

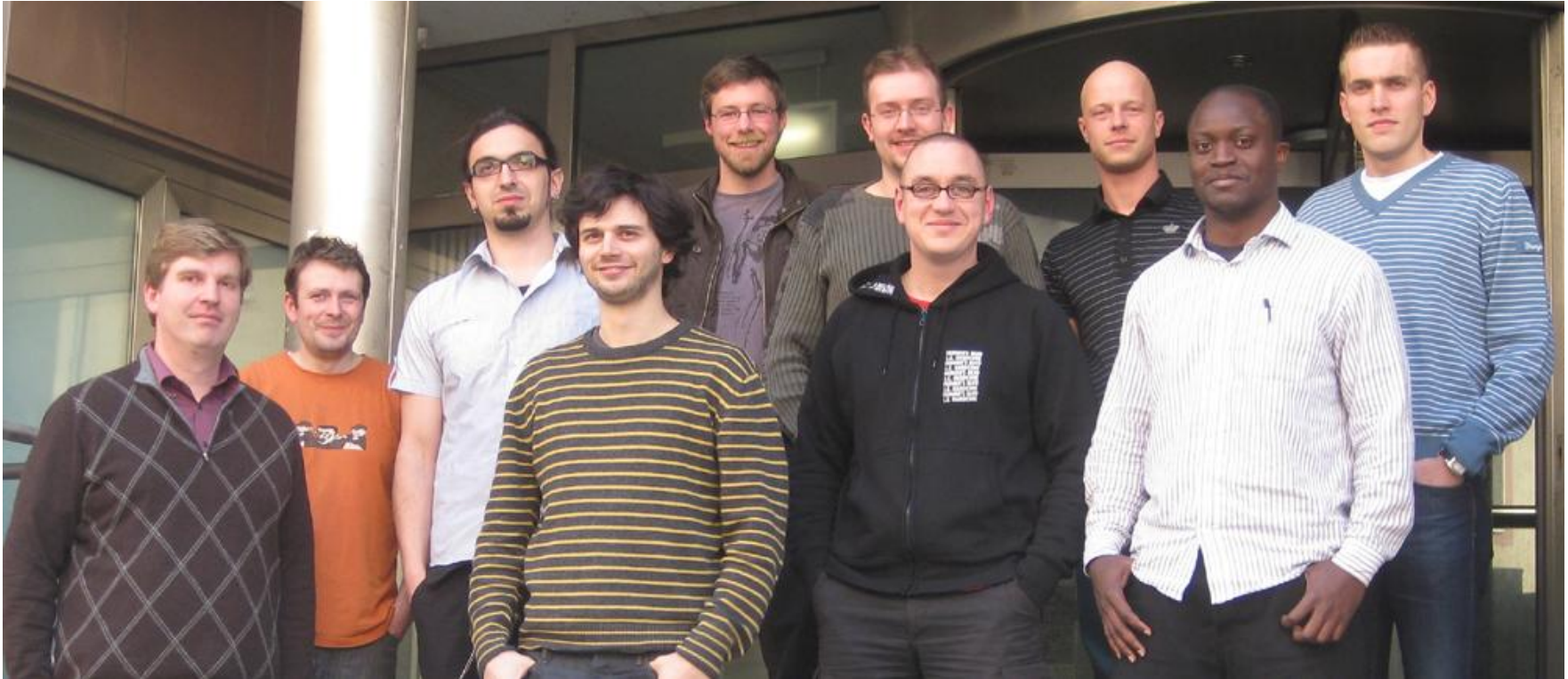


The Linked Data Lifecycle

Jens Lehmann, Sören Auer

UNIVERSITÄT LEIPZIG

AKSW Group



- 3 PostDocs, 15 PhDs, 3 Subgroups (Emergent Semantics, MOLE, SIMBA)
- centered around Semantic Web tools and applications
- <http://aksw.org>
- <http://www.slideshare.net/soeren1611/overview-ag-aksw>

AKSW Projects

Active Funded Projects:

- LOD2
- LATC
- SCMS
- LE4SW



Research/Software Projects:

- DBpedia
- LinkedGeoData
- OntoWiki
- DL-Learner
- BorderFlow
- LIMES
- SAIM
- NLP2RDF
- Triplify
- ...



Personal Background

- Studied Computer Science at TU Dresden 2001-2006
- PhD Uni Leipzig 2006-2010
- PostDoc AKSW / Uni Leipzig ab 2010
- Head of Machine Learning and Ontology Engineering Group (MOLE)
- EU-Projects: LOD2, LATC
- Software/Research-Projects: DBpedia, DL-Learner, ORE, LinkedGeoData
- Interests: Semantic Web, Machine Learning, Logic



Why Semantic Web?

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- Apartments near German-Russian bilingual childcare in Leipzig.

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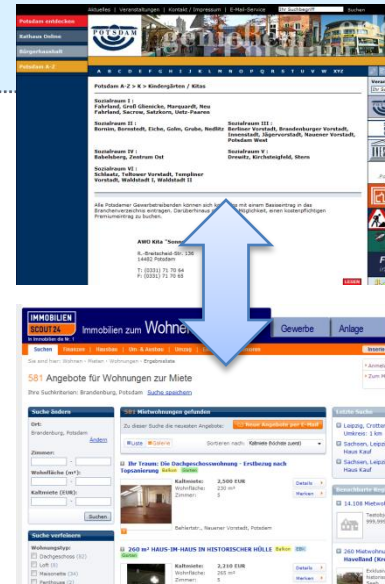
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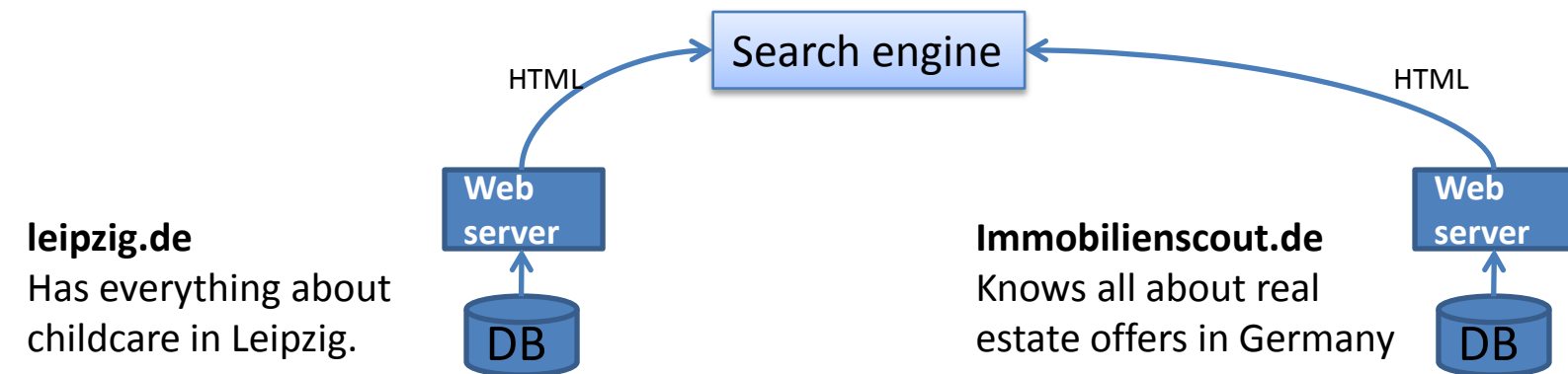
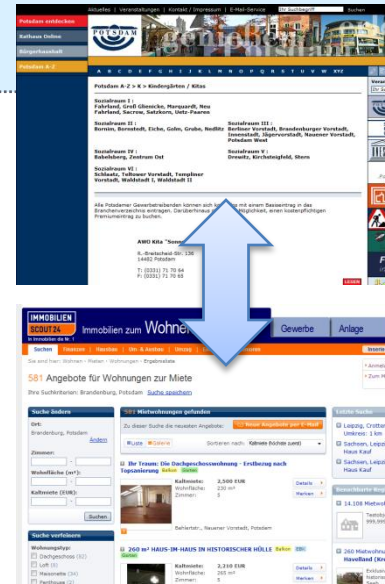


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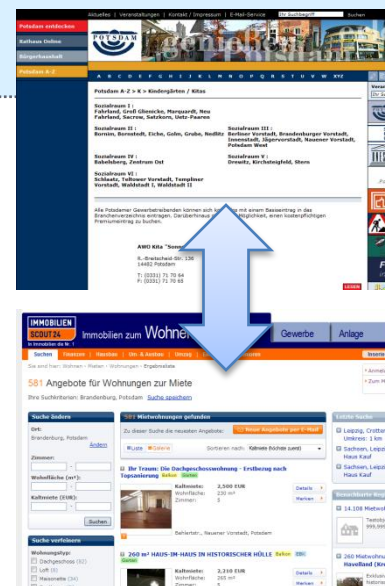


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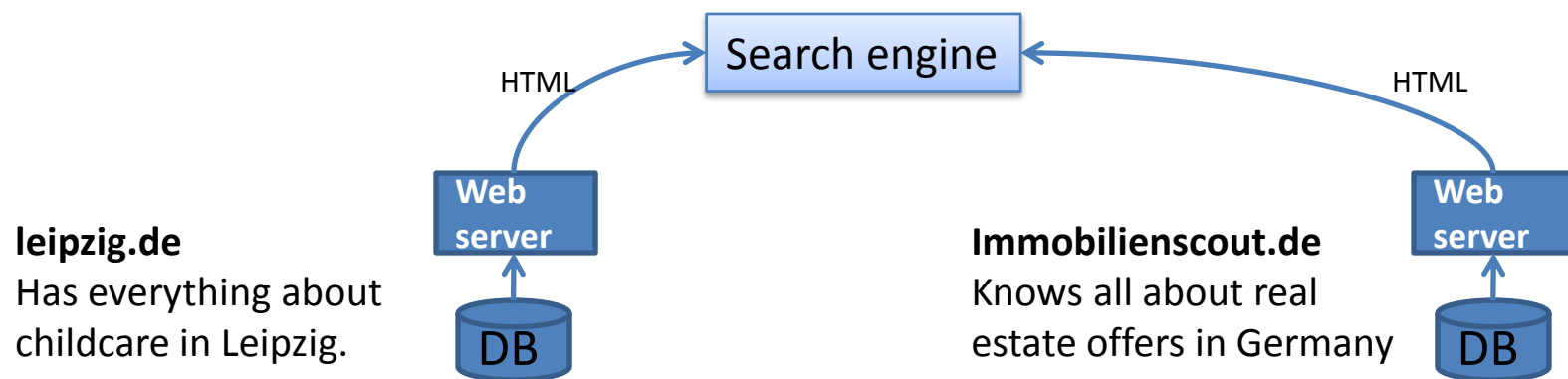
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Solution: complement text on Web pages with structured linked open data & intelligently combine/integrate such structured information from different sources:

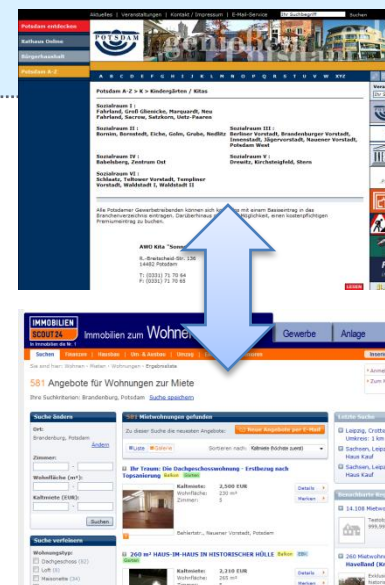


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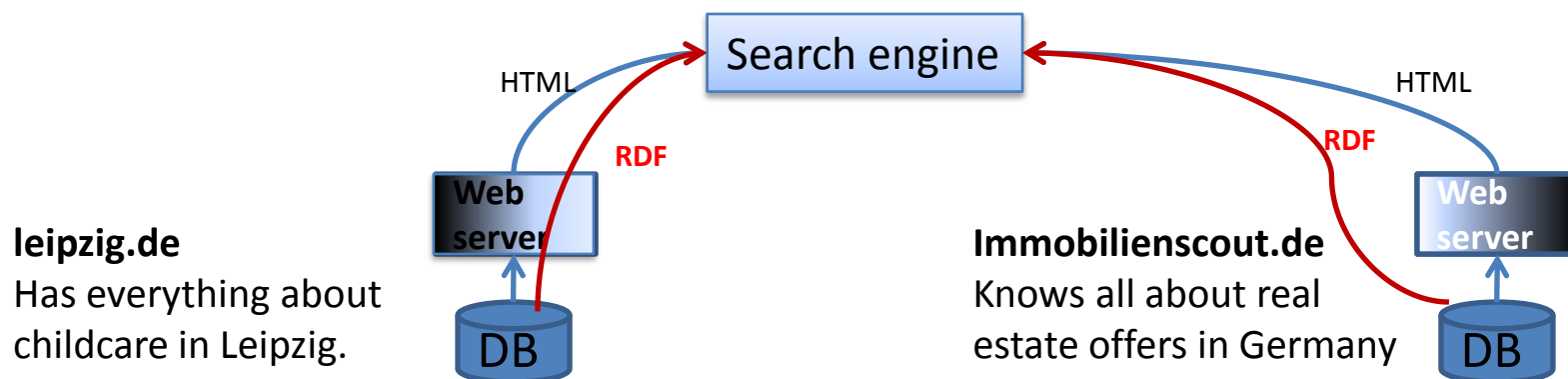
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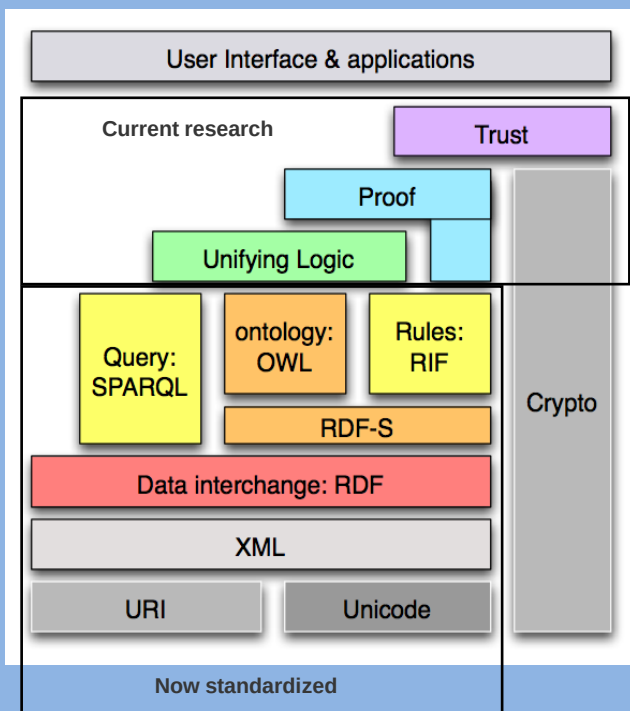


