

# Linked Open Data (for Archives)

Stuudiemiddag Linked Data Archieven

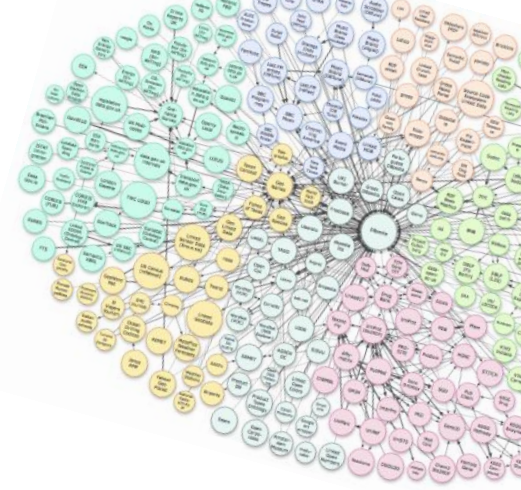
Victor de Boer





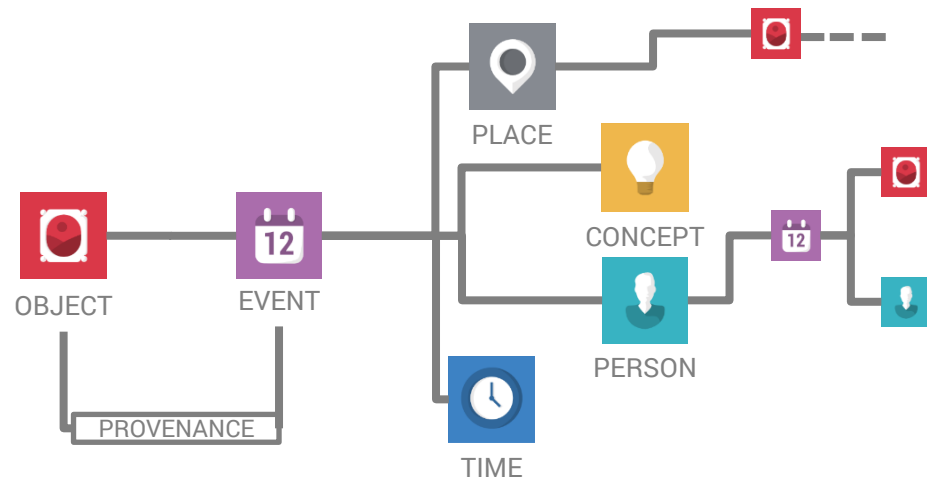


# Linked Data



- Machine readable format
- Standardized
- Flexibility to connect heterogeneous data
  - Link what can be linked

- **re-use and re-usability**



**What is Linked Open Data?**

## Linked Data

is about *technology* for interoperability

## Open Data

is about *licenses* to allow reuse

# Linked Data five star system

[www.w3.org/designissues/linkedata.html](http://www.w3.org/designissues/linkedata.html)



★	Available on the web (whatever format), but with an open license
★★	Available as machine-readable structured data (e.g. excel instead of image scan of a table)
★★★	as (2) plus non-proprietary format (e.g. CSV instead of excel)
★★★★	All the above plus, Use open standards from W3C (RDF and SPARQL) to identify things, so that people can point at your stuff
★★★★★	All the above, plus: Link your data to other people's data to provide context

# URIs

Use Web URIs for things *you* want to talk about.

<http://rijksmuseum.nl/data/painting1>



rijks:Painting001

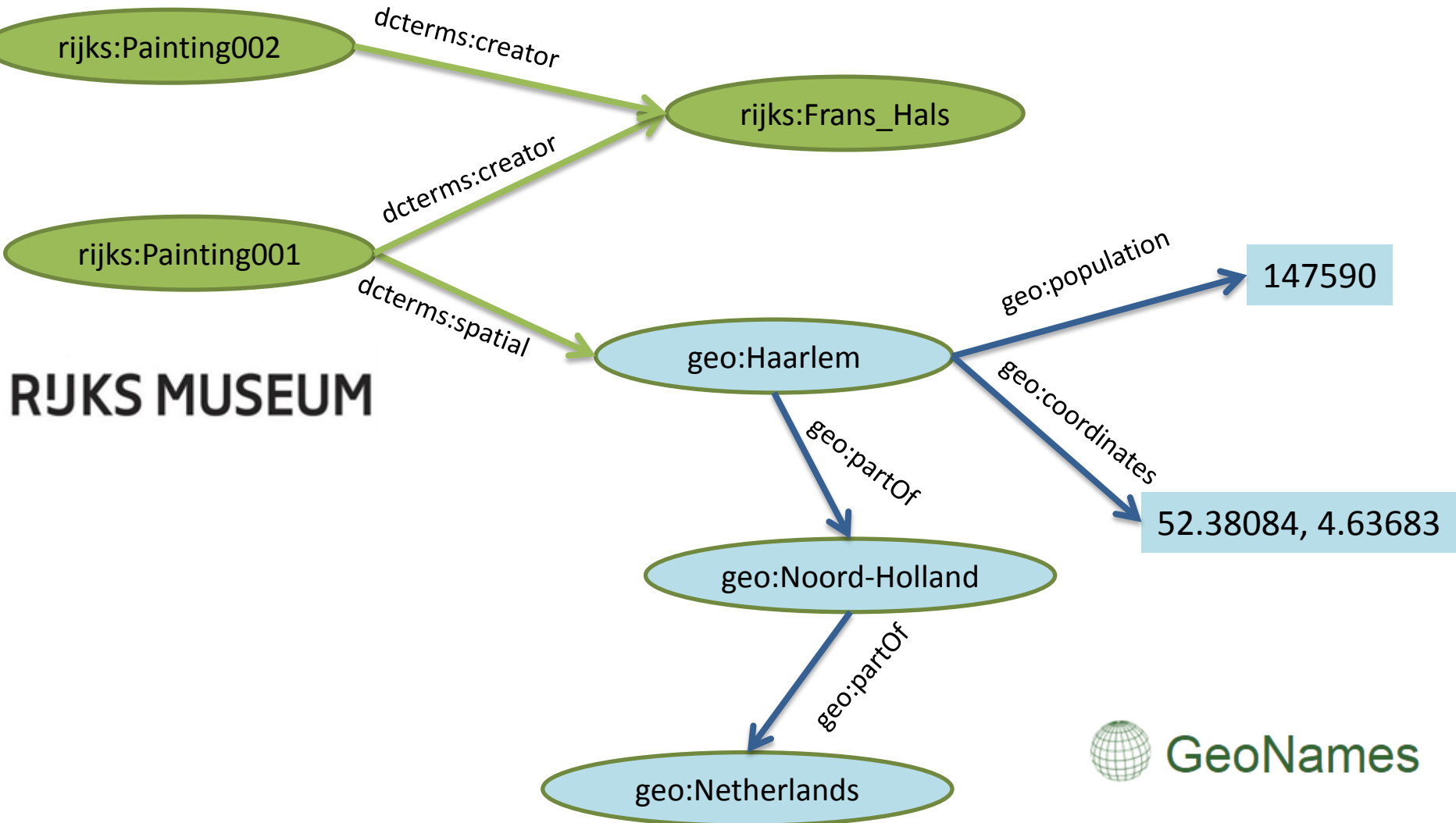
My application can go there using HTTP (the Web) and I get information about it

HTML page for humans

RDF data for machines



# RDF Triples form **Graphs**

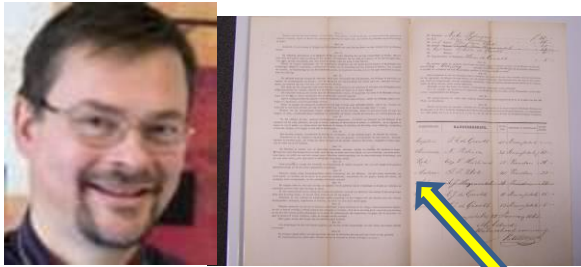




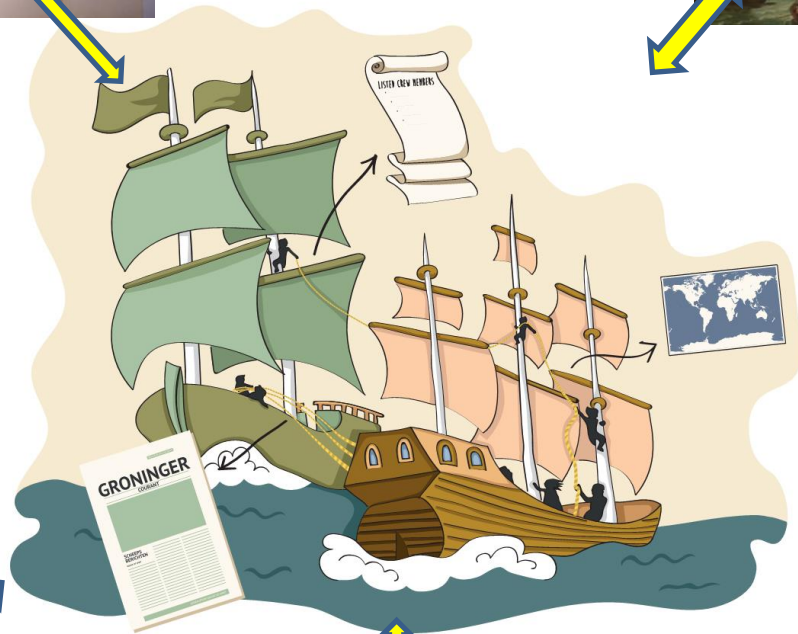
# Some Examples

# Dutch Ships and Sailors

Jur Leinenga



Matthias van Rossum



“VOC Opvarenden”

Naam	Geboortedatum	Overlijdensdatum	Plaats van Geboorte	Plaats van Overlijden
1. J. van der Meer	1640	1680	Amsterdam	Amsterdam
2. P. de Vries	1645	1685	Amsterdam	Amsterdam
3. M. van der Grinten	1650	1690	Amsterdam	Amsterdam
4. J. van der Meer	1655	1695	Amsterdam	Amsterdam
5. P. de Vries	1660	1700	Amsterdam	Amsterdam

Dutch-Asiatic Shipping



Archangel voyages



Elbing voyages

1620 - #3

Op 14-4 heeft schipper Johan Peters uit Buiskoot met zijn schip, de Fortuna

naar Elbing gebracht	Tol per Product	Waarde per Product
HG 4.0 Last	Haring	
0.0 None	Kramerijen	300 d. fl.
1.0 2.0 Chm	Rijnwijn	
HG 1.0 1.0 Elip	Wijn	
Import Tol totaal:		

