQL 1.1 (SPARQL Protocol and RDF Query Language)
 - RDB2RDF (Relational Databases to RDF)
 - RDFa 1.1 (RDF in attributes)

The present

- ▶ Some areas are subject of intensive work
 - RDF update
 - Provenance
 - Linked Data Platform

The future

- ▶ Just starting
 - Linked Data Platform
- ▶ We are discussing new works, new areas, e.g.,
 - Access Control issues
 - Constraint checking on Semantic Web data
 - ...

Link to specialized communities

- ▶ Various communities have different emphasis on which part of the Semantic Web they want to use
- ▶ W3C has contacts with some of those
 - health care and life sciences (a separate IG is up and running)
 - libraries, publishing
 - financials
 - the oil, gas, and chemicals community
 - governments
- ▶ ... but there are many more!

These links are not a one-way street!

- ▶ The communities often contribute technologies that can be used in general
- ▶ For example:
 - New vocabularies may come to the fore: SKOS or FRBR (from libraries), annotations (originally from the HCLS work), Person vocabularies (from the eGov work)
 - Health Care had a major influence on the Provenance work
 - etc.



Audio, Video, and Semantics



Audio and Video are now first class entities on the Web

But... video and audio on the Web is
not only what you see and hear

— it is also what you can search,
discover, distribute, and manage!

Ontologies for Media Resources

- ▶ The “usual” Semantic Web problem: what vocabularies to use?
- ▶ The problem is not that there aren’t any... but that there are too many!
 - EXIF, MPEG7, XMP, MRSS, ...
 - none of these cover *all* aspects
- ▶ The [Ontology for Media Resources](#) document
 - defines a core vocabulary
 - defines a set of mappings to other formats

Some Media Ontology terms

- ▶ Classes for Tracks (audio track, video track)
- ▶ Specific properties for media (average bit rate, frame height and width, locator)
- ▶ Some general “metadata” properties (copyright, creation date, creator, title)
- ▶ Most of these have a formal mapping
 - In some cases the mapping is “exact” (e.g. title vs. Dublin Core’s title)
 - In some cases it is more or less general (e.g., creator vs. XMP’s creator)

Media Fragment URIs

- ▶ Questions:
 - what is the standard URI for, say, a temporal fragment of a video?
 - what should be the behavior of the user agents for these URIs?
- ▶ These are covered by the [Media Fragments URI](#) document, e.g.
 - `http://www.example.com/video.ogv#t=10,20`
 - `http://www.example.com/video.ogv#track=audio`
 - `http://www.example.com/video.ogv#xywh=160,120,320,240`

Query RDF: SPARQL 1.1

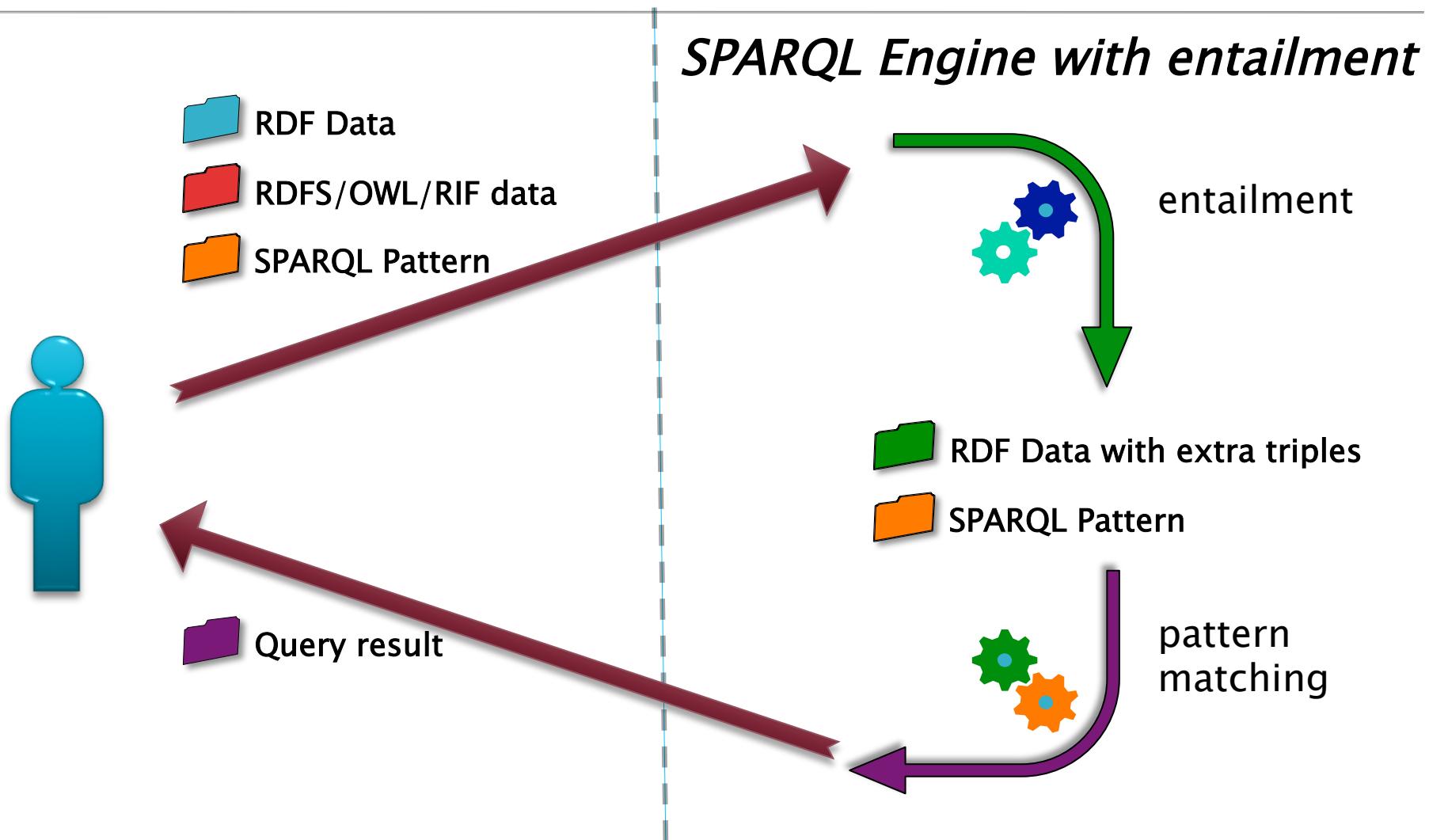
Reminder...

- ▶ *SPARQL is a query language on RDF data*
- ▶ SPARQL is defined in terms of a protocol, to send query and results over the Web
- ▶ Is based on the idea of “graph pattern matching”:
 1. a graph pattern is described in the query, with real and unknown nodes (“variables”)
 2. if the pattern can match a portion of the graph, the unknown nodes are replaced by the “real” ones
 3. resulting information is returned
- ▶ First version of SPARQL was published in 2008

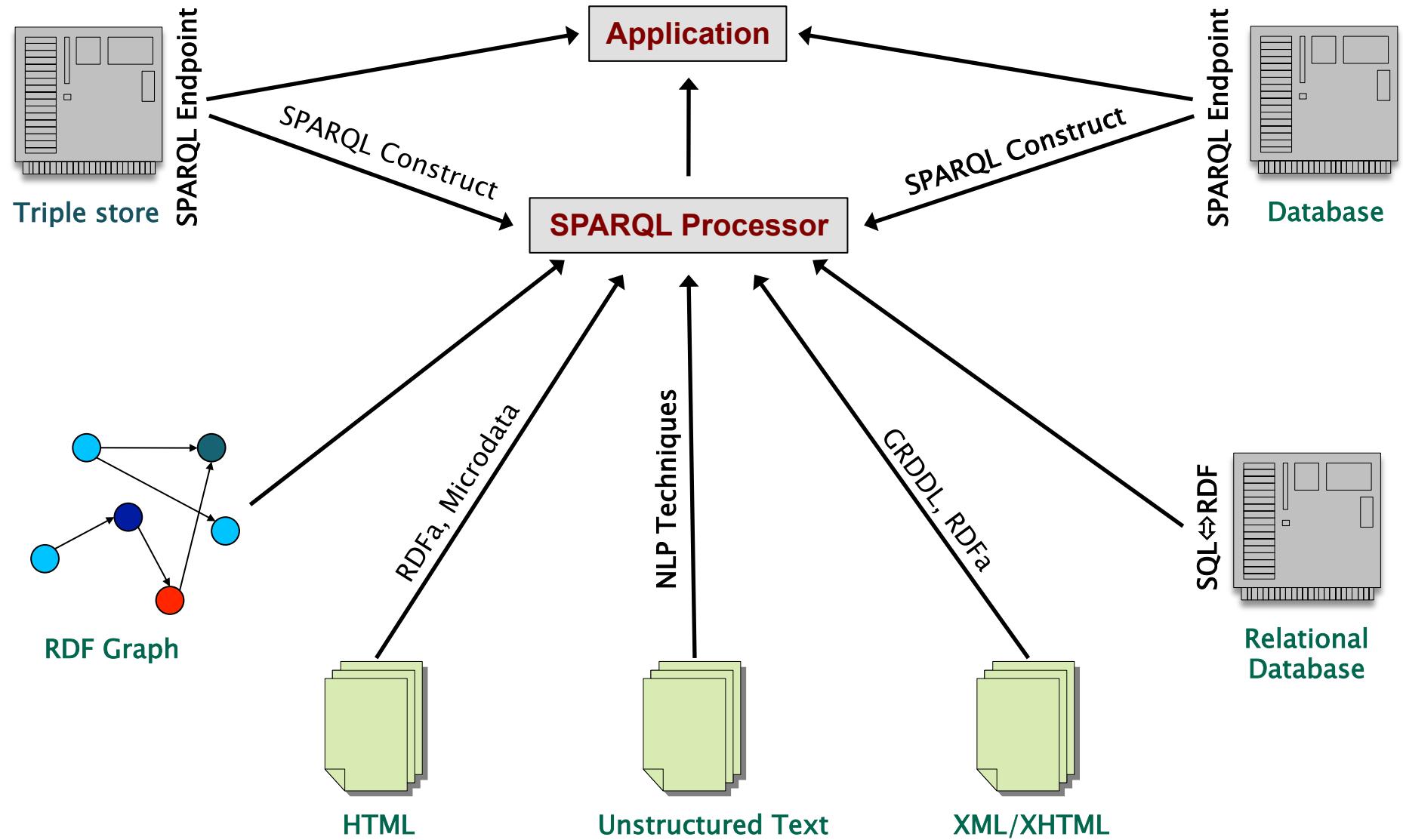
SPARQL 1.1: adding missing features to SPARQL

- ▶ Nested queries (i.e., **SELECT** within a **WHERE** clause)
- ▶ Negation (**MINUS**, and a **NOT EXIST** filter)
- ▶ Aggregate function on search results (**SUM**, **MIN**,...)
- ▶ Property path expression (**?x foaf:knows+ ?y**)
- ▶ SPARQL UPDATE facilities (**INSERT**, **DELETE**, **CREATE**)
- ▶ Combination with entailment regimes