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Semantic Web - Standards

Semantic Web Architecture



Standardization Semantic Web

1994

- First public presentation of idea

1998

- Start of standardization of RDF and RDFS

2000

- large research projects in US and Europe

2002

- Start of OWL standardisation

2004

- RDF
- OWL

2006

2008

- RDFa
- SPARQL

2009

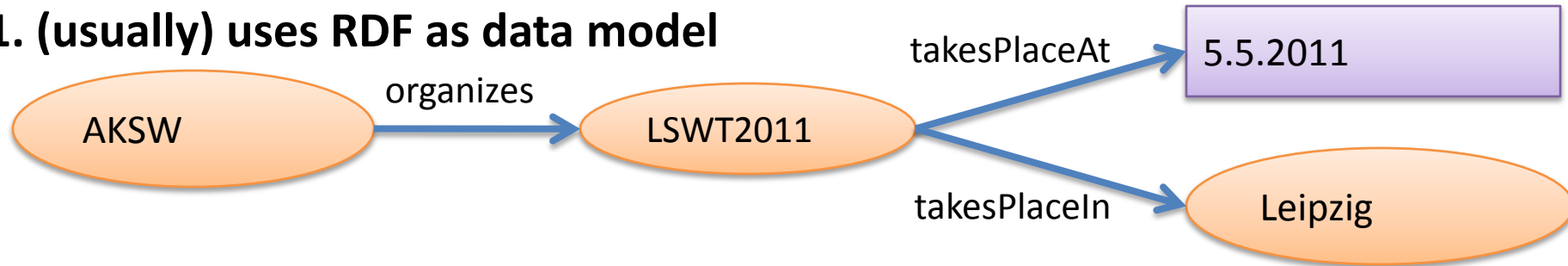
- OWL 2

2010

- RIF

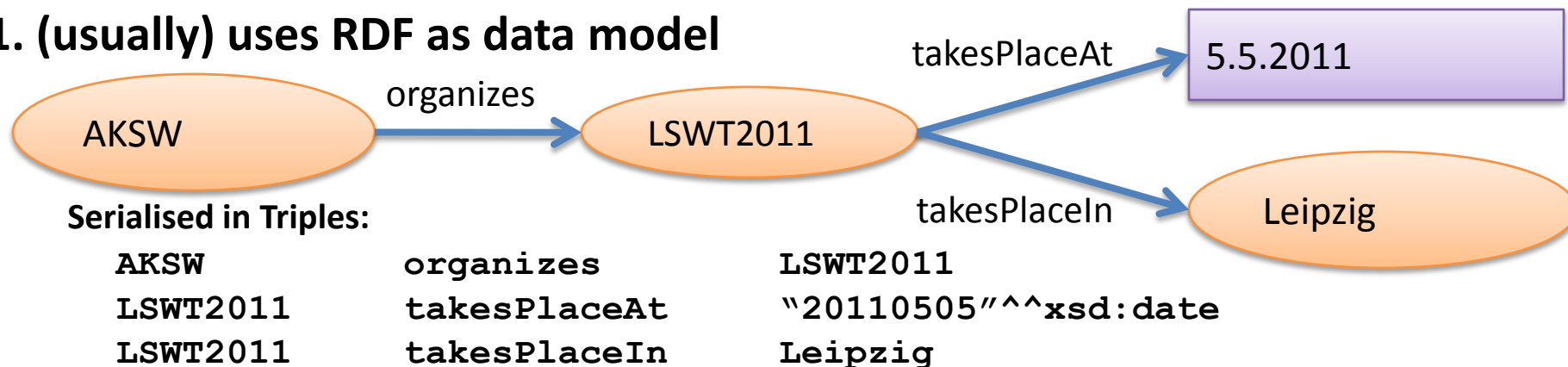
Linked Data

1. (usually) uses RDF as data model



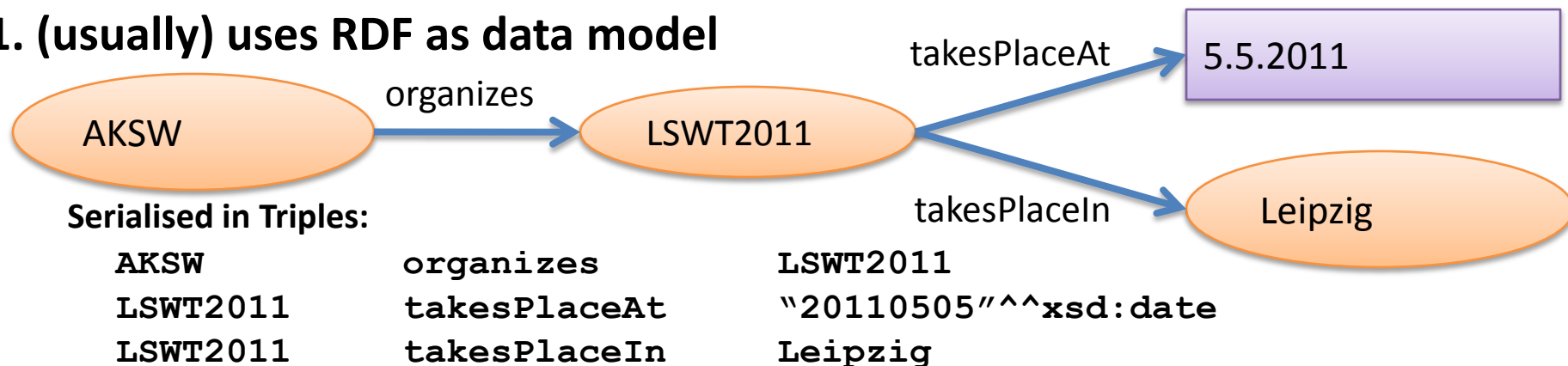
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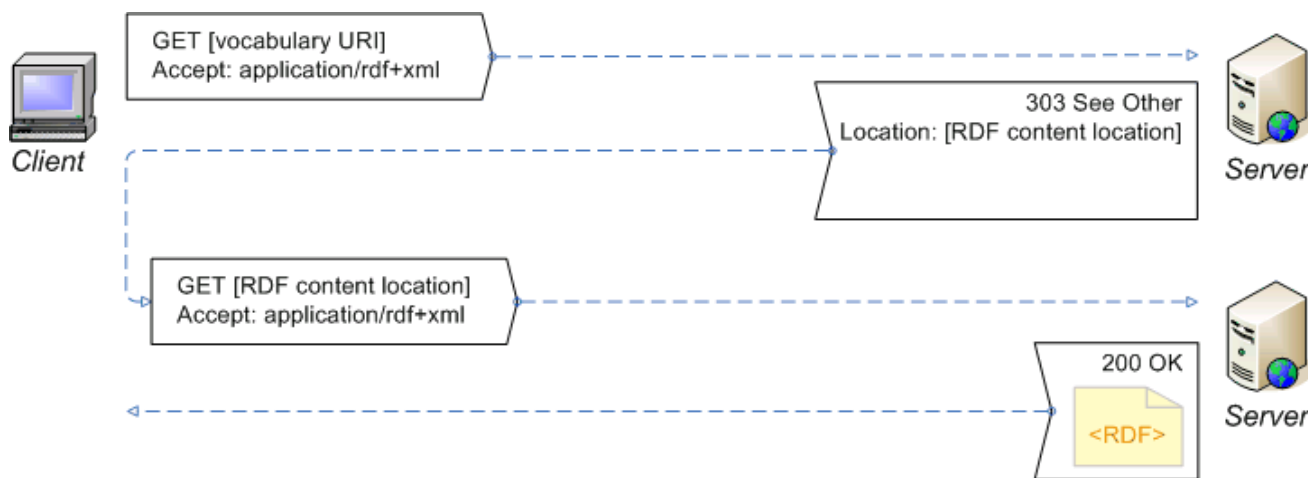


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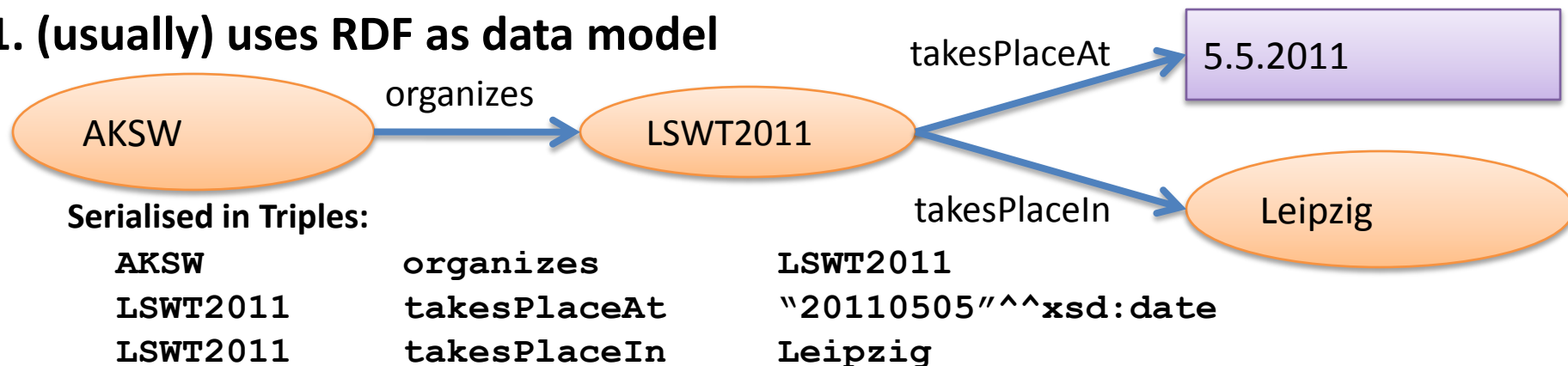


2. Uses dereferencable HTTP-URIs, e.g. Content-negotiation

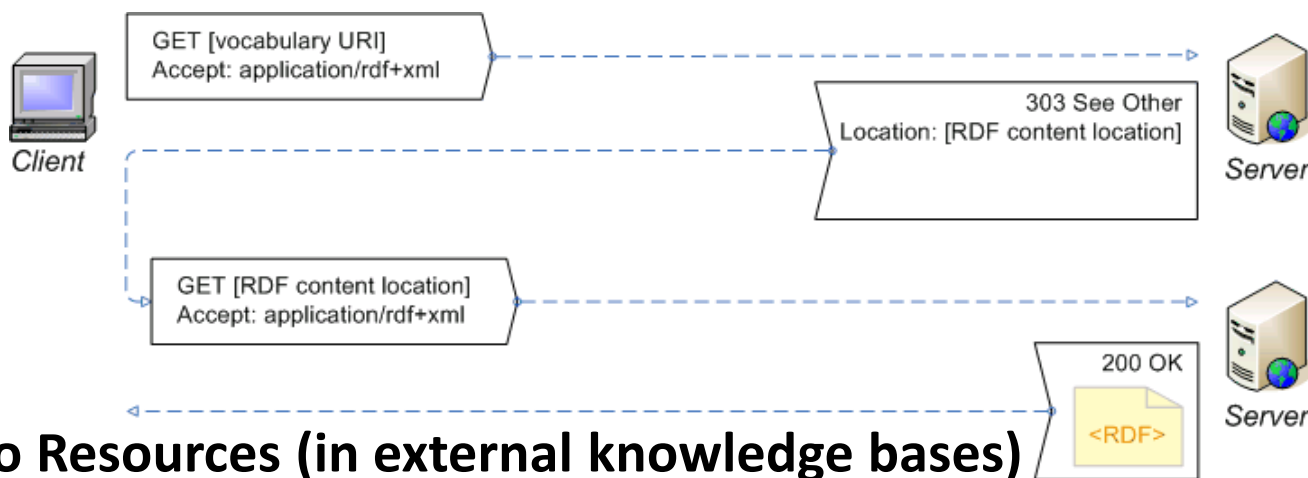


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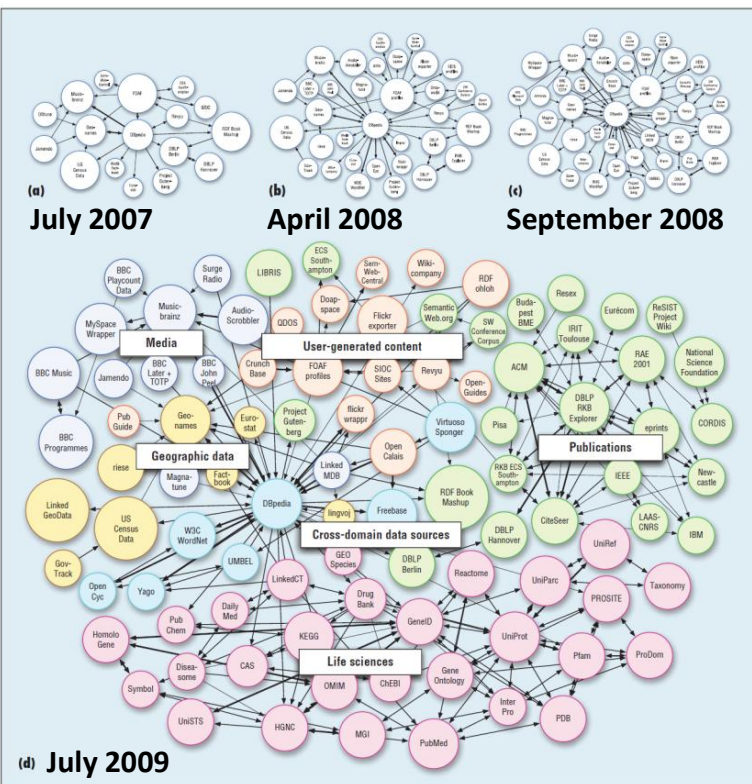
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3. Links to Resources (in external knowledge bases)

LOD achievements and challenges

- Web - a global, distributed platform for data, information and knowledge integration
- exposing, sharing, and connecting pieces of data, information, and knowledge on the Semantic Web using URIs and RDF

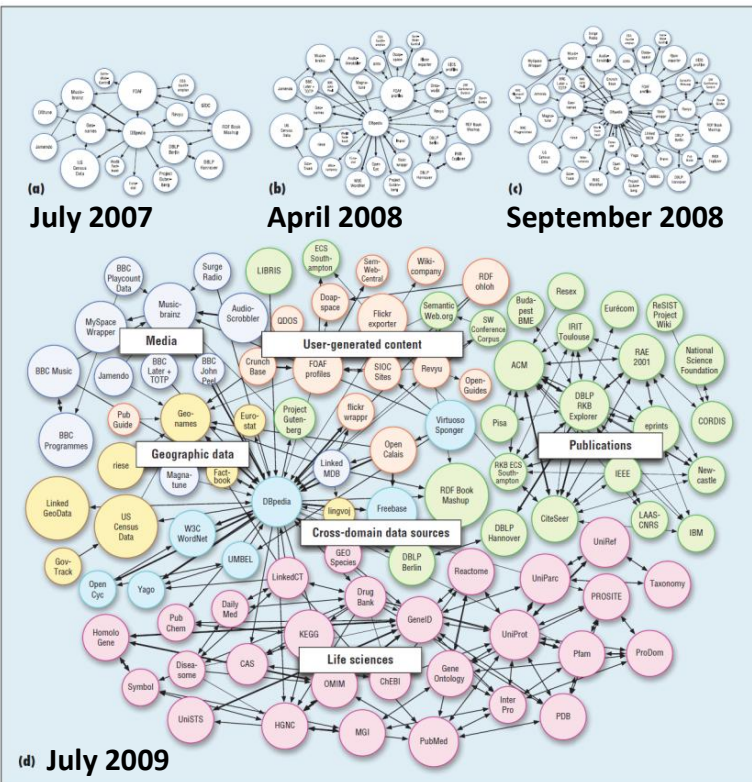


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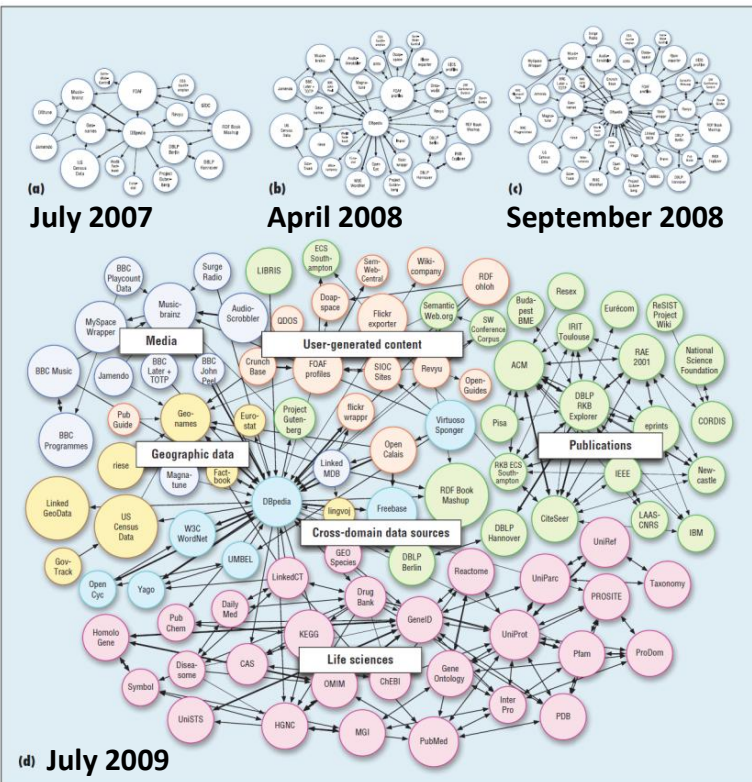
Achievements

1. Extension of the Web with a **data commons** (25B facts)
2. vibrant, global RTD **community**
3. **Industrial uptake** begins (e.g. BBC, Thomson Reuters, Eli Lilly, NY Times, Facebook, Google, Yahoo)
4. Emerging **governmental adoption** in sight
5. Establishing Linked Data as a **deployment path** for the Semantic Web.



