



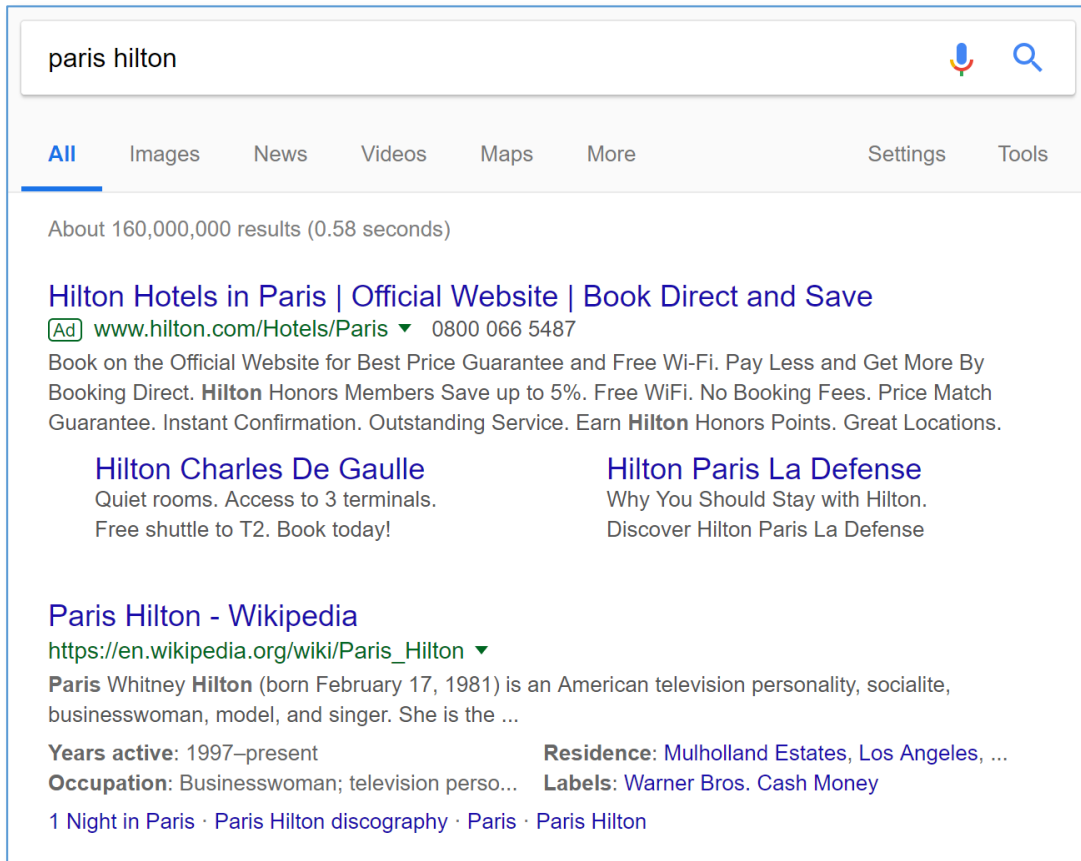
# ARIADNEplus Vocabulary Mapping Strategy

Ceri Binding | University of South Wales | Monday 27<sup>th</sup> March 2023 | Centre Marc Bloch, Berlin

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# Why use controlled vocabularies?



paris hilton

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About 160,000,000 results (0.58 seconds)

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**Paris Hilton - Wikipedia**  
[https://en.wikipedia.org/wiki/Paris\\_Hilton](https://en.wikipedia.org/wiki/Paris_Hilton)

**Paris** Whitney **Hilton** (born February 17, 1981) is an American television personality, socialite, businesswoman, model, and singer. She is the ...

