Innovative Applications And Data Sharing With Linked Open Data In Museums

Museums & the Web • April 19, 2017

bit.ly/**mw17dfc**

Design for **Context**

Making software applications and web sites easy to use

www.designforcontext.com

Duane Degler

@ddegler

With contributions from Neal Johnson, Joan Cobb, Lesley Humphreys

WHY ?

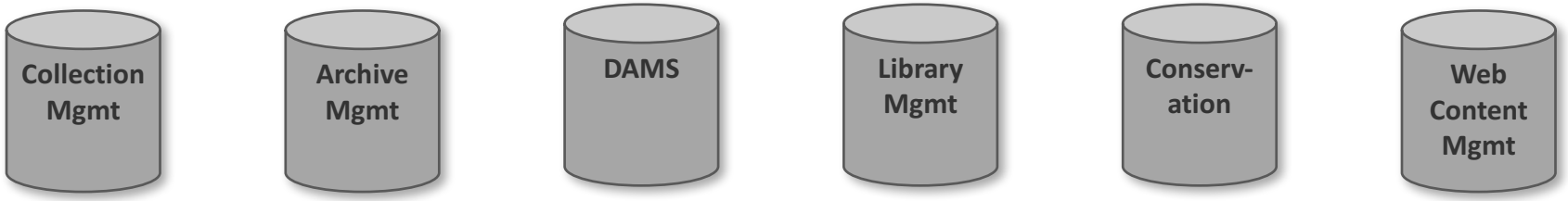
- Relationships
- Next generation of data
- Meaning . . . stories

Linked Open Data: Worse is Better

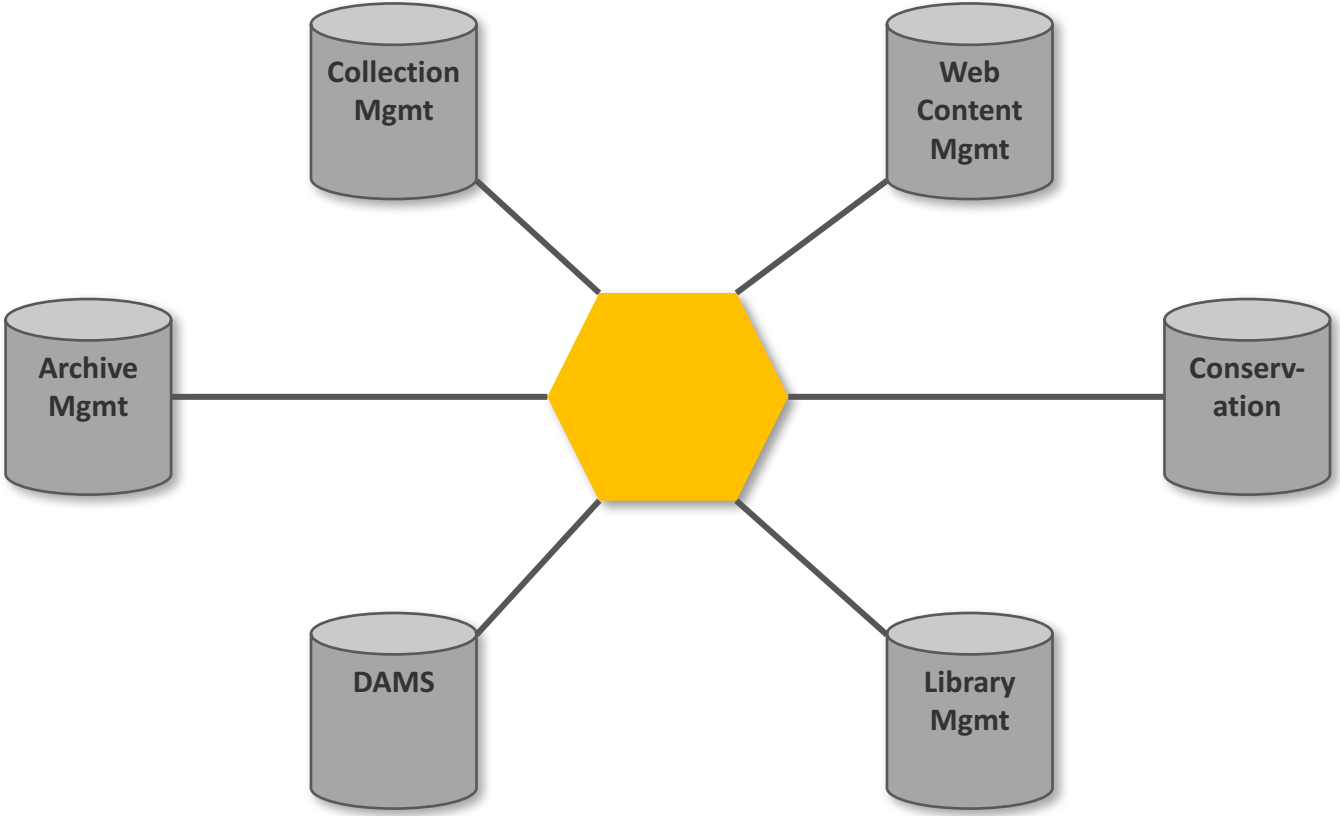
David Newbury: MCN Ignite Talk, 2016

https://www.periscope.tv/MuseumCN/1yNGaAAwemVGj?t=3m29s

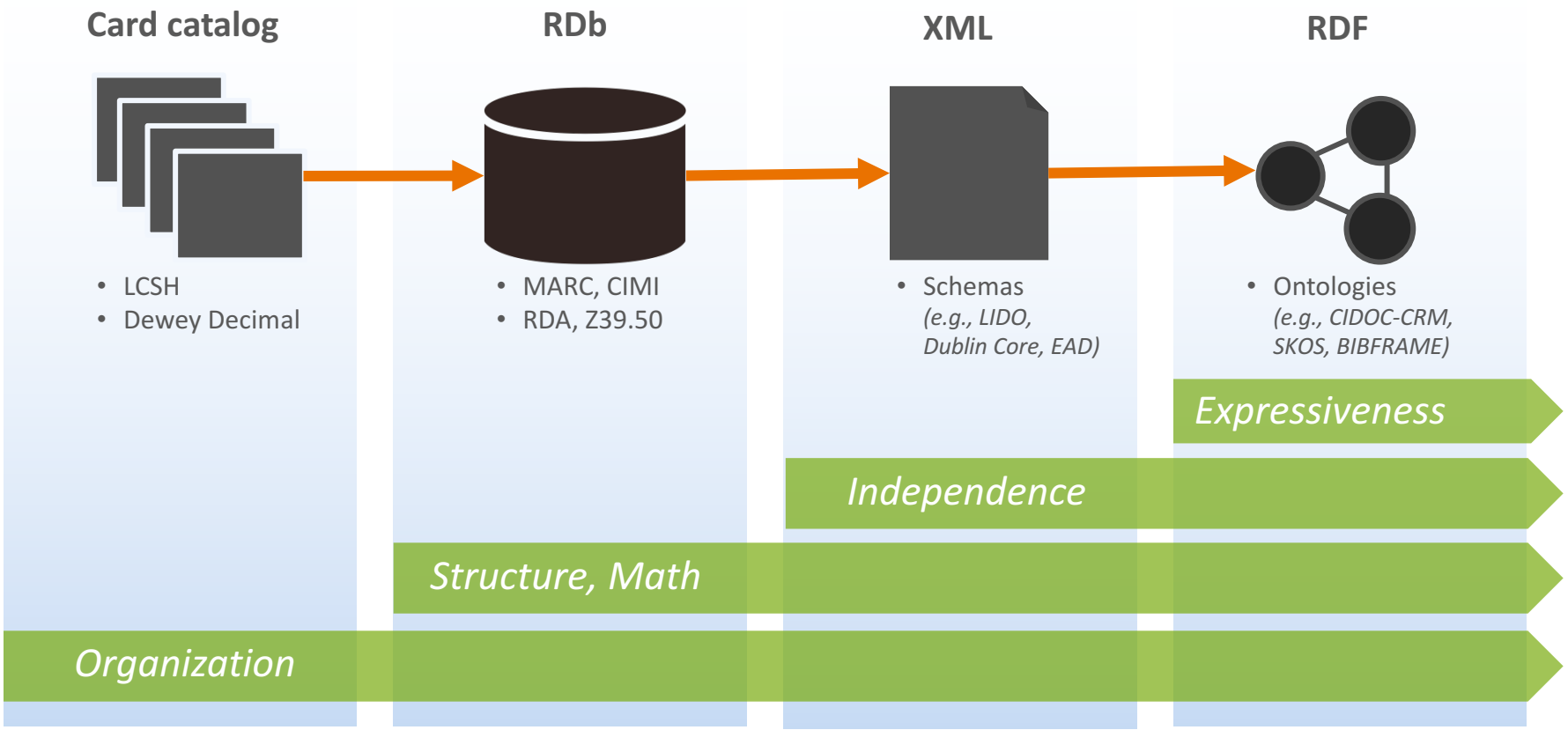
How do we get from this . . .



To this . . . ?


Collection Mgmt
Web Content Mgmt
Archive Mgmt
Conserv-ation
DAMS
Library Mgmt

Linked Data is a “Next Gen” data standard



Open Memory Project

Centro di Documentazione Ebraica Contemporanea (CDEC) Foundation
LODLAM Challenge 2015 Winner

http://summit2015.lodlam.net/2015/04/21/challenge-entry-open-memory-project

Also: Contemporary Jewish Documentation Center in Milan
LOD Navigator: LODLAM 2017 entry

https://summit2017.lodlam.net/2017/04/12/lod-navigator/#more-982

Linked Data's value for cultural heritage

- Do more with my own content
  - Eliminate data/info silos
  - Enhance scholarship through improved access to information resources
  - Enhance the museum experience
  - Serve new audiences
  - Manage content and programs more effectively (fewer one-offs)
- Enhance/extend my institutional relationships
  - Combine your data/info resources with 3rd parties
  - Offer "open content" for easy reuse by others
  - Collaborate to create new resources

WHAT IS LINKED DATA ?

- Triples
- Ontologies
- Vocabularies
- Entities

The theory, part 1

…and some play time

Linked Data: “assertions” to create a “knowledge graph”

Subject *(a noun)* — **Predicate** *(a verb)* → **Object** *(a noun)*

Georgia O’Keeffe

http://contentdm.okeeffemuseum.org/cdm/singleitem/collection/gokfa/id/746/rec/2

painted

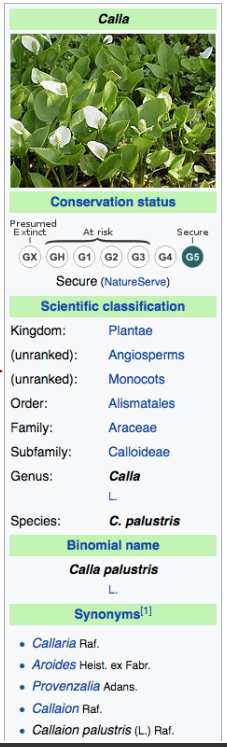
http://vocab.getty.edu/aat/300054216

Calla Lily Turned Away (1923)

https://www.okeeffemuseum.org/about-georgia-okeeffe/

has subject

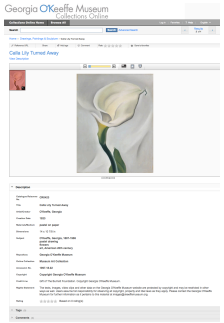
http://vocab.getty.edu/aat/300404126



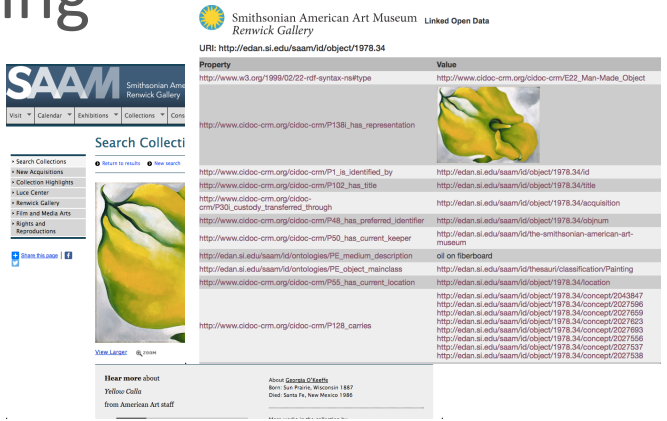
https://en.wikipedia.org/wiki/Calla

A LOD “common language” is growing

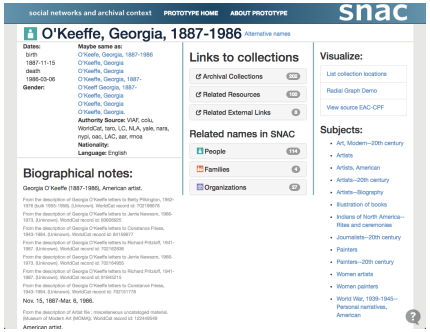
http://contentdm.okeeffemuseum.org/cdm/singleitem/collection/gokfa/id/746/rec/2



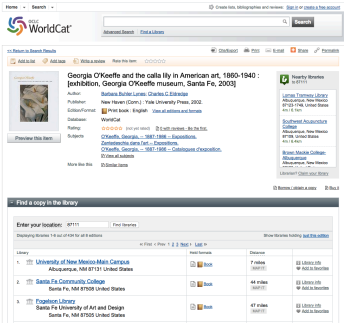
http://contentdm.okeeffemuseum.org/cdm/singleitem/collection/gokfa/id/746/rec/2



http://edan.si.edu/saam/id/object/1978.34



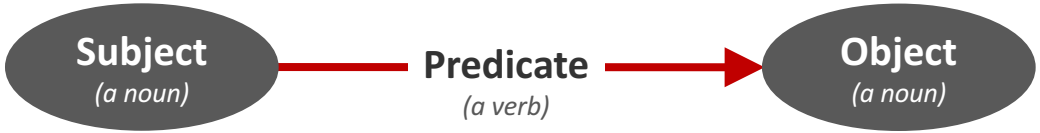
http://socialarchive.iath.virginia.edu/ark:/99166/w65h7dc3

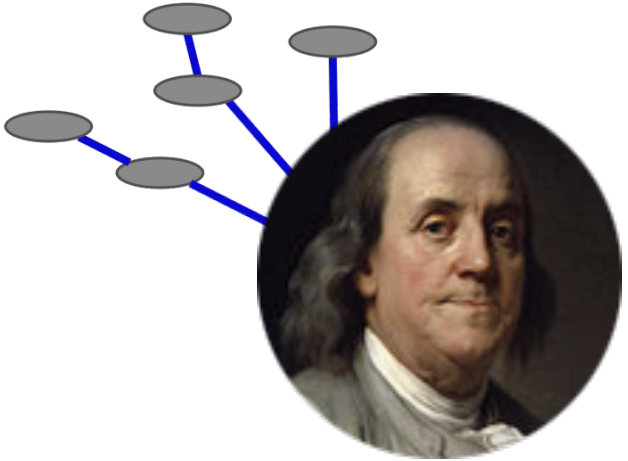


https://www.worldcat.org/title/georgia-okeeffe-and-the-calla-lily-in-american-art-1860-1940-exhibition-georgia-okeeffe-museum-santa-fe-2003/oclc/470071149

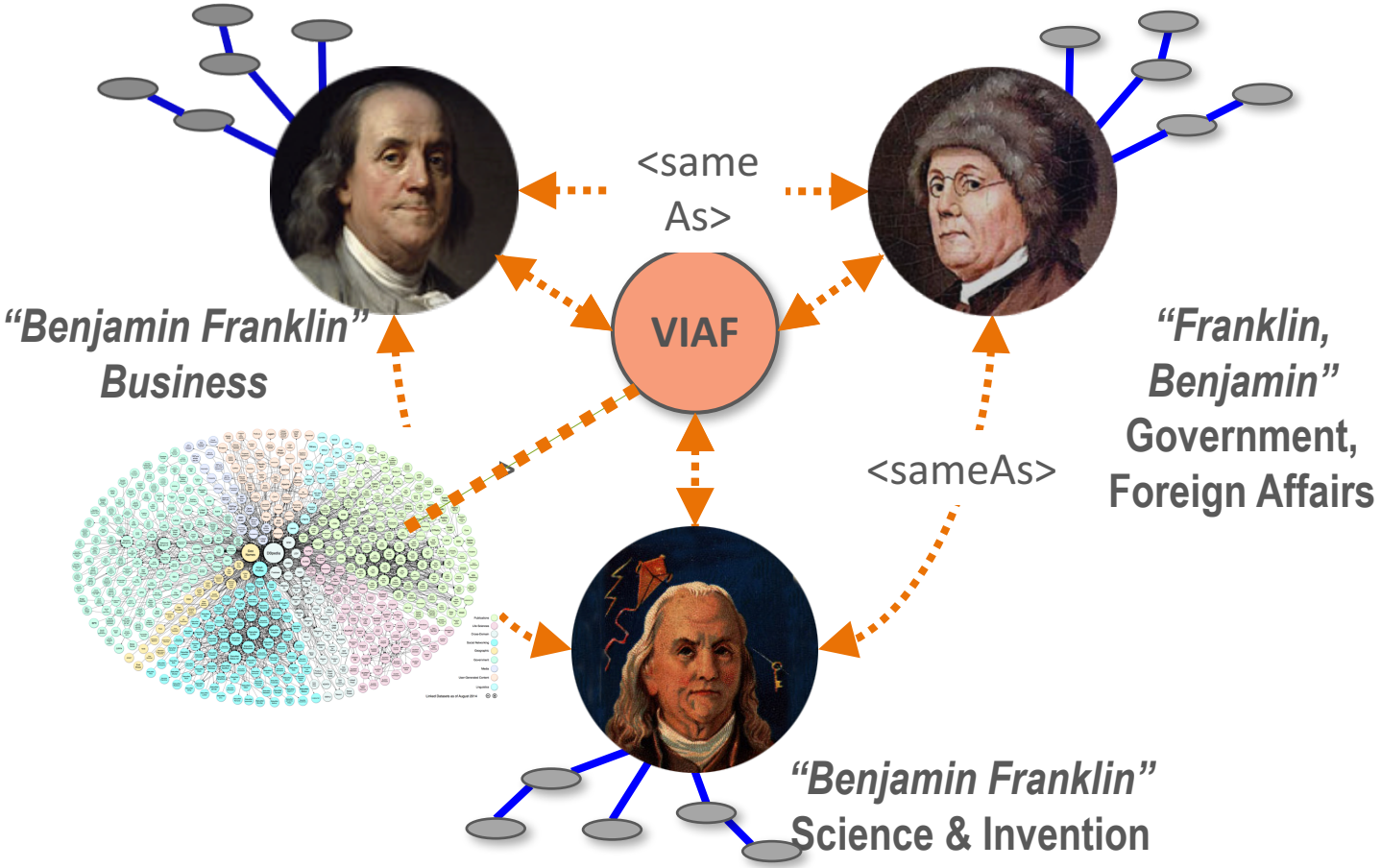
https://www.wikidata.org/wiki/Q1945962

Creating Linked Data – exercise





Options for linking “Ben Franklin” knowledge graphs



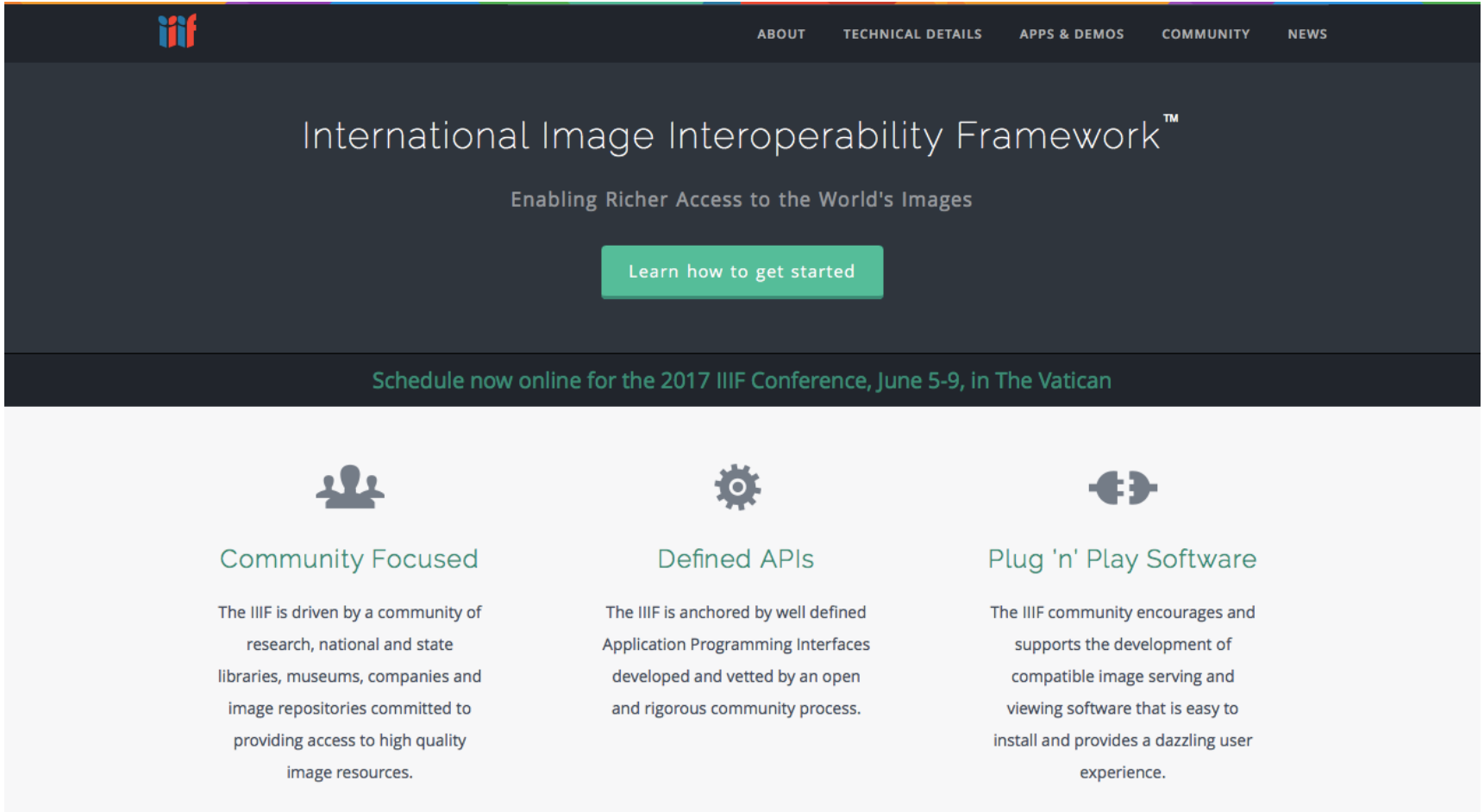
Ben Franklin exercise takeaways

- Building consensus about names is a challenge
- Collaboration is fundamental
- You describe data in ways that suit your domain, yet flexibly connect your graph to others
- Linking graphs extends their utility…especially when shared authorities facilitate linking between domains
- If the authority links BACK to you it makes you part of the Linked Data Cloud
- Others may take advantage of the enlarged graph in ways you didn’t instigate or expect.

