



Getty Vocabularies and Linked Open Data (LOD)

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Additional slides thanks to Joan Cobb,
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See full documentation and SPARQL endpoint here
<http://vocab.getty.edu/>

Background: For over four decades, the [Getty Vocabularies](#) have been a linchpin in cataloging, retrieval, research, and discovery for art, architecture, diverse cultural works, archival materials, visual surrogates, and art conservation. The Vocabularies are thesauri, compliant with international standards. The Vocabularies are in many ways unique among other terminology resources; for example, they accommodate debated and ambiguous information, and they provide complex relationships between themselves and other resources. They are not simple 'value vocabularies' or lists of terms; due to rich contextual data, they are 'knowledge bases' in themselves. Compiled, curated, and distributed by Getty, the Vocabularies grow through [contributions from the expert user community](#), including institutions, consortia, and individuals. Over the years, Getty has improved the Vocabularies for the evolving requirements of traditional and new users, leading in content development and technology, while still ensuring that the Vocabularies remain accessible and useful to all tiers of core users.

In a global environment where we strive to be more open and equitable, while maintaining high standards for scholarship and research, the Getty Vocabularies facilitate these goals for art history and related disciplines. The [scope of the Vocabularies](#) remains the visual arts, while an ongoing goal is to make them more multilingual, multicultural, and inclusive, focusing also on diversity, equity, unbiased and antiracist terminology, and accessibility. Emerging from the historical Getty focus on Western art, the Vocabularies' coverage of non-Western art and culture is expanding. Examples include the [Florentine Codex project](#), which contributed hundreds of concepts to the Vocabularies in Spanish, Classical Nahuatl, contemporary Eastern Huasteca Nahuatl, and English. Ongoing multilingual projects with external partners include Chinese, Spanish, Dutch, German, Portuguese, French, Italian, Japanese, Arabic, Hebrew, and Sanskrit terminology. Other areas of development include additions of female artists, East Asian artists, Black artists, LGBTQ artists, indigenous place names, Native American tribal names, and gender identity terminology.

As Getty provides more and more digital resources for research and discovery, it is the Vocabularies that function as the glue joining varied and separate resources. In order to serve several critical audiences, the Vocabularies are [made available](#) free of charge and without restrictions in online displays and in multiple formats, including Linked Open Data (LOD). LOD is a method of publishing datasets with semantic links that can be used by computers to aid searchers in navigating the vast universe of digital information. Through LOD, the Vocabularies can unlock and disambiguate access to many kinds of knowledge, data, and images buried in a wide variety of databases and collection management systems at Getty and at museums, archives, and libraries around the world.

<http://vocab.getty.edu/aat/30019884> <http://www.w3.org/1999/02/22-rdf-
<http://vocab.getty.edu/aat/30019884> <http://www.w3.org/1999/02/22-rdf-
<http://vocab.getty.edu/aat/30019884> <http://www.w3.org/2000/01/rdf-sch-
<http://vocab.getty.edu/aat/30019884> <http://www.w3.org/2000/01/rdf-sch-
<http://vocab.getty.edu/aat/30019884> <http://www.w3.org/2000/01/rdf-sch-
<http://vocab.getty.edu/aat/30019884> <http://www.w3.org/2000/01/rdf-sch-

Getty

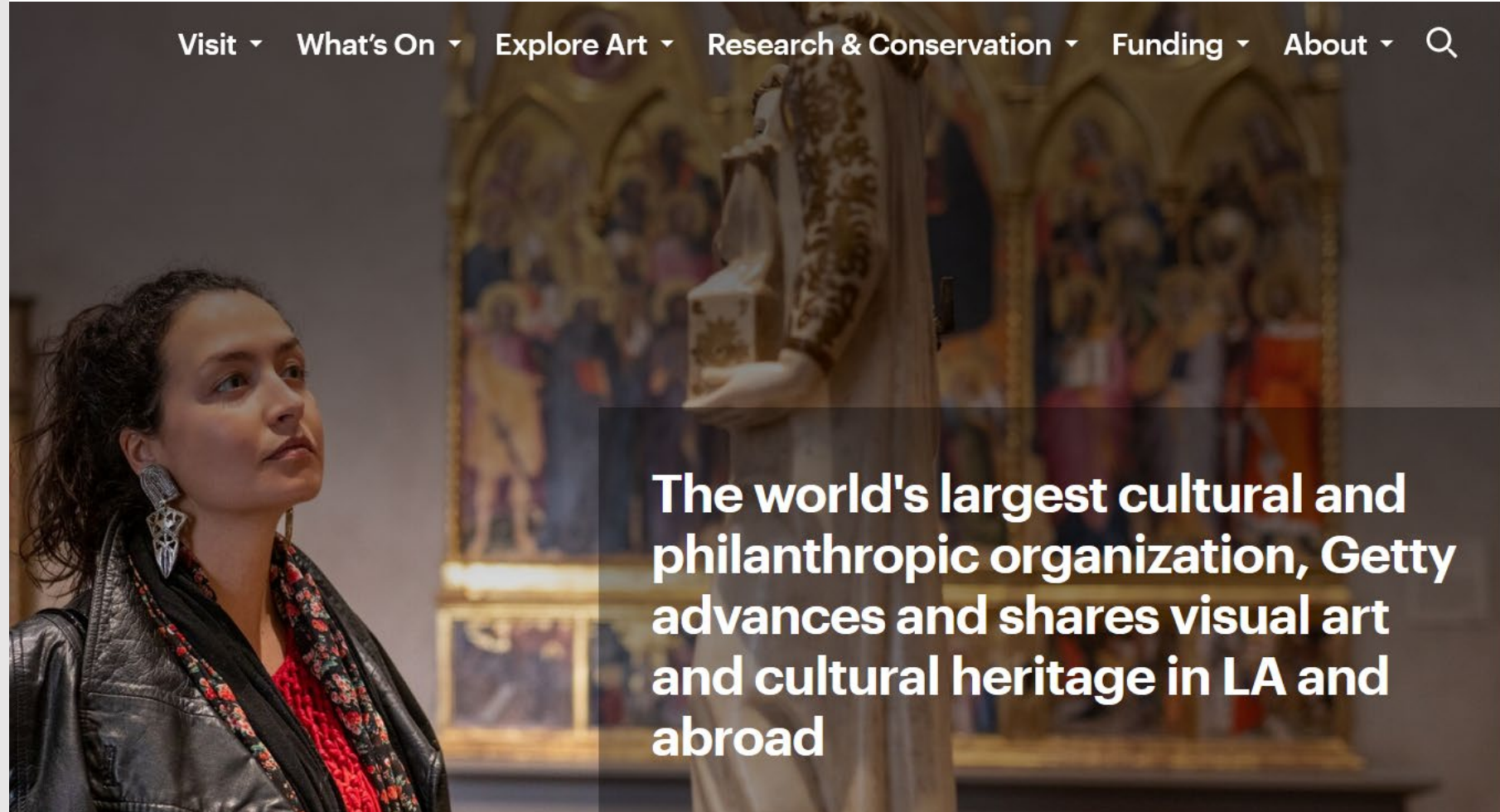
What Are Getty Vocabularies: History and Content

Find Getty Vocabs Online

For information about
Getty Vocabularies,
Google “**getty
vocabularies**”

Search the data, access
data releases, how to
contribute,
editorial guidelines,
training materials,
news

Contact us:
vocab@getty.edu



Find Getty Vocab Online

For information about Getty Vocabularies, Google “**getty vocabularies**”

Search the data, access data releases, how to contribute, editorial guidelines, training materials, news

Contact us:
vocab@getty.edu



The screenshot shows the homepage of the Getty Research Institute. The navigation bar includes: Exhibitions & Events, Special Collections, Library, Search Tools & Databases, Scholars & Projects, Publications, and About the GRI. The 'Search Tools & Databases' section is expanded, listing various search options. The 'Getty Vocabularies' section is highlighted with a red box and the text 'Click the heading'. Below this, there is a 'NEW' announcement about Linked Open Data availability. A search interface for the 'Art & Architecture Thesaurus (AAT) Online' is shown, with a search box containing 'scroll OR papyri' and a 'Search' button. The search results for 'scroll OR papyri' are visible, showing terms like 'Catherine wheel or ros...' and 'AAT is a structured vo...'. The 'The Art & Architecture Thesaurus (AAT)®' and 'The Getty Thesaurus of Geographic Names' are also visible.

Exhibitions & Events | Special Collections | Library | Search Tools & Databases | Scholars & Projects | Publications | About the GRI

Print | Share

Getty Vocabularies

NEW

The Getty vocabularies are now available as Linked Open Data. [Learn more.](#)

What is cinnabar? What is a rhyton? The Getty vocabularies contain structured terminology for art, architecture, decorative arts, archival materials, visual surrogates, conservation, and bibliographic materials. Compliant with international standards, they provide authoritative information for catalogers, researchers, and data providers. The vocabularies grow through contributions. In the new linked, open environments, they provide a powerful conduit for research and discovery for digital art history. To search the vocabularies, click on the links below.

Click the heading

scroll OR papyri

Art & Architecture Thesaurus® Online

Search the AAT

Find Term or ID:

AND OR

Note:

Pop-up Search | Browse the AAT hierarchies

Copyright information

Search Tips

For the Find Term or Note field, you may use **AND** and **OR** (all in up...

Find Getty Vocabs Online

Search online

LOD (GVP and Linked.Art)

Relational Tables

Web Services APIs

XML

SPARQL end point

OpenRefine Reconciliation

Open Data Commons

Attribution License

(ODC-By) 1.0

Contact us:

vocab@getty.edu



Search Tools & Databases

- Article & Subscription Databases
- Library Catalog
- Getty Research Portal
- Collection Inventories & Finding Aids
- Photo Archive
- Research Guides & Bibliographies
- Digital Collections
- Collecting & Provenance Research
- BHA & RILA
- ▾ Getty Vocabularies
 - Art & Architecture Thesaurus (AAT) ®
 - Cultural Objects Name Authority (CONA) ®
 - Getty Thesaurus of Geographic Names (TGN) ®
 - Union List of Artist Names (ULAN) ®
 - Contribute
 - Editorial Guidelines

Getty Vocabularies as Linked Open Data

Since their inception, the Getty Vocabularies have been designed to allow linking. Through LOD (Linked Open Data) releases, that goal can now be fully realized. LOD is a method of publishing datasets with semantic links that can be used by computers to aid searchers in navigating the vast universe of digital information. The Vocabularies can function as the glue joining varied and separate resources.



Through LOD, the Vocabularies can unlock and disambiguate access to many kinds of knowledge, data, and images buried in a wide variety of databases and collection management systems at museums, archives, and libraries around the world.

The documents on this page are subject to frequent modification and addition.

- [About Getty Vocabularies as LOD](#)
- [URIs \(Uniform Resource Identifiers\)](#)
- [Why LOD?](#)
- [Introduction to Getty Vocabularies as LOD \(PDF, 3.8 MB, 46pp\)](#)
- [List of Original External Advisors \(PDF, 88KB, 7pp\)](#)

History

Art History Information Program (AHIP)

Getty was trailblazer in committing resources to standards and vocabularies for art information in 1980s

TAU, Thesaurus Artis Universalis; CIHA, Comité international d'histoire de l'art

Getty engaged disparate communities

(visual resources, museums, libraries, special coll., archives, some scholars) under Getty leadership to reach consensus (*AAT)

1. Cataloging practice
2. Vocabularies for **cataloging, research & discovery, knowledge bases**
[classification model]
[semantic structure]

*1970s, Williamstown, MA

Getty



1997

History

International Terminology Working Group (ITWG)

Over the years, Vocabs have changed with the requirements of our core community; need to remain relevant

Getty partners with international visual arts information community

Multilingual, multicultural, inclusive

Staff: Small editorial staff, working small technical team at Getty and consultants

Contributions: Rely upon > 350 contributors: institutions, consortia, scholarly projects, scholars



History

25-year comparison 1997-2022

- **Steady growth:** in terms AAT, ULAN, and TGN, CONA, and IA
- **Global reach:** content, partners in contributions and users
- **Scope:** defined domain, with growth to be multicultural (non-Western) and multilingual; inclusivity
- **Core audience:** beyond visual resources, museums, special collections, but also art historians, conservation, archaeology, among other closely allied fields
- **Partners:** greatly enlarged number of contributors (23 vs 350) and users; e.g., VIAF
- **Free and open access:** LOD, search online, other releases Open Data Commons Attribution License (ODC-By) 1.0
- **Developers:** incorporation in search engines and collections management software, other applications; not abandoning credit and warrant, nor users without access to funds and technical support
- **Outreach:** from documentation for internal Getty to 100s of Web pages, participate in standards creation, workshops, and rules for cataloging art and creating vocabularies, *Introduction to Controlled Vocabularies, Multilingual Equivalency Work*

Click the icon to view the hierarchy.

[Semantic View \(JSON, RDF, N3/Turtle, N-Triples\)](#) Represent

ID: 300184767
Page Link: <http://vocab.getty.edu/page/aat/300184767>

jades (objects) (<sculpture by material>, sculpture (visual works), ... Visual and Verbal Comm (hierarchy name))

Note: Collectively, the class of sculptures, containers, and other objects and artifacts carved in jade several varieties of fine-grained rock materials. Prominent examples of jade 3000–2000 BCE) onward. The Chinese metaphorically equated jade with purity. A specific object name may be used, su

Terms:

- jades (objects)** ([preferred](#), C,U, (objetos) (Spanish-P,D,U,B
- jade (object)** (C,U,English,AD,U, (objeto) (Spanish,AD,U,SN)
- 玉器** (C,U,Chinese (traditional)-P,D
- yù qì** (C,U,Chinese (transliterated
- yü qi** (C,U,Chinese (transliterated
- yü ch'i** (C,U,Chinese (transliterate
- jaden beeldhouwwerken** (C,U,D
- jaden beeldhouwwerk** (C,U,Dut
- Jadekünste** (C,U,German,D,PN)
- Jadekunst** (C,U,German-P,AD,SN
- Jadeschnitzerei** (C,U,German,UF
- Jadeschnitzereien** (C,U,German,

Facet/Hierarchy Code: [V.VC](#)

```
JSON
{
  "head" : {
    "vars" : [ "Subject", "Predicate", "Object" ]
  },
  "results" : {
    "bindings" : [ {
      "Subject" : {
        "type" : "uri",
        "value" : "http://vocab.getty.edu/aat/300184767"
      },
      "Predicate" : {
        "type" : "uri",
        "value" : "http://www.w3.org/1999/02/22-rdf-syntax-ns#type"
      },
      "Object" : {
        "type" : "uri",
        "value" : "http://vocab.getty.edu/ontology#Subject"
      }
    }
  ]
}
```

Key Characteristics

- **Standards-compliant**: Comply with standards for controlled vocabularies (ISO, NISO)
- **Authoritative**: Cite authoritative sources and contributors; but not authoritarian (may use variant terms)
- **Structured, linked vocabularies**: AAT, TGN, ULAN, CONA, IA
- **Relationships**: Thesauri, 3 relationships: equivalence (synonyms), hierarchical (broader-narrower), associative (btwn records, not hierarchical); all have same core data model
- **Scope**: Carefully defined (see online); within domain of visual arts, terms for cataloging and discovery of art; Getty Vocabularies strive to be ever more multilingual, multicultural, and inclusive
- **Target Audience**: Traditional audiences (art and architecture domains: visual resources, catalogers, museums), plus scholars, and related disciplines (archaeology, conservation)
- **How unique**: In their global coverage of defined domain of visual arts, in citing published sources and contributors, in allowing interconnections among historical and current information, in accommodating the sometimes debated and ambiguous nature of art historical information, and in allowing complex relationships within and between Vocabularies
- **Rich knowledge bases**: They are not simple 'value vocabularies' or authorities; they are rich 'knowledge bases' in themselves, intended for research and discovery
- **Collaborative**: Grow through contributions from expert user community: institutions, consortia, scholarly projects, and individual scholars
- **Compiled and released**: Online search, Relational Tables, Web Services APIs, XML, LOD; Open Data Commons Attribution License (ODC-By) 1.0

Purpose and Releases

- ✓ For some users, to promote consistency in assignment of terms or to provide options for terms for a concept
- ✓ For other users, in linking in order to reference the unique identifier of the Vocabulary record, or to otherwise reconcile their data
- ✓ For other users, in retrieval and discovery, to utilize variant terms, broader/narrower contexts, rich contextual data
- ✓ For others, look-up resources of information
- ✓ As target for enriching free-text descriptions of cultural objects
- ✓ As a pivot vocabulary for coreferencing & cross referencing other art vocabularies

- Data files: LOD (GVP & Linked.Art, XML, Rel Tables, APIs); developers, incorporated in other tools; MARC for VIAF;
- simplified releases → full, rich data sets; incremental complexity
- Online Search: Consistently the top site visited at GRI, catalogers copy-and-paste, research tool; full data presented in a logical display for end users

Goals and

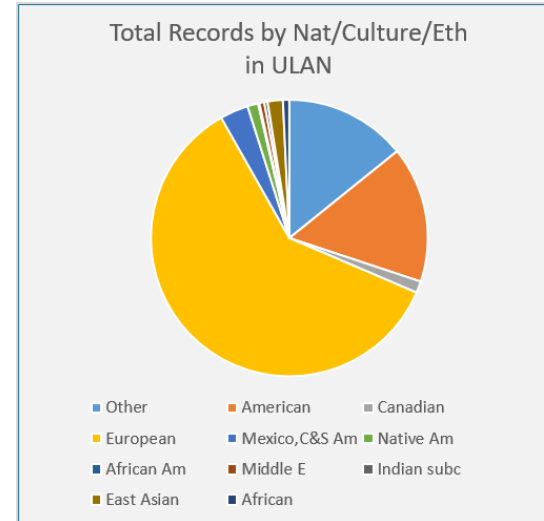
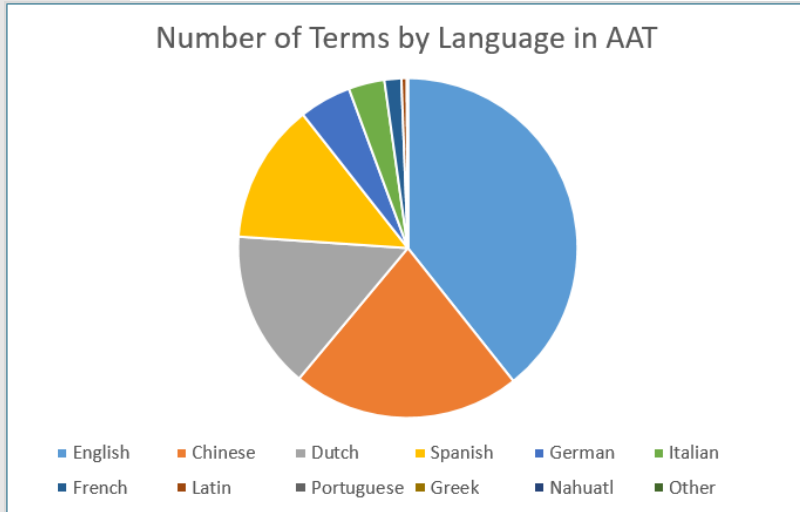
Mission

- Terms and users are too largely Western
- How to make Vocabularies more

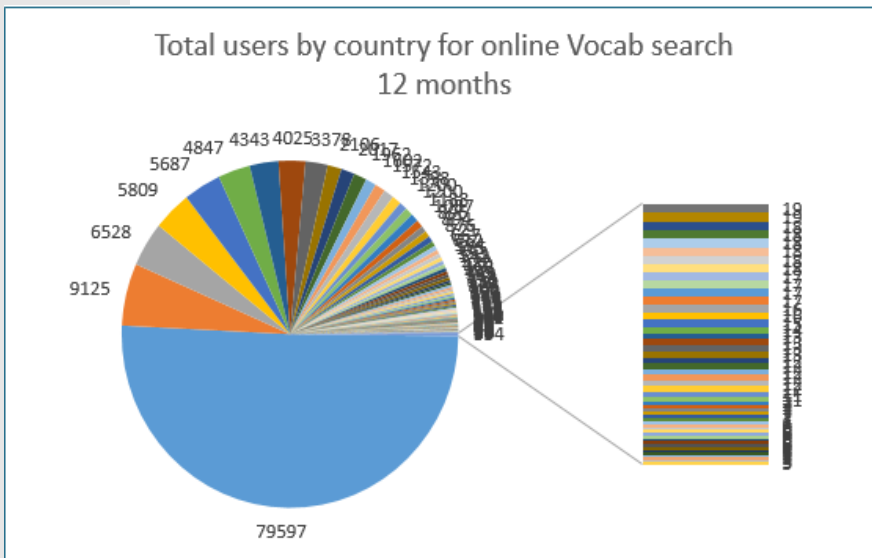
Multilingual
Multicultural
Diversity
Inclusive
Equity
Unbiased
Antiracist
Accessible