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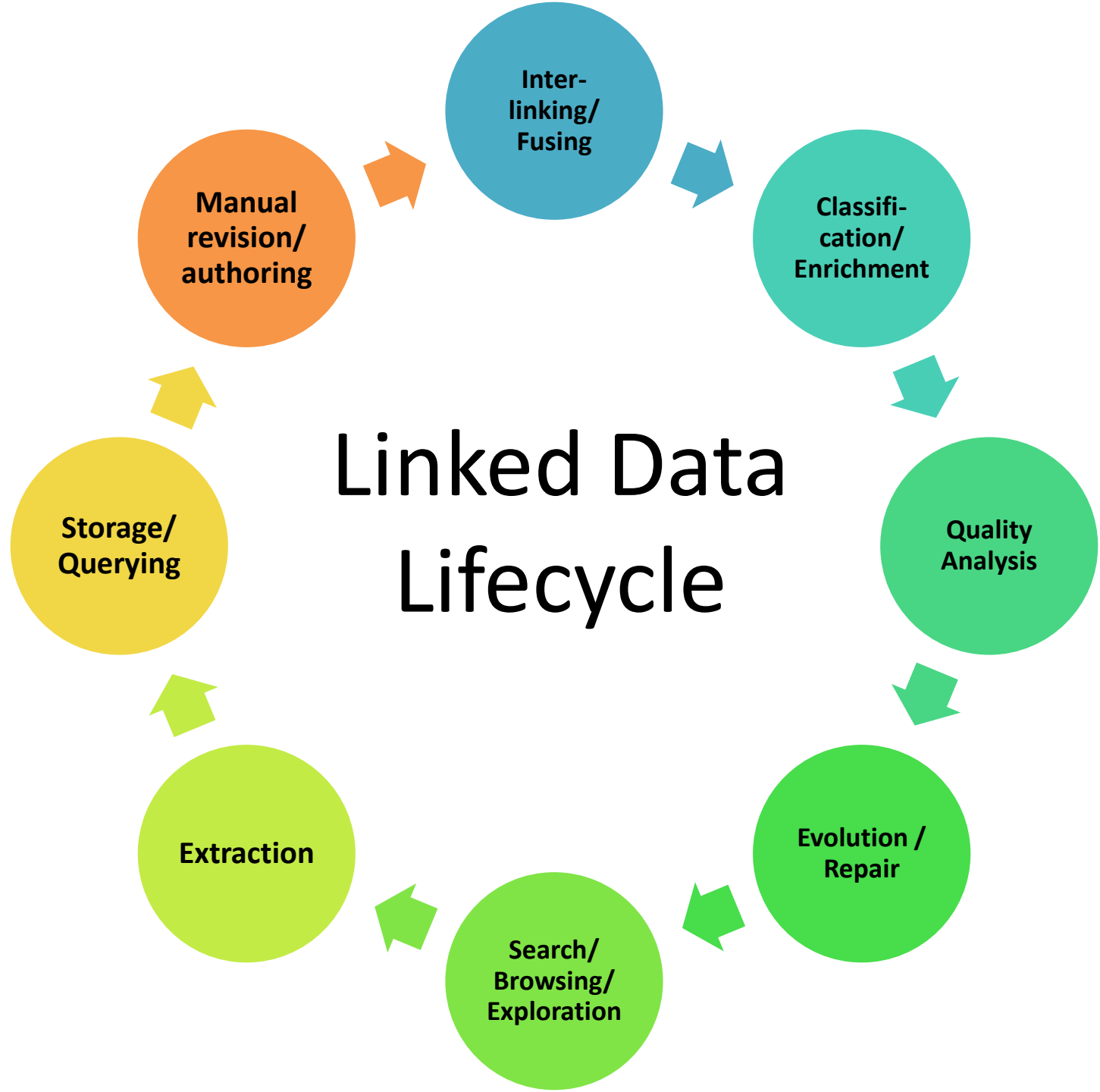
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Challenges

1. **Coherence:** Relatively few, expensively maintained links
2. **Quality:** partly low quality data and inconsistencies
3. **Performance:** Still substantial penalties compared to relational
4. **Data consumption:** large-scale processing, schema mapping and data fusion still in its infancy
5. **Usability:** Missing direct end-user tools and **network effect**

These issues are closely related and should ultimately lead to an ecosystem of interlinked knowledge!





Extraction

Extraction

From **unstructured** sources

- NLP, text mining, annotation

From **semi-structured** sources

- DBpedia, LinkedGeoData, SCOVO/DataCube

From **structured** sources

- RDB2RDF



Transforming Wikipedia into an Knowledge Base

- extract structured information from Wikipedia**
& make this information available on the Web as LOD:
- **ask sophisticated queries against Wikipedia** (e.g. universities in brandenburg, mayors of elevated towns, soccer players),
 - **link other data sets** on the Web to Wikipedia data
 - Represents a **community consensus**

Recently launched DBpedia Live transforms **Wikipedia**
into a structured knowledge base

Jens Lehmann – **Linked Data Lifecycle**

7. Juni 2011

Structure in Wikipedia

Busan

From Wikipedia, the free encyclopedia

"Pusan" redirects here. For the Vedic Hindu god, see Pushan.

Coordinates: 35°06'N, 129°02'E

	 Wikipedia The Free Encyclopedia Home Contents Featured content Random article Interact About Wikipedia Feedback Help Privacy policy Desktop changes Desktop interface
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 Busan From Wikipedia, the free encyclopedia "Pusan" redirects here. For the Vedic Hindu deity, see Pushan. Busan Metropolitan City Busan Metropolitan City, also known as *Busan*, is the largest port city in the Republic of Korea. With a population of 3.6 million, Busan is also South Korea's second largest inland city (Seoul). The most densely built-up areas of the city are situated in the vicinity of names valley between the Taekjeong River and Seopyeong River, with the surrounding slopes of the various districts. Busan Busan was the host city of the 2002 Asian Games and AFCU 2005. It was also one of the host cities for the 2002 FIFA World Cup, and the center for international conventions in Korea. Administratively, it is designated as a Metropolitan City. On November 14, 2005, the city officially announced it bid to host the 2020 Summer Olympics Games.^[a] Coordinates: 35°06′N, 129°02′E Busan Busan is the largest city in South Korea. It is the largest port city in the Republic of Korea. With a population of 3.6 million, Busan is also South Korea's second largest inland city (Seoul). The most densely built-up areas of the city are situated in the vicinity of names valley between the Taekjeong River and Seopyeong River, with the surrounding slopes of the various districts. Busan Busan was the host city of the 2002 Asian Games and AFCU 2005. It was also one of the host cities for the 2002 FIFA World Cup, and the center for international conventions in Korea. Administratively, it is designated as a Metropolitan City. On November 14, 2005, the city officially announced it bid to host the 2020 Summer Olympics Games.^[a] Coordinates: 35°06′N, 129°02′E | Busan Metropolitan City Busan Metropolitan City, also known as *Busan*, is the largest port city in the Republic of Korea. With a population of 3.6 million, Busan is also South Korea's second largest inland city (Seoul). The most densely built-up areas of the city are situated in the vicinity of names valley between the Taekjeong River and Seopyeong River, with the surrounding slopes of the various districts. Busan Busan was the host city of the 2002 Asian Games and AFCU 2005. It was also one of the host cities for the 2002 FIFA World Cup, and the center for international conventions in Korea. Administratively, it is designated as a Metropolitan City. On November 14, 2005, the city officially announced it bid to host the 2020 Summer Olympics Games.^[a] Coordinates: 35°06′N, 129°02′E || Geography Climate History Government Demographics Economy Culture Transportation Media International relations Notes References External links See also | Geography Climate History Government Demographics Economy Culture Transportation Media International relations Notes References External links See also |

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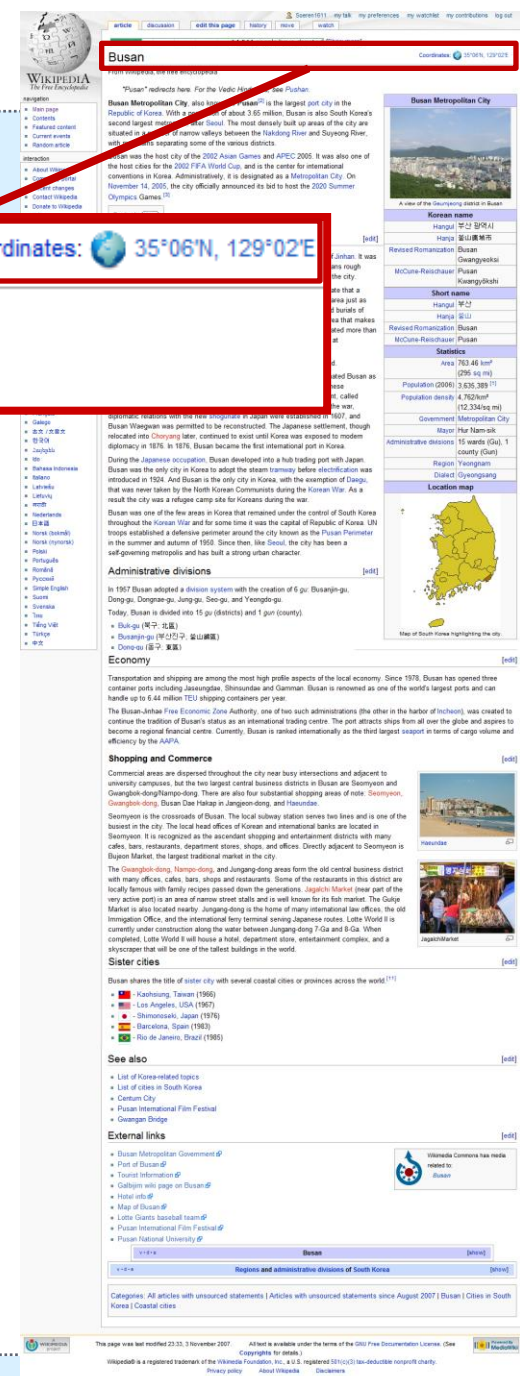
other language versions

other Wikipedia pages

To the Web

Redirects

Disambiguations



The screenshot shows the Wikipedia page for Busan. The title is "Busan". The abstract is "From Wikipedia, the free encyclopedia". The infoboxes include a description of Busan as a metropolitan city in South Korea, its location, and its history. The geo-coordinates are 35°06'N, 129°02'E. The categories are "Metropolitan areas in South Korea" and "Cities in South Korea". The images section shows a map of Busan. The links section includes "Busan Metropolitan City", "Busan International Airport", "Busan Station", "Busan Bay", "Busan Harbour", "Busan International Film Festival", "Busan International Seafood Festival", "Busan International Film Festival", "Busan International Seafood Festival", "Busan International Film Festival", "Busan International Seafood Festival". The other language versions section lists links to the page in various languages. The other Wikipedia pages section lists links to related pages. The To the Web section lists links to external websites. The Redirects section lists links to pages that redirect to this page. The Disambiguations section lists links to pages that disambiguate this page.

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 WIKIPEDIA The Free Encyclopedia articles discussions edit this page history view
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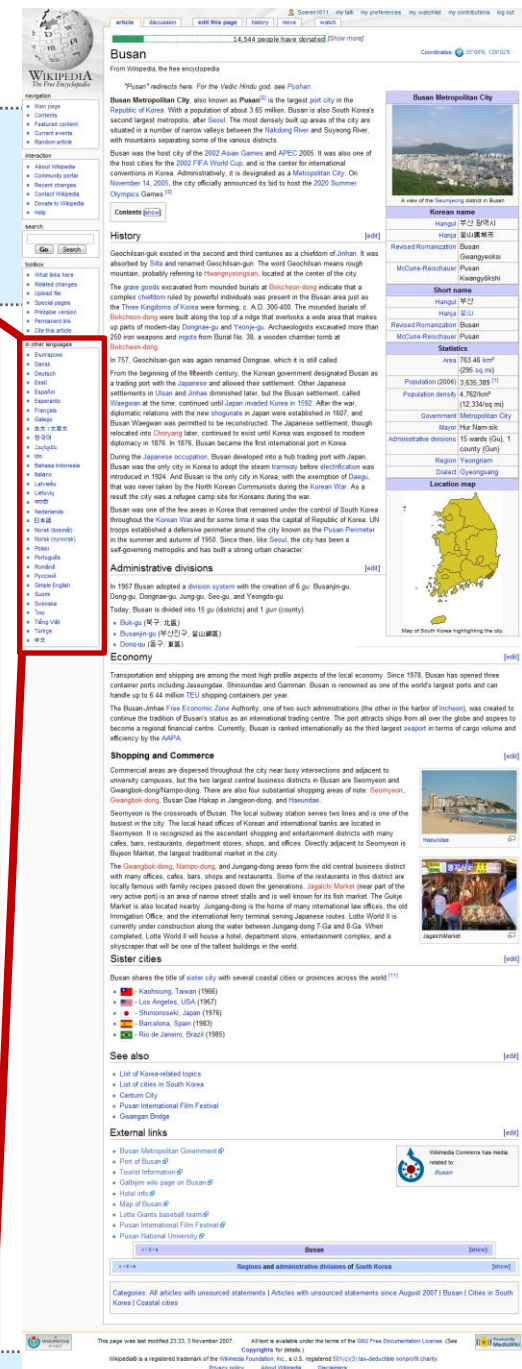
Busan Metropolitan City 	History Gyeongju-gu existed in the second and third centuries as a chieftain of Jinu. It was absorbed by Silla and renamed Gyeongju-gun. The word Gyeongju means rough mound, probably referring to Gyeongju-ryong, located at the center of the city. The grave pits excavated from mound-like burial mounds (Gyeongju-ryong) indicate that a complex chieftain ruled by powerful individuals was present in the Busan area just as the Three Kingdoms of Korea were forming. c. A.D. 300-400. The mound burials of Gyeongju-ryong were built along the top of a ridge that overlooks a wide area that makes up parts of modern-day Dongnae-gu and Yeongdo-gu. Archaeologists excavated more than 250 iron weapons and ingots from Burial No. 38, a wooden chamber tomb at Gyeongju-ryong. In 757, Gyeongju-gun was again renamed Dongnae, which is still called. From the beginning of the 16th century, the Korean government designated Busan as a trading port with the Japanese and allowed their settlements. Other Japanese settlements in Ulsan and Jinhae diminished later, but the Busan settlement, called Waegwan at the time, continued until modern Korea in 1932. After the war, diplomatic relations with the new Waegwan in Japan were established in 1952 and Busan Waegwan was permitted to be reconstructed. The Japanese settlement, though relocated into Chinyang-ri, continued to exist until Korea was exposed to modern diplomacy in 1975. In 1978, Busan became the first international port in Korea. During the Japanese occupation, Busan developed into a hub trading port with Japan. Busan was the only city in Korea to adopt the steam tramway before electrification was introduced in 1924. And Busan is the only city in Korea, with the exemption of Daejeon, that was never taken by the North Korean Democrats during the Korean War. As a result the city was a refuge camp site for North Koreans during the war. Busan was one of the few areas in Korea that remained under the control of South Korea throughout the Korean War and for some time it was the capital of Republic of Korea. UN troops established a defense perimeter around the city known as the Pusan Perimeter in the summer and autumn of 1950. Since then, the Seoul, the city has been a self-governing metropolis and has built a strong urban character.
A view of the Geumjeong district in Busan	Administrative divisions In 1957 Busan adopted a division system with the creation of 5 gu: Busanjin, Dongnae, Dongnae-gu, Jung-gu, Seogu, and Yeongdo-gu. Today, Busan is divided into 15 gu (districts) and 1 gu (county). • Dongnae (동래구) • Dongnae-gu (동래구) • Dongnae-gu (동래구) • Dongnae-gu (동래구)
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- Español
- Esperanto
- Français
- Galego
- 古文 / 文言文
- 한국어
- Հայերեն
- ལྷོ
- Bahasa Indonesia
- Italiano
- Latviešu
- Lietuvių
- मराठी
- Nederlands
- 日本語
- Norsk (bokmål)
- Norsk (nynorsk)
- Polski
- Português
- Română
- Русский
- Simple English
- Suomi
- Svenska
- ไทย
- Tiếng Việt
- Türkçe
- 中文



The screenshot shows the Wikipedia page for Busan. The page is in English and includes a title, abstract, infoboxes, geo-coordinates, categories, images, links, and other language versions. The page is titled "Busan" and is part of the "Regions and administrative divisions of South Korea" category. The page includes a table of contents, a history section, and a list of external links. The page is also part of the "Busan Metropolitan City" category.