WHAT CAN WE DO WITH IT ?

- Share
- Search > Browse > Serendipity
- Extend knowledge

http://liif.io


ABOUT
TECHNICAL DETAILS
APPS & DEMOS
COMMUNITY
NEWS
International Image Interoperability Framework™
Enabling Richer Access to the World's Images
Learn how to get started
Schedule now online for the 2017 IIIF Conference, June 5-9, in The Vatican
Community Focused
The IIIF is driven by a community of research, national and state libraries, museums, companies and image repositories committed to providing access to high quality image resources.
Defined APIs
The IIIF is anchored by well defined Application Programming Interfaces developed and vetted by an open and rigorous community process.
Plug 'n' Play Software
The IIIF community encourages and supports the development of compatible image serving and viewing software that is easy to install and provides a dazzling user experience.

International Image Interoperability Framework (IIIF): *Connecting the diaspora of cultural materials*

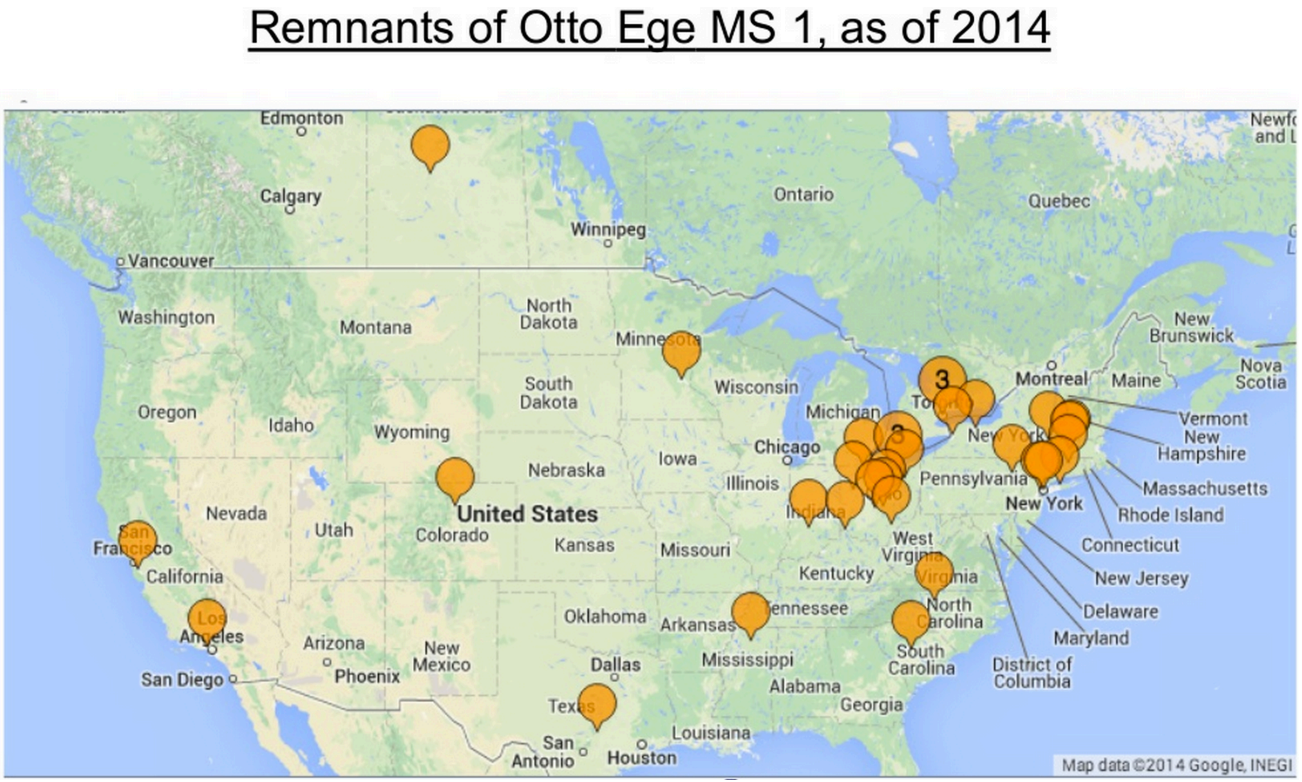


Image courtesy of Rob Sanderson, Stanford University

International Image Interoperability Framework (IIIF): *Connecting the diaspora of cultural materials*

Otto Ege MS 1, Reconstructed, in 2014

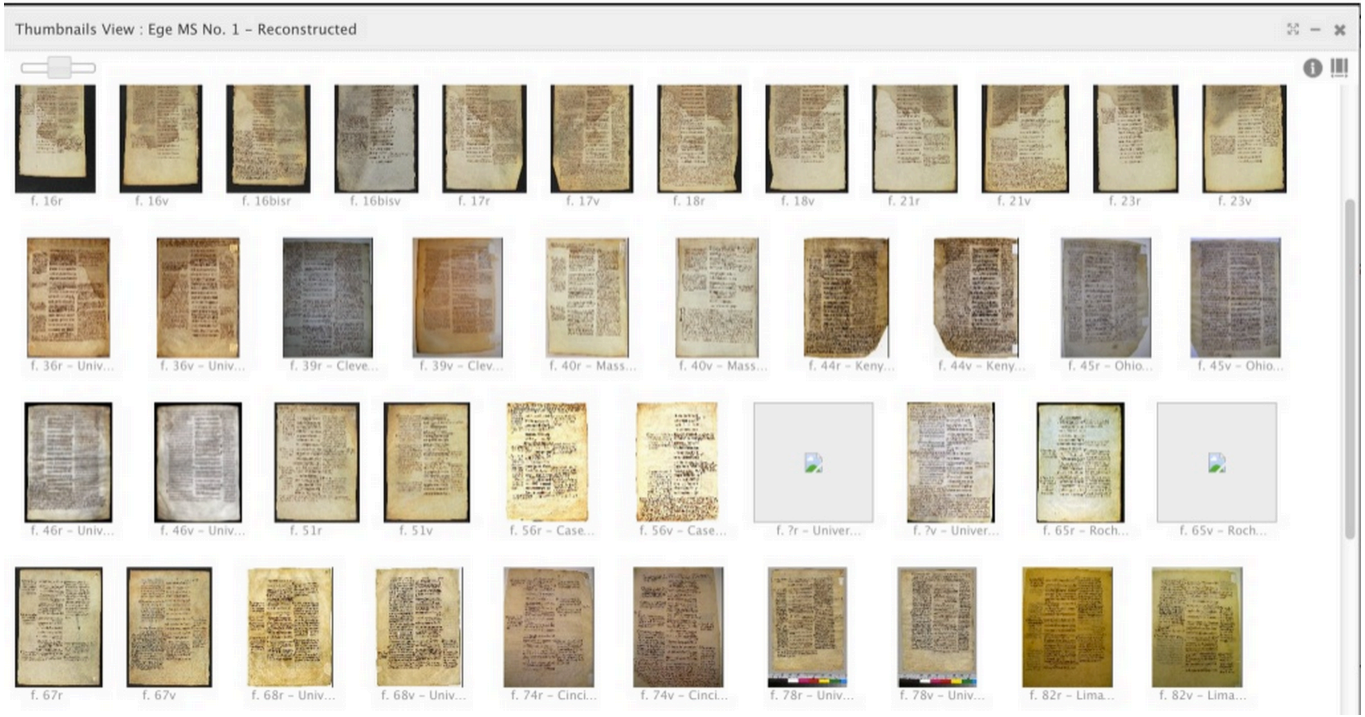
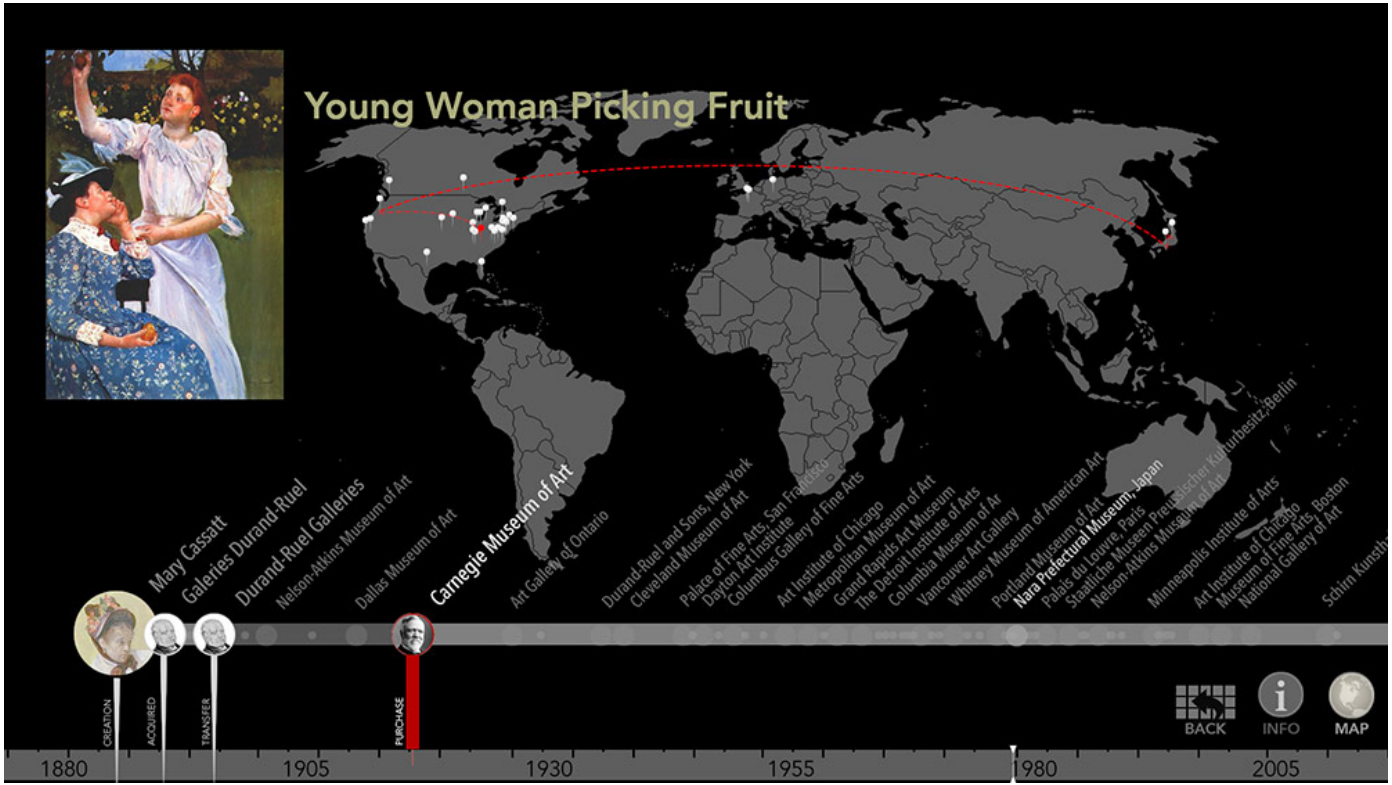


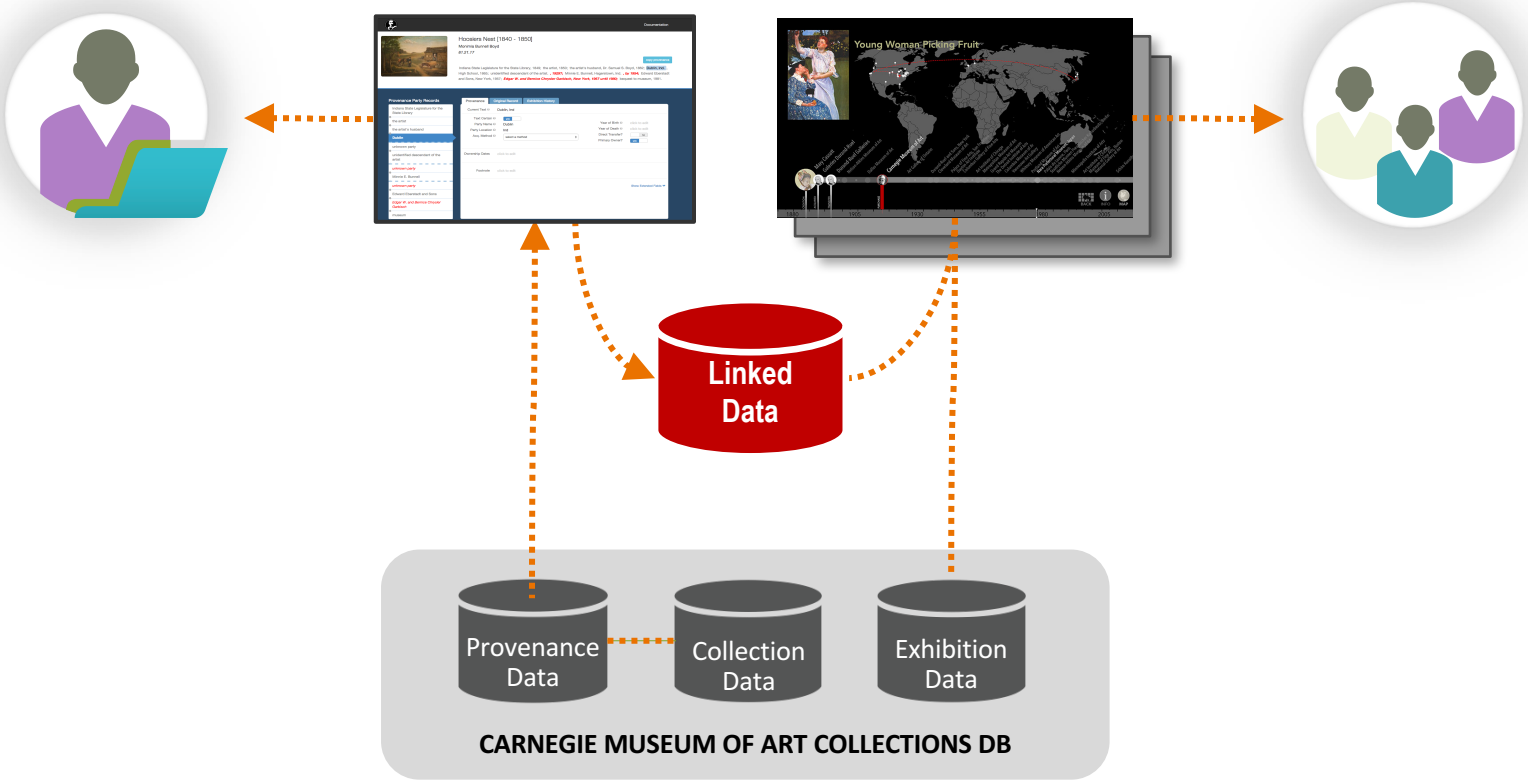
Image courtesy of Rob Sanderson, Stanford University

