

Linked Data

im Kontext Digitaler Bibliothekssysteme

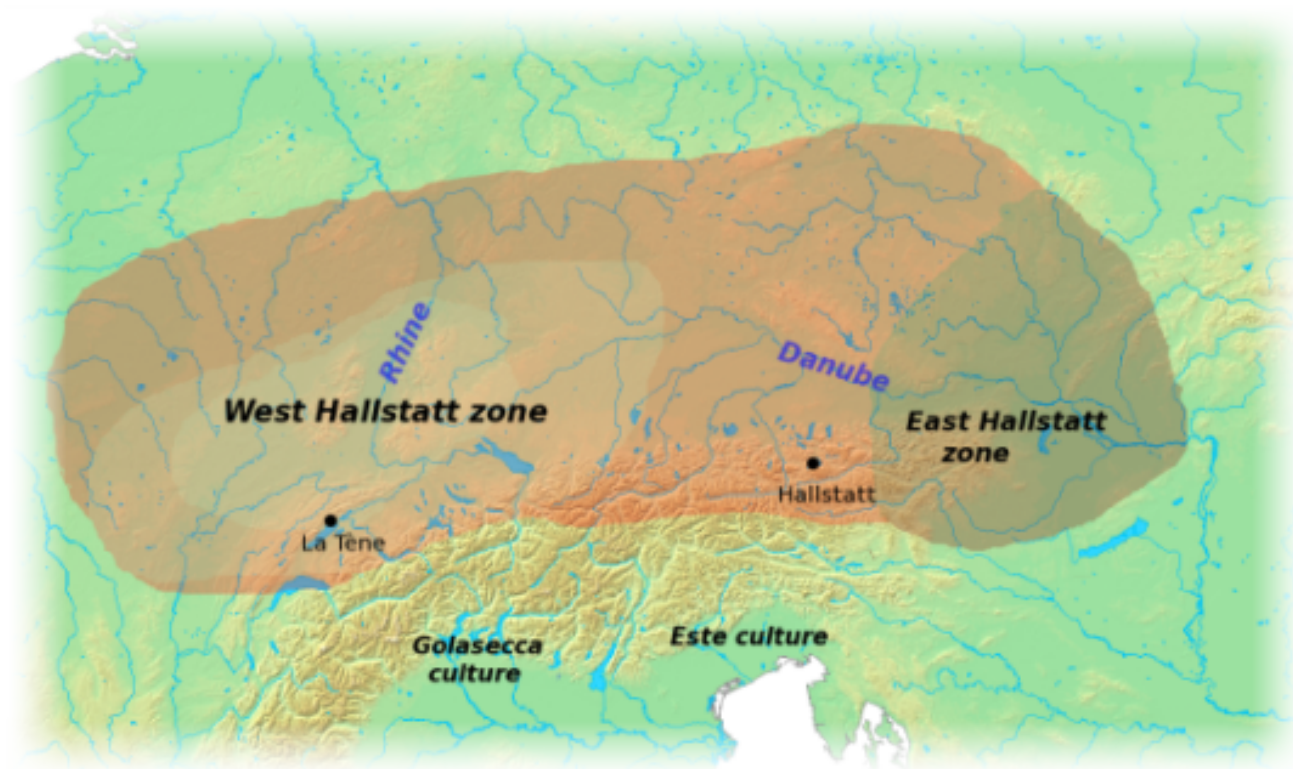
@ Fachtagung Semantic Web in Bibliotheken (SWIB'09)

Überblick

- (Digitale) Bibliotheken im Zeitraffer
- Linked Data und Bibliotheken
- Analyse existierender Linked Data Services
- Probleme und Perspektiven



(Digitale) Bibliotheken im Zeitraffer



früher...

Eisenzeit

s. auch Hallstatt-Kultur

Hallstattzeit

Latène-Kultur

Kontrolliertes Vokabular

früher...

Hallstatt-Kultur: Beiträge [und] Abbildungen

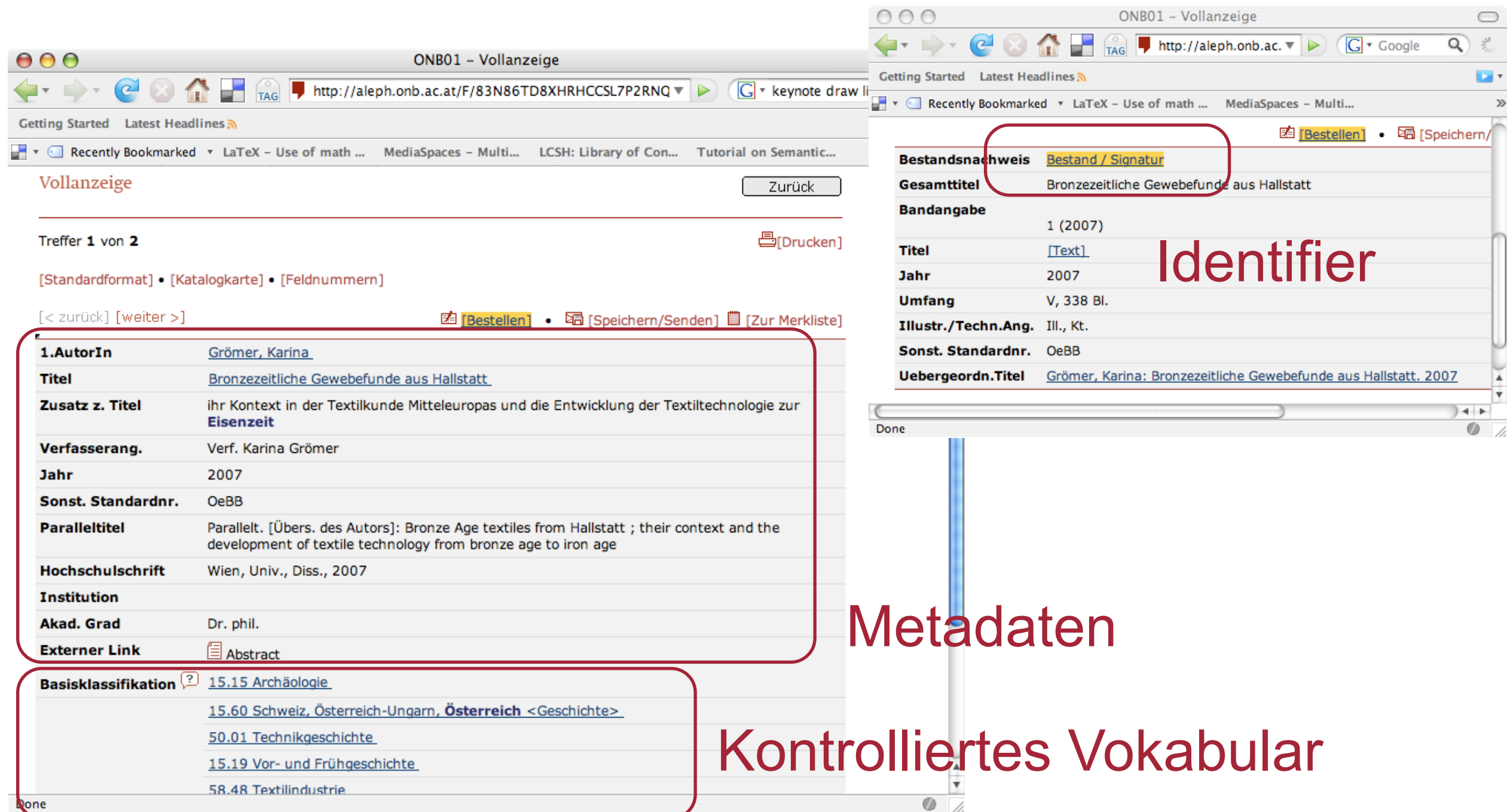
Hallstatt. - Erich L e s s i n g . Hall-
statt. Bilder aus d. Frühzeit Europas.
(Hrsg. v. Ulrich S c h a a f f . Mit
Beitr. von ...) [Illustr.] - (Wien,
München: Jugend & Volk 1980.) 283 S. h.