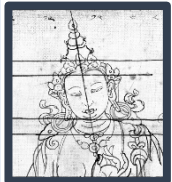
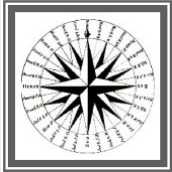
Where We Are Now, Where We Are Going



- How to measure multiculturality?
- Historical content of Vocabularies was often Western-centric
- What is the target? Comparison to similar resources and status of scholarly literature; plus broader aspirational goals



What Are the Getty Vocabularies



- **AAT**, *Art & Architecture Thesaurus*® includes generic terms in several languages, relationships, sources, and scope notes for agents, work types, roles, materials, styles, cultures, and techniques (e.g., *amphora*, *oil paint*, *olieverf*, *peintures à l'huile*, *acetolysis*, 玉器, *Jadekünste*, *sintering*, *orthographic drawings*, *Olmeca*, *Rinascimento*, *Buddhism*, *watercolors*, *asa-no-ha-toji*)
- **TGN**, *Getty Thesaurus of Geographic Names*® includes names, relationships, and coordinates, with special focus on historical information for current cities, historical nations, empires, archaeological sites, lost settlements, and physical features as necessary for cataloging art; not GIS but may include coreferences to GIS and maps (e.g., *Diospolis*, *Acalán*, *Ottoman Empire*, *Mogao*, *Ch'ien-fu-tung*, *Ganges River*, गंगा नदी)
- **ULAN**, *Union List of Artist Names*® includes names, relationships, notes, sources, and biographical information for artists, architects, firms, studios, repositories, patrons, and other individuals and corporate bodies, both named and anonymous; may include coreferences to other resources for same entity (e.g., *Mark Rothko*, *Cai Xiang*, 蔡襄, *Crevole Master*, *Riza Abbasi*, *Altobelli & Molins*, *Rajaraja Museum*)
- **IA**, *Getty Iconography Authority*™ includes proper names, relationships, and dates for iconographical narratives, religious or fictional characters, historical events, names of literary works and performing art; special focus on non-Western with coreferences to other resources including Iconclass for Western (e.g., *Viaggio dei Re Magi*, *Flood of Deucalion*, *French Revolution*, *Olouaipipilele*, *Xibalba*, *Niflheim*, शिव, *Shiva*, *Bouddha couché*)
- **CONA**, *Cultural Objects Name Authority*® focuses on architecture, multiples, and works depicted in other works; includes titles, artist attribution, creation dates, relationships, and location for works whether extant or destroyed (new contribution: 70,000 works from BWR) (e.g., *Chayasomesvara Temple*, *Hagia Sofia*, *Αγία Σοφία*, *The Lacemaker*, *La Dentellière*, *Merlettaia*, *Lion Throne Room*, 神奈川沖浪, *Great Wave*, *Die große Welle*.)

What Are Getty Vocabularies



- **AAT, Art & Architecture Thesaurus®** includes generic terms in several languages, relationships, sources, and scope notes for work types, roles, materials, styles, cultures, and techniques (477,898 terms) (e.g., *amphora, literati (painters), oil paint, olieverf, peintures à l'huile, acetolysis, 玉器, Jadekünste, sintering, orthographic drawings, Olmeca, Rinascimento, Buddhism, emakimono, watercolors, asa-no-ha-toji*)

coreferen
(e.g., *Dios*

- **ULAN, Un**
- **IA, Getty Id**

religious or fictional characters, historical events, names of literary works and performing art; special focus on non-Western with coreferences to other resources including Iconclass for Western (e.g., *Viaggio dei Re Magi, Flood of Deucalion, French Revolution, Olouaipipilele, Xibalba, Niflheim, शिव, Shiva, Bouddha couché*)

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• **AAT, Art & Architecture Thesaurus®**

Sample record (partial)

AAT ID: 300190536

Terms:

steel engravings (pref, en-P,PN)

[1000041363] **Contrib.** [VP,BHA] **Sources.** Gascoigne 1986, Lucie-Smith 1986, Brit 2000-*

Qualifier: visual works

Date: from 1792

Start: 1792 **End:** 9999

steel engraving (en, SN)

[1000299348] **Contrib.** [VP,BHA] **Sources.** *

Qualifier: visual work

engravings on steel (en) (Hist)

[1000895990] **Contrib.** [Morem] **Sources.** *

gravures sur acier (fr-N, PFN)

[1000304335] **Contrib.** [CHIN] **Sources.** *

鋼版刻印 (zh_TW-P) [1000551901]

Contrib. [AS] **Sources.** *

gāng bǎn kè yìn (zh-Latn-pny-P)

[1000551903] **Contrib.** [AS] **Sources.** *

staalgravures (nl-P) [1000482814]

Contrib. [RKD-AAT ned] **Sources.** *

gravuras em metal (pt-P)

[1000884616] **Contrib.** [CVAA-BR] **Sources.** *

Terms (cont):

grabados al acero (es-N) [1000429838]

Contrib. [CDBP-SNPC] **Sources.** *

Stahlstiche (de-N) [1000655952]

Contrib. [IfM-SMB-PK] **Sources.** *

Associative Relationships

produced by ... steel engraving (printing process) [300190536]

distinct **Contrib.** [VP,BHA] **Sources.** *

guished from ... siderographs

[300389774] **Date:** from early 1800s

Start: 1800 **End:** 9999

Hierarchical Relationships (poly)

Objects Facet

.. Visual and Verbal Communication (G)

.... Visual Works (hierarchy name) (G)

..... visual works (works) (G)

..... <visual works by material or technique> (G)

..... prints (visual works) (G)

..... <prints by process or technique> (G)

..... <prints by process: transfer method> (G)

..... intaglio prints (G)

..... engravings (prints) (G)

..... steel engravings (visual works) (G)



Note: Prints made by the process of "steel engraving (printing process)," in which plates of steel or steel-faced copper are used, having replaced the use of less durable copper plates in the early 19th century...

Contrib. [VP,BHA] **Sources.** Gascoigne 1986, Lucie-Smith 1986, Brit 2000-, *

Chinese (traditional) 以鋼版雕刻程序製成的版畫

Contrib. [AS] **Sources.** *

Dutch Gravures waarbij de afbeelding is gesneden in een stalen plaat. **Contrib.** [RKD-AAT ned] **Sources.** *

German Druck, der im Verfahren des Stahlstichs hergestellt wurde. **Contrib.** [IfM-SMB-PK] **Sources.** *

Spanish Estampas realizadas mediante el proceso de grabado en acero.... **Contrib.** [CDBP-SNPC] **Sources.** *

Contributors: VP,BHA,CHIN,AS,RKD,IfM-SMB-PK,CDPB-DIBAM

Sources: Griffiths, Prints (1996); Hunnisett, Steel-Engraved (2020); Koschatzky, Die Kunst der Graphik (1988);

Thes.Graph.Mat. **tgm010117**; Lucie-Smith, Thames & Hudson Dictionary of Art Terms (1986); Newman, Innovative Printmaking (1997)

UNIQUE IDS

LANGUAGES

PREFERENCES
= views of data

DATES, HIST/CUR

RELS/LINKS--POLY

CREDIT/WARRANT

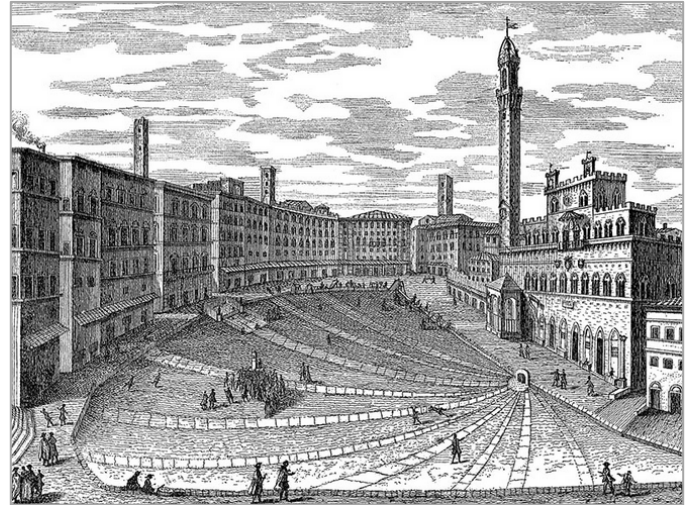
COREFERENCES

View of the TGN hierarchy

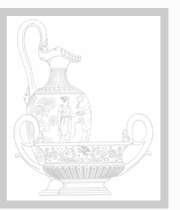
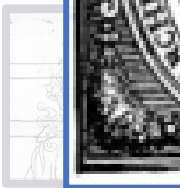
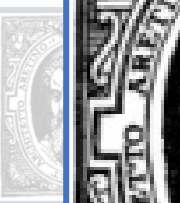
- Top of the TGN hierarchy (hierarchy root)
- [World](#) (facet)
- [Europe](#) (continent)
- [Etruria](#) (former group of political entities)
- [Arezzo](#) (inhabited place) [N]
- [Bologna](#) (inhabited place) [N]
- [Cerveteri](#) (inhabited place) [N]
- [Chianciano Terme](#) (inhabited place) [N]
- [Chiusi](#) (inhabited place) [N]
- [Cortona](#) (inhabited place) [N]
- [Fiesole](#) (inhabited place) [N]
- [Kainua](#) (deserted settlement) [N]
- [La Foce](#) (inhabited place) [N]
- [Orte](#) (inhabited place) [N]
- [Orvieto](#) (inhabited place) [N]
- [Perugia](#) (inhabited place) [N]
- [Pisa](#) (inhabited place) [N]
- [Populonia](#) (inhabited place) [N]
- [Rusellae](#) (deserted settlement) [N]
- [Siena](#) (inhabited place) [N]
- [Tarquinia](#) (deserted settlement) [N]
- [Veio](#) (deserted settlement) [N]
- [Vetulonia](#) (inhabited place) [N]
- [Volterra](#) (inhabited place) [N]

- Indention: broader/narrower (whole/part(former group of political entities))
- Historical hierarchical view of places
- Place Types display in parentheses

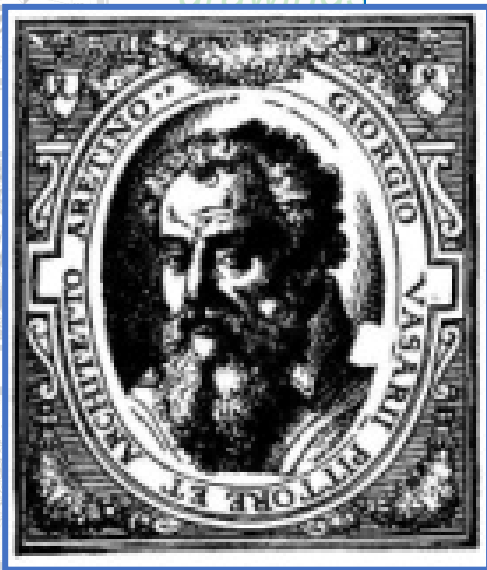
Place
Siena (Etruria)



What Are Getty Vocabularies



- **AAT**, *Art & Architecture Thesaurus*® includes generic terms in several languages, relationships, sources, and scope notes for agents, work types, roles, materials, styles, cultures, and techniques (e.g., *amphora, oil paint, olieverf, peintures à l'huile, acetolysis, 玉器, Jadekünste, sintering, orthographic drawings*)

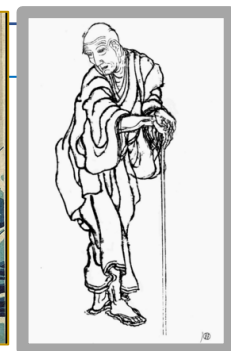


- **ULAN**, *Union List of Artist Names*® includes names, relationships, notes, sources, and biographical information for artists, architects, firms, studios, repositories, patrons, other individuals and corporate bodies, both named and anonymous; may include coreferences to other resources (1,470,142 names) (e.g., *Mark Rothko, Cai Xiang, 蔡襄, Crevole Master, Riza Abbasi, Rajaraja Museum, I. M. Pei & Partners, Ahuizotl, William Kentridge, Frida Kahlo*)

religious d
Western v
Deucalion

- **CONA**, *Consolidated Name Authority* includes titles, artist attribution, creation dates, relationships, and location for works whether extant or destroyed (new contribution: 70,000 works from BWR) (e.g., *Chayasomesvara Temple, Hagia Sofia, Αγία Σοφία, The Lacemaker, La Dentellière, Merlettaia, Lion Throne Room, 神奈川沖浪, Great Wave, Die große Welle,*)

• **ULAN, Union List of Artist Names®**
Sample record



ULAN ID: 500060426

Names:

Katsushika Hokusai (en,ja-trans) [1500235399]

Contrib. [VP,CCA, Avery]

Sources. Bowie (1964), Grove (2022),Met (2003)*

Hokusai (en,ja-trans) [1500235408]

Date: name taken by the artist in 1798, and used for his prints and paintings

Start: 1798 *End:* 9999

葛飾 北斎 (ja) [1500705416]

Shunrō (en,ja-trans) *Date:* gō (artist's name), used in his years of training, when painting hosoban (narrow prints) [1500235400]

Sōri (en,ja-trans) *Date:* gō used in early career, named taken from his Rinpa-school master Tawaraya Sōri [1500235401]

Kakō (en,ja-trans) *Date:* used for the production of commercial prints and books [1500235402]

Tatsumasa (en,ja-trans) *Date:* used for the production of privately published illustrations [1500235403]

Display bio: (Japanese printmaker, painter, 1760-1849)

Birth date: 1760

Death date: 1849

Nationalities:

Japanese (pref)

Roles:

artist

AAT

printmaker

painter

designer

calligrapher

draftsman

landscapist

marine artist

figure artist

ukiyo-e artist

Gender: male

Birth and Death Places:

Born: Tokyo (Kanto, Japan)) (inhab place)

Died: Tokyo (Kanto, Japan)) (inhab place)

Events:

active: Tokyo (Kanto, Japan)) (inhab place)

..... in Edo, modern-day Tokyo

Associative Relationships:

teacher of Taito, Katsushika, II

.....(Japanese printmaker, active ca. 1820-1850)

child of Nakajima Ise

.....(Japanese mirror maker, 18th century)

possibly identified with ... Tōshūsai Sharaku

..... (Japanese printmaker, active 1794-1795)

Contributors:

VP, Avery,GRL,BHA,CCA

Sources: Bowie, Drawings of Hokusai (1964);

Grove Dictionary of Art online (1999-2002);

Library of Congress Authorities n 80043599 ;

Metropolitan Museum of Art [online] (2003-);

Bouquillard, Hokusai: First Manga Master (2007)

TGN

UNIQUE IDS

LANGUAGES

PREFERENCES

DATES, HIST/CUR

RELS/LINKS--POLY

CREDIT/WARRANT

COREFERENCES

View of the ULAN hierarchy

Top of the ULAN list / hierarchy

.... Persons, Artists (ULAN facet)

- Katsukawa Shuntei (Japanese illustrator, printmaker, and painter, 1770-1820)
- Katsukawa Shunzan (Japanese printmaker, active 1782-1789)
- Katsuki, Liane (Brazilian jewelry designer, active late 20th century)
- Katsumoto, Fujio (Japanese painter, 1926-1984)
- Katsumoto, Hosokawa (Japanese administrator, architect, 1430-1473)
- Katsura, Hideaki (Japanese architect, contemporary)
- Katsushika Hokusai (Japanese printmaker, painter, 1760-1849)
- Katsushika Ōi (Japanese painter, active 19th century)
- Katsu Shikin (Japanese poet, seal carver, and physician, 1739-1784)

- Indention: broader/narrower (instance)
- Corporate Bodies can have more levels
- Display Biography displays in parentheses

Person

Katsushika Hokusai



.... Corporate Bodies (ULAN facet)

- Art Institute of Chicago (American museum, Chicago, founded in 1879)
- Dept. of Architecture (American department, Chicago, founded 1982)
- John M. Flaxman Library (American library, Chicago, established in 1967)
- ➔ Ryerson and Burnham Libraries (American library, Chicago, established 1967)
- Burnham Library of Architecture (American library, 1912-1967)
- Ryerson Library (American library, Chicago, founded 1904)
- School of the Art Institute of Chicago (American art school, Chicago, established in 1967)

What Are Getty Vocabularies



- **AAT**, *Art & Architecture Thesaurus*® includes generic terms in several languages, relationships, sources, and scope notes for agents, work types, roles, materials, styles, cultures, and techniques (e.g., *amphora, oil paint, olieverf, peintures à l'huile, acetolysis, 玉器, Jadekünste, sintering, orthographic drawings, Olmeca, Rinascimento, Buddhism, watercolors, asa-no-ha-toji*)



- **TGN**, *Getty*



- **IA**, *Getty Iconography Authority*™ includes proper names, relationships, and dates for iconographical narratives, religious or fictional characters, historical events, names of literary works and performing art; special focus on non-Western with coreferences to other resources (7,200 terms) (e.g., *Yemonja, Flood of Deucalion, Viaggio dei Re Magi, French Revolution, Olouaipilele, Xibalba, Niflheim, शिव, Shiva, Bouddha couché, Mithras*)



Deucalion

- **CONA**, *Getty*

includes titles, artist attribution, creation dates, relationships, and location for works whether extant or destroyed (new contribution: 70,000 works from BWR) (e.g., *Chayasomesvara Temple, Hagia Sofia, Αγία Σοφία, The Lacemaker, La Dentellière, Merlettaia, Lion Throne Room, 神奈川沖浪, Great Wave, Die große Welle,*)

• IA, Getty Iconography Authority™

Sample record



IA ID **901000085**

Names

Avalokiteśvara (pref-en) **[5000191]**

Qualifier: Buddhist bodhisattva

Date: name occurs in Sanskrit by 7th century

Start: 600 **End:** 9999 **Contrib:** VP,BHA,BWR

Sources: Bowker (1997); Dunhuang (2010)

Avalokitesvara **[5001067]**

Avalokitesvara **[5003150]**

अवलोकितेश्वर (sa) **[5001068]**

ལྷན་རས་གཟིགས (bo) **[5002308]**

Spyan ras gzigs **[5002309]**

Hierarchical Relationships

Top of the IA hierarchies

Legend, Religion, Mythology

Buddhist iconography

Buddhist characters

Avalokiteshvara (Buddhist iconography)

Vocab links

role/characteristic is ... Bodhisattva [AAT]

symbolic attribute is ... lotus [AAT]

culture/religion is ... Mahayana (Buddhism) [AAT]

culture/religion is ... Theravada (Buddhism) [AAT]

AAT
TGN
ULAN
CONA

Associative Relationships

associated with Krishna (Hindu iconography)

counterpart is Guanyin (Buddhist iconography)

Display Date: veneration in India flourished ca. 3rd-7th centuries **Start:** 200 **End:** 9999

Note The bodhisattva of infinite compassion and mercy; embodies the compassion of all Buddhas. Known in over 100 manifestations; is portrayed in different cultures as either female or male, as

Contributors VP,BHA,BWR

Sources Bowker, Oxford Dictionary of World Religions (1997); Huntington, Art of Ancient India (1985); Encyclopedia Britannica Online (2022-);

LC: LC control no.: **sh 85010492**

UNIQUE IDS

LANGUAGES

PREFERENCES

DATES, HIST/CUR

RELS/LINKS--POLY

CREDIT/WARRANT

COREFERENCES

View of the IA hierarchy

Top of the IA Hierarchies

..... Legend, Religion, Mythology

..... <Buddhist iconography>

..... <Buddhist characters>

..... Aizen Myōō (Buddhist character)