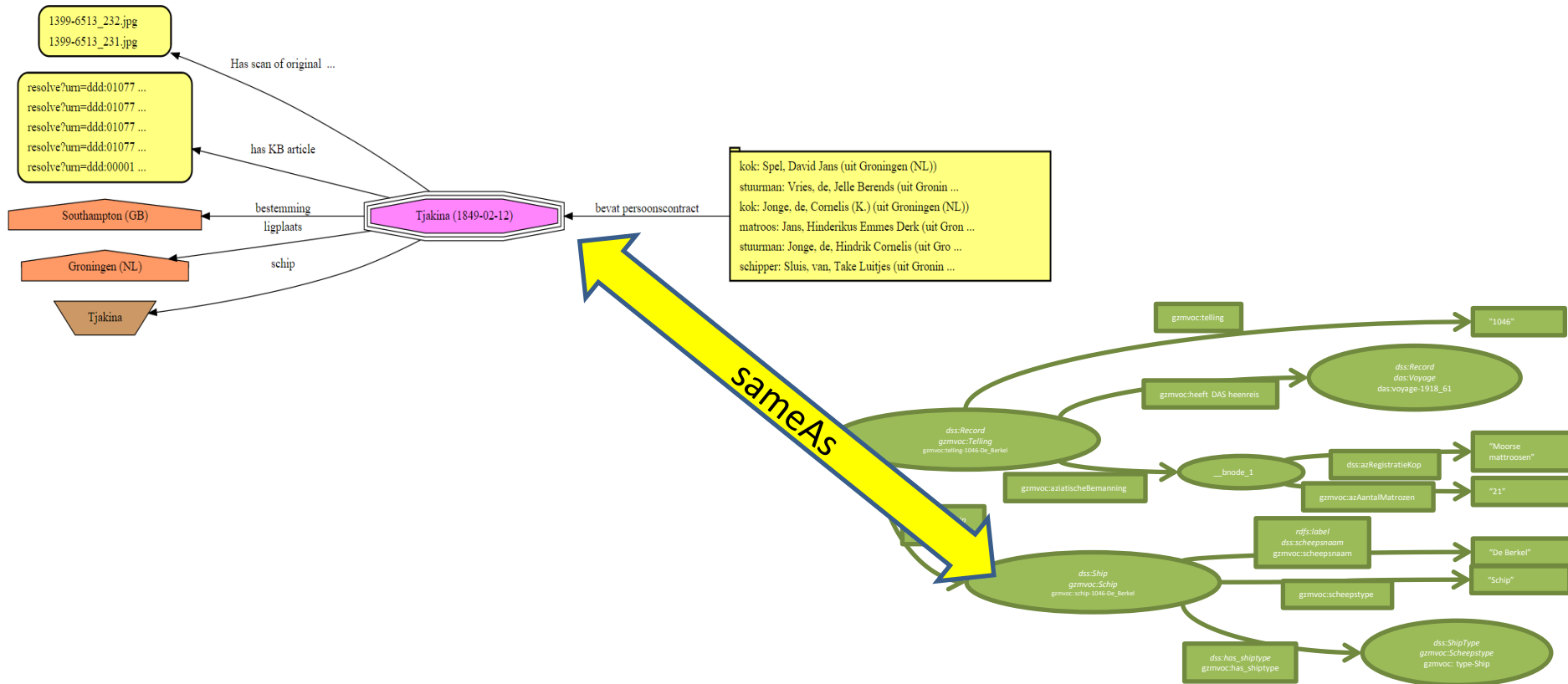
  

← vanuit Elbing naar Amsterdam meegenomen:	Tol per Product	Waarde per Product
BF 4.0 Last	Rogge	
EG 20.0 Last	Gerst	7.0 m. 13.0 gr. 6.0 d.
EG 42.54 Centner	Koper	14.0 m. 17.0 gr. 9.0 d.
EG 20.0 Last	Tarwe	15.0 m.
EG 88.0 Steen	Wol	11.0 m.
HG 31.0 Last	Rogge	
HG 10.0 Steen	Veren	
Export Tol totaal:		
		47.0 m. 30.0 gr. 15.0 d.



KB NEWSPAPERS

# HETEROGENEOUS but LINKED DATAMODELS



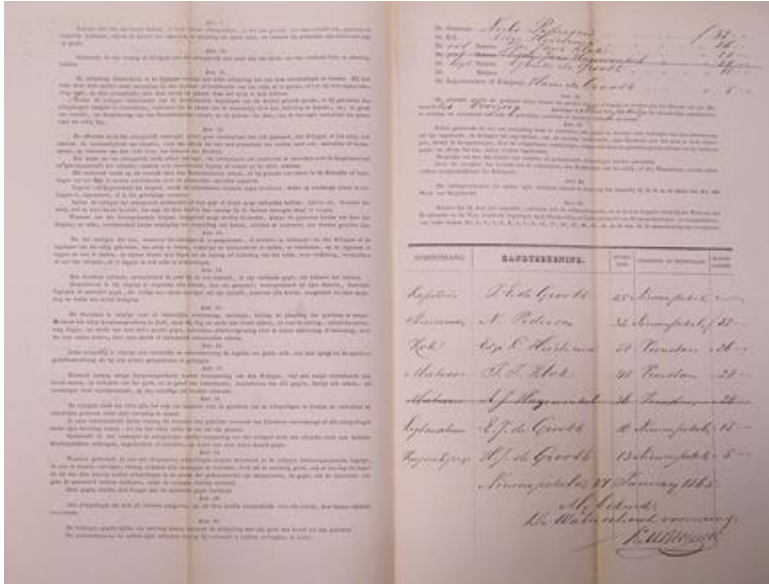
## Integrate datasets

No monolithic datamodel needed

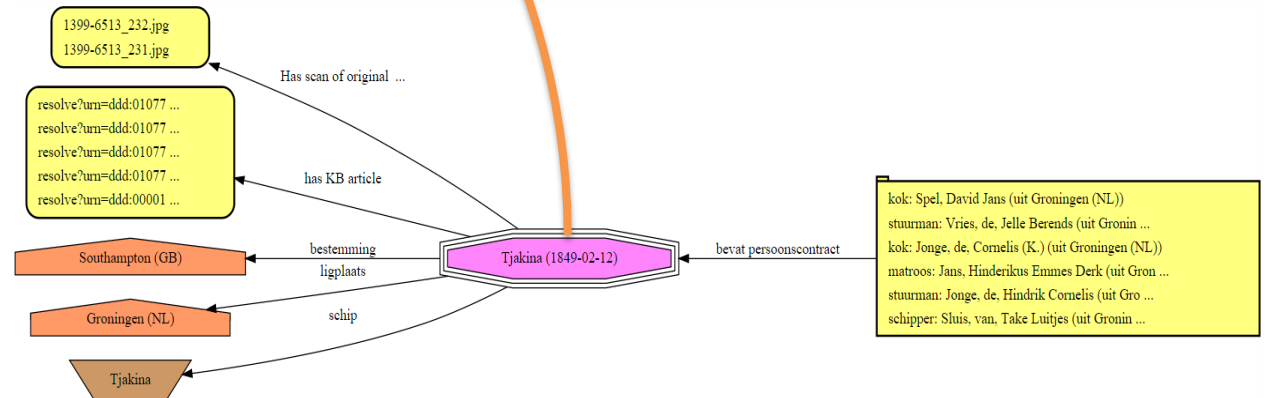
No normalisation / dumbing down of data needed