**Years active:** 1997–present      **Residence:** Mulholland Estates, Los Angeles, ...  
**Occupation:** Businesswoman; television perso...      **Labels:** Warner Bros. Cash Money

1 Night in Paris · Paris Hilton discography · Paris · Paris Hilton

- Words are ambiguous
  - If we use words to index, the indexing is ambiguous
  - If we use words to search, the search criteria are ambiguous
  - “Paris Hilton” - person or hotel?
  - The meaning depends on additional context
- Words are language-specific
  - Paris (English)
    - ≠ Parijs (Dutch)
    - ≠ Parigi (Italian)
    - ≠ باريس (Arabic)
  - For typical web search each returns *different* results, though they all *mean* the same thing



# Issues preventing effective subject integration

- Spelling errors affect recall
  - *"posthole" != "posthlole", "cess pit" != "cess pitt"*
- Alternate word forms or punctuation affect recall
  - *"posthole" != "post-hole" != "post hole" != "post holes"*
  - *"gulley" != "gullies", "boundary" != "boundaries"*
- Synonyms affect recall
  - *"fresco" != "mural", "cask" != "barrel", "brimstone" != "sulphur" (or "sulfur")*
- Differing levels of specificity / granularity affect recall
  - *"weapon" != "sword" != "rapier" != "Pappenheimer"*
- Homographs affect precision
  - *"compound" (enclosure) != "compound" (material)*
  - *"lead" (object) != "lead" (material)*
  - *"pitch" (English) has over 20 different meanings*
  - Regional: *"tenement" (Scotland) != "tenement" (England)*
  - Multilingual: *"coin" (fr) != "coin" (en), "monster" (nl) != "monster" (en)*



# Data cleaning: OpenRefine

- <http://openrefine.org/>
- Flexible open source data cleaning tool
- Import, filter, transform, align and export data
- Scripted operations for repeatable bulk processing

Cluster & Edit column "ROLE\_CLEAN"

This feature helps you find groups of different cell values that might be alternative representations of the same thing. For example, the two strings "New York" and "new york" are very likely to refer to the same concept and just have capitalization differences, and "Godel" and "Godel" probably refer to the same person. Find out more ...

Method: key collision      Keying Function: metaphone3      181 clusters found

Cluster Size	Row Count	Values in Cluster	Merge?	New Cell Value
29	47	<ul style="list-style-type: none"><li>• PHOTOGRAPHER (6 rows)</li><li>• PHOTGRAPHER (3 rows)</li><li>• PHOTOGRAPHER? (3 rows)</li><li>• PHOOTGRAPHER (2 rows)</li><li>• PHOTOGRAPHER (2 rows)</li><li>• PHOTOGRAPHER (2 rows)</li><li>• PHOTOGRAPHR (2 rows)</li><li>• PHOTOHGRAPHER (2 rows)</li><li>• PHTOGRAPHER (2 rows)</li><li>• PHTOGRAPHER (2 rows)</li><li>• PHTOOGRAPHER (2 rows)</li><li>• PPHOTOGRAPHER (2 rows)</li><li>• PHOOTOGRAPHER (1 rows)</li><li>• PHOT0GRAPHER (1 rows)</li><li>• PHOTIGRAPHER (1 rows)</li><li>• PHOTOGARPHER (1 rows)</li><li>• PHOTOGGRAPHER (1 rows)</li><li>• PHOTOGR4PHER (1 rows)</li><li>• PHOTOGRAPHEER (1 rows)</li><li>• PHOTOGRAPHER (?) (1 rows)</li><li>• PHOTOGRAPHER ? (1 rows)</li><li>• PHOTOGRAPHER (1 rows)</li><li>• PHOTOGRAPHER- (1 rows)</li><li>• PHOTOGRAPPPER (1 rows)</li><li>• PHOTOGRPHER (1 rows)</li><li>• PHOTOGRRAPHER (1 rows)</li><li>• PHOTOOGRAPHER (1 rows)</li></ul>	<input checked="" type="checkbox"/>	PHOTOGRAPHER

Select All   Deselect All   Merge Selected & Re-Cluster   Merge Selected & Close   Close

Clustering variations by similarity,  
Merging all to a single (correct!) value



# Controlled vocabulary relationships

- Equivalence (ALT)
  - *post hole* ALT [*post-hole, posthole, post holes*]
  - *sulphur* ALT [*sulfur, brimstone*]
- Hierarchical (BT/NT)
  - *weapon*
    - *sword*
      - *rapier*
        - *Pappenheimer*
- Associative (RT)
  - *cup* RT *saucer*
  - *thermometer* RT *temperature*



# Background: ARIADNEplus project

- Cloud based infrastructure and services
- Archaeological metadata - aggregation & integration
  - ≈ 3.5 million records representing 50+ countries
- Cross searching data by Place / Time / Subject
  - Place: WGS84 coordinates, place names
  - Time: BCE/CE years, named periods (e.g. *Iron Age*)
    - **17 named period vocabularies (Perio.do)**
    - **21 languages**
    - **1,880 named periods**
  - Subject:
    - **59 local subject vocabularies**
    - **16 languages**
    - **19,000+ local subject terms**



