Introduction to Controlled Vocabularies
Featuring the Getty Vocabularies

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Revised April 2020
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This ppt is a companion presentation to the book, *Introduction to Controlled Vocabularies*, revised edition, 2013.

For an online version of the 2010 edition of *Introduction to Controlled Vocabularies*, see [www.getty.edu/research/publications/electronic_publications/intro_controlled_vocab/](http://www.getty.edu/research/publications/electronic_publications/intro_controlled_vocab/).

Questions? Contributions to the Getty Vocabularies? Send an email to [vocab@getty.edu](mailto:vocab@getty.edu).
CONTROLLED VOCABULARIES IN CONTEXT

VOCABULARIES FOR VISUAL ARTS
**Audience**

- This book deals specifically with controlled vocabularies related to art works — those products of human creativity that have visual aesthetic expression.

- Such vocabularies are employed with the ultimate goal of allowing art works, images of art works, and information about them to be discovered, brought together, and compared for study and appreciation.

- The intended audience of this book includes students, academics, and professionals in art museums, art libraries, archives, visual resource collections, and other institutions that catalog the visual arts, architecture, and other cultural objects.

- The audience may also include systems providers who support these communities, as well as consortia or other groups attempting to compile or use vocabularies about art.

- The topics discussed here may be applicable to disciplines outside the arts as well.
What are cultural works?

- Objects representing visual arts and material culture are called *works* in this book.

- *Material culture* refers to art, architecture, and visual arts more broadly comprising the aggregate of physical objects produced by a society or culturally cohesive group.

- *Cultural works* are the physical artifacts of *cultural heritage*, which encompasses broadly the belief systems, values, philosophical systems, knowledge, behaviors, customs, arts, history, experience, languages, social relationships, institutions, and material goods and creations belonging to a group of people and transmitted from one generation to another.

- The group of people or society may be bound together by race, age, ethnicity, language, national origin, religion, or other social categories or groupings.
Creators of cultural works

- Creators of information about works include museums, visual resources collections, libraries, special collections, archival collections, private collections, and scholars.

- Complexity is inherent in art information itself.

- Issues surrounding the development and maintenance are further complicated by the diverse spectrum of information creators, including museum professionals, librarians, archivists, visual resource specialists, art and architectural historians, archaeologists, and conservators.

- Users of the information may include all of these groups, as well as the general public. While these communities share a vast overlap of required information about works, they also have various requirements and different cataloging and indexing traditions.
Types of Standards for art information

There are several types of standards used, some used to create and others used to share art information

- **Standards for data values** provide the actual values to be entered in fields, including the vocabulary terms and allowable character sets. Controlled vocabularies are standards for data values.

- **Standards for data structure** dictate what constitutes a record. They define the names, length, repeatability, and other characteristics of fields and their relationships to each other. Examples are the MARC format and CDWA. A Resource Description Framework (RDF) is a language or format for describing things as well as the relationships between things as simple properties and values (known as 'triples'), while things are represented using URLs. Among the most often used standard formats for publishing art vocabularies are the Simple Knowledge Organization System (SKOS) and Web Ontology Language (OWL).

- **Standards for data content** indicate how data should be entered, including cataloging rules and syntax for data. They may refer to standards for data values and standards for data structure. Examples of standards for data content are [Resource Description and Access](https://www.oclc.org/) (replaces AACR2) and [Cataloging Cultural Objects](https://www.oclc.org/) (CCO).

- **Standards for data releases or exchange** are a different class than the above, but important to mention. They may include rules for both structure and maybe content. The Getty Vocabularies are released in relational tables, XML, APIs, and Linked Open Data (LOD) releases, JSON, RDF, N3/Turtle, N-Triples.
WHAT ARE CONTROLLED VOCABULARIES?

THE BASICS
WHAT IS A CONTROLLED VOCABULARY?

- An organized arrangement of words and phrases that are used to *index* content and/or to *retrieve* content through navigation or a search
  - Controlled vocabulary typically includes preferred terms and has a limited scope or describes a specific domain

- Synonyms
  - Athens (English) = Athinaí (Greek) = Athenae (Latin)
- Concepts have relationships, provide context
  - Athens is in Greece
  - Epiktetos II is possibly identified as the Kleophrades Painter
CONTROLLED VOCABULARY

• Controlled vocabulary comprises standardized words and phrases used to refer to ideas, physical characteristics, people, places, events, subject matter, and many other concepts.

• Controlled vocabularies allow for the categorization, indexing, and retrieval of information.

• The purpose of controlled vocabularies is to organize information and to provide terminology to catalog and retrieve information.

• While capturing the richness of variant terms, controlled vocabularies also promote consistency in preferred terms and the assignment of the same terms to similar content.

• One of the most important functions of a controlled vocabulary are to gather together variant terms and synonyms for concepts and to link concepts in a logical order or into categories.

### Enhancing access to visual arts and material culture information for research, education, and discovery

- Users don’t always know what a person, place, or thing is called
- Even knowledgeable users or catalogers may use different terms for the same person, place, or thing
- Vocabularies gather related terms and other information together to improve access to art and art history information
- In access and retrieval, controlled vocabularies are critical components for increasing reliability and success of research and discovery
Are a rose window and a Catherine wheel the same thing?
How is pot-metal glass related to the more general term stained glass?
The links and relationships in a controlled vocabulary ensure that these relationships are defined and maintained, for cataloging, retrieval, and discovery.
Purpose of Controlled Vocabularies

**Cataloging:** Used as sources of standard terminology for use in description, cataloging, and documentation

**Retrieval:** Used as assistants in online search engines, creating a semantic “road map” that shows links and paths between concepts and terms; linked to other metadata as conduit for research and discovery in LOD

**Research:** Used as knowledge bases in themselves

**Scope Note:**
Dressing rooms in ancient Greek and Roman baths and palaestrae.

- apodyteria
- apodyterium
- gymnasteria
- gymnasterium
DISPLAY AND CONTROLLED INFORMATION

• Both descriptive and administrative data must be maintained in ways that will accommodate two categories of information:
  • information intended for display to end users and information intended for retrieval.
  • Information utilized for retrieval should be adapted for controlled vocabularies and controlled format.

Why are display and indexing of information separate issues?
• Art and cultural heritage information provides unique challenges in display and retrieval of information. Information must be displayed to users in a way that allows expression of nuance, ambiguity, and uncertainty.
  • The facts are not always known or straightforward, and it is misleading and contrary to the tenets of scholarship to fail to express this uncertainty.
• At the same time, efficient retrieval requires indexing according to firm rules and controlled terminology.
DISPLAY AND CONTROLLED INFORMATION

- It is often necessary to allow fuzziness in the expression of information that at the same time must be retrievable via controlled vocabulary.
- In certain key areas of a work record, this is accomplished by including separate display and indexing fields for the same information.
- Controlled information included vocabulary-controlled data ("Authority" in the example below) and controlled format (e.g., for years).

<table>
<thead>
<tr>
<th>Creator Description: primary painter and calligrapher was Dai Xi (Chinese, 1801-1860), with additional inscriptions and colophons added by other officials; commissioned by Wu Zhongzhun</th>
<th>Free text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity: Dai Xi</td>
<td>Authority</td>
</tr>
<tr>
<td>Roles: draftsman calligrapher</td>
<td>Authority</td>
</tr>
<tr>
<td>Identity: Wu Zhongzhun</td>
<td>Authority</td>
</tr>
<tr>
<td>Role: patron</td>
<td>Authority</td>
</tr>
<tr>
<td>Creation Date: between 1847 and 1849</td>
<td>Free text Controlled format</td>
</tr>
<tr>
<td>Earliest: 1847 Latest: 1849</td>
<td></td>
</tr>
</tbody>
</table>

Image credits: Dai Xi (Chinese, 1801-1860); Viewing the Waterfall at Lung-Ch’iu; 1847; ink on paper; 31.9 x 133.9 cm (12 1/2 x 52 3/4 inches); The Saint Louis Art Museum (Saint Louis, Missouri, USA); 7:19853.
• Controlled lists, synonym ring lists, taxonomies, and thesauri are covered by ISO and NISO standards


TYPES OF CONTROLLED VOCABULARIES

- There are several types of controlled vocabularies and related specifications relevant for art information

- Subject heading lists
- Controlled lists
- Synonym ring lists
- Authority Files
- Taxonomies
- Alphanumeric classifications
- Thesauri
- Ontologies
- Folksonomies

The Getty Vocabularies are thesauri
Types of vocabularies

- **Subject heading list:** uniform words or phrases assigned to books and articles (or other materials) to describe the subject or topic and to group them with materials having similar subjects
  - usually in alphabetical order
  - precoordination of terminology is a characteristic of subject headings

Cat family (Mammals)--Literary collections
Cat Sacred - Ancient Egypt
Types of vocabularies

- Subject heading list: uniform words or phrases assigned to books and articles (or other materials) to describe the subject or topic and to group them with materials having similar subjects.

