

# STELLAR

## STAR/STELLAR Case Study: Complementary use of ontologies and (other) KOS

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Arts & Humanities  
Research Council



# Presentation

- Differences between thesauri and ontologies?
- STAR/STELLAR project case study  
Linked data project with archaeological excavation datasets  
Produced tools for non-experts to map/extract RDF
- Possibilities for interoperability
- How to consider typical purpose of a KOS?

# Factors governing types of KOS (from NKOS 2006)

## (AI) Ontology – revisited on *purpose*

### ***Entities***

Concepts, terms, strings,

Atomic - Composite (attributes)

Enumerative - Synthetic

Low – medium - high degree precombination (coordination in KOS itself)

Size: small – large

Depth: small – medium - large

### ***Relationships (internal)***

Types / expressivity of relationships:

low (core set) – medium – high (definable)

concept-concept, concept-term, term-term

monohierarchies - polyhierarchies

Formality: low – medium – high

### ***Typical application to objects in domain of interest***

Metadata element: subject, various elements, general

Granularity of application objects: un/structured; discrete individual / general (document)

Relationship applying concepts to objects in domain

Extent of Interactive/automatic use -- information seeking tactics/logical inferencing

about (fuzzy), instance

Exhaustivity: low - high

Specificity: low - high

Coordination: low – high - expressivity and formality of relationships in coordination