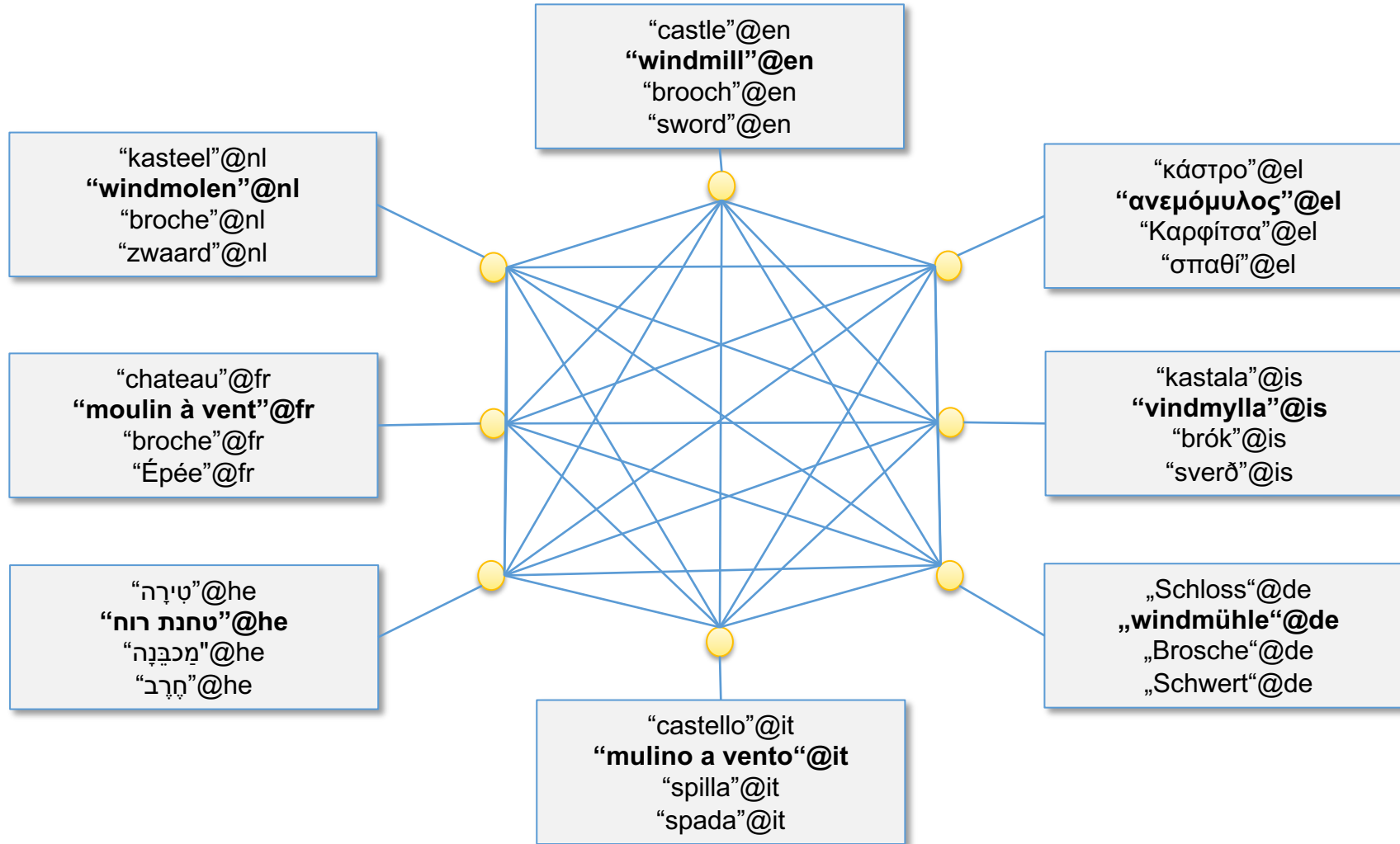
# Integration - named periods

- e.g. *Bronze Age, Iron Age, Roman* – a special case of subject indexing
- *Bronze Age* refers to different dates in different locations
- [Perio.do](http://Perio.do) – public domain multilingual gazetteer of named historical periods
- ARIADNEplus records aligned with specific Perio.do authority resources; enriched with start/end years





# Integration – Mapping subject vocabularies



Equivalent subject terms originating from multiple vocabularies - map everything to everything?