- Subject headings typically combine several unique concepts together in a string as in the Library of Congress Subject Headings (LCSH).

Cat family (Mammals)--Literary collections
Cat Sacred - Ancient Egypt
Types of Vocabularies

- **Controlled list**: A simple list of terms used to control terminology

  - In a well-constructed controlled list: • each term must be unique; • terms should all be members of same class; • terms should not be overlapping in meaning; • terms should be equal in granularity/specificity; • and terms should be arranged alphabetically or in another logical order

Anteaters, armadillos, bats, bears, cats, cows, deer, dogs, elephants, goldfish, horses, ostriches, pandas, pigs, zebras
**Types of vocabularies**

- Controlled list: A simple list of terms used to control terminology
- May include terms from other controlled vocabulary resources
- For some elements or fields in the database, a controlled list may be sufficient to control terminology, particularly where the terminology for that field is limited and unlikely to have synonyms or ancillary information

- anteaters
- armadillos
- bats
- bears
- cats
- cows
- deer
- dogs
- elephants
- goldfish
- horses
- ostriches
- pandas
- pigs
- zebras
Controlled list: A simple list of terms used to control terminology

- manuscripts
- miscellaneous paintings
- photographs
- sculpture
- site Installation
- texts
- vessels

Example of a controlled pick list for Classification
**Types of vocabularies**

- **Authority file:** A set of established names or headings and cross-references to the preferred form from variant or alternate forms. The Library of Congress name authority file is a well-known authority file.

- Vocabulary types are not mutually exclusive; a given vocabulary can be an authority file and a thesaurus.

- Building local authorities is recommended by CDWA and CCO.
Types of vocabularies

- **Synonym ring list**: A list comprising sets of terms that are considered equivalent for retrieval
  - No preferred term
  - Not necessarily true equivalents (= quasi-synonyms or generic postings)
  - Generally used for search and retrieval, providing access to content that is represented in natural, uncontrolled language

<table>
<thead>
<tr>
<th>domestic cat</th>
<th>Felis domesticus</th>
<th>cat family</th>
</tr>
</thead>
<tbody>
<tr>
<td>house cat</td>
<td>kittens</td>
<td></td>
</tr>
</tbody>
</table>
Types of vocabularies

- Authority File: An authority file is a set of established names or headings and cross-references to the preferred form from variant or alternate forms.
**Types of Vocabularies**

- **Taxonomy**: An orderly classification for a defined domain
- Vocabularies that organize a body of knowledge into conceptual categories are classifications and taxonomies

<table>
<thead>
<tr>
<th>Common name</th>
<th>Human</th>
<th>Lion</th>
<th>House Cat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingdom</td>
<td>Animalia</td>
<td>Animalia</td>
<td>Animalia</td>
</tr>
<tr>
<td>Phylum</td>
<td>Chordata</td>
<td>Chordata</td>
<td>Chordata</td>
</tr>
<tr>
<td>Class</td>
<td>Mammalia</td>
<td>Mammalia</td>
<td>Mammalia</td>
</tr>
<tr>
<td>Order</td>
<td>Primate</td>
<td>Carnivora</td>
<td>Carnivora</td>
</tr>
<tr>
<td>Family</td>
<td>Hominidae</td>
<td>Felidae</td>
<td>Felidae</td>
</tr>
<tr>
<td>Genus</td>
<td>Homo</td>
<td>Panthera</td>
<td>Felis</td>
</tr>
<tr>
<td>species</td>
<td>sapiens</td>
<td>leo</td>
<td>domesticus</td>
</tr>
</tbody>
</table>
Types of vocabularies

- **Alphanumeric classification scheme:**
  Controlled codes (letters or numbers, or both letters and numbers) that represent concepts, headings, or textual correlates
  - They generally have an implied taxonomy that can be surmised from the codes
  - The Dewey Decimal System and Iconclass are examples

### Dewey 

<table>
<thead>
<tr>
<th>Dewey #</th>
<th>10 Main Classes</th>
<th>Kinds of Books</th>
</tr>
</thead>
<tbody>
<tr>
<td>000-099</td>
<td>General Works</td>
<td>encyclopedias, almanacs, record books, such as Guinness</td>
</tr>
<tr>
<td>100-199</td>
<td>Philosophy and Psychology</td>
<td>paranormal phenomena, such as ghosts, ethics, how we think</td>
</tr>
<tr>
<td>200-299</td>
<td>Religion</td>
<td>mythology, religions</td>
</tr>
<tr>
<td>300-399</td>
<td>Social Science</td>
<td>government, holidays, folklore, fairy tales, education, community</td>
</tr>
<tr>
<td>400-499</td>
<td>Language</td>
<td>English and foreign languages, sign language, dictionaries</td>
</tr>
<tr>
<td>500-599</td>
<td>Natural Science</td>
<td>math, chemistry, biology, weather, rocks, plants, animals in nature</td>
</tr>
<tr>
<td>600-699</td>
<td>Applied Science</td>
<td>inventions, health, drugs, transportation, cooking, pets, crafts, art, drawing, painting, music, games, TV, movies, sports</td>
</tr>
<tr>
<td>700-799</td>
<td>Fine Arts and Recreation</td>
<td>short stories, poetry, plays, jokes, addies (fiction could be here)</td>
</tr>
<tr>
<td>800-899</td>
<td>Literature</td>
<td>countries, flags, historical events, biographies (82 or 92)</td>
</tr>
<tr>
<td>900-999</td>
<td>History and Geography</td>
<td></td>
</tr>
</tbody>
</table>

**Iconclass**

9 Classical Mythology and Ancient History

...94 the Greek heroic legends (I)

.........94L (story of) Hercules (Heracles)

.............94L1 early life, prime youth of Hercules

.............94L2 love-affairs of Hercules

.............94L3 most important deeds of Hercules:
the Twelve Labours
Thesaurus

- 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

<table>
<thead>
<tr>
<th>Objects Facet</th>
<th>hierarchical</th>
</tr>
</thead>
<tbody>
<tr>
<td>........ Furnishings and Equipment</td>
<td></td>
</tr>
<tr>
<td>.......... Containers</td>
<td></td>
</tr>
<tr>
<td>............ &lt;culinary containers&gt;</td>
<td></td>
</tr>
<tr>
<td>............ &lt;vessels for serving / consuming food&gt;</td>
<td></td>
</tr>
</tbody>
</table>

**Thesaurus Objects Facet**
- stirrup cups
- coaching glasses
- hunting glasses
- stirzbechers
- Sturzbecher
- stortebekers

**rhyta**
- rhyton
- rhytons
- rhea
- rheons
- ritón
- 萘僥酒杯

**distincted from**
Ontology: Formal, machine-readable specifications of a conceptual model

- Concepts, properties, relationships, functions, constraints, and axioms are all explicitly defined
- Not a controlled vocabulary, but uses one or more controlled vocabularies for a defined domain and expresses the vocabulary in a representative language that has a grammar for using vocabulary terms to express something meaningful

- Ontologies are used in the semantic web, artificial intelligence, software engineering, & information architecture as knowledge representation about a particular domain of knowledge.
- Ontologies generally divide their world into the following areas: individuals, classes, attributes, relations, and events
- The grammar of the ontology links these areas together by formal constraints that determine how the vocabulary terms or phrases may be used together
Tools related to or utilizing vocabularies

**Folksonomy:** An assemblage of concepts, which are represented by terms and names (called tags) that are compiled through social tagging.

- Social tagging refers to the decentralized practice and method by which individuals and groups create, manage, and share tags (terms, names, etc.) to annotate and categorize digital resources in an online “social” environment.
- Not a controlled vocabulary, but could use vocabularies; used for retrieval
- Social tagging = decentralized practice where individuals and groups create, manage, and share tags (terms, names, etc.) to annotate digital resources in an online “social” environment
- Typically without hierarchical structure, typically have no preferred term for a concept, and may not even cluster synonyms
- By definition not applied to indexing by professional indexers, generally characterized by non-standard, idiosyncratic tagging
**Unique Identifiers**

**Unique Identifier:** A number or other string that is associated with a record or piece of data, exists only once in a database, and is used to uniquely identify and disambiguate that record or piece of data from all others in the database.