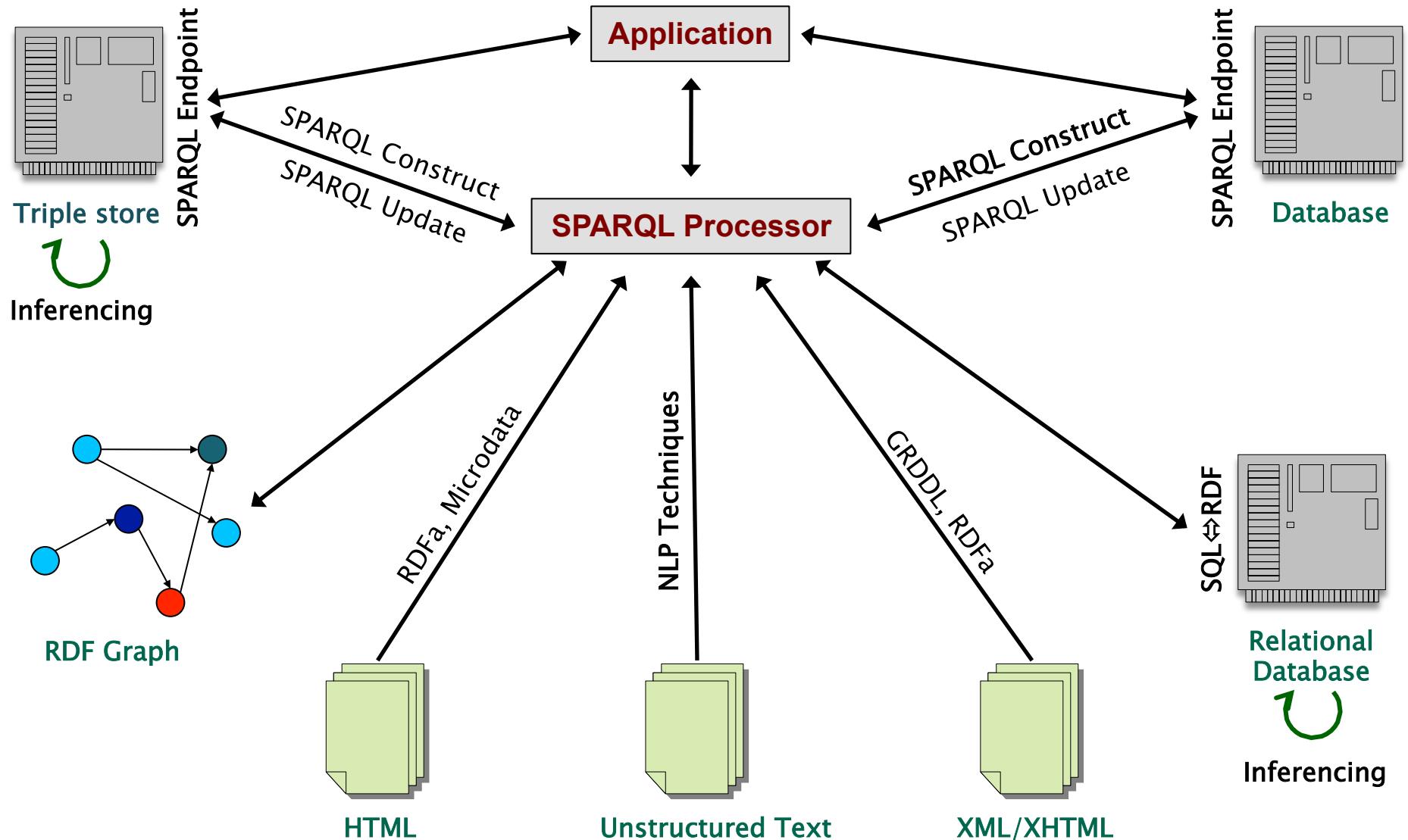
SPARQL 1.1 and RDFS/OWL/RIF



SPARQL as a unifying point



SPARQL 1.1 as a unifying point



SPARQL 1.1 Status

- ▶ Technology has been finalized
- ▶ Goes to “Proposed Recommendation” soon
- ▶ Should be finished this fall

Access to Relational Databases



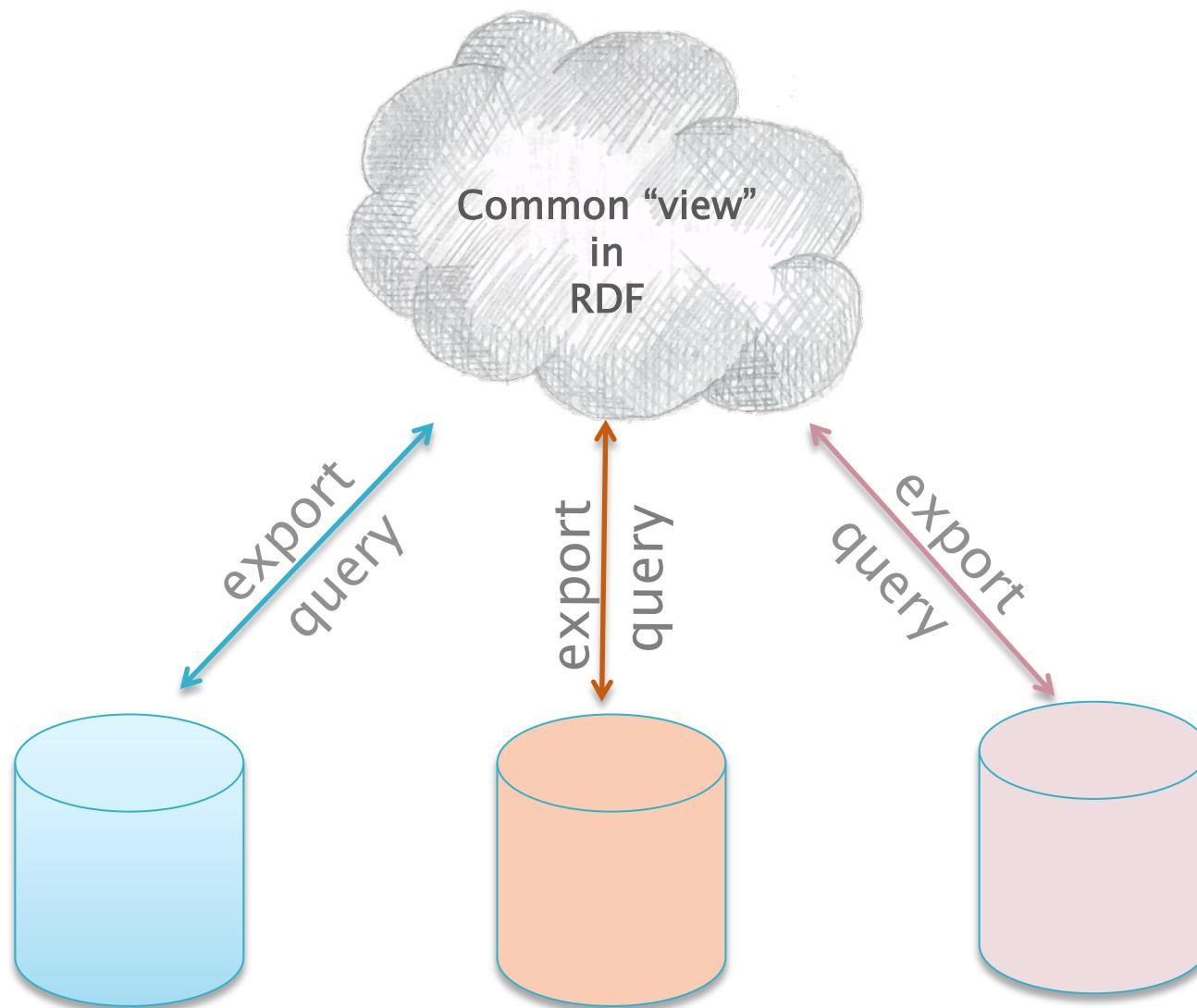
Relational Databases and RDF

- ▶ Most of the data on the Web is, in fact, in RDB-s
- ▶ Proven technology, huge systems, many vendors...
- ▶ Data integration on the Web must provide access to RDB-s
- ▶ *RDB2RDF provides means to “see” relational data as RDF*

Many RDB systems can handle RDF

- ▶ Relational database vendors realize the importance of the Semantic Web market
- ▶ Many systems have a “hybrid” view:
 - traditional, relational storage, usually coupled with SQL
 - RDF storage, usually coupled with SPARQL
 - examples: Oracle 3g, IBM’s DB2, OpenLink Virtuoso,...

RDF provides a common “view”



What is “export”?

- ▶ “Export” does not *necessarily* mean physical conversion
 - for very large databases a “duplication” would not be an option
 - systems may provide SPARQL \leftrightarrow SQL “bridges” to make queries on the fly
- ▶ Result of export is a “logical” view of the RDB content

Simple export: Direct Mapping

- ▶ A canonical RDF “view” of RDB tables
- ▶ Only needs the information in the RDB Schema

Fundamental approach

Each column name provides a predicate

ISBN	Author	Title	Publisher	Year
0006511409X	id_xyz	The Glass Palace	id_qpr	2000
0007179871	id_xyz	The Hungry Tide	id_qpr	2004

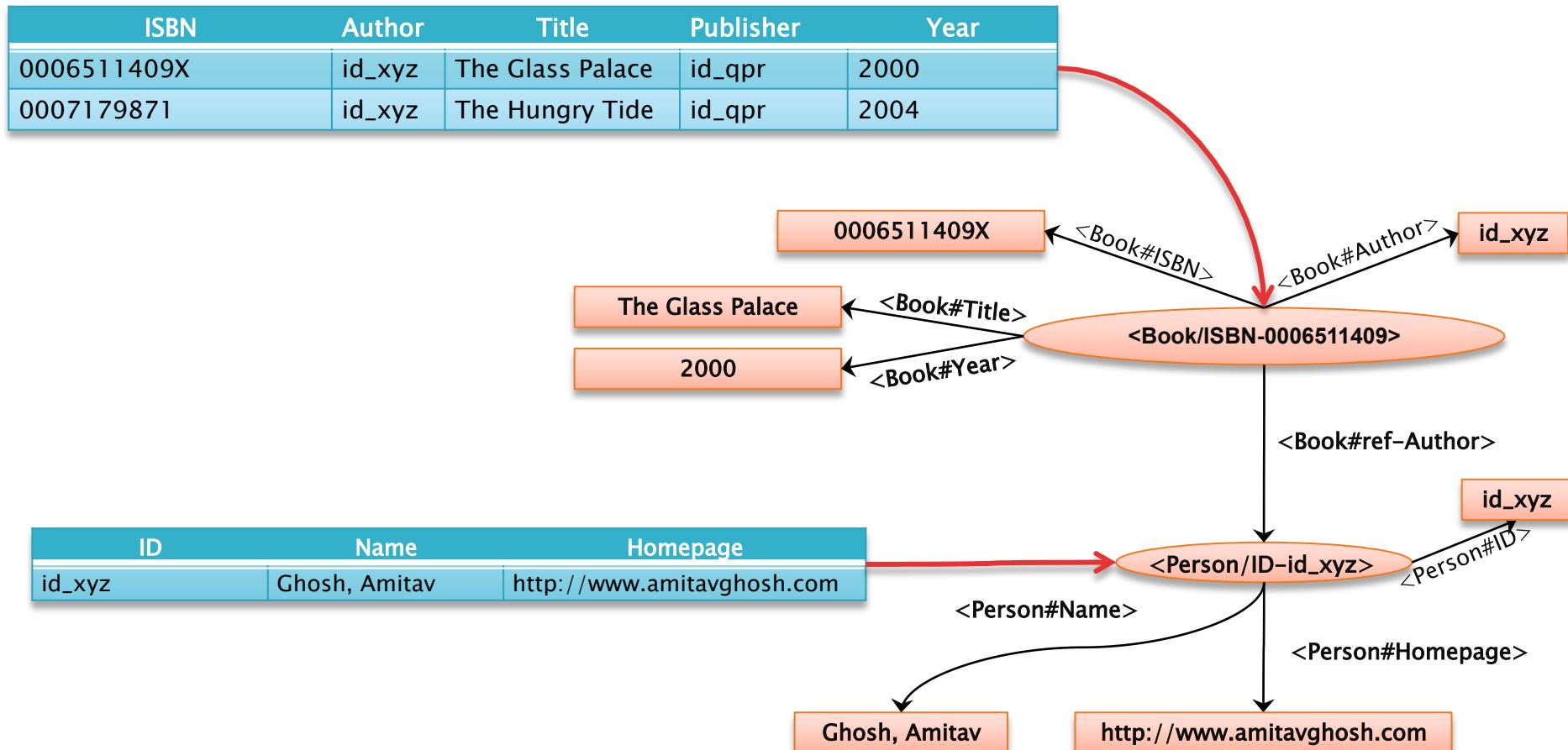
Each row is a subject

Table references are URI objects

Cells are Literal objects

ID	Name	Homepage
id_xyz	Ghosh, Amitav	http://www.amitavghosh.com

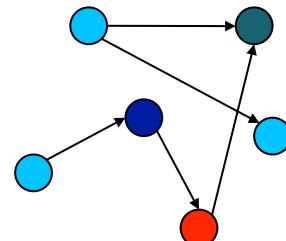
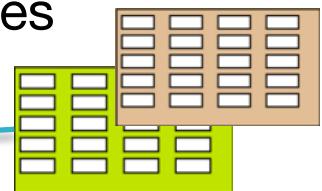
Fundamental approach



RDB
Schema

Direct
Mapping

Tables



“Direct Graph”