Retain original model and intent

# Metadata and original scans



hasOriginalScan



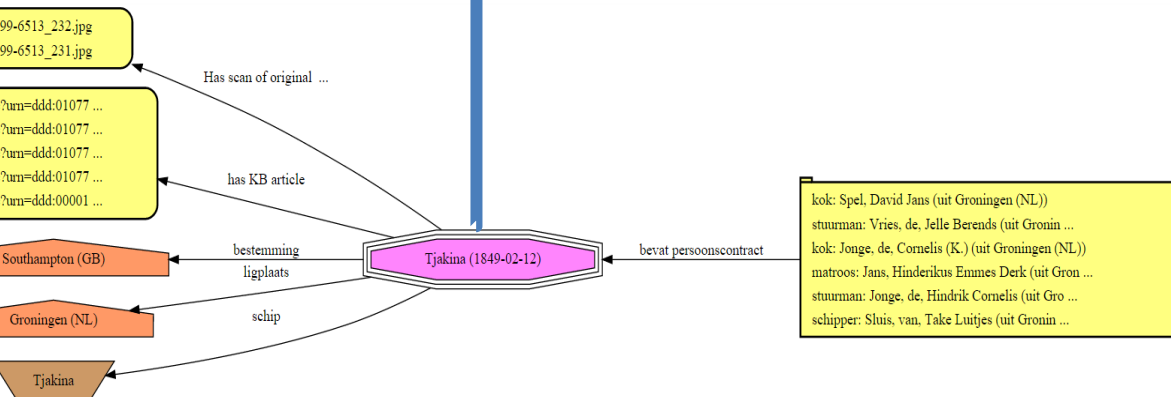
# Reuse: Links to other web resources

## Historical Newspapers

<http://delpher.nl>

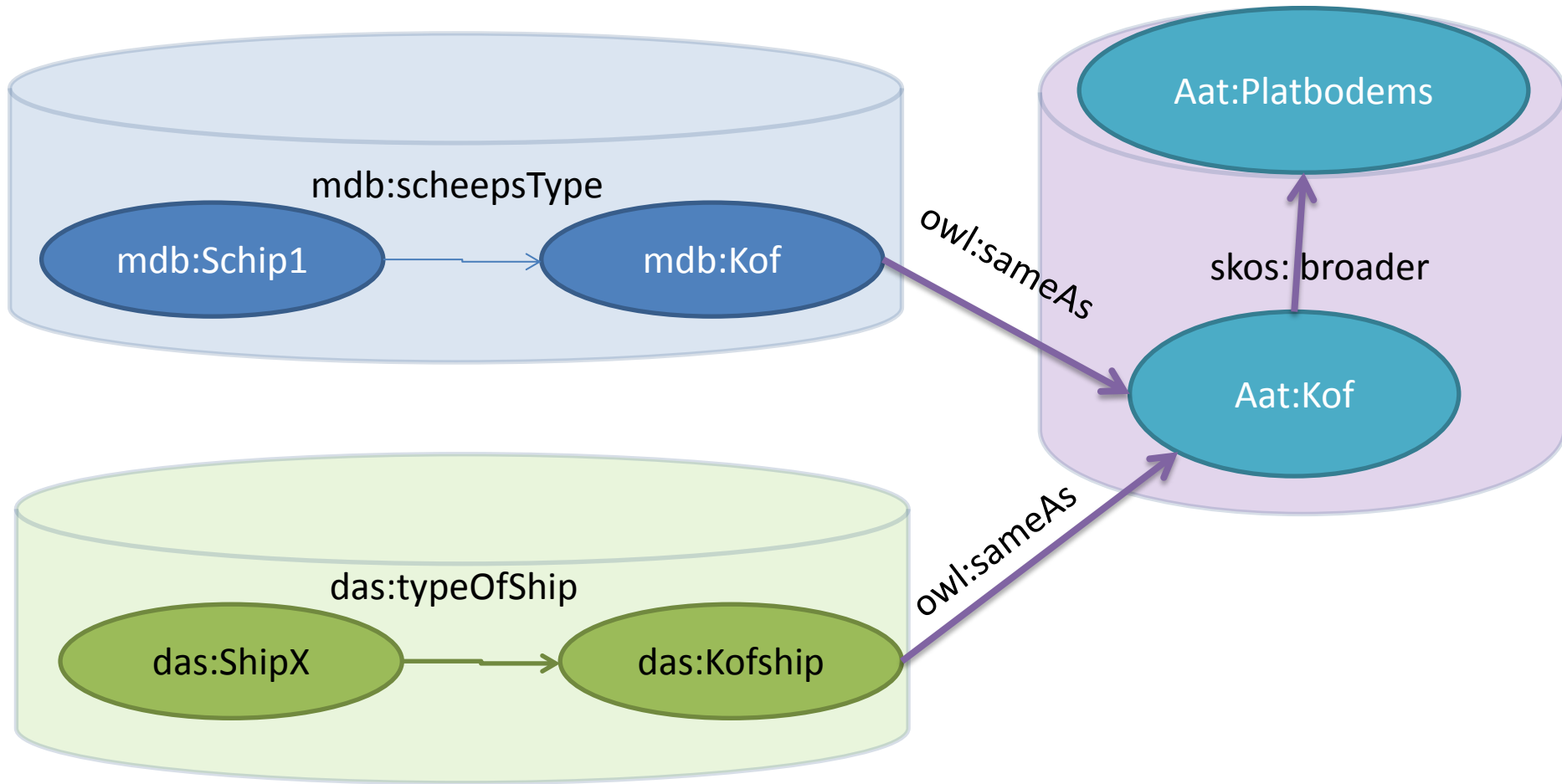


isReferencedBy



[HARLINGEN, 24 October.]  
...gestrand. Tevens is het berigt  
ontvan°e > dat het hier  
behoorende **schoonerschip  
Transit, kapitein Schaap**, in de  
Noordzee is gezonken, nadat het  
achterschip was weggeslagen ;  
een ligtmatroos verloor daarbij  
het leven. Mede zijn hier drie  
vreemde schepen met meer en  
minder zware averij  
binnengelopen.

# Reuse: background knowledge

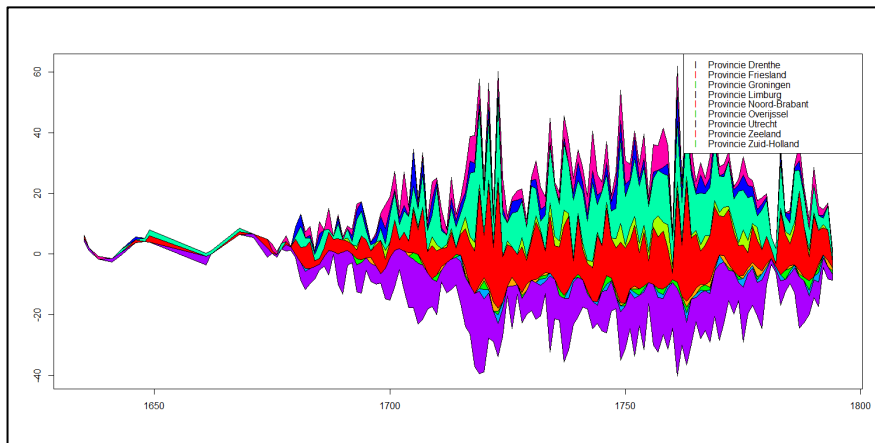
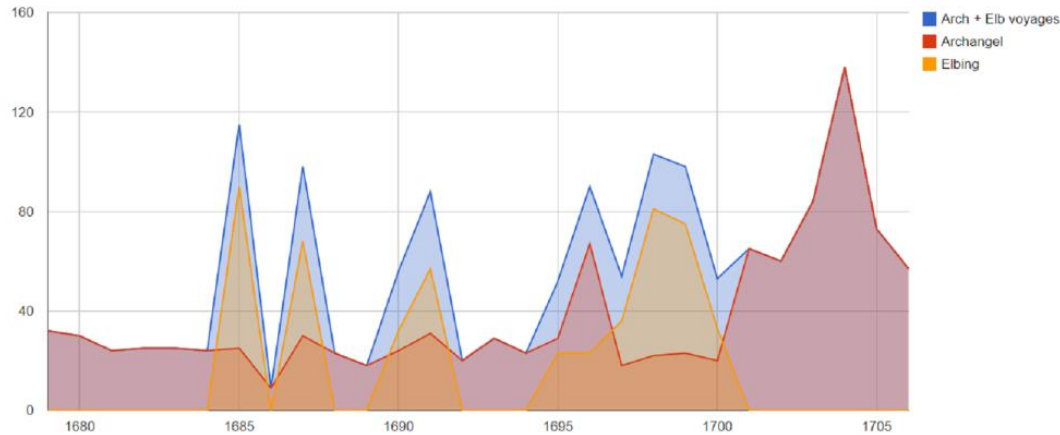


**AAT** = Art & Architecture Thesaurus  
<http://www.getty.edu/research/tools/vocabularies/aat/>

**OWL** = Web ontology language  
<https://www.w3.org/OWL/>



# Data analysis and visualisation



## Exhaustive list of research topics or questions

How big was shipping on Elbing/Archangel in total Dutch shipping

How did wars influence shipping\*

How can climate/weather be linked to shipping

Search for specific information in large datasets, such as certain names

How do the price of goods change over time

Do captains appear in multiple datasets\*

Can economic growth be linked to shipping\*

Do ships appear in multiple datasets\*

Compare load data to DSS to see transfer of goods

European shipping was usually only Dutch captains, considered more privileged

Traders who load ships can be compared, maybe see how finances were organised

Baltic trade was less profitable but lower risk than other shipping, compare this

The interlinked knowledge graph makes it possible to efficiently investigate integrated research questions.





## Mediapark Hilversum

Ontstaan in 1997:  
3 archieven (RVD, AVAC/Omroepen,  
Stichting Film en Wetenschap)  
1 museum (Omroepmuseum)

Grootste audiovisueel archief

70% audio-visual heritage material  
> 800.000 hrs

# NISV's task

## 1. *Safeguard* the wealth of Dutch AV material

Archive,  
knowledge centre



## 2. *Access* to this wealth

Archival collection for program makers  
Media Experience for everyone



# “The Archive as a Laboratory”

The screenshot shows the website's navigation bar with 'BEELD EN GELUID' and 'VISIT SALES R&D ABOUT'. The main content area features a 'R&D' header, a central image of a smartphone displaying a 'MONUMENTEN' app, and a 'your collect' button. To the right, an 'ABOUT R&D' section explains the department's role in national and international research projects. Below this, a 'EUROPEANA - EXPAND YOUR REACH' section is visible, along with a 'PUBLICATIONS [NL]' section and a 'STAY UP-TO-DATE WITH THE R&D' section.

The screenshot shows the EMERCE website with a red header. The main navigation bar includes 'HOME', 'NIEUWS', 'MAGAZINE', 'BEDRIJVEN', 'TALK BACK', 'CAREER', and 'EVENTS'. A news article titled 'Beeld en Geluid partnert met universiteiten' is featured, dated 19 maart 2010 15:47. The article text states: 'Het Instituut voor Beeld en Geluid gaat samenwerking met Nederlandse universiteiten om technologie voor het doorzoeken van beeld en geluid te verbeteren.' Below the article, a paragraph mentions a covenant signed with the University of Amsterdam, Twente, and Vrije Universiteit.



Smart



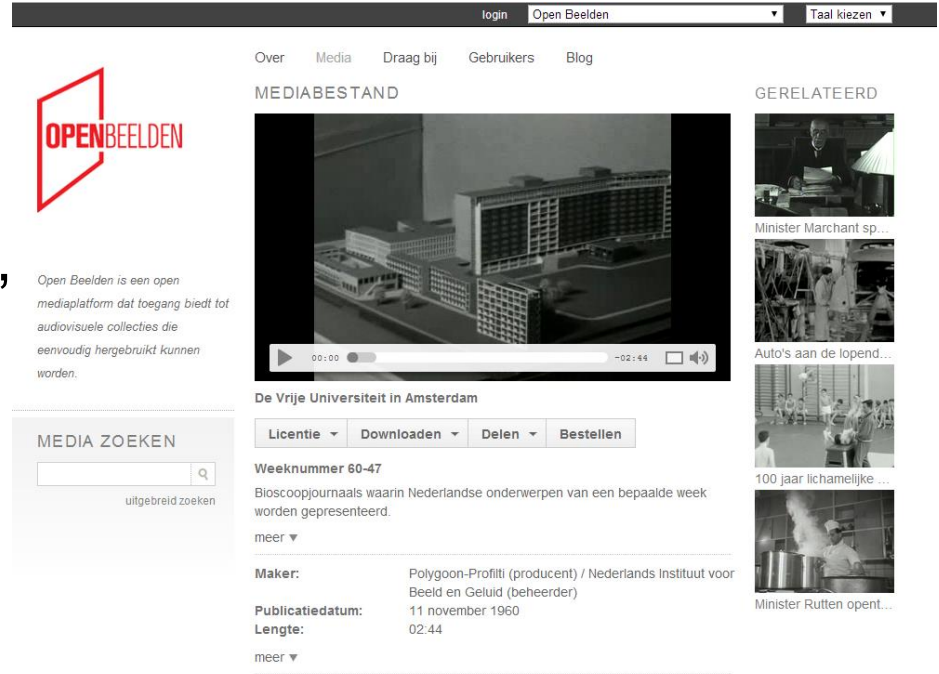
Connected



Open

# Openbeelden.nl / openimages.eu

3000 items  
“Internet Quality”



The screenshot shows the Open Beelden website interface. At the top, there is a navigation bar with 'login', 'Open Beelden', and 'Taal kiezen'. Below this, there are links for 'Over', 'Media', 'Draag bij', 'Gebruikers', and 'Blog'. The main content area features a video player showing a 3D architectural rendering of a building complex. To the right of the video player, there is a 'GERELATEERD' section with several small thumbnail images and titles, including 'Minister Marchant sp...', 'Auto's aan de lopend...', '100 jaar lichamelijke...', and 'Minister Rutten opent...'. Below the video player, there is a section titled 'De Vrije Universiteit in Amsterdam' with a 'Licentie' dropdown, 'Downloaden', 'Delen', and 'Bestellen' buttons. Below this, there is a 'Weeknummer 60-47' section with a description: 'Bioscoopjournaals waarin Nederlandse onderwerpen van een bepaalde week worden gepresenteerd.' and a 'meer' link. At the bottom, there is a metadata section with 'Maker: Polygoon-Profliti (producent) / Nederlands Instituut voor Beeld en Geluid (beheerder)', 'Publicatiedatum: 11 november 1960', and 'Lengte: 02:44'. On the left side of the main content area, there is a search bar labeled 'MEDIA ZOEKEN' with a search icon and the text 'uitgebreid zoeken' below it. Above the search bar is the 'OPENBEELDEN' logo.