..... Akṣobhya (Buddhist deity)

..... Amaterasu (Shinto deity)

..... Amitābha (Mahayana deity)

..... Amitāyus (Buddhist character)

..... Amoghapasa (Buddhist character)

..... Amoghasiddhi (Buddhist deity)

..... Ānanda (Buddhist character)

..... Arapaṇa (Buddhist deity)

..... Avalokiteśvara (Buddhist bodhisattva)

..... Benzaiten (Japanese deity)

..... Bhairava (Hindu-Buddhist deity) [N]

..... Bishamon (Buddhist character)

..... Buddha (primary character of Buddhism)

..... Cakrasaṃvara (Buddhist deity)

..... Channa (Buddhist character)

..... Daiitoku Myōō (Buddhist character)

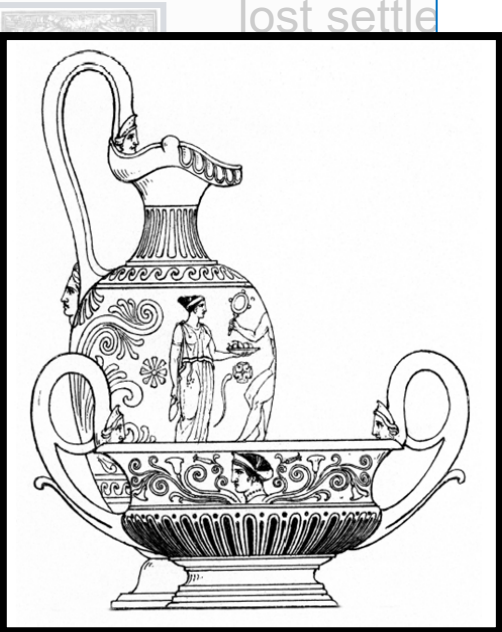
- Indention: broader/narrower (instance)
- Guide Terms in angled brackets
- Qualifying description in parentheses

Character

Avalokiteśvara (Buddhist bodhisattva)



What Are Getty Vocabularies



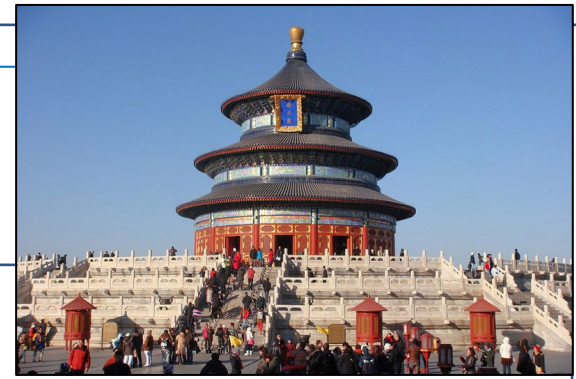
- **AAT**, *Art & Architecture Thesaurus*® includes generic terms in several languages, relationships, sources, and scope notes for agents, work types, roles, materials, styles, cultures, and techniques (e.g., *amphora, oil paint, olieverf, peintures à l'huile, acetolysis, 玉器, Jadekünste, sintering, orthographic drawings, Olmeca, Rinascimento, Buddhism, watercolors, asa-no-ha-toji*)
- **TGN**, *Getty Thesaurus of Geographic Names*® includes names, relationships, and coordinates, with special focus on historical information for current cities, historical nations, empires, archaeological sites, lost settle

- **CONA**, *Cultural Objects Name Authority*® titles, artist attribution, creation dates, relationships, and location for works; focuses on architecture, multiples, works depicted in other works, lost works, designed but not built (107,493 titles) (e.g., *Hagia Sofia, Αγία Σοφία, Adinatha Temple, Flatiron Building, The Lacemaker, Merlettaia, La Dentellière, Lion Throne Room, 神奈川沖浪, Great Wave, Die große Welle*)

includes titles, artist attribution, creation dates, relationships, and location for works whether extant or destroyed (new contribution: 70,000 works from BWR) (e.g., *Chayasomesvara Temple, Hagia Sofia, Αγία Σοφία, The Lacemaker, La Dentellière, Merlettaia, Lion Throne Room, 神奈川沖浪, Great Wave, Die große Welle,*)

• **CONA, Cultural Objects Name Authority®**

Sample record



CONA ID: 700002923

Titles/Names:

Temple of Heaven (pref- en)

[1000016889]

Display Date: renamed in the 16th century **Start:** 1521 **End:** 9999

Contrib: JPGM,BWR,BHA

Sources: BWR database (2019); Great Buildings (2000); UNESCO WHC (1992)

Tian Tan (zh-tr) [1000016890]

T'ien-t'an (zh-trl) [1000019041]

Tiantan [1000016892]

Temple du Ciel (fr) [1000019264]

Templo del Cielo (es)

[1000019265]

Himmelstempel (de) [1000019266]

天壇 (zh) [1000016894]

坛 (zh) [1000016893]

천단 (ko) [1000019043]

Catalog Level: item

Work Types: temple complex

AAT

Classification: Architecture

Creation Date: construction 1406-1420; extended 16th century **Start:** 1406 **End:** 1420

Qualifier: construction

Creator Display: first built by Ming Chengzu; extended by Ming Shizong; renovated by Qianlong

ULAN

[ULAN 500356295]

Role: patron/38121

[ULAN 500372663]

Role: patron/38121

[ULAN 500372572]

Role: patron/38121

Locations:

Location current Beijing (Beijing Shi (municipality), China) (nation) **Address Note:** +39.913889,+116.391667

TGN

Dimensions [display] entire complex: 237 hectares

Mat & Tech [display] wood and stone

wood **AAT 300011914** | stone **AAT 300011176**

Style: Chinese [AAT 300018322] | Taoist [AAT 3001

AAT

General Subject:

architecture **Type:** isness

religion and mythology **Extent:** purpose

Specific Subjects:

Heaven [AAT 300185658] **Extent:** dedication

Chinese heaven [IA 901002236]

AAT
TGN
ULAN
CONA
CONA IA

Note: Large religious complex in the old outer city comprises three buildings are built in a straight line

Contributors:

JPGM; VP; GRISC; BHA; BWR;

Sources: Built Works Registry **BWR3792244**; Library of Congress Authorities online (2002-) **n2011019454**;

Fodor's Travel (2016); J. Paul Getty Museum, collections online (2000-); Great Buildings Online (1997-); UNESCO World Heritage Centre [online] (1992-) **Ref: 881**

UNIQUE IDS

LANGUAGES

PREFERENCES

DATES, HIST/CUR

RELS/LINKS--POLY

CREDIT/WARRANT

COREFERENCES

View of the CONA hierarchy



Top of the CONA Hierarchy

.... **Built Works** (CONA facet)

.....<**Built Works by class: religious, ceremonial, and funerary structures**>

..... **Aachener Dom (cathedral)**; by order of Charlemagne; 805; Aachen (Nordrhein Westfalen, Deutschland)

..... **Abbadia San Salvatore (abbey)**; Creator: unavailable; 1035; Siena (Toscana, Ita

..... **Abba Libanos Church (church)**; Creator: unavailable; 1299; Lalibela (Amara, Ity



..... **Abbatiale Saint-Ouen (abbey)**; Jean de Bayeux I (French architect...; construct 16th centuries; Rouen (Haute-Normandie, France)



..... **Abbaye de la Chaise-Dieu (abbey)**; Robert Abbe of Saint-Dieu (died 1067?), Fre associat...; 1043; Departement de la Haute-Loire (Auvergne-Rhone-Alpes, France)

..... **Temenos of Demeter (sanctuary)**; Creator: unavailable; 200 BCE; Hellenistic; Bergama (Izmir, Turkiye)

..... **Tempel Synagogue (synagogue)**; Ignacy Hercok (Austrian-Polish architect); 1862; Cracow (Malopolskie, Polska)

..... **Temple du Devin (temple)**; Creator: unavailable; 1400 BCE; Maskanah (Ha

..... **Temple Emanu-El (temple)**; Sylvain Schnaittacher; Bakewell & Brown; Ber G...; 1928; San Francisco (San Francisco, California, United States)

..... **Temple Emanuel (synagogue)**; Kohn, Robert D. (1870-1953), American, a C...; 1929; New York (New York, United States)

..... **Temple of Apedemak (temple)**; unknown Nubian, mid 1st century CE; Athar an Naq'a (Nahr an Nil, As Sudan)



..... **Temple of Heaven (temple complex)**; first built by Ming Chengzu (1360-1424); extended by Ming Sh...; construction 1406 to 1420; ext...; Beijing (Zhongguo)

..... **Circular Mound Altar (altar)**; original construction: the Jiajing Emperor; built in 1530, rebuilt in 1740...; Beijing (Beijing Shi, Zhongguo)

..... **Hall of Prayer for Good Harvests (shrine)**; patron: Yongle Emperor of Ming Dynasty; 15th century; rebuilt after fire of 1889; Beijing (Zhongguo)

..... **Imperial Vault of Heaven (shrine)**; during the reign of the Yongle Emperor of Ming Dynasty; original, temple complex was c... Beijing (Zhongguo)

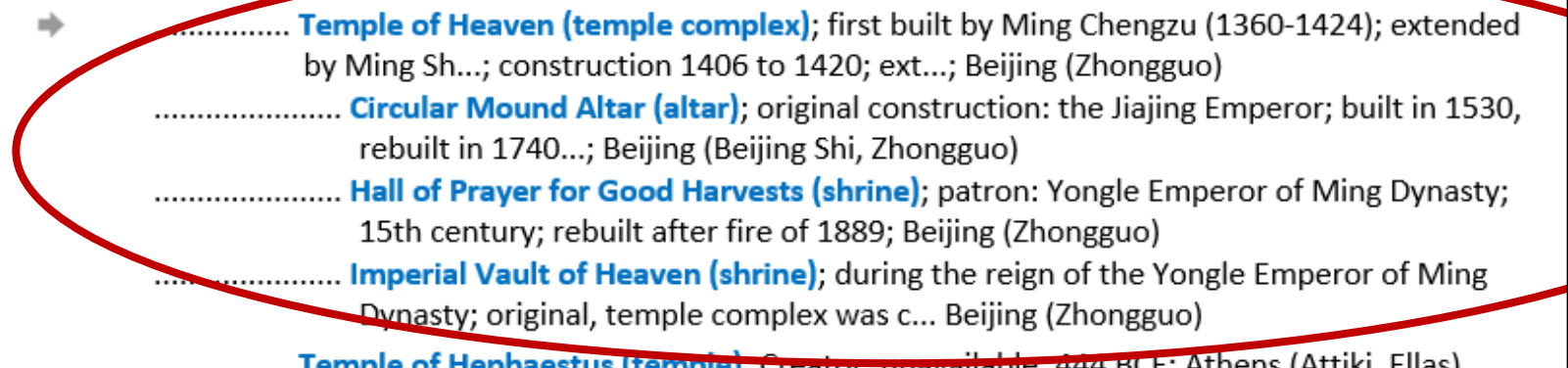
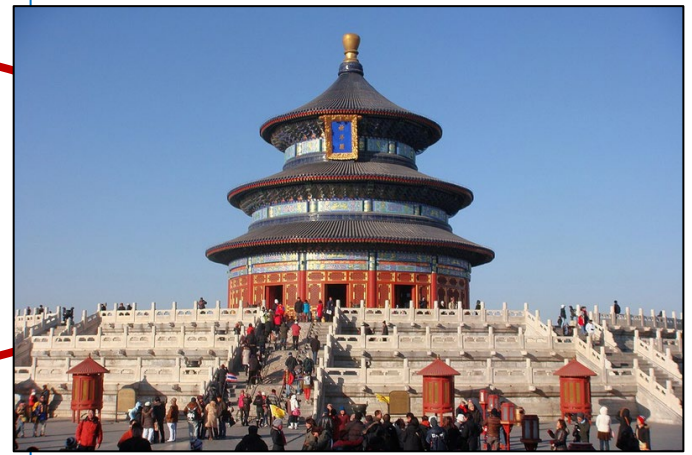
..... **Temple of Hephaestus (temple)**, Creator: unavailable, 444 BCE; Athens (Attiki, Ellas)



..... **Temple of Isis (temple)**; begun by Ptolemy II (Ancient Egyptian king, 309-246 BCE); late 2nd century BCE; Filah, Jazirat (Aswan, Misr, Africa, World)

- Indention: broader/narrower (instance or whole/part)
- Guide Terms in angled brackets
- Work Type in parentheses
- Concatenated "label"

Built Work
Temple of Heaven



Vocabularies in a Work Record

AAT record

Fields controlled by vocabs

LINKS to vocabs

- Used for cataloging and for retrieval
- Fields controlled by Getty vocabularies

[Semantic View \(JSON, RDF, N3/Turtle, N-Triples\)](#)

ID: 300011443
 Page Link: <http://vocab.getty.edu/page/aat/300011443>

marble (rock) (metamorphic rock, rock (inorganic material), ... Materials (hierar



Catalog Level item

Classification sculpture | antiquities

Work Type statuette AAT

Titles Female Figure of the Kilia Type
 Female Figure (Star Gazer)

Creator unknown Anatolian ULAN

Creation Date 2800/2200 BCE

Style/period: Chalcolithic

General Subject human figures

Specific Subject fertility | human female

Current Location J. Paul Getty Museum, Getty Villa
 Malibu (Los Angeles, California, USA) ULAN
TGN

Repository Number 88.AA.122

Dimensions 14.3 cm height (5 5/8 inches)

Mat & Tech carved marble **Index:** marble AAT

Style Kilia type

AAT
TGN
ULAN
CONA
IA

marble (rock) (preferred, C, U, LC, English)

marbles (rocks) (C, U, English, AD, U, N)

marmor (C, U, English, UF, U, N)

大理石 (C, U, Chinese (traditional)-P, D, U, U)

大理岩 (C, U, Chinese (traditional), UF, U, U)

dà lǐ shí (C, U, Chinese (transliterated Har

da li shi (C, U, Chinese (transliterated Pin

ta li shih (C, U, Chinese (transliterated W

marmer (C, U, Dutch-P, D, U, U)

marmerplaat (C, U, Dutch, UF, U, U)

marmerplaten (C, U, Dutch, UF, U, U)

marbre (roche) (C, U, French-P, D, U, N)

marbres (roche) (C, U, French, AD, U, N)

marmo (C, U, Italian-P, D, U, N)

mármol (C, U, Spanish-P, D, U, U)

Marmor (C, U, German-P, D, U, N)

Relationships and linking are built into and among the Getty vocabularies

Merging Contributed Records

- Compiled resources = multiple contributors, separate records for same entity
- Published as unified records for end users
- Rather than clustering, Getty vocabularies merge the data into a homogenous whole
- The attribution to the contributor and sources are retained

[LINK back to contributed data](#)

Getty vocabularies merge contributed records

JPGM: tmsid_3041
Guardi, Francesco

Witt: WCI_20934875
Guardi, Francesco

Avery: avery_49856
Guardi, Francesco

BHA: bha_8476
Guardi, Francesco

GRIPA: pa_3371665
Guardi, Francesco

PROV: pr_3371665
Guardi, Francesco



detail of portrait, by Pietro Longhi, in Ca' Rezzonico, Venice

ULAN_500017409

Names:

Guardi, Francesco
Francesco Guardi
Gardi, Francesco
Garde, Francesco
Gardis, Francesco
François Guardi

Nationalities:

Italian
Venetian

Roles:

artist
painter
landscapist

[Links to images](#)

<http://www.getty.edu/art/collection/objects/226156>



Relationships and linking are built into and among the Getty vocabularies



Merging Contributed Records

Getty vocabularies merge contributed records

ULAN ID	Matching name	Display biography	Roles (AAT-controlled)	Nationality (AAT-controlled)	Estimated birth date	Estimated death date
500017409	Guardi, Francesco	Venetian painter, 1712-1793	artist painter landscapist	Venetian Italian	1712	1793
500312969	Guardi, Francesco	Italian noble, born 1514	<u>noble</u>	Italian	<u>1514</u>	<u>1614</u>
500412666	Guardi, Francesco	Italian artist, ca. 1712-1793	artist	Italian	1707	1793

- Candidates for merging
- Automatically merged or rejected for merging
- Possible but not enough firm data = passed to human editors
- Long experience in perfecting algorithms → Reconciliation tools are under development by Getty Digital


ULAN record is a merged, homogenous entity




Union List of Artist Names® Online Full Record Display

[New Search](#)

[Previous Page](#)

Click the  icon to view the hierarchy.

[Semantic View](#) ([JSON](#), [JSONLD](#), [RDF](#), [N3/Turtle](#), [N-Triples](#)) [Represent](#)

 **Guardi, Francesco** (Italian painter, 1712-179

Note: Venetian painter, during the first half of his career he specialized in decorations and church paintings; later became a vedutista (view painter) of Venetian urban life.

Names:

Guardi, Francesco ([preferred](#), [V](#), [index](#), [LC](#))

Francesco Guardi ([V](#), [display](#))

Gardi, Francesco ([V](#))

Garde, Francesco ([V](#))

Gardis, Francesco ([V](#))

Gauda, Francesco ([V](#))

Guada, Francesco ([V](#))

Guarde, Francesco ([V](#))

Guardet, Francesco ([V](#))

Gvardi, Franchesko ([V](#))

Guardi, François ([V](#))

Guardi, Francisco ([V](#))

Contributors

EVERY, BHA, G

Courtauld

Sources

Avery Authorit

Harald Szeema

(2011-)

J. Paul Getty M

Library of Cong

M. Knoedler &

Collections (20

Provenance In

RILA/BHA (197

Witt Library, A

Nationalities:

Italian ([preferred](#))

Venetian

Roles:

artist ([preferred](#))

painter

landscapist

Gender:

male

Birth and Death Places:

Born: [Venice \(Venezia province, Veneto, Italy\) \(inhabited place\)](#)

Died: [Venice \(Venezia province, Veneto, Italy\) \(inhabited place\)](#)

Related People or Corporate Bodies:

member of [Guardi family](#)

(Italian painters, active 18th century) [500060865]

parent of [Guardi, Giacomo](#)

(Italian painter, 1764-1835) [500023608]

sibling by marriage (in-law) of [Tiepolo, Giovanni Battista](#)

(Venetian painter, 1696-1770)

[500018523]

Cecilia Guardi married Tiepolo in 1719

sibling of [Guardi, Antonio](#)

(Italian painter, 1699-1760) [500025094]

sibling of [Guardi, Niccolò](#)