II 1,032,681

Metadaten

Identifizier

danach...



ONB01 - Vollanzeige

http://aleph.onb.ac.at/F/83N86TD8XHRHCCSL7P2RNQ

Getting Started Latest Headlines

Recently Bookmarked LaTeX - Use of math ... MediaSpaces - Multi... LCSH: Library of Con... Tutorial on Semantic...

Vollanzeige Zurück

Treffer 1 von 2 [Drucken]

[Standardformat] • [Katalogkarte] • [Feldnummern]

[< zurück] [weiter >] [Bestellen] • [Speichern/Senden] [Zur Merkliste]

1. AutorIn	Grömer, Karina
Titel	Bronzezeitliche Gewebefunde aus Hallstatt
Zusatz z. Titel	ihr Kontext in der Textilkunde Mitteleuropas und die Entwicklung der Textiltechnologie zur Eisenzeit
Verfasserang.	Verf. Karina Grömer
Jahr	2007
Sonst. Standardnr.	OeBB
Paralleltitel	Parallelt. [Übers. des Autors]: Bronze Age textiles from Hallstatt ; their context and the development of textile technology from bronze age to iron age
Hochschulschrift	Wien, Univ., Diss., 2007
Institution	
Akad. Grad	Dr. phil.
Externer Link	Abstract

Basisklassifikation 15.15 Archäologie

- 15.60 Schweiz, Österreich-Ungarn, Österreich <Geschichte>
- 50.01 Technikgeschichte
- 15.19 Vor- und Frühgeschichte
- 58.48 Textilindustrie

Bestandsnachweis Bestand / Signatur

Gesamttitlel Bronzezeitliche Gewebefunde aus Hallstatt

Bandangabe 1 (2007)

Titel [Text]

Jahr 2007

Umfang V, 338 Bl.

Illustr./Techn. Ang. Ill., Kt.

Sonst. Standardnr. OeBB

Uebergeordn. Titel Grömer, Karina: Bronzezeitliche Gewebefunde aus Hallstatt. 2007

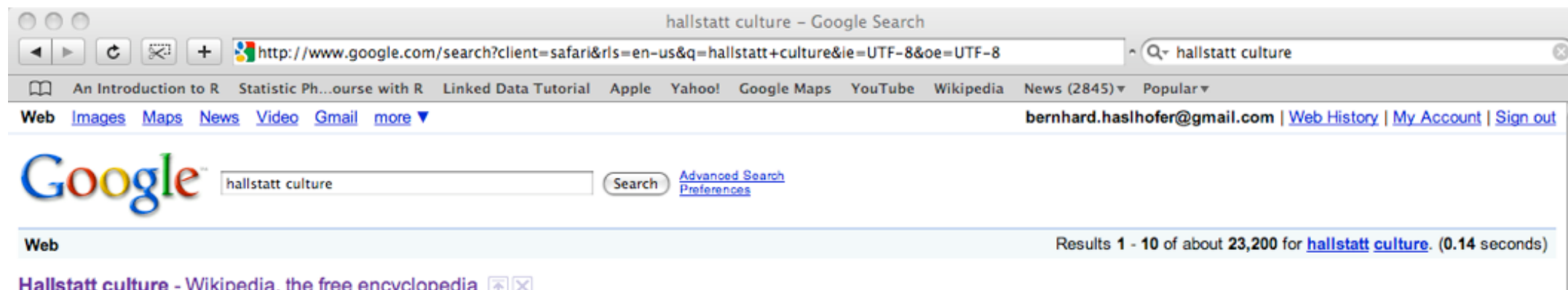
Done

Identifizier

Metadaten

Kontrolliertes Vokabular

heute...