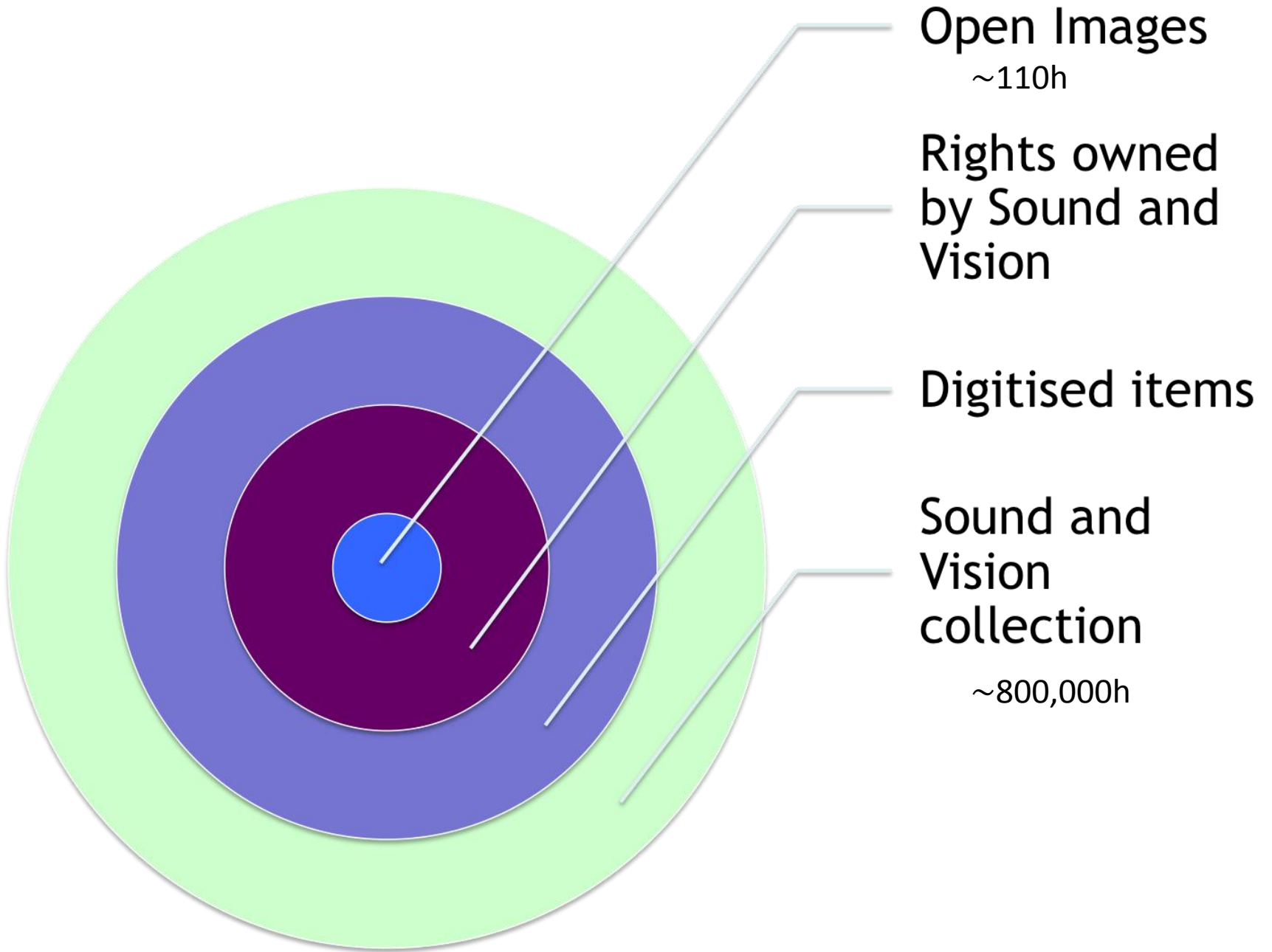
**Open** source (MMBase, FFmpeg, LAMP)

**Open** media formats (Ogg Theora, WebM)

**Open** standards (Dublin Core, CC-REL, HTML 5)

**Open** API (OAI-PMH, CC-0)

**Open** content (CC-licenses, PD Mark) CC BY-SA preferable





Article Discussion Read Edit View

# Mother's Day

From Wikipedia, the free encyclopedia

*This article is about several worldwide days celebrating motherhood. For other uses, see Mother's Day.*

**Mother's Day** is a celebration honoring **mothers** and celebrating motherhood, maternal bonds, and the influence of mothers in society. It is celebrated on various days in many parts of the world yet most commonly in March, April, or May. It complements **Father's Day**, the celebration honoring fathers.

Celebrations of mothers and motherhood occur throughout the world; many of these can be traced back to ancient festivals, like the Greek cult to **Cybele** or the Roman festival of **Hilaria**. The modern US holiday is not directly related to these.<sup>[1][2][3]</sup>

**Contents** [hide]

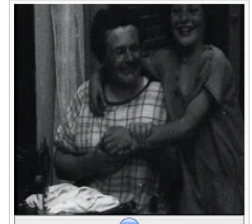
- 1 Modern antecedents and founding
- 2 Spelling
- 3 Dates around the world
- 4 International history and traditions
  - 4.1 Religion
  - 4.2 Countries
    - 4.2.1 African countries
    - 4.2.2 Arab World
    - 4.2.3 Afghanistan
    - 4.2.4 Australia
    - 4.2.5 Bangladesh
    - 4.2.6 Bolivia
    - 4.2.7 Brazil
    - 4.2.8 Bulgaria
    - 4.2.9 Canada
    - 4.2.10 China
    - 4.2.11 Czech Republic

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- Interaction
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  - About Wikipedia
  - Community portal
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  - Contact Wikipedia
- Toolbox
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  - Related changes
  - Upload file
  - Special pages
  - Permanent link
  - Cite this page
- Print/export
  - Create a book
  - Download as PDF
  - Printable version
- Languages
  - العربية
  - المصرى

## Dates around the world

As the US holiday was adopted by other countries and cultures, the date was changed to fit already existing celebrations honouring motherhood, like Mothering Sunday in the UK or, in Greece, the **Orthodox** celebration of the presentation of **Jesus** to the temple (February 2). In some countries it was changed to dates that were significant to the majority religion, like the **Virgin Mary** day in **Catholic** countries, or the birthday of the daughter of the Prophet **Muhammad** in Islamic countries. Other countries changed it to historical dates, like Bolivia using the date of a certain battle where women participated.<sup>[9]</sup> See the "International history and traditions" section for the complete list.

*Note: Countries that celebrate the **International Women's Day** instead of Mother's Day are marked with a dagger †.*<sup>[clarification needed]</sup>

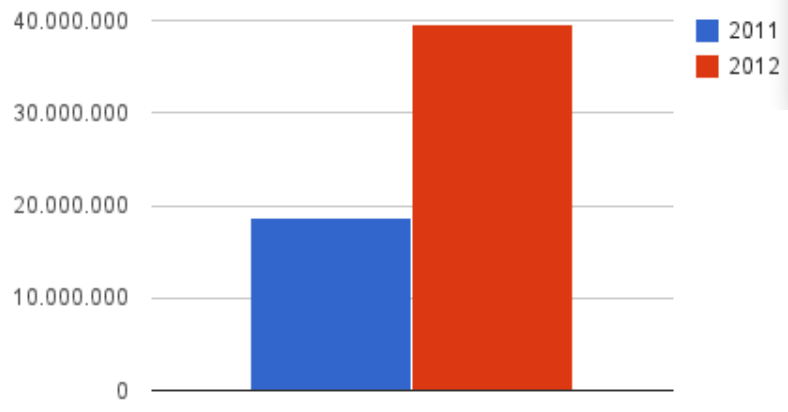


Mother's Day in the Netherlands in 1925

**Gregorian calendar**

Occurrence	Dates	Country																				
Second Sunday of February	Feb 14, 2010 Feb 13, 2011 Feb 12, 2012	<span><span><span></span></span><span> </span></span> Norway																				
Mar 3		<span><span><span></span></span><span> </span></span> Georgia																				
Mar 8		<table border="0"> <tr> <td><span><span><span></span></span><span> </span></span>Afghanistan</td> <td><span><span><span></span></span><span> </span></span>Azerbaijan</td> <td><span><span><span></span></span><span> </span></span>Bulgaria†</td> <td><span><span><span></span></span><span> </span></span>Macedonia†</td> <td><span><span><span></span></span><span> </span></span>Serbia†</td> </tr> <tr> <td><span><span><span></span></span><span> </span></span>Albania</td> <td><span><span><span></span></span><span> </span></span>Belarus†</td> <td><span><span><span></span></span><span> </span></span>Laos</td> <td><span><span><span></span></span><span> </span></span>Moldova</td> <td><span><span><span></span></span><span> </span></span>Ukraine†</td> </tr> <tr> <td><span><span><span></span></span><span> </span></span>Armenia†</td> <td><span><span><span></span></span><span> </span></span>Bosnia and Herzegovina†</td> <td><span><span><span></span></span><span> </span></span>Kazakhstan†</td> <td><span><span><span></span></span><span> </span></span>Montenegro†</td> <td><span><span><span></span></span><span> </span></span>Vietnam†</td> </tr> <tr> <td></td> <td></td> <td><span><span><span></span></span><span> </span></span>Romania†<sup>[10]</sup></td> <td></td> <td></td> </tr> </table>	<span><span><span></span></span><span> </span></span> Afghanistan	<span><span><span></span></span><span> </span></span> Azerbaijan	<span><span><span></span></span><span> </span></span> Bulgaria†	<span><span><span></span></span><span> </span></span> Macedonia†	<span><span><span></span></span><span> </span></span> Serbia†	<span><span><span></span></span><span> </span></span> Albania	<span><span><span></span></span><span> </span></span> Belarus†	<span><span><span></span></span><span> </span></span> Laos	<span><span><span></span></span><span> </span></span> Moldova	<span><span><span></span></span><span> </span></span> Ukraine†	<span><span><span></span></span><span> </span></span> Armenia†	<span><span><span></span></span><span> </span></span> Bosnia and Herzegovina†	<span><span><span></span></span><span> </span></span> Kazakhstan†	<span><span><span></span></span><span> </span></span> Montenegro†	<span><span><span></span></span><span> </span></span> Vietnam†			<span><span><span></span></span><span> </span></span> Romania† <sup>[10]</sup>		
<span><span><span></span></span><span> </span></span> Afghanistan	<span><span><span></span></span><span> </span></span> Azerbaijan	<span><span><span></span></span><span> </span></span> Bulgaria†	<span><span><span></span></span><span> </span></span> Macedonia†	<span><span><span></span></span><span> </span></span> Serbia†																		
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Fourth Sunday in Lent	Mar 14, 2010 Apr 3, 2011 Mar 18, 2012	<table border="0"> <tr> <td><span><span><span></span></span><span> </span></span>Ireland</td> <td><span><span><span></span></span><span> </span></span>United Kingdom</td> </tr> <tr> <td><span><span><span></span></span><span> </span></span>Nigeria</td> <td><span><span><span></span></span><span> </span></span>Bangladesh</td> </tr> </table>	<span><span><span></span></span><span> </span></span> Ireland	<span><span><span></span></span><span> </span></span> United Kingdom	<span><span><span></span></span><span> </span></span> Nigeria	<span><span><span></span></span><span> </span></span> Bangladesh																
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<span><span><span></span></span><span> </span></span> Nigeria	<span><span><span></span></span><span> </span></span> Bangladesh																					
Mar 21 (vernal)		<table border="0"> <tr> <td><span><span><span></span></span><span> </span></span>Bahrain</td> <td><span><span><span></span></span><span> </span></span>Lebanon<sup>[11]</sup></td> <td><span><span><span></span></span><span> </span></span>Saudi Arabia</td> <td><span><span><span></span></span><span> </span></span>United Arab Emirates</td> </tr> <tr> <td><span><span><span></span></span><span> </span></span>Egypt</td> <td><span><span><span></span></span><span> </span></span>Oman</td> <td></td> <td><span><span><span></span></span><span> </span></span>Yemen (all Arab countries in general)</td> </tr> </table>	<span><span><span></span></span><span> </span></span> Bahrain	<span><span><span></span></span><span> </span></span> Lebanon <sup>[11]</sup>	<span><span><span></span></span><span> </span></span> Saudi Arabia	<span><span><span></span></span><span> </span></span> United Arab Emirates	<span><span><span></span></span><span> </span></span> Egypt	<span><span><span></span></span><span> </span></span> Oman		<span><span><span></span></span><span> </span></span> Yemen (all Arab countries in general)												
<span><span><span></span></span><span> </span></span> Bahrain	<span><span><span></span></span><span> </span></span> Lebanon <sup>[11]</sup>	<span><span><span></span></span><span> </span></span> Saudi Arabia	<span><span><span></span></span><span> </span></span> United Arab Emirates																			
<span><span><span></span></span><span> </span></span> Egypt	<span><span><span></span></span><span> </span></span> Oman		<span><span><span></span></span><span> </span></span> Yemen (all Arab countries in general)																			