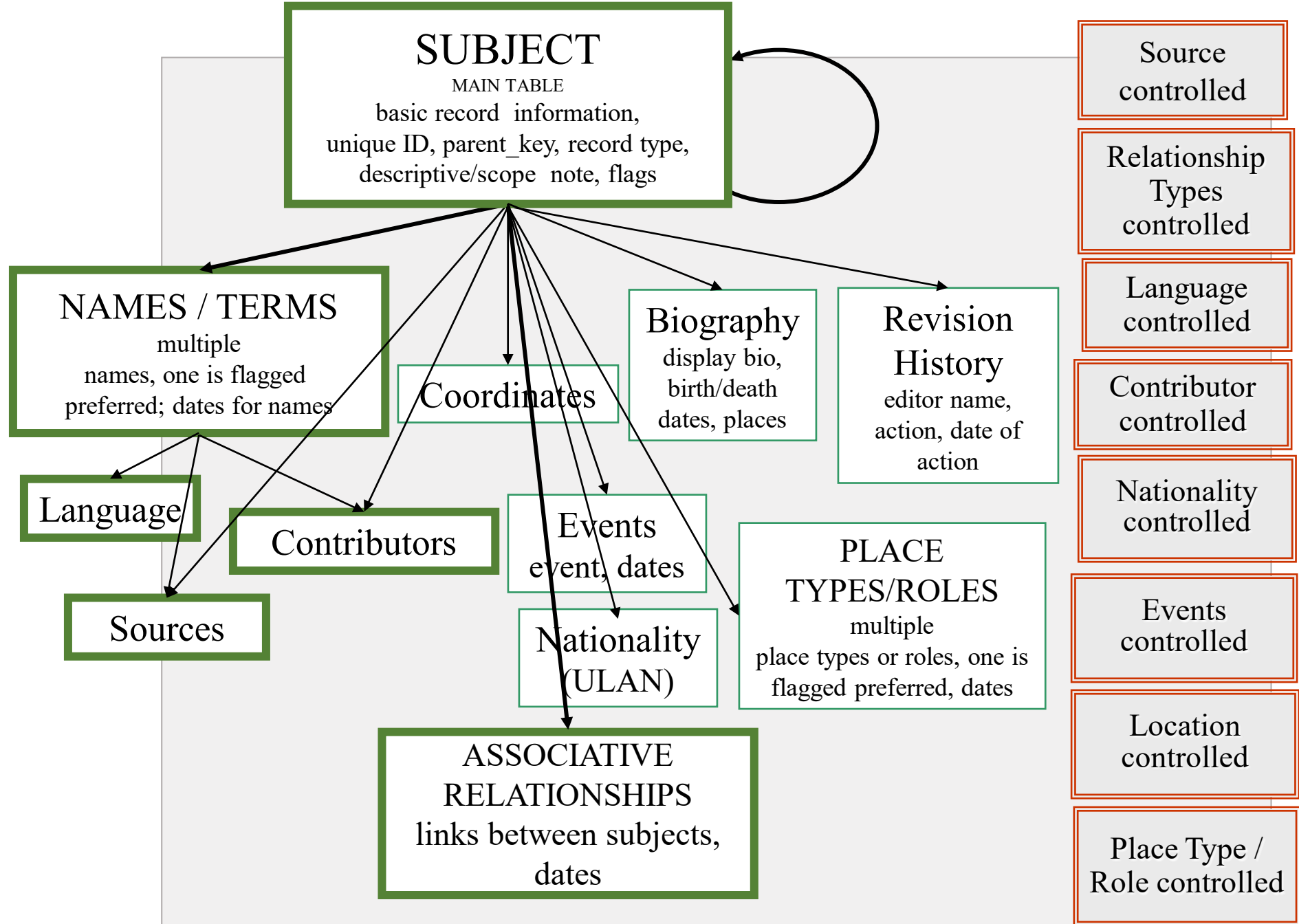
(Italian painter, 1715-1785) [500029088]

Attribution to contributor and source is maintained, but merged, unified, and “preferred” is flagged

Relationships and linking are built into Getty vocabularies

simplified Entity Relationship Diagram

- All 5 vocabularies have same core structure
- Tables then added for specific needs



Getty Vocabularies Are Thesauri

- Thesaurus: A semantic network of unique concepts
- Thesauri may be monolingual or multilingual
- Thesauri may have the following three relationships:
 - Equivalence Relationships
 - Hierarchical Relationships
 - Associative Relationships

LINKS via thesaurus

AAT

hierarchical

Objects Facet
 .. Built Environment
 Single Built Works
 <single built works by function>
 monuments
 memorial arches
triumphal



associative

triumphal processions
 triumphal procession
 Triumphzug
 procession triomphale
 processione trionfale
 procesion triunfal

triumphal arches
 triumphal arch
 凱旋門 (紀念性拱門)
 kǎi xuán mén
 triomfbogen
 Triumphbögen
 archi trionfali
 arcos de triunfo

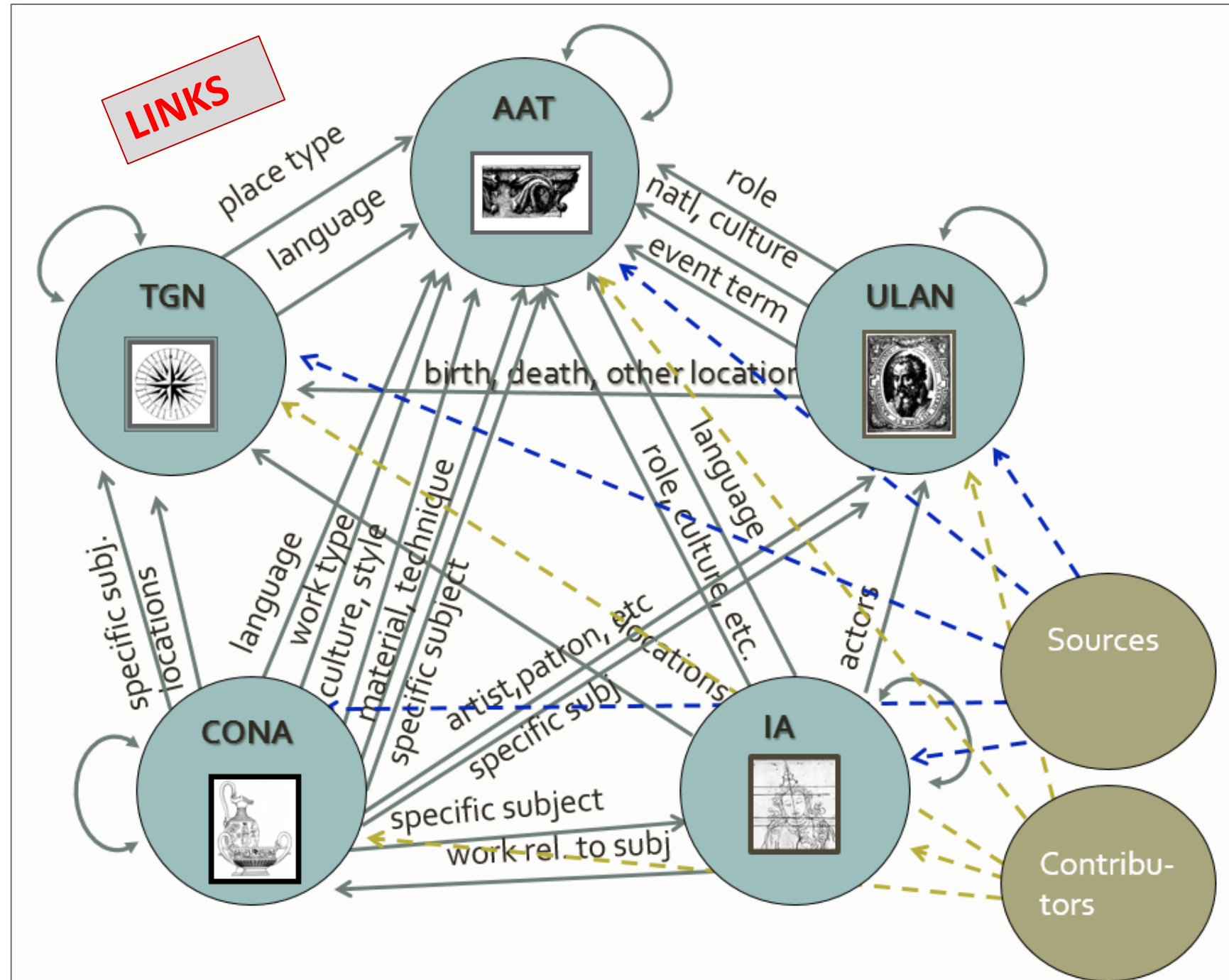
equivalence

locus/setting for



Links between Vocabularies

- Certain data within each Getty vocabulary = controlled through links to other vocabularies
- E.g., **roles** in ULAN (e.g., *artist, watercolorist, portraitist, patron, emperor*) = controlled by *Agents Facet* in AAT



What Is Linked Open Data (LOD)

What is Linked Open Data (LOD)?

AAT, TGN, and ULAN are available as LOD under the Open Data Commons Attribution License (ODC-By) 1.0

- As Getty provides more and more digital resources for research and discovery, it is the Getty Vocabularies that function as the glue joining varied and separate resources
- In order to serve several critical audiences, the Vocabularies are [made available](#) free of charge and without restrictions in online displays and in multiple formats, including Linked Open Data (LOD)
- LOD is a method of publishing datasets with semantic links that can be used by computers to aid searchers in navigating the vast universe of digital information
- Through LOD, the Vocabularies can unlock and disambiguate access to many kinds of knowledge, data, and images buried in a wide variety of databases and collection management systems at Getty and at museums, archives, and libraries around the world

Linked Open Data (LOD)

- **Linked Data**
 - A set of best practices for publishing and connecting structured data on the Web to enable the interlinking possibilities.
 - It builds upon standard Web technologies such as HTTP and URIs.
 - But, rather than using them to serve web pages for human readers, it extends them to share information in a way that can be read automatically by computers.
- **Open data**
 - The idea that certain data should be freely available to everyone to use and republish as they wish, without restrictions from copyright, patents or other mechanisms of control.
- **Linked Open Data (LOD)**
 - A community project, sponsored by the Semantic Web Education and Outreach group of the W3C, to extend the Web with a data commons by publishing various open datasets as RDF on the WEB and by setting RDF links between data items from different data sources.
 - Both linked and open.

Basics of Linked Open Data

Unique,
persistent IDs
are critical

- Universal Resource Identifier (URI) - an ASCII string used to identify things on the Semantic Web
<http://vocab.getty.edu/aat/300198841>
- URIs are linked to each other through triples composed of subject-predicate-object relationships
<aat:300198841> <gvp:aat2100_distinguished_from> <aat:300197140>



subject

rhyta

predicate

– **[are] distinguished from** –

object

stirrup cups



- The definitions of data elements and links are described by ontologies
<http://www.w3.org/2004/02/skos/core#>
<http://www.w3.org/ns/prov#>
<http://purl.org/dc/elements/1.1/>
- Data is delivered to a requesting agent through a standard triple serialization using HTTP
RDF/XML, Notation-3 (N3), Turtle, N-Triples, RDFa, JSON, JSON-LD

Linked Documents vs Linked Data

- Linked Documents on the Web
 - Connected by hypertext
 - Allows users to traverse via Web browsers
 - Data is made available in formats such as CSV, XML, or marked up as HTML tables
- Linked Data on the Web
 - Connects data from diverse domains such as people, books, scientific publications, films, genes, drugs and clinical trials, online communities, statistical and scientific data.
 - Enables new generation of search engines that follow the links between data sources to deliver more complete answers as new data sources appear
 - Operate on top of an unbound, global data space.
 - Uses the Web to create typed links between data from different sources.

Basics of Linked Open Data

ID: 300198841

rhyta (drinking vessels, <vessels for serving and consuming food>, ... Furnishings and Equipment (Hierarchy Name))

Note: Refers to vessels from Ancient Greece, eastern Europe, or the Middle East with two openings, one at the top for filling and one at the base so that liquid could stream out. Drinking was done by holding the rhyton above the drinker's head and catching the stream of liquid in the mouth.

Terms:

- rhyta** (preferred, C,U,LC,English-P,D,U,N) (Greek (transliterated)-P,D,U,PN) (Spanish,AD,U,SN)
- rhyton** (C,U,English,AD,U,SN) (Greek (transliterated),AD,U,SN) (Spanish,AD,U,SN)
- rhytons** (C,U,English,UF,U,N) (French-P,D,U,PN) (Spanish-P,D,U,PN)
- rhea** (vessels) (C,U,English,UF,U,N)
- rheons** (C,U,English,UF,U,N)
- rheon** (C,U,English,UF,U,N)
- putón** (C,U,Ancient Greek,UF,U,U)
- rhótón** (C,U,Ancient Greek (transliterated),UF,U,U)
- rytons** (C,U,Dutch-P,D,U,U)
- ryton** (C,U,Dutch,AD,U,U)
- ritons** (C,U,French,UF,U,N)
- riton** (C,U,French,UF,U,N)
- ritóns** (C,U,Spanish,UF,U,N)
- ritón** (C,U,Spanish,UF,U,SN)
- escanciadora** (C,U,Spanish,UF,U,SN)

Facet/Hierarchy Code: V.TQ

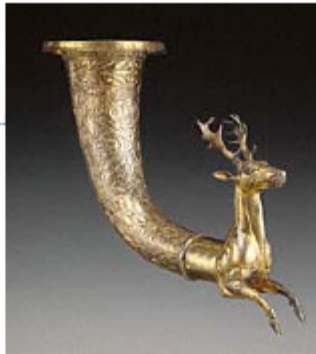
Hierarchical Position:

- Objects Facet
- ... Furnishings and Equipment (Hierarchy Name) (G)
- Containers (Hierarchy Name) (G)
- containers (receptacles) (G)
- <containers by function or context> (G)
- <culinary containers> (G)
- <containers for serving and consuming food> (G)
- <vessels for serving and consuming food> (G)
- drinking vessels (G)
- rhyta (G)

Additional Parents:

- Objects Facet
- ... Furnishings and Equipment (Hierarchy Name) (G)

HTML



XML

```
<?xml version="1.0" encoding="utf-8" ?>
- <Vocabulary xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="http://vocabsservices.getty.edu/.../AAT2020.ttl"
- <Subject Subject_ID="300198841">
- <Parent_Relationships>
- <Preferred_Parent>
  <Parent_Subject_ID>300194567</Parent_Subject_ID>
  <Relationship_Type>Parent/Child</Relationship_Type>
  <Historic_Flag>Current</Historic_Flag>
  <Parent_String>drinking vessels [300194567], vessels for serving food [300198938], containers [300197577], containers (receptacles) [300197197], Containers (Hierarchy Name) [300000000] [300000000]
  <Hier_Rel_Type>Genus/Species-BTG</Hier_Rel_Type>
</Preferred_Parent>
- <Non-Preferred_Parent>
  <Parent_Subject_ID>300198865</Parent_Subject_ID>
  <Relationship_Type>Parent/Child</Relationship_Type>
  <Historic_Flag>Current</Historic_Flag>
  <Parent_String>plastic vases (ancient vessels) [300198865], vessels (containers) [300193015], containers by form [300197197], Containers (Hierarchy Name) [300264551], Objects Facet [300000000] [300000000]
  <Hier_Rel_Type>Genus/Species-BTG</Hier_Rel_Type>
</Non-Preferred_Parent>
- <Non-Preferred_Parent>
  <Parent_Subject_ID>300198333</Parent_Subject_ID>
  <Relationship_Type>Parent/Child</Relationship_Type>
  <Historic_Flag>Current</Historic_Flag>
  <Parent_String>ceremonial vessels [300198333], ceremonial containers by function or context [300197200], containers [300197197], Containers (Hierarchy Name) [300045611], Equipment (Hierarchy Name) [300264551], Objects Facet [300000000]
  <Hier_Rel_Type>Genus/Species-BTG</Hier_Rel_Type>
</Non-Preferred_Parent>
- <Descriptive_Notes>
- <Descriptive_Note>
  <Note_Text>Refers to vessels from Ancient Greece, eastern Europe, or the Middle East that typically have a dosed form with two openings, one at the top for filling and one at the base so that liquid could stream out. They are often decorated with an animal's head, and were typically used as a drinking cup or for pouring liquid from another vessel. Drinking was done by holding the rhyton above the drinker's head and catching the stream of liquid in the mouth.</Note_Text>
  <Note_Language>English</Note_Language>
```

SUBJECT #300198841

skos:altLabel	escanciadora
skos:altLabel	rhea
skos:altLabel	rheon
skos:altLabel	rheons
skos:altLabel	rhyton
skos:altLabel	rhytons
skos:altLabel	rhótón
skos:altLabel	riton
skos:altLabel	ritons
skos:altLabel	ritón
skos:altLabel	ritóns
skos:altLabel	ryton
skos:altLabel	rytons
skos:altLabel	putón
is skos:broader of	<http://karma.getty.edu/2020/resource/AAT/Subject/300265000>
skos:broader	<http://karma.getty.edu/2020/resource/AAT/Subject/300194567>
gvp:broaderNonPreferred	<http://karma.getty.edu/2020/resource/AAT/Subject/300198333>
gvp:broaderNonPreferred	<http://karma.getty.edu/2020/resource/AAT/Subject/300198865>
is gvp:btgRelationshipType of	<http://karma.getty.edu/2020/resource/AAT/Subject/300194567>
is gvp:btgRelationshipType of	<http://karma.getty.edu/2020/resource/AAT/Subject/300198333>
is gvp:btgRelationshipType of	<http://karma.getty.edu/2020/resource/AAT/Subject/300198865>
gvp:btgRelationshipType	<http://karma.getty.edu/2020/resource/AAT/Subject/300265000>
gvp:facetCode	V.TQ
is gvp:historicFlagCurrent of	<http://karma.getty.edu/2020/resource/AAT/Subject/300194567>
is gvp:historicFlagCurrent of	<http://karma.getty.edu/2020/resource/AAT/Subject/300198333>
is gvp:historicFlagCurrent of	<http://karma.getty.edu/2020/resource/AAT/Subject/300198865>
gvp:historicFlagCurrent	<http://karma.getty.edu/2020/resource/AAT/Subject/300265000>
rdfs:label	SUBJECT #300198841
skos:note	Refers to vessels from Ancient Greece, eastern Europe, or the Middle East that typically have a dosed form with two openings, one at the top for filling and one at the base so that liquid could stream out. They are often decorated with an animal's head, and were typically used as a drinking cup or for pouring liquid from another vessel. Drinking was done by holding the rhyton above the drinker's head and catching the stream of liquid in the mouth.
skos:note	Refiere a vasijas de la Antigua Grecia, Europa del Este, o del Medio Oriente que típicamente tienen una forma cerrada con dos aberturas, una en la parte superior para llenar y una en la base para que el líquido pueda salir. Suelen estar decorados con la cabeza de un animal, y se usaban típicamente como una copa para beber o para verter líquido de otro recipiente. Se bebía o se vertía sosteniendo el rhyton por encima de la cabeza del bebedor y atrapando el chorro de líquido en la boca.