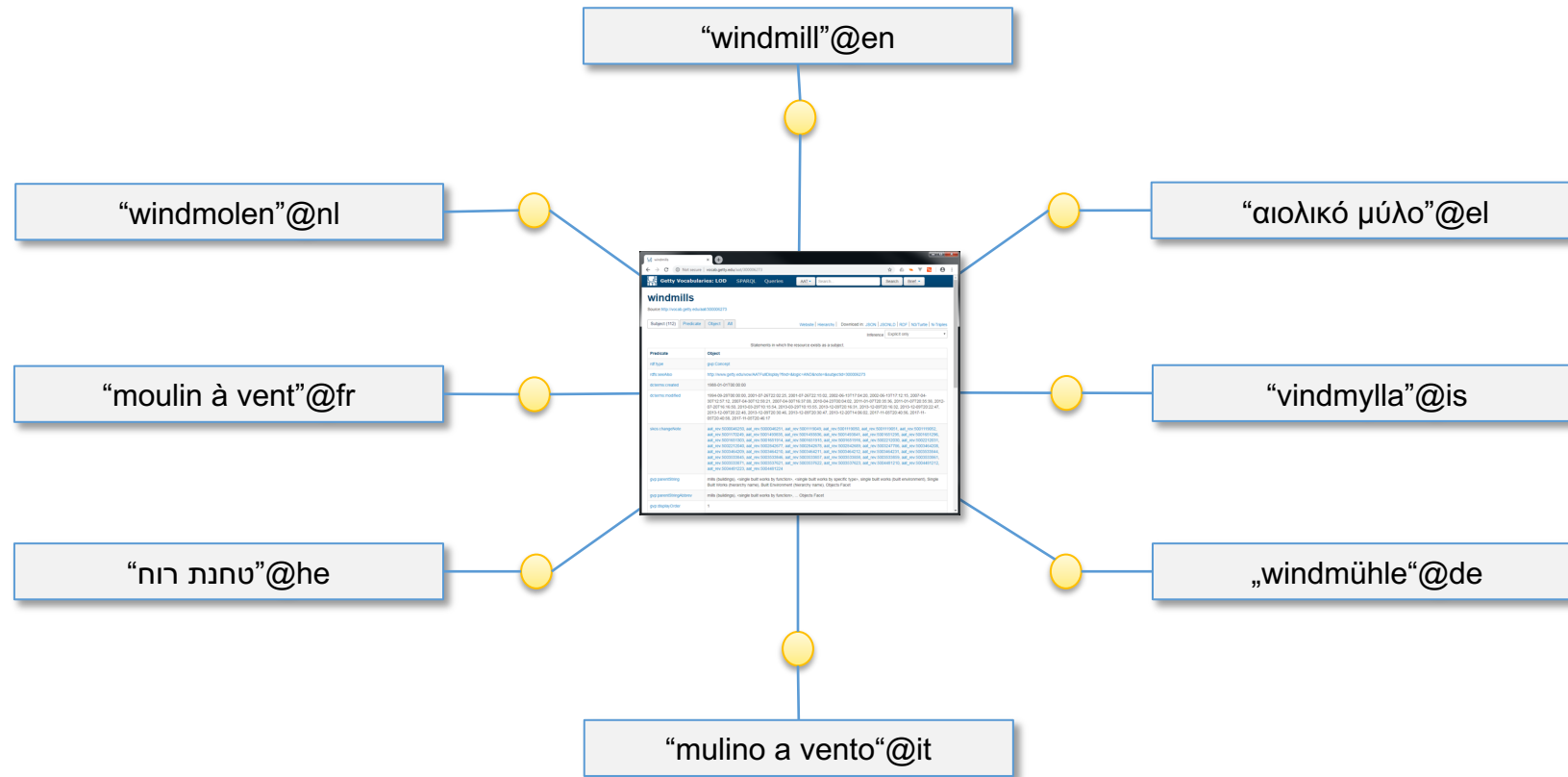


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# Strategy - map local subjects to spine vocabulary