**Page views of Wikipedia pages containing media from the Sound and Vision set of Open Images**





# Reuse: 3<sup>rd</sup> party applications



**open CULTUUR**  
**data.nl**  
delen. verbinden. verrijken.

<http://www.beeldvoorbeeld.nl/tv/>

# Connected (internal)

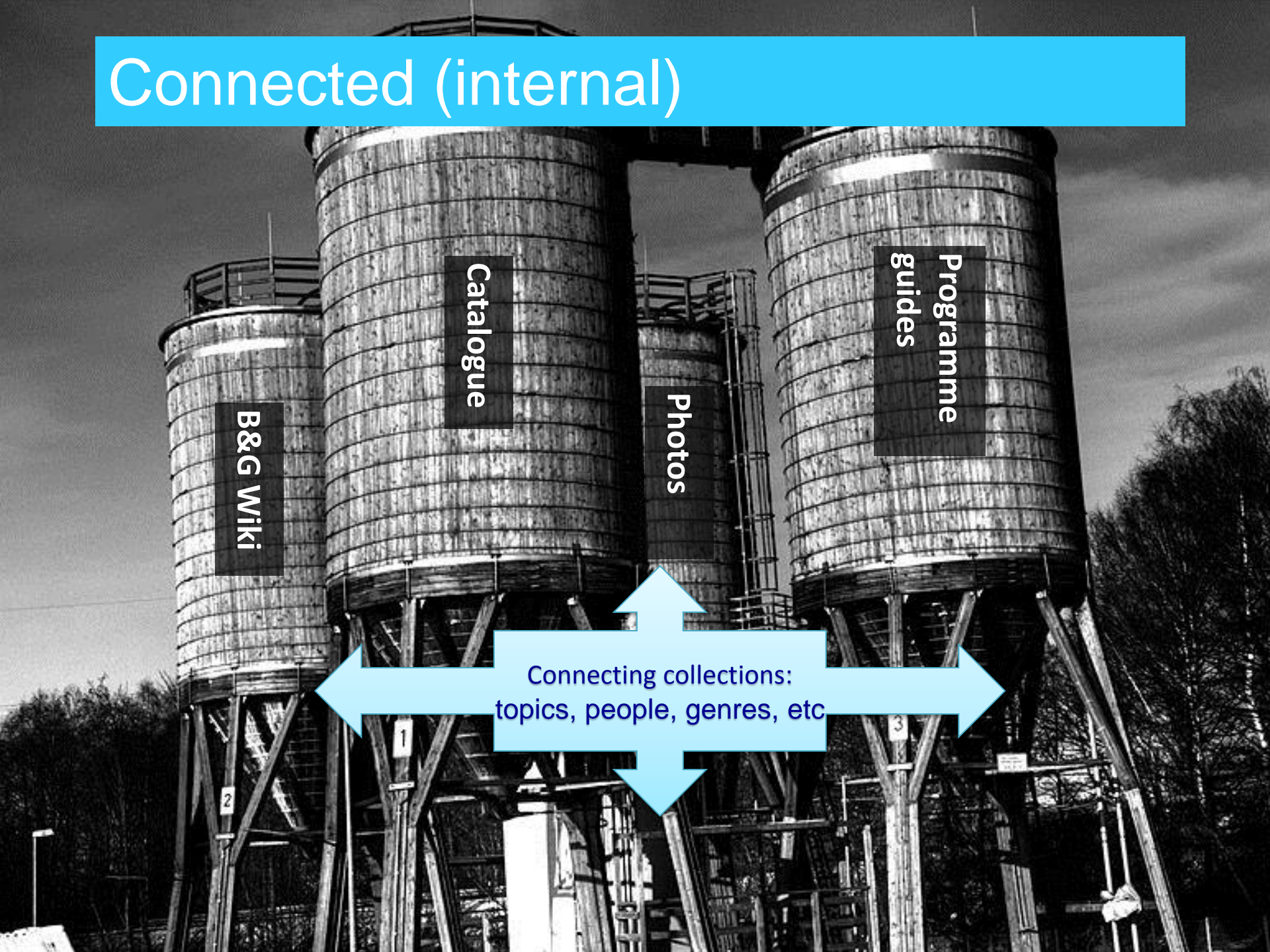
B&G Wiki

Catalogue

Photos

Programme  
guides

Connecting collections:  
topics, people, genres, etc





# Application: LinkedTV

## Concept: Jan Sluijters (schilder)



DBpedia



Related items



Links

ART CYCLOPEDIA



- Styles (Expressionism, Cubism, Fauvism)
- Period (contemporaries)



# Gemeenschappelijke Thesaurus Audiovisuele Archieven (GTAA)

~60.000 terms:

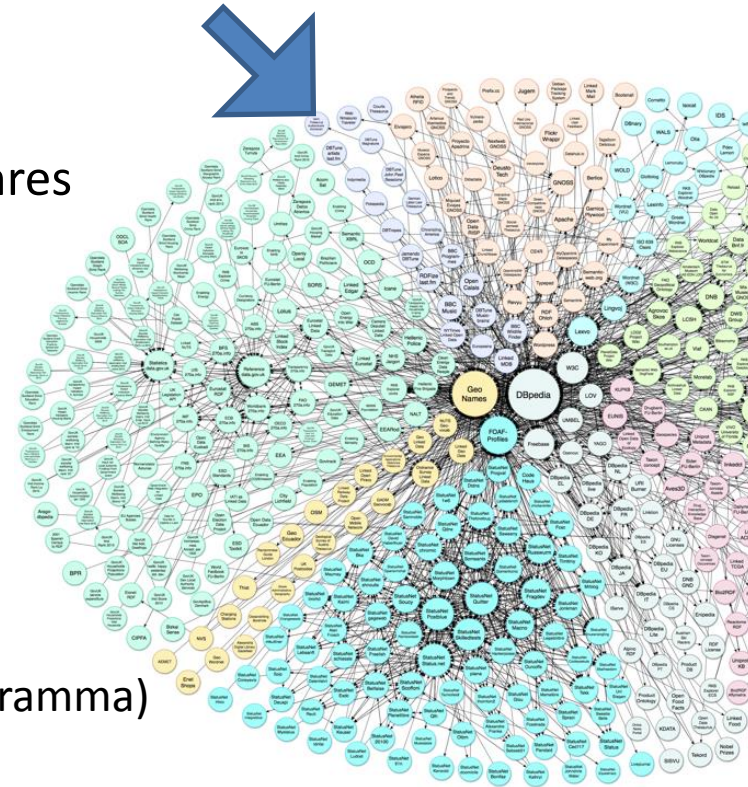
Subjects, Persons, 27.000 Names, Locations, Genres

Published as SKOS Linked Open Data

<http://gtaa.beeldengeluid.nl/>

<http://data.beeldengeluid.nl/gtaa/30173> (Gymnastiekprogramma)

<http://data.beeldengeluid.nl/gtaa/35878> (Haarlem)



# Alignment service



**BEELD EN GELUID**

Gemeenschappelijk Thesaurus  
Audiovisuele Archieven (GTAA)  
*Instituut voor Beeld en Geluid*

[http://openskos.beeldengeluid.nl/oa-pmh/oaal\\_rdfs/oaembg/gtaa](http://openskos.beeldengeluid.nl/oa-pmh/oaal_rdfs/oaembg/gtaa)

Select

**Rijksdie  
Ministeri  
Wetenscl**

Erfgoedthesaurus  
*Rijkdienst voor Cultureel Erfgoed*

[http://openskos.org/oa-pmh/Toal\\_rdfs/erfgoed/EGTb7258f3-dbc1-0e9b-72b0-949142b1c94](http://openskos.org/oa-pmh/Toal_rdfs/erfgoed/EGTb7258f3-dbc1-0e9b-72b0-949142b1c94)

Select

**N**  
Naturalis  
Biodiversity  
Center

Nederlands Soorten Register  
*Naturalis*

<https://github.com/niravaan/naturalis/>  
March 9, 2015

Select

**GETTY**

Art and Architecture Thesaurus (AAT)  
*The Getty Research Institute (Dutch content RKD-  
Netherlands Institute for Art History)*  
License: ODC-BY1.0, J. Paul Getty Trust

<http://vocab.getty.edu/>  
August 18, 2015

Select

**MIMO**  
musical instrument museums online  
A Toolkit for Museums

Vocabulary about musical instruments  
(MIMO)  
*Musical Instrument Museums Online*

<http://www.mimo-international.com/vocabulary.html>  
August 31, 2015

Select

**ICONOLOGIA**  
**onclas**

Iconclass  
*A multilingual classification system for cultural content*  
License: Open Database License, RIOD-Netherlands Institute for  
Art History

