

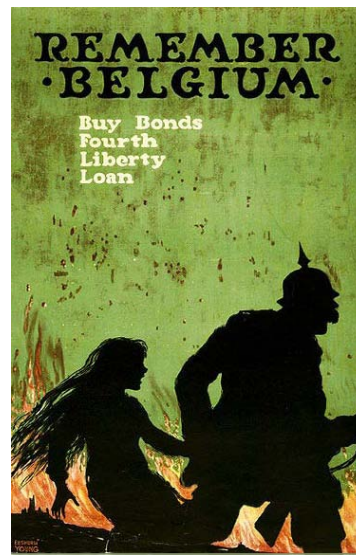
History on the Semantic Web as Linked Data

— An Event Gazetteer and Timeline for World War I

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Semantic Computing Research Group

Aalto University, University of Colorado Boulder, and
University of Helsinki



Outline

- Research Goals and Means
- Context: Web of Linked Data
- Focus and Contributions of This Paper
- Requirements for an Event Gazetteer of History
- Metadata Elements for Historical Events
- An Event Gazetteer and Timeline for WWI
- Semantic Portal Application



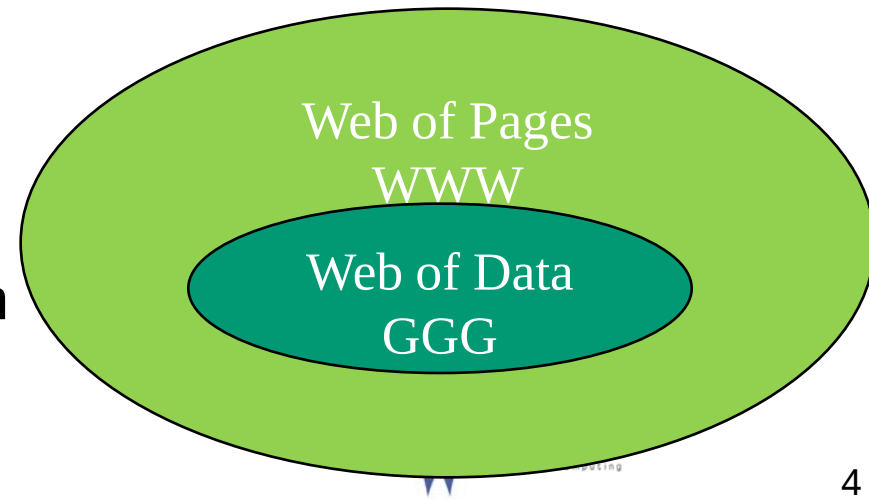
London, [1915]
Collection of the Library of Congress

Research Goals and Means

- Goals
 - Enriching other cultural heritage content by linking data
 - » E.g. paintings, books, artifacts, news, photographs, ...
 - Providing more comprehensive history data online for a variety of audiences
 - Providing finer grained, multi-valued data about history
 - Detecting differences in views/opinions to support historical research
 - Answering history questions, based on Linked Data, that cannot be answered based on separate datasets alone
- Means
 - Linked Data paradigm and technology as the basis: focus on events
 - Aggregating local/regional/national perspectives on events into a global view
 - Aggregating "subjective" views/opinions about the events
 - Link history with CH collections, ontologies and linked datasets

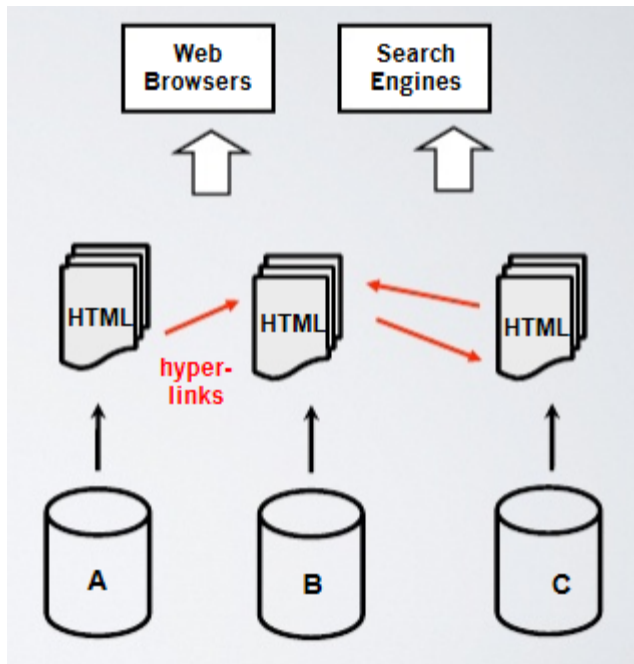
Linked Data $\approx$ Web of Data $\approx$ Semantic Web

- **Web of Pages** (traditional web)
 - Links connect pages
 - Used by browsers
- **Web of Data** (semantic web)
 - Links connect concepts (e.g. magpie $\rightarrow$ bird)
 - Used by semantic web browsers and applications
- WWW contains both webs
 - Web of Pages for **humans**
 - » **WWW** World Wide Web
 - Web of Data for **machines**
 - » **GGG** Giant Global Graph