Carnegie Museum of Art program idea: Art Tracks

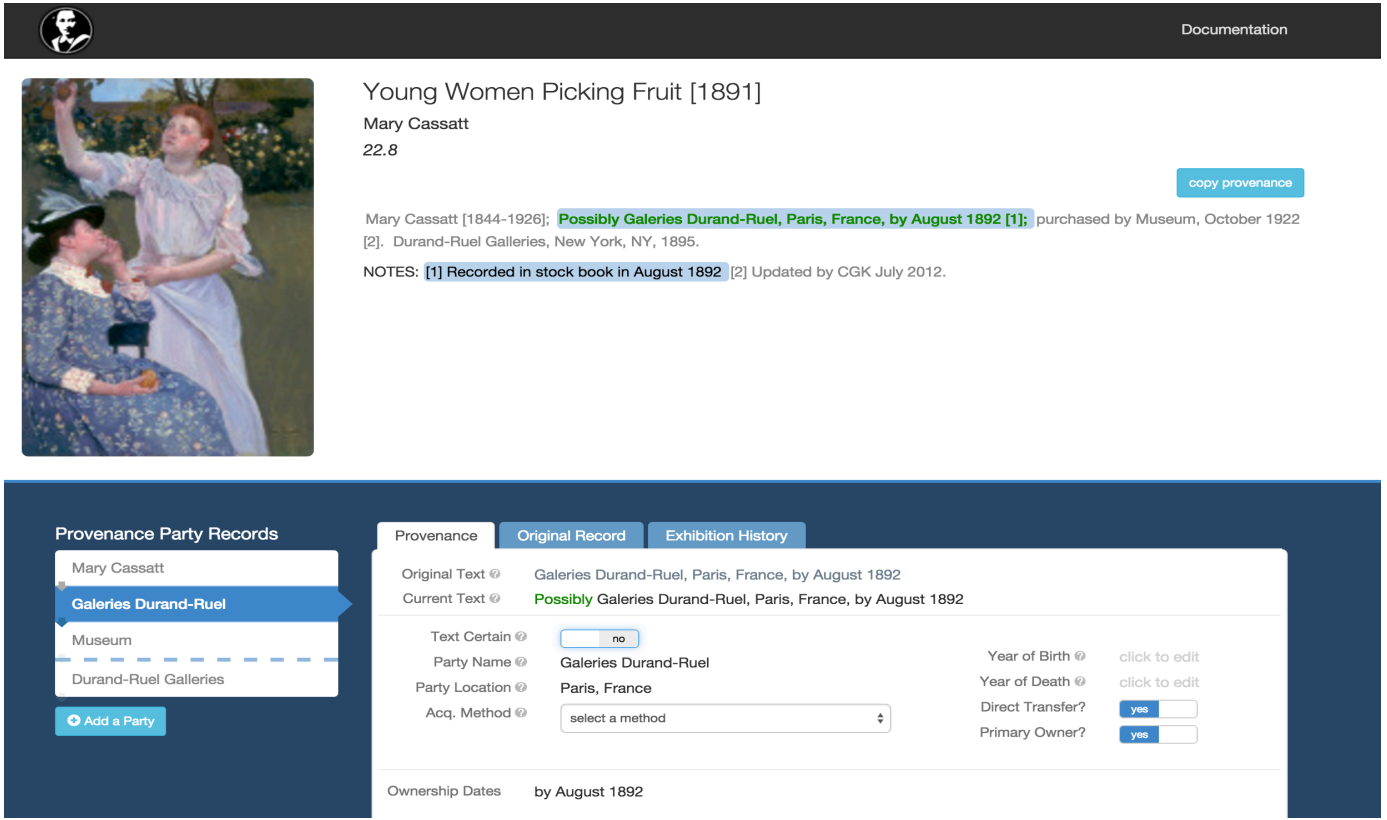


http://museumprovenance.org

Carnegie Museum of Art program idea: Art Tracks

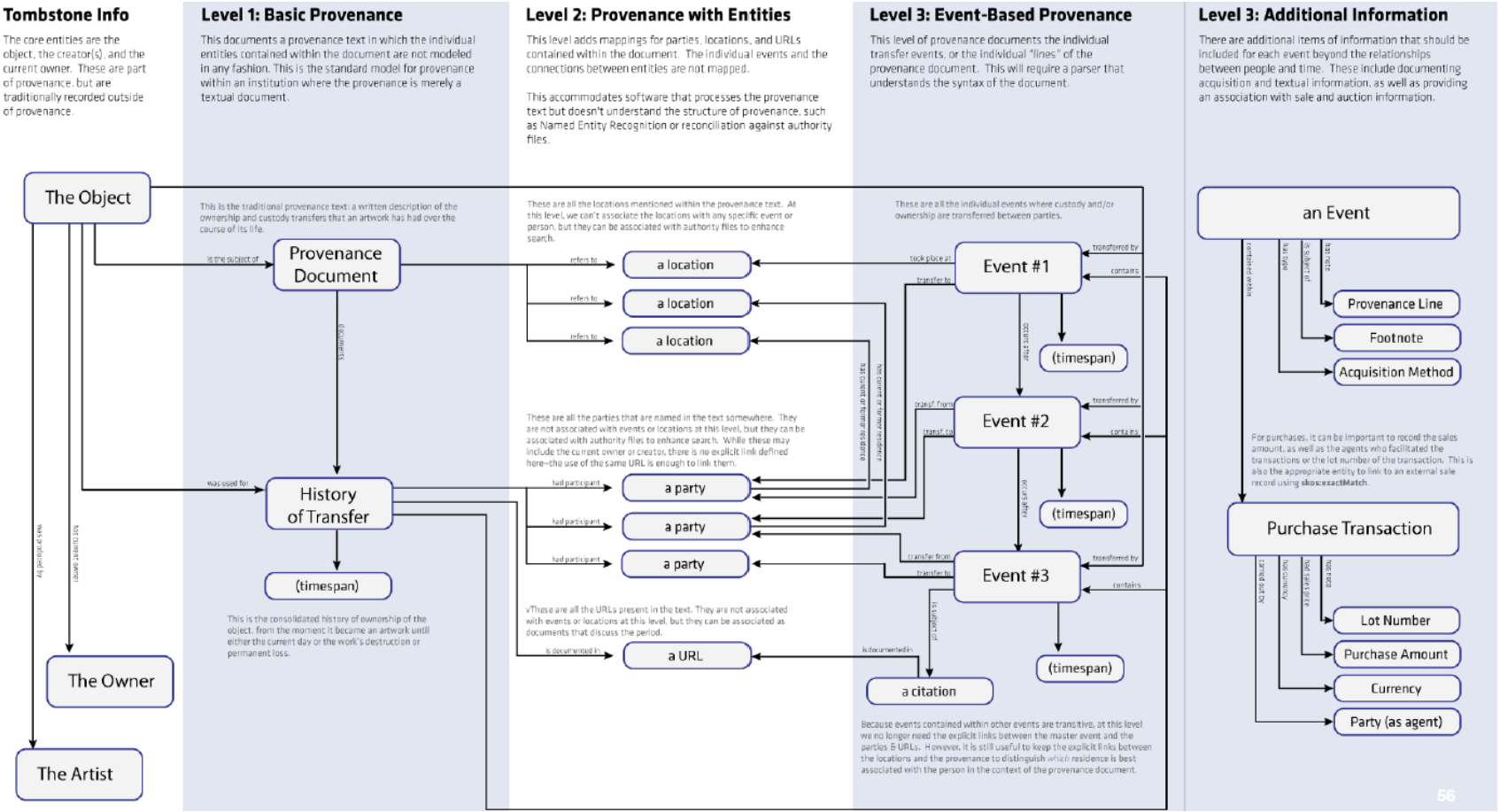


Carnegie Museum of Art provenance app: Elysa



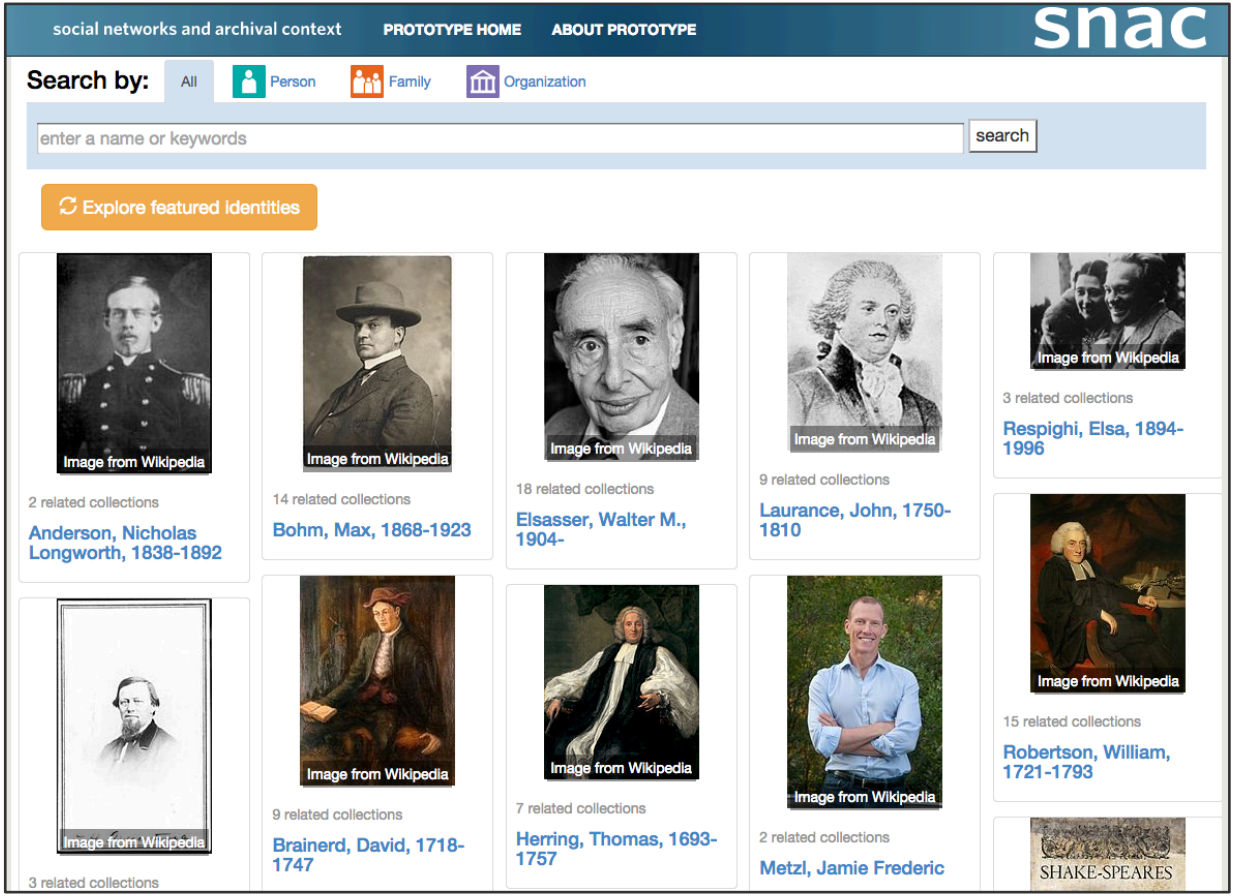
http://elysa-demo.museumprovenance.org

Evolutionary model for provenance LOD



http://www.museumprovenance.org/pages/scholars_day_2016/

Social Networks & Archival Context (SNAC)



http://socialarchive.iath.virginia.edu/snac/search

Social Networks & Archival Context (SNAC)

social networks and archival context PROTOTYPE HOME ABOUT PROTOTYPE snac

Bohm, Max, 1868-1923 Alternative names

Dates:
birth 1868
death 1923
Gender:

Authority Source: WorldCat, VIAF, LC
Nationality:
Language:

Biographical notes:

Max Bohm (1868-1923) was a painter in Provincetown, Mass.

Max Bohm was born on January 21, 1868, in Cleveland, Ohio. He began his study of art in 1887 and studied in artist communities in Brittany and in Paris at the Academie Julian with Boulanger, Lefebvre, and Benjamin Constant. He and his family spent the next several decades moving between France, England, and various places in the U.S. Eventually, they settled in Bronxville, N.Y. and had a cottage in Provincetown, Mass., where Bohm died on September 19, 1923.

From the description of Max Bohm papers, 1873-1970, bulk 1880-1959. (Unknown). WorldCat record id: 430380032

From the description of Max Bohm papers, 1870-1970, bulk 1880-1959. (Unknown). WorldCat record id: 422875086

Painter; Provincetown, Mass.

Born in Cleveland, Ohio.

From the description of Max Bohm papers, 1856-1964. (Unknown). WorldCat record id: 227190065

American painter.

From the description of Receipt, 1898 Aug. 13. (Getty Research Institute). WorldCat record id: 82151837

Links to collections

Archival Collections 14

creator of | referenced in

BOHM, MAX. Artist file : miscellaneous uncataloged material.
Museum of Modern Art (MOMA)

Bohm, Max, 1868-1923. Artist file.
Brooklyn Museum Libraries & Archives

Bohm, Max, 1868-1923. Max Bohm papers, 1856-1964.
Unknown (ISIL:DSI-AAA)

Bohm, Max, 1868-1923. Max Bohm papers, 1870-1970, bulk 1880-1959.
Unknown (ISIL:DSI-AAA)

Bohm, Max, 1868-1923. Max Bohm papers, 1873-1970, bulk 1880-1959.
Unknown (ISIL:DSI-AAA)

Bohm, Max, 1868-1923. Receipt, 1898 Aug. 13.
Getty Research Institute

Bohm, Max. [Max Bohm] : artist file
John and Mable Ringling Museum of Art Library

Milch Gallery. Milch Gallery records, 1911-1980.
Unknown (ISIL:DSI-AAA)

Milch Gallery. Milch Gallery records, 1911-1980.
Unknown (ISIL:DSI-AAA)

Visualize:

- List collection locations
- Radial Graph Demo
- View source EAC-CPF

Subjects:

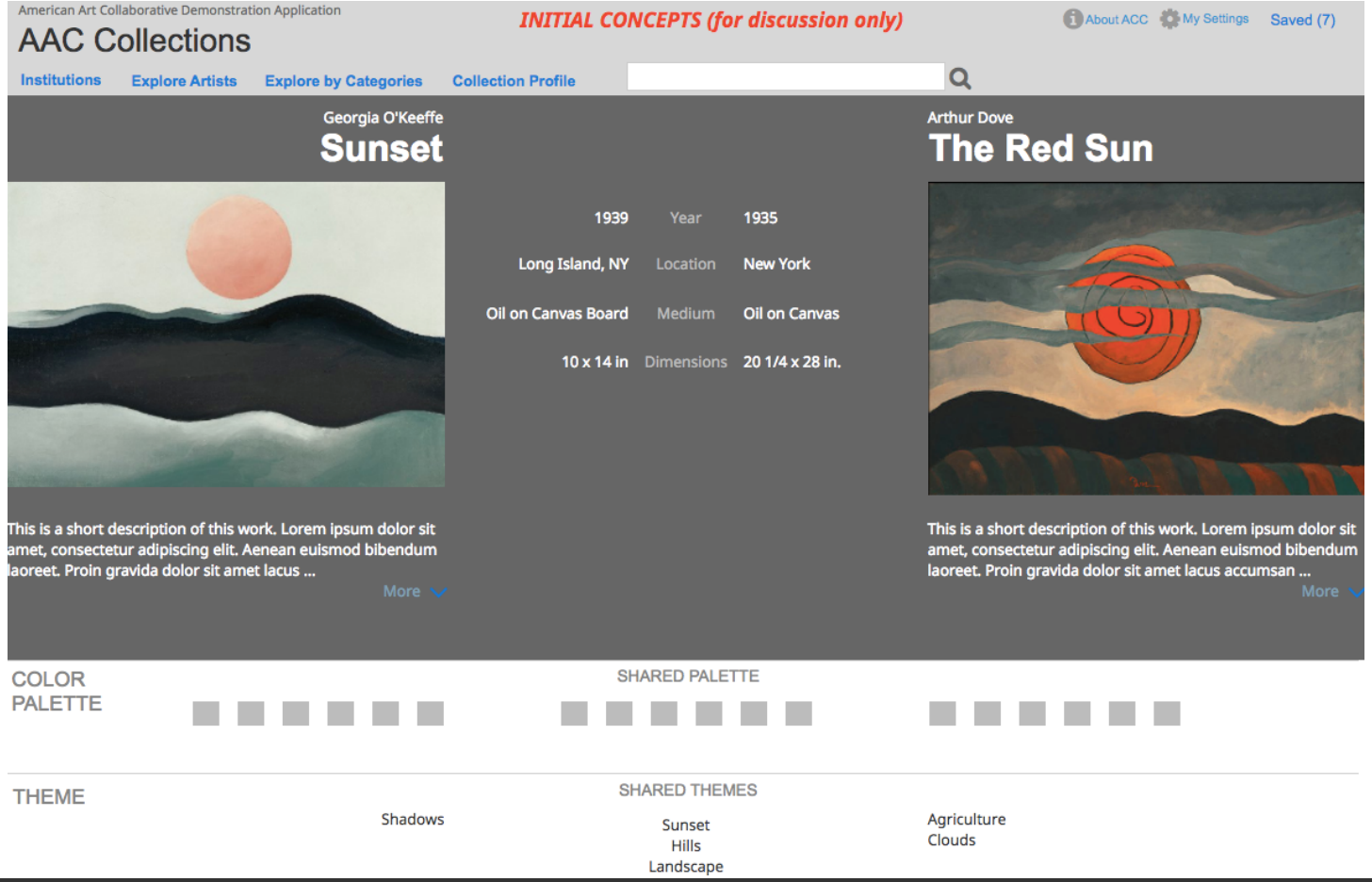
- Painting, American
- Painting--Study and teaching

Occupations:

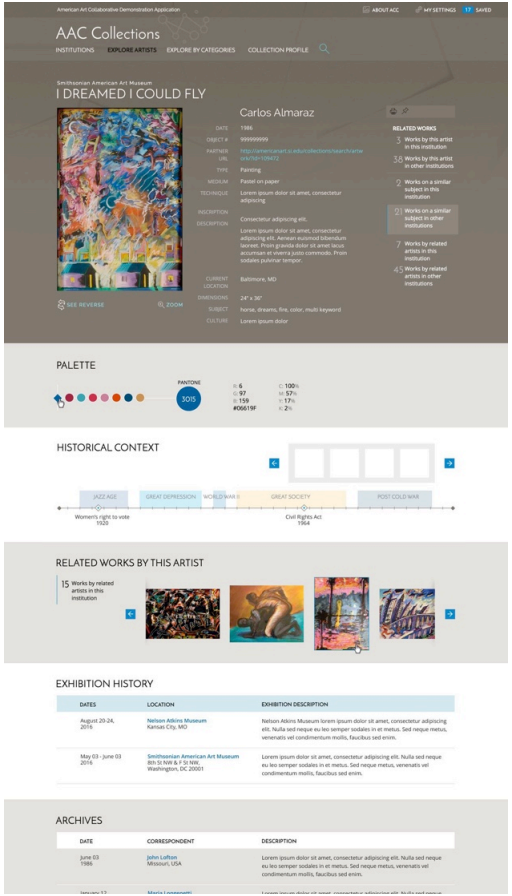
not available for this record

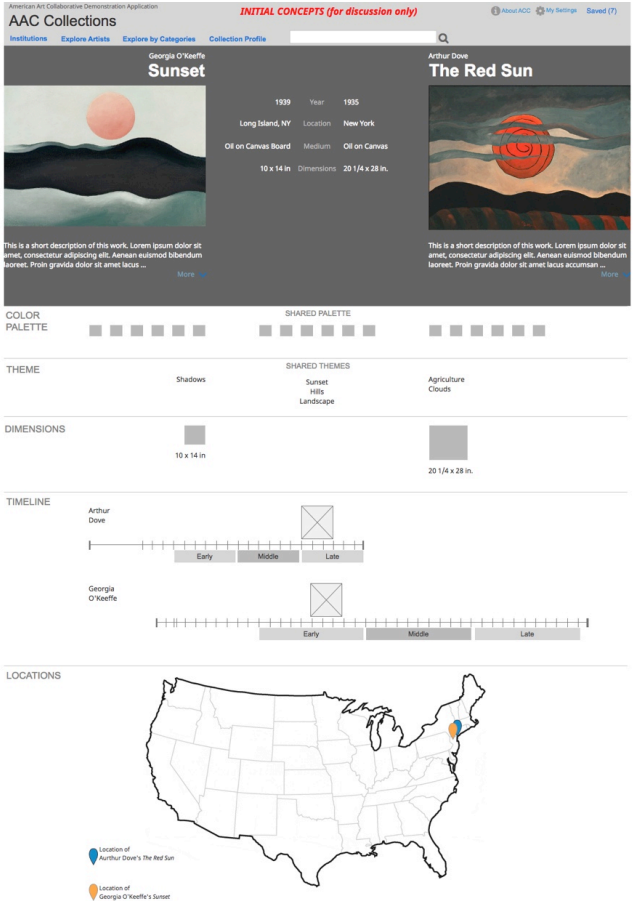
AAC – Browse Application

http://browse.americanartcollaborative.org



Serendipity and Insights *(federated collection browsing)*





American Art Collaborative
initial design concepts

AAC – Data Review Site

http://review.americanartcollaborative.org

When the work was created.

Creation Location
Where the work was created.

Acquisition Date
When the work was acquired.

Aboutness

Main Description
Description of the work.

Other Descriptions
Alt. description of the work.

Classification
The type of object the work is.

Style
The style or period of the work.

Subject
What the work depicts.

Technique
How the object was made.

Concept
What the work is about.

Materials
What the work is made of.

Medium Text
A medium descriptive text.

Physical Object

Current Owner 🔷
Who owns the work.

Current Location
Where the work is located.

Responsible Department
Institution Department responsible for the work.

Dimensions (Part)
Size of a part of the work.

Dimensions

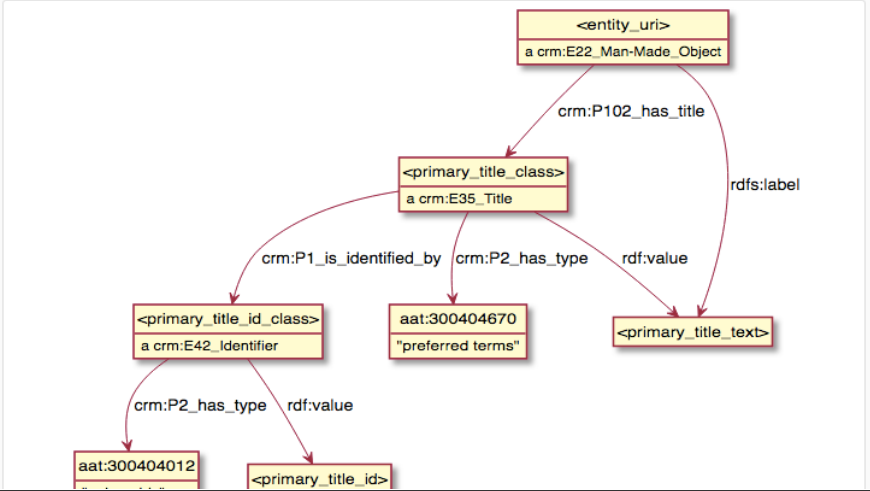
Primary Title for **data.americanartcollaborative.org/npg/object/49748**

primary_title_text	primary_title_class	primary_title_id	primary_title_id_class
William McChesney Martin	http://data.americanartcollaborative.org/npg/th...		