**Subject_ID:** 300311452  
**Record Type:** concept  
**Label:** cinnabar (mineral) (mineral, inorganic material, ... Materials (Hierarchy Name))  
**Scope Note:** A soft, dense, red, native ore composed of mercuric sulfide, found in deposits in veins near volcanic rocks or hot springs around the world. [...]  
**Terms:**  
- cinnabar (mineral) (preferred,C,U,English-P,D,U,N)  
  **Term_ID:** 1000403760  
- cenobrium (mineral) (C,U,English,UF,U,N)  
  **Term_ID:** 1000403756  
- natural vermilion (mineral) (C,U,English,UF,U,N)  
  **Term_ID:** 1000403762  
- cinabre (mineral) (C,U,French-P,D,U,N)  
  **Term_ID:** 1000403757  
- cinabrio (mineral) (C,U,Spanish-P,D,U,N)  
  **Term_ID:** 1000403758  
- cinabro (minerale) (C,U,Italian-P,D,U,N)  
  **Term_ID:** 1000403760  
- cinábrio (mineral) (C,U,Portuguese-P,UF,U,N)  
  **Term_ID:** 1000403774  
- cinnaber (mineraal) (C,U,Dutch-P,D,U,U)  
  **Term_ID:** 1000539139  
- Zinnober (Mineral) (C,U,German-P,D,U,N)  
  **Term_ID:** 1000403760  
- Zinnoberersatz (Mineral) (C,U,German,UF,U,N)  
  **Term_ID:** 1000403771  
- tan-sha (C,U,Chinese (transliterated)-P,D,U,N)  
  **Term_ID:** 1000403776  
- shinsha (C,U,Japanese (transliterated)-P,D,U,N)  
  **Term_ID:** 1000403775

**Hierarchical Position:**

- Materials Facet  
  **Subject_ID** 300264091  
  .... Materials (Hierarchy Name) (G)  
  **Subject_ID** 300010357  
  ........ materials (matter) (G)  
  **Subject_ID** 300010358  
  ............ <materials by composition> (G)  
  **Subject_ID** 300212963  
  ................ inorganic material (G)  
  **Subject_ID** 300010360  
  .................. mineral (G)  
  **Subject_ID** 300011068  
  ..................... cinnabar (mineral) (G)  
  **Subject_ID** 300311452

**Related concepts:** Code 2818 source for .... cinnabar (pigment) **Subject_ID** 300400883
RELATIONSHIPS IN CONTROLLED VOCABULARIES

EQUIVALENCE, HIERARCHICAL, ASSOCIATIVE
• **Equivalence relationships:** The relationships between synonymous terms or names for the same concept.

• A good controlled vocabulary should include terms representing different forms of speech and various languages where appropriate.

• Ideally, all terms that share an equivalence relationship are either true synonyms or lexical variants of the preferred or another term in the record.
Equivalence Relationship

- **True synonyms**: Synonyms may include names or terms of different linguistic origin, scientific terms and common terms, dialectical variants, and names in different languages.

  - Synonyms are names or terms for which meanings and usage are identical or nearly identical in a wide range of contexts.
  - Note that true synonyms are rare in natural language.
  - In many cases, different terms or names may be interchangeable in some circumstances, but they should not necessarily be combined as synonyms in a single vocabulary record.

- **Near synonyms**: *Near synonyms*, also known as *quasi-synonyms*, are terms with meanings that are regarded as different, but the terms are treated as equivalents for the purposes of retrieval in the controlled vocabulary.
## Equivalence Relationship

- In a vocabulary, the equivalence relationship may apply to generic terms and also to proper names.
- E.g., names of people or names of places.

<table>
<thead>
<tr>
<th>Kahlo, Frida</th>
<th>Strasbourg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frida Kahlo</td>
<td>Strassburg</td>
</tr>
<tr>
<td>Kahlo de Rivera, Frida</td>
<td>Straßburg</td>
</tr>
<tr>
<td>Rivera, Frida</td>
<td>Strossburi</td>
</tr>
<tr>
<td>Kahlo y Calderon, Magdalena Carmen Frida</td>
<td>Estrasburgo</td>
</tr>
<tr>
<td></td>
<td>Strateburgum</td>
</tr>
<tr>
<td></td>
<td>Argentoratum</td>
</tr>
</tbody>
</table>

- sparver beds
- sparver bed
- sparver-beds
- sparver bedsteads
- sverver beds
**Equivalence relationship**

- **Lexical variants**: Although they are grouped with synonyms for practical purposes, lexical variants technically differ from synonyms in that synonyms are different terms for the same concept, while lexical variants are different word forms for the same expression.

- Lexical variants may result from spelling differences, grammatical variation, and abbreviations. Terms in inverted and natural order, plurals and singulars, and the use of punctuation may create lexical variants.

- In a controlled vocabulary, such terms should be linked via an equivalence relationship.

---

**dimidiating rhyta**
**dimidiating rhyton**
**dimidiating rhytons**
**rhyta, dimidiating**

**watercolor (paint)**
**water color (paint)**
**watercolour (paint)**
**water-colour (paint)**

**Ancient Greek (language)**
**grc**
**Equivalence Relationship**

- **Homographs**: A *homograph* is a term that is spelled identically to another term, but the meanings of the terms are different.
- For example, *drums* can have at least three meanings: They can be components of columns, membranophones, or walls that support a dome.
- Homographs exist whether or not the terms are pronounced alike.
- **Qualifier**: A word or phrase used to distinguish a term in a vocabulary from otherwise identical terms that have different meanings. A qualifier is separated from the term, generally displayed within parentheses.

<table>
<thead>
<tr>
<th>drums (column components)</th>
</tr>
</thead>
<tbody>
<tr>
<td>drums (membranophones)</td>
</tr>
<tr>
<td>drums (walls)</td>
</tr>
</tbody>
</table>
**Equivalence relationship**

**preferred term**
The term designated among all synonyms or lexical variants for a concept to be used as the default term to represent the concept in displays and other situations. In a monolingual thesaurus, the preferred term is also the only descriptor in the record. In a multilingual thesaurus, there may be a descriptor for every language, but there is often only one preferred term for the record as a whole.

<table>
<thead>
<tr>
<th>Descriptor (D)</th>
<th>Alternate Descriptor (ALT or AD)</th>
<th>Used for Term (UF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>jades (objects) (record-preferred, English-P,D)</td>
<td>jade (object) (English,AD)</td>
<td>jades (objects) (record-preferred, English-P,D)</td>
</tr>
<tr>
<td>(objetos) Spanish-P,D</td>
<td>(objeto) Spanish,AD</td>
<td>(objetos) Spanish-P,D</td>
</tr>
<tr>
<td>jade (object) (English,AD)</td>
<td>jade (object) (English,AD)</td>
<td>jade (object) (English,AD)</td>
</tr>
<tr>
<td>(objetos) Spanish,AD</td>
<td>(objetos) Spanish,AD</td>
<td>(objetos) Spanish,AD</td>
</tr>
<tr>
<td>玉器 (Chinese (traditional)-P,D)</td>
<td>yù qì (Chinese (transliterated Hanyu Pinyin)-P,UF)</td>
<td>玉器 (Chinese (traditional)-P,D)</td>
</tr>
<tr>
<td>(objeto) Spanish,AD</td>
<td>jaden beeldhouwwerken (Dutch-P,D)</td>
<td>(objeto) Spanish,AD</td>
</tr>
<tr>
<td>jade (object) (English,AD)</td>
<td>jaden beeldhouwwerk (Dutch,AD)</td>
<td>jade (object) (English,AD)</td>
</tr>
<tr>
<td>Jadekünste (German,D)</td>
<td>Jadekunst (German-P,AD)</td>
<td>Jadekünste (German,D)</td>
</tr>
</tbody>
</table>
Cross-language equivalence
When terms are in different languages in a multilingual thesaurus, each language may have descriptors, alternate descriptors, and used for terms in its own language; the relationship of terms across languages is known as cross-language equivalence.

vases (preferred,C,U,LC,English-P,D,U,PN)
vases (French-P,D,U,PN)
vas (C,U,English,AD,U,SN)
vase (French,AD,U,SN)
花瓶 (C,U,Chinese (traditional)-P,D,U,U)
陶瓷 (C,U,Chinese (traditional),UF,U,U)
huā píng (C,U,Chinese (transliterated Hanyu Pinyin)-P,UF,U,U)
huā piāng (C,U,Chinese (transliterated Pinyin without tones)-P,UF,U,U)
hua p'ing (C,U,Chinese (transliterated Wade-Giles)-P,UF,U,U)
vazen (C,U,Dutch-P,D,U,U)
vaas (C,U,Dutch,AD,U,U)
vazos (C,U,Spanish-P,D,U,PN)
vaso (C,U,Spanish,AD,U,SN, Italian-P, AD)
vasi (C,U,Italian,D,U,PN)
Hierarchical relationships: The broader and narrower (parent/child) relationships between records. The hierarchical relationship is the primary feature that distinguishes a thesaurus or taxonomy from simple controlled lists and synonym rings.

Hierarchical relationships are referred to by genealogical terms: child, children, siblings, parent, grandparent, ancestors, descendants, etc.
Hierarchical relationship

Types of hierarchical relationships

Genus/Species Relationships
• The genus/species or generic relationship is the most common relationship in thesauri and taxonomies because it is applicable to a wide range of topics.
• All children in a genus/species relationship should be a type of the parent, (e.g., bronze is a type of metal).
• The placement of a child may be tested by the all/some argument.
• In the example of bronze, all architectural bronze is bronze, but only some bronze is architectural bronze.