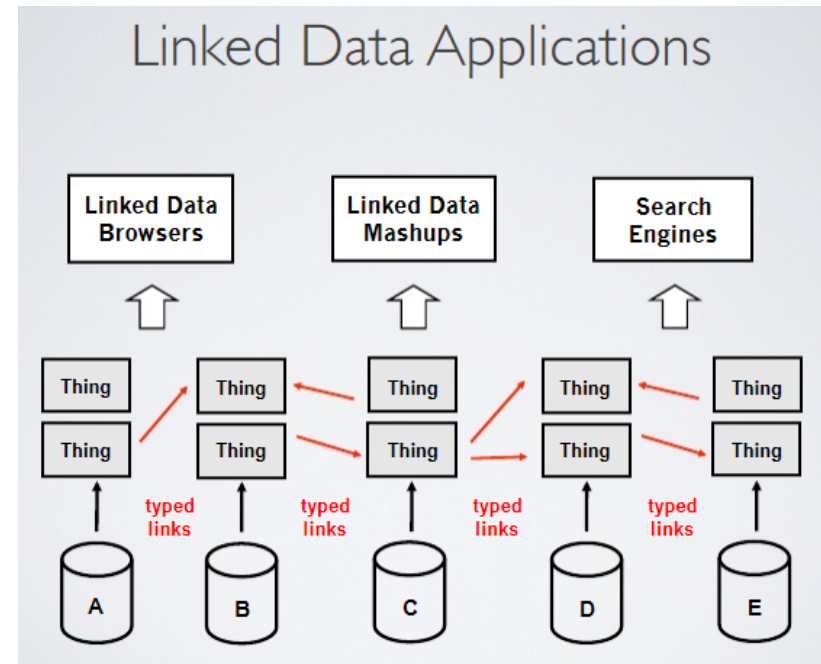


Using WWW and GGG

WWW

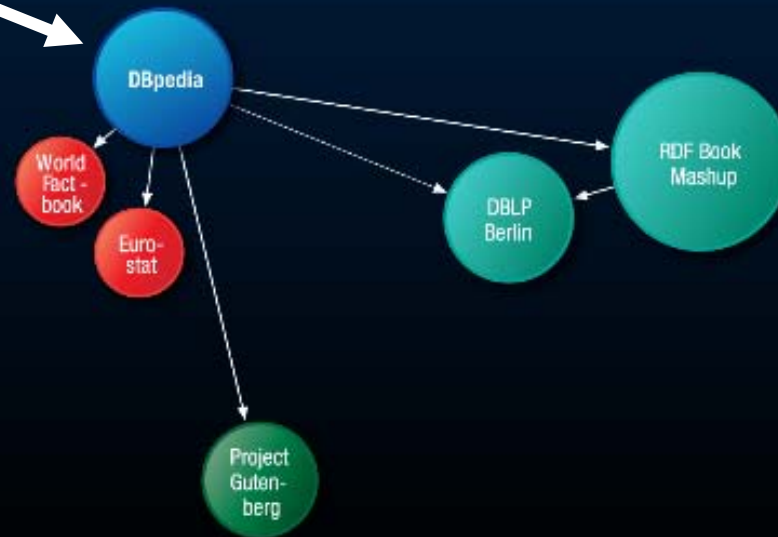


GGG



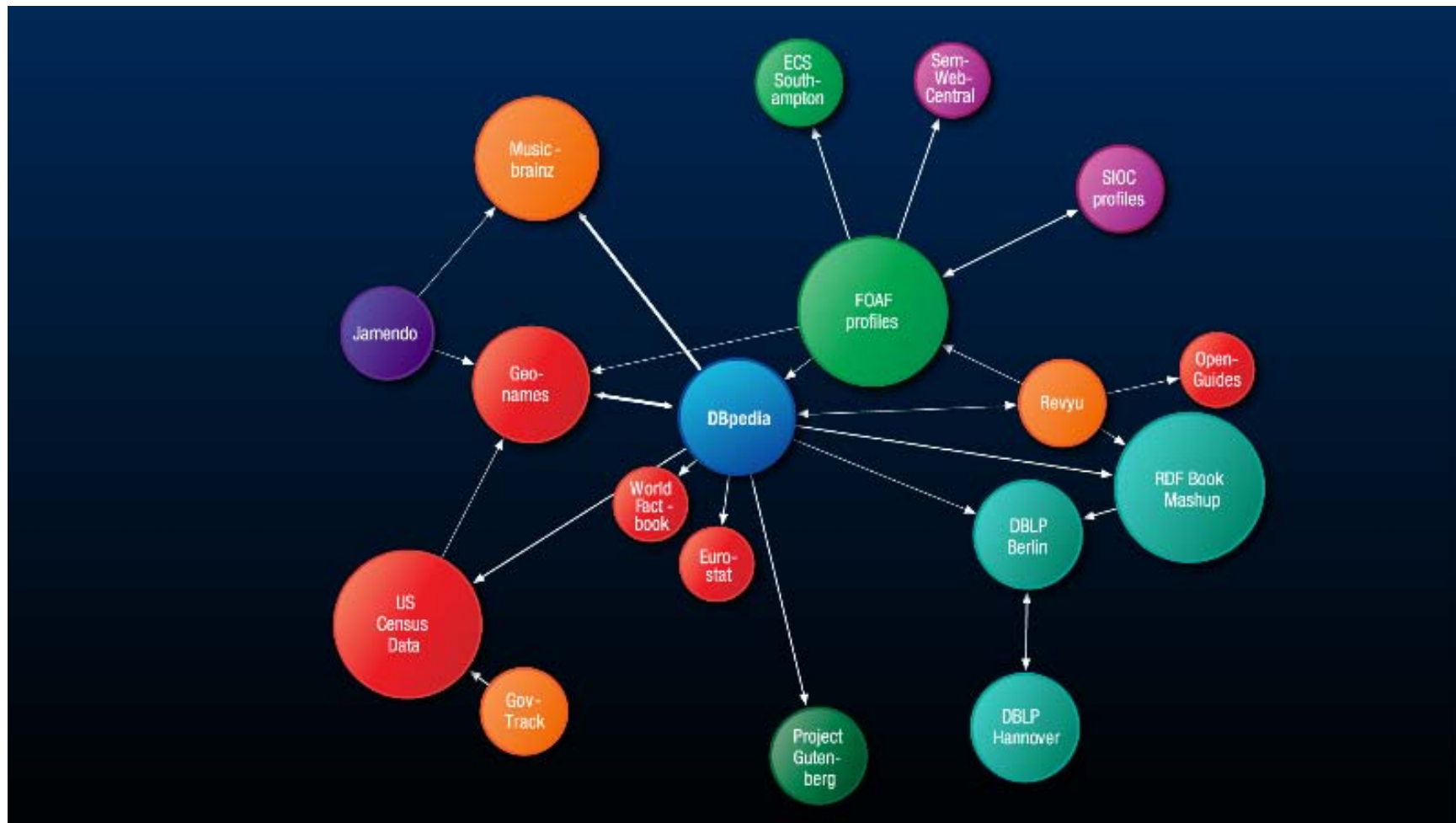
(Anja Jentzsch, 2012)

Linked Open Data Story so Far Starting 2005



(Tim Berners-Lee)

New Datasets Linked with Others



(Tim Berners-Lee)