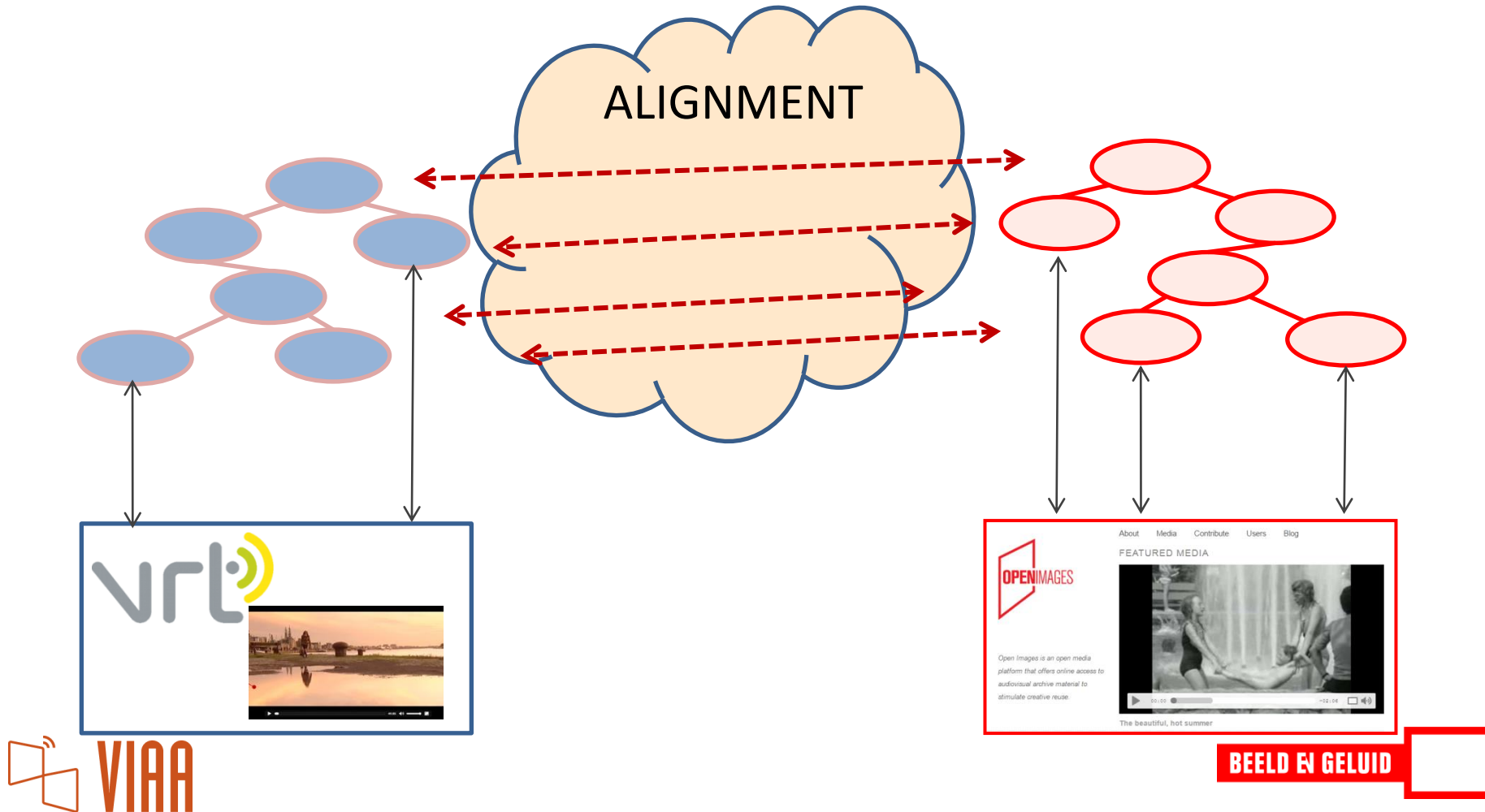
<http://www.iconologia.org/help/fod>  
September 9, 2015

Select

id	skos:prefLabel	skos:altLabel	skos:scopeNote	skos:broader
gtaa:221962	senels (nl)			
http://example.com/concept102518	SJEK (nl) SJEK (nl)	SHEK (nl) SHEK (nl)		ISLAM (nl) ISLAM (nl)
gtaa:217374	sjeta (nl)			
http://example.com/concept102526	SJRET (nl) SJRET (nl)	SHIET (nl) SHIET (nl)		ISLAM (nl) ISLAM (nl)
gtaa:217172	sjeten (nl)		aanhangen van het sjeten, bootsbroning sjeten (nl) sjeten (nl)	

<http://CultuurLINK.beeldengeluid.nl>

# Application: Browsing Dutch-Flemish connections



# Application: Browsing Dutch-Flemish connections

The screenshot displays the VIAA application interface. At the top, there is a search bar with the text 'VIAA' and two filters: 'melken' and 'vrouwen'. Below the search bar, there is a progress indicator for 'VRT' and a search icon. The main content area is divided into two columns. The left column contains a list of filters under the heading 'Persoon/Organisatie' and 'Onderwerp'. The right column displays search results for 'B&G' and 'VRT'. Each result includes a title, a description, and a list of tags.

**VIAA** melken vrouwen

VRT B&G

**Persoon/Organisatie** [toon meer](#)

DOTTERMANS ELS

THEUS ALEJANDRA

VERBEKE KATLIJNE

**Onderwerp** [toon meer](#)

**vrouwen**

INTERVIEW

KIND

**Locatie** [toon meer](#)

**B&G** Een dag bij de Nederlandse Vrouwen Arbeidsdienst  
511158  
Bioscoopjournaals waarin Nederlandse onderwerpen van een bepaalde week worden gepresenteerd.

melken vrouwen ZWEMMEN koeien HARDLOPEN  
nationaalsocialisme vlaggen gymnastiek dagelijks leven Arbeidsdienst  
Nederland

**VRT** IEDEREEN BEROEMD  
WP00017288  
Dagelijks magazine dat met beide voeten in Vlaanderen staat en laat zien waar mensen echt mee bezig zijn00.00 Generiek Bocholt.00.23 Pendelquiz op de trein Gent De Panne met Sebastiaan, Hanne en Marie. Zij beantwoorden de tweede vraag fout en moeten uitstappen in Lichtervelde.03.00 Bumper Bocholt. (

vrouwen melken België boeren JACOBS ILYA GROEPSFOTO  
KLEINKUNST yoga BOCHOLT BUTLER (PERSONEEL) dagboeken  
INDIA GEHANDICAPTE KALF EXAMEN and 11 more

<http://link.spinque.com/VIAA-1.0/>



# Connecting within Clariah

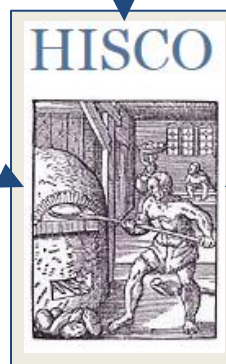
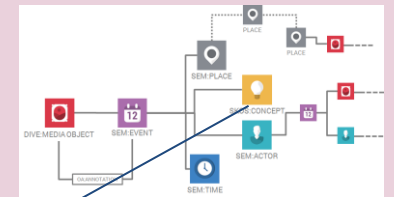
WP3: Texts



WP4: Census data



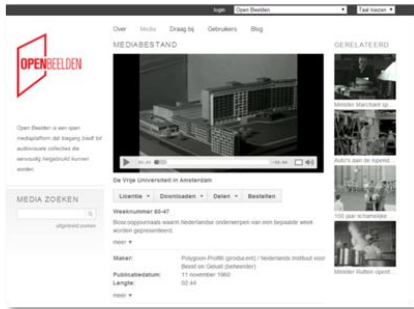
WP5: Media



# Digital Humanities application: DIVE



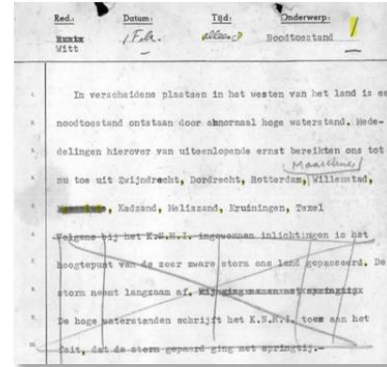
# FOUR DATA SOURCES



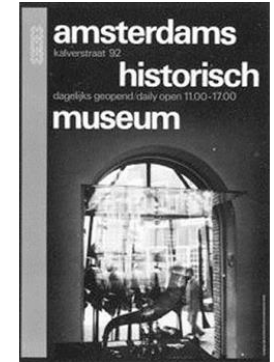
OPENIMAGES.EU 510 News videos (1920s-1970s)



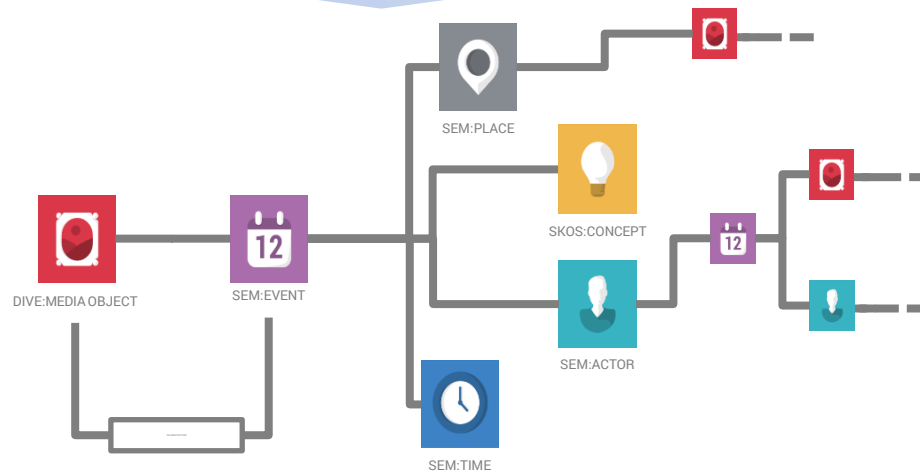
TROPENMUSEUM ~1000 objects (20<sup>th</sup> C)



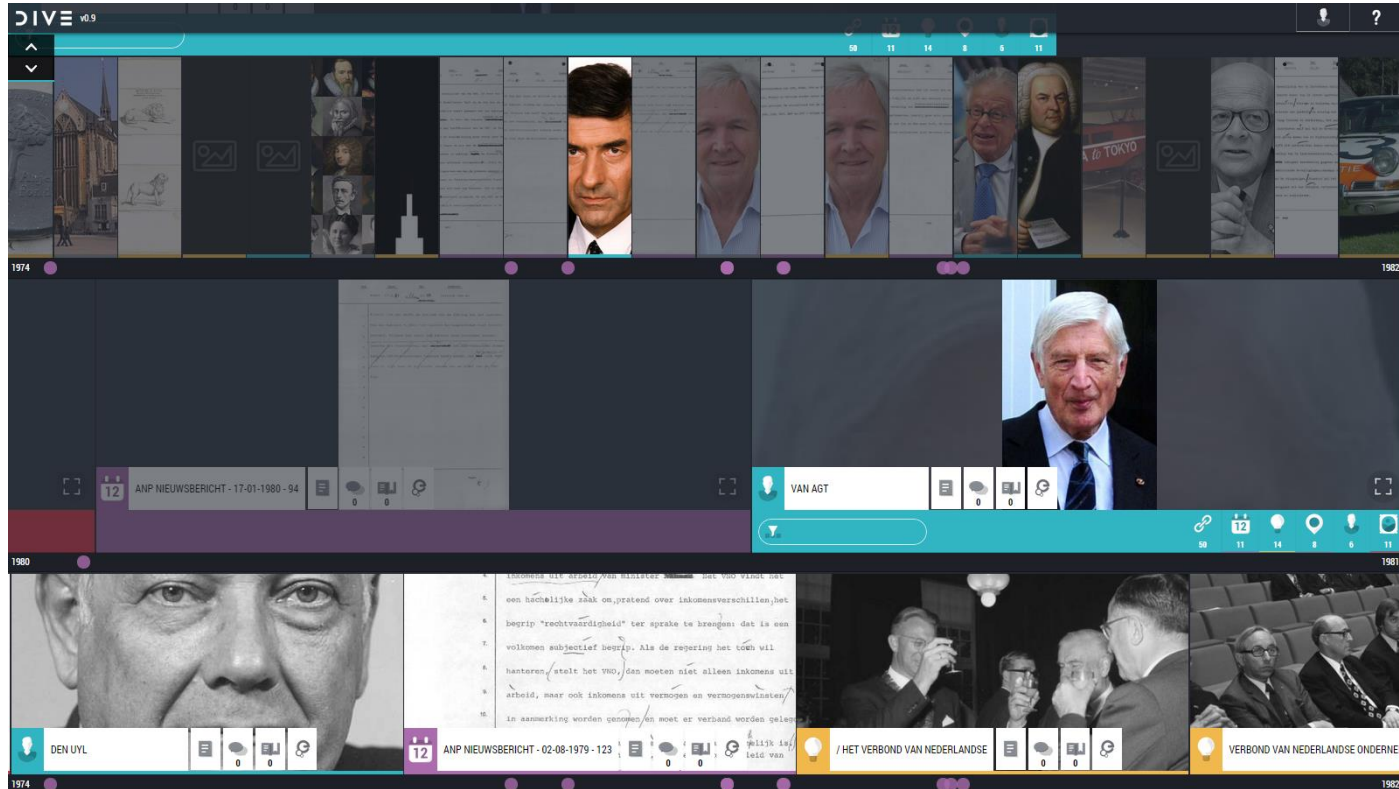
DELPHER Radio News Bulletins 2210 Scripts (1945-1985)