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[illegible]

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7. Juni 2011

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[Privacy policy](#) [About Wikipedia](#) [Disclaimers](#)

Wikitext-Syntax

```

{{Infobox Korean settlement
| title           = Busan Metropolitan City
| img            = Busan.jpg
| imgcaption     = A view of the [[Geumjeong]] district in Bu
| hangul         = 부산 광역시
. . .
| area_km2       = 763.46
| pop            = 3635389
| popyear        = 2006
| mayor          = Hur Nam-sik
| divs           = 15 wards (Gu) , 1 county (Gun)
| region         = [[Yeongnam]]
| dialect        = [[Gyeongsang]]
}}
  
```



<http://dbpedia.org/resource/Busan>

RDF representation

```

dbp:Busan      dbpp:title      "Busan Metropolitan City"
dbp:Busan      dbpp:hangul     "부산 광역시"@Hang
dbp:Busan      dbpp:area_km2   "763.46"^xsd:float
dbp:Busan      dbpp:pop        "3635389"^xsd:int
dbp:Busan      dbpp:region     dbp:Yeongnam
dbp:Busan      dbpp:dialect    dbp:Gyeongsang
. . .
  
```

Busan Metropolitan City



A view of the **Geumjeong** district in Busan

Korean name

Hangul	부산 광역시
Hanja	釜山廣域市
Revised Romanization	Busan Gwangyeoksi
McCune-Reischauer	Pusan Kwangyŏkshi

Short name

Hangul	부산
Hanja	釜山
Revised Romanization	Busan
McCune-Reischauer	Pusan

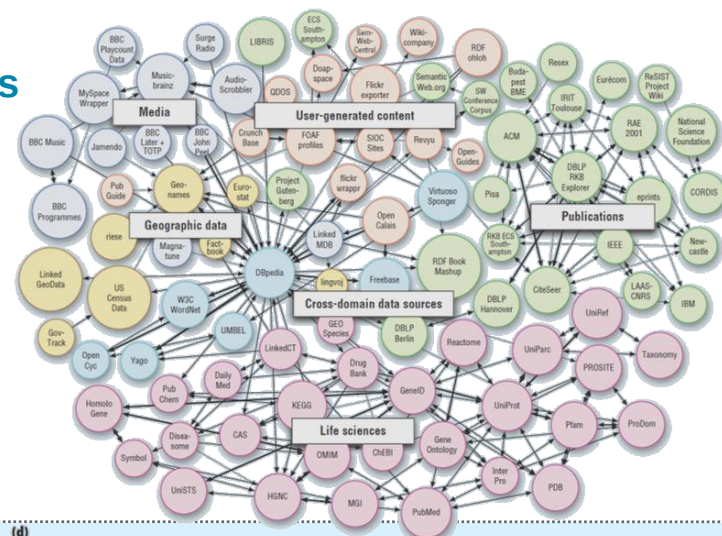
Statistics

Area	763.46 km ² (295 sq mi)
Population (2006)	3,635,389 ^[1]
Population density	4,762/km ² (12,334/sq mi)
Government	Metropolitan City
Mayor	Hur Nam-sik
Administrative divisions	15 wards (Gu), 1 county (Gun)
Region	Yeongnam
Dialect	Gyeongsang



A vast multi-lingual, multi-domain knowledge base

- **descriptions of ca. 3.4 million things** (1.5 million classified in a consistent ontology), including 312K *persons*, 413K *places*, 94K *music albums*, 49K *films*, 15K *video games*, 140K *organizations*, 146K *species*, 5K *diseases*
- labels & abstracts in up to 92 different languages
- altogether **>1 billion pieces of information** (i.e. RDF triples): 257M from English edition, 766M from other language editions
 - **substantial impact** in science, technology and society
 - became a **central interlinking hub** on the Data Web
 - Scientific publications attracted more than **500 citations**
 - More than 15.000 monthly visits on DBpedia.org, numerous press articles, blog posts ...
 - Ecosystem of commercial and community applications: ThomsonReuters, BBC, Neofonie, Openlink, Faviki ...



OpenStreetMap<->LinkedGeoData

OpenStreetMap is an incredible source of spatial data
LinkedGeoData makes this data available as Linked Data

- Mappings to DBpedia, Geonames
- SPARQL Endpoint
- REST API – Linked Data Services



Users	309465
GPS points	1993482813
Nodes	795615514
Ways	66102033
Relations	751638





[+] **amenity**(397)
 atm (5) | bank (8) | bench (101) |
 bicycle parking (17) |
 bicycle rental (1) | biergarten (2) |
 cafe (11) | car wash (1) | cinema (2) |
 circus (1) | clock (1) | dentist (1) |
 doctors (2) | fast food (16) |
 fountain (9) | grit bin (11) |
 hospital (1) | kindergarten (5) |
 library (1) | nightclub (2) | parking (15) |
 pharmacy (8) | post box (18) |
 post office (1) | pub (7) |
 recycling (24) | restaurant (34) |
 school (7) | shelter (1) | taxi (5) |
 telephone (43) | theatre (1) |
 toilets (11) | university (2) |
 vending machine (18) | veterinary (1) |
 waste basket (2) | water (1) |

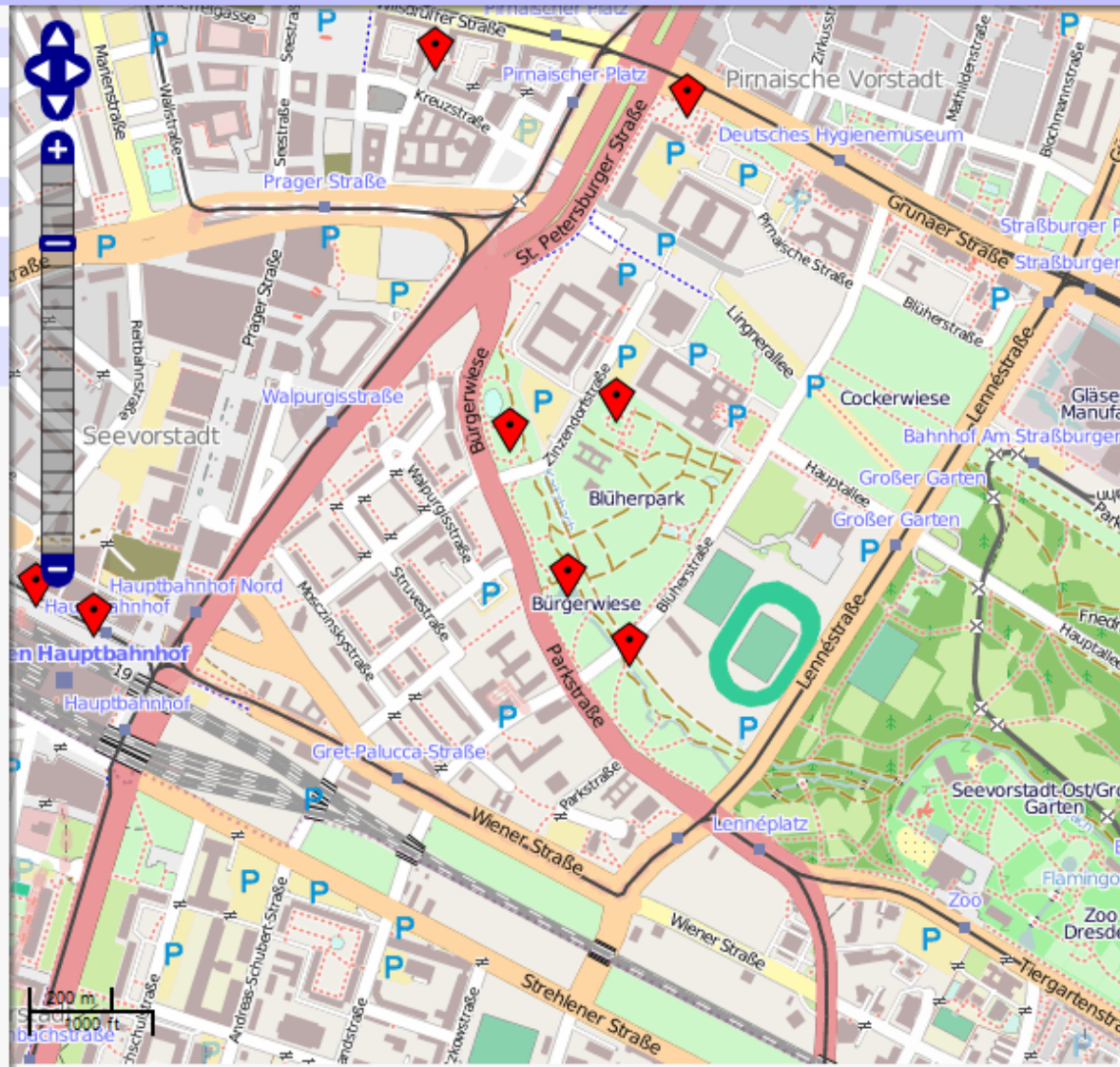
Query took 136ms.

- [+] [highway](#)(109)
- [+] [historic](#)(6)
- [+] [leisure](#)(10)
- [+] [man_made](#)(60)
- [+] [natural](#)(69)
- [+] [railway](#)(76)
- [+] [shop](#)(60)
- [+] [sport](#)(4)
- [+] [tourism](#)(21)
- [+] [waterway](#)(1)

[+] cuisine(18)
[+] place(1)

deselect

Query took 141ms.



Extraction Relational Data

Many different approaches (D2R, Virtuoso RDF Views, Triplify, ...)

No agreement on a formal semantics of RDF2RDF mapping

- LOD readiness,
SPARQL-SQL translation
- W3C RDB2RDF WG

Tool	Triplify	D2RQ	Virtuoso RDF Views
Technology	Scripting languages (PHP)	Java	Whole middleware solution
SPARQL endpoint	-	X	X
Mapping language	SQL	RDF based	RDF based
Mapping generation	Manual	Semi-automatic	Manual
Scalability	Medium-high (but no SPARQL)	Medium	High

Extraction Challenges

From **unstructured** sources

- Deploy existing NLP approaches (OpenCalais, Ontos API)
- Develop standardized, LOD enabled interfaces between NLP tools (NLP2RDF)

From **semi-structured** sources

- Efficient bi-directional synchronization

From **structured** sources

- Declarative syntax and semantics of data model transformations (W3C WG RDB2RDF)

Orthogonal challenges

- Using LOD as background knowledge
- Provenance



ando omnes passim deliberant et loquuntur, optimum à multis
ortus consilium est: Homines quoque si taceant, vocem inueniunt,
et quæ nemo dicit, prudens antiquitas suggerit.

linea se

Storage and Querying

RDF Data Management

Still by a factor 5-50 slower than relational data management

Performance increases steadily

Comprehensive, well-supported open-source and commercial implementations are available:

- OpenLink's Virtuoso (os+commercial)
- Big OWLIM (commercial), Swift OWLIM (os)
- Talis (hosted)
- Bigdata (distributed)
- Allegrograph (commercial)
- Mulgara (os)

Adaptive SPARQL Query Cache

```
...
JensLehmann    rdf:type      foaf:person
JensLehmann    foaf:knows   SoerenAuer
JensLehmann    foaf:birthDay "10.4.1981"
SebastianTramp rdf:type      foaf:person
SebastianTramp foaf:knows   SoerenAuer
...
```

Adaptive SPARQL Query Cache

```
...
JensLehmann    rdf:type      foaf:person
JensLehmann    foaf:knows   SoerenAuer
JensLehmann    foaf:birthDay "10.4.1981"
SebastianTramp rdf:type      foaf:person
SebastianTramp foaf:knows   SoerenAuer
...
```

Graph pattern (SPARQL core):

```
?person rdf:type      foaf:person
?person foaf:knows    http://aksw.org/SoerenAuer
```

Adaptive SPARQL Query Cache

...		
JensLehmann	rdf:type	foaf:person
JensLehmann	foaf:knows	SoerenAuer
JensLehmann	foaf:birthDay	"10.4.1981"
SebastianTramp	rdf:type	foaf:person
SebastianTramp	foaf:knows	SoerenAuer
...		

Graph pattern (SPARQL core):

?person	rdf:type	foaf:person
?person	foaf:knows	http://aksw.org/SoerenAuer



Adaptive SPARQL Query Cache

...		
JensLehmann	rdf:type	foaf:person
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SebastianTramp	foaf:knows	SoerenAuer
...		

Graph pattern (SPARQL core):

?person	rdf:type	foaf:person
?person	foaf:knows	http://aksw.org/SoerenAuer

Question: Which query results are affected by which updates?

Adaptive SPARQL Query Cache

RDF Graph: LOD2

...		
JensLehmann	rdf:type	foaf:person
JensLehmann	foaf:knows	SoerenAuer
JensLehmann	foaf:birthDay	"10.4.1981"
SebastianTramp	rdf:type	foaf:person
SebastianTramp	foaf:knows	SoerenAuer
...		

Graph pattern (SPARQL core):

?person	rdf:type	foaf:person
?person	foaf:knows	http://aksw.org/SoerenAuer

Question: Which query results are affected by which updates?

Theorem: *Query results only change, when updated triples match one of the triple patterns.* Formal proof wrt. SPARQL algebra in [1].

[1] Michael Martin, Jörg Unbehauen, Sören Auer: [Improving the Performance of Semantic Web Applications with SPARQL Query Result Caching](#). In proceedings of 7th Extended Semantic Web Conference (ESWC2010).

Adaptive SPARQL Query Cache

RDF Graph:

...		
JensLehmann	rdf:type	foaf:person
JensLehmann	foaf:knows	SoerenAuer
JensLehmann	foaf:birthDay	"10.4.1981"
SebastianTramp	rdf:type	foaf:person
SebastianTramp	foaf:knows	SoerenAuer
...		