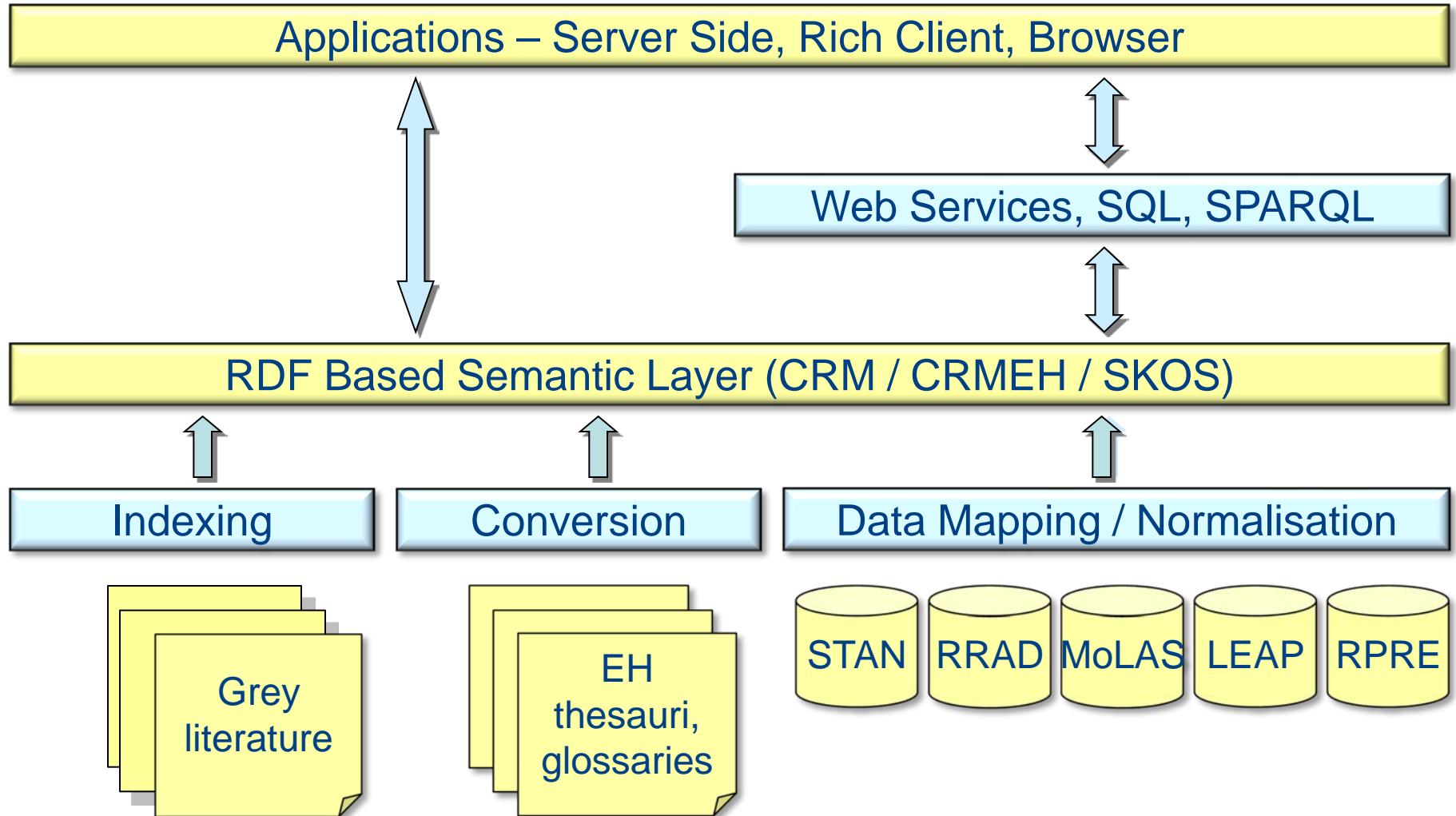
# STELLAR

- 12 month AHRC funded project
  - Hypermedia Research Unit, University of Glamorgan
  - Archaeology Data Service, University of York
  - English Heritage Centre for Archaeology, Portsmouth
- Builds on previous 3 year AHRC funded STAR Project
- Acknowledgments
  - Ceri Binding (University of Glamorgan)
  - Andreas Vlachidis (University of Glamorgan)
  - Keith May, English Heritage (EH)
  - Stuart Jeffrey, Julian Richards,
    - Archaeology Data Service (ADS)
    - Archaeology Department, University of York

# STAR – Aims and background

- *Investigate semantic technologies for integrating and cross searching datasets and associated grey literature*
- Current situation - fragmented datasets with different terminology
- Lack of semantic interoperability and cross search
- Need for integrative metadata framework  
CIDOC CRM (ISO standard) as high level, core ontology  
together with the CRM-EH archaeological extension of the CRM  
  
along with relevant EH thesauri and glossaries

# STAR Project - General Architecture



## EH Monuments Type Thesaurus

# Knowledge Organization Systems

- English Heritage thesauri
- Reengineering to ontology would be significant effort (and would change them)
- STAR holds thesauri in SKOS

Applies concepts to instances of CRM classes via E55 Type

- [WORKHOUSE](#)
- [RUBBISH PIT](#)
- [SADDLERY](#)
- [SERGEANTS MESS](#)
- [SERVANTS HALL](#)
- [SERVICE WING](#)
- [SETTLEMENT](#)
  - [CONSTRUCTION CAMP](#)
  - [CRANNOG](#)
  - [DESERTED SETTLEMENT](#)
  - [DISPLACED PERSONS CAMP](#)
  - [ENCLOSED SETTLEMENT](#)
    - [BURH](#)
    - [CLOTHES LINE ENCLOSURE](#)
    - [ENCLOSED HUT CIRCLE SETTLEMENT](#)
    - [ENCLOSED OPPIDUM](#)
    - [HILLFORT](#)
      - [BIVALLATE HILLFORT](#)
      - [MULTIPLE ENCLOSURE FORT](#)
      - [MULTIVALLATE HILLFORT](#)
      - [UNIVALLATE HILLFORT](#)
    - [HILLTOP ENCLOSURE](#)
      - [PALISADED HILLTOP ENCLOSURE](#)
    - [OPPIDUM](#)
      - [ENCLOSED OPPIDUM](#)
    - [PALISADED ENCLOSURE](#)
    - [PALISADED HOMESTEAD](#)
    - [PALISADED SETTLEMENT](#)
    - [PROMONTORY FORT](#)
      - [CLIFF CASTLE](#)
    - [ROUND](#)
  - [EXTRA MURAL SUBURB](#)
  - [HAMLET](#)
  - [HOMESTEAD](#)
  - [HOUSING ESTATE](#)

# Natural Language Processing (NLP)

## of archaeological grey literature

Extract key concepts in same semantic representation as for data.

Allows unified searching of different datasets and grey literature  
in terms of same underlying conceptual structure

**“ditch containing prehistoric pottery dating to the Late Bronze Age”**

---

EHE1002.ContextFindProductionEvent

---

prehistoric pottery dating to the Late Bronze Age

EHE0009.ContextFind

EHE0039.TimeSpanAppellation

pottery [#ehg027.2]

Late Bronze Age [#134734]

EHE1004.ContextFindDepositionEvent

---

ditch containing prehistoric pottery

EHE0007.Context

EHE0009.ContextFind

ditch [#ehg003.20]

pottery [#ehg027.2]

---



# Information extraction is context dependent

Annotation terms – ontology **not an instance relationship**  
but a less certain relationship

form of ring ditches or ploughed out barrows, to the south of the study area.