Joan Cobb

Basics of Linked Open Data

Triple Store vs. RDBMS

Triple Stores (OWLIM, 4store, Virtuoso)

- Built for storage and retrieval of triples
- Queried using SPARQL
- Import/export using RDF and SPARQL Update

Relational Database Management Systems (Oracle, SQL Server, MySQL)

- Data is organized into flat, two-dimensional tables containing fields
- Queried using SQL
- Import/export using DML statements along with whatever formats are supported by RDBMS such as comma-delimited files and XML

Gregg Garcia

Five-Star Data

Sir Tim Berners-Lee, the inventor of the WWW and the initiator of Linked Data, presented a Star Scheme for measuring the rank of a dataset



Available on the Web (any format) with an open license, to be Open Data



Available as machine-readable structured data (e.g., Excel instead of image scan of a table)



Available in a non-proprietary format (e.g., CSV instead of Excel)



All of the above plus using open standards from W3C (RDF and SPARQL) to identify things so that users can point to your data

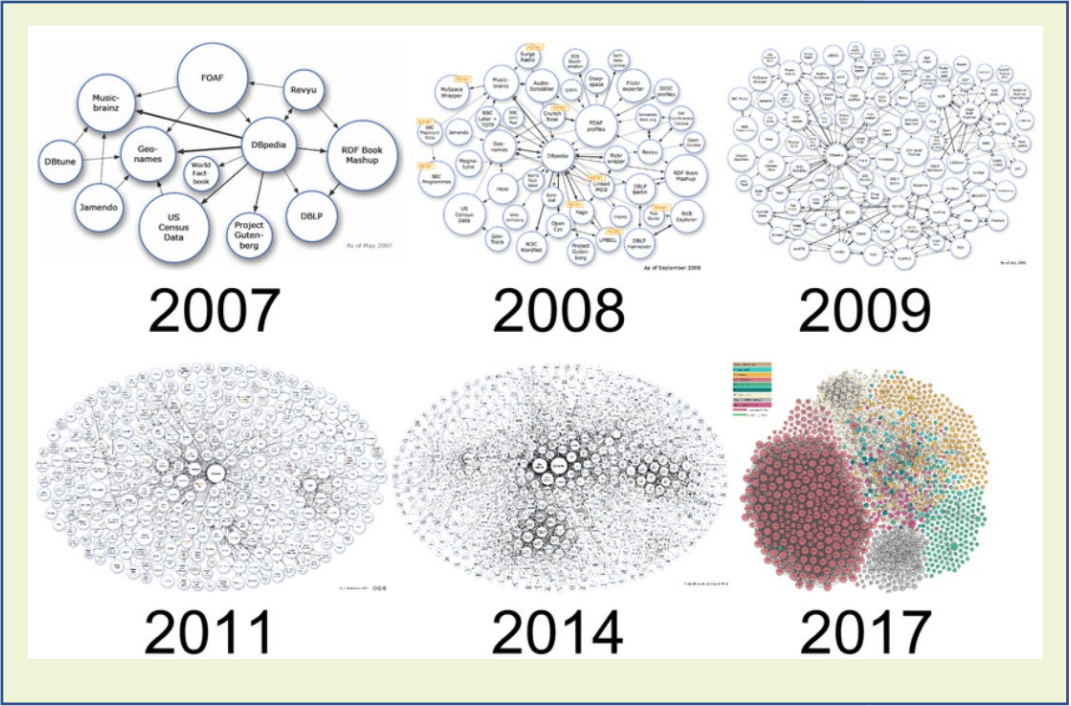


All of the above plus linking your data to other data sets to provide context

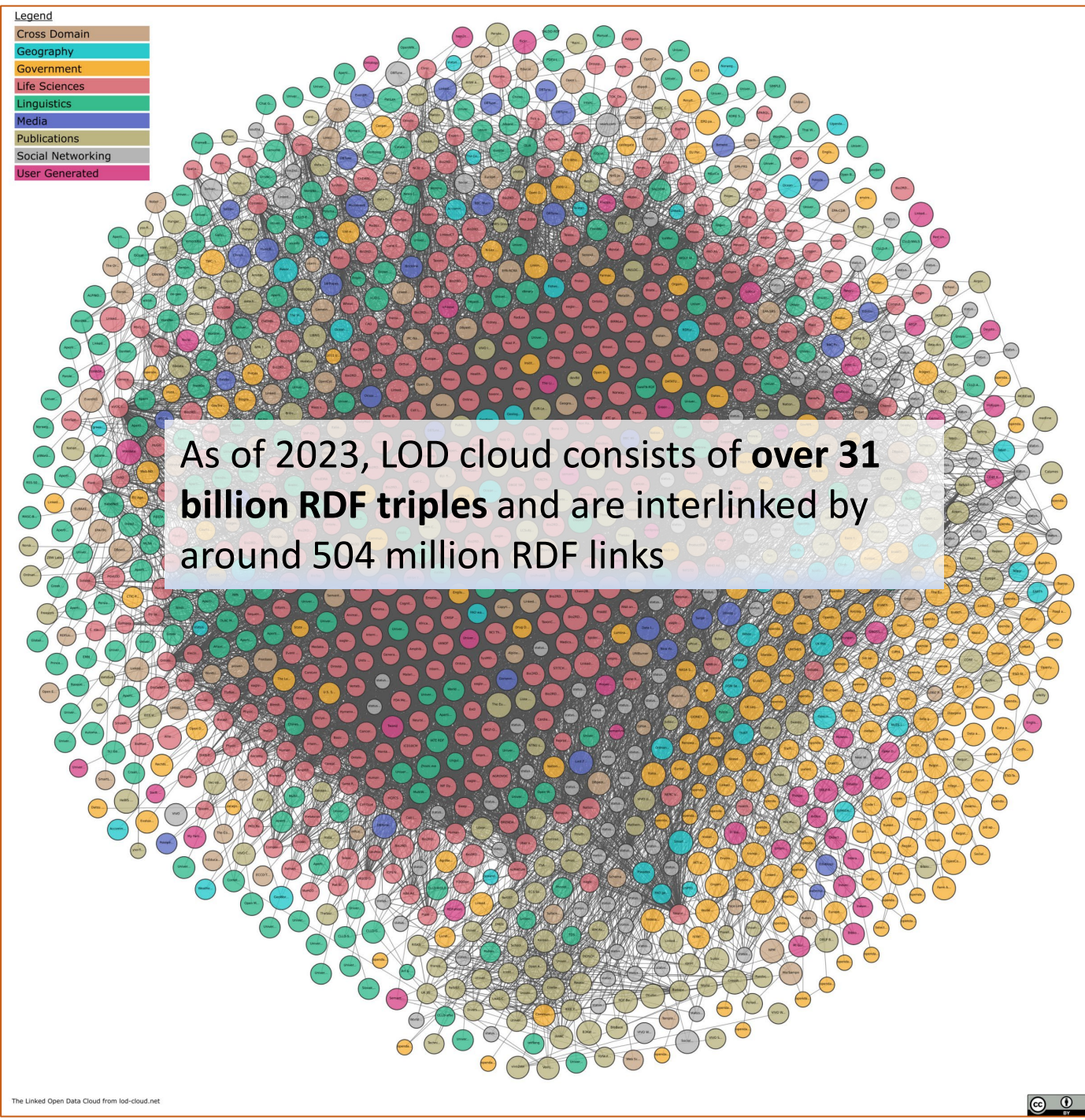
<https://www.w3.org/DesignIssues/LinkedData.html>

Growth of LOD Cloud since 2007

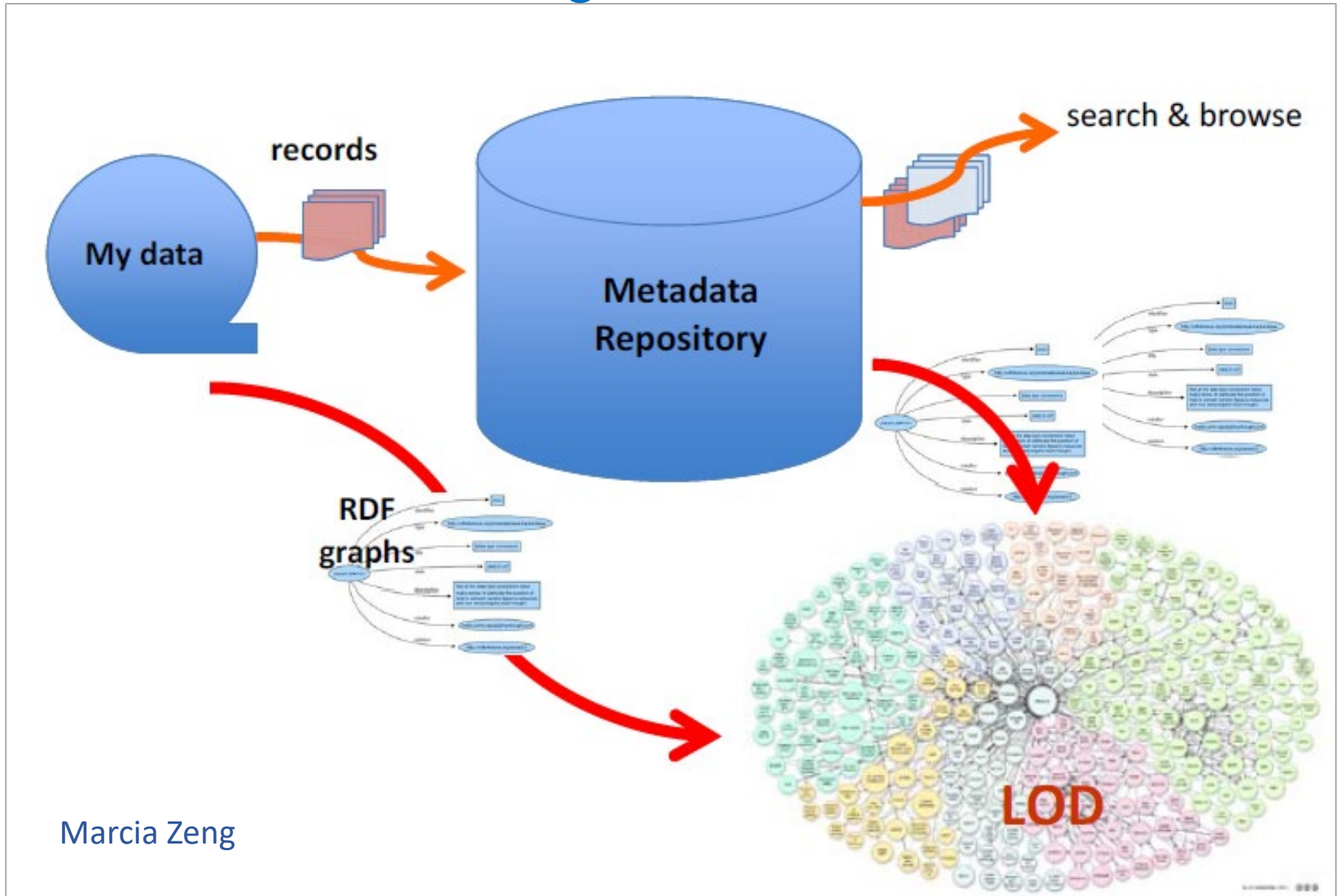
Getty Vocabularies are part of this cloud



<http://lod-cloud.net>
revised from Joan Cobb



Using LOD



Marcia Zeng

Resource Description Framework (RDF)

One of the key ingredients of Linked Data.

Provides a generic graph-based data model for describing things, including their relationships with other things.

- Three column format – known as a *triple* – *forms the fundamental building block of semantic representations.*

Subject - corresponds to the entity – a ‘thing’

Predicates – property of the entity - names, birth/death dates

Objects - Subjects in another triple OR Literal values

Conceptualized anything (and everything) in the universe as a resource.

Specifically supports evolution of schemas over time without requiring all the data consumers to be changed

RDF has varying representations (e.g., XML, text, JSON)

LOD Ontologies & Vocabularies

Ontology

Used to capture knowledge about some domain of interest. An ontology describes the concepts in the domain and also the relationships that hold between those concepts.

Vocabulary

- A vocabulary in the sense of knowledge systems or ontologies are controlled vocabularies. They provide a way to organize knowledge for subsequent retrieval.

Semantic Web Ontology

This is a formal specification of a shared conceptualization of the information to be published.

Examples of the vocabulary used in ontologies: class, object property, role, category, property, resource, etc.

Uniform Resource Identifier (URI)

- Identifies a resource either by location (URL), or name (URN). It usually includes some type of unique and persistent identifier.
- URIs are not URLs but every URL is a URI
- The URI for a resource represented in an RDF statement is called the URI reference (URIref) for that graph node.
- URIs are used as ‘strong keys’ that are assigned to each of the nodes so that we can refer to them consistently across all the triples that describe their relationships.
- The URN that will be the base URI for AAT will be <http://vocab.getty.edu/aat>.

Web Ontology Language (OWL)

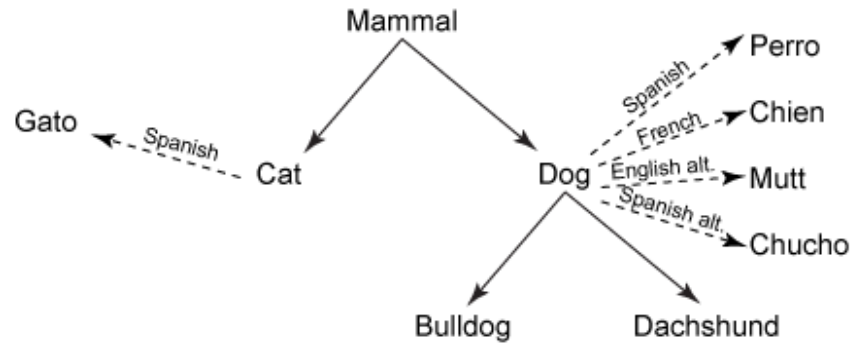
- Developed by the W3C
- Built as an extension to RDFS
- Provides a precise vocabulary that enables more powerful reasoning and inference over relationships with which to knowledge can be represented.
- Can be seen as a social contract between a data provider and a data consumer.

Simple Knowledge Organization System (SKOS)

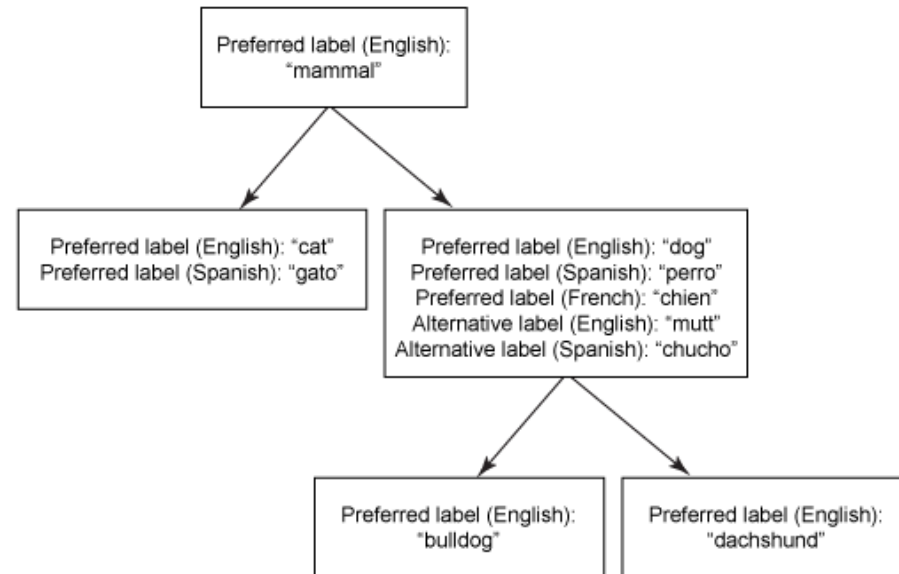
- A language designed for representation of thesauri, classification schemes, taxonomies, subject-heading systems, or any other type of structured controlled vocabulary.
- Based on RDF
- SKOS is currently developed within the W3C framework
- Can be used on its own, or in combination with other ontologies.

LOD: Simple SKOS example

Sample concepts relationship
in a pre-SKOS taxonomy



Sample concepts relationship
in SKOS



<http://www.ibm.com/developerworks/xml/library/x-skostaxonomy/index.html>

Triplestores

- Are purpose-built databases for the storage and retrieval of the type of unstructured information express in RDF triples that makes up the Semantic Web.
- Are not relational databases.
- Query language used with triplestores is typically SPARQL
- In addition to queries, triples can usually be imported/exported using RDF and other formats.
- Some triplestores store billions of triples.

SPARQL Protocol RDF Query Language

- Was made a standard by the RDF Data Access Working Group (DAWG) of the W3C.
- Is considered one of the key technologies of the semantic web.
- Allows users to write unambiguous queries.
- SPARQL endpoint is a service that accepts SPARQL queries and returns results.
- Queries can be distributed to multiple SPARQL endpoints.
- Fundamental difference between SQL and SPARQL
 - Data exposed via SPARQL on *any server* can be queried by a SPARQL client.
 - Data from multiple places can be combined dynamically, as needed, to create new forms of information.

Why do we care?

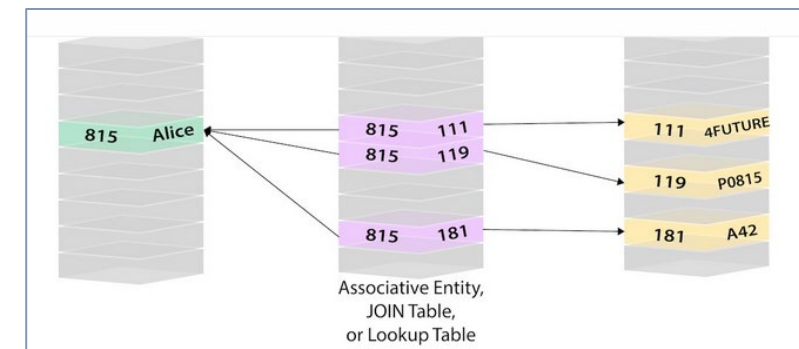
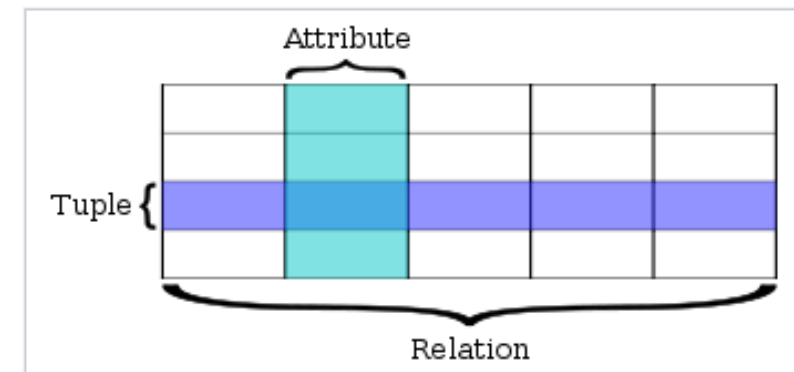
- The way data is being published on the web is currently in transition.
- A current trend in managing art information is to increasingly make data art, architecture, and cultural heritage objects available as Linked Open Data.
- This applies to the information directly describing the objects, but also the vocabularies used in the descriptions.
- For years now, the Getty Vocabulary team has been receiving legitimate requests to publish our thesauri as LOD.
- It was time to stop asking “why” and to start exploring “how”.

Key advantages of Linked Open Data

- **Everyone** can access, reuse, enrich and share the data published in LOD format!
 - It is somewhat like Wikipedia and it makes “interworkability” more feasible.
- LOD disambiguates your search. In other words it eliminates the noise you sometimes get in Google search. What you are seeking is more precise because of the way you tag the information you are converting to LOD.
- LOD connects you to all kinds of relevant information creating a playground for serendipity and it updates that information dynamically within the same web space.
- LOD is able to connect data from the Web that was not previously connected.

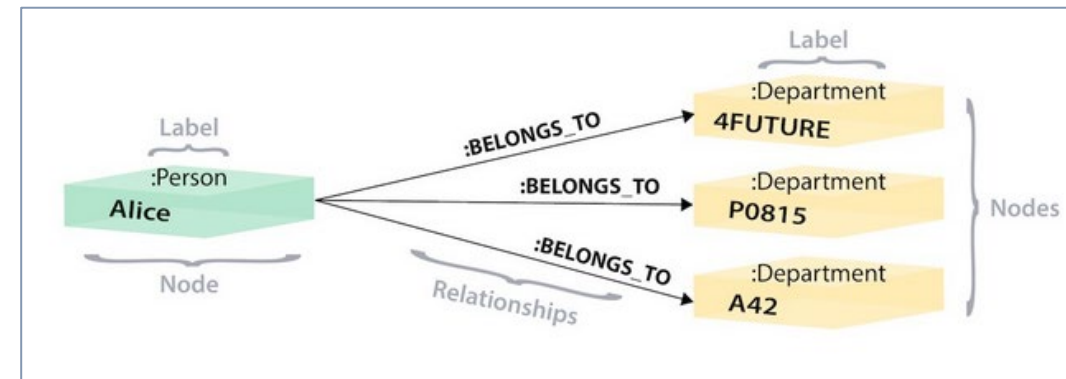
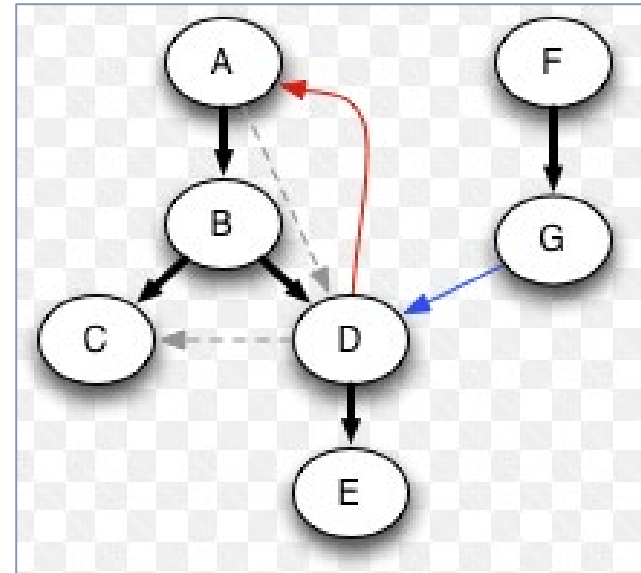
What is a relational data model

- A relational database is a set of formally described tables from which data can be accessed or reassembled in many different ways without having to reorganize the database tables
- The standard user and application programming interface (API) of a relational database is the Structured Query Language (SQL)
- Each table (called a relation) in a relational database contains one or more data categories in columns (called attributes)
- Each row (called a record or tuple) contains a unique instance of data, or key, for the categories defined by the columns
- Each table has a unique primary key, which identifies the information in a table
- The relationship between tables can then be set via the use of foreign keys



What is a graph-based data model

- A graph database (GDB) is a database that uses graph structures for semantic queries with nodes, edges and properties to represent and store data
- Querying relationships within a graph database is fast because they are perpetually stored within the database itself
- Native *graph* processing (called index-free adjacency) is the most efficient means of processing data in a *graph* because connected nodes physically point to each other in the *database*



Getty Vocabularies as LOD

Getty

Why Linked Open Data for Getty?