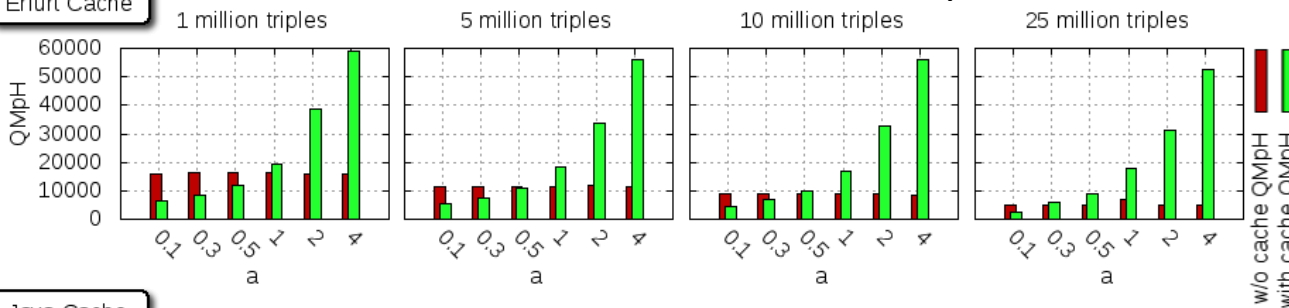
Graph pattern (SPARQL core):

```
?person rdf:type foaf:person
?person foaf:knows http://aksw.org/SoerenAuer
```

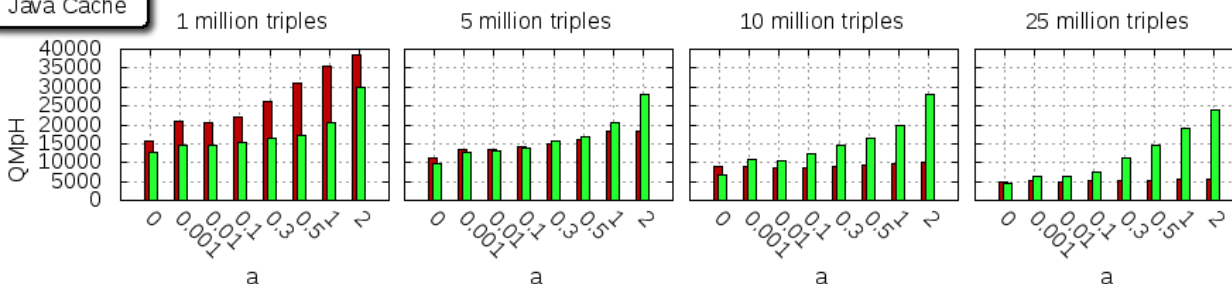
Question: Which query results are affected by which updates?

Theorem: Query results only change, when updated triples match one of the triple patterns. Formal proof wrt. SPARQL algebra in [1].

Erfurt Cache



Java Cache



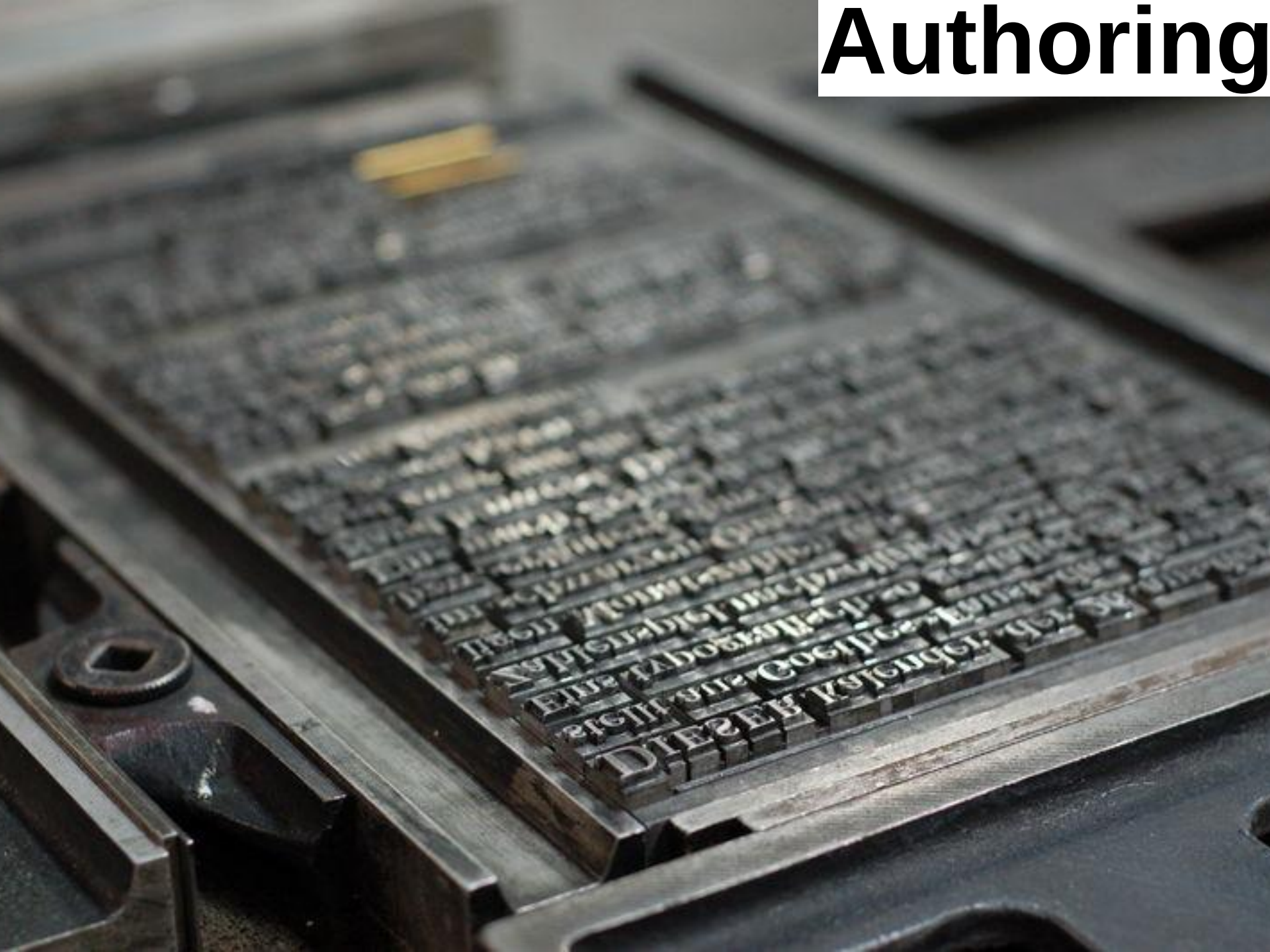
Work with **OpenLink Ltd.** (UK) on integrating the approach into the **Virtuoso** triple store and with **CWI (NL)** into **MonetDB**

[1] Michael Martin, Jörg Unbehauen, Sören Auer: [Improving the Performance of Semantic Web Applications with SPARQL Query Result Caching](#). In proceedings of 7th Extended Semantic Web Conference (ESWC2010).

Storage and Querying Challenges

- Reduce the performance gap between relational and RDF data management
- SPARQL Query extensions
- Spatial/semantic/temporal data management
- More advanced query result caching
- View maintenance / adaptive reorganization based on common access patterns
- More realistic benchmarks

Authoring



Two Kinds of Semantic Wikis

1. Semantic (Text) Wikis

- Authoring of semantically annotated texts

2. Semantic Data Wikis

- Direct authoring of structured information
(i.e. RDF, RDF-Schema, OWL)

Two Kinds of Semantic Wikis

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2. Semantic Data Wikis

- Direct authoring of structured information (i.e. RDF, RDF-Schema, OWL)



The screenshot shows a web interface for editing a page titled 'Australia'. At the top, there are tabs for 'article', 'discussion', 'edit', 'history', 'protect', 'delete', 'move', 'watch', and 'ref'. Below the tabs is a toolbar with icons for bold, italic, link, unlink, image, table, source, undo, redo, and a minus sign. The main text area contains the following content:

This is a sample page that is used in the SMW documentation process. This page represents an "individual" - in this case, the country of Australia. ([[Special:ExportRDF/{PAGENAME}}|RDF Rendering]])

According to <https://www.cia.gov/cia/publications/factbook/print/as.html>, Australia [[hasPopulation:=20,264,082]] had an estimated population of 20,264,082 as of July, 2006.

The country of Australia is [[locatedOn::Australian_Continent]]

[[Category:Country]]

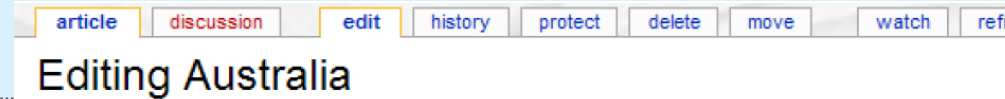
Two Kinds of Semantic Wikis

1. Semantic (Text) Wikis

- Authoring of semantically annotated texts

2. Semantic Data Wikis

- Direct authoring of structured information (i.e. RDF, RDF-Schema, OWL)

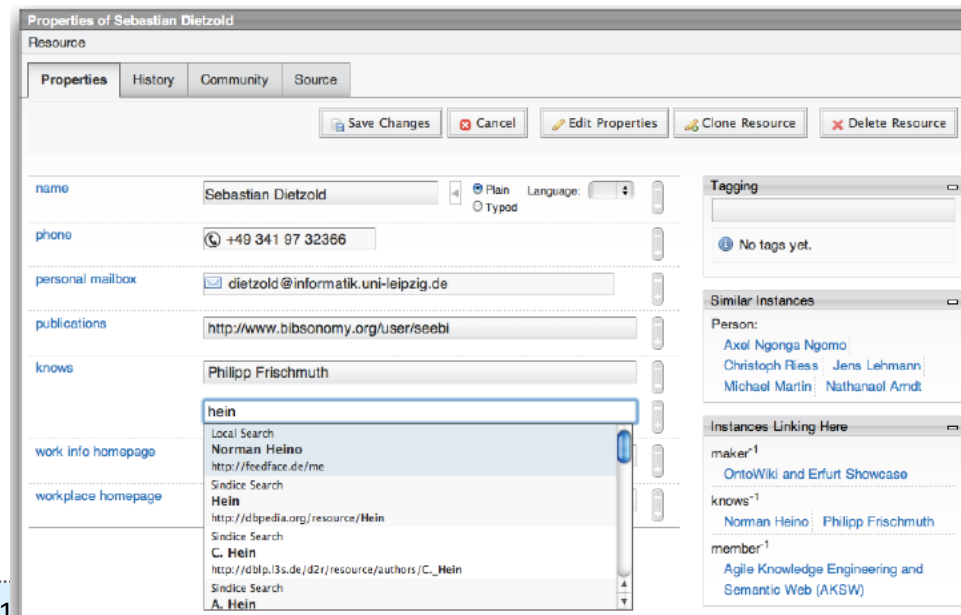


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The country of Australia is [[locatedOn::Australian_Continent]]

[[Category:Country]]



OntoWiki – a semantic data wiki

Versatile domain-independent tool

Serves as Linked Data / SPARQL endpoint on the Data Web

Open-source project hosted at Google code

Not just a Wiki UI, but a whole framework for the development of Semantic Web applications

Developed in PHP based on the Zend framework

Very active developer and user community

More than 500 downloads monthly

Large number of use cases

Management of multimedia content for a record label in the UK

OntoWiki (Sebastian Tramp) [-]

User Extras Help Debug

Search for Resources

POWERED BY VIRTUOSO

Knowledge Bases [-]

Edit View

OntoWiki System Configuration

Caucasus Spiders

Navigation: CheckList [-]

Edit View Type

Search in Navigation

Caucasus Spiders

Ukraine ▶

Russia ▶

Turkey ▶

Iran ▶

Moldavia ▶

Resource List

View

Instances History Community Source

	published in	location
1. 33167: Harpactea golovatchi Original Record	Dunin (1992)	Shvanidzor
2. 33169: Harpactea eskovi Original Record	Dunin (1992)	Shnokh
3. 33168: Harpactea eskovi Original Record	Dunin (1992)	Ozun
rdf:type Original Record label 33168: Harpactea eskovi comment type series 92 location Ozun species name Harpactea eskovi published in Dunin (1992)		
4. 33172: Harpactea eskovi Original Record	Dunin (1992)	Savarlo
5. 33173: Harpactea nenilini Original Record	Dunin (1992)	Kuris
6. 33170: Harpactea eskovi Original Record	Dunin (1992)	Vanadzor
7. 33175: Harpactea deelemanae Original Record	Dunin (1992)	Kajaran
8. 33174: Harpactea nenilini Original Record	Dunin (1992)	Shishkert
9. 40155: Macarokeris nidicolens Original Record	Logunov & Rakov (1998)	Mukhtadir
10. 33178: Harpactea azerbaijdzhianica Original Record	Dunin (1992)	Aurora

Explore Tags [-]

View

within

[Temirgoe](#) · [Rossk.](#) · [Evdokimovsk](#) · [Kergez Mt.](#) · [Bazardyuzu Mts.](#)

Minimap [-]

Edit View Zoom

Search for location

Data CC-BY-SA by OpenStreetMap

Show Properties [-]

[rdf:type](#) · [label](#) · [comment](#) · [location](#) · [species name](#) · [published in](#) · [within](#)

Filter [-]

Search in list

Add complex Filter Clear

Active Filters:

- [rdf:type](#) equals [Original Record](#)

<http://philipp.frischmuth24.de/id/me>[View Resource](#)

Properties

History

Community

Source

✓ Data was found for the given URI. 28 statements were added.

ns1:to <http://philipp.frischmuth24.de/pingback/ping/>

type [Person](#)

seeAlso <http://feeds.delicious.com/rss/pfrischmuth>

sameAs [5562](#)

[id490bd762-0352-40e8-8559-3726c31bbd8a](#)

birthday 1984-10-09

current project <http://pingback.aksw.org/>

depiction



firstName Philipp

gender male

holds account [pfrischmuth](#)

[pfrischmuth](#)

homepage <http://www.frischmuth24.de>

knows [me](#)

[Sebastian Tramp](#)

personal mailbox <mailto:frischmuth@informatik.uni-leipzig.de>

<mailto:philipp@frischmuth24.de>

name Philipp Frischmuth

nickname Phil

Tagging

[AKSW](#)[OntoWiki](#)

[Tag removed](#)

Similar Instances

Person

[Norman Heino](#) • [me](#) • [Sebastian Tramp](#) •
[AxelCNgongaNgomo](#) • [ChristophRiess](#) • ...

Instances Linking Here

knows⁻¹

[Norman Heino](#) • [Sebastian Tramp](#)

maker⁻¹

[OntoWiki and Erfurt Showcase](#) •
[Erfurt API](#) • [OntoWiki](#) •
[Semantic Pingback](#) • [Triplify](#)

member⁻¹

[Agile Knowledge Engineering and
 Semantic Web \(AKSW\)](#)

RDFauthor in OntoWiki

Properties of Sebastian Dietzold

Resource

Properties

History

Community

Source

Save Changes

Cancel

Edit Properties

Clone Resource

Delete Resource

name

Sebastian Dietzold

Plain

Language:

Typed

phone

+49 341 97 32366

personal mailbox

dietzold@informatik.uni-leipzig.de

publications

http://www.bibsonomy.org/user/seebl

knows

Philipp Frischmuth

he in

Local Search

Norman Heino

http://feedface.de/me

Sindice Search

Hein

http://dbpedia.org/resource/Hein

Sindice Search

C. Hein

http://dblp.l3s.de/d2r/resource/authors/C_Hein

Sindice Search

A. Hein

work info homepage

workplace homepage

Tagging

No tags yet.

Similar Instances

Person:

Axel Ngonga Ngomo

Christoph Rieß

Jens Lehmann

Michael Martin

Nathanael Arndt

Instances Linking Here

maker¹

OntoWiki and Erfurt Showcase

knows¹

Norman Heino

Philipp Frischmuth

member¹

Agile Knowledge Engineering and Semantic Web (AKSW)

OntoWiki: Supporting Requirements engineering

SoftWiki Integrator Window

Softwiki Main Selection

Anforderungen im Forschungsprojekt LE4SW

Please login first

New Requirement

Topics

Tags
 Search for Tag ...
Geodata Grouping criteria Multimedia Query logging
RDFa Widgets WP4 WP6 asset editor asset types authorization ci comment CONX cross cutting concern deleting resources display criteria export information faceted faceted based browsing feedback i18n inline editing integration labrep library login ontology ontology creation ontowiki performance provenance rating scalability search soap sso tagging theme trilith usability user generated content user management web services
Defined: ☒ Undefined: ☒

SoftWiki Login

Sonstiges > Comment

Zurück

Comment

To each lab in the repository users can write comments. To accomplish that a simple text field is required and a function which saves the comments related to the specific resource.
This functionality provides a communication channel between users and developers as well as among users. It allows them to give hints for improvements, to criticize, to leave compliments for the authors. To avoid spam it is necessary to implement methods like Captcha or math story problems.