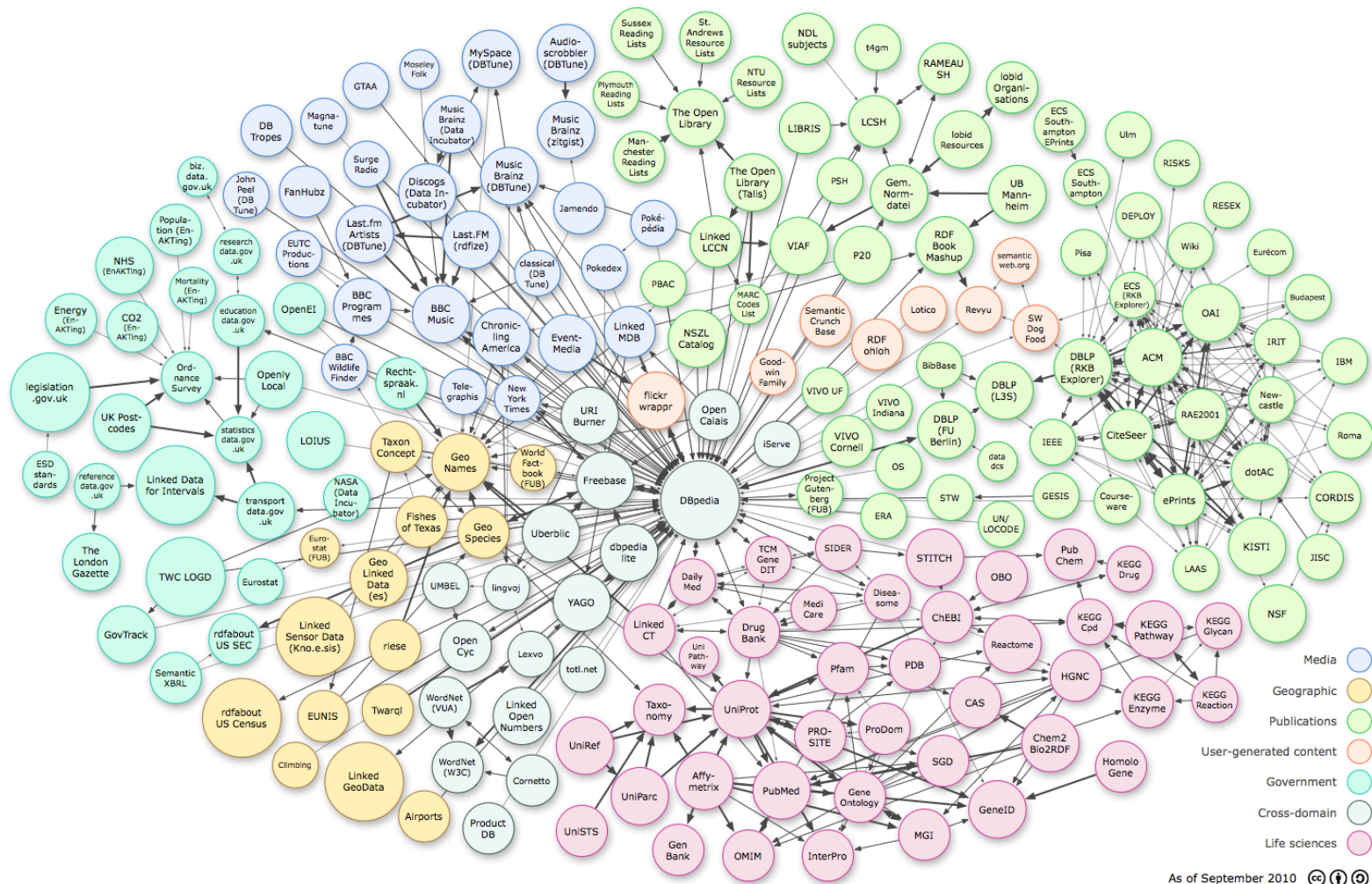


(Tim Berners-Lee)



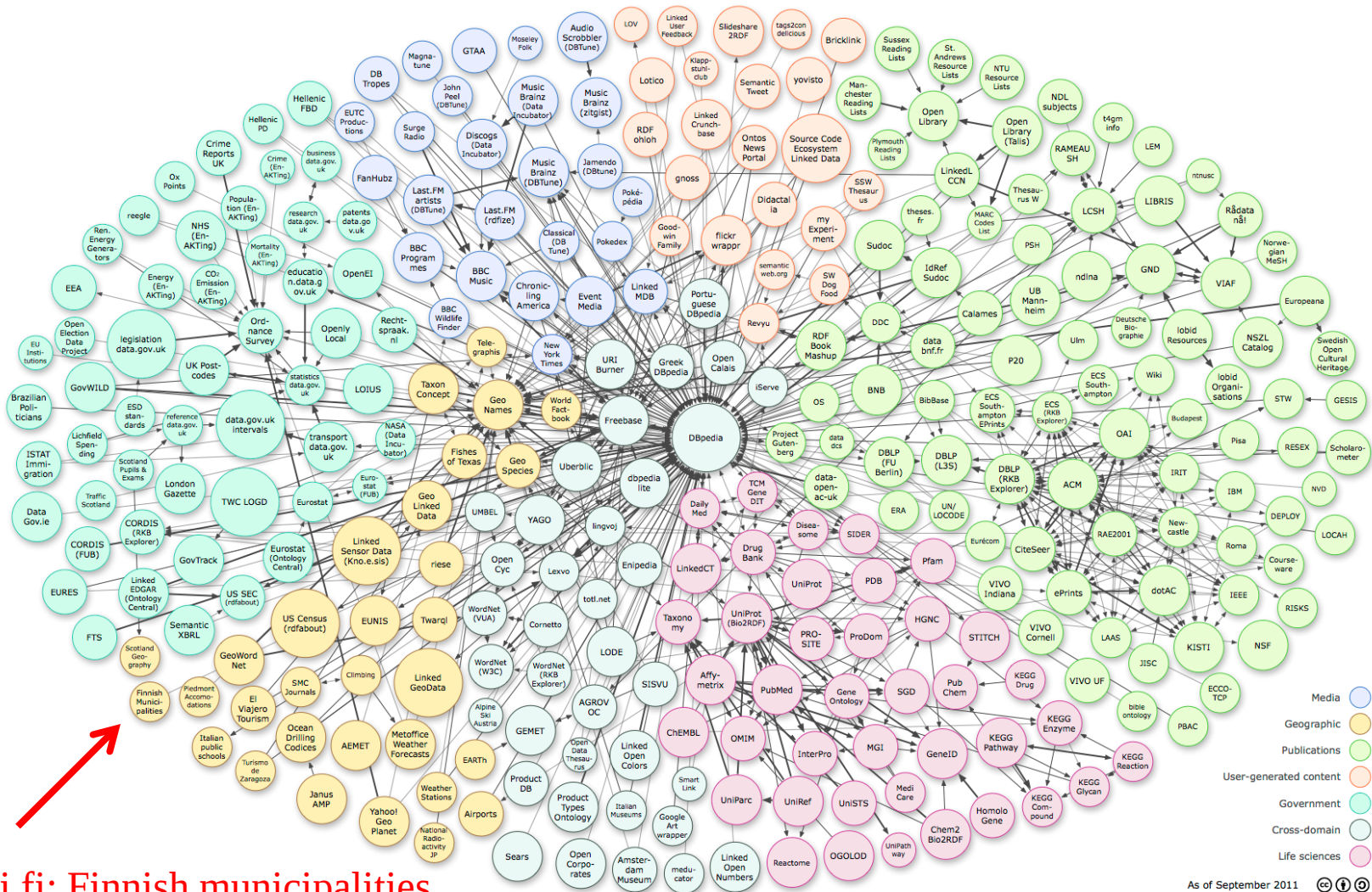
Linked Open Data Cloud 2010:

<http://linkeddata.org>



Linked Open Data Cloud 2011:

<http://linkeddata.org>



onki.fi: Finnish municipalities

As of September 2011

LOD Cloud Statistics, Sept 2011

Domain	Number of datasets	Triples	%	(Out-)Links	%
Media	25	1,841,852,061	5.82 %	50,440,705	10.01 %
Geographic	31	6,145,532,484	19.43 %	35,812,328	7.11 %
Government	49	13,315,009,400	42.09 %	19,343,519	3.84 %
Publications	87	2,950,720,693	9.33 %	139,925,218	27.76 %
Cross-domain	41	4,184,635,715	13.23 %	63,183,065	12.54 %
Life sciences	41	3,036,336,004	9.60 %	191,844,090	38.06 %
User-generated content	20	134,127,413	0.42 %	3,449,143	0.68 %
	295	31,634,213,770		503,998,829	