- The time was right for the Getty, particularly as the LOD project coincides with the Getty's Open Content initiative
 - The J. Paul Getty Museum and Getty Research Institute (GRI) make available, without charge, all available digital images to which the Getty holds the rights or that are in the public domain to be used for any purpose. No permission is required
 - www.getty.edu/about/opencontent.html
- Also, GRI Portal: The Getty Research Portal™ is an online search platform providing global access to growing number of digitized art history texts
- The Getty Conservation Institute (GCI), GRI, and the Getty Museum are also releasing information as LOD

Licensing the data

- Historically, the Getty vocabularies relational tables, XML, (MARC) were licensed, with use somewhat restricted; fees adjusted for not-for-profit and for-profit licensees
- Policy makers and legal experts analyzed which licensing was best for LOD

Open Data Commons Attribution License (ODC-By) v1.0

Allows that you (the users) are free to do the following:

- To Share: To copy, distribute, and use the database
- To Create: To produce works from the database
- To Adapt: To modify, transform, and build upon the database
- As long as you Attribute: You must attribute any public use of the database, or works produced from the database, in the manner specified in the license
 - For any use or redistribution of the database, or works produced from it, you must make clear to others the license of the database and keep intact any notices on the original database
- <http://opendatacommons.org/licenses/>

Getty Vocabularies as Linked Open Data

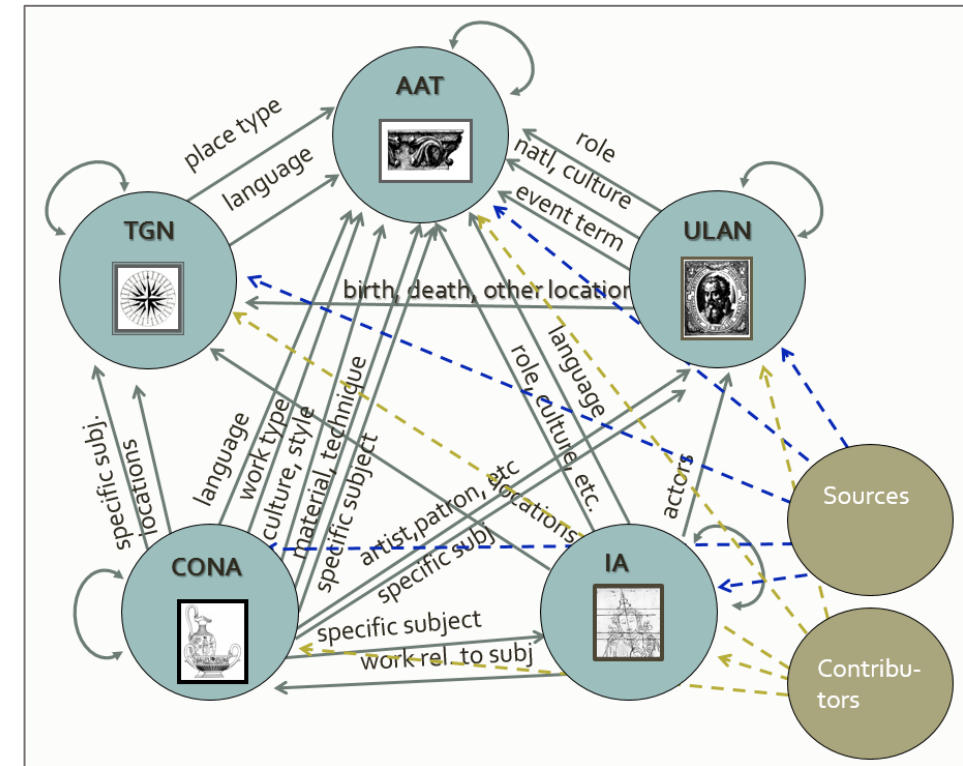
- Getty Vocabularies are valued as authorities because
 1. quality is reliable (compiled by experts, sources cited)
 2. the data is linkable
- Vocabs were planned from beginning to be linked, to aid in answering complex art historical questions (e.g., return records for *oil paintings that are now located in North America having non-Christian iconography and created by Netherlandish or French painters active in Tuscany or Umbria, Italy between 1410 and 1630*)
- Vocabs contain thesaural and other rich links
- Unique, persistent IDs for records, terms, other data
- Include IDs of outside resources too, to allow linking

Examples of unique, persistent IDs in AAT

AAT_ID: 300132869

Terms:

- **triumphal arches** [1000007003] **Qual:** (memorial arches)
Pref: pref **Type:** D **Lang:** (en) **Con.:** FDA, GCI, VP
- **triumphal arch** [1000290974] **Qual:** (memorial arch)
Type: ALT **Lang:** (en) **Con.:** FDA, VP
- **凱旋門** **Qual:** (紀念性拱門) [1000545314]
Type: D **Lang:** (zh, Chinese (traditional)) **Con.:** AS



Getty Vocabularies as Linked Open Data


```
<aat:300198841> <skos:prefLabel> "rhyta"@en  
<aat:300198841> <skos:altLabel> "rifons"@fr  
<aat:300198841> <rdf:type> <gvp:Concept>  
<aat:300198841> <gvp:broaderPreferred> <aat:300194567>  
<aat:300198841> <gvp:aat2100_distinguished_from> <aat:300197140>
```

[Semantic View](#) ([JSON](#), [RDF](#), [N3/Turtle](#), [N-Triples](#))

■ [Representative Images](#): 1 2 3

ID: 300198841

Record Type: concept

 **rhyta** (drinking vessels, <vessels for serving and consuming food>, ... Furnishings and Equipment (Hierarchy Name))

Note: Refers to vessels from Ancient Greece, eastern Europe, or the Middle East that typically have a closed form with two openings, one at the top for filling and one at the base so that liquid could stream out. They are often in the shape of a horn or an animal's head, and were typically used as a drinking cup or for pouring wine into another vessel. Drinking was done by holding the rhyton above the drinker's head and catching the stream of liquid in the mouth.

Terms:

rhyta (**preferred**, C,U,LC,English-P,D,U,PN)
(Greek (transliterated)-P,D,U,PN)
(Spanish,UF,U,PN)

rhyton (C,U,English,AD,U,SN)
(Greek (transliterated) AD,U,SN)

Getty Vocabularies as Linked Open Data

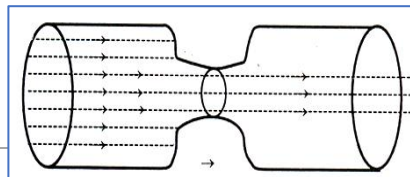
- AAT, TGN, and ULAN are available as LOD
- Under Open Data Commons Attribution License (ODC-By) 1.0
- Linked Open Data (LOD) is popular, in a typical month in 2018 = over 1,000,000 records (92.95 GB of data) downloaded
- JSON, RDF, N3/Turtle, N-Triples; analysis now for other formats too
- Available at SPARQL end point: download entire datasets or subsets
- Also released in online search (refreshed every month), XML, Relational Tables, Web Services, implemented in collection management systems and Web sites around the world, new implementations are being explored

Parsing the Getty vocabularies to LOD was not simple

- Needed institutional support, coincided with new open policy at Getty
- Required research and mapping Vocab data to which was best fit for LOD, retaining the full richness and integrity of the vocabulary data
- Required decisions regarding which open license is best
- Edited data to make it consistent and linkable, virtual links and cross-references had been maintained by hand for decades → now real links
- LOD = more contributions; streamline processing, while maintaining content quality;

must avoid bottleneck

contribution → processing → publication



Links

There are many examples of datasets aligning or co-referencing the Getty Vocabularies; below are some examples

- Wikidata. Here are the pages that detail the current status of that alignment:

ULAN: <https://tools.wmflabs.org/mix-n-match/#/catalog/27>

AAT: <https://tools.wmflabs.org/mix-n-match/#/catalog/48>

The project relies on volunteers making manual matches over time after the initial automatic matching process. Here is the home page for the overall Wikidata authority control process.

The Getty Vocabs are mentioned a number of times.

https://www.wikidata.org/wiki/Wikidata:WikiProject_Authority_control

- Europeana is also connected to AAT concepts:

<https://pro.europeana.eu/page/europeana-aat>

See the links from their SPARQL API: <https://pro.europeana.eu/resources/apis/sparql>

- There are other various institutions that have linked to ULAN.

Some examples include MoMA (ULAN IDs included in this data set:

<https://github.com/MuseumofModernArt/collector>

and the Gilcrease Museum (“About the creator” section comes from ULAN:

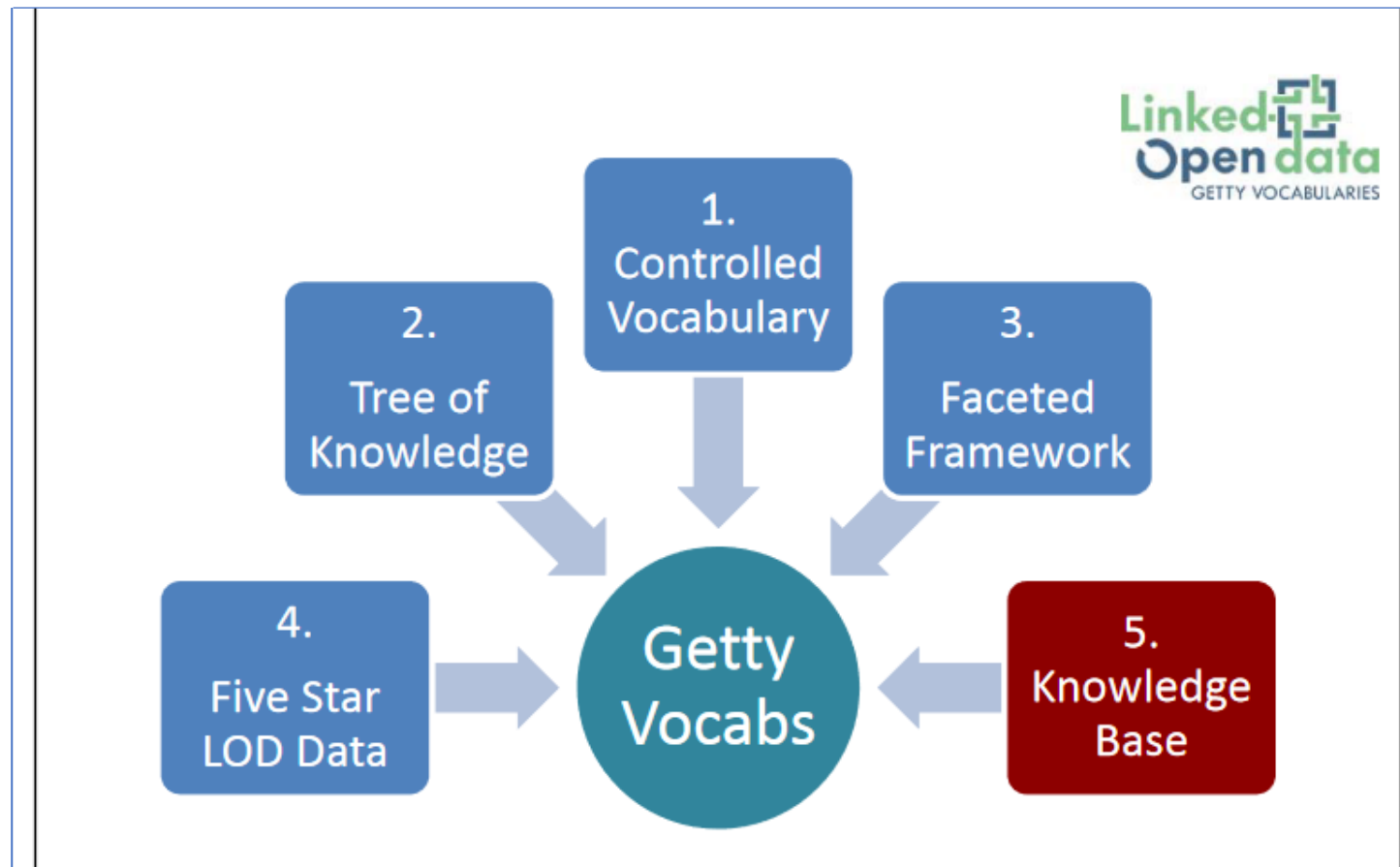
<https://collectons.gilcrease.org/object/1526167>

- The Ariadne project also mapped a number of data sets to the AAT:

<http://www.ariadne-infrastructure.eu/Resources/AAT/Mappings-to-AAT>

Gregg Garcia

Five-Star LOD Datasets



courtesy of Marcia Zeng

Getty Vocabularies and Five-Star LOD Datasets: https://www.getty.edu/research/tools/vocabularies/zeng_vocabs_and_five_star_lod.pdf

LOD, KOS, and Getty Vocabularies: https://www.getty.edu/research/tools/vocabularies/zeng_itwg_2017.pdf

Key Metrics of KOS Products: https://www.getty.edu/research/tools/vocabularies/0_m_zeng_itwg_keynote_itwg2020.pdf

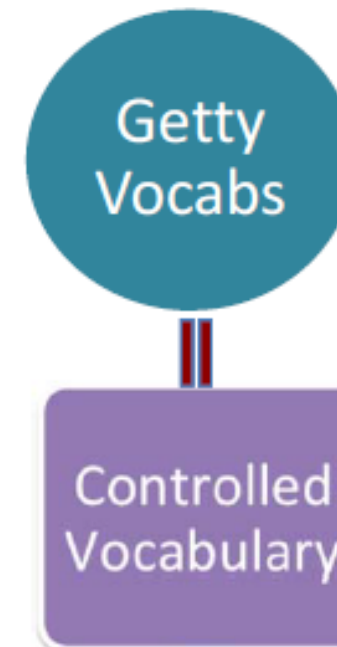
Nomen Explained: https://www.getty.edu/research/tools/vocabularies/m_zeng_visual_nomen_itwg2020.pdf

Create Microthesauri from Getty LOD: https://www.getty.edu/research/tools/vocabularies/zeng_microthesauri_getty_lod.pdf

To be a five-star LOD dataset,
one has to be already a five-star product

The Getty Vocabularies -- is a five-star vocabulary

- High quality authority control of appellations representing things;
- Multilingual and multi-cultural; historical and contemporary;
- High specificity while comprehensive; continual and open-ended;
- One of the few selected vocabularies that are being:
 - recommended or required by many important metadata standards (e.g., DC., VRA Core, CCO, etc.)
 - used as examples at national and international standards for structured vocabularies (e.g., ISO25964-1 and ISO25964-2, NISO Z39.19)
 - adopted by cross-country and cross-domain data services, in addition to many institutions' (e.g., Europeana, DPLA (Digital Public Library of America))
 - widely studied by researchers. Google Scholar shows results when searching (exact match):
 - 2,110 entries for "Art and Architecture Thesaurus"
 - 3,570 for "Thesaurus of Geographic Names"
 - 89 for "Cultural Objects Name Authority"
 - 72 for "Union List of Artist Names"
 - 355 for "Getty Vocabularies"



2016.07.20

In comparison:

- "Eurovoc": 2,220
- "Library of Congress Name Authority": 768

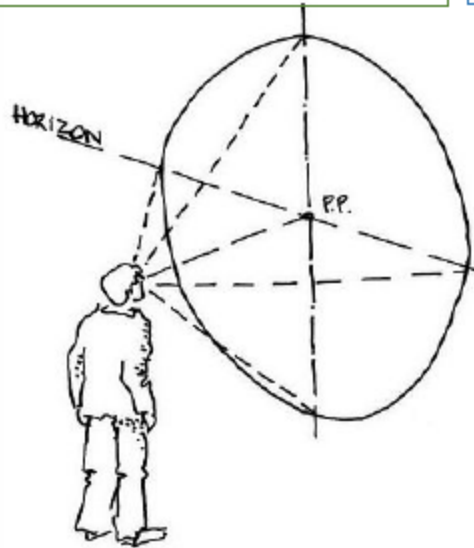
Marcia Zeng

How to improve five-star data



All the above, plus: **Link** your data to other people's data to provide context.

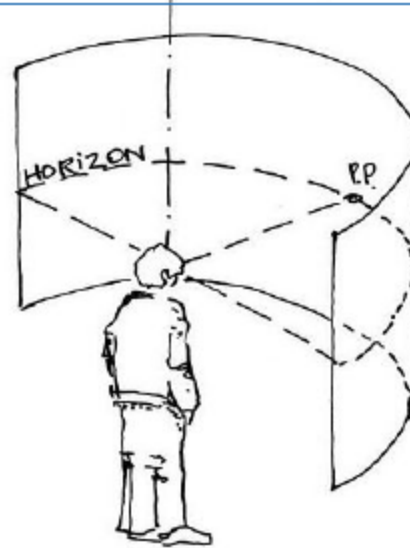
1. Getty Vocab \leftrightarrow Others' Metadata



E.g., Used by MARC, LIDO, EAD, local dbs, Wikipedia, etc.

Needed Actions?

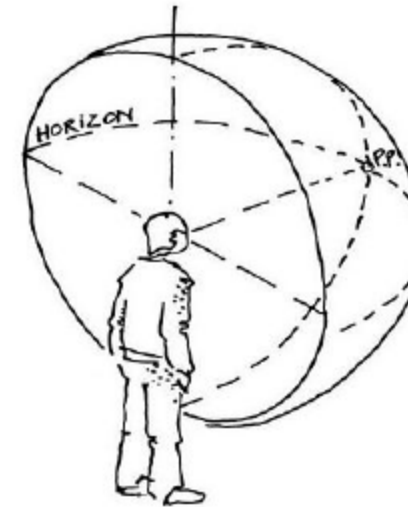
2. Getty Vocab \leftrightarrow Other Vocab



E.g., Integrated multilingual versions; Aligned with [to or by] other vocabs.

Needed Actions?

3. Getty Vocab \leftrightarrow Other Services



E.g., Served through APIs & SPARQL end-points; included by other services (VIAF, Finto, etc.).

Needed Actions?