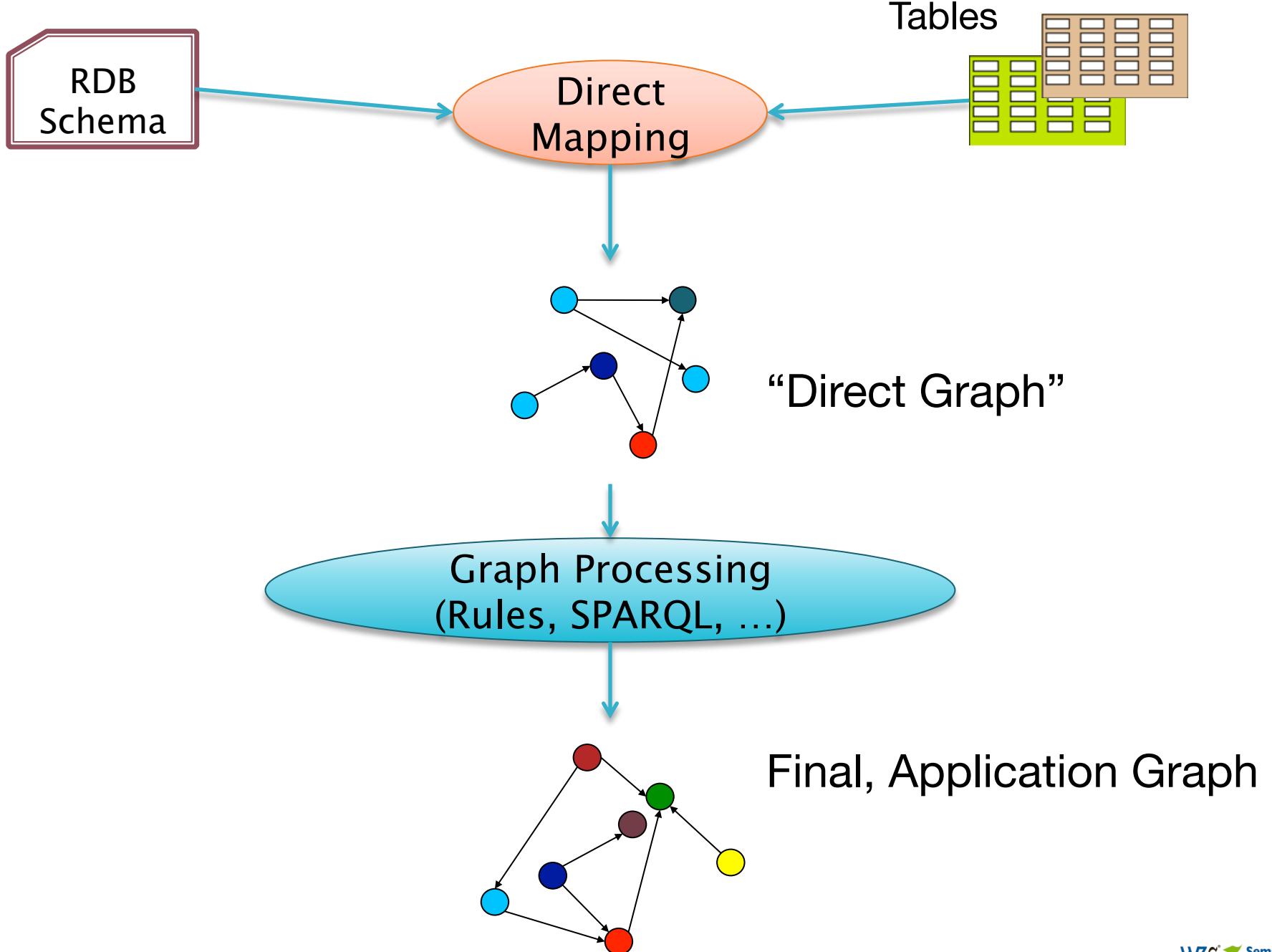
Pros and cons of Direct Mapping

- ▶ Pros:

- Direct Mapping is simple, does not require any other concepts
- know the Schema ⇒ know the RDF graph structure
- know the RDF graph structure ⇒ good idea of the Schema(!)

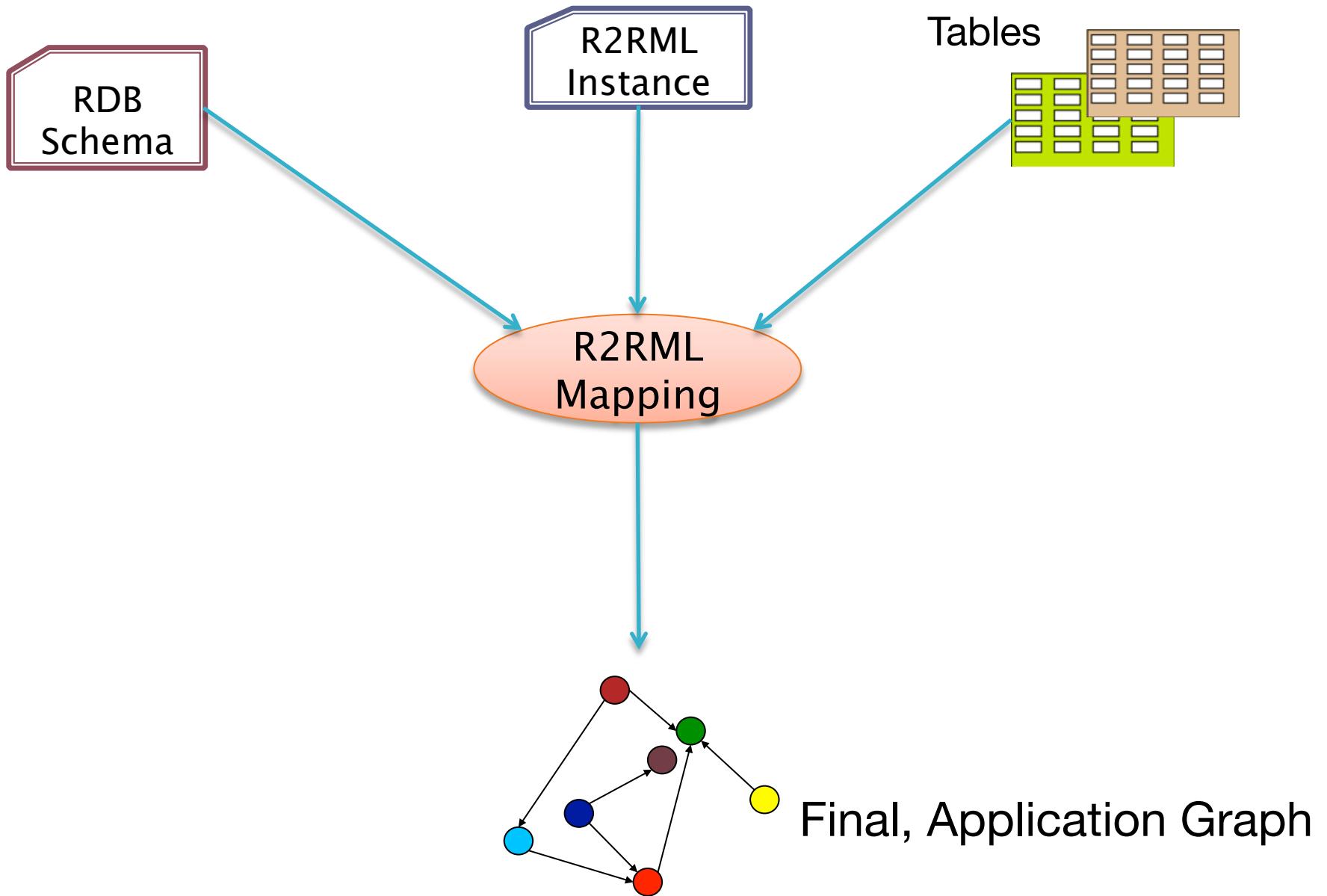
- ▶ Cons:

- the resulting graph is not what the application really wants



Beyond Direct Mapping: R2RML

- ▶ Separate vocabulary to control the details of the mapping, e.g.:
 - finer control over the choice of the subject
 - creation of URI references from cells
 - predicates may be chosen from a vocabulary
 - datatypes may be assigned
 - etc.
- ▶ Gets to the final RDF graph with one processing step



Relationships to the Direct Mapping

- ▶ Fundamentals are similar:
 - each row is turned into a series of triples with a common subject
- ▶ Direct mapping is a “default” R2RML mapping

R2RML and Direct Mapping Status

- ▶ Technology has been finalized
- ▶ Implementations revealed some minor issues to fold into the specification
- ▶ Should be finished this summer

28
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- Zet je eerste stappen met jQuery Mobile
- Maak een HTML5-pagina met nieuwe lay-out-tags
- Soepele afbeeldingseffecten met jQuery



IE9-PROMOTIE EN
HTML5-EXPERIMENT
These Days presenteert
Microsofts designwedstrijd
Formate Fest



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voor de Apple iPad

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BPB 710966 113769



01135

Photo credit "shetladd", Flickr

HTML pages are a huge source of structured data

- ▶ Not necessarily large amount of data per page, but lots of them...
- ▶ Have become very valuable to search engines
 - Google, Bing, Yahoo!, or Yandex (i.e., schema.org) all committed to use such data
- ▶ Two syntaxes have emerged at W3C:
 - microdata with HTML5
 - RDFa with HTML5, XHTML, and with XML languages in general

```
<li class="list-item">
<li><a href="#">
```

```
</div>
</div>
```

```
<!-- googleon: all -->
```

```
<div id="tmglBody" >
<div class="access"><a name="a1" href="#">
```

```
<div class="twoThirdsThird2 gutter">
<div class="twoThirds gutt">
<div class="story">
```

```
<h1 itemprop="name">Oscars 2012: The Artist, review</h1>
<h2 itemprop="description">
```

```
The Artist, an utterly beguiling silent, black-and-white celebration of early Hollywood won Best Picture at the Oscars 2012
```

```
</h2>
```

```
<div class="rating" itemprop="reviewRating">
<meta itemprop="worstRating" />
<meta itemprop="bestRating" />
<span itemprop="ratingValue" />

```

```
</div>
<div class="artIntro">
```

```
<div id="storyEmbed" style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;">
```

```
<div class="slideshow ssIntro">
```

```
<div class="nextPrevLayer">
```

```
<!-- remove the whitespace added by escenic before end of
```



Search - enhanced by Google

Monday 09 April 2012

Dating Offers Jobs

CULTURE TRAVEL LIFESTYLE FASHION TECH

TV & Film Trailblazers Theatre Gay Festival Dance Opera Photography Comedy Video In the Know

Shows Dates Times Coming Soon Talking Movies Interviews DVDs Film Life Film Video

Reviews

Books DVDs

Film Life Film Video

Reviews

Books DVDs

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Reviews

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```
<li class="first"><a href="/">Home</a><span>&raquo;</span></li>
<li><a href="http://www.telegraph.co.uk/culture/">Culture</a><span>&raquo;</span></li>
    <li><a href="http://www.telegraph.co.uk/culture/film/">Film</a><span>&raquo;</span></li>
    <li class="styleSix"><a href="http://www.telegraph.co.uk/culture/film/filmreviews/">Film reviews</a></li>
</div>
</div>

<!-- googleon: all -->
<div id="tmglBody" >
    <div class="access"><a name="article"></a></div>

    <div class="twoThirdsThird2 gutterUnder">
        <div class="twoThirds gutter" itemscope itemtype="http://schema.org/Review">
            <div class="storyHead">

                <h1 itemprop="name">Oscars 2012: The Artist, review</h1>
                <h2 itemprop="description">
                    The Artist, an utterly beguiling silent, black-and-white celebration of early Hollywood won Best Picture at the Oscars 2012.
                </h2>
                <div class="rating" itemprop="reviewRating" itemscope itemtype="http://schema.org/Rating">
                    <meta itemprop="worstRating" content = "0.5">
                    <meta itemprop="bestRating" content = "5">
                    <span itemprop="ratingValue" class="hidden">5</span>
                    
                </div>
                <div class="artIntro">
                    <div id="storyEmbSlide">
                        <div class="slideshow ssIntro">
                            <div class="nextPrevLayer">
                                <div class="ssImg">
                                    
                                <div class="artImageExtras" >
                                    <div class="ingCaptionCredit">
                                        <span class="caption">Bérénice Bejo as Rita in The Artist</span>
                                    </div>
                                </div>
                            </div>
                        </div>
                    </div>
                </div>
            </div>
            <div class="oneHalf gutter">
                <div class="story">
                    <div class="cl"> </div>
                    <!-- remove the whitespace added by scenic before end of </a> tag -->
                </div>
            </div>
        </div>
    </div>
</div>
```

In RDF...