Hallstatt culture - Wikipedia, the free encyclopedia

5 Feb 2009 ... Bronze **Hallstatt culture** tool, possibly an early razor, the three c on the handle and the blade body indicate the possibility ...

en.wikipedia.org/wiki/Hallstatt_culture - 45k - [Cached](#) - [Similar pages](#) -

Hallstatt - Wikipedia, the free encyclopedia

23 Jan 2009 ... The village also gave its name to the early Iron Age Hallstatt World Heritage Site for Cultural Heritage. ...

en.wikipedia.org/wiki/Hallstatt - 46k - [Cached](#) - [Similar pages](#) -

Celtic Guide - Historical background

1 Feb 2009 ... "The **Hallstatt Culture** reflects the Celts in their state of develop the beginning of the ninth century B.C. and the middle of ...

www.silicon Glen.com/celtfaq/1_1.html - 13k - [Cached](#) - [Similar pages](#) -

Celts - Hallstatt and La Tene cultures

Hallstatt culture is characterised in 4 stages, according to James(2005: 21): A Bronze Age, from c 1200 to 700 BC; C Early Iron Age, from c700-600 ...

celts.etrusia.co.uk/celtic_cultures.php - 12k - [Cached](#) - [Similar pages](#) -

Hallstatt culture -- Britannica Online Encyclopedia

Britannica online encyclopedia article on **Hallstatt culture**: site in the Upper Aus Salzkammergut region where objects characteristic of the late Bronze ...

www.britannica.com/EBchecked/topic/252896/Hallstatt-culture - 56k -

[Cached](#) - [Similar pages](#) -

Category:Hallstatt culture - Wikimedia Commons

3 Aug 2008 ... English: The **Hallstatt culture** (1200 BC-500 BC) was the predom European **culture** during the local Bronze Age, and introduced the ...

commons.wikimedia.org/wiki/Category:Hallstatt_culture - 26k - [Cached](#) - [Similar](#)

Category:Hallstatt culture artefacts - Wikimedia Commons

19 Jul 2008 ... Media in category "Hallstatt culture artefacts". The follow this category, out of 31 total. ...

commons.wikimedia.org/wiki/Category:Hallstatt_culture_artefacts - 38k

[Cached](#) - [Similar pages](#) -

[More results from commons.wikimedia.org »](#)

Hallstatt Culture - MSN Encarta

Hallstatt Culture, **culture** characteristic of an early stage of the Iron Age in cen western Europe and the Balkans. It received its name from..

encarta.msn.com/encyclopedia_761578264/hallstatt_culture.html - 31k -

[Cached](#) - [Similar pages](#) -



Hallstatt culture - Wikipedia, the free encyclopedia

http://en.wikipedia.org/wiki/Hallstatt_culture

article discussion edit this page history

Hallstatt culture

From Wikipedia, the free encyclopedia

The **Hallstatt culture** was the predominant **Central European** culture from the 8th to 6th centuries BC (European **Early Iron Age**), developing out of the **Urnfield culture** of the 12th century BC (Late Bronze Age) and followed in much of Central Europe by the **La Tène culture**.

By the 6th century BC, the Halstatt culture extended for some 1000 km, from the **Champagne-Ardenne** in the west, through the **Upper Rhine** and the upper **Danube**, as far as the **Vienna Basin** and the **Danubian Lowland** in the east, from the **Main**, **Bohemia** and the **Little Carpathians** in the north, to the **Swiss plateau**, the **Salzkammergut** and to **Lower Styria**.

It is named for its **type site**, *Hallstatt*, a lakeside village in the **Austrian Salzkammergut** southeast of **Salzburg**. The culture is commonly linked to **Proto-Celtic** and **Celtic** populations in its western zone and with (pre-)Illyrians in its eastern zone.

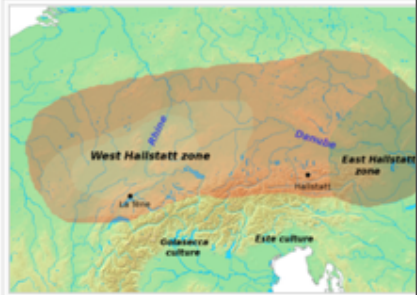
Contents [hide]

- 1 Hallstatt site
- 2 Periodization
- 3 Geography
- 4 Culture and trade
- 5 Notes
- 6 Bibliography
- 7 External links
- 8 See also

Hallstatt site

In 1846, Johann Georg Ramsauer discovered a large **prehistoric cemetery** near Halstatt, which he excavated during the second half of the nineteenth century. Eventually the excavation would yield 1,045 burials.

The community at Hallstatt exploited the **salt mines** in the area (note 'halen' is salt in Modern Welsh), which had been worked from time to time since the **Neolithic** period, from the eighth century to fifth century BC. The style and decoration of the grave goods found in the cemetery are very distinctive, and artifacts made in this style are widespread in **Europe**.



Map of distribution of the Hallstatt culture



Overview of the Hallstatt and **La Tène** cultures. The Hallstatt territory (800 BC) is shown in solid yellow, t of influence by 500 BC (HaD) in light yellow. The cor territory of the La Tène culture (450 BC) is shown in



(c) <http://www.flickr.com/photos/39258569@N00/522143955/>



Linked Data und Bibliotheken



**Bibliotheksdaten liegen in
geschlossenen Datensilos**



Andere (Web-)Applikationen haben keinen direkten Zugriff auf Bibliotheksdaten, außer...



OAI-PMH

REST

DVD

FTP

SRU/SRQ

Web Services

OAI-ORE

SOAP

RSS

WSDL

Atom

UDDI

JSON

CD-ROM

RPC

Z39.50

DCOM

RMI

CORBA



Linked Data **Vision** ...

- Dereferenzierbare **HTTP URIS** für Ressourcen
- Menschen-und **Maschinen-lesbare** Repräsentation von Daten im Web
- **Verlinkung** semantisch in Beziehung stehender Ressourcen



Linked Data Technologien...

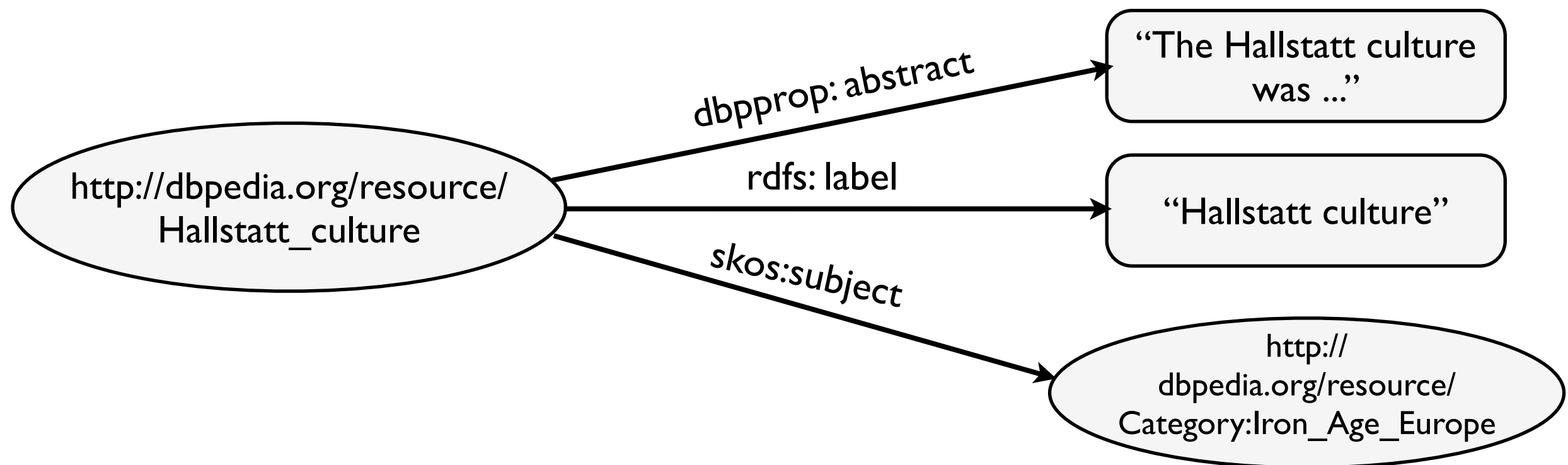
Uniform Resource Identifier (URI)