Image credit: https://commons.wikimedia.org/wiki/File:Three_perspectives.jpg

- Top of the AAT hierarchies
- ... Associated Concepts Facet
- Associated Concepts (hierarchy name)
- ... Physical Attributes Facet
- Attributes and Properties (hierarchy name)
- Conditions and Effects (hierarchy name)
- Design Elements (hierarchy name)
- Color (hierarchy name)
- ... Styles and Periods Facet
- Styles and Periods (hierarchy name)

- Top of the TGN hierarchy (hierarchy root)
- ... World
- [**view physical features**]
- Abbasid Caliphate (historical region)
- Africa (continent)
- Alexandrian Empire (former nation/state)
- Antarctica (continent)
- Arctic (general region)
- Asia (continent)



Multi-Faceted Framework

- ... Styles and Periods Facet
- Styles and Periods (hierarchy name)
- <styles, periods, and cultures by geographic region>
- <styles, periods, and cultures by region>
- <generic styles, periods, and cultures by region>
- <styles, periods, and cultures by area>


WHO
WHAT
HOW
WHERE
WHEN

- Agents Facet
- ... People (hierarchy name)
- ... Organizations (hierarchy name)
- ... Living Organisms (hierarchy name)
- ... agents (general) [N]
- Activities Facet
- ... Disciplines (hierarchy name)
- ... Functions (hierarchy name)
- ... Events (hierarchy name)
- ... Physical and Mental Activities (hierarchy name)
- ... Processes and Techniques (hierarchy name)
- ... activities (general context)

- **Top of the ULAN list / hierarchy**
- ... **Corporate Bodies**
- ... **Persons, Artists**
- ... **Non-Artists**
- ... **Unidentified Named People and Firms**
- ... **Unknown People by Culture**

- Materials Facet
- ... Materials (hierarchy name)
- ... Objects Facet
- ... Built Environment (hierarchy name)
- ... Components (hierarchy name)
- ... Furnishings and Equipment (hierarchy name)
- ... Object Genres (hierarchy name)
- ... Object Groupings and Systems (hierarchy name)
- ... Visual and Verbal Communication (hierarchy name)
- ... Brand Names Facet

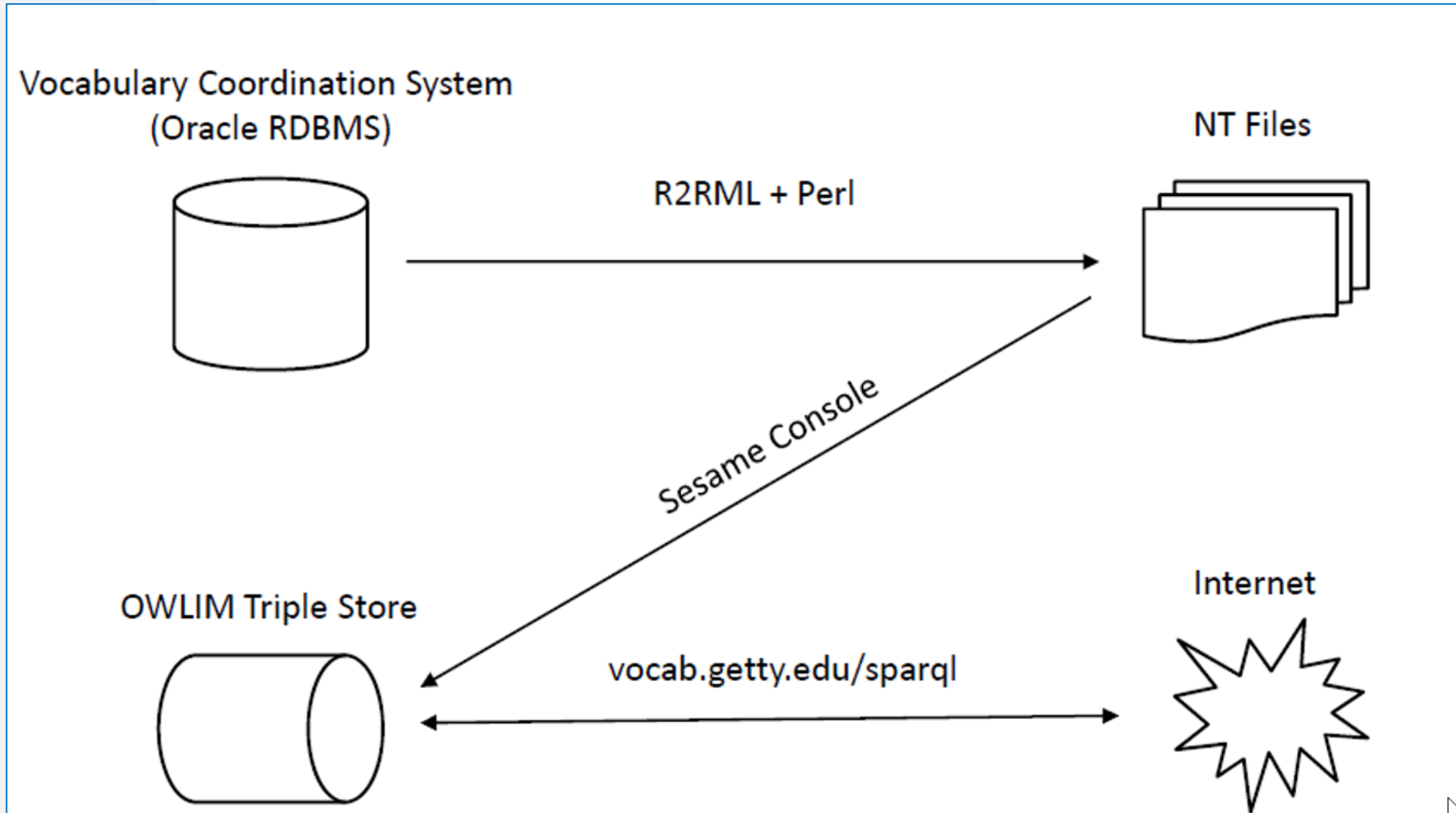
- **Top of the CONA Hierarchy**
- ... **Built Works**
- ... **Movable Works**
- ... **Visual Surrogates**
- ... **Conceptual Works**
- ... **Unidentified Works**



The Getty Iconography Authority
Named events, religious/mythological iconography, fictional characters and places,

Marcia Zeng

Triple Extract Process



Gregg Garcia

Using SPARQL

- Now we can begin to find materials for research and discovery online
- Getty vocabularies have been used for indexing Now = links are possible via LOD, links to TGN and AAT within ULAN are used
- 90 sample SPARQL queries, editable

Find artists who worked in Italy and lived during a given time range but who are not Italian

Select ULAN records

- Having event that took place in **LINK** [tgn:1000080](#) Italy or any of its descendants
- Birth date between 1250 and 1780
- Descendants of facet [ulan:500000002](#) **LINK** "Persons, Artists"
- Not having nationality [aat:300111198](#) Italian or any of its descendants **LINK**

- Then use this set of artists to search for works

Using Linked Open Data

Getty Vocabularies are LINK-able

ULAN

Getty Vocabularies: LOD SPARQL Queries

Any Search... Search Brie

Possessions)

4.20 Places Nearby Each Other

5 ULAN-Specific Queries

5.1 Agents by Type

5.2 Associative Relations of Agent

5.3 Female Artists

5.4 Female Artists as a Hobby

5.5 Native American Painters

5.6 Names of Native American Painters

5.7 Architects Born in the 14th or 15th Century

5.8 Indian and Pakistani Architectural Groups

5.9 Non-Italians Who Worked in Italy

5.10 Artists Associated to a Given Patron or His Family

5.11 German, Dutch, Flemish printmakers, listed with their teachers

5.12 Artists Whose Identity May be Associated or Confused With Another

5.13 Ordered Hierarchy of Given Subject

5.14 Ancient Artists or Groups by Nationality

5.15 Art Repositories in the USA by State

5.16 Popes and Their Reigns

5.17 Pope Reign Durations

5.18 Life Events

5.19 Artists with Name, Bio, Nationality, Type

6 Language Queries

6.1 Scientific Names by Language

6.2 Scientific Names not in English and Latin

6.3 Find Terms by Language Tag

6.4 Languages and ISO Codes

6.5 Language URLs

```
select ?x ?name ?bio ?birth {
  {select distinct ?x
   {?x
   foaf:focus/bio:event/(schema:location|(schema:location/gvp:broaderExtended)) tgn:1000080-place}}
  ?x gvp:prefLabelGVP/xl:literalForm ?name;
  foaf:focus/gvp:biographyPreferred [
    schema:description ?bio;
    gvp:estStart ?birth].
  filter ("1250"^^xsd:gYear <= ?birth && ?birth <= "1780"^^xsd:gYear)
  filter exists {?x gvp:broaderExtended ?facet.
    filter (?facet in (ulan:500000003,
    ulan:500000002))}
  filter not exists {
    ?x
    foaf:focus/(schema:nationality|(schema:nationality/gvp:broaderExtended)) aat:300111198}}
```

LINK – [this is coming, as of now not enough works are discoverable]

External ontologies

Prefix	Ontology	Used for
bibo:	Bibliography Ontology	Sources
dc:	Dublin Core Elements	common
dct:	Dublin Core Terms	common
foaf:	Friend of a Friend ontology	Contributors
iso:	ISO 25946 (latest on thesauri)	iso:ThesaurusArray, BTG/BTP/BTI
owl:	Web Ontology Language	Basic RDF representation
prov:	Provenance Ontology	Revision history
rdf:	Resource Description Framework	Basic RDF representation
rdfs:	RDF Schema	Basic RDF representation
schema:	Schema.org	common, geo (TGN)
skos:	Simple Knowledge Org System	Basic vocabulary representation
skosxl:	SKOS Extension for Labels	Rich labels
wgs:	W3C World Geodetic Survey geo	Geo (TGN)
xsd:	XML Schema Datatypes	Basic RDF representation

GVP Data

Scope includes:

- Subjects: Concepts but also non-concepts
- Obsolete subjects (and `dct:isReplacedBy`)
- Terms: plain (SKOS) & rich (SKOS-XL). Term characteristics
- Languages (some custom lang tags)
- Hierarchical rels: custom & standard, distinguish BTG,BTP,BTI
- Associative rels (170 subprop of `skos:related`)
- Historic info on rels (`rdf:Statement`) and terms
- Alignment (exactMatch to LCSH)
- Sources (`bibo:Document`, `bibo:DocumentPart` with locator)
- Contributors (`foaf:Agent`)
- Revision history (`prov:Activity`)
- Thesaurus-specific (TGN place types, coordinates)

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Semantic resolution and content negotiation

All GVP, AAT, TGN, and ULAN URLs resolve, returning human or machine readable content through content negotiation
(303 redirect)

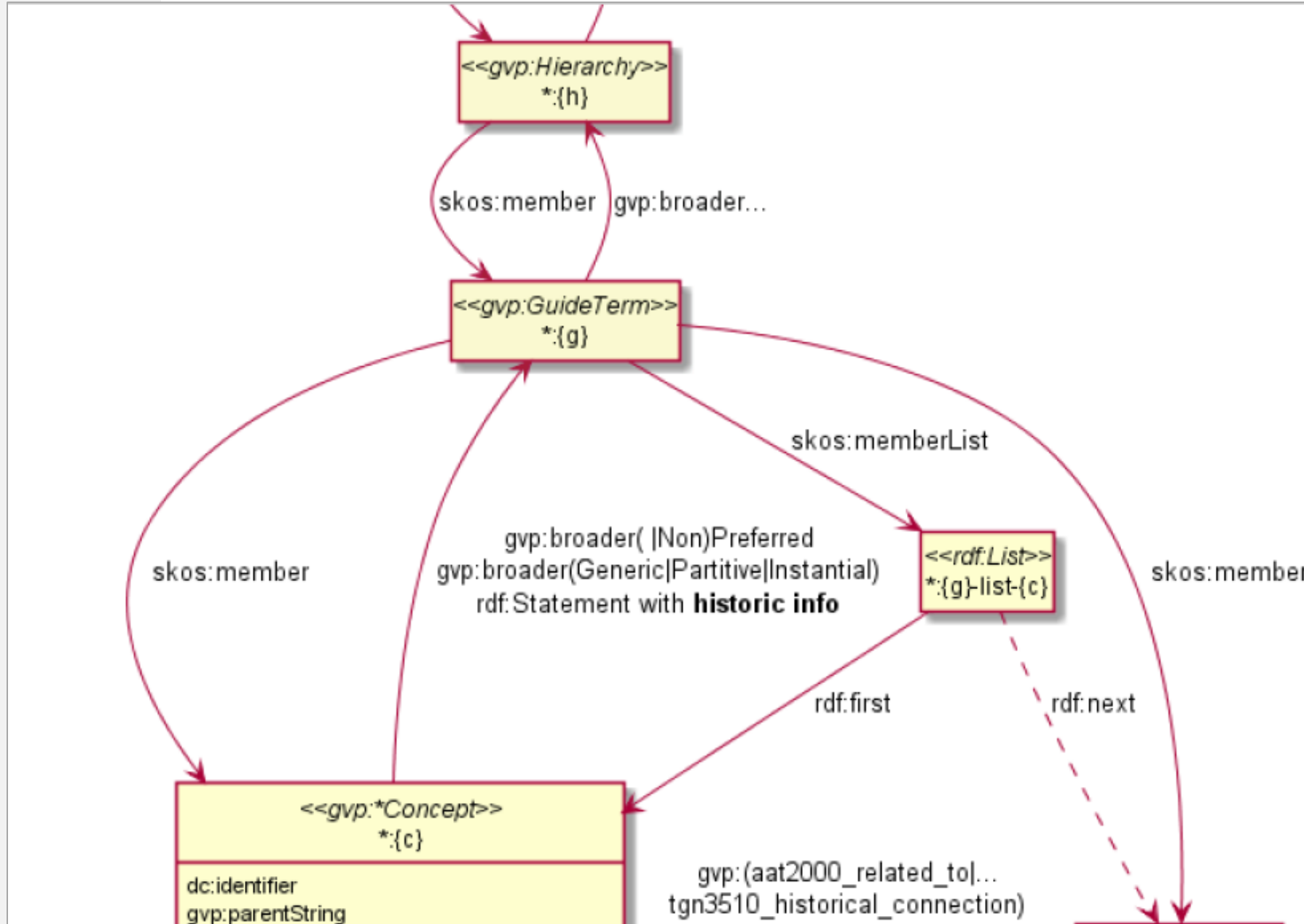
http://vocab.getty.edu/ontology	semantic URI, content-negotiated
http://vocab.getty.edu/ontology.html	page (application/xhtml+xml)
http://vocab.getty.edu/ontology.rdf	application/rdf+xml
http://vocab.getty.edu/ontology.ttl	text/turtle

Eg about an AAT subject

http://vocab.getty.edu/aat/300011154	semantic URI, con-neg
http://vocab.getty.edu/aat/300011154.html	page (application/xhtml+xml)
http://vocab.getty.edu/aat/300011154.rdf	application/rdf+xml
http://vocab.getty.edu/aat/300011154.ttl	text/turtle
http://vocab.getty.edu/aat/300011154.nt	NTriples

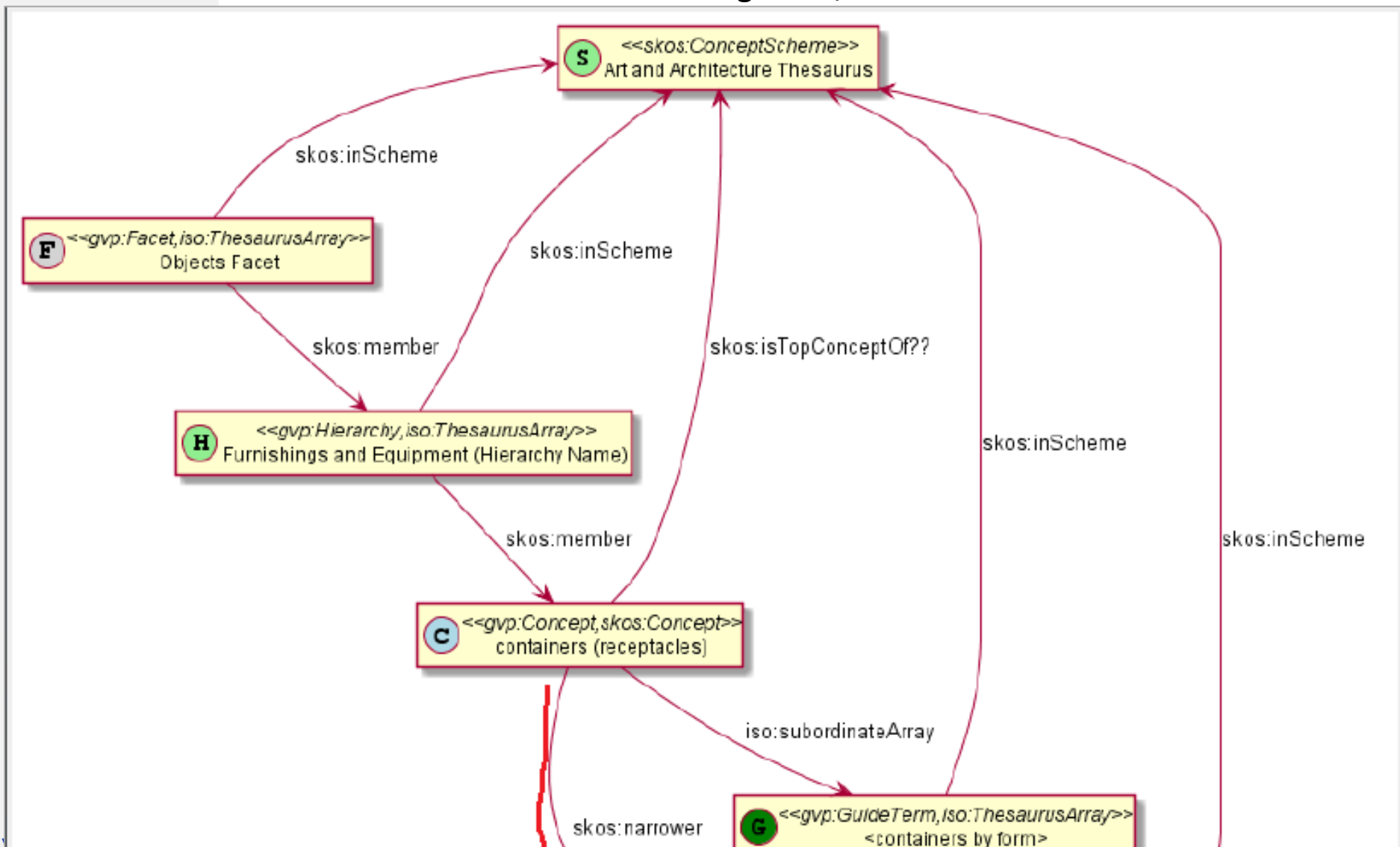
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GVP Semantic Representation



Hierarchical relations

Use ISO: ThesaurusArray to allow Guide Terms below Concepts.
Infer cross-threading SKOS/ISO broader relations



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Key values (“flags”) are important

vocab	table	field	val	ObjectProperty	Class	label	domain	range	subProperty	subClassOf	ConceptScheme
	subject	record_type	F		gvp:Facet	Facet				gvp:Subject, iso:ThesaurusArray	
AAT	subject	record_type	H		gvp:Hierarchy	Hierarchy Name				gvp:Subject, iso:ThesaurusArray	
AAT	subject	record_type	G		gvp:GuideTerm	Guide Term				gvp:Subject, iso:ThesaurusArray	
AAT	subject	record_type	C		gvp:Concept	Concept				gvp:Subject, skos:Concept	
	subject	record_type	-		gvp:ObsoleteSubject	Obsolete Subject				gvp:Subject	
TGN	subject	record_type	P		gvp:PhysPlaceConcept	Physical Place Concept				gvp:Subject, skos:Concept	
TGN	subject	record_type	A		gvp:AdminPlaceConcept	Administrative Place Concept				gvp:Subject, skos:Concept	
TGN	subject	record_type	B		gvp:Phys.AdminPlaceConcept	Physical and Administrative Place Concept				gvp:Subject, skos:Concept	
	subject_rels	preferred	P	gvp:broaderPreferred		Preferred Parent	gvp:Subject	gvp:Subject	gvp:broader		
	subject_rels	preferred	N	gvp:broaderNonPreferred		Non-Preferred Parent	gvp:Subject	gvp:Subject	gvp:broader		
	subject_rels	hier_rel_type	G	gvp:broaderGeneric		Parent (Generic)	gvp:Subject	gvp:Subject	gvp:broader		
	subject_rels	hier_rel_type	P	gvp:broaderPartitive		Parent (Partitive)	gvp:Subject	gvp:Subject	gvp:broader		
	subject_rels	hier_rel_type	I	gvp:broaderInstantial		Parent (Instantial)	gvp:Subject	gvp:Subject	gvp:broader		
	term	preferred	P	gvp:prefLabelGVP		Preferred Label for GVP	gvp:Subject	skosxl:Label			
	term	aacr2_flag	Y	gvp:prefLabelLoC		Preferred Label for LoC	gvp:Subject	skosxl:Label			
	term	vernacular	V	gvp:termFlag		Term Flag	skosxl:Label	skos:Concept			term/flag/
	term	other_flags	A	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	C	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	CN	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	F	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	J	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	N	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	S	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/

```

gvp:Facet a owl:Class ;
  rdfs:isDefinedBy <http://vocab.getty.edu/ontology> ;
  rdfs:subClassOf gvp:Subject, iso:ThesaurusArray ;
  rdfs:label "Facet" ;
  rdfs:comment "One of the major divisions of a vocabulary" ;
  skos:example "Objects Facet (AAT), World (TGN)" ;