Focus of this Paper:

Historical Events Fostering Linked Data

- Events are a basis for modern metadata models
 - Generic event-centric schema ontologies
 - CIDOC CRM, LIDO,...
- Events = semantic glue linking cultural heritage (CH) content
 - Persons, organizations
 - Places
 - Times
 - Artifacts
 - Intangible things
 - Other events
- **We consider vocabularies of particular historical events**
 - “Crucifixion of Jesus”, “Coronation of Napoleon I”, “World War I”

- There are controlled vocabularies / gazetteers for
 - Persons, organizations
 - » E.g. ULAN, authority files
 - Places (modern & historical)
 - » E.g. TGN, Geonames, GNS, local databases
 - Artifacts
 - » E.g. AAT, MASA/MAO,
 - ...
- **Controlled vocabularies for events are missing!**
 - We propose semantic web "event gazetteers"

Contributions of this Paper

- Analyze requirements for an event gazetteer
 - From Linked Open Data (LOD) perspective
- A metadata model for representing events
- Application case study: World War I
 - Gazetteer of WWI events
 - Semantic portal for WWI

Requirements for an Event Gazetteer of History

Requirements for Usage

- Use as a gazetteer
 - Shared reference IDs glue data together
- Use as a data repository
 - Event timeline with descriptions
- Use metadata schema for representing events

Requirements for Linked Data

- Tim Berners-Lee's **5 star criteria for Linked Data**
 - ★ Data is available as structured data, e.g., as an Excel sheet instead of as an image scan of a table, so that it can be **reused**.
 - ★ Data is available on the Web (in whatever format) under an **open license**.
 - ★ Non-proprietary **open formats** are used, e.g., CSV (Comma Separated Values) format instead of Excel's own proprietary format.
 - ★ **HTTP URIs** are used to identify things, so that people can point to the data and serve RDF from it.
 - ★ Data is **linked** internally and externally to other data to provide context.

- Earning 5 stars in our case:
 - ★ The structured semantic data based on RDF, SKOS, OWL is used
 - ★ The Creative Commons Attribution License (or similar) is used
 - ★ The W3C and other non-proprietary and open standards are used
 - ★ Dereferencable HTTP URIs are used, according to LD principles
 - ★ RDF for machines
 - ★ HTML for humans
 - ★ The data is linked to related repositories
 - ★ E.g. DBpedia and Geonames in Linked Open Data cloud
 - ★ Collections of WWI materials

Requirements for Interfaces and APIs

- **Human interface.** Human end-user-interface
 - For search engines and browsers
- **Linked Data browsing.** Linked Data browser interface based on URI dereferencing
 - LD browsers created for the Web of Data.
- **SPARQL endpoint.** For querying the data in a standard way for, e.g., mash-up applications
- **Download.** Downloading the data as an RDF data dump

Requirements for Identifiers

- Use HTTP Universal Resource Identifiers (URI)
 - Unique **identifiers** for anything (inside or outside WWW)
 - » Based on Domain Name System of WWW
 - E.g. <http://www.cidoc-crm.org/>
 - Like web **addresses**
 - » URI identifier also tells where the data is
 - Can be used e.g. in a browser!
 - » Not all URI schemas have this property
 - E.g. URN identifiers
 - Not recommended for Linked Data!
 - **Persistence** - cool URIs do not change

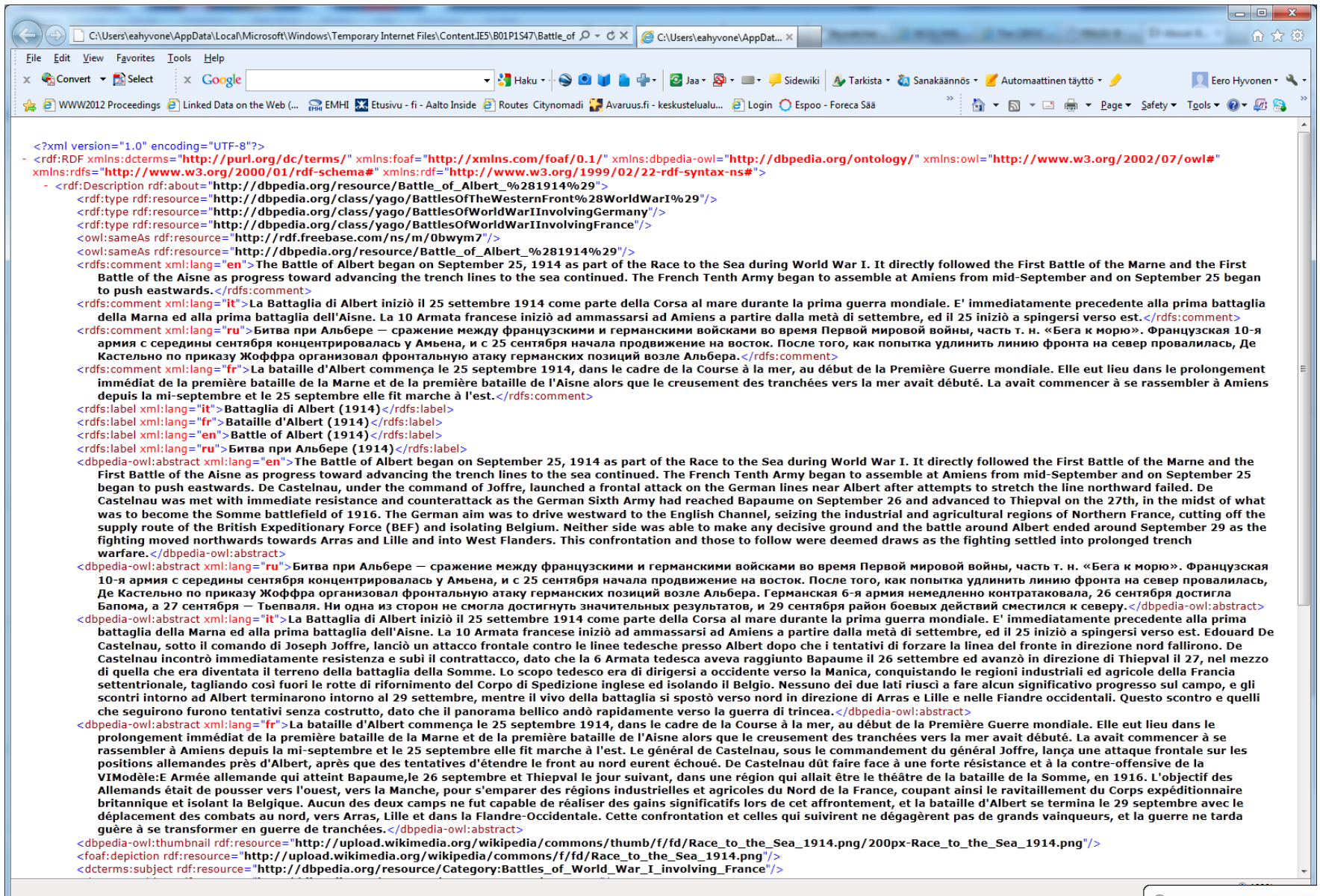
Example: Challenges in Identifying Events

