Linked Open Data Approaches within the ARIADNE project

@ARIADNE_Network  ariadne-infrastructure.eu
portal.ariadne-infrastructure.eu

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What is ARIADNE?

A proposal to integrate existing archaeological data infrastructures across Europe, so researchers can use the various distributed datasets and new technologies to explore new research methodologies.
What is ARIADNE?

Stimulate new research avenues in the field of archaeology, relying on the comparison, re-use and integration into current research, the outcomes of past and on-going field and laboratory activity.
ARIADNE Activities

• **Research Workpackages**
  – Implementing Interoperability
  – Developing Integrated Services
  – Addressing Complexity
  – Linking Archaeological Data
  – Data Mining and Natural Language Processing
  – Innovation in Archaeological Research Methodology
Focus

• How does working with Linked Data make the ARIADNE project more open?
• What Linked Data approaches are used by ARIADNE?
• Lessons learned: How can archaeological data be more open?
ARIADNE and Linked Data

How does working with Linked Data make the ARIADNE project more open?

– Using Linked Data is a way to make data more easily processable by machines, more automated
– A way to make heterogeneous data more interoperable and searchable (often) by linking with other data by mapping to an authoritative vocabulary or mapping between vocabularies
– A way to infer new information from existing data
• Just because you're using Linked Data doesn't mean your data is open (LOD)
  – Linked Data is a technical solution for breaking down data silos and creating a Web of Data instead of a Web of Documents (pages)
  – The data still has to be open and accessible, through open licensing and open dissemination
Welcome
ARIADNE brings together and integrates existing archaeological research data infrastructures so that researchers can use the various distributed datasets and new and powerful technologies as an integral component of the archaeological research methodology.

Browse the Catalog

Where

When

What

flakes (object genre)
houses
farms
farmhouses
huts
menhirs
ditches
drains
Quercus
Archeology
cairns
silo
Church
forts
Souterrain
• What Linked Data approaches are used by ARIADNE?
  – What: Mapping subjects to Getty Art & Architecture Thesaurus (controlled)
  – When: Contributing to/using PeriodO (assertions) for time periods
• Manually matched vocabulary concepts to Getty Art & Architecture Thesaurus (AAT) concepts; a popular LOD vocabulary
  – Used the AAT as a ‘mediating platform’ or neutral spine to map concepts in national languages
  – Partners at the University of South Wales created a bespoke thesaurus mapping tool for the task, but tool is openly available for use outside of ARIADNE
http://www.heritagedata.org/vocabularyMatchingTool/
Mapping to the AAT

- Manually matching vocabulary concepts to Getty Art & Architecture Thesaurus (AAT) concepts
- Uses linked data – Javascript components using external SPARQL endpoints (no back-end)
- Side by side comparison of concepts, with contextual details (labels, scope notes, linked concepts)
- Multilingual - French, German, Spanish, English, Dutch AAT concept details
- Export created mappings to JSON, CSV, RDF
Mapping to the AAT

**Welcome**

ARIADNE brings together and integrates existing archaeological research data infrastructures so that researchers can use the various distributed datasets and new and powerful technologies as an integral component of the archaeological research methodology.
Mapping to the AAT

ring brooches

**Getty AAT ID** 300263352

**Note** Brooches in the shape of a ring, with a movable pin that may extend beyond the diameter of the ring; usually of metal and often ornamented. Used to fasten costume and worn especially during the Medieval period in Europe.

**URI** http://vocab.getty.edu/aat/300263352

**Broader** 🔗 brooches

**Terms**

- **English**: ring brooches, brooches, annular, brooch, annular, ring brooch, annular brooches, annular brooch, brooches, ring, ring-brooch, broach, ring-brooches
- **Spanish**: broches, ring broche, broche
- **Dutch**: ringbroches, ringbroche

**Provider mapping**

**ANNULAR BROOCH**

**Match URI** http://www.w3.org/2004/02/skos/core#exactMatch

**Source URI** http://purl.org/heritagedata/schemes/MDA_OBJ/concepts/97114
Mapping to the AAT

- **An Archaeological Evaluation at 98-100 Bull Close Road, Norwich, Norfolk**
  - Type: Sites and monuments databases or Inventories
  - Publisher: Archaeology Data Service
  - An Archaeological Evaluation at 98-100 Bull Close Road, Norwich, Norfolk

- **Archaeological Excavation Report: Norwich Road and Exeter Crescent Road alignment, RAF Lakenheath ERL 161**
  - Type: Sites and monuments databases or Inventories
  - Publisher: Archaeology Data Service
  - Archaeological Excavation Report: Norwich Road and Exeter Crescent Road alignment, RAF Lakenheath ERL 161

- **Report on a Second Phase of Archaeological Evaluation at Land adjoining Swanton Morley Airfield, Beetley, Norfolk**
  - Type: Sites and monuments databases or Inventories
  - Publisher: Archaeology Data Service
  - Report on a Second Phase of Archaeological Evaluation at Land adjoining Swanton Morley Airfield, Beetley, Norfolk

- **The Mucking Anglo-Saxon cemeteries**
  - Publisher: Archaeology Data Service
  - The Anglo-Saxon cemeteries at Mucking, Essex, represent the burials of over 800 individuals from the 5th to early 7th centuries AD. The mixed rite Cemetery II is one of the largest and most complete Anglo-Saxon cemeteries yet excavated (282 inhumations, 463 cremation burials), while the pa...
Mapping to the AAT

Report on a Second Phase of Archaeological Evaluation at Land adjoining Swanton Morley Airfield, Beetley, Norfolk