Top of the AAT hierarchies
... Materials Facet
...... Materials (Hierarchy Name)
......... materials (matter)
............ <materials by composition>
............ inorganic material
............ metal
.................. <metal by composition or origin>
........................ nonferrous metal
........................ <copper and copper alloy>
........................ copper alloy
........................ bronze (metal)
........................ architectural bronze
........................ bell metal
........................ Corinthian bronze
........................ gunmetal (casting bronze
........................ lead bronze
........................ manganese bronze [N]
........................ nickel bronze
........................ phosphor bronze
........................ statuary bronze
### Hierarchical relationship

#### Types of hierarchical relationships

**Whole/Part Relationships**
- *Whole/part*, also called a *partitive relationship*, typically applied to geographic locations, parts of corporate bodies, parts of the human body, and other types of concepts that are not readily placed into genus/species relationships.

- Each child should be a part of the parent and all the other ancestors above it. (e.g., *Acomayo* is a part of *Cusco* region).

<table>
<thead>
<tr>
<th>Top of the TGN hierarchy (hierarchy root)</th>
</tr>
</thead>
<tbody>
<tr>
<td>... World (facet)</td>
</tr>
<tr>
<td>...... South America (continent)</td>
</tr>
<tr>
<td>........ Peru (nation)</td>
</tr>
<tr>
<td>............ Cusco (region (administrative division))</td>
</tr>
<tr>
<td>................. Acomayo (inhabited place)</td>
</tr>
<tr>
<td>................. Anta (inhabited place)</td>
</tr>
<tr>
<td>................. Calca (inhabited place)</td>
</tr>
<tr>
<td>................. Capi (inhabited place)</td>
</tr>
<tr>
<td>................. Chanapata (deserted settlement)</td>
</tr>
<tr>
<td>................. Chaullay (inhabited place)</td>
</tr>
<tr>
<td>................. Choquequirao (deserted settlement)</td>
</tr>
<tr>
<td>................. Conchopata (inhabited place)</td>
</tr>
<tr>
<td>................. Cuzco (inhabited place)</td>
</tr>
<tr>
<td>................. Espinar (inhabited place)</td>
</tr>
<tr>
<td>................. Huarocondo (inhabited place)</td>
</tr>
<tr>
<td>................. Lares (inhabited place)</td>
</tr>
<tr>
<td>................. Llactapata (deserted settlement)</td>
</tr>
<tr>
<td>................. Llusco (inhabited place)</td>
</tr>
<tr>
<td>................. Machupicchu (inhabited place)</td>
</tr>
<tr>
<td>................. Machupicchu (deserted settlement)</td>
</tr>
</tbody>
</table>
Hierarchical relationship

Types of hierarchical relationships

Instance Relationships

• In addition to the whole/part and genus/species relationships, some vocabularies may utilize a third type of hierarchical relationship, the instance relationship.

• Children are an instance or example of the parent, most commonly seen in vocabularies where proper names are organized by general categories of things or events.

• For example, if the proper names of mountains and rivers were organized under the general categories mountains and rivers.
Hierarchical relationship

Record types for thesauri

**facet**
A fundamental, homogeneous, and mutually exclusive category in a thesaurus (for example, the AAT has seven facets: Associated Concepts, Physical Attributes, Styles and Periods, Agents, Materials, Activities, Objects; an eighth facet, Brand Names, was recently added).

**guide term**
Also called a *node label*. A record represented by a term or phrase that is created as a hierarchical level where no concept is appropriate as the level, to provide order and structure to thesauri by grouping narrower terms according to a given logic. Guide terms are not used for indexing and are often enclosed in angled brackets (for example, *<photographs by form>*).

**concept**
In the context of the AAT and other thesauri comprising generic terms, the subject of the vocabulary record (i.e., the concept to which the terms refer).
Hierarchical relationship

**Polyhierarchy**

- Some concepts logically belong to more than one broader context. To accommodate this, the data structure should allow polyhierarchical relationships, meaning that each child may be linked to multiple parents.

- Polyhierarchical relationships may exist in whole/part, genus/species, and instance relationship models.

- In a polyhierarchy, each record exists only once in the vocabulary, but may be linked to multiple parents and can thus appear in multiple hierarchical views.

- In the example here, Siena is part of the modern nation of Italy, but it was also part of the ancient confederation of Etruria. Dates and Historical flag clarify this is a former relationship.

World (facet)
....Europe (continent) (P)
.......Italy (nation) (P)
...........Tuscany (region (administrative division)) (P,Current) part of new kingdom of Italy from 1861
.................Siena (province) (P)
.................Siena (inhabited place) (P)

Additional Parent:
World (facet)....Europe (continent) (P)
...........Italian Peninsula (peninsula) (P)
...........Etruria (former group of nations/states/cities) (P, Historical)
...............Siena (inhabited place) (P, Historical)
sites near Siena date to the Late Etruscan period
**Associative Relationship**

**Associative Relationships:** Relationships between records that are closely related conceptually, but where the relationship is not equivalent and not hierarchical.

- Only clear and direct associative relationships should be recorded.
- If a thesaurus is bound together by too many associative relationships between entities that are only loosely or indirectly related, the value of the relationships in retrieval is lost.
- These direct relationships are typically current, but occasionally may be historical.
ASSOCIATIVE RELATIONSHIP

When to make associative relationships

• Associative relationships may be made between records in the same or different hierarchies.
  • There may occasionally be relationships between overlapping siblings, for example where the meanings are similar and the terms are occasionally (but not generally) used as synonyms.

• In general, terms that are mutually exclusive do not require associative relationships, particularly if they cannot be confused with one another.

• There should be associative relationships between terms that are intended to be used as separate concepts but may be confused by users.
  • Barring that situation, do not make associative relationships between homographs simply because the terms are spelled the same.

Final Neolithic (transitional periods Stone Age to Bronze Age, three-age system, ... Styles and Periods)

Note: Refers to the last stage of a Neolithic culture, which often partially overlaps with the Early Bronze Age. It is generally held to have occurred from around 4,000 BCE to around 3,000 BCE in Europe, lasting until around 2,000 BCE in parts of the British Isles.

Related concept:
meaning/usage overlaps with
Early Bronze Age (Bronze Age, three-age system, ... Styles and Periods)
ASSOCIATIVE RELATIONSHIP

Types of associative relationships

• Most basic type of associative relationship is simply related to.

• In some vocabularies, more specific types of associative relationships may be designated.

• Associative relationships are reciprocal.
  • For some relationships, the relationship type is the same on both sides of the link (e.g., “related to”)
  • For others the associative relationship is different depending upon which record is the focus.

Hokusai, Katsushika (Japanese printmaker and painter, 1760-1849)

teacher of
Taito, Katsushika, II (Japanese printmaker, active ca. 1820-1850)

student of
<name of teacher>  <name of student>
VOCABULARIES FOR CULTURAL OBJECTS

BRIEF OVERVIEW OF THE GETTY VOCABULARIES
Vocabularies for cultural objects

Types of vocabulary terms

- **Classification**: antiquities
- **Work Type**: amphora
- **Creators**:
  - Painter of the Wedding Procession *(Greek vase painter, active ca. 360s BCE)*
  - Nikodemos *(Attic potter, active ca. 362 BCE)*
- **Repository**: J. Paul Getty Museum
- **Geographic Locations**:
  - Los Angeles, California, USA *(repository location)*
  - Athens, Greece *(creation location)*
- **Culture**: Greek (Attic)
- **Materials & Techniques**:
  - terracotta, turning, sintering, vase painting
- **Specific Subjects**:
  - Athena Promachos
  - Nike
  - boxers (athletes)
  - prize
  - competition (event)
  - Panathenaia
  - kiwordon (writing style)

- The types of terms that will be necessary for art and architecture include personal names, corporate body names, geographic names, object names, names of iconographic subjects, and genre terms, among others.
- Values may be provided from a variety of sources, flagged in the illustration from the Getty Vocabularies.
Vocabularies for cultural objects

The primary vocabularies

**Getty Vocabularies**
AAT, TGN, ULAN, CONA, and IA are authorities in the form of thesauri, intended to provide terminology and other information about the objects, artists, concepts, and places important to various disciplines that specialize in art, architecture and material culture.

**Nomenclature**
*Nomenclature 4.0 for Museum Cataloging* is a revised and expanded version of Robert Chenhall’s system for classifying man-made objects first published in 1978 as a cataloging tool for historical organizations.

**Library of Congress Authorities**
The U.S. Library of Congress Authorities include subject, name, and title authority records created by or for the Library of Congress; comprise a tool used by librarians to establish forms of names for persons, places, meetings, and organizations, as well as titles and subjects (i.e., topics) indexed in bibliographic records.

**Thesaurus for Graphic Materials**
developed from a list of terms for visual images used by the U.S. Library of Congress Prints and Photographs Division, including subject terms and descriptive terms.