Hub architecture – more manageable. Using mappings, a search on one term can incorporate all others



# Vocabulary Matching Tool

- For matching local subject terms to Getty AAT concepts
- Search & browse Getty AAT structure and create mappings
- Not automatic matching – can examine scope and context of concepts
- 6,400+ existing subject mappings from original ARIADNE project reused, revised & extended
- New subject mappings created for new partners = 19,220 total mappings, local subject → AAT

<https://vmt.ariadne.d4science.org/vmt/>

Vocabulary Matching Tool

Source Concept	Match Type	Target Concept	Suggest	Delete Row
Identifier		Filter column...		
Label				
Filter column...				
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> Abbey Church	Close Match	abbey churches	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> ABBEY	Exact Match	abbeys (monasteries)	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> AGRICULTURAL BUILDING	Exact Match	agricultural buildings	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> AGRICULTURAL DWELLING	Broad Match	agricultural buildings	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> AGRICULTURAL HALL	Broad Match	agricultural buildings	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> FARM BUILDING	Close Match	agricultural buildings	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> FIELD SYSTEM	Broad Match	agricultural land	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> FIELD SYSTEM	Broad Match	agricultural land	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> LAND USE SITE	Broad Match	agricultural land	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> LYNCHET	Broad Match	agricultural land	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> CURVILINEAR ENCLOSURE	Broad Match	agricultural settlements	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> DITCHED ENCLOSURE	Broad Match	agricultural settlements	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> DOUBLE DITCHED ENCLOSURE	Broad Match	agricultural settlements	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> ENCLOSED SETTLEMENT	Broad Match	agricultural settlements	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> ENCLOSURE	Broad Match	agricultural settlements	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> AGRICULTURE AND SUBSISTENCE	Broad Match	agriculture	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> AIR RAID SHELTER	Exact Match	air raid shelters	Q	⊖
<a href="http://purl.org/heritagedata/schemes...">http://purl.org/heritagedata/schemes...</a> AIRCRAFT	Close Match	aircraft	Q	⊖

390 rows

IMPORT JSON EXPORT JSON EXPORT CSV + ADD NEW ROW CLEAR ROWS SHOW HELP

**ARIADNE** plus  
Created by University of South Wales

ARIADNEplus is a Horizon 2020 project funded by the European Commission (Grant Agreement No. 823914).  
This application retrieves some information originating from Getty Art & Architecture Thesaurus (AAT)® which is made available under the ODC Attribution License. See <http://vocab.getty.edu/> for further details.



# Type of match between concepts

SKOS mapping properties define the type of match between concepts  
Don't rely on label matches; consider meaning and scope of concepts

skos:exactMatch

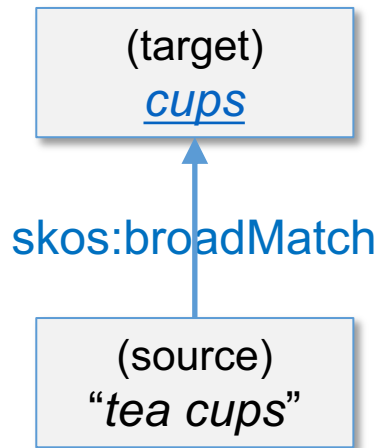


Where there is a high degree of confidence that the concepts may be used interchangeably

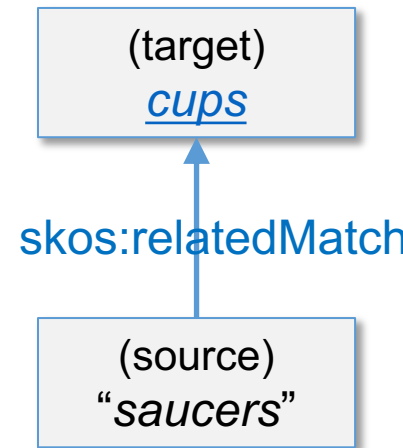
skos:closeMatch



Where scope or hierarchy of concepts suggests slight conceptual differences



Use “**some/all**” test for generic hierarchical relationships:  
**some** *cups* are *tea cups*;  
**all** *tea cups* are *cups*