Thema: Sonstiges

Tags: WP4 comment feedback labrep rating user generated content

Edit Requirement

Authors
First author: JoergUnbehauen
(approx. 273 days ago)
[Show all authors](#)

Linked Files
No files found
Link to file
Upload File

Related Requirements

Comments and Valuations
Related Requirements

Defined Relations ☒ Similar Requirements ☐ Undefined Relations (all) ☐

No matches.

Linking



LOD Linking

Manual:

- SILK
- LIMES

Semi-Automatic:

- SAIM (soon)

Examples (toggle)
Drugbank
Diseases
SimCities



Download:
[Manual](#) | [Distribution](#)

Source:

Endpoint:
Var:
Pagesize:
Restriction:
Property:

Target:

Endpoint:
Var:
Pagesize:
Restriction:
Property:

Metric:

Exemplars:

Acceptance:

Threshold:
Relation:

Review:

Threshold:
Relation:

Detected prefixes:

rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> (-)
rdfs: <http://www.w3.org/2000/01/rdf-schema#> (-)
owl: <http://www.w3.org/2002/07/owl#> (-)
linkedct: <http://data.linkedct.org/resource/linkedct/> (-)
dc: <http://purl.org/dc/terms/> (-)
meshr: <http://bio2rdf.org/ns/mesh#> (-)

[Start Linking](#)

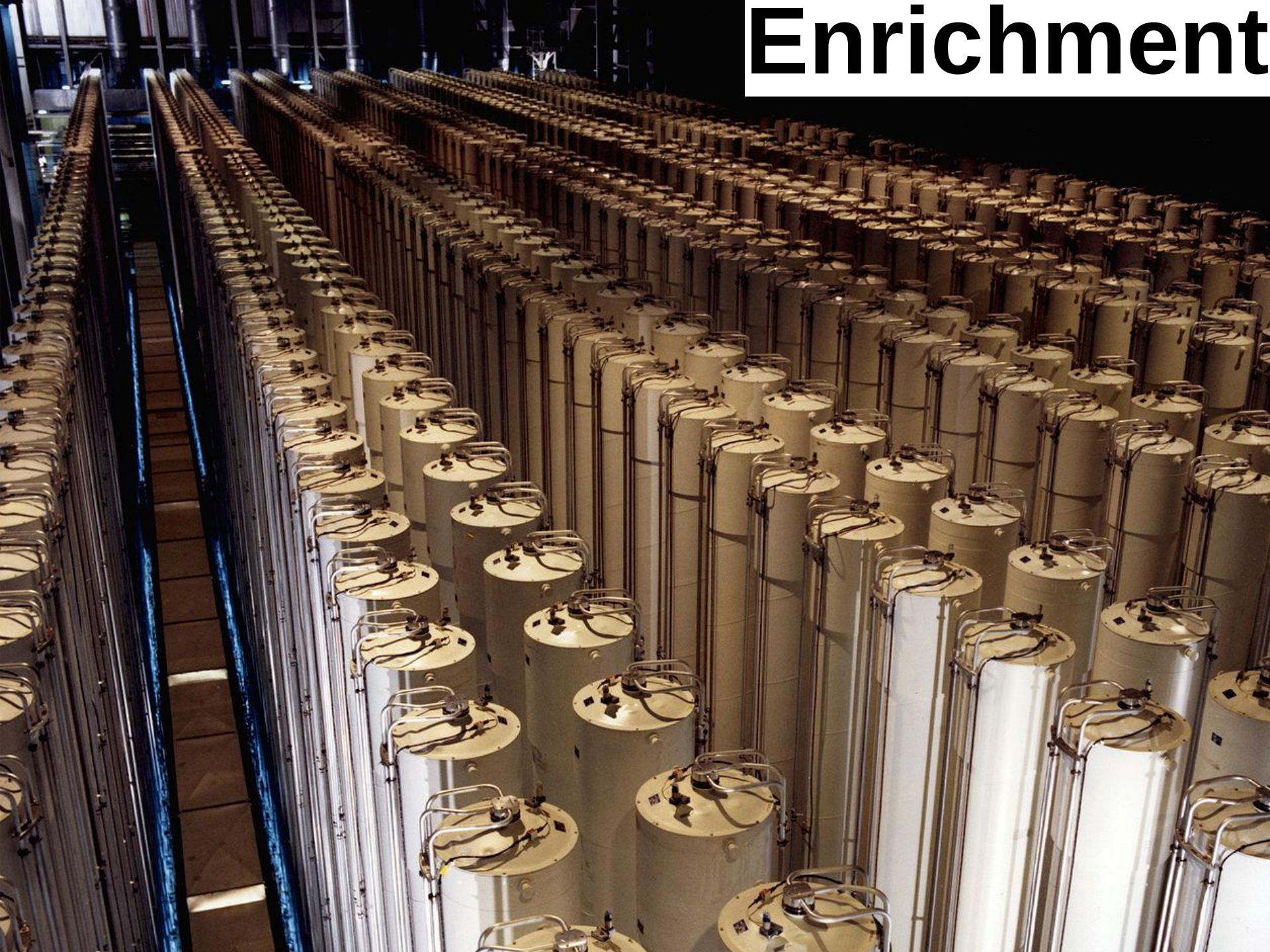
Interlinking Challenges

Only 5% of the information on the Data Web is actually linked

- Make sense of work in the de-duplication/record linkage literature
- Consider the open world nature of Linked Data
- Use LOD background knowledge
- Zero-configuration linking
- Explore active learning approaches, which integrate users in a feedback loop
- Maintain a 24/7 linking service: Linked Open Data Around-The-Clock project (LATC-project.eu)



Enrichment



Enrichment & Repair



ORE (**O**ntology **R**epair and **E**nrichment) tool allows to improve an OWL ontology by fixing inconsistencies & making suggestions for adding further axioms.

- **Ontology Debugging:** OWL reasoning to detect inconsistencies and satisfiable classes + detect the most likely sources for the problems. user can create a repair plan, while maintaining full control.
- **Ontology Enrichment:** uses the DL-Learner framework to suggest definitions & super classes for existing classes in the KB. works if instance data is available for harmonising schema and data.

<http://aksw.org/Projects/ORE>

Improving Linked Data **Quality** by Ontology Learning

Given:

- **Background knowledge base**
- Positive and negative **examples**
(example = individual in ontology)

Goal:

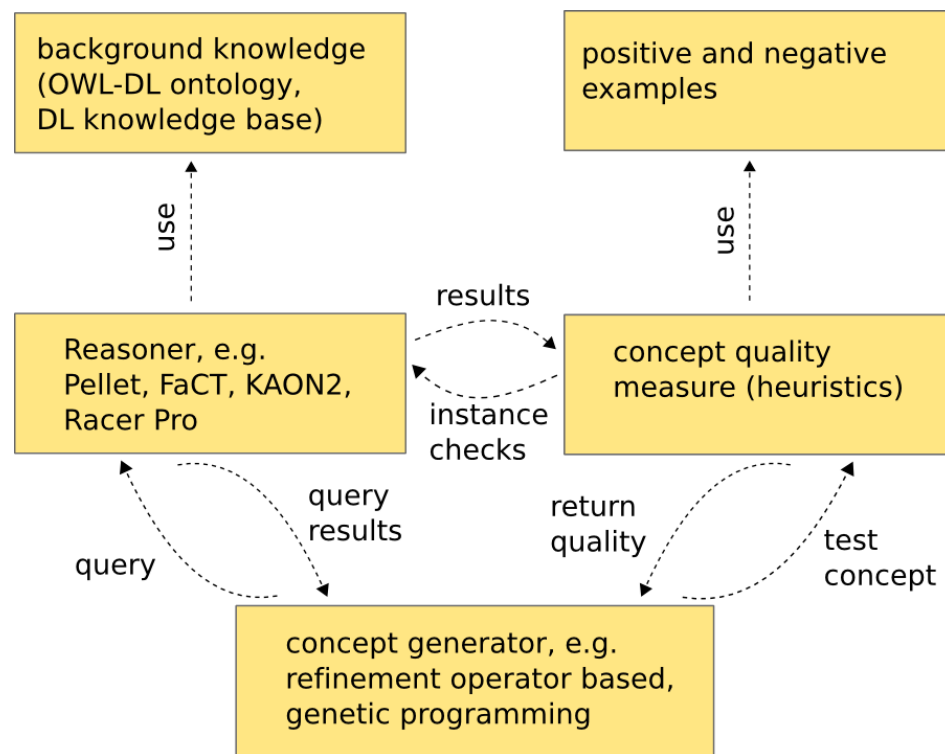
Find an OWL **Class Expression** /
DL concept which

- **covers** as many positive examples as possible
- **covers** as few negative examples as possible

Concept C covers example a $\Leftrightarrow$
a is instance of C

Analogous problem can be defined for logic programs $\Rightarrow$ Inductive Logic Programming

Supervised Machine Learning Task



Framework for Supervised Machine Learning for OWL & Description Logics

Application areas:

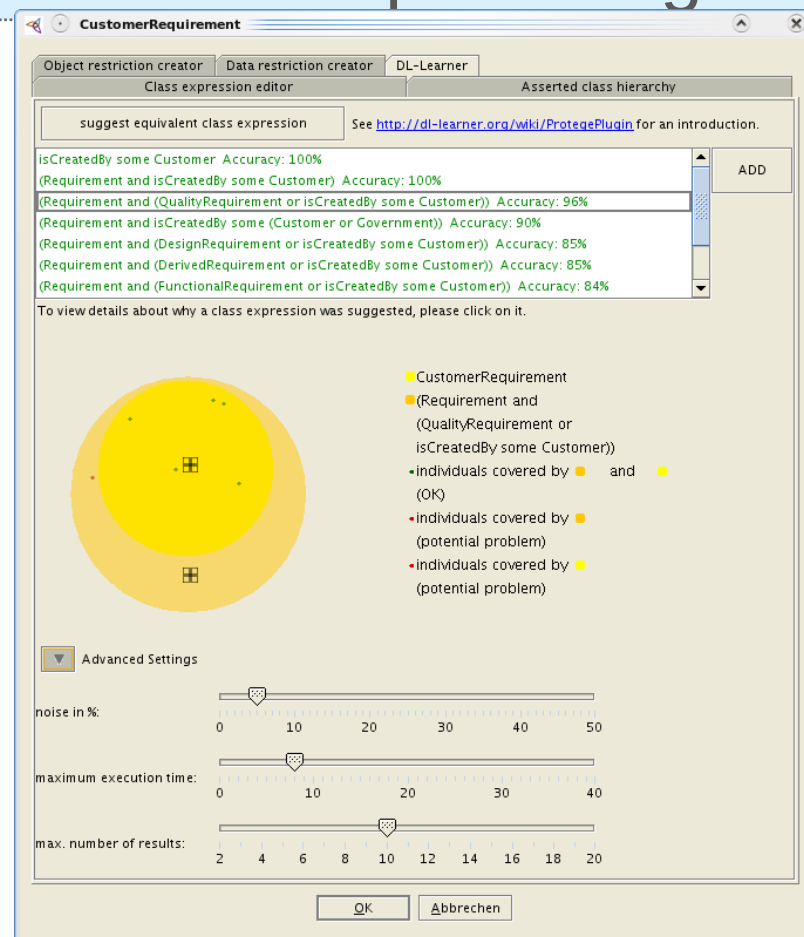
- **Ontology Engineering:** learn axioms for existing classes, Plugins for Protégé and OntoWiki
- **recommendation/navigation**, e.g. music based on last songs heard or navigation suggestions in large knowledge bases (Dbpedia navigation)
- **“Classical” Machine Learning**, e.g. predicting Carcinogenesis

Works on OWL Files and SPARQL endpoints

Supports different reasoner interfaces

Accessible via command-line, GUI, web service

Implemented in Java, available as open-source,



Hellmann, Lehmann, Auer: [Learning of OWL Class Descriptions on Very Large Knowledge Bases](#). Int. Journal on Semantic Web & Information Systems (IJSWIS), Vol. 5, Issue 2, April-July 2009, ISSN: 1552-6283.

Jens Lehmann, Sören Auer: [Class Expression Learning for Ontology Engineering](#). To appear in Journal of Web Semantics (JWS).



**Quality
Analysis**

Linked Data Quality Analysis

Quality on the Data Web is varying a lot

- Hand crafted or expensively curated knowledge base (e.g. DBLP, UMLS) vs. extracted from text or Web 2.0 sources (DBpedia)

Research Challenge

- Establish measures for assessing the authority, provenance, reliability of Data Web resources

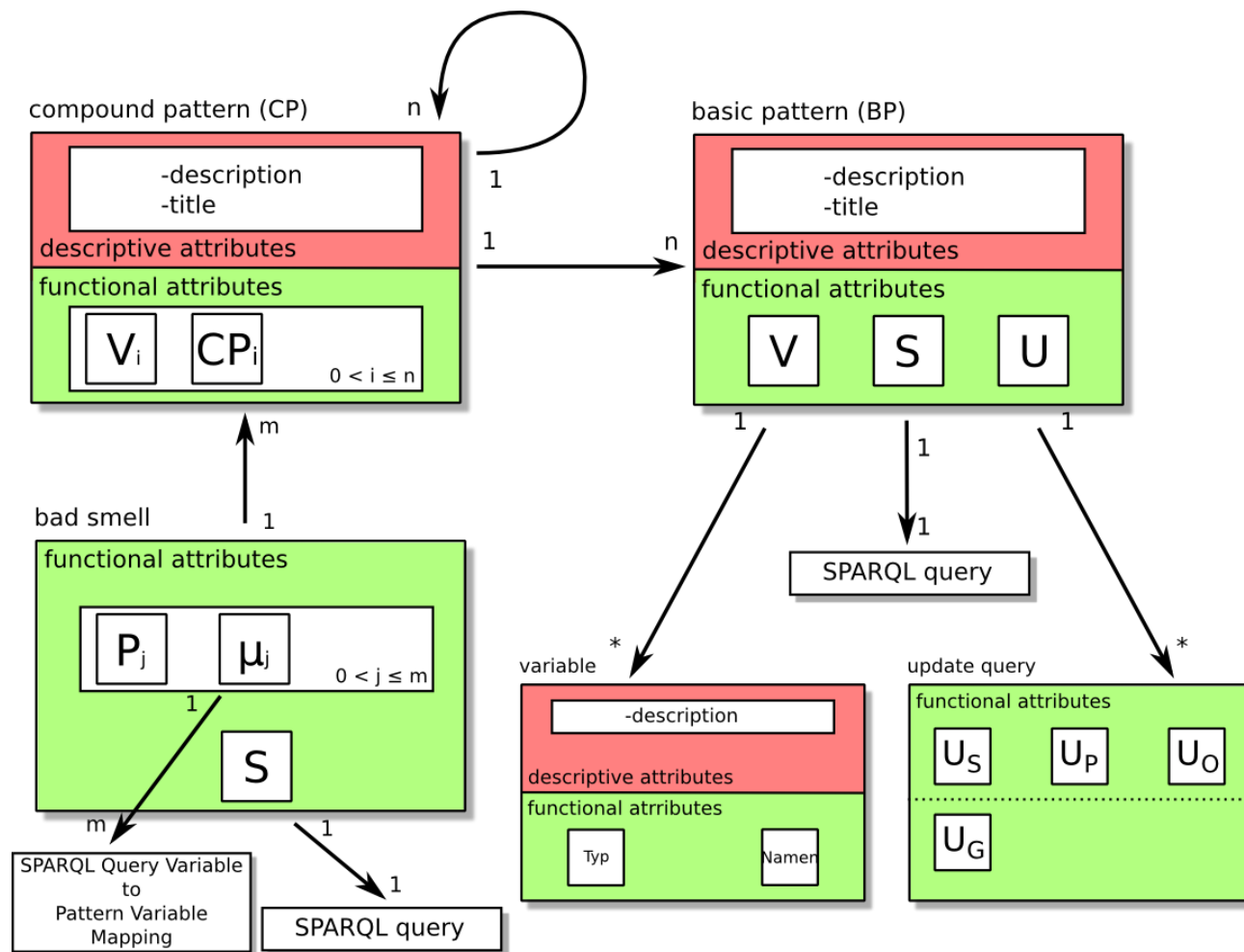


Evolution

EvoPat – Pattern based KB Evolution

- unified method, for both data evolution and ontology refactoring.
- modularized, declarative definition of evolution patterns is relatively simple compared to an imperative description of evolution
 - allows domain experts and knowledge engineers to amend the ontology structure and modify data with just a few clicks
- Combined with RDF representation of evolution patterns and their exposure on the Linked Data Web, EvoPat facilitates the development of an evolution pattern ecosystem
 - patterns can be shared and reused on the Data Web.
- declarative definition of **bad smells and corresponding evolution patterns** promotes the (semi-)automatic improvement of information quality.