```
[ rdf:type schema:Review ;
  schema:name "Oscars 2012: The Artist, review" ;
  schema:description "The Artist, an utterly beguiling..." ;
  schema:ratingValue "5" ;
  ...
]
```



Ivan Herman

Who am I?

I graduated as mathematician at the [Eötvös Loránd University of Budapest](#), Hungary, in 1979. After a brief scholarship at the Université Paris VI I joined the Hungarian research institute in computer science ([SZTAKI](#)) where I worked for 6 years (and turned into a computer scientist...). I left Hungary in 1986 and, after a few years in industry in Munich, Germany, I joined the [Centre Mathematics and Computer Sciences \(CWI\)](#) in Amsterdam where I have a tenure position since 1988. I received a PhD degree in Computer Science in 1990 at the [University of Leiden](#), in the Netherlands. I joined the [World Wide Web Consortium \(W3C\)](#) Team as Head of [W3C Offices](#) in January 2001 while maintaining my position at CWI. I served as Head of Offices until June 2006, when I was asked to take the [Semantic Web Activity](#) Lead position, which is now my principal work at W3C.

Before joining W3C I worked in quite different areas (distributed and dataflow programming, language design, system programming), but I spend most of my research years in computer graphics and information visualization. I also participated in various graphics related ISO standardization activities and software developments. My "[professional](#)" [home page](#) contains a list of [my publications](#) (see also [my Mendeley account](#)), [my public presentations](#), and details of the various projects I participated in the past. There is also a [dblp entry for my publications](#) generated automatically (although I am not sure it is complete...). (B.t.w., based on my publications, my Erdős number is ≤ 4 ...)

In my previous life (i.e., before joining W3C...) I was member of the Executive Committee of the [Eurographics Association](#) for 15 years, and I was vice-chair of the Association between 2000 and 2002. I was the co-chair of the [9th World Wide Web Conference](#), in Amsterdam, May 2000; since then, I have also been member of [IW3C2 \(International World Wide Web Conference Committee\)](#), responsible for the World Wide Web Conference series. Since autumn 2007 I am also member of [SWSA \(Semantic Web Science Association\)](#), the committee responsible for the International Semantic Web Conferences (better known as "ISWC") series.

Some personal data

- The Hungarian spelling of my full name is Herman Iván. Ie, my name is Ivan (well, spelled properly: Iván) and my surname is Herman (many in the Netherlands and in Germany mix it up, and use "Herman" as my name... this is aggravated by the fact that, uniquely in Europe, the Hungarian custom is to put surname first).
- Nationalities: French and Hungarian
- Gender: male
- Family: I am married and have a son, David.
- Date and city of birth: 24th February, 1955, [Budapest](#), Hungary
- Email addresses: 'ivan' on my own ivan-herman.net domain, 'ivan' on the w3.org domain, or 'ivan.herman' on the cwi.nl domain
- (Mobile) Phone: +31-641044153
- Skype ID: ivan_herman
- I live in [Amstelveen](#) (see also [geonames](#)), the Netherlands (lat: 52.302063, long: 4.87397). This is a suburb of [Amsterdam](#). The closest airport is Amsterdam Schiphol
- I am the administrator of the Semantic Web Activity Blog at W3C which can either be accessed [directly](#) or via [its](#)



some links

- [personal homepage](#)
- [more data on me](#)
- [personal blog \(RSS feed\)](#)
- [homepage at W3C](#)
- ["professional" homepage](#)
- ["official" CV](#)
- [more about me](#)
- [my photos](#)

"social" links

- [facebook](#)
- [flickr](#)
- [picasa web](#)
- [linkedin](#)
- [IWIW](#)
- [tripit](#)
- [twitter](#)
- [Mendeley](#)
- [Google+](#)
- [freebase](#)



Ivan Herman

Who am I

I graduated as mathematician at the Eötvös Loránd University of Budapest, Hungary, in 1979. After the Université Paris VI I joined the Hungarian research institute in computer science (SZTAKI) (and turned into a computer scientist...). I left Hungary in 1986 and, after a few years joined the Centre Mathematics and Computer Sciences (CWI) in Amsterdam where I received a PhD degree in Computer Science in 1990 at the University of Leiden. Web Consortium (W3C) Team as Head of W3C Offices in January 1994 until June 2006, when I was asked to take principal work at W3C.

Before joining W3C I worked in quite a few different areas of computer programming, but I spent most of my time working on various web page content management systems.

he < a re

property="dc:creator"
as Head of < a re

"owl:sameAs" href="

"owl:sameAs" href="[http://](#)
"foaf:workplaceHomepage"

erty="schema:jobTitle" conte

joining W3C I worked in quite

Journal of World War II Studies

previous life (i.e., before j

nal data

¹ The Hungarian spelling of my first name.

name is <span property="foa

```
property="foaf:givenname schema:  
property="foaf:surname schema:
```

in the Netherlands and in Ge

Dimensione: 2000 mm x 1000 mm

After receiving scholarship at worked for 6 years in Munich, Germany, I held position since 1988. In 1992 I joined the World Wide position at CWI. I served as position, which is now my

ming, language design, system information visualization. I also opments. My “**professional**” home entations, and details of the various ted automatically (although I am not

mittee of the Eurographics Association, the co-chair of the 9th World Wide Web W3C2 (International World Wide Web) since autumn 2007 I am also member of International Semantic Web Conferences.

Ivan (well, spelled properly: Iván) and my p, and use "Herman" as my name... this is to put surname first).



some links

- personal homepage
 - more data on me
 - personal blog (RSS feed)
 - homepage at W3C
 - "professional" homepage
 - "official" CV
 - more about me
 - my photos

“social” links

- facebook
 - flickr
 - picasa web
 - linkedin
 - IWIW
 - tripit
 - twitter
 - Mendeley
 - Google+
 - firebase

```

<meta property="foaf:accountName" content="ivan-herman" />
</a>
</li>
<li>
  <a href="https://plus.google.com/u/0/113268051484517627727" typeof="foaf:OnlineAccount">
    <span property="foaf:accountServiceHomepage" href="http://www.mendeley.com/">Google+</span>
    <meta property="foaf:accountName" content="113268051484517627727" />
  </a>
</li>
<li>
  <a about="http://www.ivan-herman.net/foaf#me" rel="owl:sameAs" resource="http://rdf.freebase.com/ns/en.113268051484517627727" type="foaf:Person">
    <span property="foaf:name" href="http://www.ivan-herman.net/foaf#me">Ivan Herman</span>
    <meta property="foaf:title" content="Dr" />
    <h2>Who am I?</h2>
    <p>I graduated as mathematician at the <a rel="foaf:schoolHomepage schema:alumniOf" href="http://www.elte.hu/">ELTE</a> Budapest University of Technology and Economics<br/>I joined the <a rel="schema:worksFor" href="http://www.w3.org" resource="http://www.w3.org/Data#W3C">World Wide Web Consortium (W3C)</a><br/>
      <span property="dc:title">World Wide Web Consortium (W3C)</span>
    </p>
    Team as Head of <a rel="foaf:pastProject" href="http://www.w3.org/Consortium/Offices"><span property="dc:title">W3C</span></a><br/>
    <link rel="owl:sameAs" href="http://www.ivan-herman.net/me" />
    <link rel="owl:sameAs" href="http://www.ivan-herman.net/Ivan_Herman" />
    <link rel="foaf:workplaceHomepage" href="http://www.w3.org"/>
    <meta property="schema:jobTitle" content="Semantic Web Activity Lead" />
</li>
</ul>
</div>

<div id="content" >
  <h1 property="schema:name foaf:name">Ivan Herman</h1>
  <meta property="foaf:title" content="Dr" />
  <h2>Who am I?</h2>
  <p>I graduated as mathematician at the <a rel="foaf:schoolHomepage schema:alumniOf" href="http://www.elte.hu/">ELTE</a> Budapest University of Technology and Economics<br/>I joined the <a rel="schema:worksFor" href="http://www.w3.org" resource="http://www.w3.org/Data#W3C">World Wide Web Consortium (W3C)</a><br/>
    <span property="dc:title">World Wide Web Consortium (W3C)</span>
  </p>
  Team as Head of <a rel="foaf:pastProject" href="http://www.w3.org/Consortium/Offices"><span property="dc:title">W3C</span></a><br/>
  <link rel="owl:sameAs" href="http://www.ivan-herman.net/me" />
  <link rel="owl:sameAs" href="http://www.ivan-herman.net/Ivan_Herman" />
  <link rel="foaf:workplaceHomepage" href="http://www.w3.org"/>
  <meta property="schema:jobTitle" content="Semantic Web Activity Lead" />
</div>

<p>Before joining W3C I worked in quite different areas (distributed and dataflow programming, language design, system design, ...)</p>
<p>In my previous life (i.e., before joining W3C...) I was member of the Executive Committee of the <a rel="foaf:pastProject" href="http://www.w3.org/Consortium/Offices"><span property="dc:title">W3C</span></a><br/>
  <h2>Some personal data</h2>
  <ul>
    <li>The Hungarian spelling of my full name is <span property="foaf:name" lang="hu">Herman Iván</span>. Ie, my name is <span property="foaf:givenname schema:givenName">Ivan</span> (well, spelled properly: <span property="foaf:givenname schema:givenName" lang="hu">Iván</span>) and my surname is <span property="foaf:surname schema:familyName">Herman</span> (many in the Netherlands and in Germany mix it up, and use "Herman" as my name... this is aggravated by the fact that the Dutch spelling "Herman" is identical to the German spelling "Hermann")</li>
  </ul>
</div>

```

Yielding...

```
<http://www.ivan-herman.net/foaf#me>
  schema:alumniOf      <http://www.elte.hu> ;
  foaf:schoolHomePage <http://www.elte.hu> ;
  schema:worksFor     <http://www.w3.org/W3C#data> ;

...
<http://www.elte.hu>
  dc:title "Eötvös Loránd University of Budapest" .

...
<http://www.w3.org/W3C#data>
  dc:title "World Wide Web Consortium (W3C)"