Show this Query | Show this as Turtle

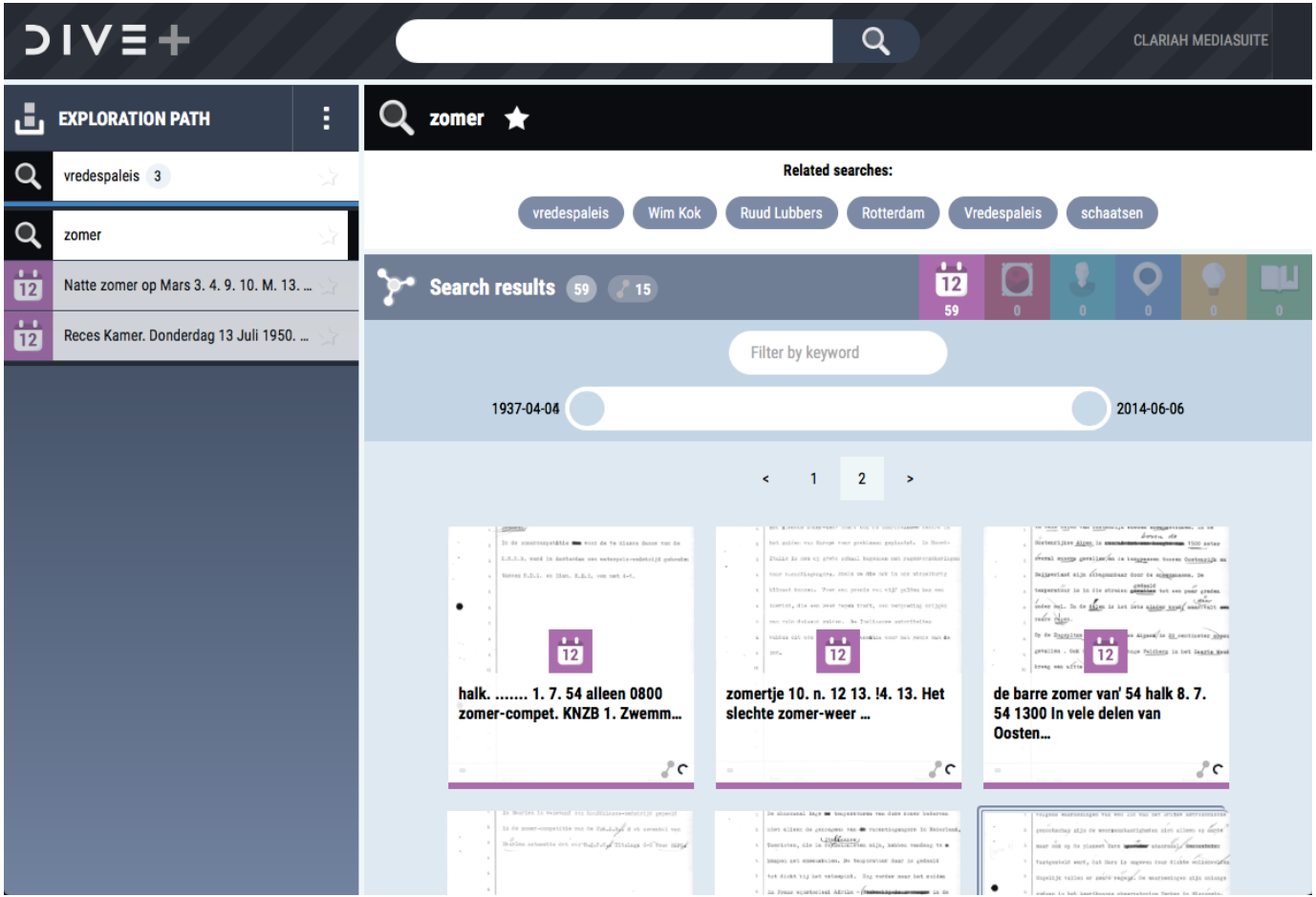
Do you see a problem with this? Submit an issue.

AAC Target Mapping For **Primary Title**

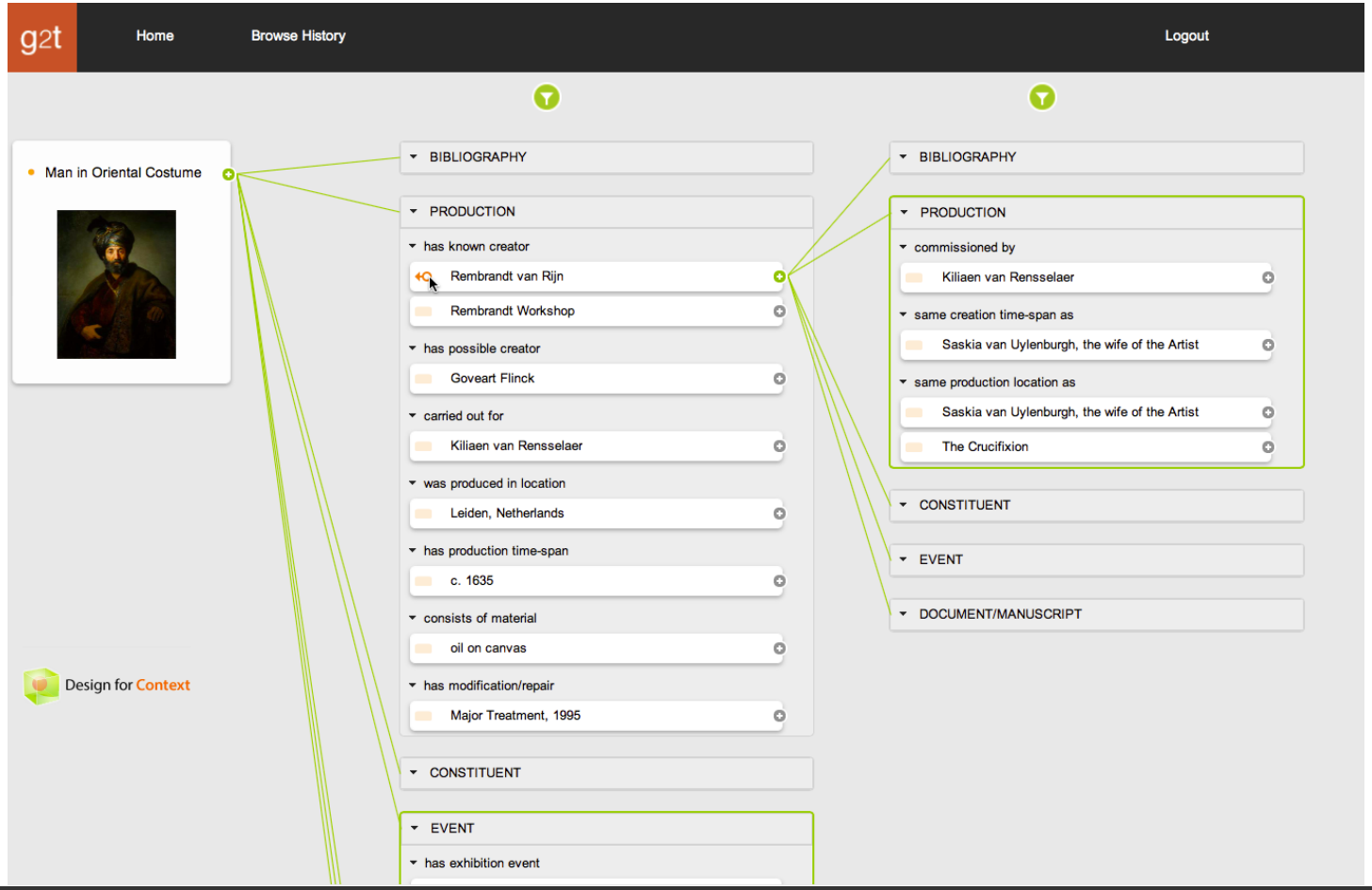


DIVE+

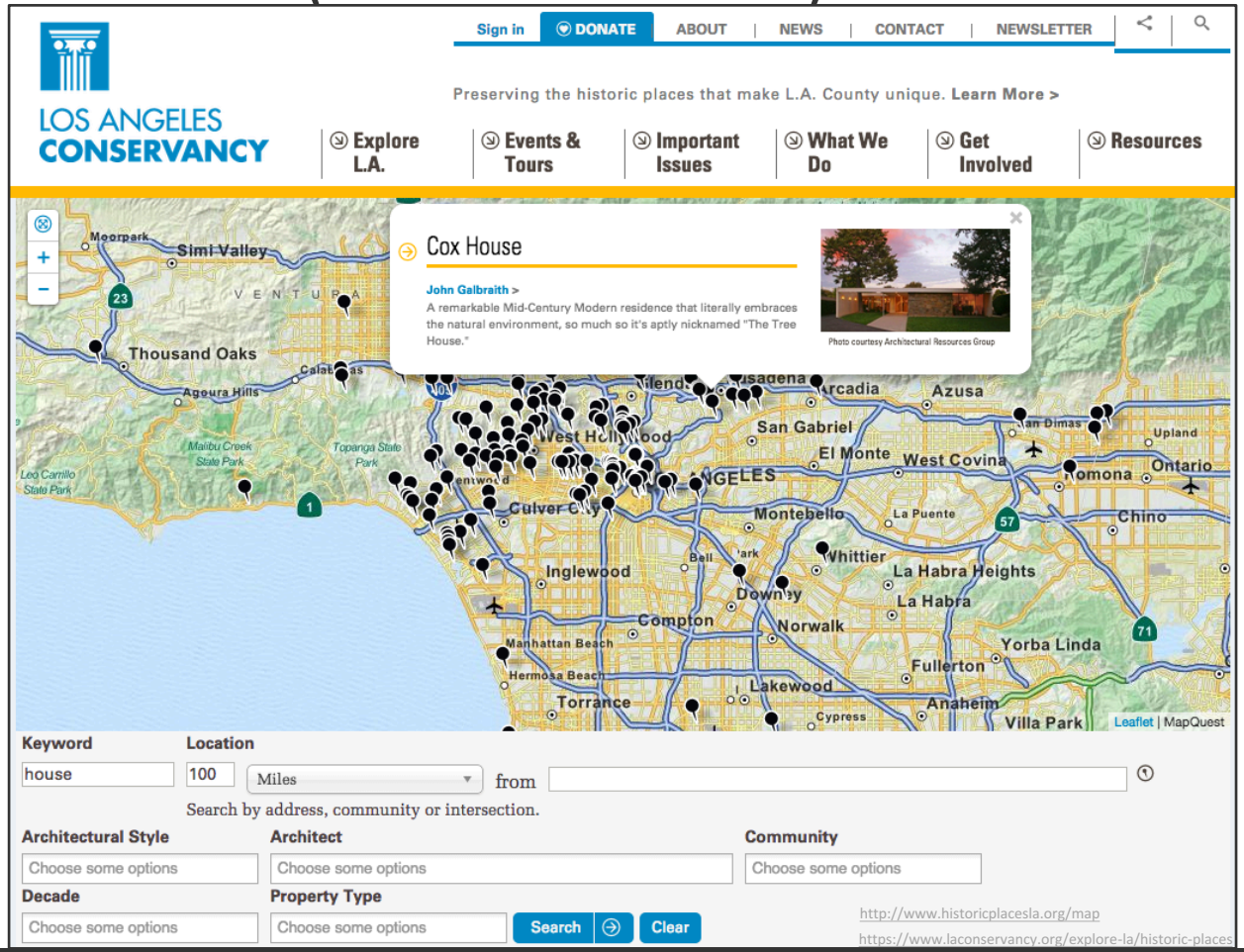
http://diveplus.beeldengeluid.nl



Browsing and Reviewing Graph Data



Historic Places LA (Arches Platform)



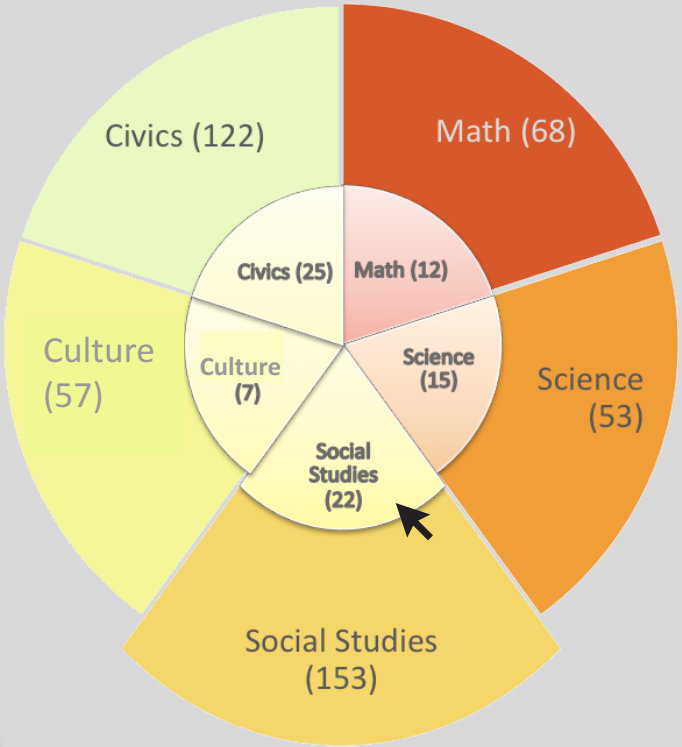
http://historicplacesla.org/map

Find Synthesis *(education concept)*

Results for **Benjamin Franklin** 534 results total

Subject: **All**

Grade Level: **6-12**



Available online — Available in school district

Social Studies

Texts
11 Internal
74 External

Videos
2 Internal
12 External

Visuals
8 Internal
59 External

Activity Guides
1 Internal
8 External

See details

My Lesson Plans

Benjamin Franklin: A Great Thinker

Math
- Worksheet

Science
- On seasonal time (Hudson)
- Electricity Worksheet

Civics
-

Social Studies
-

Culture
- Vie de Franklin, écrite par lui-même - Tome I (French)
- Vie de Benjamin Franklin, écrite par lui-même - Tome II (French)

Spark Imagination *(text mining/analysis concept)*

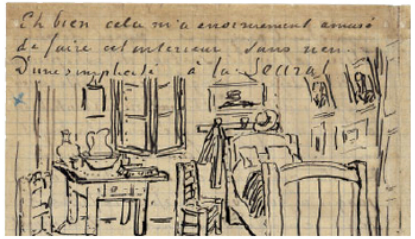
VINCENT VAN GOGH
1853-1890

BIRTHPLACE:
ZUNDERT, NL

PLACES WORKED:
NUENE, ANTWERP,
PARIS, ARLES, more...

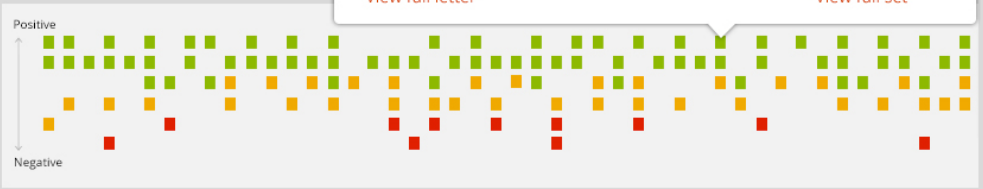
Letters from the artist provide insight into his mood. A sentiment analysis on those letters identifies the frequency of positive and negative sentiments expressed by the artist over time.

Letter to Paul Gauguin
Arles, Wednesday, 17 October 1888



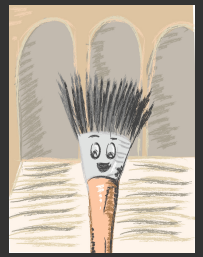
View full letter

View full set



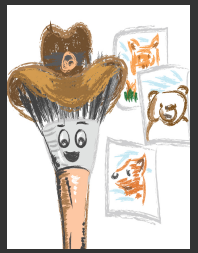
Conversational avatars: Enhance experience across the entire journey

Engaging conversation: Text and voice



Smooth online-to-gallery transitions

Explore a collection with your personal digital docent



Multi-institution

WHAT IS LINKED DATA ?

- Triples
- Ontologies
- Vocabularies
- Entities

The theory, part 2

Common relationship structures, e.g. genealogy, commerce

General Ontology

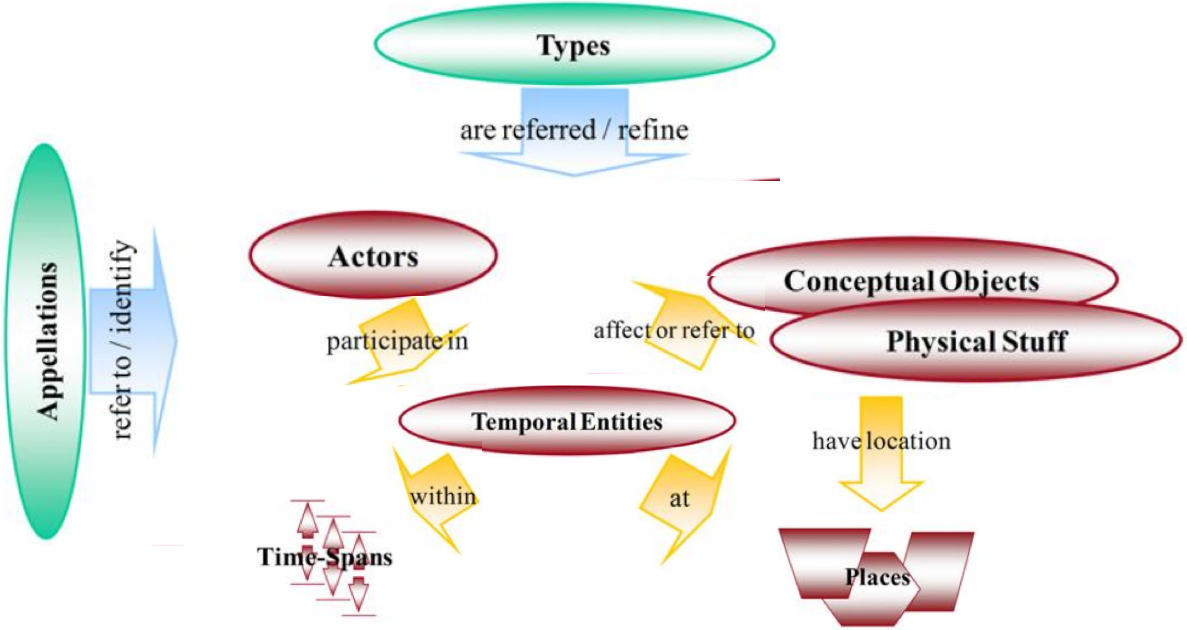
Domain-specific, e.g. medicine, government