1.15 A number of stray finds of Mesolithic, Neolithic and Bronze Age stone and flint implements have been recorded within 1km to the north and east of the present site (SMR nos 6531, 6591, 6595 and 6598). No evidence of settlements of these dates has been recovered from the vicinity of the study area.

## 1 Roman

1.16 Evidence for Roman activity in the immediate vicinity of the study area is relatively sparse. No settlement of this period has yet been identified nearby, but an archaeological evaluation on land at Tunbridge Lane, approximately 700m to the north-east, revealed a number of ditched enclosures, possibly agricultural in purpose (Seddon, 2000). The fact that modern field boundaries follow the alignment of the Roman enclosure ditches suggests that the basic layout of the landscape may have changed very little since then. The quantity of pottery sherds and other finds recovered from the ditches suggest occupation in the vicinity. Pottery sherds were also recovered by a metal detectorist on a building site, approximately 550m to the north of the study area (SMR no 6586).

Land off Bell Road, Bottisham, Cambs Evaluation Report

HN310\dba.sam Page 5

1.17 The remains of a large building were discovered in Swaffham Bulbeck at NGR TL 559 613, approximately 2.5km to the north-east of the present site. The evidence included ceramic roofing tile and opus signinum.

1.18 The lodes, or canals, running south-east from the river Cam to Swaffham Bulbeck and Lode were originally thought to date to the Roman period. The lack of major Roman occupation sites close to the lodes makes this unlikely. David Hall (Hall, 1996, p112) has demonstrated that they are much more likely to be Saxon or early medieval in date. The southern end of the canal into Lode is approximately 3km north-west of the present site.

## 1 Anglo-Saxon

1.19 Although no finds of Saxon date have been recovered from the vicinity of the present site, the Domesday Survey apparently records a sizeable and well established village, which

# STAR Demonstrator – search for a conceptual pattern

A research publication on one of the (Silchester Roman) datasets used in STAR discusses the finding of a *coin* within a *hearth*.

-- does the same thing occur in any of the grey literature reports?

Requires comparison of extracted data with NLP indexing in terms of the ontology and the vocabularies.

<http://hypermedia.research.glam.ac.uk/resources/star-demonstrator/>

The screenshot displays the STAR Demonstrator interface, which is used for searching conceptual patterns. The interface is divided into several panels:

- Groups/Contexts/Finds/Samples:** A sidebar on the left with tabs for Groups, Contexts, Finds, and Samples. Under the Contexts tab, a list of concepts is shown, including Site, Context ID, Context Type, Context Notes, Within Group, Within Context, Contains Context, Contains Context Find, Contains Context Sample, Stratigraphically Above Context, Stratigraphically Below Context, and Stratigraphically Equal To Context.
- Group Details:** A panel showing a hierarchical tree structure. The root node is a green box labeled 'Site'. It has two children: a green box labeled 'Context ID' and an orange box labeled 'Context Type'. The 'Context ID' node has two children: a green box labeled 'Context Notes' and an orange box labeled 'Context Sample'. The 'Context Sample' node has two children: a green box labeled 'Context Find' and an orange box labeled 'Context Sample'.
- Context Details:** A panel showing a hierarchical tree structure. The root node is a green box labeled 'Site'. It has two children: a green box labeled 'Context ID' and an orange box labeled 'Context Type'. The 'Context ID' node has two children: a green box labeled 'Context Notes' and an orange box labeled 'Context Sample'. The 'Context Sample' node has two children: a green box labeled 'Context Find' and an orange box labeled 'Context Sample'.
- Context Sample Details:** A panel showing a hierarchical tree structure. The root node is an orange box labeled 'Context Sample'. It has one child: a red box labeled 'Context Find'.
- Context Find Details:** A panel showing a hierarchical tree structure. The root node is an orange box labeled 'Context Find'. It has one child: a blue box labeled 'Context Sample'.

Below each tree structure, there are input fields for various attributes, such as Site, Group ID, Location, Group Type, Context ID, Context Type, Sample ID, Sample Type, Sample Notes, Find ID, Find Type, Find Dating, and Material. A 'Run Query' button is located at the bottom left of the interface.