- **Identifier** für Ressourcen in offenen Umgebungen
- Dereferenzierbare HTTP URIs = URL

[http://dbpedia.org/resource/
Hallstatt_culture](http://dbpedia.org/resource/Hallstatt_culture)

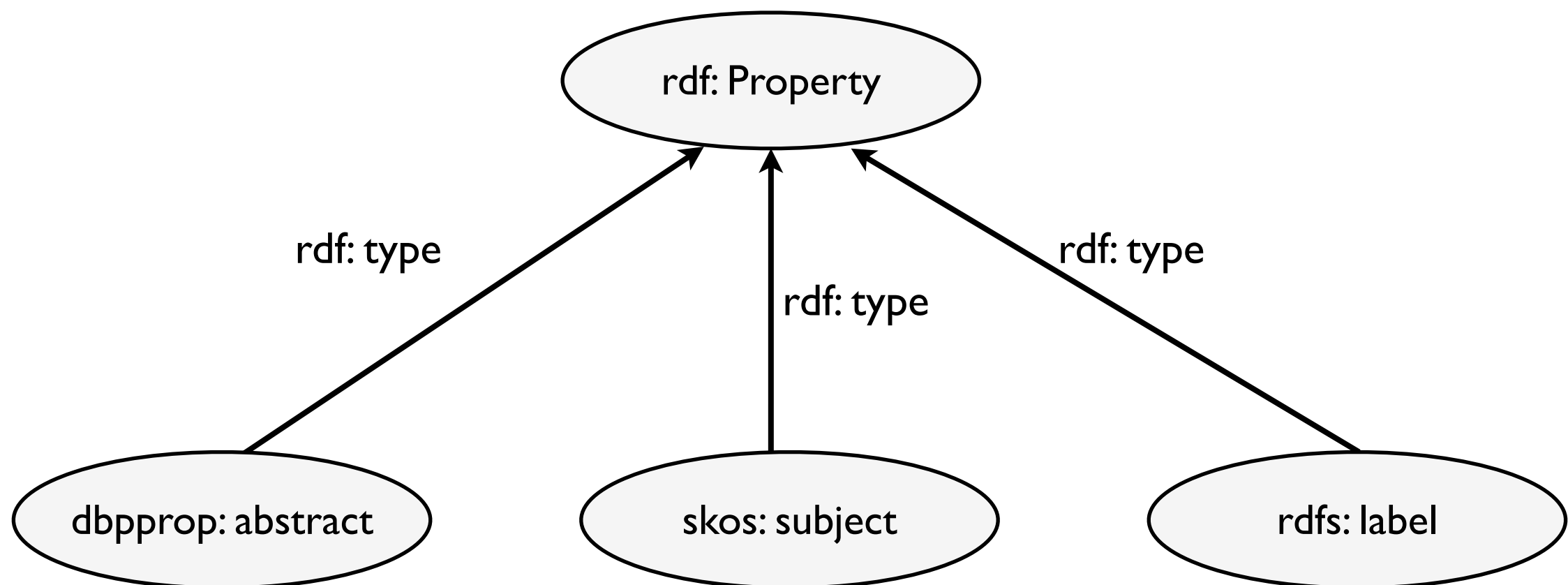
Resource Description Framework (RDF)

- Datenmodell um **Metadaten** im Web zu repräsentieren
- In Form von Statements (Triples)



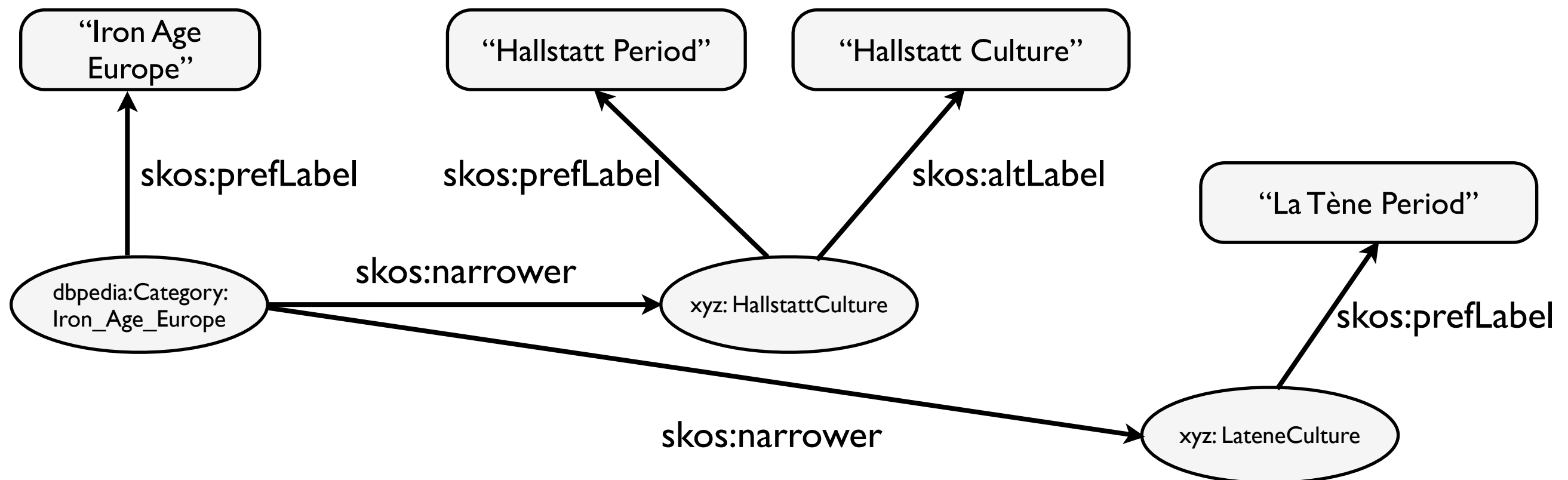
RDFS & OWL

- Sprachen zur Beschreibung von Vokabularen



Simple Knowledge Organization System (SKOS)