Domain Ontology

Specialized model, e.g. workflow structures, policies

Local Ontology

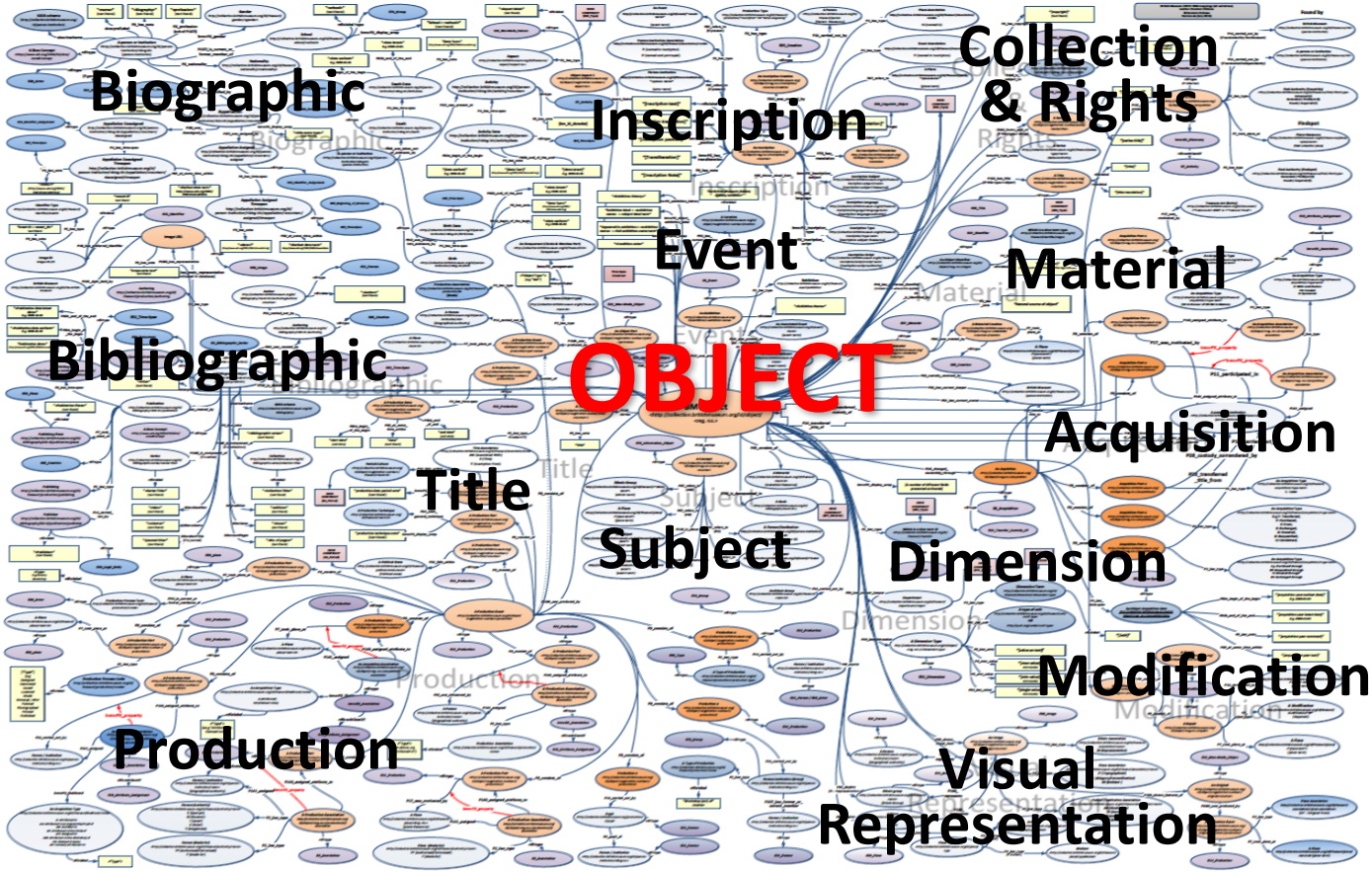
Ontologies: CIDOC-CRM (Conceptual Reference Model)



- Product of more than 20 years of development and testing
- Event-based (documenting persistent and temporary things)
- Extensible

http://www.cidoc-crm.org/docs/CRM_for_TPDL.ppt

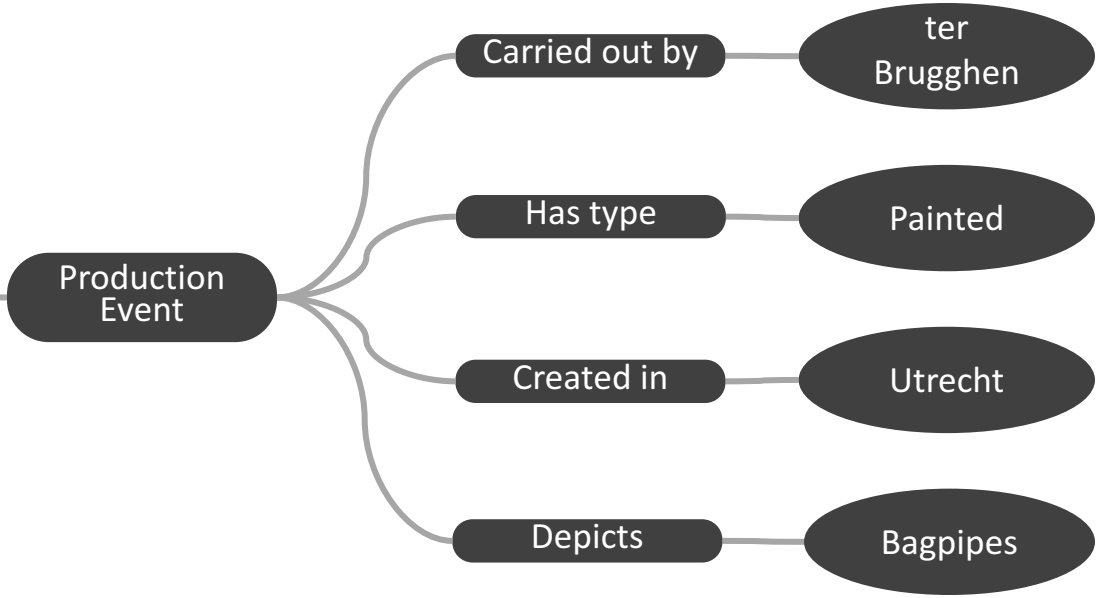
Domain-Specific: British Museum, using CIDOC-CRM



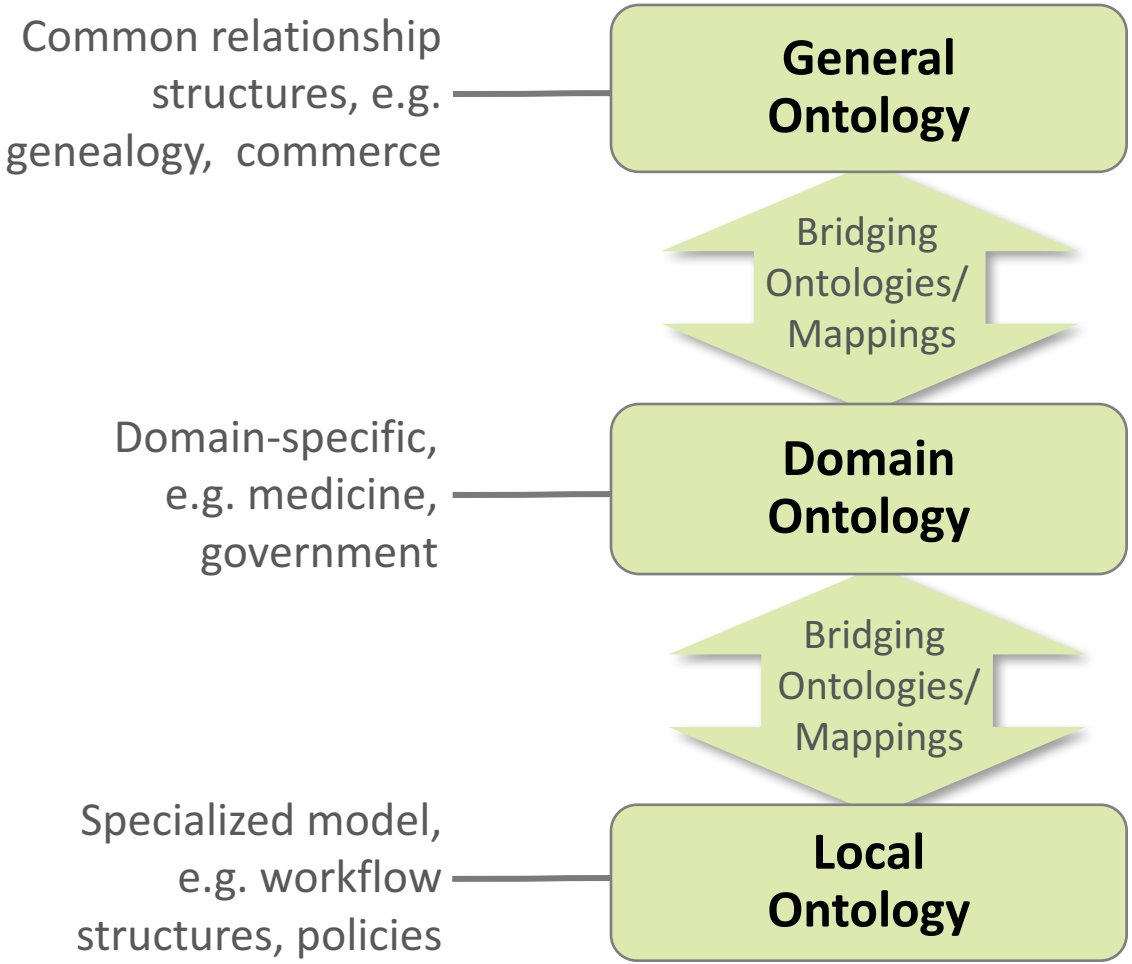
https://confluence.ontotext.com/display/ResearchSpace/BM+Mapping

Naming and Typing things in the CRM

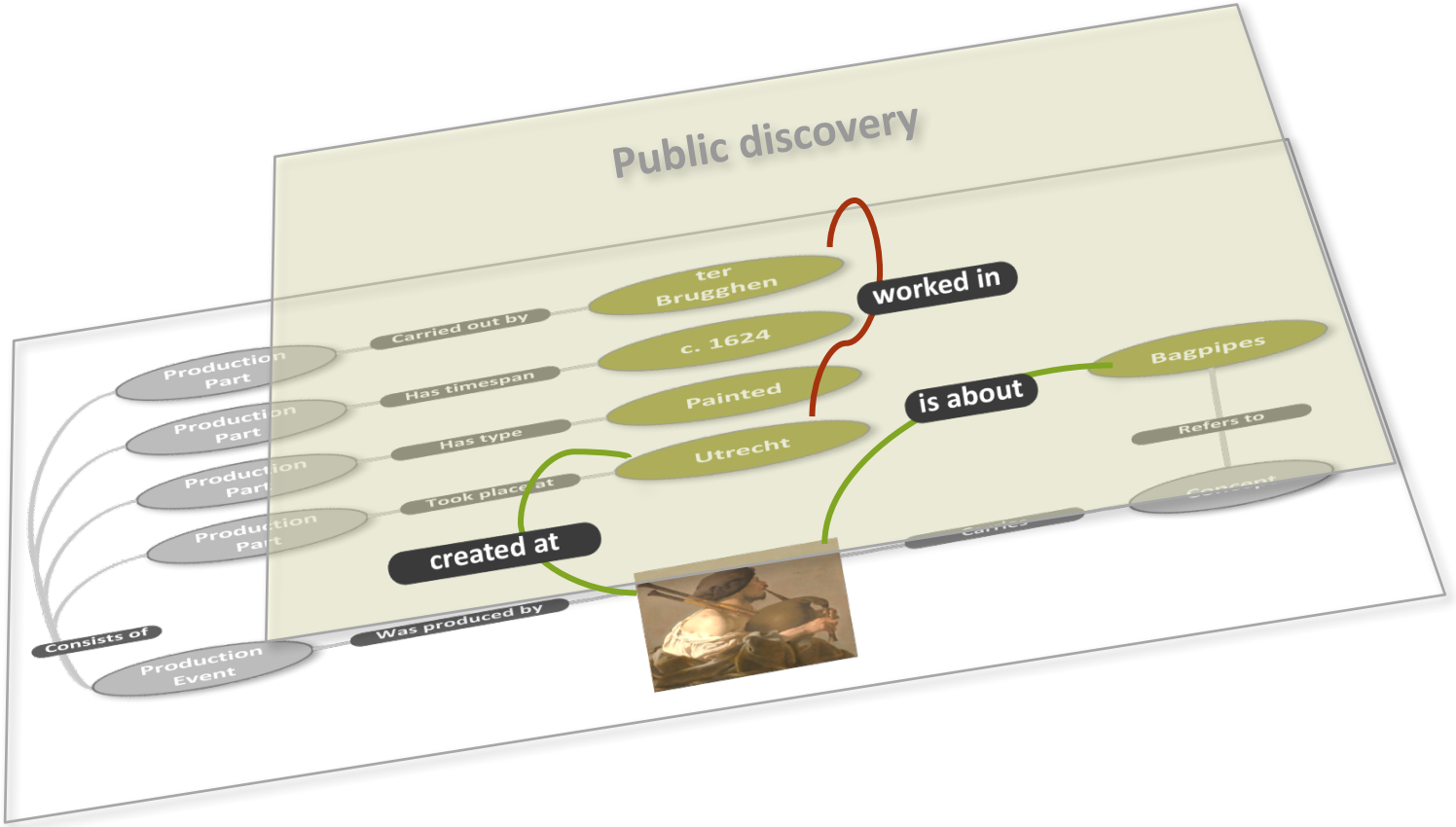
The Bagpipe Player
(c.1624)
Hendrick ter Brugghen



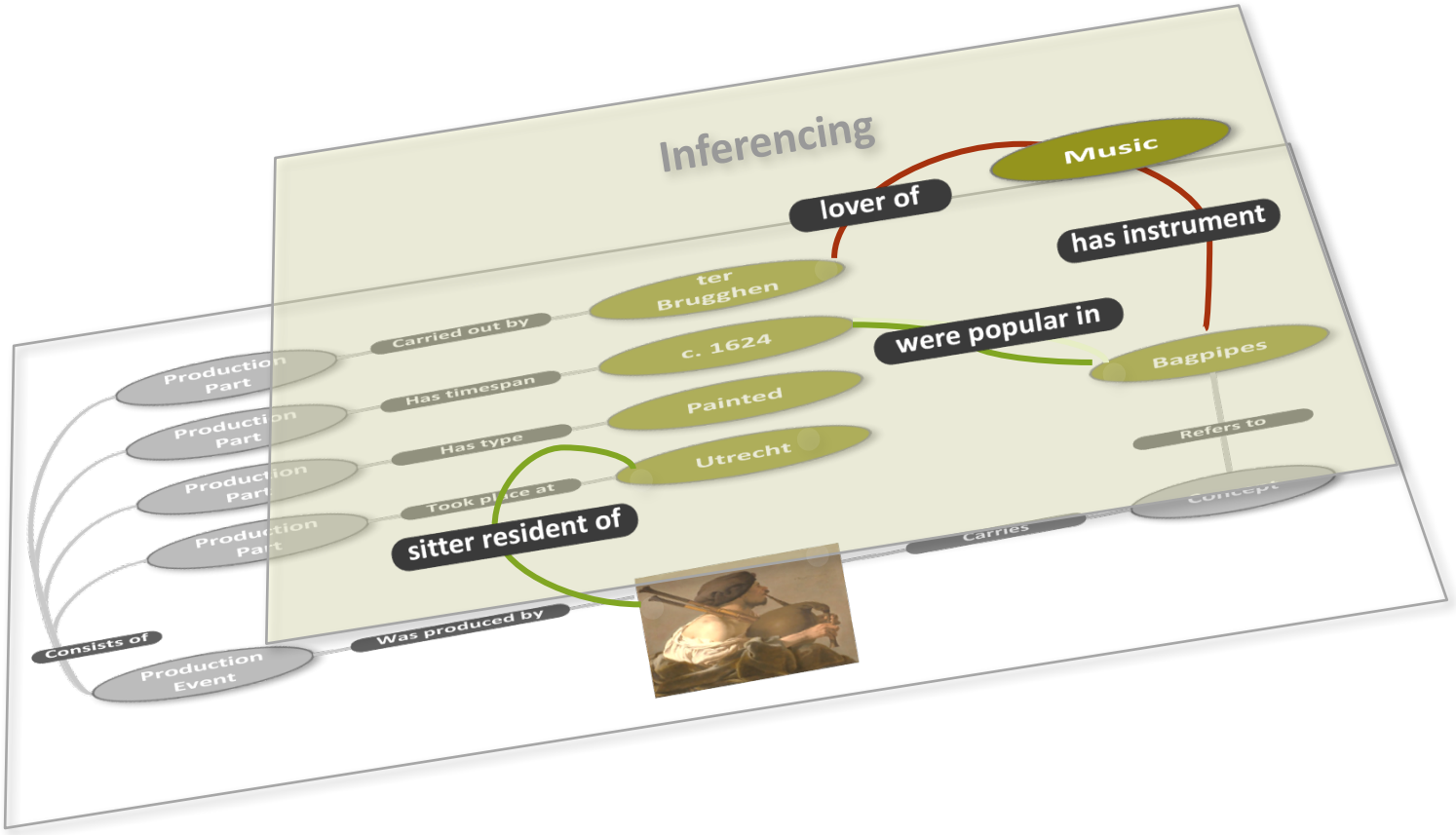
http://www.nga.gov/content/ngaweb/Collection/art-object-page.144298.html

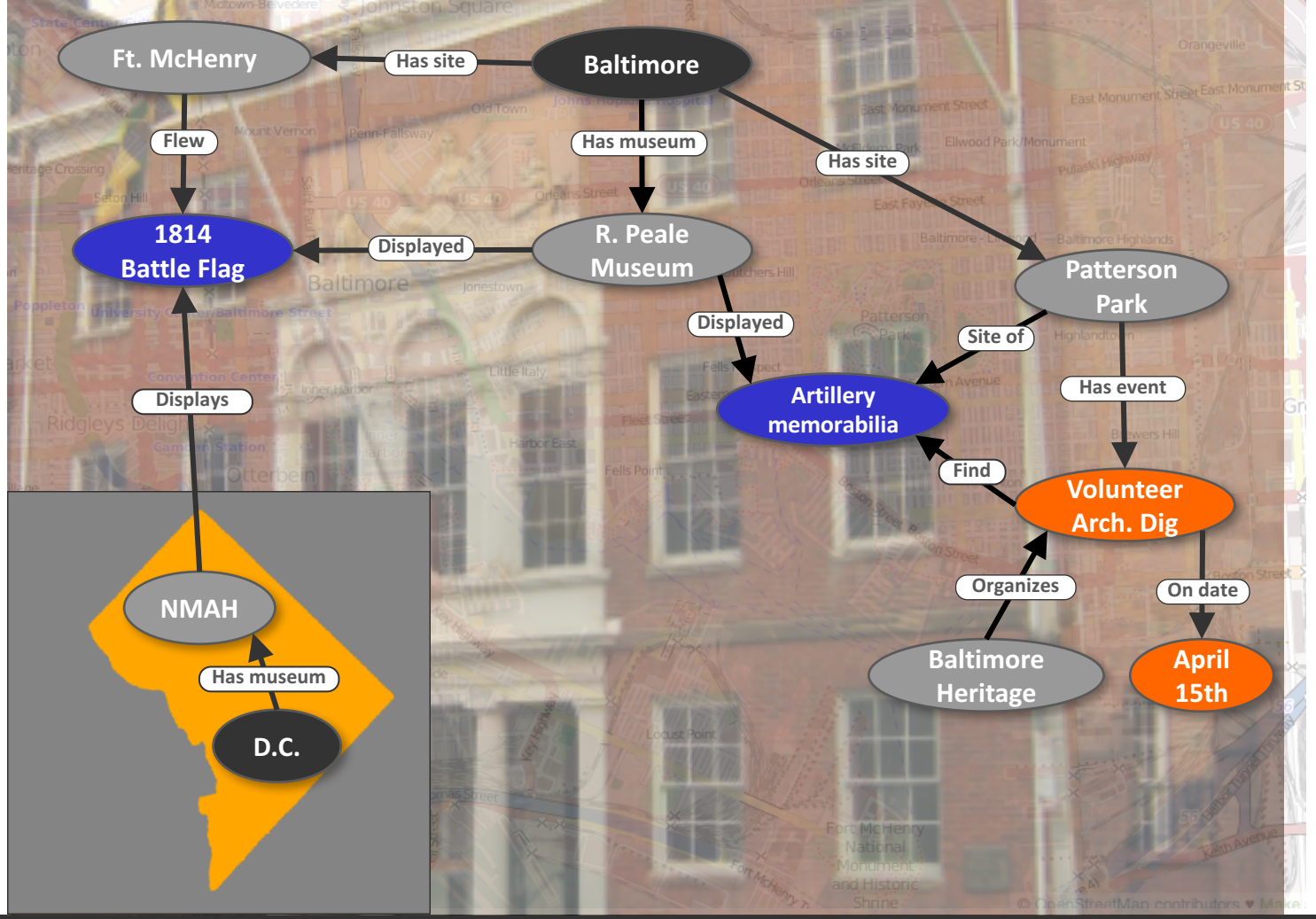

Common relationship structures, e.g. genealogy, commerce
General Ontology
Bridging Ontologies/ Mappings
Domain-specific, e.g. medicine, government
Domain Ontology
Bridging Ontologies/ Mappings
Specialized model, e.g. workflow structures, policies
Local Ontology