...
```

RDFa and microdata: similarities

- ▶ Both have similar philosophies:
 - the structured data is expressed *via attributes only* (no specialized elements)
 - both define some special attributes
 - e.g., `itemscope` for microdata, `resource` for RDFa
 - both reuse some HTML core attributes (e.g., `href`)
 - both reuse the textual content of the HTML source, if needed
- ▶ RDF data can be extracted from both

RDFa and microdata: differences

- ▶ Microdata has been optimized for simpler use cases:
 - one vocabulary at a time
 - tree shaped data
 - no datatypes
- ▶ RDFa provides a full serialization of RDF in XML or HTML
 - the price is an extra complexity compared to microdata
- ▶ RDFa 1.1 Lite is a simplified authoring profile of RDFa, very similar to microdata

A relevant W3C note

- ▶ [HTML Data Guide](#)

- published by a separate W3C Task Force
- help publishers to choose what to use
- how to combine microdata and RDFa in one document

Structured data in HTML is mainstream!

... we see a five-fold increase in RDFa usage [...] over 7% of web pages containing microdata.

[Mail from Peter Mika, Yahoo!](#)

*Based on a crawl evaluation by P. Mika and T. Potter
LDOW2012 Workshop, April 2012, Lyon, France*

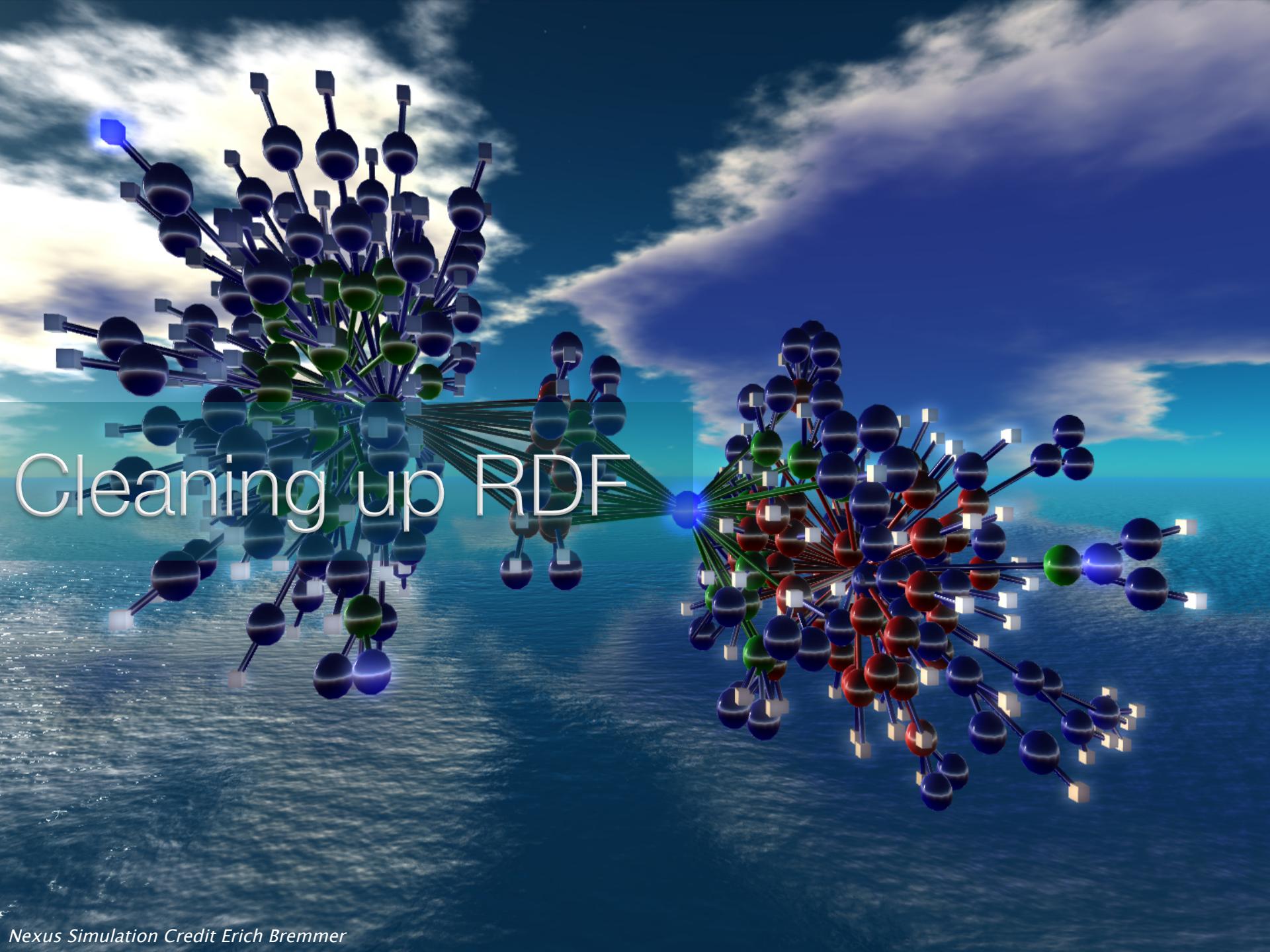
... web pages that contain structured data has increased from 6% in 2010 to 12% in 2012.

[Hannes Mühleisen and Christian Bizer](#)

*Web Data Commons—Extracting Structured Data from Two Large Web Corpora,
LDOW2012 Workshop, April 2012, Lyon, France*

RDFa 1.1 and microdata status

- ▶ For RDFa 1.1
 - Technology has been finalized
 - Is in “Candidate Recommendation”
 - Should be finished this summer
- ▶ For microdata
 - Technology has been finalized
 - The [microdata→RDF](#) mapping is defined in a separate Note
 - Is part of HTML5, hence its formal advancement depends on other technologies

The background features a vast ocean under a dramatic sky with dark clouds and a bright horizon. Two large, complex network graphs are shown. One graph on the left is primarily composed of blue and green spheres connected by black lines, with a translucent blue rectangular overlay containing the text "Cleaning up RDF". The other graph on the right is composed of red, blue, and white spheres, also connected by black lines.

Cleaning up RDF

Reminder...

- ▶ *Resource Description Framework*: a graph-based model for (Web) data and its relationships
 - has a simple (**subject**,**predicate**,**object**) model
 - makes use of URI-s for the naming of terms
 - objects can also be Literals
 - informally: defines named relationships (named links) among entities on the Web
 - has different serialization formats
- ▶ Latest version was published in 2004

RDF cleanup (a.k.a. RDF1.1)

- ▶ Many issues have come up since 2004:
 - deployment issues
 - new functionalities are needed
 - underlying technology may have moved on (e.g., datatypes)
- ▶ The goal of the RDF Working Group is to refresh RDF
- ▶ NOT a complete reshaping of the standard!

Some new features/plans

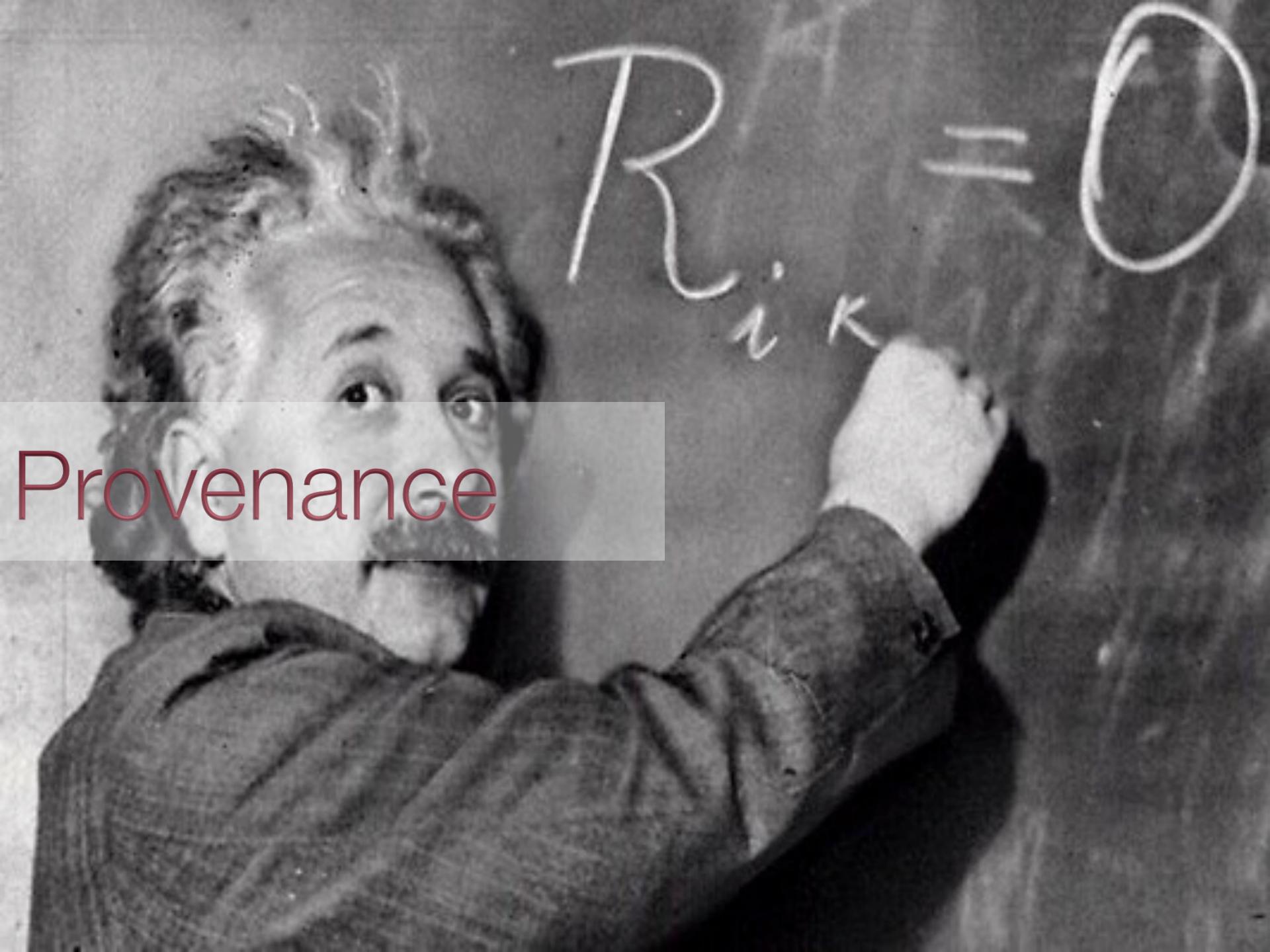
- ▶ Standardize Turtle as a serialization format
- ▶ Clean up some aspects of datatyping, e.g.:
 - plain vs. typed literals
 - introduction of an `rdf:HTML` datatype
 - details and role of `rdf:XMLLiteral`
- ▶ Proper definition for “named graphs”
 - including concepts, semantics, syntax, ...
 - obviously important for linked data access
 - but generates quite some discussions on the details