```


Associative relations are important

Relations come in owl:inverseOf pairs or owl:symmetricProperty self-inverse

vocab	table	field	val	ObjectProperty	Class	label	domain	range	subProperty	subClassOf	ConceptScheme
	subject	record_type	F		gvp:Facet	Facet				gvp:Subject, iso:ThesaurusArray	
AAT	subject	record_type	H		gvp:Hierarchy	Hierarchy Name				gvp:Subject, iso:ThesaurusArray	
AAT	subject	record_type	G		gvp:GuideTerm	Guide Term				gvp:Subject, iso:ThesaurusArray	
AAT	subject	record_type	C		gvp:Concept	Concept				gvp:Subject, skos:Concept	
	subject	record_type	-		gvp:ObsoleteSubject	Obsolete Subject				gvp:Subject	
TGN	subject	record_type	P		gvp:PhysPlaceConcept	Physical Place Concept				gvp:Subject, skos:Concept	
TGN	subject	record_type	A		gvp:AdminPlaceConcept	Administrative Place Concept				gvp:Subject, skos:Concept	
TGN	subject	record_type	B		gvp:PhysAdminPlaceConcept	Physical and Administrative Place Concept				gvp:Subject, skos:Concept	
	subject_rels	preferred	P	gvp:broaderPreferred		Preferred Parent	gvp:Subject	gvp:Subject	gvp:broader		
	subject_rels	preferred	N	gvp:broaderNonPreferred		Non-Preferred Parent	gvp:Subject	gvp:Subject	gvp:broader		
	subject_rels	hier_rel_type	G	gvp:broaderGeneric		Parent (Generic)	gvp:Subject	gvp:Subject	gvp:broader		
	subject_rels	hier_rel_type	P	gvp:broaderPartitive		Parent (Partitive)	gvp:Subject	gvp:Subject	gvp:broader		
	subject_rels	hier_rel_type	I	gvp:broaderInstantial		Parent (Instantial)	gvp:Subject	gvp:Subject	gvp:broader		
	term	preferred	P	gvp:prefLabelGVP		Preferred Label for GVP	gvp:Subject	skosxl:Label			
	term	aacr2_flag	Y	gvp:prefLabelLoC		Preferred Label for LoC	gvp:Subject	skosxl:Label			
	term	vernacular	V	gvp:termFlag		Term Flag	skosxl:Label	skos:Concept			term/flag/
	term	other_flags	A	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	C	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	CN	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	F	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	J	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	N	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/
AAT	term	other_flags	S	gvp:termKind		Term Kind	skosxl:Label	skos:Concept			term/kind/

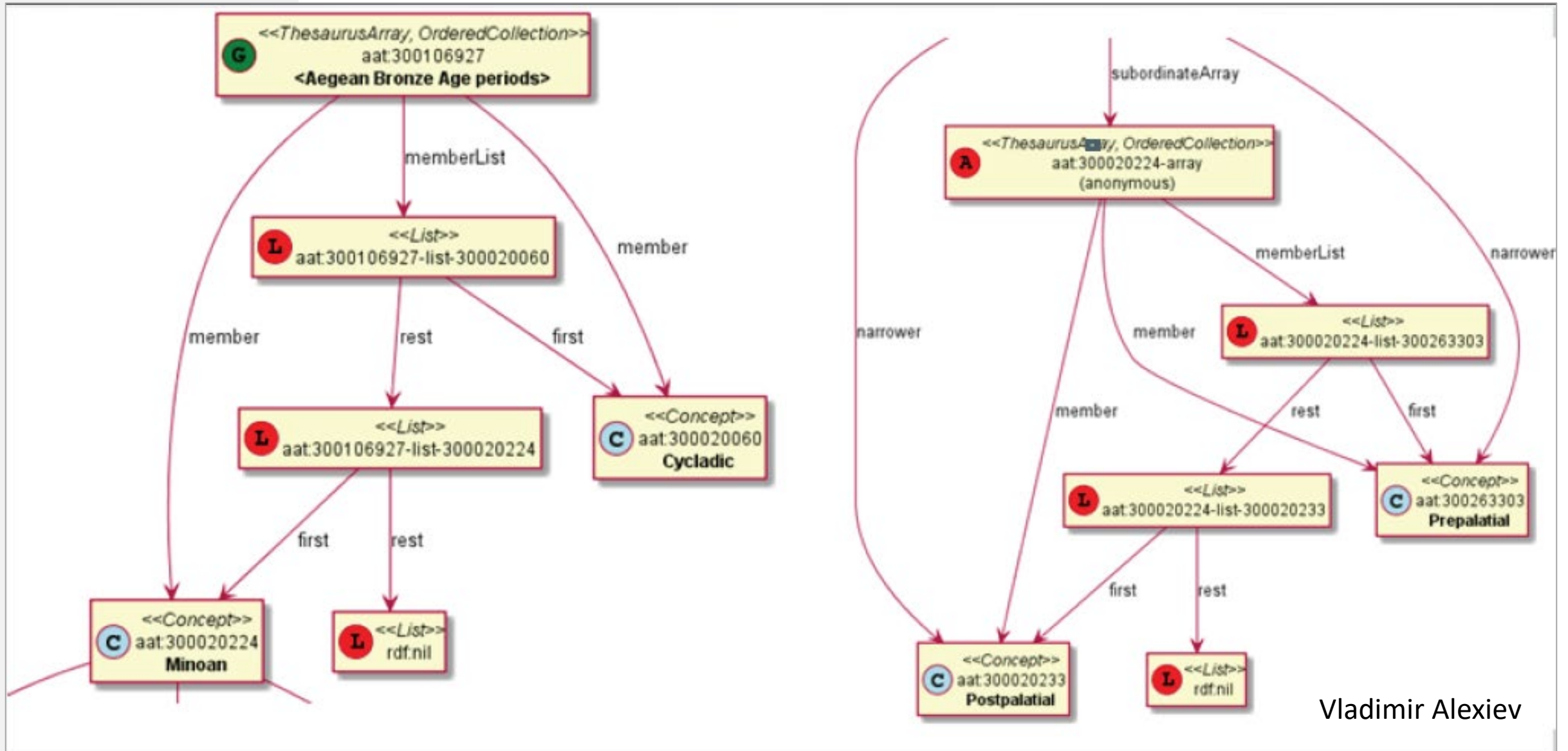
```

gvp:Facet a owl:Class ;
  rdfs:isDefinedBy <http://vocab.getty.edu/ontology> ;
  rdfs:subClassOf gvp:Subject, iso:ThesaurusArray ;
  rdfs:label "Facet" ;
  rdfs:comment "One of the major divisions of a vocabulary" ;
  skos:example "Objects Facet (AAT), World (TGN)" .

```

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Use of ISO: ThesaurusArray in GVP



Vladimir Alexiev

CONTRIBUTION TO ISO 25946

- Contributed to [ISO 25946 ontology \(LOV entry\)](#)
- First industrial use of ISO 25946
- Defined appropriate combinations of BTG, BTP, BTI relations (first formally defined in ISO).

On Compositionality of ISO 25964 Hierarchical Relations (BTG, BTP, BTI), V.Alexiev, J.Lindenthal, A.Isaac. [Draft paper, Presentation at NKOS 2014 Workshop, London, 12 Sep 2014](#)

	BTGx	BTPx	BTIx
BTGx	BTGE	BTPE	no
BTPx	BTPE	BTPE	no
BTIx	BTIE	no	no

- Eg: anvil components BTP <anvils and anvil accessories> BTG <forging and metal-shaping tools> => BTPE
- Mount Athos BTI Orthodox religious center BTG religious center => BTIE

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TERMS

Support multilingual labels: both SKOS (plain)...

```
aat:300198841 a skos:Concept , gvp:Subject , gvp:Concept ;
  skos:prefLabel "rhyta"@el-latn , "rhyta"@en , "rhytons"@es , "rhytons"@fr ;
  skos:altLabel "rhyta"@es , "rhyton"@es , "rhyton"@en , "rhyton"@el-latn ...;
  skosxl:prefLabel aat_term:1000198841-en , aat_term:1000198841-el-Latn ...;
  skosxl:altLabel aat_term:1000198841-es , aat_term:1000297235-en ...
```

... and rich info in SKOS-XL:

```
aat_term:1000198841-en a skosxl:Label ;
  dc:identifier "1000198841" ;
  dct:language aat:300388277 , gvp_lang:en ; # owl:sameAs
  dct:contributor aat_contrib:10000000 , aat_contrib:10000131 ;
  skosxl:literalForm "rhyta"@en ;          ##### with Qualifier if applicable
  gvp:term "rhyta"@en ;                   ##### no qualifier
  gvp:displayOrder "1"^^xsd:positiveInteger ;
  gvp:termType <term/type/Descriptor> ;   ##### Descr/AltDescr/UseFor
  gvp:termPOS <term/POS/PluralNoun> ;     ##### Part of Speech
  gvp:contributorPreferred aat_contrib:10000000 , aat_contrib:10000088 ;
  gvp:contributorNonPreferred aat_contrib:10000131 ;
  gvp:sourcePreferred aat_source:2000051089-term-1000198841 ...;
  dct:source aat_source:2000024811 , aat_source:2000052946 ...;
  gvp:sourceNonPreferred aat_source:2000052946 ;
  gvp:sourceAlternatePreferred aat_source:2000048328-term-1000198841 .
```

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SOME CUSTOM LANGUAGE TAGS

Despite the richness of IANA tags (9000), we had to define new tags, using several extension mechanisms:

- Private language, e.g.
 - **x-byzantin-Latn**: Byzantine Greek (transliterated)
 - **x-frisian** (IANA/ISO has codes for predecessor Old Frisian and dialects West, Saterland and North Frisian)
- Private language used in specific region, e.g.
 - **qqq-002**: African language (not specified which)
 - **qqq-ET**: Ethiopian (not specified: Boro/Borna, Karo...)
- Private modifier, e.g.
 - **grc-Latn- x-liturgic**: Liturgical Greek
 - **ber-Latn- x-dialect**: Berber Dialects (transliterated)
 - **fa-Latn- x-middle**: Persian, Middle (transliterated)
 - **zh-Latn-pinyin- x-notone**: transliterated Pinyin without tones

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SOURCES

bibo:Document or bibo:DocumentPart

```
aat_source:2000051089 a bibo:Document;  
  dc:identifier "2000051089"  
  bibo:shortTitle "AATA database (2002-)";  
  dct:title "Getty Conservation Institute (GCI). database of AATA Online...".  
aat_source:2000051089-term-1000198841 a bibo:DocumentPart;  
  dct:isPartOf aat_source:2000051089;  
  bibo:locator "128257 checked 26 January 2012".
```

Applied to subject, term, scopeNote:

```
aat:300198841 # subject (rhyta)  
  dct:source aat_source:2000030301-subject-300198841;  
  dct:source aat_source:2000052378.  
aat_term:1000198841-en # term "rhyta"@en  
  gvp:sourceNonPreferred aat_source:2000049728;  
  dct:source aat_source:2000051089-term-1000198841.  
aat_scopeNote:34904 # scopeNote  
  dct:source aat_source:2000046502.
```

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CONTRIBUTORS

foaf:Agent

```
aat_contrib:10000131 a foaf:Agent;  
dc:identifier "10000131";  
foaf:nick "CDBP-DIBAM";  
foaf:name "Centro de Documentación de Bienes Patrimoniales...".
```

Applied to subject, term, scopeNote:

```
aat:300198841 # subject "rhyta"  
dct:contributor aat_contrib:10000131;  
dct:contributor aat_contrib:10000000.  
aat_term:1000198841-en # term "rhyta"@en  
gvp:contributorNonPreferred aat_contrib:10000131;  
gvp:contributorPreferred aat_contrib:10000000.  
aat_scopeNote:34904 # scopeNote  
dct:contributor aat_contrib:10000000.
```

HISTORIC INFO

tes of applicability, historicFlag, comment. Applied to
& assoc rels, place types (using rdf:Statement)

```
00002693-en a skosxl:Label;  
    literalForm "lambruscatura"@en ;  
    historicFlag <http://vocab.getty.edu/historic/historic> ;  
    startDate "0900"^^xsd:gYear ;  
    endDate "1700"^^xsd:gYear ;  
    comment "Medieval term for wainscoting".
```

```
020271-aat2812_followed-300020269 a rdf:Statement;  
    subject aat:300020271;          # Second Dynasty (Egyptian)  
    predicate gvp:aat2812_followed;  
    object aat:300020269;          # First Dynasty (Egyptian)  
    comment "Second Dynasty began ca. 2775 BCE";  
    startDate "-2785"^^xsd:gYear;  
    endDate "-2765"^^xsd:gYear.
```

```
-placeType-300008347 a rdf:Statement;  
    subject tgn:7011179;          # Siena  
    predicate gvp:placeTypePreferred;  
    object aat:300008347;          # inhabited place  
    comment "settled by Etruscans (flourished 6th century BCE)";  
    startDate "-0800"^^xsd:gYear;  
    dayOrder "1"^^xsd:positiveInteger.
```

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REVISION HISTORY

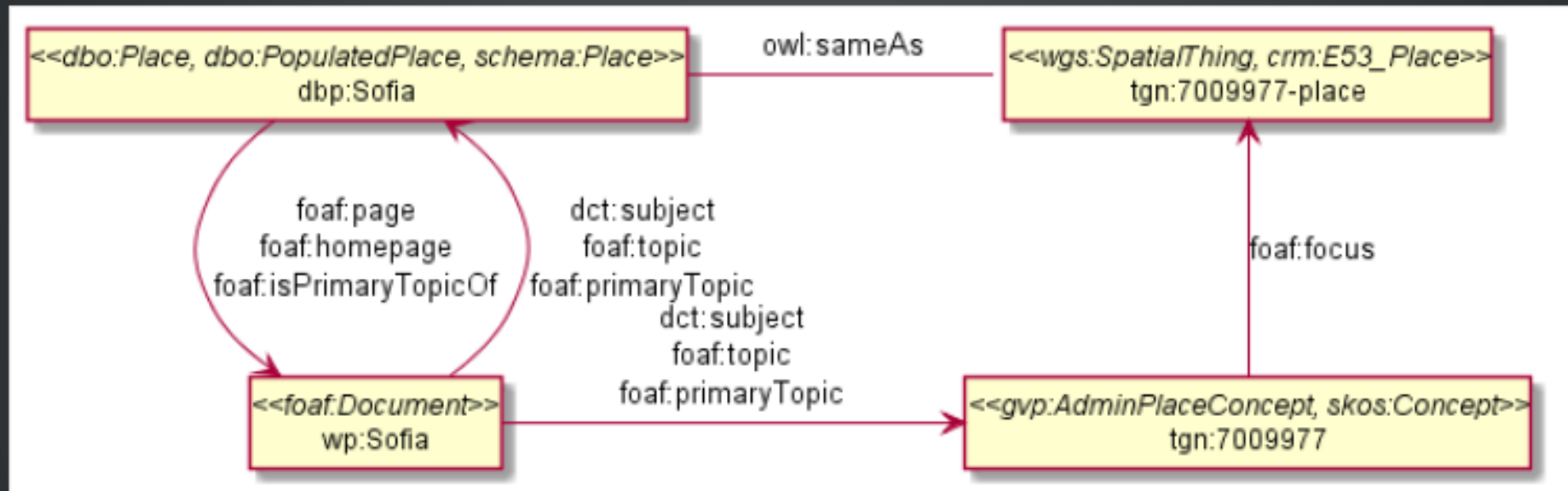
PROV is too complex, so we simplify:

```
aat:300018699
  skos:changeNote aat_rev:12345, aat_rev:12346, aat_rev:12347;
  prov:wasGeneratedBy aat_rev:12345;
  dct:created "2014-01-02T01:02:03"^^xsd:dateTime;
  dct:modified "2014-01-03T01:02:03"^^xsd:dateTime;
  dct:issued "2014-01-04T01:02:03"^^xsd:dateTime.
aat_rev:12345 a prov:Activity, prov:Create;
  dc:type "created";
  prov:startedAtTime "2014-01-02T01:02:03"^^xsd:dateTime.
aat_rev:12346 a prov:Activity, prov:Modify;
  prov:used aat:300018699;
  dc:type "term added";
  dc:description "leggings, puttee (1000248060)";
  prov:startedAtTime "2014-01-03T01:02:03"^^xsd:dateTime.
aat_rev:12347 a prov:Activity, prov:Publish;
  prov:used aat:300018699;
  dc:type "issued";
  prov:startedAtTime "2014-01-04T01:02:03"^^xsd:dateTime.
```

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TGN SPECIFICS: CONCEPT-PLACE DUALITY

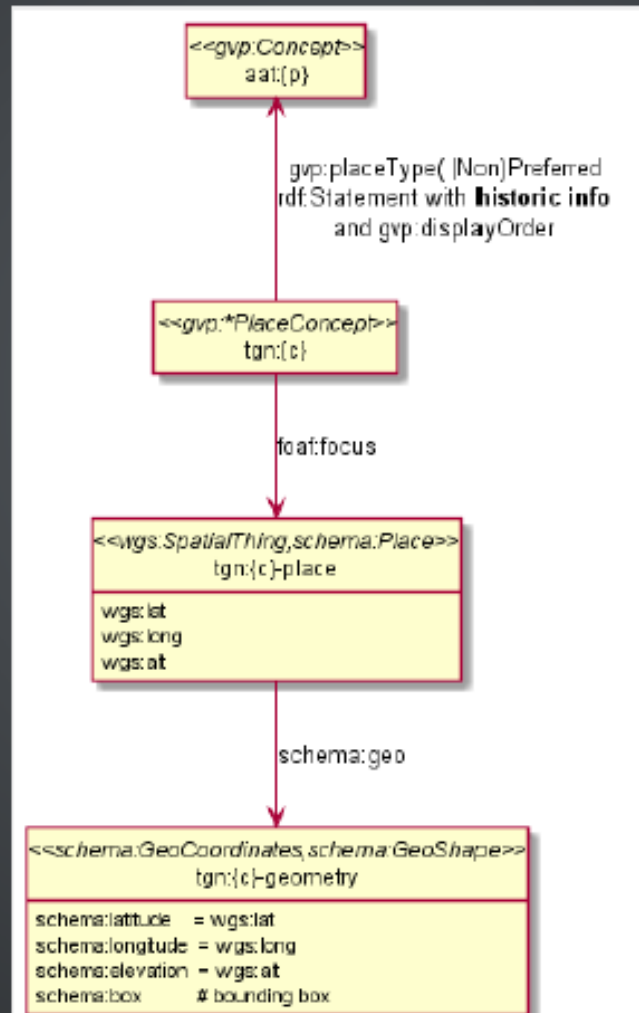
Duality between Concept and its denotation (ala VIAF, UK BL, FR BnF, SE KB...)



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TGN SEMANTIC REPRESENTATION

Place types (TGN->AAT), Concept-Place duality, coordinates



Vladimir Alexiev

See original slides by other authors in these PDFs

- Getty Vocabularies, Why LOD?, Joan Cobb
http://www.getty.edu/research/tools/vocabularies/cidoc_cobb_getty_vocabs_lod.pdf
- Getty Vocabularies as LOD: Process, Discovery, Evolutions, Gregg Garcia
http://www.getty.edu/research/tools/vocabularies/cidoc_garcia_getty_vocabs_lod.pdf
- GVP Ontologies and Semantic Representation, Vladimir Alexiev
http://www.getty.edu/research/tools/vocabularies/cidoc_alexiev_getty_vocabs_lod.pdf
- Present and Future of LOD, KOS, and the Getty Vocabularies, Marcia Zeng
http://www.getty.edu/research/tools/vocabularies/zeng_itwg_2017.pdf
- Getty Vocabularies and the Significance of Five-Star LOD Datasets, Marcia Zeng
https://www.getty.edu/research/tools/vocabularies/zeng_vocabs_and_five_star_lod.pdf

See full documentation and SPARQL endpoint here

<http://vocab.getty.edu/>

Thank you.

Patricia Harpring
Managing Editor
Getty Vocabulary Program

pharpring@getty.edu
vocab@getty.edu

<https://www.getty.edu/research/tools/vocabularies/>