**Iconclass**
An alphanumeric classification scheme designed for the iconography of art, focusing primarily on the religious and mythological stories and themes in Western art.
THE GETTY VOCABULARIES
ENABLING DIGITAL ART HISTORY

• Art & Architecture Thesaurus®
  AAT = includes generic terms, relationships, sources, and notes for 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)

• Getty Thesaurus of Geographic Names®
  TGN = includes names, relationships, and coordinates for current and historical cities, nations, empires, archaeological sites, lost settlements, and physical features; through LOD, TGN may be linked to GIS and maps (e.g., Diospolis, Acalán, Ottoman Empire, Mogao, Ch’ien-fu-tung, Ganges River, गंगा नदी)

• Union List of Artist Names®
  ULAN = includes names, relationships, notes, sources, and biographical information for artists, architects, firms, studios, repositories, patrons, sitters, and other individuals and corporate bodies, both named and anonymous (e.g., Mark Rothko, Cai Xiang, 奚襄, Crevoile Master, Altobelli & Molins, Rajaraja Museum)

• Cultural Objects Name Authority®
  CONA = is a new resource linking rich metadata such as title, artist attribution, patron, materials, and location for works of art, architecture, and other cultural works, to allow a conduit for research and discovery (e.g., Mona Lisa, Livre de la Chasse, Chatyosomesvara Temple, Hagia Sofia, Αγία Σοφία, Le déjeuner sur l’herbe)

• Getty Iconography Authority
  IA = is a new resource that includes proper names, relationships, and dates for iconographical narratives, religious or fictional characters, historical events, names of literary works and performing art (e.g., Adoration of the Magi, Flood of Deucalion, French Revolution, Xibalba, Nifheim, शिव, Shiva, Bouddha couché)
AAT, the Art & Architecture Thesaurus®

The AAT is a thesaurus containing generic terms, dates, relationships, sources, and notes for work types, roles, materials, styles, cultures, techniques, and other concepts related to art, architecture, conservation, other cultural heritage.

- Generic terms, not proper names
- oil paint, olieverf, acetolysis, sintering, orthographic drawings, Olmeca, Rinascimento, Buddhism, watercolors, asa-no-ha-toji, sralais
- AAT is multilingual; large translation projects are underway
- Conceptually organized from terms to describe abstract concepts to generic terms for concrete, physical artifacts
- Facets are the upper levels of the AAT structure
- AAT is not organized by subject matter or discipline
### Sample record

**ID:** 300132869  

**Terms:**  
- bobbin lace (pref, en)  
- bone lace (en)  
- cushion lace (en)  
- 梭心蕾絲 (zh)  
- 線軸編織花邊 (zh)  
- kloskant (nl)  
- dentelle aux fuseaux (fr)  
- encaje de bolillos (es)  
- encaje de bolillo (es)  
- Klöppelspitze (de)  
- Klöppelspitzen (de)  

**Associative Relationships**  
- requires ... lace pillows (<textile fabricating tools and equipment>...Objects Facet) [300132869]  
- **Hierarchical Relationships (poly)**  
  - Objects Facet  
  - Visual & Verbal Communication  
  - Visual Works  
  - visual works (works)  
  - <visual works by material>  
  - needlework (visual works)  
  - lace (needlework)  
  - bobbin lace  

**Note:** With "needle lace," one of two primary types of handmade lace. It is characterized by being made by ...  

**Chinese (traditional) **  
- 與「針織蕾絲」同為主要的手工蕾絲,其特色是以纏繞於線軸或梭心...  

**Dutch**  
- Een van de twee belangrijkste soorten met de hand vervaardigde kant; 'naaldkant' is ...  

**German**  
- Zusammen mit der "Nadelspitze" eine der wichtigsten...  

**Spanish**  
- Junto a "encaje a aguja", uno de los dos tipos principales de ...  

**Contributors:** VP, CHIN, AS, RKD, IFM-SMB-PK, CDPB-DIBAM  
**Sources:** Earnshaw, Claburn, Needleworker's Dictionary (1976); Identification of Lace, 2d ed. (1984); Ginsburg, Illustrated History of Textiles (1991)
Contributors are cited

AAT records are merged information from multiple contributors

• Getty Conservation Institute (Los Angeles, California)
• Academia Sinica (Nankang, Taiwan)
• Netherlands Institute for Art History (RKD: Bureau AAT) (The Hague, The Netherlands)
• Centro de Documentación de Bienes Patrimoniales (Dirección de Bibliotecas, Archivos y Museos) (Santiago, Chile)
• Staatliche Museen zu Berlin Preussischer Kulturbesitz (Berlin, Germany)
• [Canadian Heritage Information Network (CHIN) (Gatineau, Quebec, Canada), Istituto Centrale per il Catalogo e la Documentazione (Rome, Italy)(ICCD)] and other contributors of partial translations; future translations in French, Italian, Portuguese, other languages

All information in a Getty Vocabulary record is attributed to a contributor and cites the published sources

bobbin lace (preferred, C, U, LC, English-P, D, U, PN)
bone lace (C, U, English-U, F, U, N)
cushion lace (C, U, English-U, F, U, N)
lace, bobbin (C, U, English-U, F, U, N)
pillow lace (C, U, English-U, F, U, N)
suō xīn lèi sī (C, U, Chinese (transliterated Pinyin))
suō xīn lèi sī (C, U, Chinese (transliterated Pinyin))
sūo hsin leis su (C, U, Chinese (transliterated Wade-Krofskant))
dentelle aux fuseaux (C, U, French-P, D, U, PN)
merletto a tombolo (C, U, Italian-P, D, U, PN)
encaja de bolillos (C, U, Spanish-P, D, U, PN)
encaje de bolillo (C, U, Spanish-AD, U, SN)
Klöppelspitze (C, U, German-AD, U, SN)
Klöppelspitzen (C, U, German-P, D, U, PN)
ULAN, the Union List of Artist Names®

ULAN contains names, relationships, notes, sources, and biographical information for artists, architects, firms, studios, repositories, patrons, sitters, and other individuals and corporate bodies, both named and anonymous.

- Named people and corporate bodies
  *Bartolo di Fredi, Xueshi Bai, 白雪石, National Palace Museum (Taipei)*
- Anonymous creators known by appellation: *Santa Eufemia Master*
- Scope also includes “Non-Artists” (e.g., sitters and patrons)
- “Unknown People by Culture” (e.g., *unknown Aztec*)
- “Unidentified Named People” (e.g., known from archival documents)

- ULAN includes current and historical associative relationships (e.g., students to teachers; firm and studios to members)
- Contributions to ULAN are from experts at authorized institutions (e.g., museums, special collections, art libraries, cataloging projects, bibliographic projects, etc.)
ULAN, the Union List of Artist Names®

Sample record

**ID:** 500060426

**Names:**
- Hokusai, Katsushika (pref, en, ja-trans, de)
- Katsushika Hokusai (en, ja-trans)
- 葛飾 北斎 (ja)
- Shunrō (en, ja-trans)
- Tawaraya Sōri (en, ja-trans)
- Kakō (en, ja-trans)
- Tatsumasa (en, ja-trans)
- Gakyōjin (en, ja-trans)
- Taito (en, ja-trans)
- Iichi (en, ja-trans)
- Manji (en, ja-trans)
- Tokitarō (en, ja-trans)
- 時太郎 (ja)
- 葛飾 北濟 (ja)

**Nationalities:**
- Japanese (pref)

**Roles:**
- artist
- printmaker
- painter
- designer
- calligrapher
- draftsman
- landscapist
- marine artist
- figure artist
- ukiyo-e artist

**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)

**Gender:** male

**Contributors:**
- VP, Avery, GRL, BHA, CCA

**Sources:**
- Bowie, Drawings of Hokusai (1964);
- Grove Dictionary of Art online (1999-2002);
- Library of Congress Authorities database (n.d.);
- Metropolitan Museum of Art [online] (2003-);
- Bouquillard, Hokusai: First Manga Master (2007)
Merging data in one record

- Getty vocabularies merge contributed records representing the same concept
- Example from ULAN: Three contributions; are any of these records for the same person? Yes, 1st and 3rd rows
- Merged by algorithm, if possible; if not, merged by editor4s

### Publishing data

- Contributors’ data is loaded and processed by the Getty Digital technical team and the Vocabulary Program editorial team
- Data is merged, normalized, and published
- Refreshed for users every two weeks
- Releases: Online search, XML, relational tables, APIs, LOD
ULAN record is a merged, homogenous entity

Click the icon to view the hierarchy.