Where some other association exists between concepts

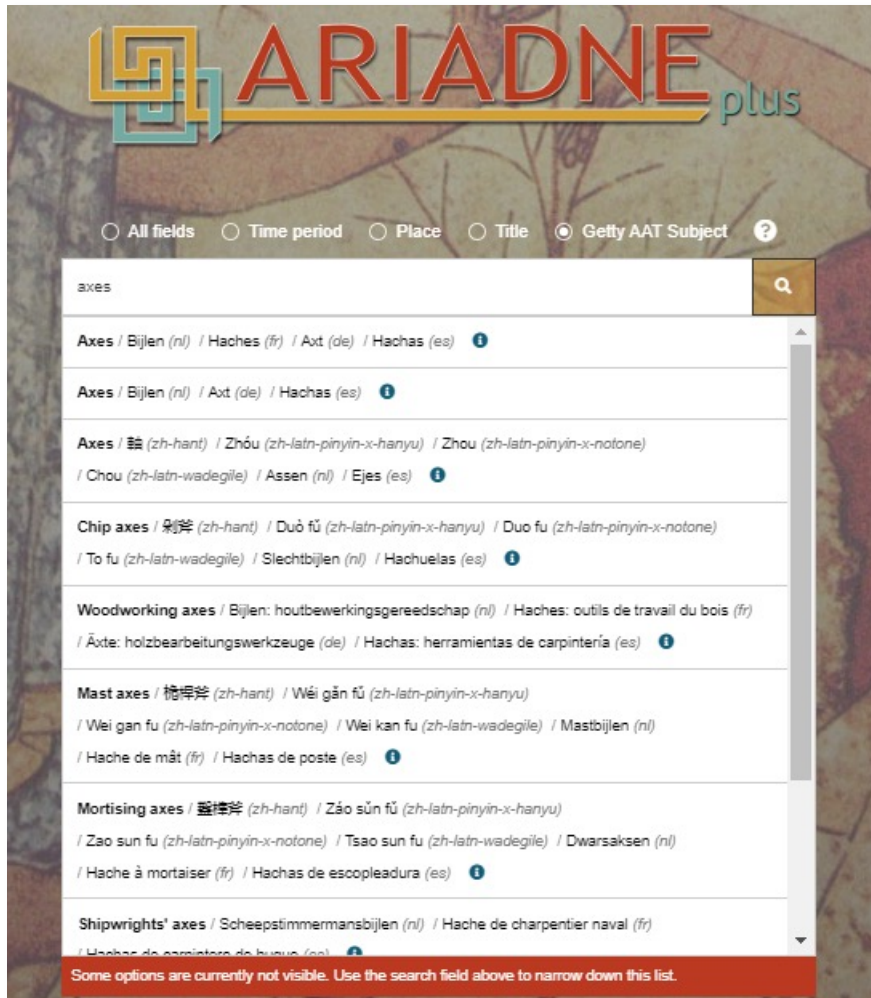
[skos:narrowMatch also exists, but was not used]