Evolution Patterns



OntoWiki (Admin)
Benutzer Extras Hilfe Debug
Suche nach Ressourcen

Wissensbasen
Bearbeiten Ansicht
OntoWiki System Configuration
Philosopher's Ontology
Catalogus Professorum Modell (CPM)
Professorenkatalog Leipzig
Conference Model

OntoWiki Evolution Pattern Engine
savepattern
dtProp birth PROPERTY
objProp http://catalogus-professorum.org/cpm/birthDate PROPERTY
http://catalogus-professorum.org/cpm/birthState
http://catalogus-professorum.org/cpm/birthCity
http://catalogus-professorum.org/cpm/birthCountry
http://catalogus-professorum.org/cpm/birthPlace
⚠ execution took: 0.503 s

Navigation: Classes
Bearbeiten Ansicht Typ
Search in Navigation
Person
Körperschaft
Vorname
Lebensabschnitt
Veröffentlichung
Familie
Query
Institution
Organisation
Beziehung zu einer Institution
Show Me More

Wissensbasen
Ansicht
Professorenkatalog Leipzig

Navigation: Classes
Bearbeiten Ansicht Typ
Search in Navigation
Nothing to navigate here.

Anmeldung
Local OpenID FOAF+SSL
Benutzername
Kennwort
Remember me
Anmeldung Register

OntoWiki Evolution Pattern Engine
savepattern
add
Name for ComplexPattern:
Convert datatype to object property - full
Description for ComplexPattern:
Deletes old property and all its assignments are transformed to new resources with old data value as label and creates new object property
hide show del
Name for SubPattern:
Move axioms from datatype to object property
Description for SubPattern:
Moves all axioms except for range axioms and type axioms

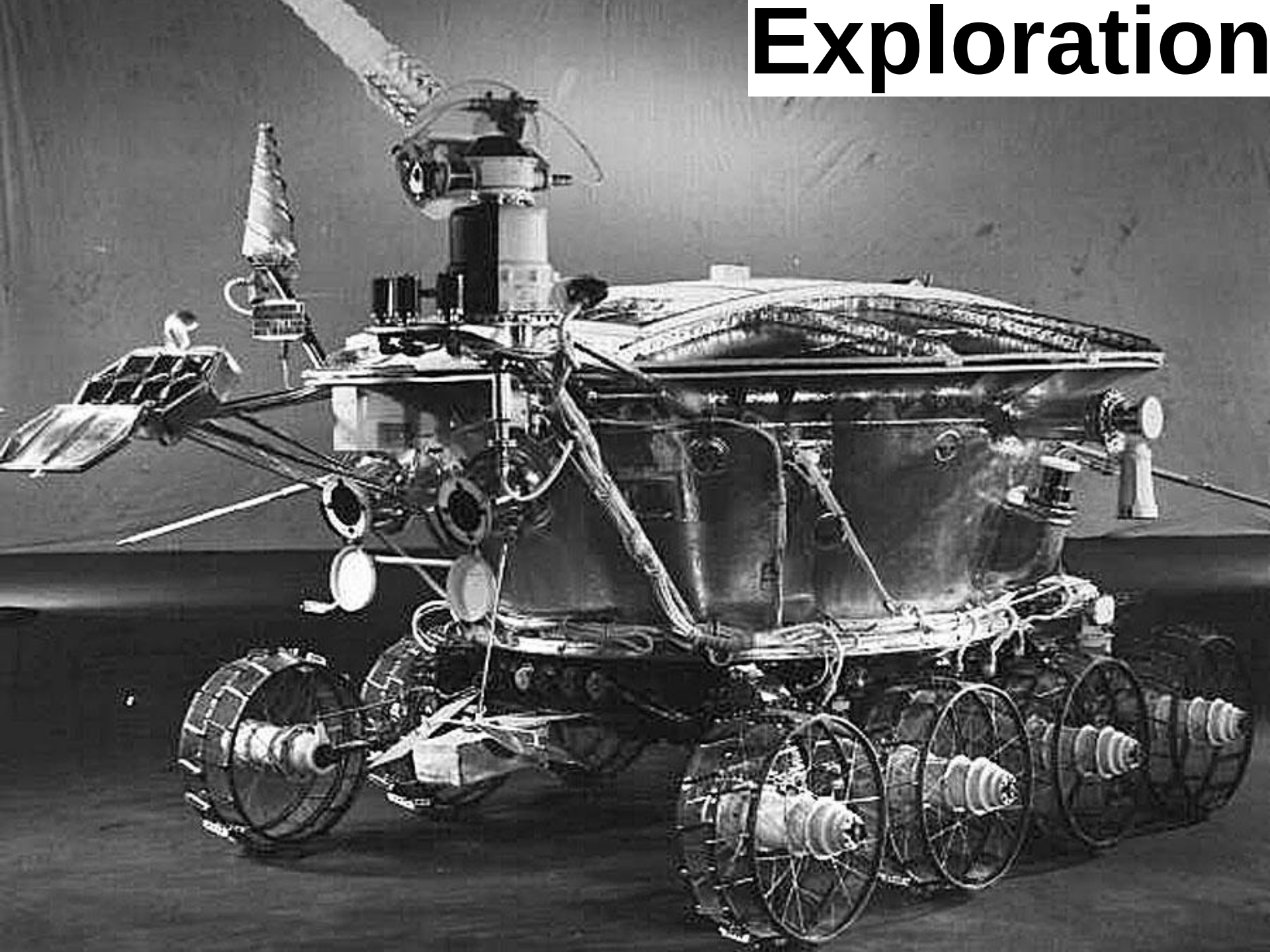
Variable name	Variable type	Variable description	
dtProp	PROPERTY	datatype property	add del
o	TEMP	temp object	del
objProp	PROPERTY	object property	del
p	TEMP	temp pred	del

Selectquery
{ %dtProp% %p% %o% . FILTER (!sameTerm(%p%,<http://www.w3.org/2000/01/rdf-schema#range>) && !sameTerm(%p%,<http://www
Inserttriples
%objProp% %p% %o%
Deletetriples
%dtProp% %p% %o%
hide show del
Name for SubPattern:
Delete property
Description for SubPattern:
Deletes all statements for given property dtProp

Variable name	Variable type	Variable description	
dtProp	PROPERTY		del
o	TEMP	temp object	del
p	TEMP	temp pred	del

Selectquery
{ %dtProp% %p% %o% }

Exploration



Catalogus Professorum Lipsiensis



Professorenkatalog der Universität Leipzig | catalogus professorum lipsiensis

[Epochen](#) > [1919-1932](#) und [1933-1945](#)

[Fakultäten](#) > Philosophische Fakultät I der Universität Leipzig - Philologisch-Historische Abteilung (1920-1951)

Prof. Dr. phil. *Levin* Ludwig Schücking

Lebensdaten

geb. 29.05.1878 in Burgsteinfurt

gest. 12.10.1964 in Farchant

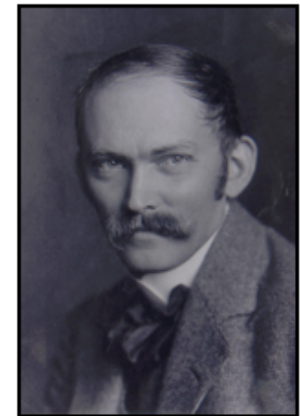
Lebenslauf

Studium

- 1897-1901 Studium: Neuere Sprachen und Kunstgeschichte in Freiburg, Göttingen, Berlin und München

Qualifikation

- 1904 Habilitation für Englische Philologie an der Universität Göttingen
Titel der Arbeit: Grundzüge der Satzverknüpfung im Beowulf.
- 1901 Promotion zum Dr. phil. in Englischer Philologie an der Universität Göttingen
Titel der Arbeit: Stoffliche Beziehungen der englischen Komödie zur italienischen bis Lilly.



Bildquelle: Privatbesitz

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des Tages](#)

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Professorenkatalog Leipzig

User View Extras Help

Suchtext

☐ Alle Wissensbasen durchsuchen

Suchen

Wissensbasen

Modell des Professorenkatalogs

Professorenkatalog der Universität Leipzig

Sprachen (ausgezeichnete Labels)

de

en

keine

Klassen

Vorname (693)

Person (1534)

Professor (1312)

Veröffentlichung (1262)

Lebensabschnitt (10299)

Beziehung zu einer Institution (8840)

Karriere (4367)

Amt (803)

Qualifikationsschrift (2385)

Studium (1285)

gesellschaftliche Funktion (1412)

Verwandschaftsbeziehungen (1)

Geschwister (1)

Bruder (1)

Körperschaft (423)

Person > Professor > Levin Ludwig Schücking

Resource Edit View

Eigenschaften

Karte

Kalender

Versionen

Bearbeiten

Kommentare und Bewertungen

Properties for Levin Ludwig Schücking

Nachname

Schücking

voller akademischer Titel

Prof. Dr. phil.

eine Person hat Vornamen

Levin

Ludwig

Person ID

144

Geburtstag

1878-05-29

Geburtsstadt

Burgsteinfurt

Geburtsland

Preußen

Todestag

1964-10-12

Todesstadt

Farchant

Bild



Bildherkunft

Privatbesitz

Links (e.g. Wikipedia)

http://de.wikipedia.org/wiki/Levin_Ludwig_Sch%C3%BCcking

Abitur Stadt

Münster

Abitur Land

Preußen

Professor hat

1897-1901 Studium: Neuere Sprachen und Kunstgeschichte in Freiburg.

Autoren

Erstellt vor ca. 530 Tagen durch Admin

Letzte Änderung vor ca. 253 Tagen durch ChristianAugustin

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Professor

Georg Hermann Schnedermann

Carl Friedrich Heinrich Schaffstein

Wolfgang Otto Bernhard

Schadewaldt

Fritz Adolf Albert

Prinzhorn

Ludwig Weickmann

Show all 1312 in Main Tab »

Hierher verweisende Instanzen

ist Betreuer

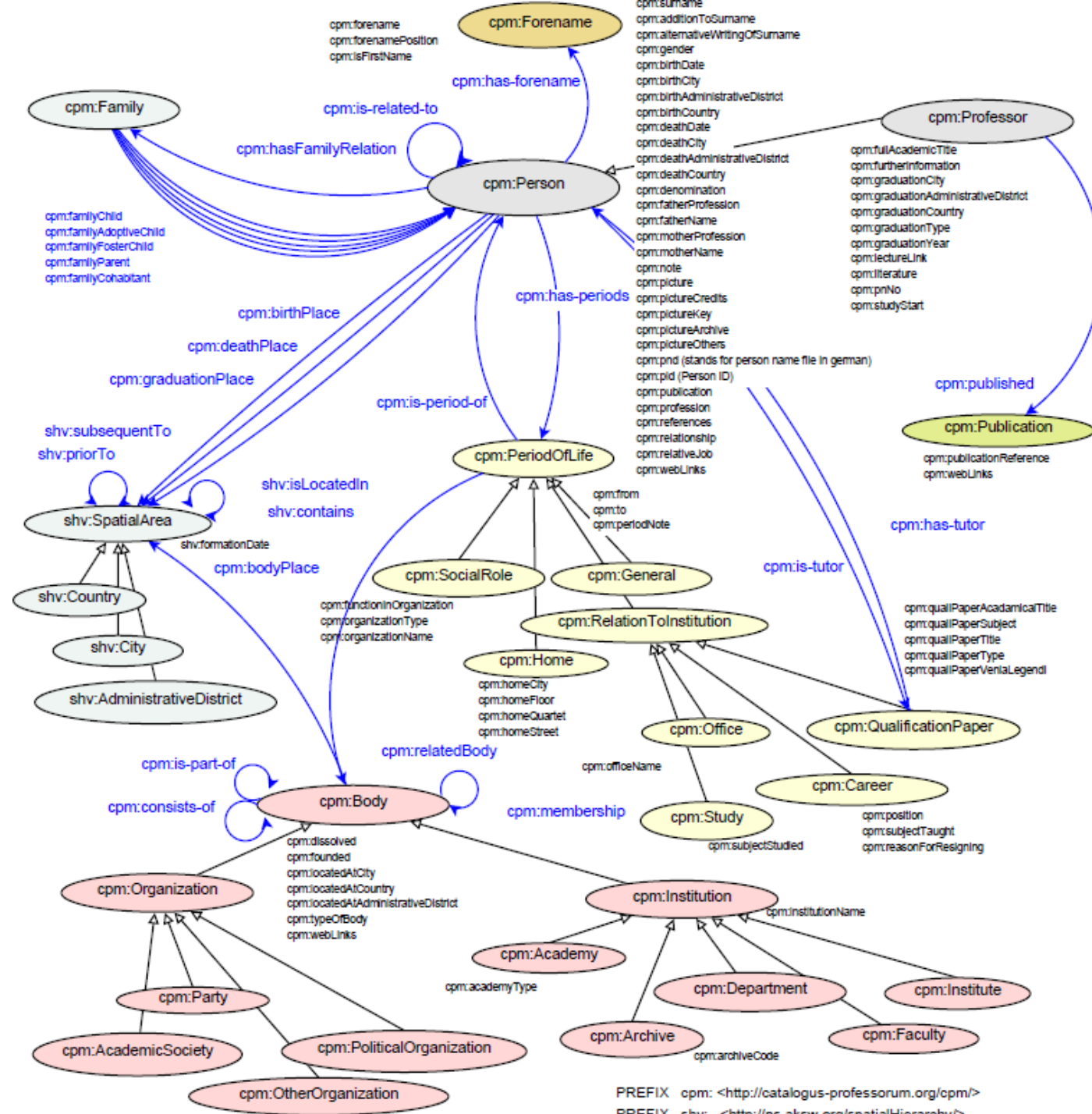
Lorenz Morsbach

Show in Main Tab »