- Sprache zur Beschreibung **Kontrollierter Vokabulare**



Linked Data versucht die im **Bibliotheksbereich** etablierten **Mechanismen** der Informationsorganisation (**Identifizier**, **Metadaten**, **Kontrollierte Vokabulare**) **im Web** weiterzuführen.



Analyse existierender Linked Data Services

Library of Congress Subject Headings (LCSH)

- <http://id.loc.gov/>
- exponiert ~260.000 Normdatensätze in SKOS als Linked Data
- URI-Pattern:
<http://id.loc.gov/authorities/{lccn}#concept>

```

<rdf:Description rdf:about="http://id.loc.gov/authorities/sh85058486#concept">
  <skos:broader rdf:resource="http://id.loc.gov/authorities/sh85068153#concept" />
  <skos:prefLabel xml:lang="en">Hallstatt period</skos:prefLabel>
  <rdf:type rdf:resource="http://www.w3.org/2004/02/skos/core#Concept" />
  <owl:sameAs rdf:resource="info:lc/authorities/sh85058486" />
  <skos:closeMatch rdf:resource="http://stitch.cs.vu.nl/vocabularies/rameau/ark:/12148/cb11942233p" />
  <dcterms:created rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">1986-02-11T00:00:00-04:00</dcterms:created>
  <skos:narrower rdf:resource="http://id.loc.gov/authorities/sh85087734#concept" />
  <dcterms:modified rdf:datatype="http://www.w3.org/2001/XMLSchema#dateTime">1996-09-11T10:10:33-04:00</dcterms:modified>
  <skos:inScheme rdf:resource="http://id.loc.gov/authorities#topicalTerms" />
  <skos:inScheme rdf:resource="http://id.loc.gov/authorities#conceptScheme" />
</rdf:Description>
<rdf:Description rdf:about="http://id.loc.gov/authorities/sh85087734#concept">
  <skos:prefLabel xml:lang="en">Mounds--Rhine River Valley</skos:prefLabel>
</rdf:Description>
<rdf:Description rdf:about="http://id.loc.gov/authorities/sh85068153#concept">
  <skos:prefLabel xml:lang="en">Iron age</skos:prefLabel>
</rdf:Description>

```

Library of Congress Subject Headings (LCSH)

- **Motivation**

- Bibliotheksstandards sollen mit der Web Architektur integriert werden, damit diese in anderen Web Applikationen wiederverwendet werden können
- Web Identifiers für Datenelement und Vokabulare

Schwedischer Verbundskatalog (LIBRIS)

- <http://libris.kb.se/>
- exponiert Daten von ca. 175 Bibliotheken
- URI Pattern:
<http://libris.kb.se/resource/bib/{number}>
<http://libris.kb.se/resource/auth/{number}>

```
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:bibo="http://purl.org/ontology/bibo/"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:libris="http://libris.kb.se/vocabulary/experimental#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#" >
  <rdf:Description rdf:about="http://libris.kb.se/resource/bib/10542240">
    <libris:held_by rdf:resource="http://libris.kb.se/resource/library/Svk"/>
    <dc:relation>Hallstatt textiles : technical analysis, scientific
investigation and experiment on Iron Age textiles /</dc:relation>
    <dc:date>2005</dc:date>
    <dc:type>text</dc:type>
    <dc:creator>Anton Kern</dc:creator>
    <dc:creator>Kern, Anton 1947-</dc:creator>
    <dc:title xml:lang="de">Hallstatt : eine Einleitung zu einem sehr
bemerkenswerten Ort</dc:title>
    <rdf:type rdf:resource="http://purl.org/ontology/bibo/Article"/>
    <rdfs:isDefinedBy rdf:resource="http://libris.kb.se/data/bib/10542240"/>
  </rdf:Description>
</rdf:RDF>
```

Schwedischer Verbundskatalog (LIBRIS)

- Motivation

- Zugriff auf Bibliotheksdaten bislang nur über domänenspezifische Protokolle (Z.39.50, SRU/SRW)
- Bislang keine Möglichkeiten Datensätze (bzw. Ressourcen) direkt zu adressieren
- Neuer Web-Auftritt

RAMEAU Subject Headings

- <http://www.cs.vu.nl/STITCH/rameau/>
- Exponiert 160.000 Konzepte des RAMEAU Vokabulars als Linked Data

```
<skos:Concept rdf:about="http://stitch.cs.vu.nl/vocabularies/rameau/ark:/12148/cb11942233p">
  <skos:prefLabel xml:lang="x-notation">FRBNF119422333</skos:prefLabel>
  <skos:prefLabel xml:lang="fr">Civilisation de Hallstatt</skos:prefLabel>
  <skos:altLabel xml:lang="fr">Civilisation hallstattienne</skos:altLabel>
  <skos:altLabel xml:lang="fr">Culture de Hallstatt</skos:altLabel>
  <skos:altLabel xml:lang="fr">Culture hallstattienne</skos:altLabel>
  <skos:altLabel xml:lang="fr">Hallstatt, Civilisation de</skos:altLabel>
  ....
  <skos:altLabel xml:lang="fr">Premier âge du fer</skos:altLabel>
  <skos:definition xml:lang="fr">Civilisation du premier âge du fer en
Europe</skos:definition>
  <skos:editorialNote xml:lang="fr">Source : Dict. de la préhistoire / A.
Leroi-Gourhan, 1994. - Les sociétés de la préhistoire / J.-P. Mohen, Y.
Taborin, 1998. - Les Celtes / V. Kruta, 2000. - La préhistoire / D. Vialou,
2004</skos:editorialNote>
  <skos:note xml:lang="fr">Domaine : 930</skos:note>
  <skos:inScheme rdf:resource="http://stitch.cs.vu.nl/vocabularies/rameau/
autorites\_matières" />
  <skos:inScheme rdf:resource="http://stitch.cs.vu.nl/vocabularies/rameau/
noms\_commun" />
  <skos:broader rdf:resource="http://stitch.cs.vu.nl/vocabularies/rameau/ark:/
12148/cb11946304b" />
  <skos:related rdf:resource="http://stitch.cs.vu.nl/vocabularies/rameau/ark:/
12148/cb11944010z" />
</skos:Concept>
```