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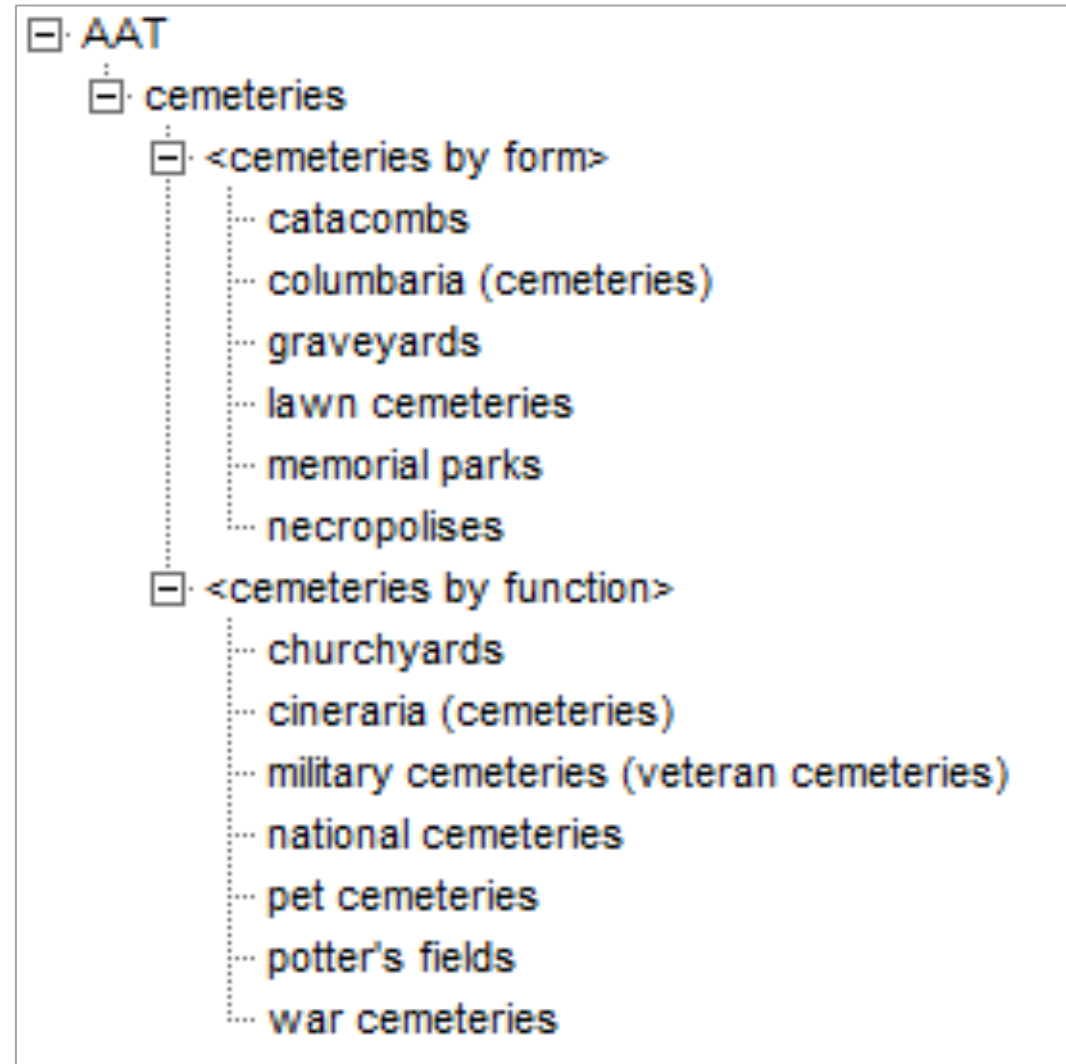
# AAT built in to ARIADNEplus search



- (optionally) searching on AAT concepts
- Exploits multilingual entry vocabulary of AAT
- Suggests concept matches
- View context of suggested concepts – scope note, broader & narrower concepts

# Use of vocabulary structure

- A search on AAT [cemeteries](#) can be expanded to include items indexed using any descendant concept ([catacombs](#), [graveyards](#) etc.)
- The search can also be expanded to include the multilingual entry vocabulary for the concept and any descendants ("*cimetières*"@fr, "*begraafplaatsen*"@nl, "*Friedhof*"@de etc.)





# Using local subject → AAT mappings

ARIADNE PORTAL

Back to search results

Riom (Puy-de-Dôme), Parc Européen Economique - rue Ludwig von Beethoven, rapport de diagnostic

**Description**

L'opération se situe au sein d'un secteur archéologiquement sensible.

Les tranchées réalisées, ont permis de reconnaître des indices d'occupations humaines se rapportant à deux périodes chronologiques : le Néolithique et la période Médiévale à Moderne.

# Les paléoenvironnements locaux ont été restitués grâce à l'observation des séquences sédimentaires (nature et géométrie des dépôts).

# Pour le Néolithique, quatre fosses (F0 à F3) montrent une occupation du secteur au cours de la première moitié du 4e mill. av. J.-C. (Néolithique moyen 2) qui peut être corrélée à celle, plus dense, fouillée en 1992 légèrement plus au Sud-Ouest (site de PEER 2).

# Pour la période Médiévale à Moderne, des creusements successifs (F1 à F5) du fossé méridional bordant l'axe de communication Riom/Varennes-sur-Morge/Thuret, matérialisé actuellement par la D 211, ont été observés dans le sondage S1. Il est vraisemblable que cet axe soit relativement ancien : le mobilier du fossé F5 tend à montrer que ce dernier est en place au moins depuis la période médiévale.