- ▶ JSON format for Linked Data (JSON-LD)

Editorial improvements

- ▶ Cleanup the documents, make them more readable
 - possibly rewrite all documents
 - maybe a completely new primer
 - new structure for the Semantics document

Status

- ▶ Turtle is almost finalized
- ▶ JSON-LD is in a very good shape
- ▶ Agreement on most of the literal cleanup
- ▶ Lots of discussion currently on named graphs...

A black and white photograph of Albert Einstein. He is shown from the chest up, wearing a dark suit jacket over a light-colored shirt. He has his right hand raised, holding a piece of chalk, and is pointing it towards a chalkboard. On the chalkboard behind him, the letters "R" and "i" are written in chalk, followed by an equals sign and a large circle. Einstein's face is partially visible, looking towards the camera with a thoughtful expression.

Provenance

$R_i = 0$

The goal is simple...

- ▶ We should be able to express all sorts of “meta” information on the data
 - who played what role in creating the data (author, reviewer, etc.)
 - view of the full revision chain of the data
 - in case of data integration: which part comes from which original data and under what process
 - what vocabularies/ontologies/rules were used to generate some portions of the data
 - etc.

...the solution is more complicated

- ▶ Requires a complete model describing the various constituents (actors, revisions, etc.)
- ▶ The model should be usable with RDF
- ▶ Has to find a balance between
 - simple provenance: easily usable and editable
 - complex provenance: allows for a detailed reporting of origins, versions, etc.
- ▶ That is the role of the Provenance Working Group (started in 2011)

Exhibit 3.0 Staged Demo: Sweden Europeana

The following screenshot is from Exhibit 3.0 Staged Demo 3.2. Staged by with service that did some very heavy computations from the between basic components of Exhibit 3.0. Scripted to speed up the faceted navigation of very large sets of data. Note that Staged Demo has been Redesigned. From 9/16/13.

9721 results in total (showing first 20 only)

exhibit

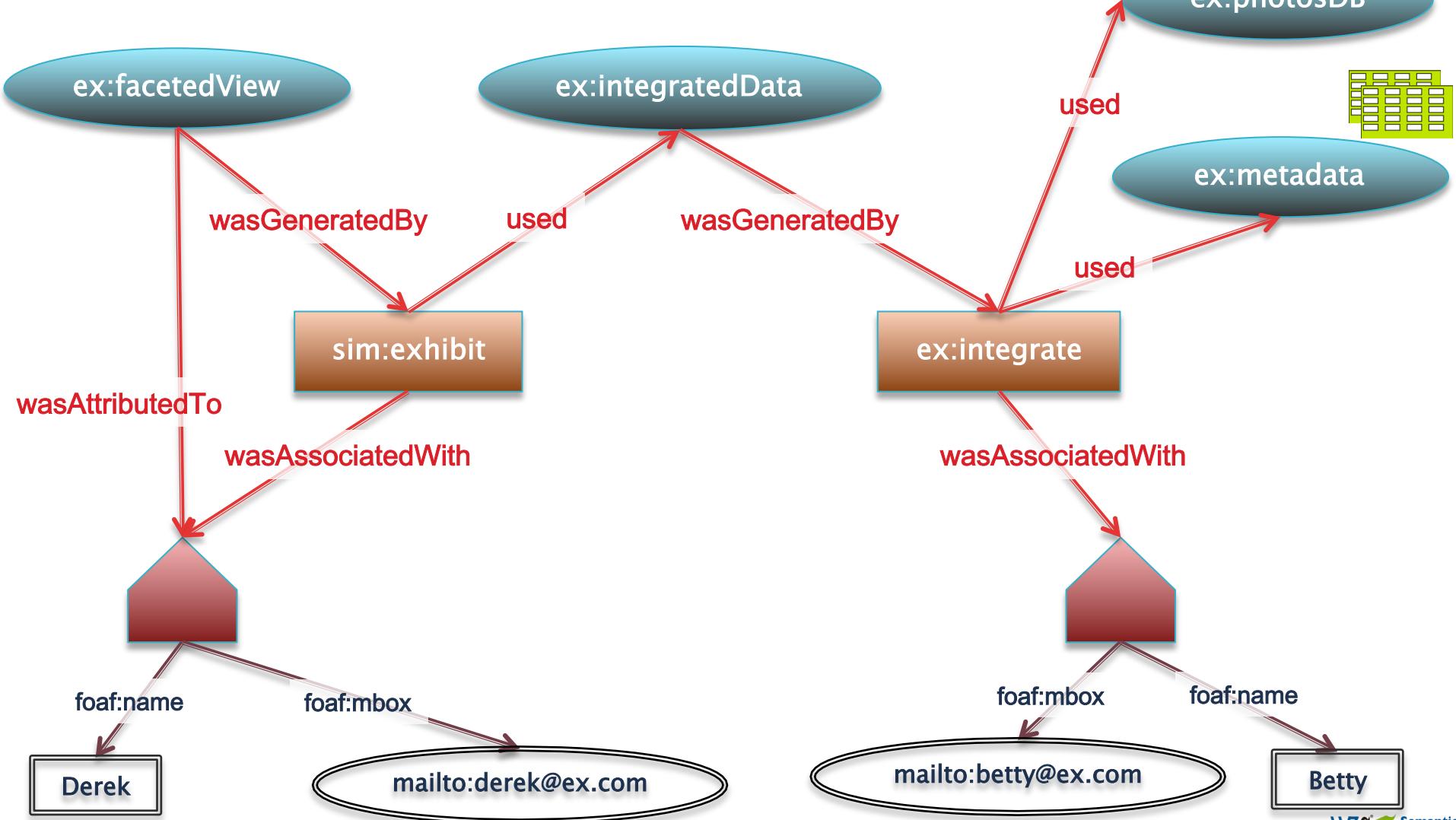
Creator

Created

Gammelstads kyrka
Creator: Åke
Created: 1894-01-01

Hässö kyrka
Creator: Svennsson, William
Created: 1919-01-01

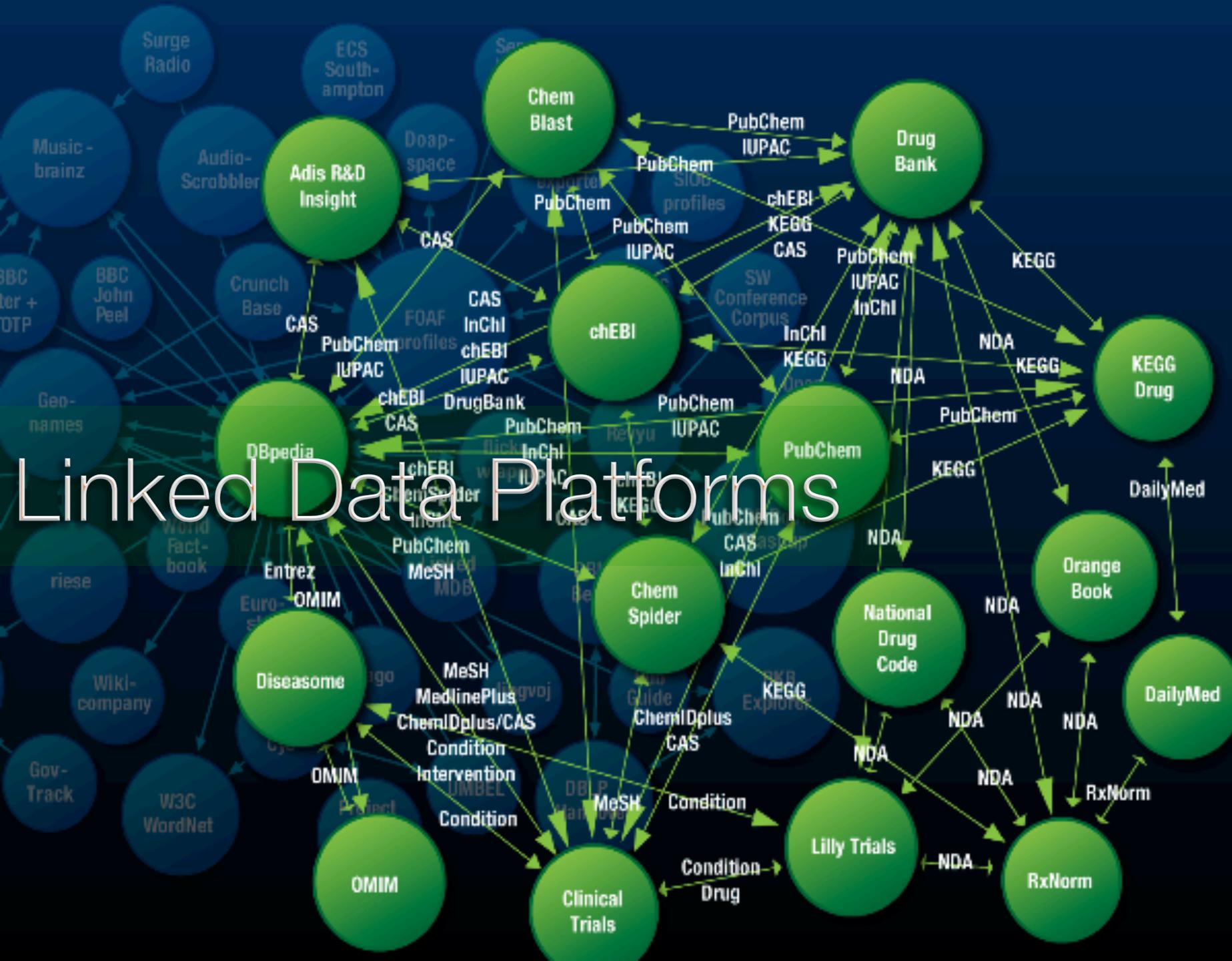
Hässö kyrka
Creator: Sjögren, D.F.
Created: 1920-01-01

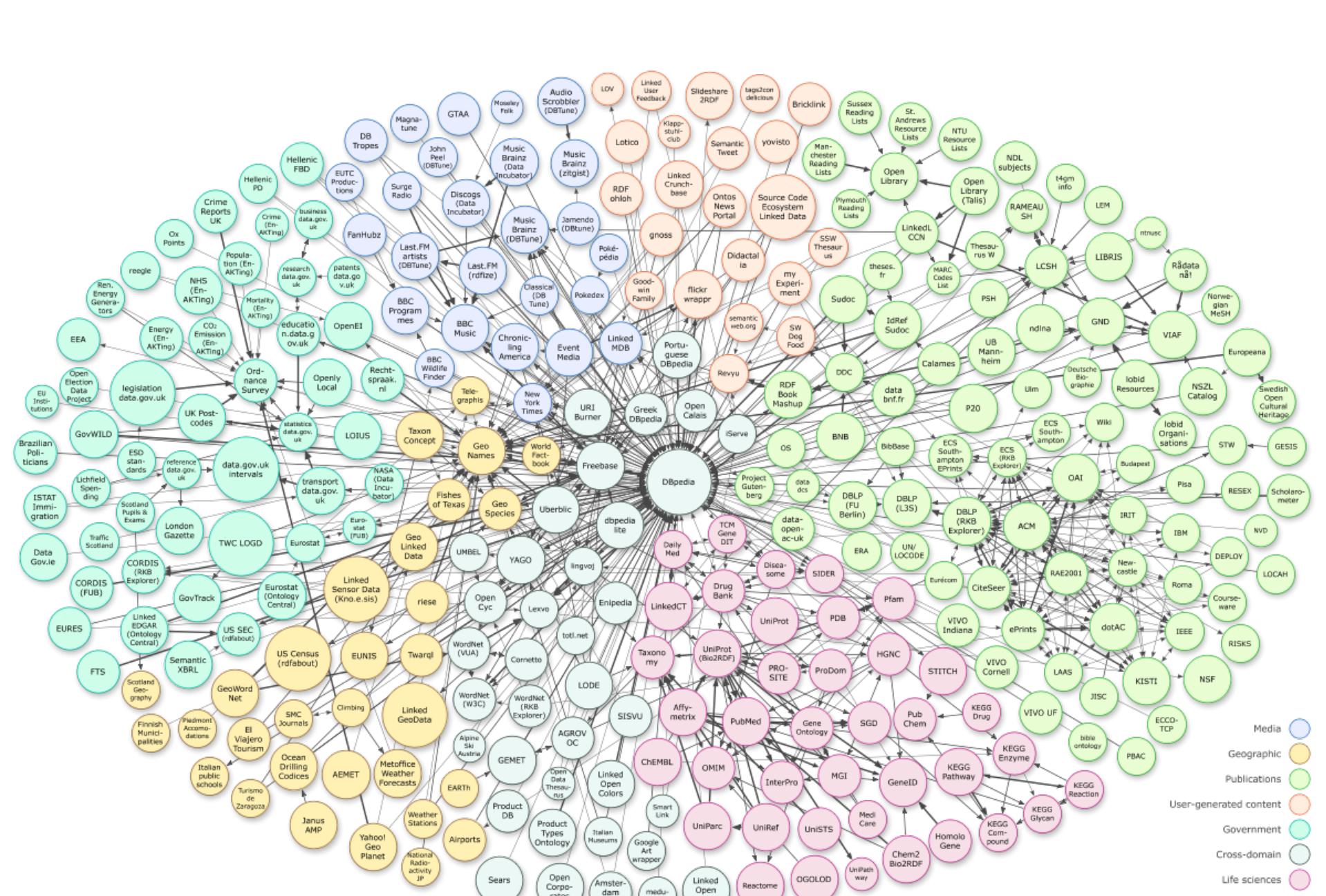


Status

- ▶ Drafts have been published
 - abstract data model, OWL version
 - protocol (where to find provenance data)
 - primer
- ▶ Goal is to finalize the technical design in fall

Linked Data Platforms





As of September 2011 CC BY-SA

Reminder



- ▶ “Linked Data” is also a set of principles:
 - put things on the Web through URI-s
 - use HTTP URI-s so that things could be dereferenced
 - provide useful information (using standards) when a URI is dereferenced
 - *include links* to other URI-s
- ▶ RDF is an ideal vehicle to realize these principles

Some characteristics of Linked Data and its Applications

- ▶ The datasets are essentially read-only
 - they are curated “out of band”: regularly extracted from other databases, changed manually by data owners, etc
- ▶ The dominating paradigm is to extract data via SPARQL queries
- ▶ Applications use (very) large datasets via (RDF based) integration



Monuments historiques



Recherche

Aix-en-Provence



» Affiner

» Photos du monument ?

- Non 4
- Oui 2

» Région / Département / Ville