Dewey Decimal Classification (DDC) Summaries

- <http://dewey.info>
- Top 1000 Klassen der Dewey Klassifikation in neun Sprachen als Linked Data
- Creative Commons **BY-NC-ND**

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:xhtml="http://www.w3.org/1999/xhtml/vocab#"
  xmlns:cc="http://creativecommons.org/ns#"
  xmlns:dct="http://purl.org/dc/terms/"
  xmlns:skos="http://www.w3.org/2004/02/skos/core#">

  <rdf:Description rdf:about="http://dewey.info/class/943/2009/08/about.en">
    <rdf:type rdf:resource="http://www.w3.org/2004/02/skos/core#Concept"/>
    <xhtml:license rdf:resource="http://creativecommons.org/licenses/by-nc-nd/
3.0/" />
    <cc:attributionName>OCLC Online Computer Library Center, Inc.</
cc:attributionName>
    <cc:attributionURL rdf:resource="http://www.oclc.org/dewey/" />
    <dct:isVersionOf rdf:resource="http://dewey.info/class/943/" />
    <dct:language rdf:datatype="http://purl.org/dc/terms/RFC4646">en</
dct:language>
    <skos:notation rdf:datatype="http://dewey.info/schema-terms/Notation">943</
skos:notation>
    <skos:inScheme rdf:resource="http://dewey.info/scheme/2009/08/about.en"/>
    <skos:prefLabel xml:lang="en">Central Europe; Germany</skos:prefLabel>
    <skos:broader rdf:resource="http://dewey.info/class/94/2009/08/about.en"/>
    <cc:morePermissions rdf:resource="http://www.oclc.org/dewey/about/
licensing/" />
  </rdf:Description>

</rdf:RDF>
```

Virtual Internet Authority File (VIAF)

- <http://viaf.org/>
- Verknüpft Normdaten von >10 Nationalbibliotheken (inkl. DNB) und stellt diese im Web zur Verfügung
- Verwendet FOAF Vokabular zur Beschreibung von Personen

```
<?xml version="1.0" ?>
  <?xml-stylesheet type="text/xsl" href="/viaf/xsl/
searchRetrieveResponse_en.xsl"?>
  <rdf:RDF xmlns:foaf="http://xmlns.com/foaf/0.1/" xmlns:l="http://purl.org/
rss/1.0/modules/link/" xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">
    <foaf:Person rdf:about="http://viaf.org/viaf/56611857.rwo">
      <foaf:name>&#x5E7;&#x5E4;&#x5E7;&#x5D4;, &#x5E4;&#x5E8;&#x5E0;&#x5E5;,
1883-1924</foaf:name>
      <foaf:name>Kafka, Franz, 1883-1924</foaf:name>
      <l:link l:rel="http://purl.org/rss/1.0/modules/link/#alternate"
l:type="application/x-marc21+xml" rdf:resource="http://viaf.org/viaf/
56611857.m21"/>
      <l:link l:rel="http://purl.org/rss/1.0/modules/link/#alternate"
l:type="application/x-unimarc+xml" rdf:resource="http://viaf.org/viaf/
56611857.unimarc"/>
      <l:link l:rel="http://purl.org/rss/1.0/modules/link/#alternate"
l:type="application/x-viaf+xml" rdf:resource="http://viaf.org/viaf/
56611857.viaf"/>
    </foaf:Person>
  </rdf:RDF>
```

Beweggründe für Linked Data?

- Bibliotheksdaten sollen im **Web veröffentlicht** werden um auch in **anderen Kontexten** verwendet werden zu können
- **Verknüpfung** in Beziehung stehender Daten
- Technischer Aufwand relativ gering
- Bottom-up Entwicklungen....



Probleme und Perspektiven



Urheberrecht



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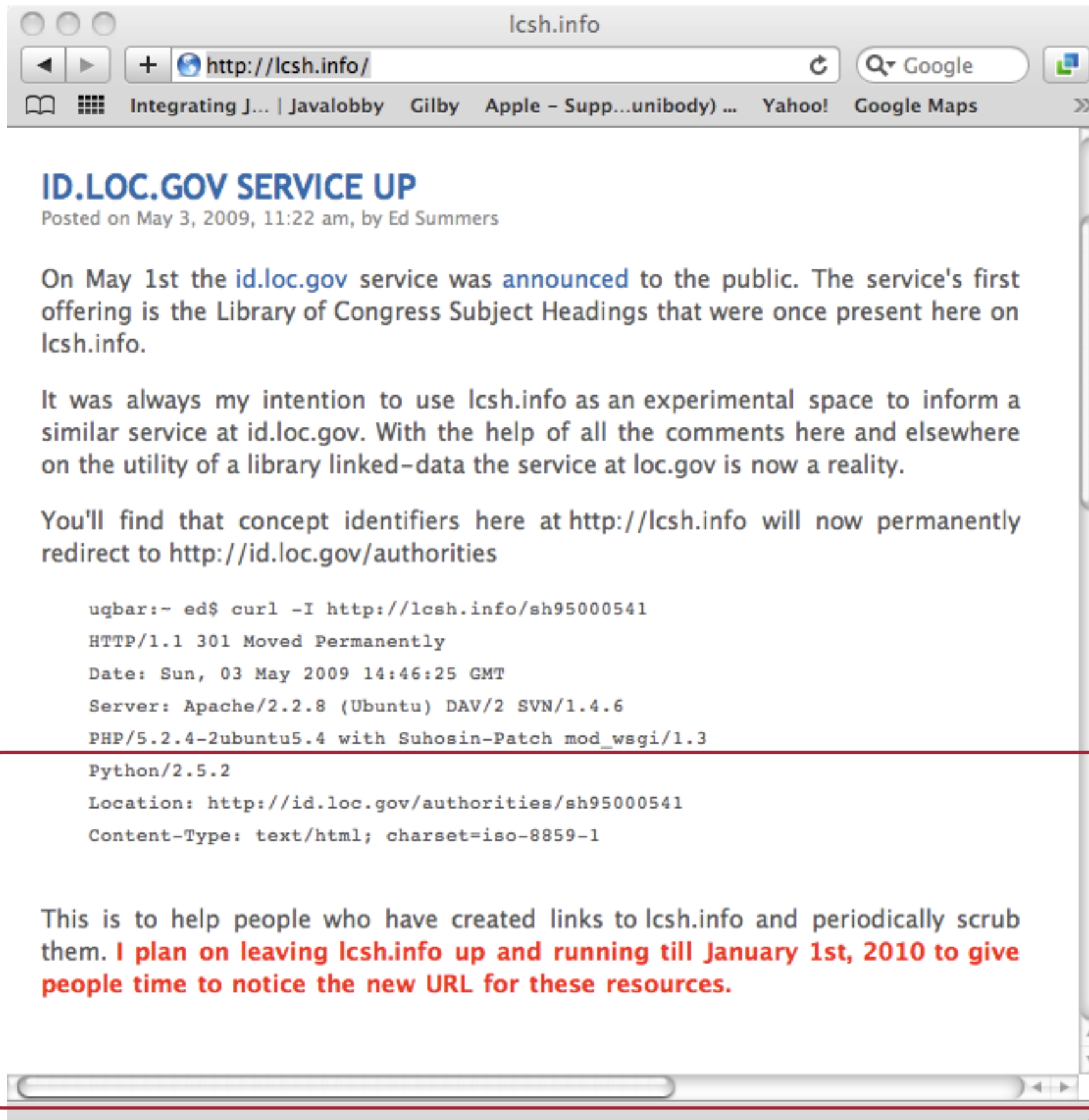


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Broken Links



lcsh.info

http://lcsh.info/

Integrating J... | Javalobby | Gilby | Apple - Supp...unibody) ... | Yahoo! | Google Maps

ID.LOC.GOV SERVICE UP

Posted on May 3, 2009, 11:22 am, by Ed Summers

On May 1st the id.loc.gov service was **announced** to the public. The service's first offering is the Library of Congress Subject Headings that were once present here on lcsh.info.

It was always my intention to use lcsh.info as an experimental space to inform a similar service at id.loc.gov. With the help of all the comments here and elsewhere on the utility of a library linked-data the service at loc.gov is now a reality.

You'll find that concept identifiers here at <http://lcsh.info> will now permanently redirect to <http://id.loc.gov/authorities>