Shortcuts and non-destructive contexts



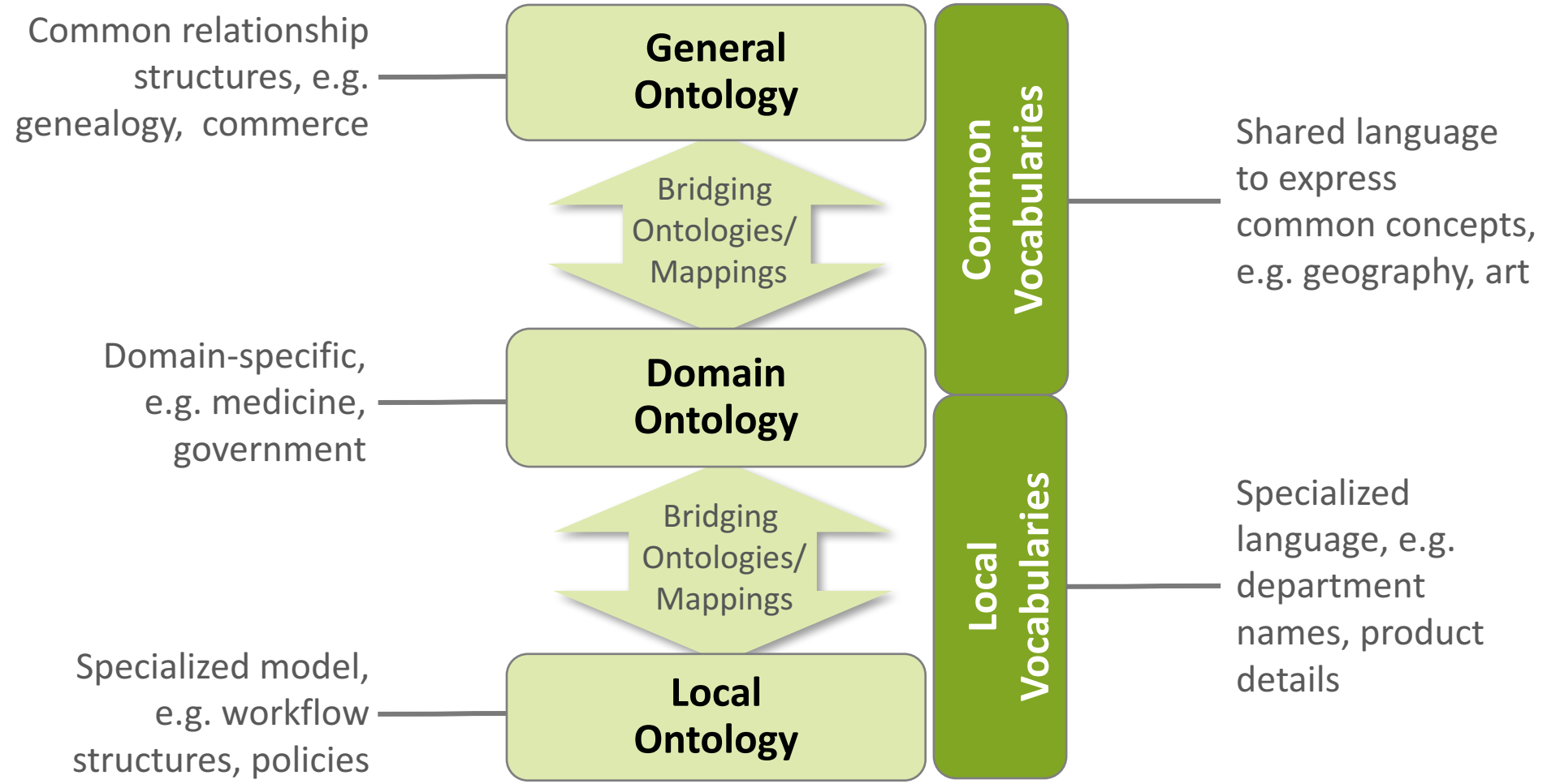
Inferencing: *Eliciting facts without linking explicitly*




Ft. McHenry
Has site
Baltimore
Flew
Has museum
Has site
1814
Battle Flag
Displayed
R. Peale
Museum
Patterson
Park
Displayed
Site of
Displays
Artillery
memorabilia
Has event
Find
Volunteer
Arch. Dig
Organizes
On date
Baltimore
Heritage
April
15th
NMAH
Has museum
D.C.

COMMON LANGUAGE

- Vocabularies
- Reconciliation


Common relationship structures, e.g. genealogy, commerce
General Ontology
Bridging Ontologies/ Mappings
Domain-specific, e.g. medicine, government
Domain Ontology
Bridging Ontologies/ Mappings
Specialized model, e.g. workflow structures, policies
Local Ontology
Common Vocabularies
Shared language to express common concepts, e.g. geography, art
Local Vocabularies
Specialized language, e.g. department names, product details

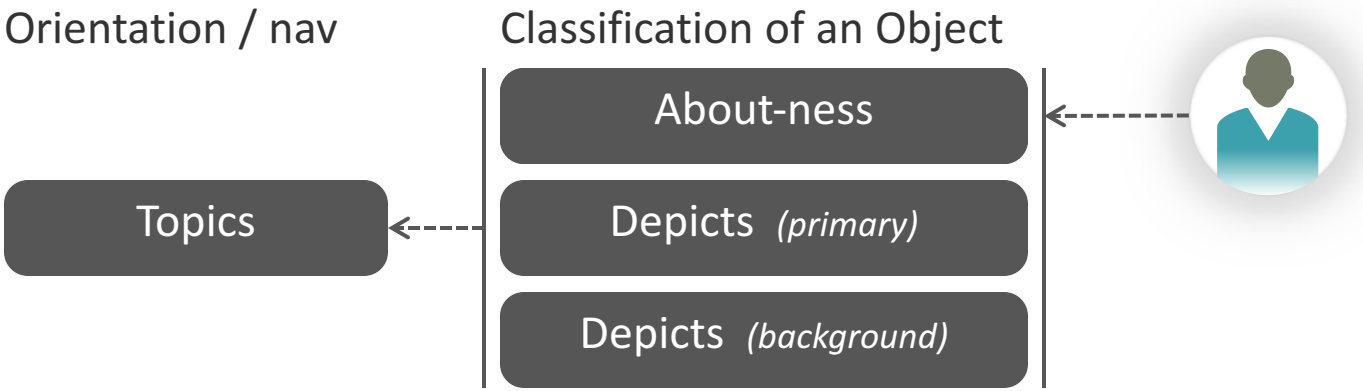
Texas Coastal Bend Collection

http://www.texascoastalbend.org

The Story Behind the Collections

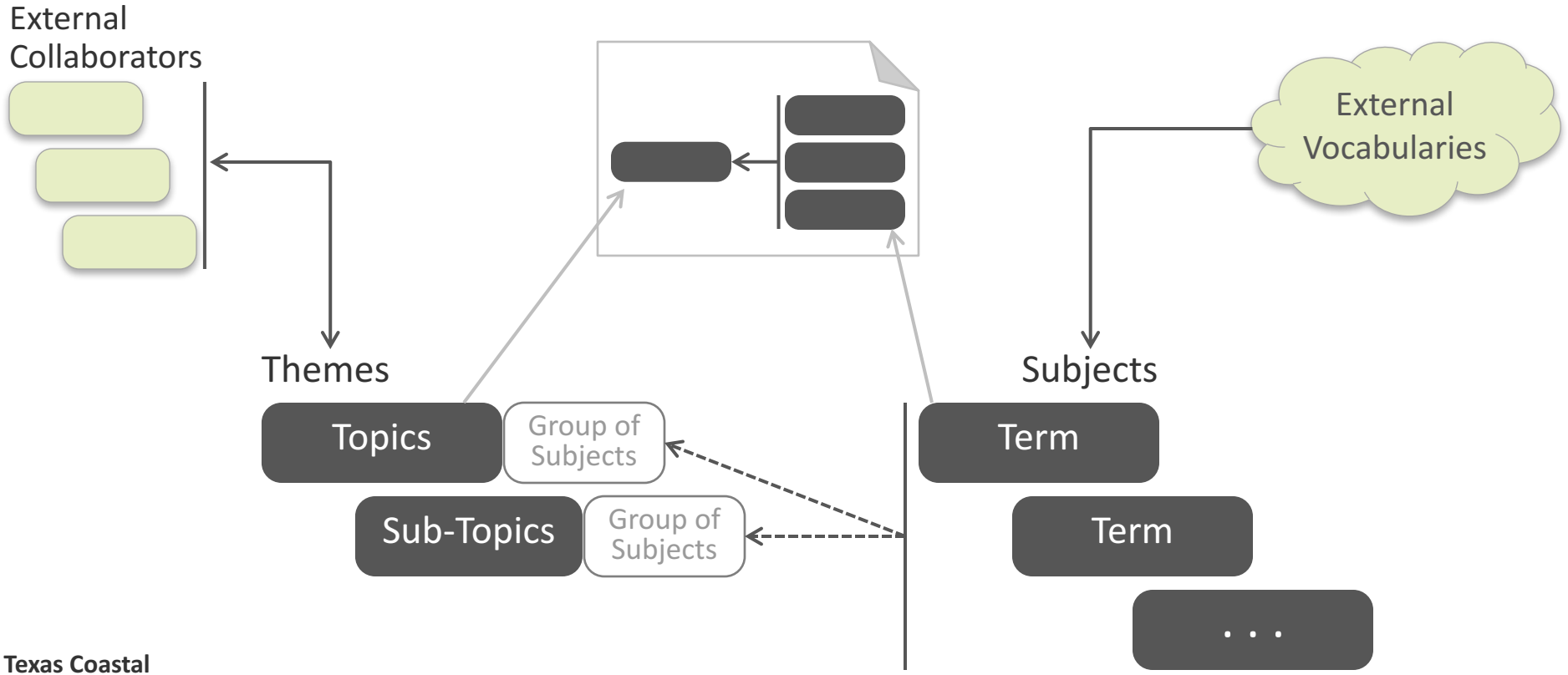
"This whole project is based on sounds — they're echoes from the past callin' to us to be remembered. We're movin' too fast to hear them now; we'll have to go into the past to recover them, to recover a way of life that is gone, a better way of life. There was a lot wrong back then, but there was a lot more right. The good keeps on comin' back, tryin' to be heard. These people are the instruments of those righteous echoes." - Nathaniel Youngblood, Tophand

Vocabulary Relationships *(subject alignment for collaboration)*



Texas Coastal Bend Collection
metadata subject architecture

Vocabulary Relationships *(subject alignment for collaboration)*



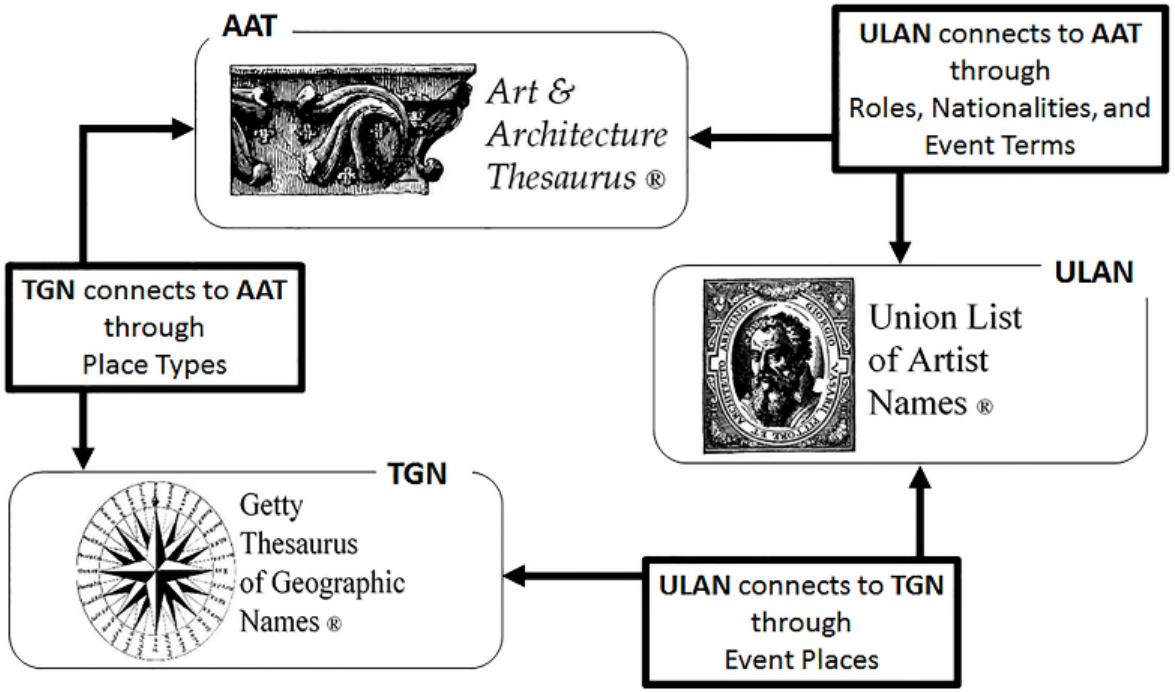
Texas Coastal Bend Collection
metadata subject architecture

Vocabularies and Instance Data

- Examples of 3rd party linked data authorities
  - Getty Vocabularies
  - Library of Congress Subject Headings and Name Authorities
  - GeoNames
  - Virtual International Authority File (VIAF)
  - Dbpedia / Wikidata

- Local authorities
  - Institutional vocabularies (e.g., department names)
  - Your variation on an existing authority

The Getty Vocabularies are Semantically Linked



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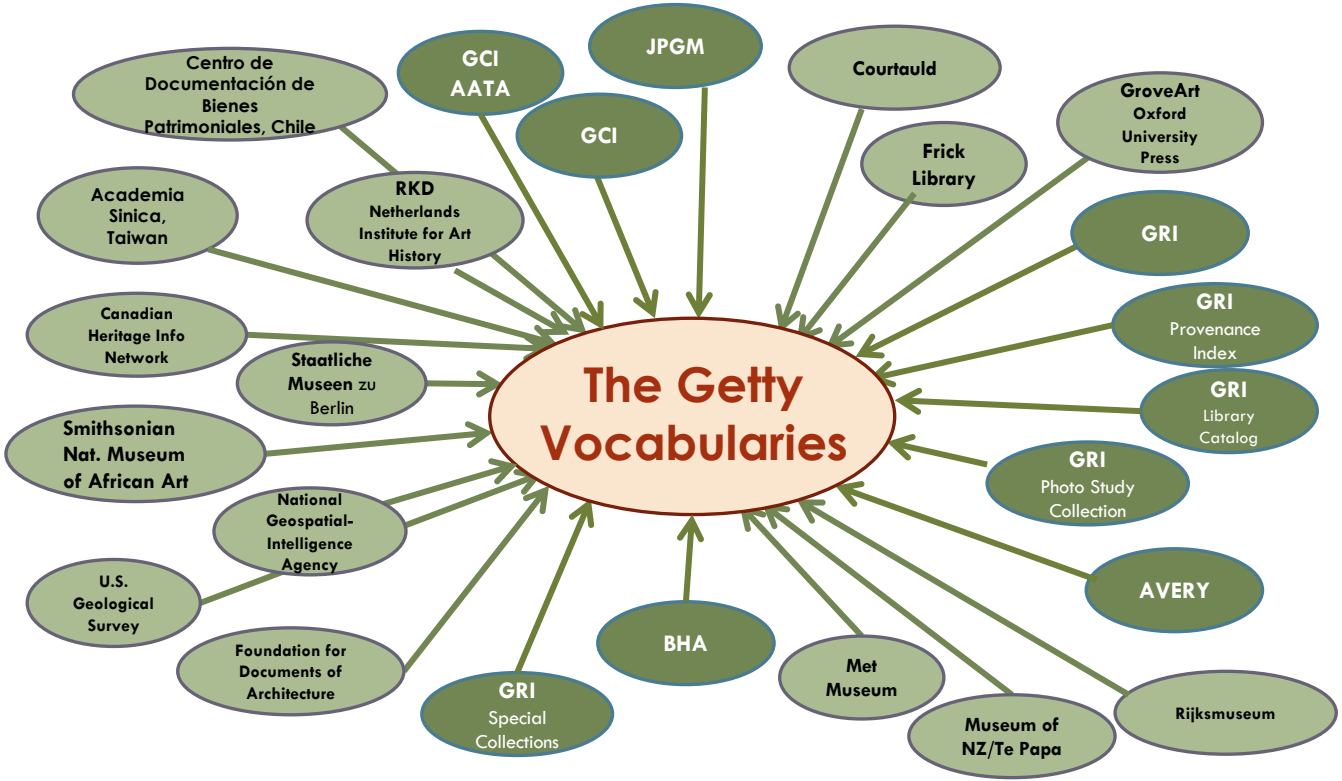
Where do the terms and concepts come from?



Example of some of the top contributors

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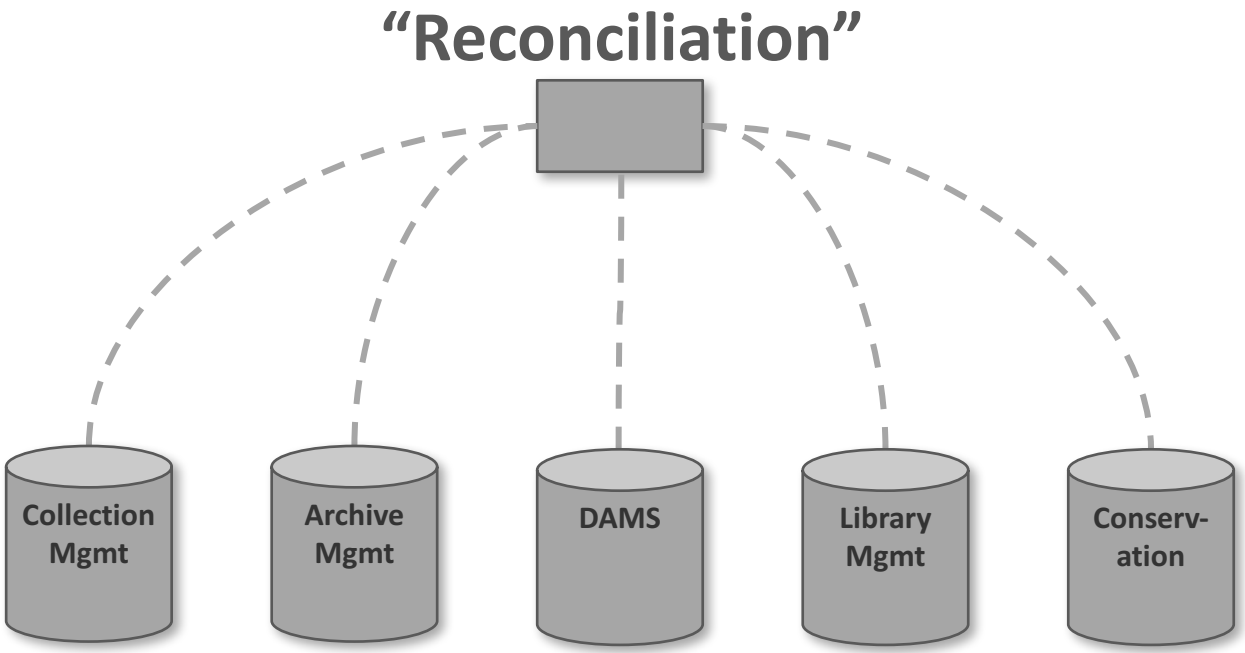
Getty Vocabulary resources

- Developer SPARQL Endpoint
  - http://vocab.getty.edu
- General Information about our LOD project
  - http://www.getty.edu/research/tools/vocabularies/lod/index.html
- About the Getty Vocabularies in general
  - http://www.getty.edu/research/tools/vocabularies/index.html
- Public Forum
  - https://groups.google.com/forum/#!forum/gettyvocablod
- Examples of ID 300198841
  - Human readable: http://vocab.getty.edu/page/aat/300198841
  - Machine readable: http://vocab.getty.edu/aat/300198841

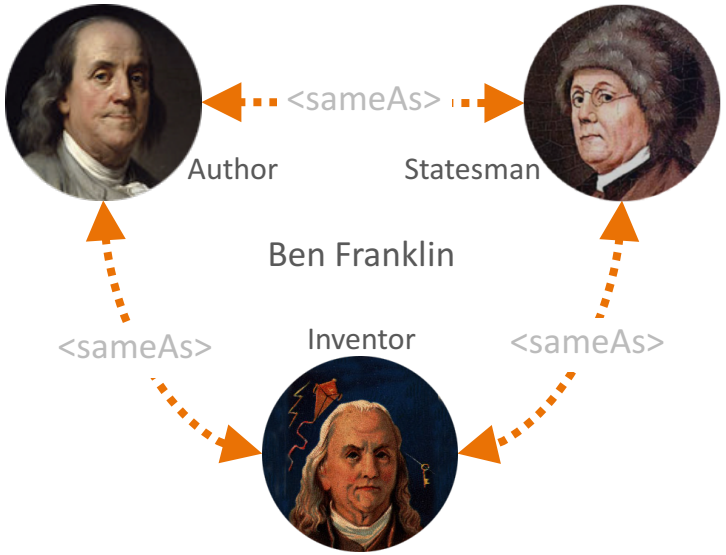
How do we know we're talking about the same thing?