**Metadata**

Original ID: 29407

Landing page: <https://dola.inrap.fr/fora/ark:/04298/0129407>

Language: French

**Subject - AAT:**

- pits (earthworks) (en)
- quartz (mineral) (en)
- industry (object groupings) (en)
- fauna (en)
- teeth (animal components) (en)

**Original:**

- Céramique médiévale
- Céramique moderne
- Céramique néolithique
- Dent
- Faune
- Fossé
- Fosse
- Géomorphologie
- Industrie lithique
- Quartz
- Voie

**Dating:**

- Néolithique: -6000 to -2201
- Époque médiévale: 0500 to 1500
- Néolithique moyen: -5300 to -4501

**Resource links**

View resource at provider

Json Xml Ref Cite Report an issue

**Resource is part of**

Dola

**Thematically similar**

Thematically similar resources based on terms in common of:

Subject & Time period

- Le Boulou (cat. El Voló) Rue Chapelle Saint Luc - El Cortal d'en Quirc Projet de lotissement - Les jardins d'Auréliu. Occitanie, Pyrénées-Orientales, rapport de diagnostic
- Entre alluvions du Castelhou et ancienne terrasse de la Tet, quelques traces d'occupations humaines. Occitanie, Pyrénées-Orientales, Castelhou - Thuir, RD612 tranche 3, rapport de diagnostic
- Extension septentrionale de l'occupation du Néolithique moyen. Provence-Alpes-Côte d'Azur, Bouches-du-Rhône, Trets, La Builière 2, rapport de fouilles
- Saint-Paul (1). Le Gasquet-Parc photovoltaïque Le Gasquet, rapport de diagnostic
- 4 - Exploitation d'un territoire en bord de Seine: de l'enceinte monumentale du Néolithique moyen II à la ferme fossyée médiévale, une néropole exceptionnelle du Néolithique moyen II en "Bassée auboise". Pont-sur-Seine, Aube "Ferme de l'Île" [Grand Est], volume 4: Etude funéraire, rapport de fouille
- Berlitz-Rumersheim (Bas-Rhin) rue des Acacias, rapport de diagnostic, un habitat du Néolithique récent et les traces d'une houblonnière d'époque contemporaine
- Saint-Jean-Le-Vieux (Ain) - Au Mollard - La Vigne Orset -. rapport de diagnostic, Tranche 2

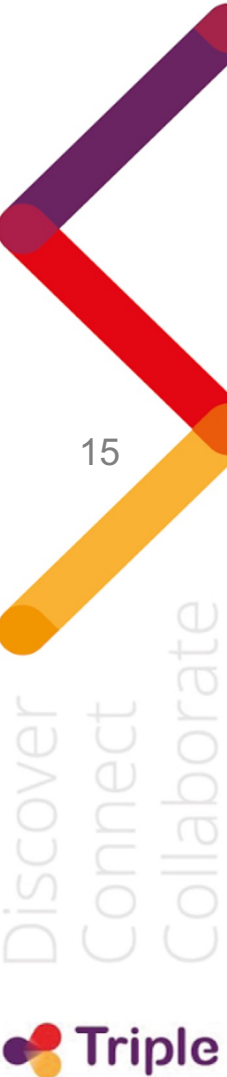
Subject indexing derived from local subject → AAT mappings

- Enriched metadata records with derived AAT subjects
- Can exploit AAT entry vocabulary
- Facilitates multilingual cross-search e.g. search for *sword* returns *sværd*, *svärd*, 剣 etc.
- Facilitates hierarchical semantic search e.g. search for weapons – can return axes, spears, swords, rapiers, rifles, pistols etc.



# Benefits of the approach

- Prompted data providers to clean and improve their data, in some cases producing new vocabularies
- Mappings allowed data owners to express how their own data relates to a common spine vocabulary (AAT)
- Matching tool and mappings are reusable
- Improved precision and recall in search
  - Use of multilingual entry vocabulary of AAT
  - Use of poly-hierarchical structure of AAT
- Improved visibility of resources originating from smaller data provider organisations





# Thank you

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The views and opinions expressed in this presentation are the sole responsibility of the author and do not necessarily reflect the views of the European Commission

## Links

- ARIADNEplus project <https://ariadne-infrastructure.eu/>
- ARIADNE portal <https://portal.ariadne-infrastructure.eu/>
- Vocabulary Matching Tool <https://vmt.ariadne.d4science.org/vmt/>
- USW Hypermedia Research Group <https://hypermedia.research.southwales.ac.uk/>

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