```
ugbar:~ ed$ curl -I http://lcsh.info/sh95000541
HTTP/1.1 301 Moved Permanently
Date: Sun, 03 May 2009 14:46:25 GMT
Server: Apache/2.2.8 (Ubuntu) DAV/2 SVN/1.4.6
PHP/5.2.4-2ubuntu5.4 with Suhosin-Patch mod_wsgi/1.3
Python/2.5.2
Location: http://id.loc.gov/authorities/sh95000541
Content-Type: text/html; charset=iso-8859-1
```

This is to help people who have created links to lcsh.info and periodically scrub them. **I plan on leaving lcsh.info up and running till January 1st, 2010 to give people time to notice the new URL for these resources.**

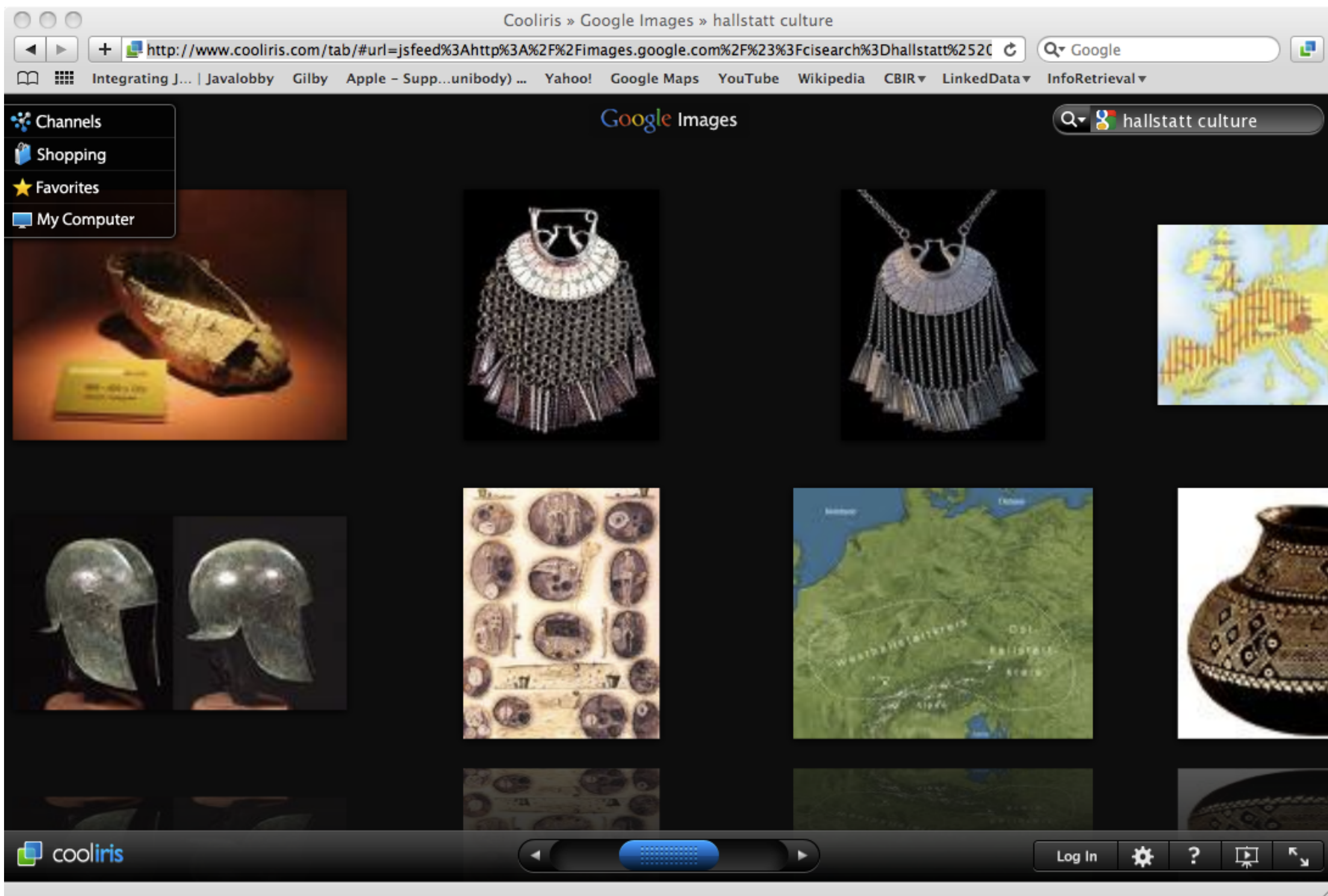


Semantische Anreicherung