Contributors
AVERY, BHA, GRISC, GRL, GRLPA, PROV, VP, WCI, WCP, WL-Courtauld

Sources
Avery Authority files (1963-)
Harald Szemann papers, Finding Aid, GRI Special Collections (2011-)
J. Paul Getty Museum, collections online (2000-)
Library of Congress Authorities database (n.d.) n 50074509
M. Knoedler & Co. records, Finding Aid, GRI Special Collections (2012-)
Provenance Index Databases, Authority file (1985-)
RILA/BHA (1975-2000)
Witt Library, Authority files

Note: Venetian painter, during the first half of his life on decorations and church paintings; later became 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)
- Garde, Francesco (V)
- Guardet, Francesco (V)
- Gvardi, Franchesko (V)
- Guardi, François (V)
- Guardi, Francisco (V)
The ULAN record is a merged, homogenous entity with redundant information eliminated. Note links to other ULAN records, to AAT and TGN.
Implementing the Getty Vocabulary data

- Vocabulary data is licensed and used by hundreds of institutions and vendors
- We contribute to VIAF, collections management systems (e.g., Gallery Systems)
- Now linking vocabulary data in LOD

*GRI (with ULAN and TGN) contributes to VIAF, the Virtual International Authority File.*

*Link to other sources in Linked Open Data*
TGN, the Getty Thesaurus of Geographic Names®

TGN focuses on places relevant to art, architecture, and related disciplines, recording names, relationships, place types, dates, notes, and coordinates for current and historical cities, nations, empires, archaeological sites, lost settlements, and physical features.

- Places relevant to art history
  *Thebes, Diospolis, Ottoman Empire, Mogao Caves, Ch’ien-fu-tung, Ganges*

- TGN is a structured vocabulary
- TGN is a thesaurus compliant with ISO standards

- Focus on historical regions, archaeological sites, lost settlements, built upon a skeleton of the modern world from NGA/NIMA and USGS data sets

- TGN is not GIS, is a thesaurus focused on names and links. Why invent the wheel over again? Many sources of geographic data exist. However, TGN may be linked to GIS, maps, and other geographic resources.
**Sample record**

**ID:** 7011179

**Names:**
- Siena (it,en,es,fr,nl,de)
- Сиена (el)
- Siyenah
- 锡耶纳 (zh)
- シエーナ (ja)
- Sienese (en-adj)
- Sienna (h-en)
- Sena Julia (h-la)
- Sanna (h)
- Saena (h)

**Hierarchical Rel. (polyhier.)**
- World (facet)
  - Europe (continent)
    - Italy (nation)
      - Tuscany (region)
      - Siena (province)
      - Siena (inhabited place)
    - World (facet)
      - Europe (continent)
      - Italian Peninsula (peninsula)
      - Etruria (former confederation)
      - Siena (inhabited place)
      - Historical: Late Etruscan

**Place Types**
- inhabited place, settled by Etruscans (founded in 6th century BCE)

**Location:**
- **city**
- **archiepiscopal see**
- **commune (administrative)** since 1125
- **cultural center**
- **university center**
- **world heritage site**

**AAT**

**Note:** Siena was founded as an Etruscan hill town; later was the Roman city of Sena Julia (3rd century BCE). It flourished under the Lombard kings (6th century CE) and was Medieval self-governing commune ...

**Contributors:** BHA, FDA, GRLPSC, VP

**Sources:**
- Dizionario Corografico Toscana (1977) 1508
- Library of Congress Subject Headings (2002)-
- Milanesi, Storia dell'Arte Senese (1969) passim
- NGA/NIMA database (2003) -129709
- UNESCO World Heritage Centre [online] (1992) accessed 20 July 2010
- Webster’s Geographical Dictionary (2007) 1114
IA, the Getty Iconography Authority™

IA is a thesaurus that covers topics relevant to art, architecture, and related disciplines; includes multilingual proper names, relationships, and dates for iconographical narratives, religious or fictional characters, themes, historical events, and named literary works and performing arts.

- Includes the proper names of subjects not covered by other Getty Vocabularies
- Scope is multicultural and multilingual, grows through contributions
- Includes links to other sources where there is overlap, such as Iconclass and US Library of Congress subject authorities
- The IA is compliant with the Subject Authority of CDWA and CCO (*Categories for the description of Works of Art and Cataloging Cultural Objects*)
- The IA has a thesaural structure; it includes equivalence, associative, and hierarchical relationships
- The IA is linked to the other Getty Vocabularies
IA, the Getty Iconography Authority™

Sample record

**ID:** 1000085

**Names:**
Avalokiteshvara
Avalokiteśvara
अवलोकितेश्वर
Spyan ras gzigs

**AAT links**
role/characteristic is ... bodhisattva
symbolic attribute is ... lotus
culture/religion is ... Mahayana (Buddhism)
culture/religion is ... Theravada (Buddhism)

**Associative Relationships**
associated with .... Krishna (Hindu iconography)
counterpart is .... Guanyin (Buddhist iconography)

**Note**
The bodhisattva of infinite compassion and mercy; embodies the compassion of all Buddhas. This bodhisattva is portrayed in different cultures as either female or male...

**Contributors & sources**
[VP] Encyclopedia Britannica Online (2002-);
Bowker, Oxford Dictionary of World Religions (1997);
Huntington, Art of Ancient India (1985);
**LC:** LC control no.: sh 85010492

**Hierarchical Relationships**
Top of the IA hierarchies
Legend, Religion, Mythology
Buddhist iconography
Buddhist characters
Avalokiteshvara (Buddhist iconography)
CONA, the Cultural Objects Name Authority®

CONA compiles titles/names and other metadata for works of art, architecture, and other cultural works, current and historical, documented as items or in groups, whether works are extant, destroyed, or never built.

- In development, may be used to record works depicted in visual surrogates and for other purposes
- CONA compiles titles, attributions, depicted subjects, and other metadata about works of art, architecture, and cultural heritage, both extant and historical works, works never built, disassembled works, conceptual works for multiples
  
  \textit{Hagia Sophia, Mona Lisa, Thirty-six Views of Mount Fuji, 富嶽三十六景}

- Scope is multicultural and multilingual; grows through contributions
- CONA is linked to images; CONA is linked to the AAT, TGN, ULAN, and IA
- Through this rich metadata and links, CONA may provide a powerful conduit for research and discovery for digital art history
The simplified entity-relationship diagram for CONA is the same as CDWA / CCO

ULAN
TGN
AAT
Iconography Authority

CONA (Work Records)

Source Records
**Sample record**

| **ID:** 700001950 |
| **Titles:** |
| Shiva met de maan in het haar (nl) |
| Shiva with the Moon in his Hair (en) |
| **Catalog Level:** item |
| **Work Types:** sculpture (visual work) |
| **Classifications:** sculpture (preferred) |
| **Creation Date:** 1000/1200 |
| **Creator Display:** anoniem; sculptor: unknown Chola |

**Locations:**
- **Current:** Rijksmuseum (Amsterdam, North Holland, Netherlands) AK-MAK-1291; RM001.collect.910; Bruikleen van de Vereniging van Vrienden der Aziatische Kunst
- **Creation:** Tamil Nādu (India)

**Materials:** bronze founding

**Dimensions:** 40 cm (height) x 24 cm (width) x 10.5 (depth)

| **Events:** exhibition: Metamorfoze/Geheugenproject Willem Witsen |
| **Cultures:** Indian; Chola |

**General Subject:** human figure(s) (preferred)

| **Specific Subjects:** Shivá (Hindu iconography) |
| mudrā (pose, <visual and representational concepts>) |
| [link to Iconclass] |

**Contributors & Sources:** [Rijksmuseum;VP]; Rijksmuseum XML file
CONA, the Cultural Objects Name Authority®

Sample record

**ID:** 700000141  
**Titles/Names:** Hagia Sophia  
Hagia Sophia  
(Hagia Sophia (en, de, nl) Ayasofya (tr) Aγία Σοφία (el) Agia Sophia Hagia Sophia Sainte-Sophie (fr) Santa Sofia (es) Santa Sofia (it) Sancta Sophia (la) Sancta Sapientia (la) Holy Wisdom (en) Saint Sophia (en) 聖蘇菲亞大教堂 (zh)

**Work Types:** church; mosque; museum

**Date:** original structure dated from 4th century CE; present structure built 532-537 CE; rebuilt in 12th century

**Creators:** Anthemiou of Tralles (Byzantine architect, ca. 474-ca. 534) and Isidorus of Meletus, the Elder (Byzantine architect, active mid-6th century); Patron: Justinian I (Byzantine emperor, ca. 482-565)

**Built Work**  
... Hagia Sophia **Associative Relationship** depicted in View of the Hagia Sophia in Constantinople; Eduard Hildebrandt; watercolor; ca. 1852; Hermitage Museum (Saint Petersburg, Russia) [700008345]

**Location:** Istanbul (Marmara, Turkey)  
**Address Note:** 41.008548°N; 28.979938°E

**Materials:** system bearing masonry, centralized plan; interior surfaces are sheathed with polychrome marble, porphyry, and mosaics