- How to represent the "Battle of Albert" in WWI
- What language to use?
 - Bataille d'Albert? (fr)
 - Albertin taistelu? (fi)
- Which battle?
 - Battle of Albert (1914) (25–29 September 1914)
 - » encounter battle during the Race to the Sea
 - Battle of Albert (1916) (1–13 July 1916)
 - » opening phase of the Battle of the Somme, 1916
 - Battle of Albert (1918) (21–23 August 1918)
 - » opening phase of the Second Battle of the Somme, 1918
- Is "Battle of Albert" a Web page, a concept and/or identifier?

Linked Data Solution in DBpedia: Dereferencing "Battle of Albert, 1914"

- Web of Data (GGG) for machines:
 - URI identifier
 - » http://dbpedia.org/resource/Battle_of_Albert_%281914%29
 - Web page URL
 - » http://dbpedia.org/page/Battle_of_Albert_%281914%29
 - (Meta)data on the web
 - » http://dbpedia.org/data/Battle_of_Albert_%281914%29
- Web of Pages (WWW) for humans:
 - The actual Wikipedia information page
 - » [http://en.wikipedia.org/wiki/Battle_of_Albert_\(1914\)](http://en.wikipedia.org/wiki/Battle_of_Albert_(1914))

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```
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xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#" xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
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Battle of the Aisne as progress toward advancing the trench lines to the sea continued. The French Tenth Army began to assemble at Amiens from mid-September and on September 25 began
to push eastwards.</rdfs:comment>
  <rdfs:comment xml:lang="it">La Battaglia di Albert iniziò il 25 settembre 1914 come parte della Corsa al mare durante la prima guerra mondiale. E' immediatamente precedente alla prima battaglia
della Marna ed alla prima battaglia dell'Aisne. La 10 Armata francese iniziò ad ammassarsi ad Amiens a partire dalla metà di settembre, ed il 25 iniziò a spingersi verso est.</rdfs:comment>
  <rdfs:comment xml:lang="ru">Битва при Альбере — сражение между французскими и германскими войсками во время Первой мировой войны, часть т. н. «Бега к морю». Французская 10-я
армия с середины сентября концентрировалась у Амьена, и с 25 сентября начала продвижение на восток. После того, как попытка удлинить линию фронта на север провалилась, Де
Кастельно по приказу Жоффра организовал фронтальную атаку германских позиций возле Альбера.</rdfs:comment>
  <rdfs:comment xml:lang="fr">La bataille d'Albert commença le 25 septembre 1914, dans le cadre de la Course à la mer, au début de la Première Guerre mondiale. Elle eut lieu dans le prolongement
immédiat de la première bataille de la Marne et de la première bataille de l'Aisne alors que le creusement des tranchées vers la mer avait débuté. La avait commencer à se rassembler à Amiens
depuis la mi-septembre et le 25 septembre elle fit marche à l'est.</rdfs:comment>
  <rdfs:label xml:lang="it">Battaglia di Albert (1914)</rdfs:label>
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First Battle of the Aisne as progress toward advancing the trench lines to the sea continued. The French Tenth Army began to assemble at Amiens from mid-September and on September 25
began to push eastwards. De Castelnau, under the command of Joffre, launched a frontal attack on the German lines near Albert after attempts to stretch the line northward failed. De
Castelnau was met with immediate resistance and counterattack as the German Sixth Army had reached Bapaume on September 26 and advanced to Thiepval on the 27th, in the midst of what
was to become the Somme battlefield of 1916. The German aim was to drive westward to the English Channel, seizing the industrial and agricultural regions of Northern France, cutting off the
supply route of the British Expeditionary Force (BEF) and isolating Belgium. Neither side was able to make any decisive ground and the battle around Albert ended around September 29 as the
fighting moved northwards towards Arras and Lille and into West Flanders. This confrontation and those to follow were deemed draws as the fighting settled into prolonged trench
warfare.</dbpedia-owl:abstract>
  <dbpedia-owl:abstract xml:lang="ru">Битва при Альбере — сражение между французскими и германскими войсками во время Первой мировой войны, часть т. н. «Бега к морю». Французская
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Де Кастельно по приказу Жоффра организовал фронтальную атаку германских позиций возле Альбера. Германская 6-я армия немедленно контратаковала, 26 сентября достигла
Бapauma, а 27 сентября — Тьеппвала. Ни одна из сторон не смогла достигнуть значительных результатов, и 29 сентября район боевых действий сместился к северу.</dbpedia-owl:abstract>
  <dbpedia-owl:abstract xml:lang="it">La Battaglia di Albert iniziò il 25 settembre 1914 come parte della Corsa al mare durante la prima guerra mondiale. E' immediatamente precedente alla prima
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Castelnau, sotto il comando di Joseph Joffre, lanciò un attacco frontale contro le linee tedesche presso Albert dopo che i tentativi di forzare la linea del fronte in direzione nord fallirono. De
Castelnau incontrò immediatamente resistenza e subì il contrattacco, dato che la 6 Armata tedesca aveva raggiunto Bapaume il 26 settembre ed avanzò in direzione di Thiepval il 27, nel mezzo
di quella che era diventata il terreno della battaglia della Somme. Lo scopo tedesco era di dirigersi a occidente verso la Manica, conquistando le regioni industriali ed agricole della Francia
setentrionale, tagliando così fuori le rotte di rifornimento del Corpo di Spedizione Inglese ed isolando il Belgio. Nessuno dei due lati riuscì a fare alcun significativo progresso sul campo, e gli
scontri intorno ad Albert terminarono intorno al 29 settembre, mentre il vivo della battaglia si spostò verso nord in direzione di Arras e Lille e nelle Fiandre occidentali. Questo scontro e quelli
che seguirono furono tentativi senza costrutto, dato che il panorama bellico andò rapidamente verso la guerra di trincea.</dbpedia-owl:abstract>
  <dbpedia-owl:abstract xml:lang="fr">La bataille d'Albert commença le 25 septembre 1914, dans le cadre de la Course à la mer, au début de la Première Guerre mondiale. Elle eut lieu dans le
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rassembler à Amiens depuis la mi-septembre et le 25 septembre elle fit marche à l'est. Le général de Castelnau, sous le commandement du général Joffre, lança une attaque frontale sur les
positions allemandes près d'Albert, après que des tentatives d'étendre le front au nord eurent échoué. De Castelnau dut faire face à une forte résistance et à la contre-offensive de la
VI Modèle:É Armée allemande qui atteint Bapaume, le 26 septembre et Thiepval le jour suivant, dans une région qui allait être le théâtre de la bataille de la Somme, en 1916. L'objectif des
Allemands était de pousser vers l'ouest, vers la Manche, pour s'emparer des régions industrielles et agricoles du Nord de la France, coupant ainsi le ravitaillement du Corps expéditionnaire
britannique et isolant la Belgique. Aucun des deux camps ne fut capable de réaliser des gains significatifs lors de cet affrontement, et la bataille d'Albert se termina le 29 septembre avec le
déplacement des combats au nord, vers Arras, Lille et dans la Flandre-Occidentale. Cette confrontation et celles qui suivirent ne dégagèrent pas de grands vainqueurs, et la guerre ne tarda
guère à se transformer en guerre de tranchées.</dbpedia-owl:abstract>
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http://en.wikipedia.org/wiki/Battle_of_Albert_(1914)