```
<http://dbpedia.org/resource/Hallstatt_culture >  
  p:abstract “Die Hallstattzeit bezeichnet...” @de  
  p:abstract “The Hallstatt culture was...” @en  
  rdfs:label “Hallstatt culture” @en;  
  rdfs:label “Hallstattzeit” @de;  
  rdfs:label “Civilisation de Hallstatt” @fr;  
  rdfs:label “ハルシュタット文明” @jp;  
  skos:subject dbpedia:Category:Iron_Age_Europe;  
  ...
```



Neue Zugänge





Baustein einer freien, community-getriebenen Alternative?



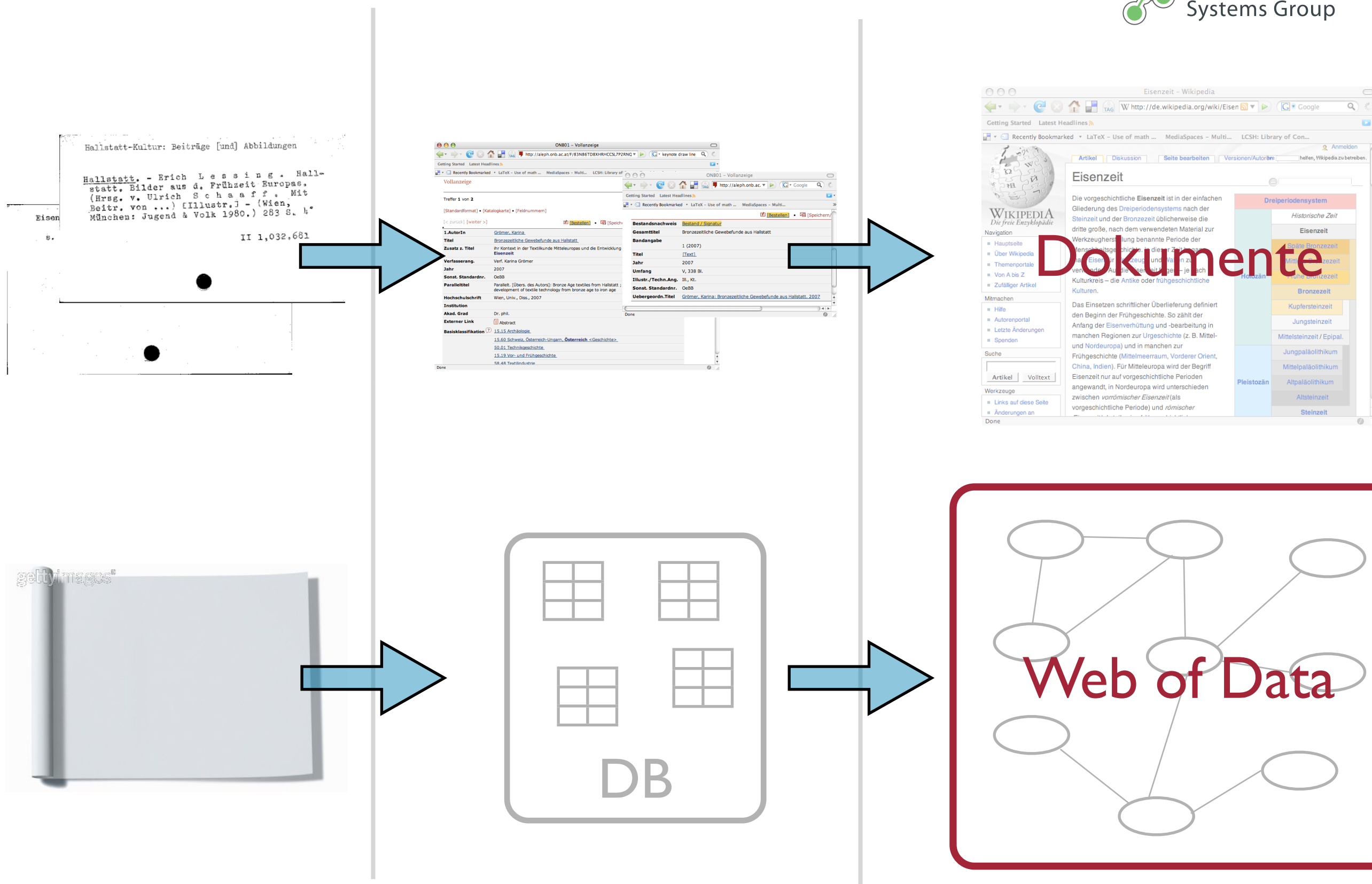


Backup

Nach Bildern suchen

Bildauswahl einschränken auf: Suchbegriff: suchen





RDF/XML, N3, Turtle, etc.

- für den Austausch von RDF Daten

```
<rdf:Description rdf:about=" http://dbpedia.org/resource/Hallstatt_culture">  
  <dbpprop:abstract>The Hallstatt culture was...</dbpprop:abstract>  
  <skos:subject rdf:resource="http://dbpedia.org/resource/  
    Category:Iron_Age_Europe">  
  <rdfs:label>Hallstatt culture</rdfs:label>  
</rdf:Description>
```

SPARQL

- **Strukturierte Abfragesprache & Protokoll** für den Zugriff auf RDF Daten im **Web**

```
SELECT ?uri
WHERE {
    ?uri skos:subject <http://dbpedia.org/resource/Category:Iron_Age_Europe>.
}
```



Average Salary of Jobs with Related Titles



In USD as of Nov 19, 2009

45k

90k

135k