Report on a Second Phase of Archaeological Evaluation at Land adjoining Swanton Morley Airfield, Beetley, Norfolk

ring brooches  •  necklaces  •  crematoria

Swanton Morley Airfield, Beetley, Norfolk

Metadata

ARIADNE ID 14672180
Original ID 1942829
Language English
Resource type Sites and monuments databases or inventories
Subject ring brooches  •  necklaces  •  crematoria
Dating 410 – 1066
Place Swanton Morley Airfield, Beetley, Norfolk, ENGLAND [0.954953, 52.729908]
Type Dataset
Publisher Archaeology Data Service [Organization]
Issued 2011-10-11T00:00:00.0
Modified 2011-10-11T00:00:00.0

Responsible persons and organisations

Resource is part of
ArchSearch: ADS catalogue

Geographically similar

Thematicaly similar

Report on a Second Phase of Archaeological Evaluation at Land adjoining Swanton Morley Airfield, Beetley, Norfolk
PeriodO is a LOD gazetteer for linking and visualising data

- It contains scholarly definitions of historical, art-historical and archaeological period
- Allows easier linking of datasets that define periods differently (when is always linked with where in archaeology)
- Allows users to see where period definitions overlap or diverge
Issues with interoperability and time in archaeology

- We often use conceptual, rather than quantitative language to refer to time (e.g. Bronze Age)
- Different people can use the same period terms to refer to very different things (Bronze Age happens at different times and can have different meaning depending on place)
The PeriodO approach

- Documents definitions of periods by authoritative sources (assertion and attribution)
- Corresponds with traditional scholarly practice, so users know what place is associated with the assertion, and who says so (what authoritative source has contributed the assertion)
• How ARIADNE is working with PeriodO
  – All ARIADNE content-providing partners were asked to submit the authoritative period terms in use in their country or region, in their national languages to PeriodO
  – The submitted terms were given PeriodO Linked Data URIs (Linked Data addresses) and incorporated into the gazetteer for use within ARIADNE, but allowing interoperability with any other project or researcher using PeriodO
Working with PeriodO

### Periods

Viewing 1 - 25 of 3745

Show 25 periods at a time.

<table>
<thead>
<tr>
<th>▲ Label</th>
<th>Earliest start</th>
<th>Latest stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Millenium BCE</td>
<td>-2000</td>
<td>-1000</td>
</tr>
<tr>
<td>2nd Millenium BC Egypt</td>
<td>-2000</td>
<td>-1000</td>
</tr>
<tr>
<td>2nd Millenium BC Levant</td>
<td>-2000</td>
<td>-1000</td>
</tr>
<tr>
<td>3rd millennium BC</td>
<td>-3000</td>
<td>-2000</td>
</tr>
<tr>
<td>4th millenium BCE</td>
<td>-4000</td>
<td>-3000</td>
</tr>
<tr>
<td>13th Century AD Eastern Mediterranean (AD 1200-1300)</td>
<td>1200</td>
<td>1300</td>
</tr>
<tr>
<td>16th Century</td>
<td>1500</td>
<td>1600</td>
</tr>
<tr>
<td>17th Century</td>
<td>1600</td>
<td>1700</td>
</tr>
<tr>
<td>17th Century (1600 - 1699)</td>
<td>1600</td>
<td>1699</td>
</tr>
</tbody>
</table>

### Filters

#### Time range

- Hide outliers?
  - Hiding range from -2600000 to -49942

#### Text

- Match string

#### Source

- British Museum.
- ARIADNE Consortium. ARIADNE Data Collection. 2015.
- Roger Bagnall. Poulade: A community-built gazetteer and
### Periods

Viewing 1 - 8 of 8

Show **25** periods at a time.

<table>
<thead>
<tr>
<th>Label</th>
<th>Earliest start</th>
<th>Latest stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>bronasta doba</td>
<td>-1750</td>
<td>-751</td>
</tr>
<tr>
<td>bronzkor</td>
<td>-2700</td>
<td>-901</td>
</tr>
<tr>
<td>kora bronzkor</td>
<td>-2700</td>
<td>-1901</td>
</tr>
<tr>
<td>késő bronzkor</td>
<td>-1400</td>
<td>-901</td>
</tr>
<tr>
<td>középső bronzkor</td>
<td>-1900</td>
<td>-1401</td>
</tr>
<tr>
<td>mlajša bronasta doba</td>
<td>-1250</td>
<td>-1001</td>
</tr>
<tr>
<td>srednja bronasta doba</td>
<td>-1500</td>
<td>-1251</td>
</tr>
<tr>
<td>starejša bronasta doba</td>
<td>-1750</td>
<td>-1501</td>
</tr>
</tbody>
</table>

### Filters

**Time range**

- Hide outliers?

**Text**

- Match string: bronze age

**Source**


How ARIADNE is working with PeriodO

- PeriodO search is currently being implemented in the ARIADNE portal, and should be available within the next couple of months.
- As new associated partners are added to ARIADNE (e.g. Lithuania!) they will also be invited to submit their period terms to PeriodO, further broadening coverage across Europe.
Lessons Learned

- Lessons learned: How can archaeological data be more open?
  - Linked Data provides important tools for making archaeological data more open, but working together to support open practices is the real key.
  - Most researchers have bigger concerns than making their data open as Linked Data, there is a significant learning and technology curve.
  - Getting to this point has taken years of cooperative work by archaeologists and developers.
Lessons Learned

• Lessons learned: How can archaeological data be more open?
  – Archaeologists across Europe are coming under increasing pressure to deposit their data in an open repository and make it available for re-use
    • Pressure from funders
    • Pressure from institutions
    • Funding available but no guidance
    • No appropriate options for archaeological data
Lessons Learned

• Lessons learned: How can archaeological data be more open?
  – This initial deposit is where support is really needed; making data available with an open license is the hardest work
  – Once data is online under an open license, opportunities to make it even more open and accessible using Linked Data become possible!
Thank You!

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