- Provence-Alpes-Côte D'Azur 6

» Type de monument

- Eglise 3
- Monument 1
- Hôtel de ville 1
- Monastère 1

» Période historique

- Moyen Âge 6
- Époque moderne 5
- Renaissance 2
- Époque contemporaine 1

» Gares les plus proches

- Gardanne 6
- Aix-en-Provence 6
- Simiane 6

» Type de propriété

» Résultats de la recherche

6 résultats (105ms)

Trier par Pertinence

Afficher 10 résultats par page



Hôtel de Ville

Type : Hôtel de ville

Adresse : place de l'Hôtel-de-Ville

Localité : Aix-en-Provence (Bouches-du-Rhône)

Période historique concernée : Moyen Âge - Renaissance - Époque moderne -

Liens externes : [Base Mérimée](#) - [Wikimedia Commons](#)*Description de l'ensemble inscrit ou classé : Hôtel de Ville (cad. AS 63) : classement par arrêté du 12 octobre 1995*Mis à disposition sur [Wikimedia Commons](#)

Eglise Saint-Jean-de-Malte

Type : Eglise

Localité : Aix-en-Provence (Bouches-du-Rhône)

Période historique concernée : Moyen Âge - Époque moderne -

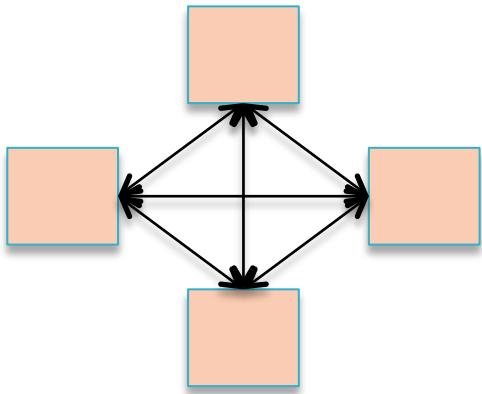
Liens externes : [Base Mérimée](#) - [Wikipedia francophone](#) - [Wikimedia Commons](#)*Description de l'ensemble inscrit ou classé : Eglise Saint-Jean-de-Malte : classement par liste de 1840*Mis à disposition sur [Wikimedia Commons](#)

However... Linked Data Has Potentials
for “Simpler” Applications

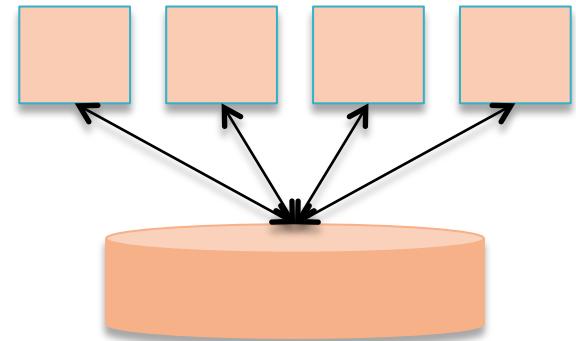
Example: Data-intensive application integration

- ▶ Application Lifecycle Management
 - integration of development teams around the globe
 - management of bug report, user requirements
 - versioning
- ▶ Distributed access to, and management of Library Catalogue data
- ▶ Integrated view of corporate and private address book data

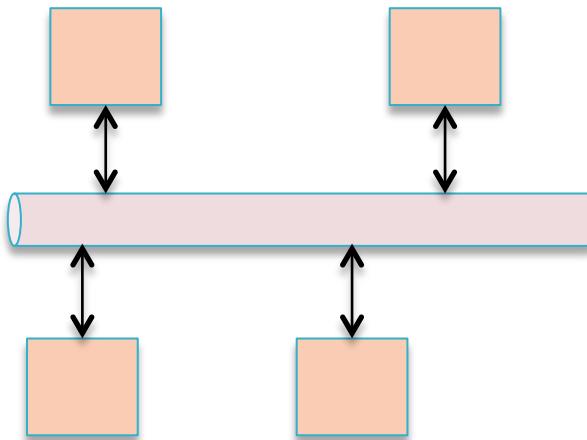
There has been approaches in the past



Point-to-point via API



Centralized repository



Central Hub/Bus

None of these are really satisfactory 😞

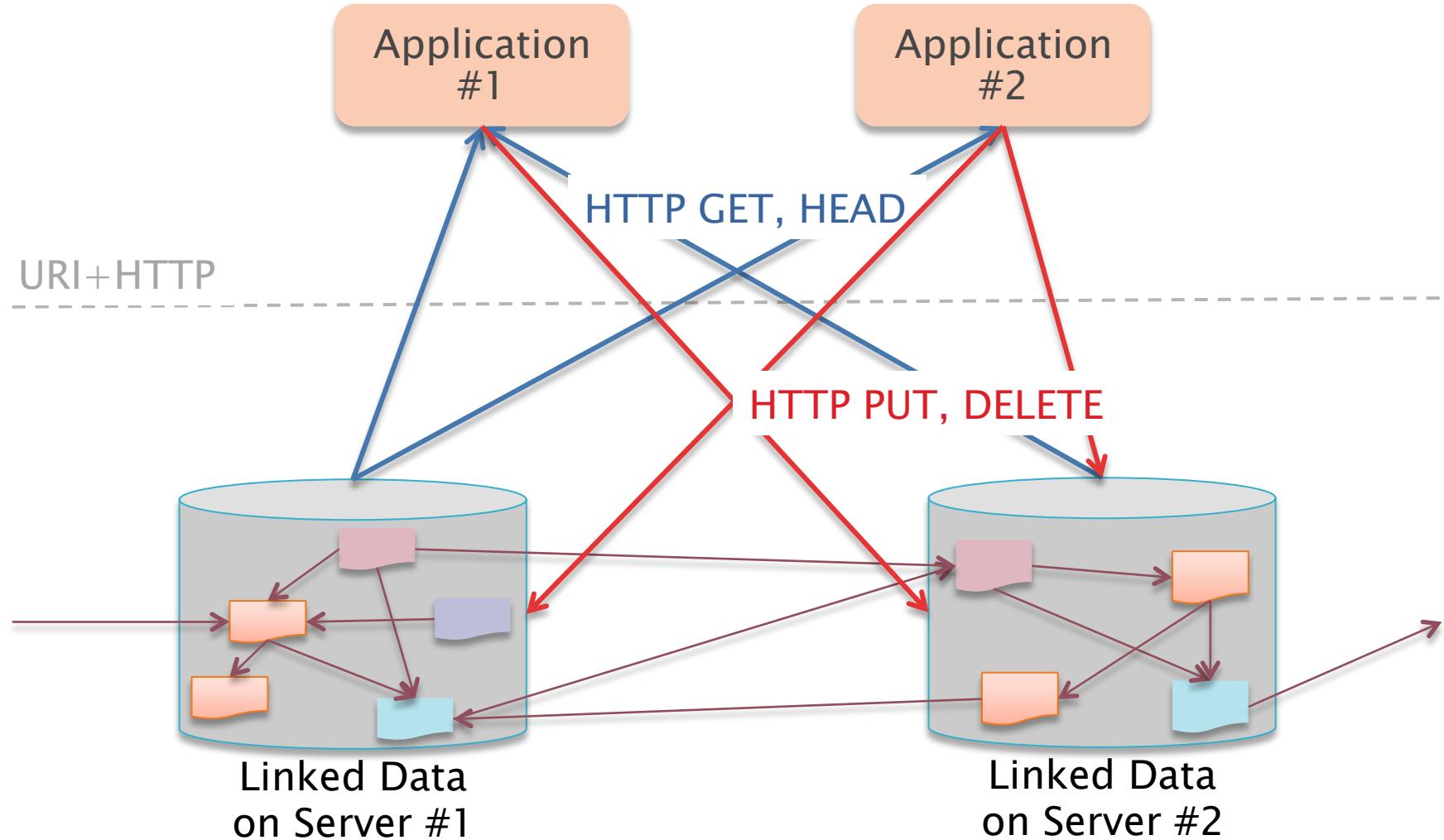
- ▶ They force to re-invent the wheel on many fronts
 - distribution of data around the Internet
 - access control issues
 - definition and implementation of new API-s, Protocols, data formats
 - etc.

Why not make use of an architecture that is...

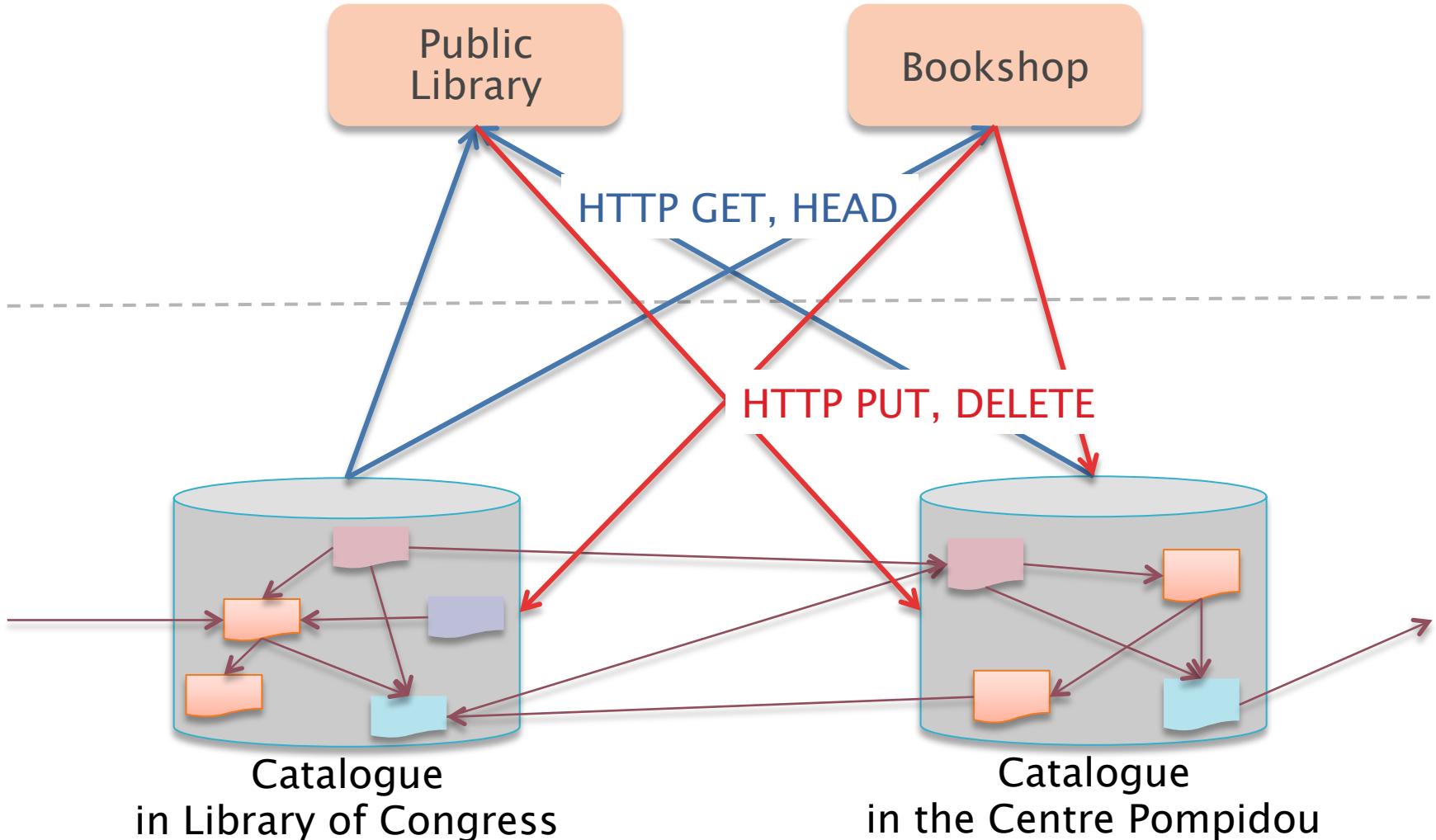
- ▶ Distributed at its core
- ▶ Scalable in terms of users, of data, of hardware and software architecture
- ▶ Open to anyone
- ▶ Has a wide variety of available tools
- ▶ Widely known

Sounds Familiar? ☺

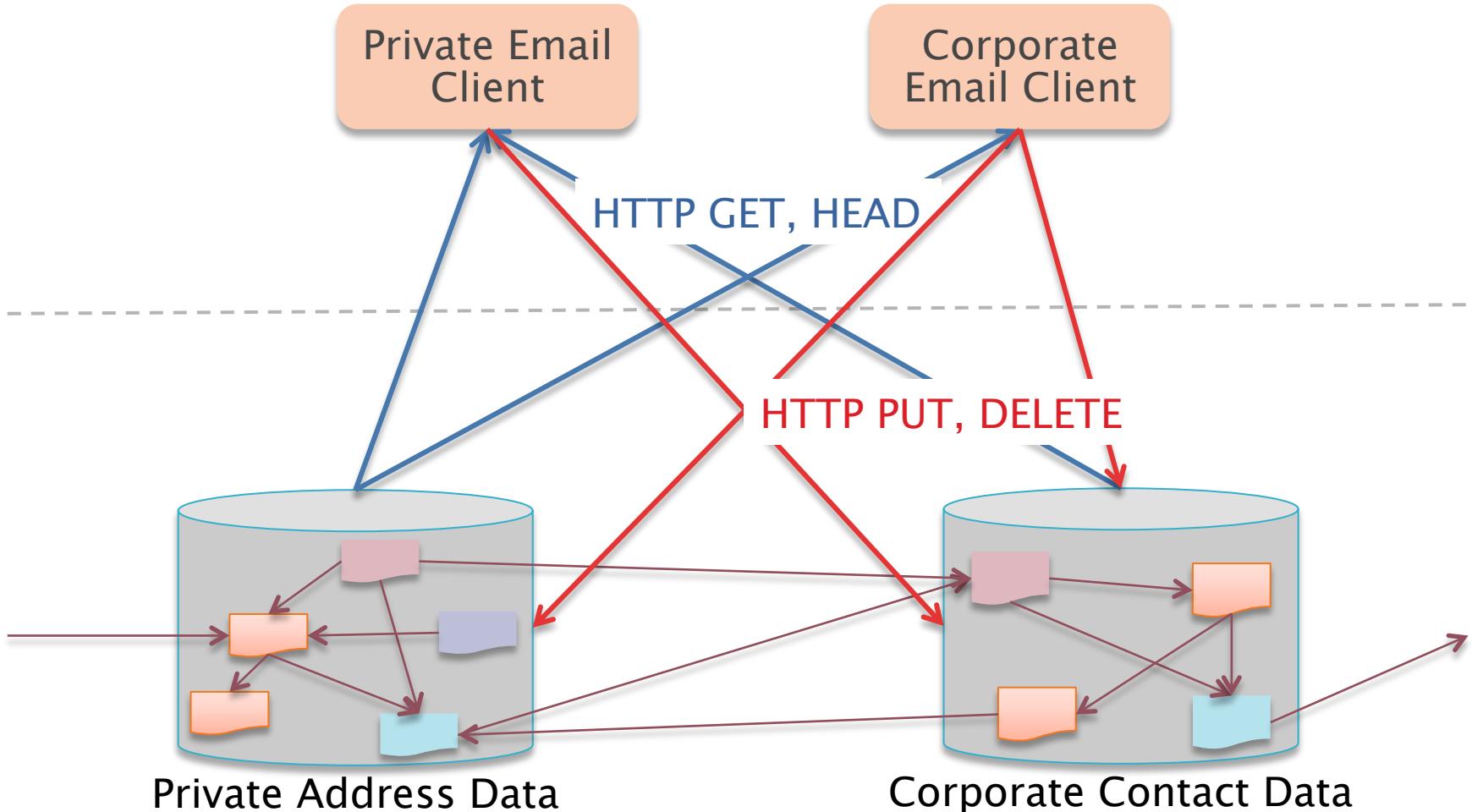
Linked Data Provides a Better Paradigm: Use the Existing Web Architecture!



Example: Simple Application Integration via Linked Data



Example: Simple Application Integration via Linked Data



Linked Data Platform WG

- ▶ Provide a simple, HTTP based infrastructure to publish, read, write, or modify linked data
- ▶ The infrastructure should be easy to implement and install
 - more complex applications may require more sophisticated tools like SPARQL, Provenance, OWL,....
 - provides an “entry point” for Linked Data applications!

Linked Data Platform WG

- ▶ Main Work items:
 - define a RESTful way to access/update RDF data via HTTP
 - what does HTTP GET/PUT/DELETE/POST/... mean for Linked Data?
 - define a “profile” of minimal requirements for applications:
 - what RDF datatypes are used
 - what serialization syntax(es) must be supported
 - how to access reasonable chunks of information (paging)
 - how to manage collections of RDF data
 - what vocabulary items to use for metadata