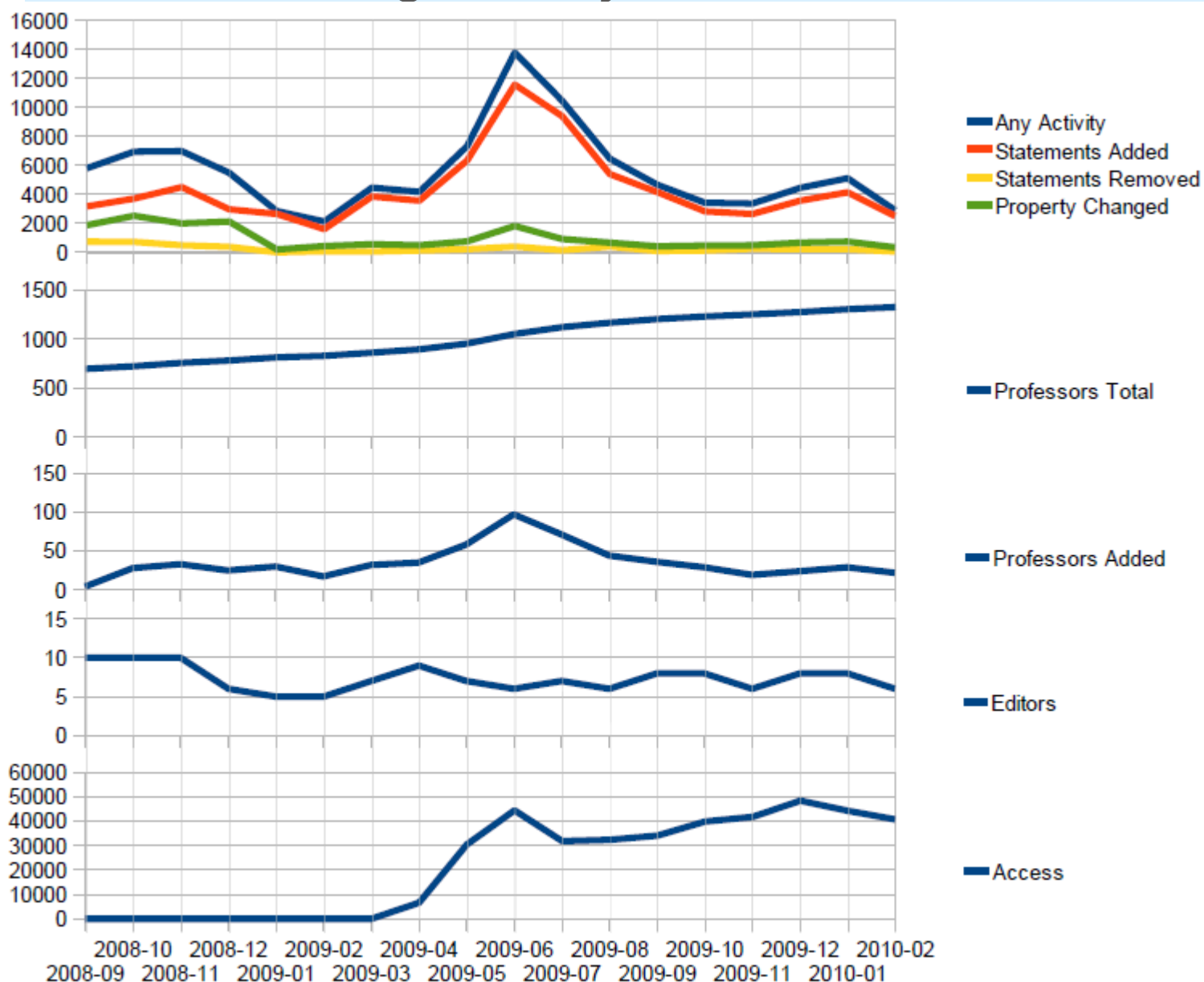
Auftreten als Wert

Keine Entsprechungen.

The CPL Model



CPL Authoring Activity



▼ Levin Ludwig Schücking	
Geburtsstadt	Burgsteinfurt
Geburtsort	1878-05-29
Geburtsort	► http://catalogus-professorum.org/place/Burgsteinfurt
birthState	Preußen
Todesstadt	Farchant
Todestag	1964-10-12
Sterbeort	► http://catalogus-professorum.org/place/Farchant
voller akademischer Titel	Prof. Dr. phil.
weiter Informationen	1946-1952 Lehrstuhlvertretung an der Universität Erlangen
Abitur Stadt	Münster
Ort des Abiturs	► http://catalogus-professorum.org/place/Burgsteinfurt
graduationState	Preußen
eine Person hat Vornamen	► http://catalogus-professorum.org/lipsiensis/Levin-1-1 ► http://catalogus-professorum.org/lipsiensis/Ludwig-2-0
Person hat Lebensabschnitte	► http://catalogus-professorum.org/lipsiensis/1904HabilitationinEnglischerPhilologieanderUniversittGttingen86 ► 1925-1944 oProf für Anglistik an der Philologisch-Historischen Abteilung der Philosophischen Fakultät der Universität Leipzig ► http://catalogus-professorum.org/lipsiensis/Karriere_594 ► 1910-1916 aoProf für Englische Sprache und Literatur an der Universität Jena ► 1916-1925 oProf für Englische Sprache und Literatur an der Universität Breslau ► 1952 oProf für Englische Sprache und Literatur an der Universität München ► Mitglied der American Academy of Arts and Sciences

▼ **1897-1901 Studium: Neuere Sprachen und Kunstgeschichte in Freiburg, Göttingen, Berlin und München**

von	1897
Mitgliedschaft	► Universität München
Fach	Kunstgeschichte
bis	1901-01-01
mentions	► Studium ► Data Creation ► Data Item ► Data Creating Service
request	► Request for http://catalogus-professorum.org/lipsiensis/Study_110
type	► Studium
label	1897-1901 Studium: Neuere Sprachen und Kunstgeschichte in Freiburg, Göttingen, Berlin und München
is-period-of	► Levin Ludwig Schücking
requested	► Studium ► Fach
is used by	► This Session

Find all

[Table](#)
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[Timeline](#)
[SPARQL](#)
[New...](#)

Select queries to display: ☐

Visual Query Builder

CPL Navigation

OntoWiki (Admin)

Navigation

Edit View Type

Search in Navigation

Root

- professor
- archive
- forename
- qualification paper
- person
- study
- career
- social role
- faculty
- academy

Show Me More

Knowledge Bases

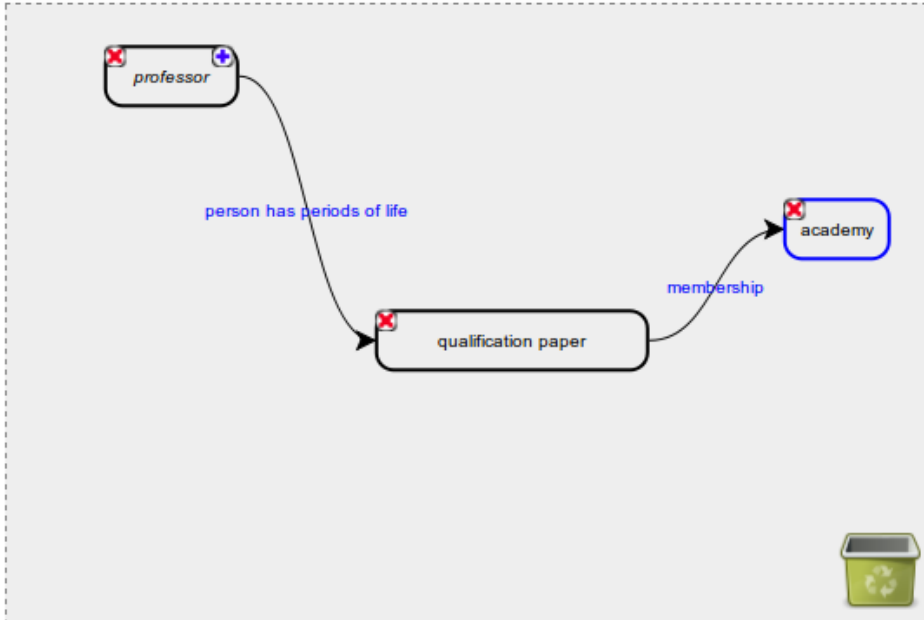
Edit View

- Catalogus Professorum Model (CPM)
- professors catalogue Leipzig
- Professors born in Dresden and related (subset of CPL)

Visual Query Builder

Saved Queries | Query Editor | **Graphical Query Builder**

Display results | Show Query | en | de



#	professor1	qualificationpaper1	academy1
1.	cpl:Anger_1210	cpl:Promotion_1477	cpl:Hochschule-1
2.	cpl:Anger_1210	cpl:Promotion_1476	cpl:Hochschule-1

Save Query

Properties

- ☐ is located at City
- ☐ is located at Country
- ☐ related body
- ☐ type of body
- ☐ is located at State

Restrictions:

AND

- name of the institution contains "Leipzig"

available links:

- institution consists of (body)
- an institution is part of (body)
- body place (not found)

selected links:

- none

Relationship Finder in CPL

RelFinder 

URL   

between **examples**

(1)

(2)

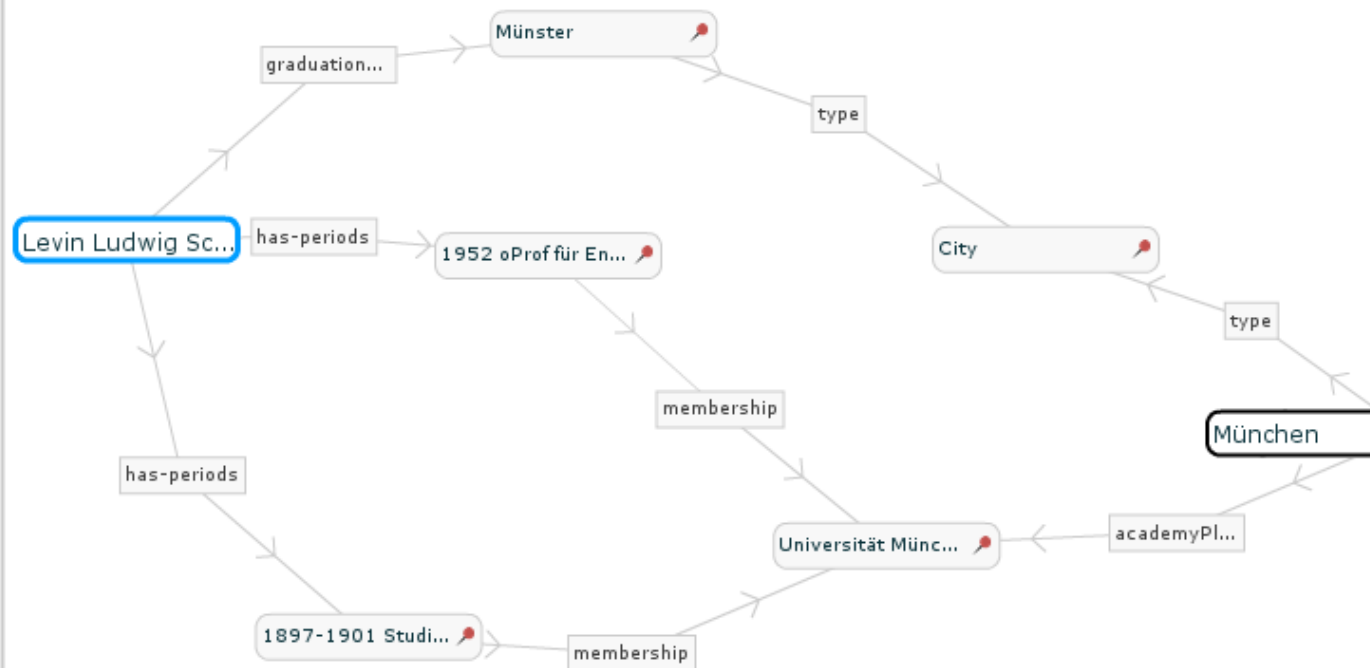
Filter by: relations: (3/3)

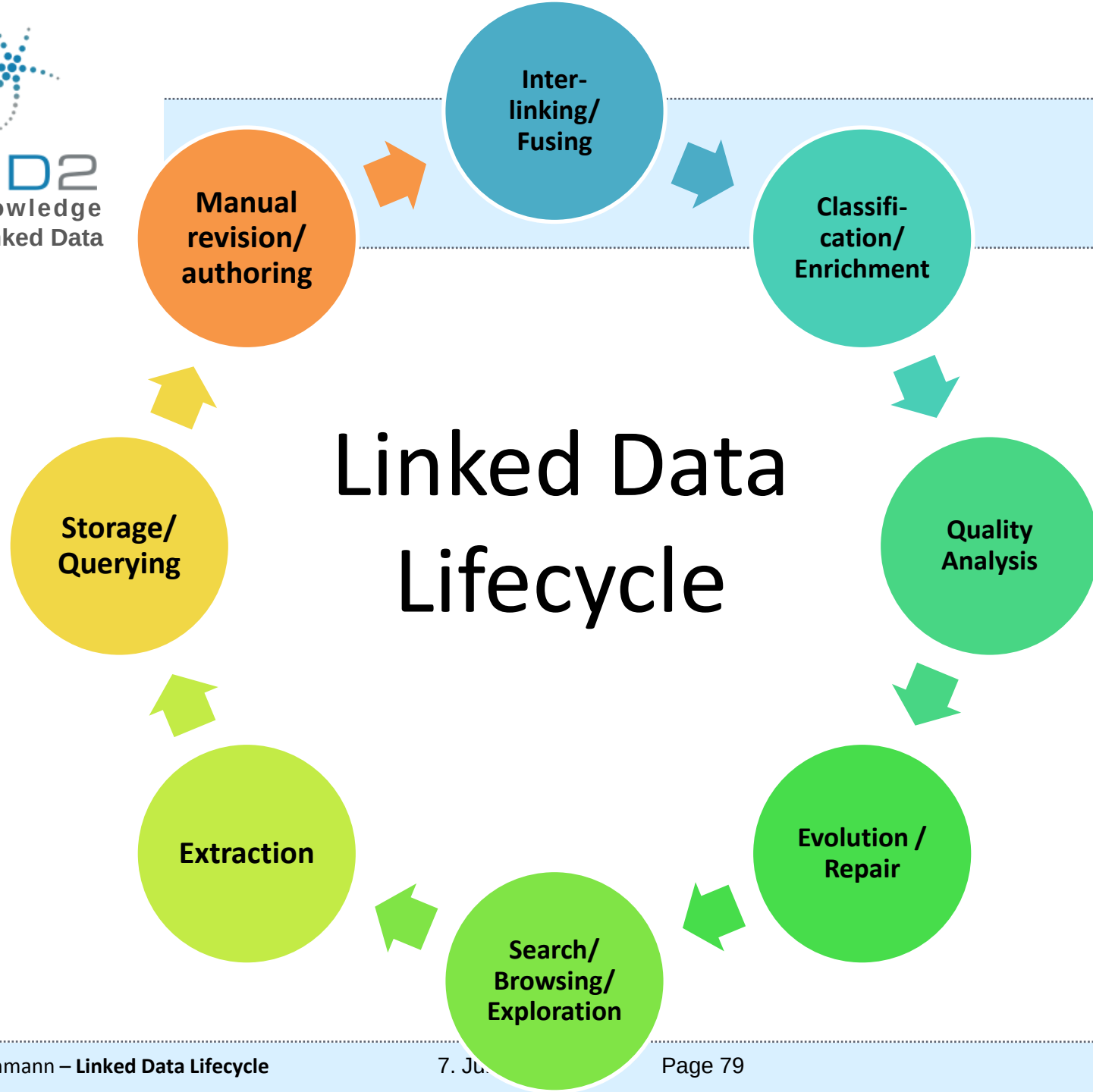
☒ length ☐ class ☐ link ☐ conne...

number of objects	num	vi
2	3/3	

Levin Ludwig Schü...

More Infos: catalogus-professorum.org
de.wikipedia.org



Make the Web a Linked Data Washing Machine



Make the Web a Linked Data Washing Machine

AKSW Data Web Building Blocks



RDB2RDF

Mapping relational data to RDF



DL-Learner

Machine Learning for Ontologies



ORE

Ontology Enrichment & Repair



LIMES

Link Discovery Framework
for metric spaces)



RDF Query Subsumption & View Maintenance

Scaling triple stores

Foundations

Marrying databases with RDF
and ontologies

AKSW Data Web Building Blocks



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OntoWiki
Collaborative creation of explicit
knowledge via Semantic Wikis

DBpedia
“Semantification” of
Wikipedia

LinkedGeoData
“Semantification” of
OpenStreetMaps

Triplify
“Semantification” of (small) Web
Applications

LESS
Semantification Syndication

Tools

AKSW Data Web Building Blocks



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OpenStreetMaps

Triplify
"Semantification" of (small) Web
Applications

LESS
Semantification Syndication

Tools

Vakantieland
Building Data Web applications

SoftWiki
Distributed, stakeholder driven
Requirements Engineering

OpenResearch.org
A semantic Wiki for the sciences

xOperator
Combining Instant Messaging
with the Data Web

Catalogus Professorum
Prosopographical knowledge
base

...

Applications

Bringing the Data Web to
end users



Thanks for your attention!

Jens Lehmann

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lehmann@informatik.uni-leipzig.de