Reconciliation

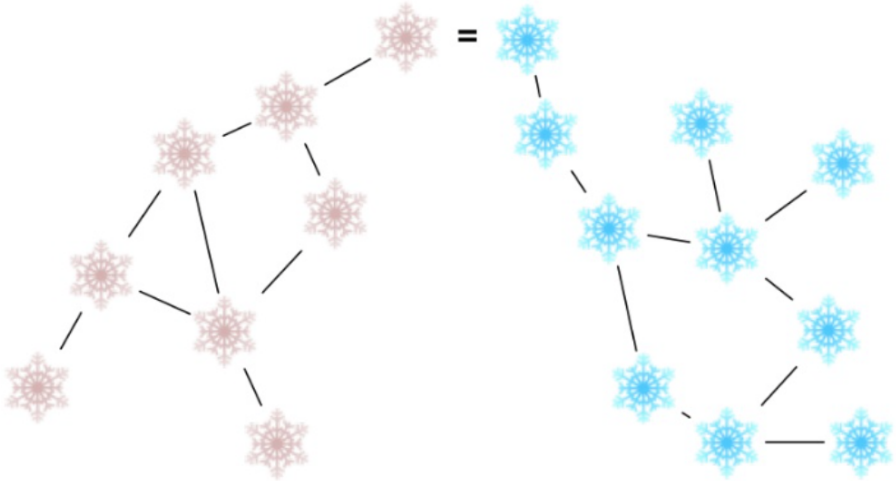
When each department
or institution is talking about…

- A person
- An institution
- An artwork
- A location
- A subject
- A time period

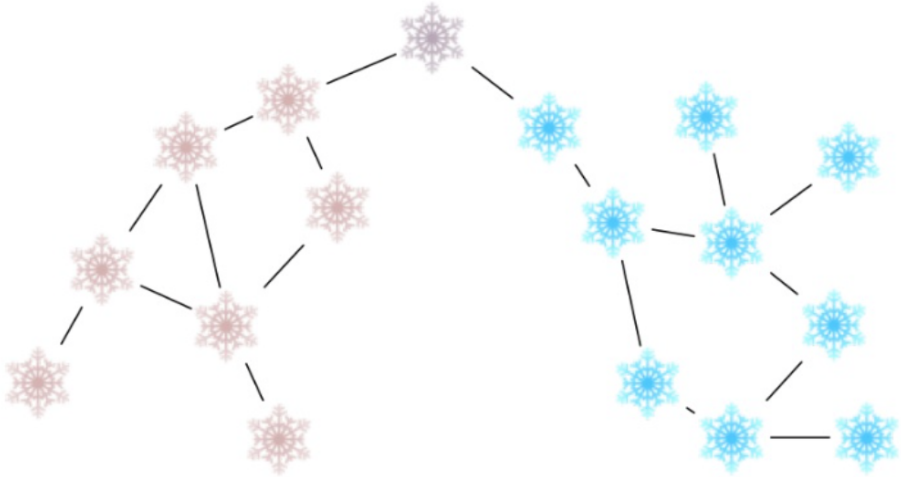


Reconciliation

Option 2a: Reconciliation (distributed authority)

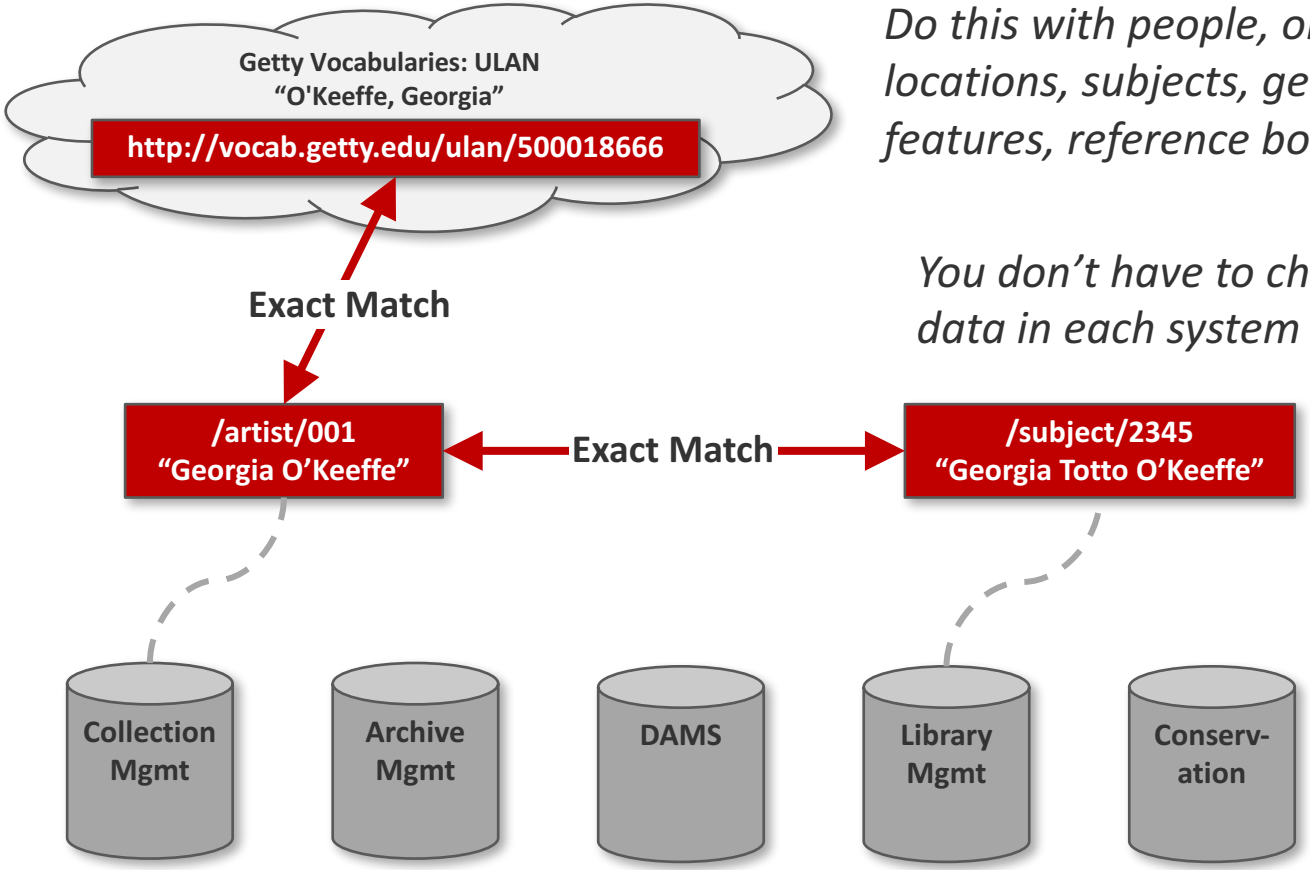


Option 2b: Reconciliation (centralized authority)



Linked Data Snowball, or Why We Need Reconciliation (4.2016)
Rob Sanderson, Senior Semantic Architect, J. Paul Getty Trust, for AAC Reconciliation Meeting
http://www.slideshare.net/azaroth42/linked-data-snowball-or-why-we-need-reconciliation

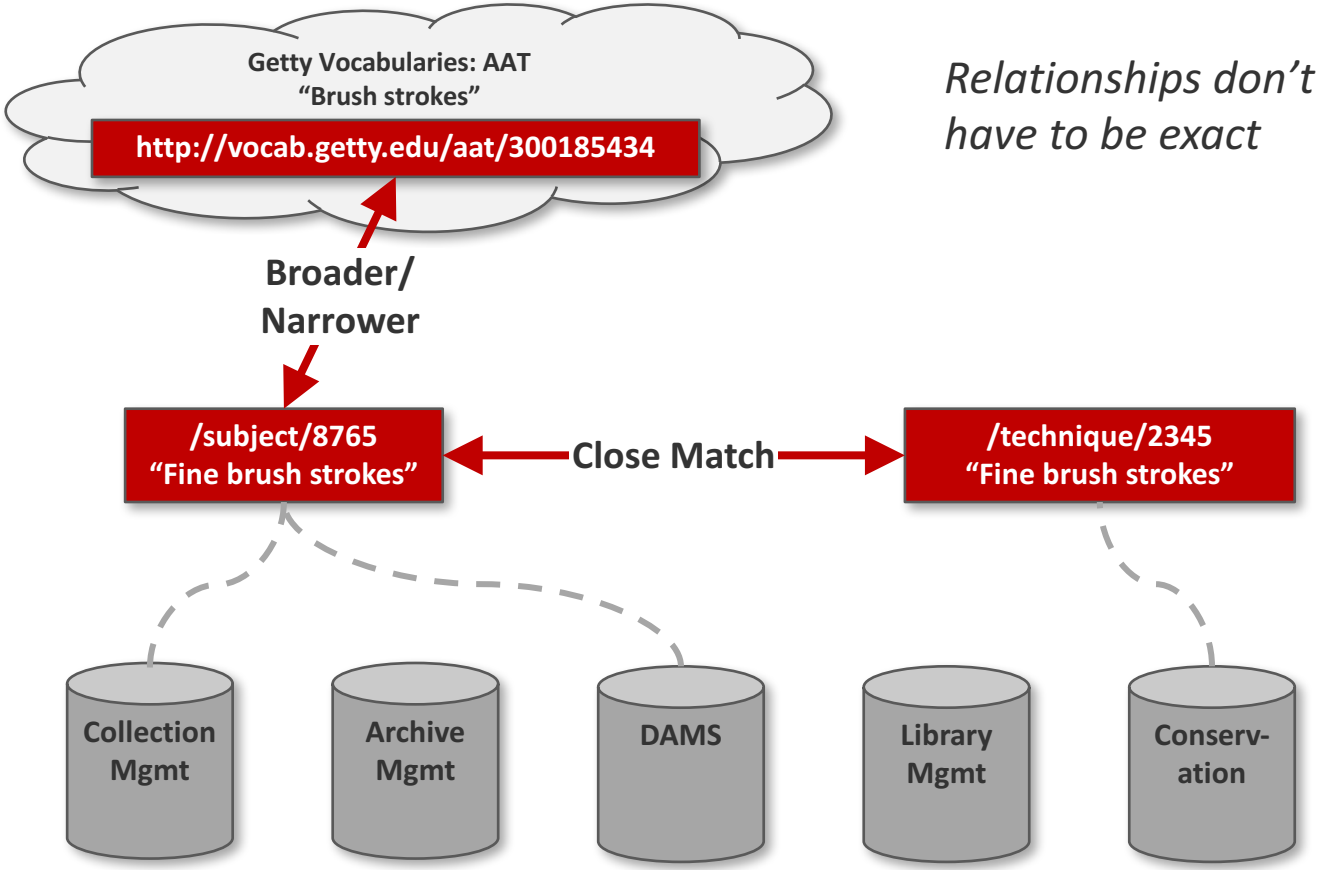
Gluing different data sets together



Do this with people, organizations, locations, subjects, geographic features, reference books, etc.

You don't have to change the data in each system to match…

Gluing different data sets together



Relationships don’t have to be exact

Multi-Institution Collaboration ?

- Desired by your institutions
- Desired by your funders
  - For example… 2016 IMLS / NEH initiative

"…Under this new partnership, we are encouraging applications that involve innovative collaborations between museum or library professionals and humanities professionals…"

NEH news announcement: Digital Humanities Advancement Grants, 7.21.2016 http://bit.ly/nehgrants

"…an interrelated set of activities forming a decentralized ecosystem can unite memory institutions in pursuing a shared strategy."

Page 5, IMLS Focus Summary Report: National Digital Platform, 4.28.2015 http://bit.ly/imlsplatform

Some Motivations for Multi-Institution Collaborations

- Broaden exploration
  - Supporting scholars, serendipity, synthesis
- Topical collaborations
  - Education, exhibitions, engagement
- Enable sharing and reuse
  - Foster flexibility, creativity, open access

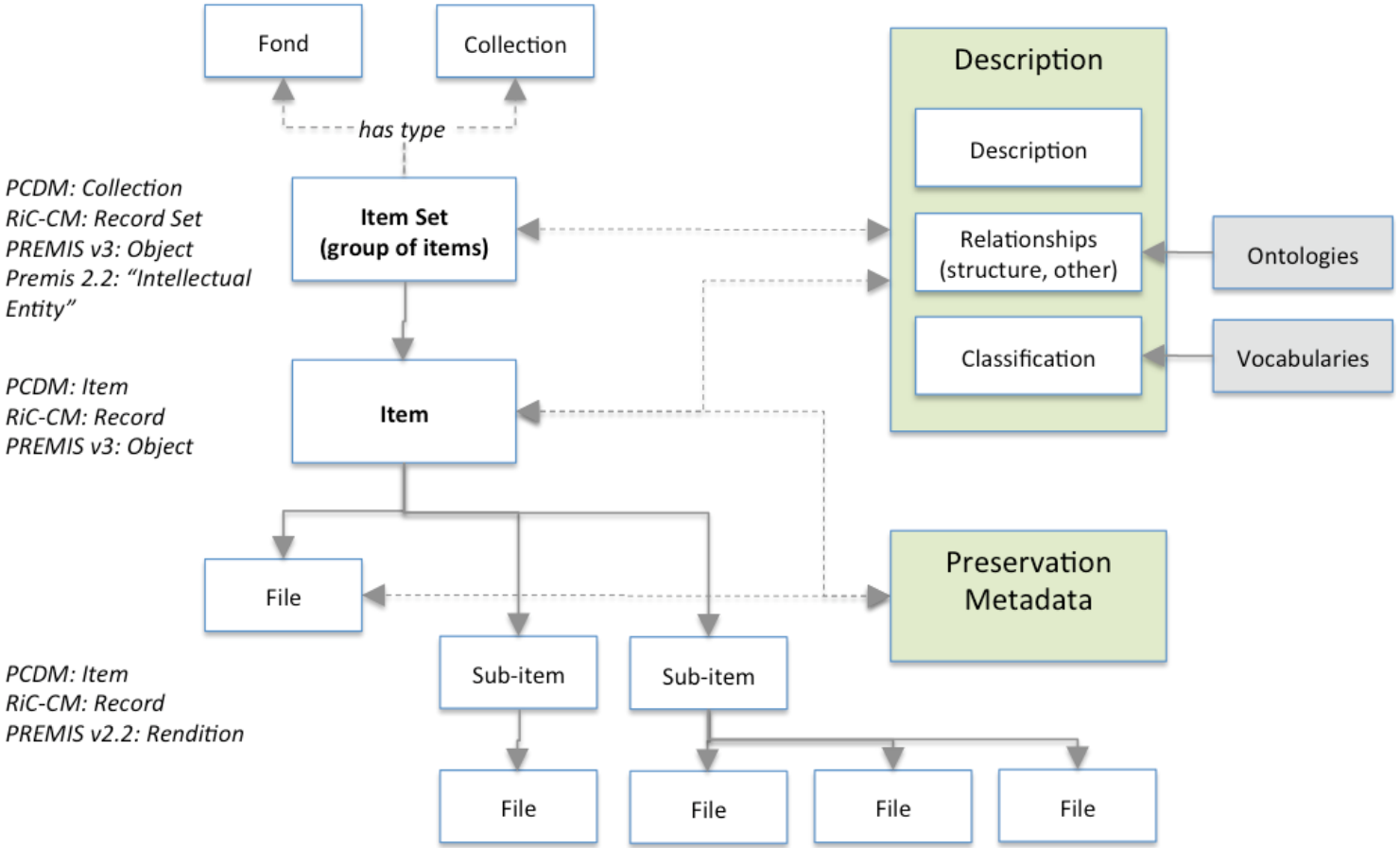
⊘ one-offs

MODELS

- Museums . . . and Libraries and Archives
- Technology (pipelines, architectures)

“Writing about music is like dancing about architecture” *(attrib. possibly Martin Mull)*

Archive model evolution



LAM: Libraries, Archives, Museums

- Museums
  - CDWA > CIDOC-CRM
- Libraries
  - MARC > FRBR/BIBFRAME
- Archives
  - EAD/EAC (MARC) > PREMIS/METS > RIC-RM, PCDM, PREMIS 3.0
- And…
  - DCMI (DublinCore), Schema.org, etc.

Playing Well Together

- Collaborate on content/data inventory
- Collect sufficient examples to understand the range

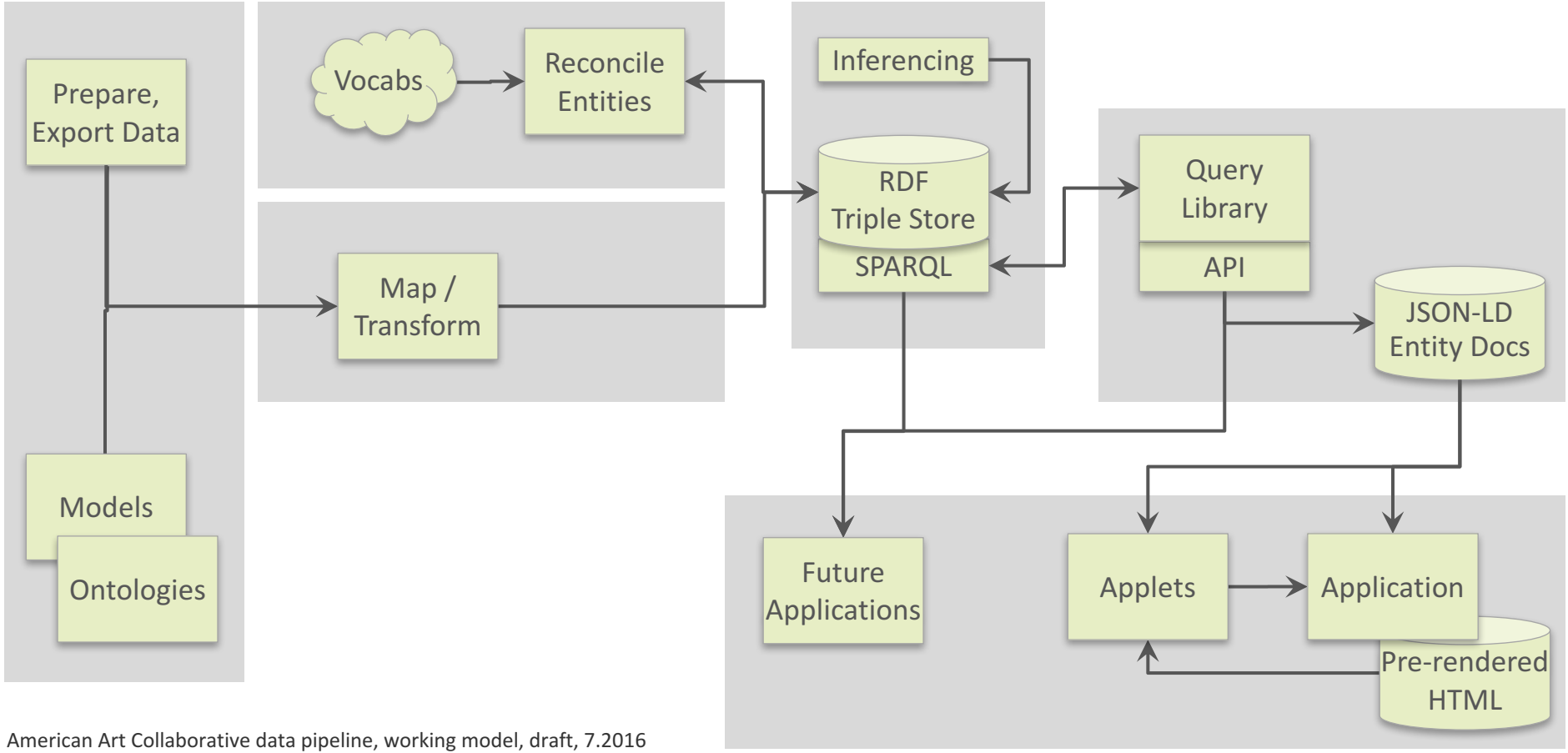
Term				x					x
ThesXrefType									x
#Dimensions Node									
Dimension	x			x				x	x
DimensionsDisplayText		x		x	x	x		x	
DimensionType	x			x				x	x
DimRank				x					x
Element	x			x				x	x
UnitLabel	x			x				x	x
#Constituents Node									
AlphaSort			x		x	x			
Biography									
BirthDate/BeginDate				x		x		x	
BirthDeathDisplayDate			x	x	x	x			
BirthPlace/Nationality			x	x	x			x	
Con Source Authority (ULAN, LOC, etc.)				x					x
CreatorDispOrder						x			x