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ArticleTalk

Battle of Albert (1914)

From Wikipedia, the free encyclopedia

Not to be confused with *Battle of Albert (1916)* or *Battle of Albert (1918)*.

 This article **does not cite any references or sources**. Please help [improve this article](#) by adding citations to [reliable sources](#). Unsourced material may be [challenged](#) and [removed](#). (April 2008)

The **Battle of Albert** began on September 25, 1914 as part of the [Race to the Sea](#) during World War I. It directly followed the [First Battle of the Marne](#) and the [First Battle of the Aisne](#) as progress toward advancing the trench lines to the sea continued.

The [French Tenth Army](#) began to assemble at Amiens from mid-September and on September 25 began to push eastwards. [De Castelnau](#), under the command of Joffre, launched a frontal attack on the German lines near [Albert](#) after attempts to stretch the line northward failed. [De Castelnau](#) was met with immediate resistance and counterattack as the [German Sixth Army](#) had reached [Bapaume](#) on September 26 and advanced to [Thiepval](#) on the 27th, in the midst of what was to become the [Somme](#) battlefield of 1916. The German aim was to drive westward to the [English Channel](#), seizing the industrial and agricultural regions of Northern France, cutting off the supply route of the [British Expeditionary Force](#) (BEF) and isolating Belgium.

Neither side was able to make any decisive ground and the battle around Albert ended around September 29 as the fighting moved northwards towards [Arras](#) and [Lille](#) and into [West Flanders](#). This confrontation and those to follow were deemed draws as the fighting settled into prolonged [trench warfare](#).

 This World War I article is a *stub*. You can help Wikipedia by [expanding it](#).

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Course of the "Race to the Sea" showing dates of encounters and highlighting the significant battles.

V · T · E

Race to the Sea

[hide]

1st Picardy · Flirey · Albert · Arras · La Bassée · Messines · Armentières · Yser · 1st Ypres

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Requirements for Core Metadata

- Minimal metadata to identify an event unambiguously
 - Name
 - Time
 - Place
 - Description
- Visualized by pattern *name(time, place)*
- Examples:
 - Battle of Albert (1914, France)
 - World War I (1914-1918, Belgium)
 - World War I (1914-1918, Germany)

Metadata Elements for Historical Events

Metadata type	Label	Meaning	Identifier	Cardinality	Range	Value
Core elements						
Name	name	Short event name	:name	0..1	Literal	string@language
	full name	Full event name	skos:prefLabel	1	Literal	string@language
Description	description	Description of the event	dc:description	0..1	Literal	string@language
Time	time	Time span of the event	:time	1	Time instance	Time URI
Place	place	Place where the event took place	:place	1	Place instance	Place URI
	point		geo:point	0..1	Point instance	Point URI
	path		geo:line	0..1	Line instance	Line URI
	area		geo:polygon	0..1	Polygon instance	Polygon URI
Subject						
Subject matter	related actor	Actor involved in the in the event	:subjectActor	0..n	Actor instance	Actor URI
	related time	Other time related to the event	:subjectTime	0..n	Time instance	Time URI
	related place	Other place related to the event	:subjectPlace	0..n	Place instance	Place URI
	related event	Other event related to the event	:subjectEvent	0..n	Event instance	Event URI
	related topic	Topic concept related to the event	:subjectConcept	0..n	Concept	Topic URI
	related object	Individual object related to the event	:subjectObject	0..n	Object instance	Object URI
classification	event type		:eventType	0..n	Concept	Classification URI
Narrative						
Event hierarchy	is contained in	Larger event	skos:broader	0..n	Event instance	Event URI
	contains	Narrower event	skos:narrower	0..n	Event instance	Event URI
Event succession	next event	Next event	:next	0..n	Event instance	Event URI
	previous event	Previous event	:previous	0..n	Event instance	Event URI
Causal structure	cause	Cause of the event	:cause	0..n	Event instance	Event URI
	effect	Effect of the event	:effect	0..n	Event instance	Event URI
Administrative						
	Documentation properties	SKOS Documentation properties	skos:xxx	0..n	Literal	string@language

An Event Gazetteer and Timeline for World War I

- Represent the events and story of WWI as LOD
- Publish WWI events as a 5 star RDF LOD repository & service
- Link it with relevant ontologies and datasets
- Joint work of Aalto University, University of Colorado Boulder, and University of Helsinki
 - With an international collaboration network

Datasets

- Wikipedia/DBpedia WWI timeline and events
- *Principal Events, 1914-1918* (London, 1922)
 - British government's view of the war proceedings
 - Appendix provides German, Belgian, French and American views
- Imperial War Museum (London) data
 - Geographical terms relating to the Western Front
 - Event terms relating to WWI
- Horne & Kramer, *German Atrocities, 1914* (New Haven, 2001)
 - Atrocity data
- Tessin, *Deutsche Verbände und Truppen* (Osnabrück, 1974)
 - German army hierarchy
- *Annuaire Statistique de la Belgique* (Brussels, 1922)
 - Government data about Belgian population, economy, etc. for war years
- Polygons of Belgian provinces during WWI
 - HISSTAT project (Universities of Ghent, Brussels, Louvain-la-Neuve and State Archives of Belgium)

- Collections
 - University of Colorado Boulder, WWI Collection Online
 - Over 1,100 titles (55,000 pages)
 - Published 1829-1922, vast majority 1914-1918
- Articles
 - DBpedia
 - Potential collaboration with online encyclopedia project
- Ontologies
 - Annotated event gazetteer of WWI
 - Ontologies of agents, regions, and times
 - Places mapped on Geonames
- Specialized vocabulary relating to WWI Belgium

Annotation Process

- Collection MARCXML -> RDF
 - Transformation by machine
- Manual deep linking based on content
 - Strings in text -> URI references
- Manual creation of additional ontologies and metadata
- Automatic annotation of texts
 - Work in progress

<http://libcudl.colorado.edu/wwi/index.asp>

WWI Collection - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Mozilla Firefox Web Browser — Geolo... x How Google and Microsoft taught se... x WWI Collection x +