**Dimensions:** central dome: diameter 31 m (102 feet); height 56 m (184 feet)

**General Subject:** architecture  
**Specific Subject:** Holy Wisdom (Religion/Mythology)

**Note:** Domed basilica was constructed by the Emperor Justinian, built in Constantinople in 6th century...

**Contributors:** Avery, BHA, F.A.O., P.A.  
**Sources:** Fleming, Penguin Dictionary of Architecture (1999); Herrin, Judith, Byzantium (2007); Maidstone, Hagia Sophia (2002); Theohariou, Architecture of Hagia Sophia (1988); Xydis, Chancel Barrier of Hagia Sophia (1947)
Possible implementations of CONA

Movable works linked to architecture depicted

CONA ID 700000090  Class. architecture
Work Type: house
Title: Case Study House No. 21
Title: Bailey House  Title: CSH #21
Creator: architect: Pierre Koenig
Creation Date: 1956-1958; renovated 1998
Dimensions: 1 story, 1320 square feet, 4 rooms and 2 baths, on a 110 x 160 foot lot
Mat & Tech: steel frame and flat roof deck
Current Location: Los Angeles (California, USA)
Address Note: 34.116634 -118.391623; 038 Wonderland Park Avenue, Hollywood Hills, Los Angeles, 90046

CONA ID 700008539 Work Type: photograph
Title: Case Study House No. 21
Creator: Julius Shulman
Current Location: GRI Special Collections, Getty Center (Los Angeles, California); 2004.R.10-26622-32-LF

CONA ID 700000120 Work Type: architectural drawing
Title: Case Study House No. 21
Creator: Pierre Koenig
Current Location: GRI Special Collections, Getty Center (Los Angeles, California) 2006.M.30-

Possible implementations of CONA
## Possible implementations of CONA

### Works linked to outside resources

**Merging information from multiple contributors**

<table>
<thead>
<tr>
<th>CONA ID</th>
<th>700002923</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalog Level</td>
<td>item</td>
</tr>
<tr>
<td>Classification</td>
<td>architecture</td>
</tr>
<tr>
<td>Work Type</td>
<td>building complex</td>
</tr>
<tr>
<td>Title/Name</td>
<td>Temple of Heaven (en)</td>
</tr>
<tr>
<td>Creator</td>
<td>first built by Ming Chengzu (1360-1424); extended by Ming Shizong (1507-1567); renovated by Qianlong (1711-1799)</td>
</tr>
<tr>
<td>Creation Date</td>
<td>1530, during Ming dynasty</td>
</tr>
<tr>
<td>General Subject</td>
<td>architecture</td>
</tr>
<tr>
<td>Type</td>
<td>isness</td>
</tr>
<tr>
<td>Specific</td>
<td>Earth (TGN 7030638)</td>
</tr>
<tr>
<td>Extent</td>
<td>dedication</td>
</tr>
<tr>
<td>Current Location</td>
<td>Beijing (Beijing Shi (municipality), China) (nation)</td>
</tr>
<tr>
<td>Address Note</td>
<td>39°57′05″N 116°24′36″E</td>
</tr>
<tr>
<td>Dimensions</td>
<td>entire complex: 237 hectares</td>
</tr>
<tr>
<td>Mat &amp; Tech</td>
<td>wood and stone (wood AAT 300011176; stone AAT 30001176)</td>
</tr>
<tr>
<td>Style</td>
<td>Chinese [AAT 300018322]; Taoist [AAT 30014366]</td>
</tr>
<tr>
<td>Contributors</td>
<td>JPGM, VP, GRISC, BWR</td>
</tr>
<tr>
<td>Sources</td>
<td>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-)</td>
</tr>
</tbody>
</table>

- CONA ID uniquely identifies the work in CONA
- Links to other IDs, such as LOC, VIAF, BWR
Possible implementations of CONA

CONA ID: 700000178
Catalog Level: item
Classification: paintings
Work Type: panel painting | altarpiece
Title: Adoration of the Magi
Creator: Bartolo di Fredi (Sienese painter, active by 1353, died 1410)
Creation Date [display]: 1380s/1390s; some scholars date it ca. 1400 or later
 execution Start Date: 1380  End Date: 1399
 alternative date Start Date: 1395  End Date: 1409
General Subject: religion and mythology | human figures
Specific: Adoration of the Magi Extent: foreground | Siena | horses | Holy Family | gold | frankincense | myrrh | Journey of the Magi Extent: background | king | deity | death | Epiphany | Three Ages of Man
Current Location: Pinacoteca Nazionale di Siena (Siena, Italy);
Repository No: no. 104
Dimensions: 195 x 158 cm (76 x 61 5/8 inches)
Mat & Tech: tempera on panel
Contributors: BHA  VP  CD  PNS  GRI-PA
Sources:
Pinacoteca Nazionale di Siena (2002-);
Boucher and Fiorini, Magi Reconstructed (2012);
Cole, Sienese Painting (1985);
Freuler, Bartolo di Fredi (1994);
Harpring, Bartolo di Fredi (1992)

Multiple opinions are accommodated

Opinions vary, all may be included in the CONA record

Possible implementations of CONA

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Opinions vary, all may be included in the CONA record
**Possible implementations of CONA**

**IA ID 1000045**
Names
- Xibalba
- Place of Fear

**AAT ID 300191778**
Terms
- skeleton [English]
- beendergestel [Dutch]
- squeleto [Spanish]
- squelette [Italian]
- 骨架 [Chinese]

---

**CONA ID 70000012** Class: Pre-Colombian art

**General Subject:**
- religion and mythology [General Subject ID 31801]

**Specific Subjects:**
- Xibalba (Maya underworld) [IA 1000045]
- Baby Jaguar (Maya character) [IA 901002211]
- Chahk (Maya deity) [IA 901002210]
- man (male human) [AAT 300025928]
- skeleton (animal component) [AAT 300191778]
- ax (weapon) [AAT 300024664]
- altar [AAT 300003725]
- death [AAT 300151836]
- celebration [AAT 300152441]

---

**Works linked to subjects depicted**

Value added: Contributions to CONA may be indexed for subject depicted access

OCLC survey, of core fields missing is subject depicted
Mining titles and text for subjects depicted, missing from museum data
Controlled by AAT, ULAN, TGN, CONA, and IA

---

**CONA ID 70000012**
Class: Pre-Colombian art

**Description:**
Straight-sided ceramic vessels with painted decoration comprising complex scenes were common in eighth-century Maya art. The "codex-style" painting depicts a scene in the realm of the Lords of Death, where a dancing figure holds a long-handled axe and a handstone. On a monster-head altar lies Baby Jaguar, a deity figure, and beside the altar is a dancing, a skeletal death figure. The meaning has been variously interpreted as depicting either sacrifice or celebration.

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**Note Source:** Metropolitan Museum of Art on line

---

**IA ID 1000045**
Names
- Xibalba
- Place of Fear

---

**AAT ID 300191778**
Terms
- skeleton [English]
- beendergestel [Dutch]
- squeleto [Spanish]
- squelette [Italian]
- 骨架 [Chinese]
Works depicted in visual surrogates

- What is advantage to linking to CONA for work depicted?
- Access for all surrogates for same work
- Multilingual access, links, etc.

**Surrogate in Photo Archive**

Velázquez et al copy in the Uffizi after Rubens

**LINKS**

Specific subject

**Enough information in surrogate records to make minimal record for work depicted**
HOW ARE VOCABULARIES USED?

- Traditional use of vocabularies for retrieval focuses on the names
- If a user asks for one name/term, all of the synonyms can be used for retrieval
- For example, if a user searches on “Giovanni da Bologna”...

“giambologna” OR “giovanni da bologna” OR “giovanni bologna” OR “jean boulogne” OR “bologna, giovanni da”

From ULAN

Giambologna
Giovanni da Bologna
Giovanni Bologna
Jean Boulogne
Jean de Boulogne
Bologna, Giovanni da
• New methods and LOD can incorporate hierarchical and associative relationships, and other links or inferred relationships to answer more complex questions and aid serendipitous discovery.

**HOW ARE VOCABULARIES USED?**

**Associative relationships**

- **Giambologna** *(Flemish sculptor and architect, 1529-1608, active in Italy)*
  - teacher of **Tacca, Pietro** *(Italian sculptor and architect, 1577-1640)*
  - patron of **Marie de Medici** *(French queen, patron, 1573-1642)*

**Display Date:** from 1592
**Start Date:** 1592  **End Date:** 1608
WHAT IS LINKED OPEN DATA (LOD)?

- The AAT, TGN, and ULAN are now available as LOD
- They are published under the Open Data Commons Attribution License (ODC-By) 1.0
- When data is linked and open, it means that data is structured and published according to the principles of Linked Data, so that it can be both interlinked and made openly accessible and shareable on the Semantic Web. The goal of linked open data is to allow data from different resources to be interconnected and queried.
- In order for data to be understood and processed automatically by computers, data in records or about resources must be expressed in a standard format. Each thing (for example, a museum object, a place, or a person) must be represented by a persistent identifier (known as a Uniform Resource Identifier (URI)). A Resource Description Framework (RDF) is a language or format for describing things as well as the relationships between things as simple properties and values (known as 'triples'), while things are represented using URIs.
Getty Vocabularies are linked to each other
 Getty Vocabularies providing conduits to links in the cloud
USING MULTIPLE VOCABULARIES

INTEROPERABILITY
Using Multiple Vocabularies

Multiple vocabularies are required

- Catalogers of art information will require multiple vocabularies
- No single vocabulary will provide the full set of terminology needed to catalog or index a given set of cultural heritage data
- A combination of vocabularies will be necessary for indexing
- Separate vocabularies may be required for retrieval
- Ideally, retrieval vocabularies would be based on indexing vocabularies, but may be optimized and applied differently for this different purpose
- Strategies for using vocabularies for indexing and retrieval will differ
Interoperability of Vocabularies

What is interoperability?