American Art Collaborative, summer 2016

Display	Vocab Needed	Entity-descriptors	Sample data
Y	Y	CurrentLocation	Not on view
		DataDateStamp	2015-12-11T11:31:47.600
?		DateBegin	1901
Y	Y	Dated	early 20th century
?		DateEnd	1925
Y	Y	DateBegin/EndQualifier	circa, about, probably, before
?	Y	Department	American Art
Y		Edition	
Y		Inscription	[Signature] At lower left: James M. Hart; [Date] At lower left: 1859
Y		Object Accession Date	9/11/13
		Object AltNumber	TR11652
		Object Owned By or In Jurisdiction Of	
?		ObjectID	81155
Y		ObjectNumber	2013.72
Y	Y	Period/Dynasty/Era	late Archaic
Y		Provenance	William T. Walters, Baltimore, 1858 1860, by commission; Henry Walters, Baltimore, 1894, by inheritance; Walters Art Museum, 1931, by bequest.
Y		PublicDescription	Waist-length, three-quarter to righ

ArtObject | Constituent_artist | ArchiveItemRecord | Exhibitions

Harmonizing and Modernizing Data



American Art Collaborative data pipeline, working model, draft, 7.2016

Harmonizing and Modernizing Data

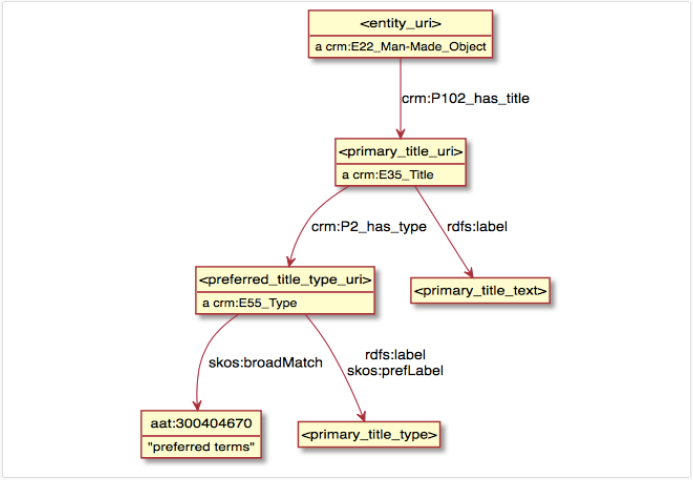
Primary Title

primary_title_text	primary_title_type	primary_title_uri
Blue Passion Flower, for the "Temple of Flora" by Robert Thornton	preferred	ycba:id/object/1000/title/1
The Blue Passion Flower, for Robert John Thornton's Temple of Flora (London, 1799–1812)	preferred	ycba:id/object/1000/title/1

Show this Query Show this as Turtle

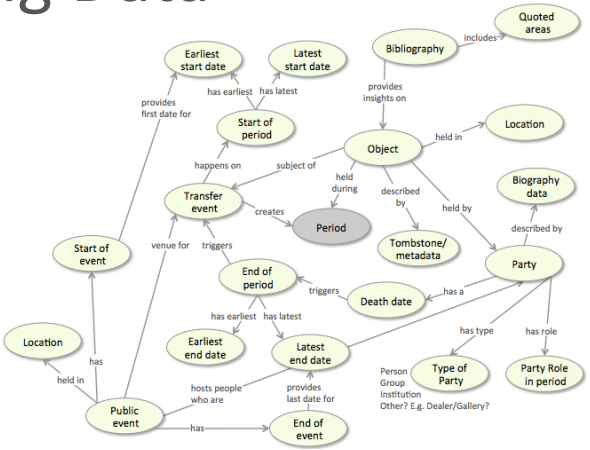
Do you see a problem with this? Submit an issue.

AAC Target Mapping For **Primary Title**



Show Mapping as Turtle

American Art Collaborative data review tool

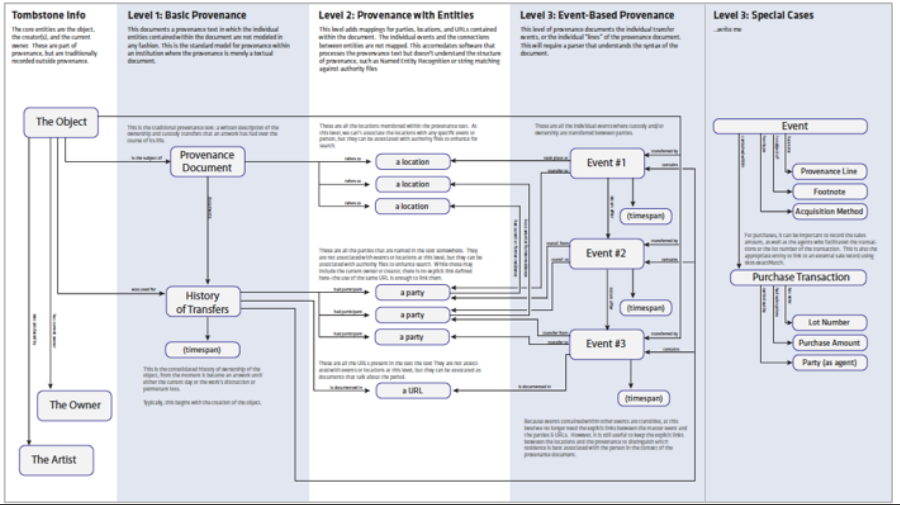


Early concepts

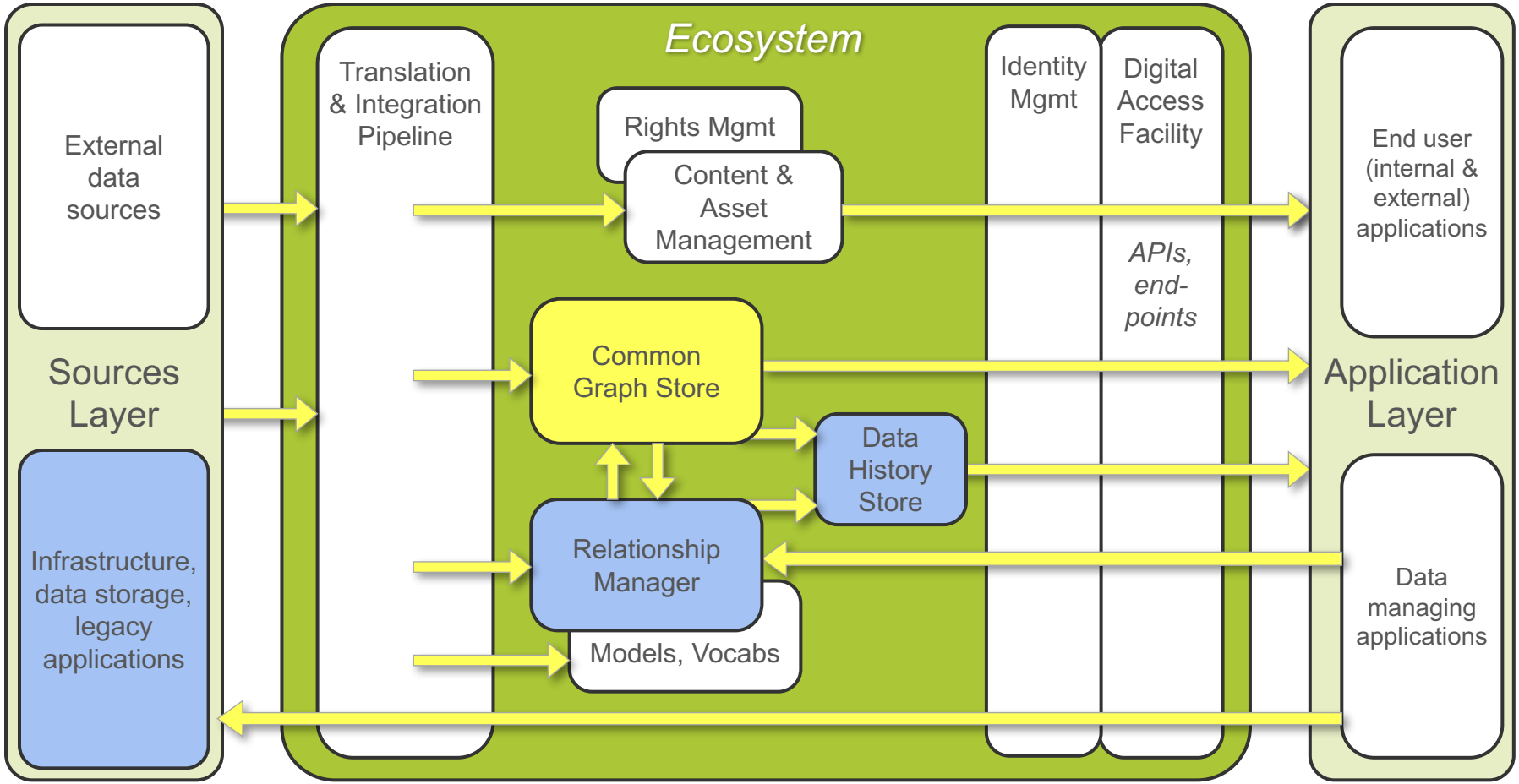
Museum Linked Data provenance modeling

ArtTracks.
Carnegie Museums,
Smithsonian Freer|Sackler,
Yale Center for British Art,
Getty Research Institute.
http://museumprovenance.org

Model presented 10.2016



Flexible Digital Environments



Collaboration with Balboa Park *"Lost in Balboa Park"* http://libp.bpoc.org/technology

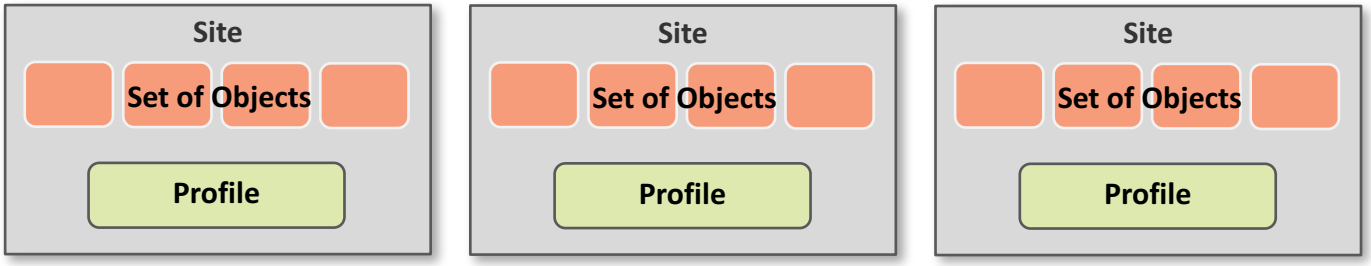
Plan for change

…with Open Access and Linked Open Data…

You're making a commitment to the community that your content and data will be available.

Persistent URLs are vital !

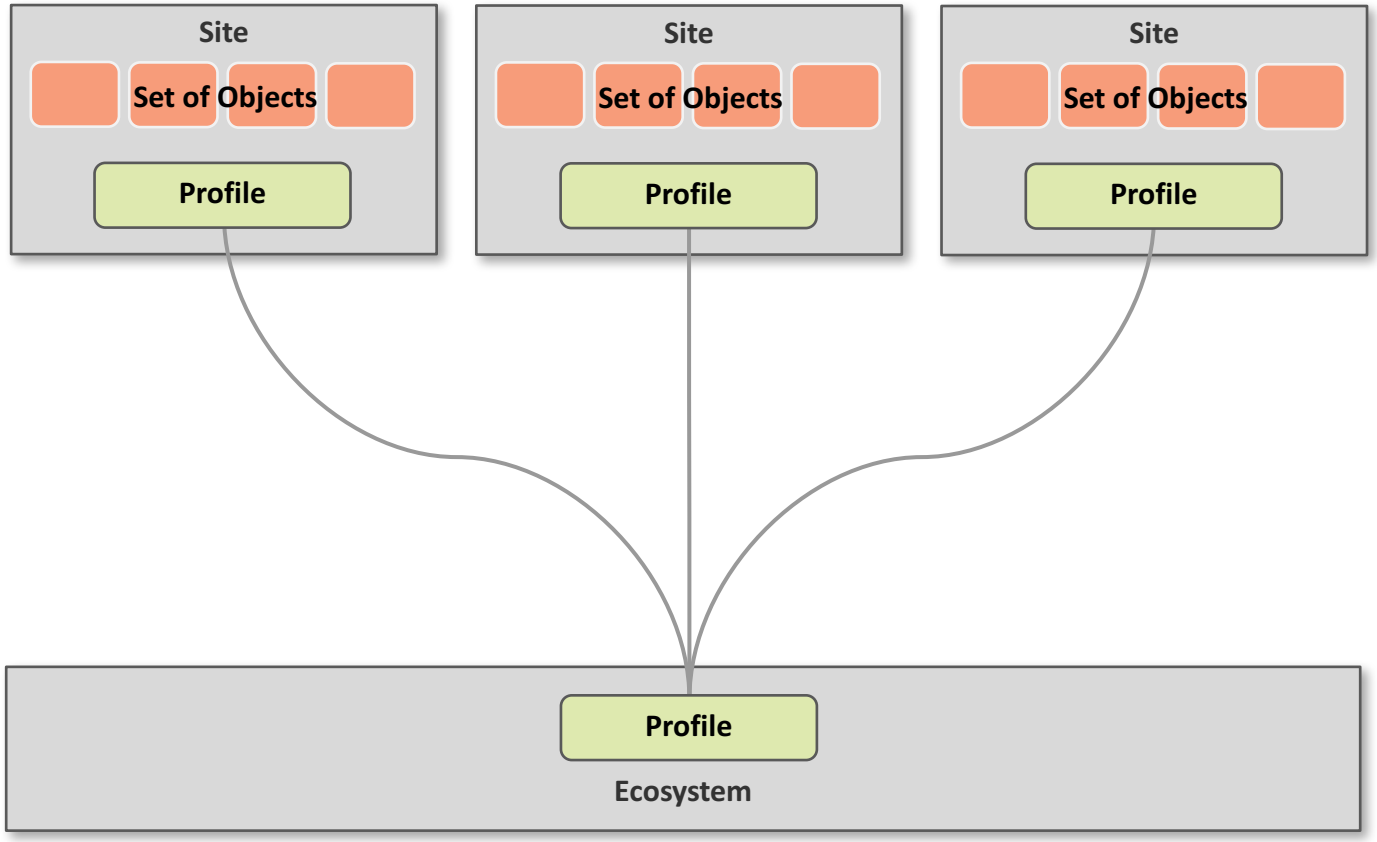
Personalization now: Typically a closed-world scenario



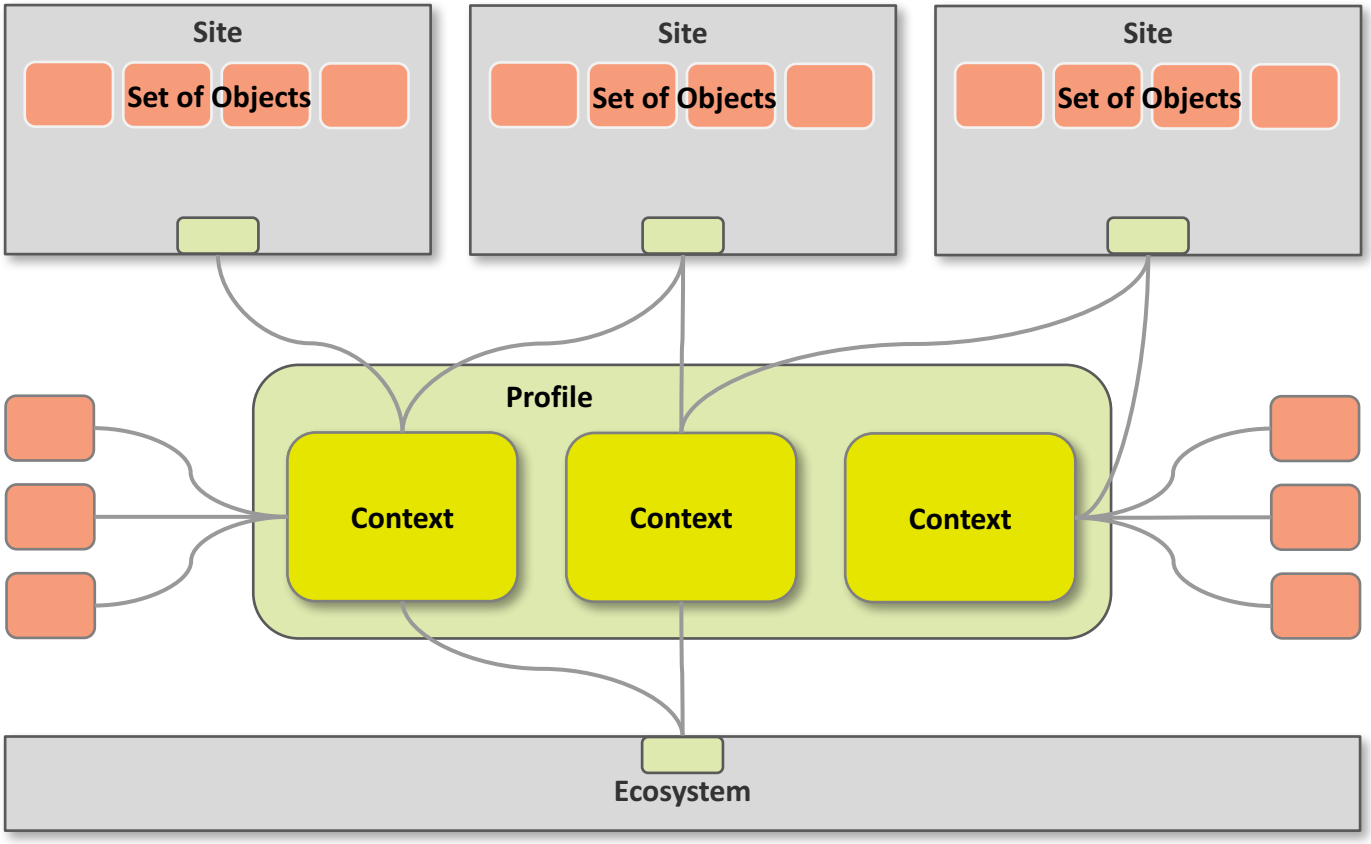
A site has an model (information architecture)
Every asset has a model (metadata and classification)
Every user has a model (personal interests and experience)

They rarely talk to each other…!

Even ecosystems behave as (semi) closed-worlds



Personalization future: Requires open-world scenarios



Linked Data design requirements

- Discovery & Serendipity
  - Discover relevant information objects – known and unknown (and foster that “A-ha!” moment)
- Extend use
  - Take away information objects relevant to my interest
  - Conveniently re-use information in my own work products
- Persistence
  - Conveniently link/reference my work and source information objects
  - Trust that information objects to which I link/reference will remain available
- Sustainability
  - Flexibility in design and data modeling to adapt to future capabilities and topics
- Scalability
  - Comfortably adapt to ever-growing resources and different working styles

The value propositions for linked data

- **Maturity, flexibility, tools**
  - A next-generation data standard
  - An active, world-spanning community
  - Flexibility in adoption, integration
  - Expanding / maturing tools
- **Do more with your content**
  - Eliminate silos
  - Avoid one-off single-use content and applications
  - Manage content more effectively
  - Improve analytical capability
- **Enhance the user experience**
  - Increase discoverability and serendipity
  - Push the boundaries on interaction
  - Serve audiences better, attract new ones
  - Bridge the physical and digital realms
- **A pioneering opportunity**
  - Demonstrate leadership, define a legacy
  - Exercise a spirit of engagement
- **Increase your reach**
  - The promise and challenge of “openness”
  - Visibility and authority at “web scale”
  - Enhance/extend organizational partnerships

Innovative Applications And Data Sharing With Linked Open Data In Museums

Museums & the Web • April 19, 2017

bit.ly/**mw17dfc**

Design for **Context**

Making software applications and web sites easy to use

www.designforcontext.com

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With contributions from Neal Johnson, Joan Cobb, Lesley Humphreys