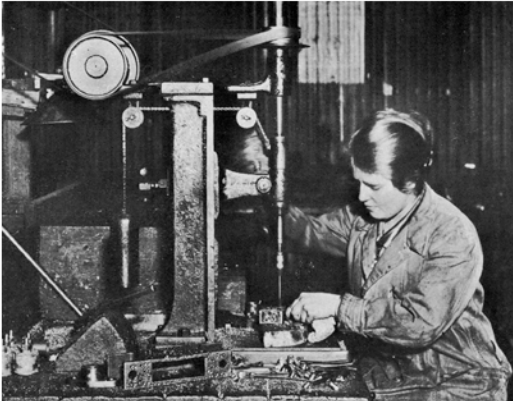
Back Forward Mail Reader Web Search Maps Calendar Wave Dashboard Settings libcudl.colorado.edu/wwi/index.asp Reload Stop Home Firebug

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World War I Collection

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The University of Colorado at Boulder Libraries' digital World War I collection offers a rich array of primary-source material relating to the War selected from the World War I "Pamphlets" Collection housed in the CU Archives. The collection consists of over 1,200 individual titles representing a staggering range of genres, authors, geopolitical units, and subject matter. A selection of core works from the rich body of materials in the collection is currently available online. This resource offers full-text searching capability along with visualization tools that facilitate alternate avenues of exploration in the collection.



Search Collection

Explore...
Map
Timeline

work may english
prisoners london law policy
liberty cross **food** john
colorado aspects otto
neutrality commission
england kahn diplomatic
william women question
propaganda documents
finance address army
1916 politics thomas naval
references **peace**
published navy economic
germany 1915
american von
atrocities loan
britain labor 1918
supply council des **league**
1914 bulletin louis hon par

Example from Principal Events (1922)

30th ... Fort Thiaumont (Verdun) retaken by French forces (see 23rd, and July 1st).
Battle of the Strypa ends (see 11th).
 British Government conclude further agreement with the Netherlands Overseas Trust for rationing of Holland (see November 23rd, 1915).

JULY 1916.

1st ... **Battles of the Somme, 1916, begin with Battle of Albert, 1916** (1st/13th) (see November 18th).
 Contact patrol, or liaison with infantry, first instituted in the Royal Flying Corps.
 Kirmanshah (Persia) reoccupied by Turkish forces (see February 26th, 1916, and March 11th, 1917).

2nd ... **Battle of Baranovichi begins** (see 9th).

3rd ... Russian and Japanese Governments conclude treaty with regard to future policy in the Far East.

7th ... **Italian counter-offensive in the Trentino ends** (see June 16th).
 Tanga (German East Africa) occupied by British forces (see November 5th, 1914).
 Mr. Lloyd George succeeds Lord Kitchener as Secretary of State for War, Great Britain (see June 5th and December 11th).
British Government issue Order in Council rescinding Declaration of London of 1909. French Government issue similar order (see October 29th, 1914, and November 6th, 1914).

* Bulk of position was captured on May 23rd, and this date marks the limit of the German advance on Verdun.

[8369]

G 2



Creating Metadata about WWI Events: Classes and Instances in SAHA Editor

Collaborative annotation project (Aalto & CU Boulder)

SAHA3 | ww1 - search

[agent](#) (6)

[collective](#) (2)

[group](#) (4)

[organization](#) (488)

[person](#) (99)

historical event (326)

[atrocities incident](#) (104)

[region](#) (3)

[country](#) (5)

[county](#) (10)

[municipality](#) (1,162)

[village](#) (96)

[time](#) (157)

historical event (326)

[\[create a new instance\]](#)

Filter

[1st National Defence Loan \(historical event\)](#)

[2nd National Defence Loan \(historical event\)](#)

[3rd National Defence Loan \(historical event\)](#)

[3rd War Loan \(historical event\)](#)

[4th National Defence Loan \(historical event\)](#)

[4th War Loan \(historical event\)](#)

[4th War Loan \(historical event\)](#)

[5th National Defence Loan \(historical event\)](#)

[5th War Loan \(historical event\)](#)

[5th War Loan \(historical event\)](#)

[6th War Loan \(historical event\)](#)

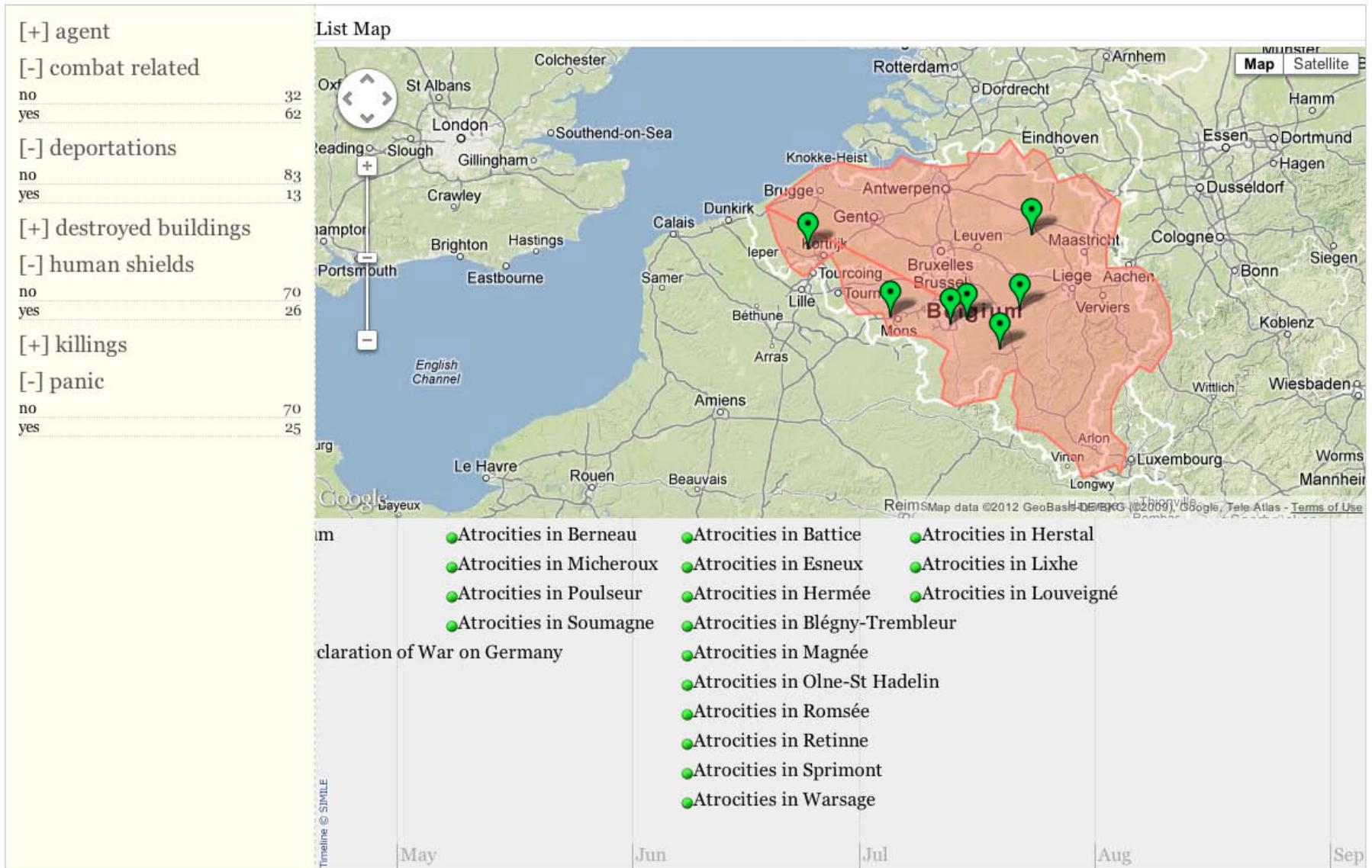
[6th War Loan \(historical event\)](#)