- *Interoperability* in the context of controlled vocabularies refers to the ability of two or more vocabularies and their systems or components of their systems to map to each other’s data with the goal of exchanging information or enhancing discovery.

- Deals with the two conflicting demands, both require interoperability:
  - specialized vocabularies should be developed for a certain community, such as the art and cultural heritage community reflecting the specific terms and concepts needed by catalogers to index and classify that material; however, no single vocabulary will be comprehensive
  - end users who want to use a single search to find resources in federated settings across resources in different domains and created by different communities.

- Mappings between vocabularies may be used to facilitate faster indexing and better retrieval
  - When the user selects a term from the first vocabulary, the system can respond by offering corresponding terms from the second vocabulary
Interoperability of Vocabularies

Achieving interoperability

Interoperability may involve merging or adapting two or more controlled vocabularies to actually or virtually form a new controlled vocabulary that will combine all the concepts and terms contained in the originals. It could also involve merging or adapting two or more resources that have been indexed using different controlled vocabularies. Various methodologies for direct mapping and switching may be used.

- **Direct mapping**: Matching of terms one-to-one in each controlled vocabulary. The vocabularies need not be the same size (one may be smaller or larger) or cover exactly the same content, but there should be significant overlap in content. This technique assumes that where overlap exists, there will be the same meaning and level of specificity between the two terms in each controlled vocabulary. Mapping may be done by algorithm or using human mediation, but often both methods are employed together.

- **Switching**: Use of a third vocabulary, a *switching vocabulary*, that itself can link to terms in each of the two original controlled vocabularies. As with direct mapping, this type of mapping also assumes that the meaning of the terms can be reconciled, in this case between all three terms: the original two controlled vocabulary terms and one switching term. The advantage of this method is that the scope and format of the switching term may be made broad enough compensate for differences between the two original terms. Another application of switching occurs when the third vocabulary provides notations or a classification scheme under which terms from both original controlled vocabularies may be grouped. This approach enables a single, unifying hierarchical display for terms that originated in multiple sources.
INTEROPERABILITY OF VOCABULARIES

Factors for successful interoperability

- **Scope of mapping**: The greater the number of elements included in the mapping, the more difficult the mapping will become. At minimum, a mapping between vocabularies should match terms to terms.

- **Similarity of content**: The more there is similarity in the content of each of the vocabularies and of the resources being searched, the more likely it is that successful interoperability may be achieved. If the content is not similar, differences and variability in terminology, meaning, and syntax will hamper cross-domain interoperability.

- **Intended audience**: If the purposes or intended audiences of the resources or vocabularies are very different, mappings of vocabularies will be difficult or impossible and search results will be uneven.

- **Format and hierarchical structure**: The more there is similarity in the format and hierarchical structure of the vocabularies, the more likely interoperability between them will be successful.

- **Pre- and post-coordination**: Differences in the application of pre- and post-coordinated terminology in the vocabularies will complicate mapping efforts if one vocabulary contains headings while the other contains unique terms. A related issue concerns the differences in pre- and post-coordination expected in the search methodologies of the resources being searched.

- **Granularity and specificity**: The differences in degree of specificity or granularity of the controlled vocabularies themselves, and of the indexers’ applications of the vocabularies in the target resources, may result in uneven results in indexing and retrieval. But if indexers of both resources have used the same vocabulary, use = relatively successful because the broader and narrower terms are logically linked.

- **Synonymy and near-synonymy**: Differences in how synonyms and near-synonyms are handled will affect the ability to make a successful mapping between vocabularies.

- **Authoritativeness**: If vocabularies differ in the level of authoritativeness by which they are developed, mapping them will be difficult.
INTEROPERABILITY OF VOCABULARIES

Semantic mapping

• A semantic network comprises relationships between terms and concepts based on their meanings or the nature of the relationships. The semantic relationships are sometimes derived from the vocabularies.
  • In other cases, they are extrapolated from the target content databases.

• A semantic network may be used to map terms from one or many controlled vocabularies according to a defined underlying organizational structure or conceptual scheme.
  • The relationships may range from a simple hierarchical structure with generic broader/narrower relationships to a more complex set of carefully defined relationships, such as contained in, agent for, process is, etc.
  • The relationships may be categorized to indicate the degree of closeness between linked terms, for example exact synonyms, near synonyms, closely related terms, loosely related terms, and antonyms.
Interoperability of Vocabularies

Interoperability across languages

• Multilingual controlled vocabularies are sometimes treated as a special case of interoperability.

• If unique vocabularies have been developed independently by groups in separate nations using different languages, utilizing the two together as a multilingual controlled vocabulary is generally not effective without extensive human intervention in the mapping process.

• This is due to the problems and idiosyncrasies of translation and usage of terms in various languages, which are not resolved with the simple employment of an automated dictionary or data mining.

• For translating vocabularies, see Harpring, Guidelines for Multilingual Equivalency Work: Translating the Art & Architecture Thesaurus® [anticipated publication date, 2019] and ISO 25964-1-2:2011 & 2013: Information and documentation: Thesauri and interoperability with other vocabularies.
INTEROPERABILITY OF VOCABULARIES

Issues of multilingual terminology

Exact equivalence: The most desirable match involves terms in each language that are identical, or nearly identical, in meaning and scope of usage in each language.

Inexact and partial equivalences: In cases where a suitable preferred term with the exact meaning and usage of the original term is not available in the second language, terms are sometimes linked as equivalents when they have only inexact or partial matches in scope and meaning.

Single-to-multiple term equivalence: If there is no match in scope and meaning between terms, sometimes a concept in one vocabulary is matched to multiple descriptors in the second language.

Non-equivalence: Sometimes there is no exact match, no term in the second language has partial or inexact equivalence, and there is no combination of descriptors in the second language that would approximate a match. The AAT would advise using a coined term, a literal translation, or a borrowing of the source-language term (without literary warrant) rather than leaving a gap in the target language.
Interoperability of Vocabularies

Dominant languages

- In a completely multilingual vocabulary, all languages would be treated equally, with none serving as a so-called dominant language.

- However, in practical applications, it is often necessary to treat one language as the default dominant language, particularly when the vocabulary is rich and complex.
  - An example is the AAT, in which each concept record has over 100 fields in addition to the term itself. With such vocabularies, it would be impractical to maintain not only the terms, but also the values of flags, notes, dates, hierarchies, and other subsidiary information in several languages.
  - For the AAT, English is the dominant language, although terms and the scope note may be in multiple languages.
  - In addition, if every term in the original source language has not been assigned equivalents in all other target languages, the status of the other languages is not equal to that of the source language, and they are known as secondary languages.
Interoperability of Vocabularies

Satellite and extension vocabularies

- Satellite and extension vocabularies may be considered *microcontrolled vocabularies* (also known as *microthesauri*), because they are specialized vocabularies that may be fit into the structure of a larger, broader, or more generic controlled vocabulary.

- Characterized by having been constructed with the goal of being interoperable with an existing vocabulary, e.g., a narrow specialty vocabulary that is intended to be linked to the superstructure of a larger vocabulary. The satellite may be linked at multiple points to the original vocabulary.

- Node or leaf linking is a closely related method that links a specialized vocabulary to a node in the hierarchical structure of a broader controlled vocabulary, so that the specialized vocabulary becomes a virtual new branch to the original vocabulary.

- With either approach, the resulting family of controlled vocabularies should be consistent in structure, term format, and editorial oversight.
  - By using satellite or extension vocabularies, specialized users may have access to the desired levels of specificity in the new controlled vocabulary without swamping the original controlled vocabulary with detail that may not be needed by most users.
  - It can allow a particular set of users to access only the specialized vocabulary terms that apply to their indexing needs, thus excluding the full original vocabulary from these users, while ensuring that their specialized terms are still compatible with the full vocabulary in retrieval.
Other topics covered in *Introduction to Controlled Vocabularies*

- Local authorities
- Constructing a vocabulary
- Indexing with controlled vocabulary
- Retrieval using controlled vocabulary
Thank you.

Patricia Harpring
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Getty Vocabulary Program

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Los Angeles, CA 90049

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