 - etc.

Status

- ▶ Just starting, almost as we speak!

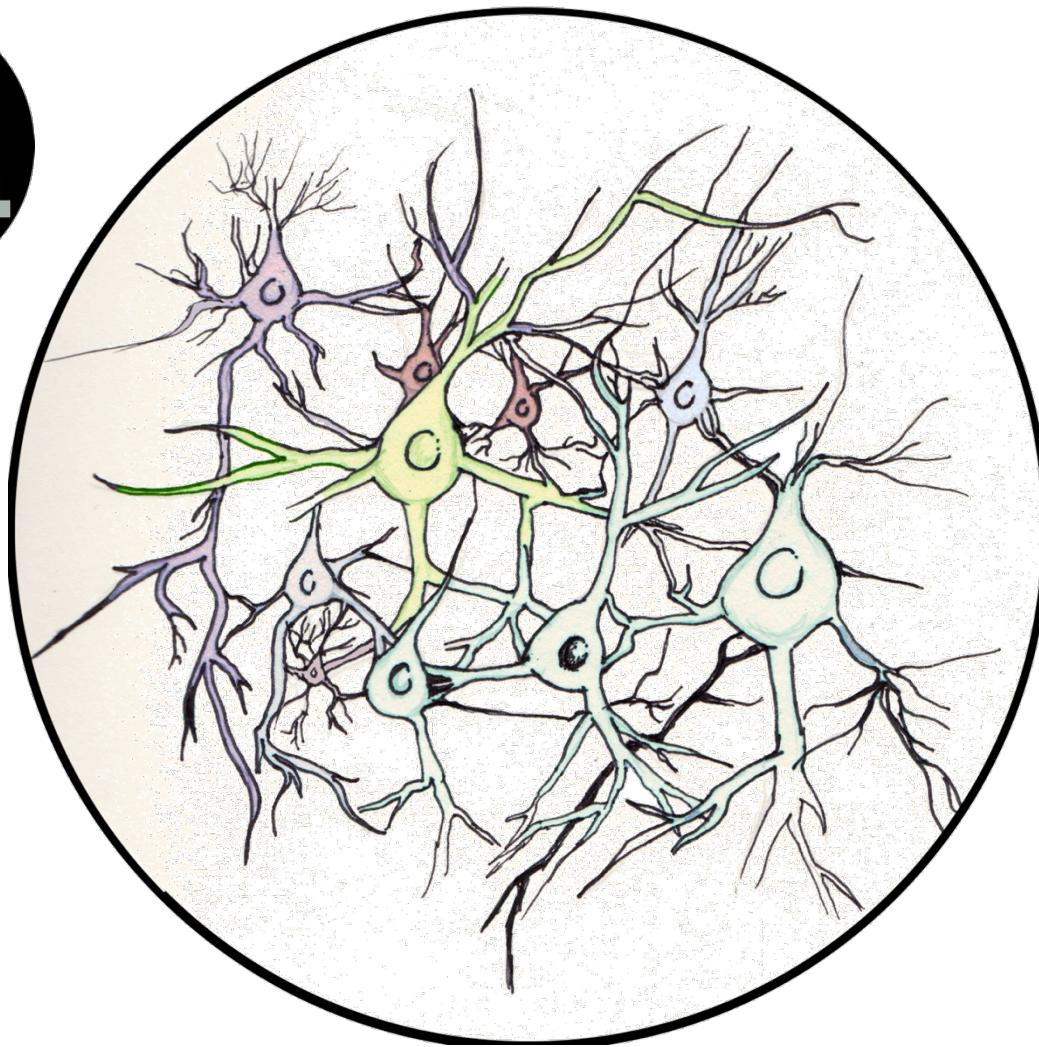
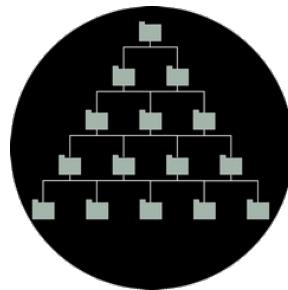


What else may be on the horizon?

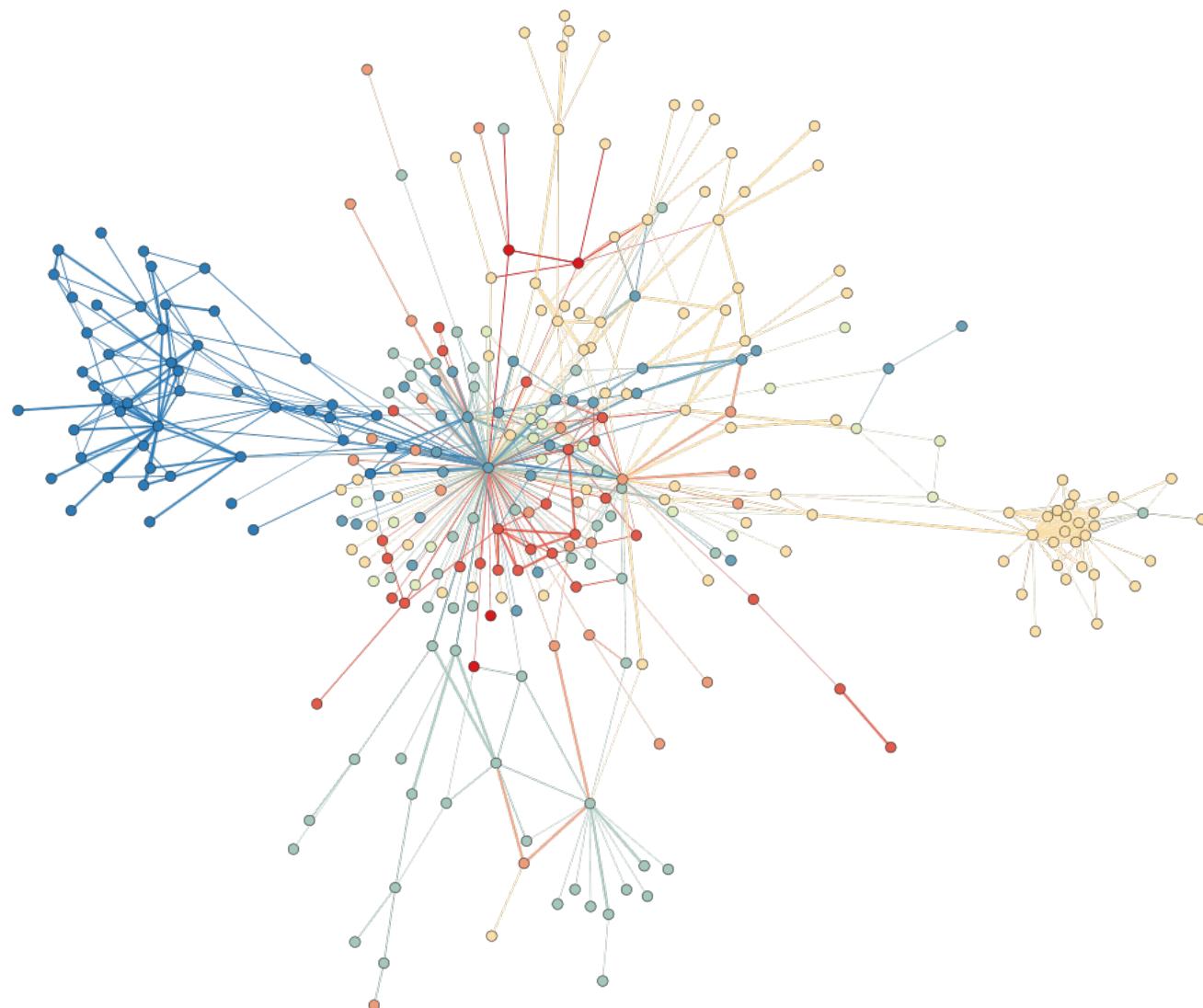
Further challenges raised by Linked Data

- ▶ Knowledge vs. data ratio is different: very shallow, simple vocabularies for huge sets of data
 - the role of reasoning is different (vocabularies, OWL DL, etc., may not be feasible)
- ▶ Not enough links among datasets
 - lots of work on “creating” further links

For example: data vs. vocabularies



Missing links



Other, possible future works in the activity

- ▶ Profiles for the publication of Linked Data, e.g.,
 - further profiles of OWL (beyond what is already in OWL 2)
 - URI patterns
 - datatypes to be used (or not)
 - usage of Blank Nodes
 - etc.
- ▶ Standardized approaches for Access Control to data
- ▶ Reconsider rule languages for (e.g., for Linked Data applications)
- ▶ Relationship to JSON

Other, possible future works in the activity

- ▶ Constraint checking of Data
- ▶ API-s for client-side Web Application Developers
- ▶ Issues around internationalization of Semantic Web technologies
- ▶ Relationship between Semantic Web technologies and Big Data, Cloud Storage and Computing,...
- ▶ Specific standard vocabularies (e.g., data annotation, governmental vocabularies)
 - some of these may be defined at W3C, some elsewhere

A landscape photograph of Sugarloaf Mountain in Rio de Janeiro, Brazil. The sky is a warm orange and yellow at sunset. In the foreground, the dark silhouette of Sugarloaf Mountain rises prominently. Below it, the city of Rio de Janeiro is visible, with numerous small lights from buildings and streets. In the background, there are more mountain ranges, partially obscured by mist or low-hanging clouds.

To summarize...

To remember...

- ▶ *Data on the Web* is a major challenge
 - technologies are needed to use them, to interact with them, to integrate them
- ▶ Semantic Web technologies, Linked Data principles and practices, etc., should play a major role in publishing and using Data on the Web

Lot remain to be done...

The screenshot shows the homepage of the World Wide Web Consortium (W3C) website. The header includes the W3C logo and navigation links for STANDARDS, PARTICIPATE, MEMBERSHIP, and ABOUT W3C. The main content area features several news items:

- W3C Expands Presence at WWW 2012 to Increase Community Engagement (27 March 2012 | Archive)
- Last Call: Cross-Origin Resource Sharing (03 April 2012 | Archive)
- Three drafts published by the CSS Working Group (03 April 2012 | Archive)
- Note: Requirements for Japanese Text Layout Updated (03 April 2012 | Archive)
- Ten HTML5 Drafts Updated (29 March 2012 | Archive)
- SMIL Timesheets 1.0 Note Published (29 March 2012 | Archive)

On the right side, there are sections for JOBS (listing Web Technologies Specialist, Web Accessibility Specialist, and Web Accessibility Engineer), W3C BLOG (listing On the W3C Agenda: Headlights 2012 and First European Members to join the new W3C Startup Program), and VALIDATORS, UNICORN, AND OTHER SOFTWARE (listing Unicorn validator, HTML and markup validator, and CSS validator).

- ▶ Lots of issues to be solved
- ▶ But... W3C needs experts!
 - consider joining W3C, as well as the work done there!

Thank you for your attention

These slides are also available on the Web:

<http://www.w3.org/2012/Talks/@@@-IH/>