The Semantic Portal: Faceted Search for Atrocities

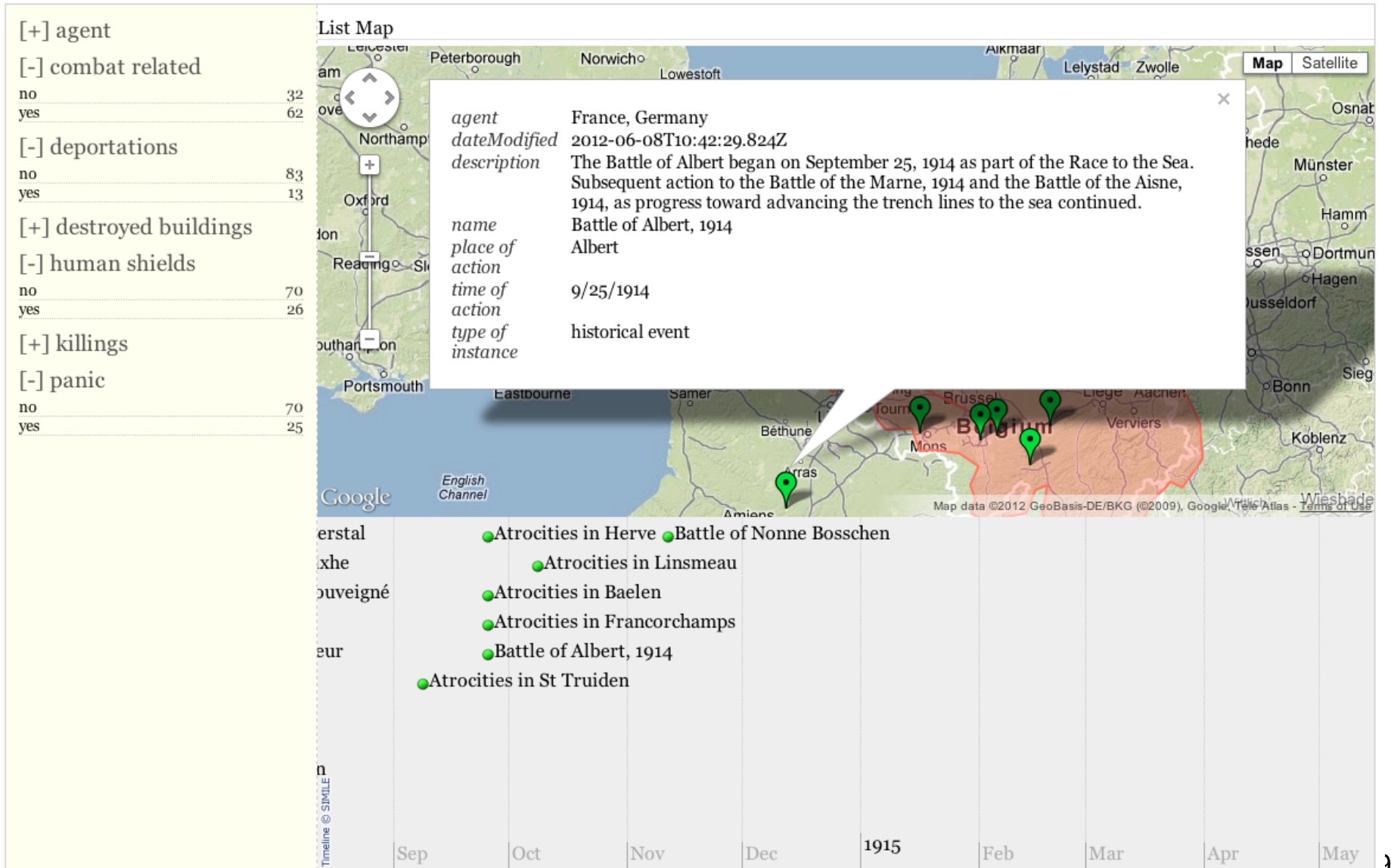
[-] agent	List Map
100th Infantry Regiment 1	
101st Infantry Regiment 1	[remove] no
103rd Infantry Regiment 1	[remove] yes
108th Infantry Regiment 1	
119th Infantry Regiment 1	Atrocities in Baranzky (atrocidity incident)
11th Field Artillery Regiment 1	
121st Infantry Regiment 1	Atrocities in Dinant (atrocidity incident)
122nd Infantry Regiment 1	
125th Infantry Regiment 1	Atrocities in Esen (atrocidity incident)
127th Infantry Regiment 1	
12th Field Artillery Regiment 1	Atrocities in Flénu (atrocidity incident)
12th Reserve Infantry Regiment 1	
178th Infantry Regiment 1	Atrocities in Korbeek-Lo (atrocidity incident)
182nd Infantry Regiment 1	
202nd Reserve Infantry Regiment 1	Atrocities in Rotselaar (atrocidity incident)
203rd Reserve Infantry Regiment 1	
204th Reserve Infantry Regiment 1	Atrocities in Somme-Leuze (atrocidity incident)
48th Field Artillery Regiment 1	
[-] deportations	
yes 8	
[-] combat related	
no 2	
yes 6	
[-] human shields	
no 6	
yes 2	
[+] killings	
[-] panic	
no 8	

Results 8

Visualizing Search Results on a Map & Timeline



End-user Interface: Events on the Map and Timeline: Battle of Albert 1914



Conclusions

- History is a promising application area for Linked Data
- Linked Data is based on shared concepts (resources)
- Event gazetteers are missing
- We presented a model for this based on LD requirements
- Evaluation by application is underway
 - Populating a gazetteer/timeline for WWI
 - Creating a semantic portal for WWI
- More info in the paper online:

Proceedings of CIDOC2012 - Enriching Cultural Heritage, Helsinki, Finland, June 10-14, 2012.
<http://network.icom.museum/cidoc/resources/cidoc-digital-library.html>

History on the Semantic Web as Linked Data —An Event Gazetteer and Timeline for the World War I

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