AMSTERDAM MUSEUM 3541 Objects (1950-1989)



# Exploratory interface



DIVE.BEELDENGELUID.NL

# Wrap up

1. Publishing information as Linked Data allows machines to **re-use** your data for all kinds of search, browsing, analysis, applications.
2. **Flexible integration** of heterogeneous data, metadata and background knowledge
3. **(Re)use** of web resources, vocabularies and ontologies enriches the original data



# More than one road

Publish and link metadata (EAD?)

Metadata + content (DSS)

Start with a small part (Openbeelden)

Publish and link vocabulary (Cultuurlink?)

**Linked Archival Metadata: A Guidebook**  
<https://sites.tufts.edu/liam/2014/04/24/version-099/>

**Thank you**

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<http://victordeboer.com>







# EAD to (EDM) RDF

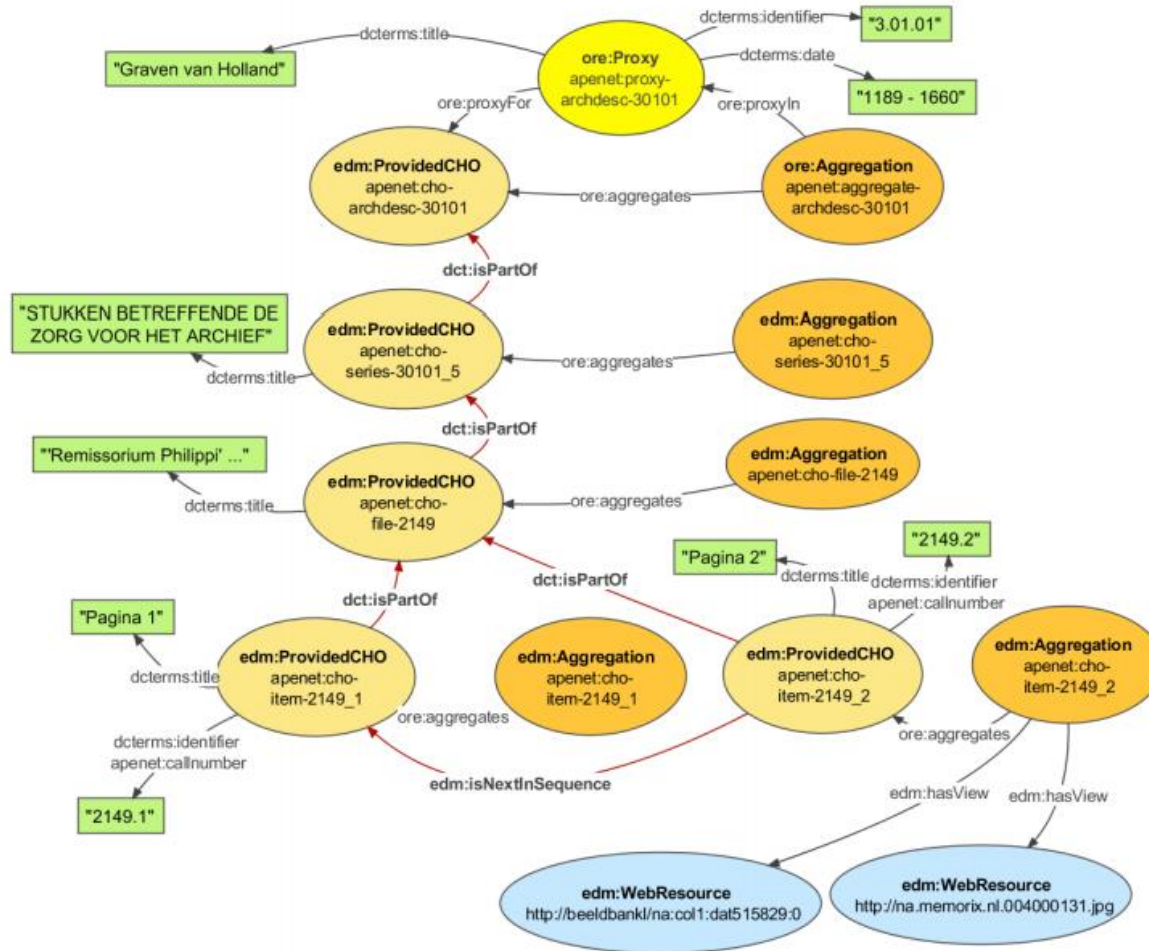


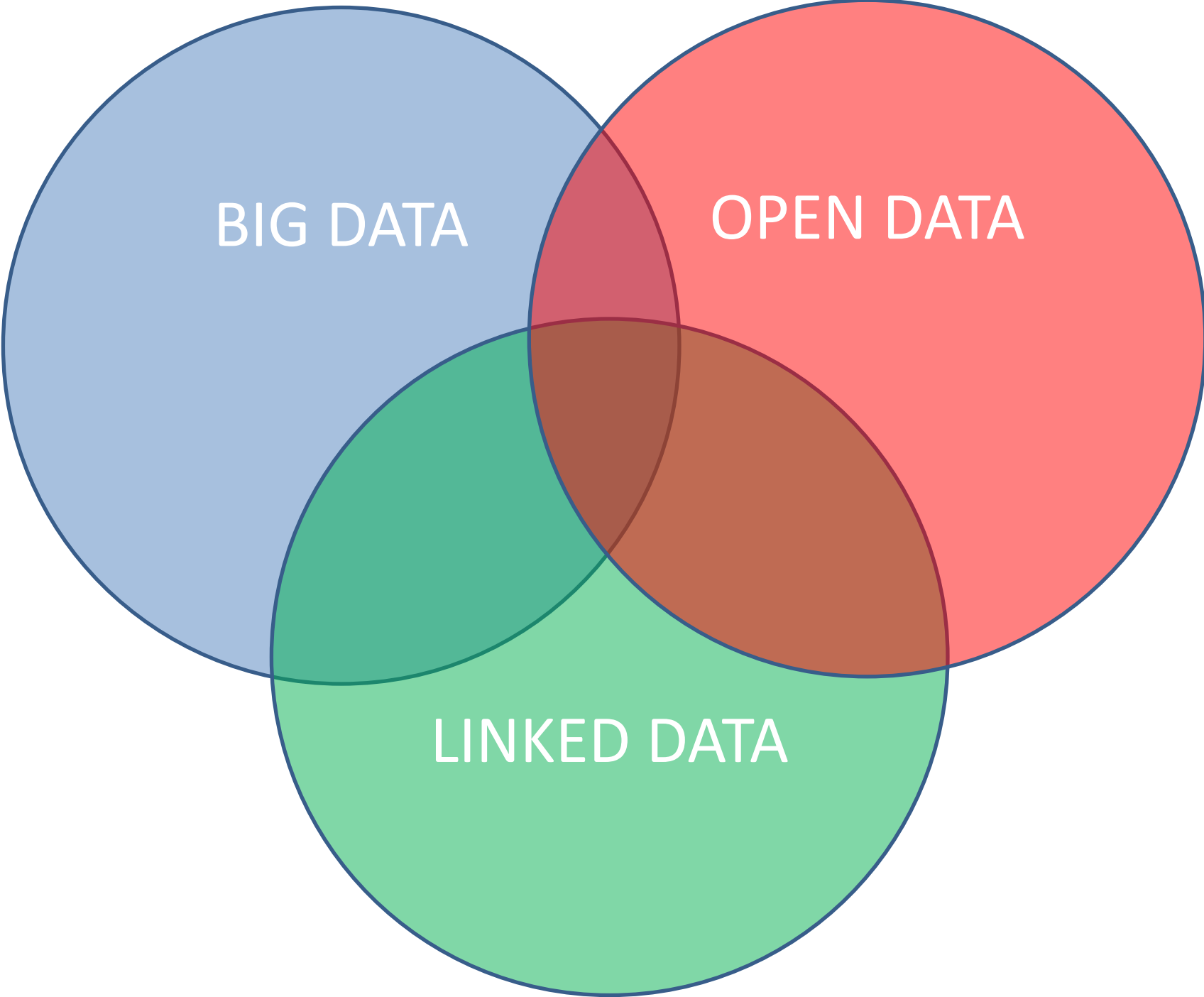
Figure 2: EDM-RDF representation of a EAD encoded Finding Aid.

**BIG ? LINKED? OPEN?**



# Wrap up

- Graphs, not tables
- Web standards and technologies
  - URIs for things
  - RDF (triples) to describe these things and have *links*
- Distributed, heterogeneous (meta)data
  - Integrate datasets in a flexible way
  - Cross-collection, -institution, -domain
- Re-use background knowledge
- Provenance fits DH requirements well
- Knowledge graphs enable efficient investigation of integrated research questions.

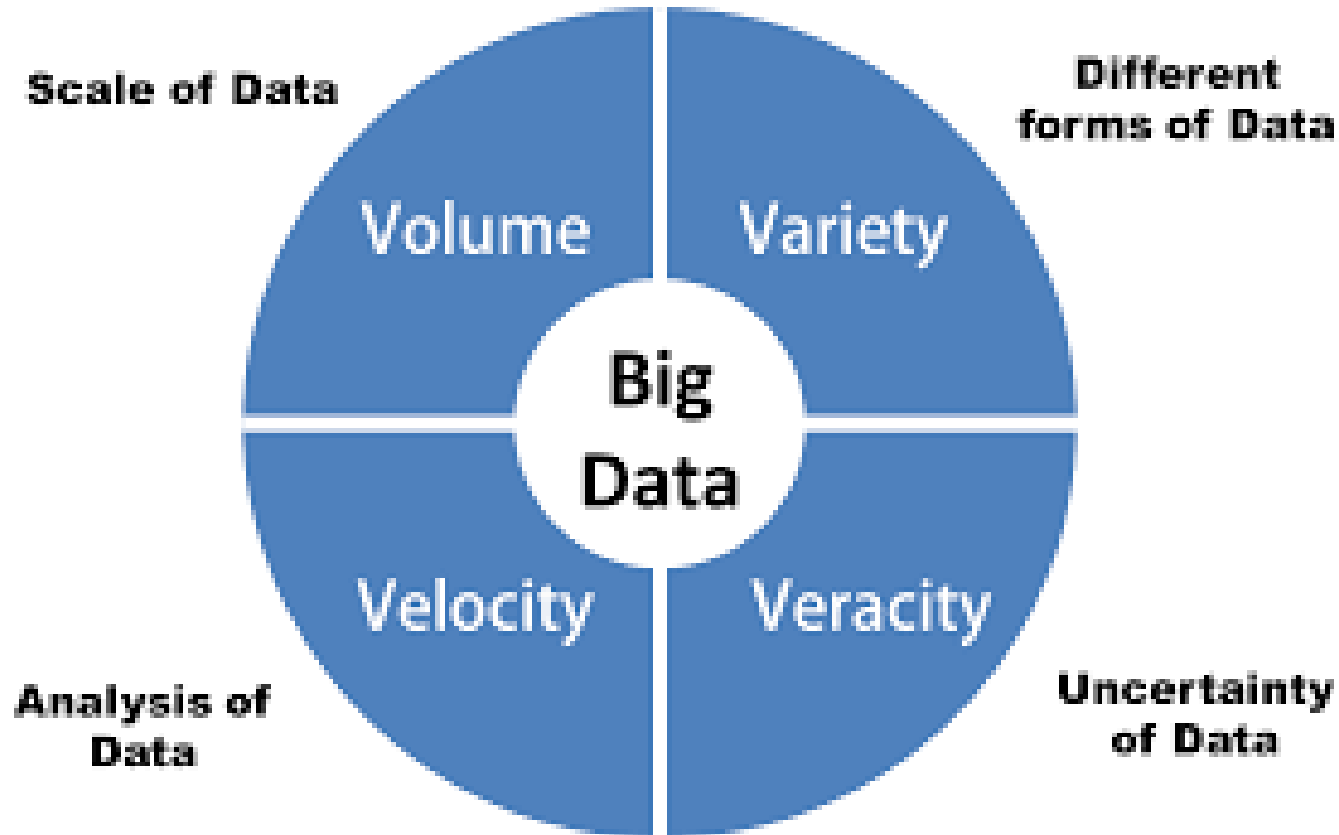


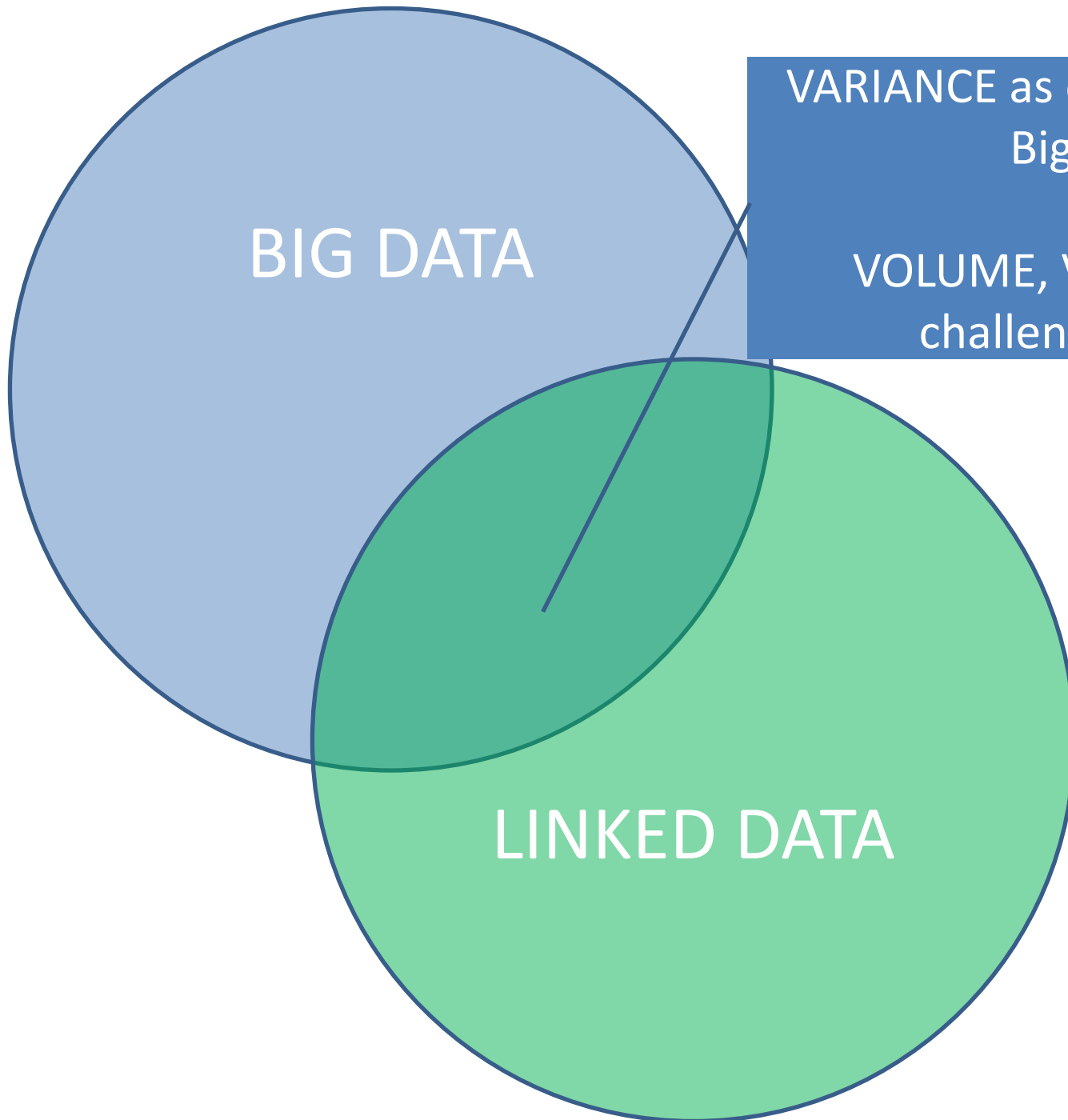
BIG DATA

OPEN DATA

LINKED DATA

# Four V's of Big Data





BIG DATA

LINKED DATA

VARIANCE as one of the V's of  
Big Data

VOLUME, VELOCITY are  
challenges for LD



**Jindřich Mynarz**

@jindrichmynarz



 Follow

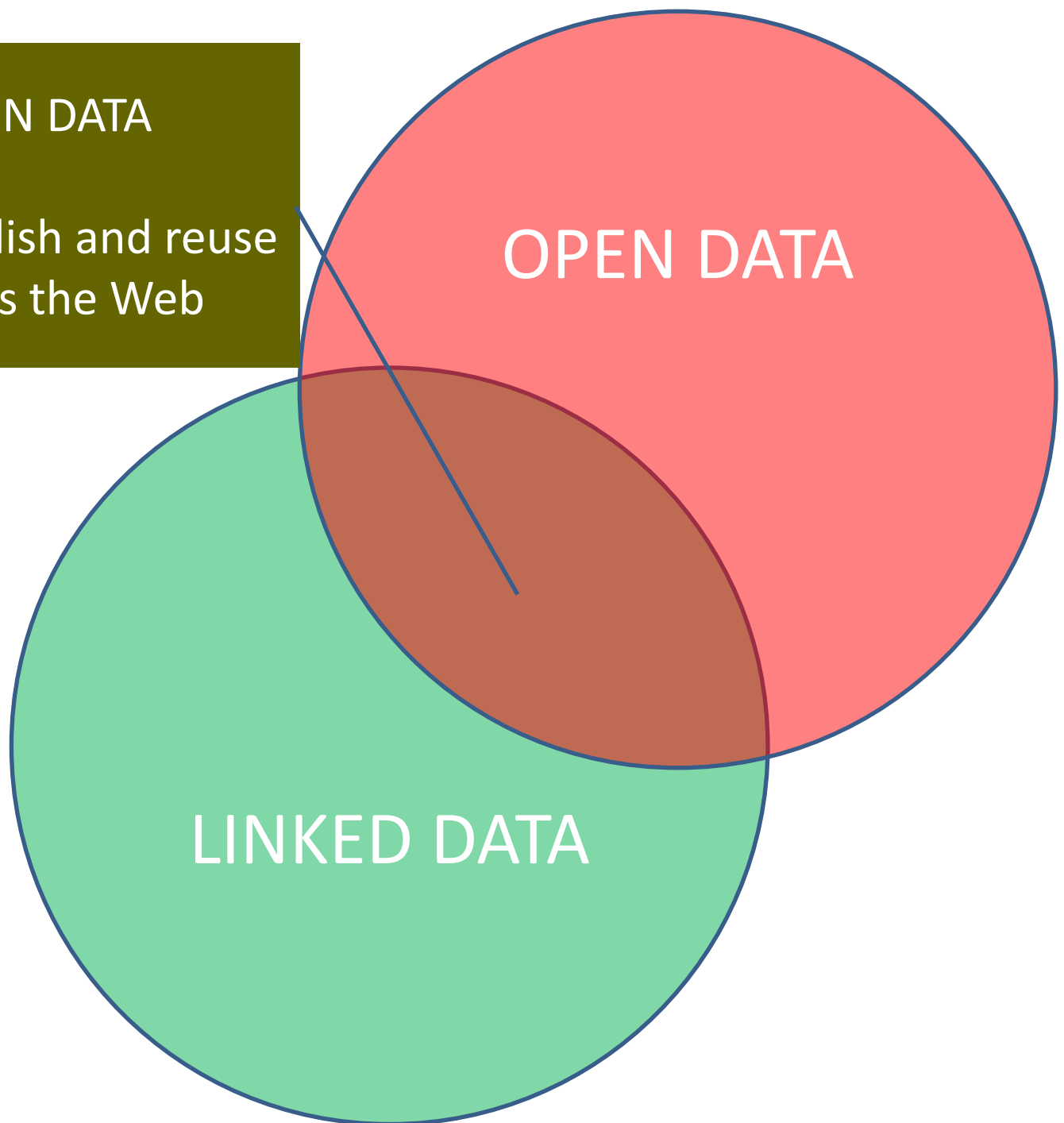
**#bigdata**: solving problems by adding more data.

**#linkeddata**: solving problems by combining different kinds of data.



# LINKED OPEN DATA

as *the* way to publish and reuse datasets across the Web



OPEN DATA

LINKED DATA

LINKED **OPEN** DATA

- ★ On the web **OPEN LICENSE**
- ★ Machine-readable data
- ★ Non-proprietary format
- ★ RDF standards
- ★ Linked RDF

IS YOUR DATA 5 ★ ?