# STAR Demonstrator – search for a conceptual pattern

## Research paper reports finding a *coin in hearth* – exist elsewhere?

Groups

Contexts

Finds

Samples

Site

Context ID

Context Type

hearth

Context Notes

Within Group

Within Context

Contains Context

Contains Context Find

Find ID

Find Type

COIN

Find Material

Find Notes

Contains Context Sample

Stratigraphically Above Context

Run Query

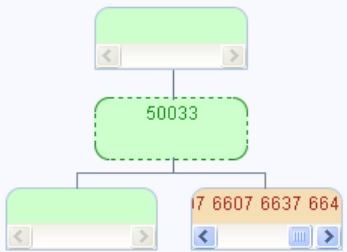
#archaeol8-6428.134861

#archaeol8-6428.134875

6637

3 results

Group Details



#ehe0001.leap

Group ID

50033

Location

Group Type

Group Notes

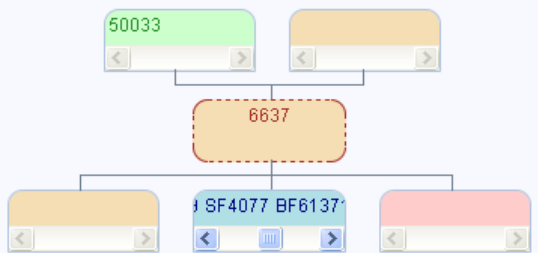
Timber building pre-dating circular structure

<http://tempuri/star/base#ehe0005.leap.objects.object.50033>

Context Details

Hierarchy

Stratigraphy



Site

#ehe0001.leap

Context ID

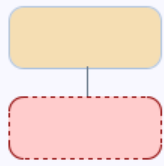
6637

Context Type

Hearth

<http://tempuri/star/base#ehe0007.leap.contexts.context.6637>

Context Sample Details



Site

[not set]

Sample ID

[not set]

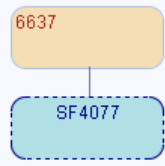
Sample Type

[not set]

Sample Notes

<http://tempuri/star/base#ehe0009.leap.finds.id.sf4077>

Context Find Details



Find Type

Coin Illegible

Find Dating

1st C BC, 1st C AD

Material

Silver

Find Notes

<http://tempuri/star/base#ehe0009.leap.finds.id.sf4077>

# STELLAR outcomes

- Make it easier to map and extract archaeological excavation datasets to CIDOC CRM and CRM-EH archaeological extension of the ontology
- Generalise the data extraction tools produced by STAR so third party data providers can use them
- Develop methods for mapping and extraction of archaeological datasets into RDF/XML conforming to CIDOC CRM and CRM-EH ontology with unique global identifiers for entities and concepts (http URIs) for publication as linked data
- Resulting linked data available from ADS website  
<http://data.archaeologydataservice.ac.uk>
- Freely available tools and guidelines/tutorials  
<http://hypermedia.research.glam.ac.uk/kos/STELLAR/>

# STELLAR outcomes


- In practice mapping to CRM has tended to require specialist knowledge of the ontology and been resource intensive
- Given the wide scope of the CRM, it is possible to make multiple valid mappings depending on the intended purpose and focus of the mappings
- **STELLAR tools convert archaeological data to CRM/RDF in a consistent manner, without requiring detailed knowledge of the underlying ontology**
- User chooses a template for a particular data pattern and supplies the corresponding input from their database (combination of optional elements with a mandatory ID)
- STELLAR templates for
  - CRM-EH archaeological extension to the CIDOC CRM
  - Some more general CIDOC CRM templates conforming to the CLAROS Project format
  - SKOSifying a glossary/thesaurus connected with the dataset

# STELLAR applications


<http://hypermedia.research.glam.ac.uk/resources/STELLAR-applications/>


# STELLAR


An application for converting delimited (CSV) format data to valid RDF data conforming to a chosen 'template'.

Delimited Data File 


test\_crneh\_contexts\_strat\_lower\_id.csv


Template name 

CRMEH\_CONTEXTS 


Namespace prefix 


<http://stellar/>

Validator 



Type the two words:  
absolown regard



**Results** 

[nis33qv1.rdf](#)  
(the download link will remain available on the server for 30 minutes, after which it will be automatically deleted)

-----  
Statistics  
-----  
5 unique subject URIs  
8 unique object URIs  
1 unique literals using 1 languages  
3 unique class URIs:  
<[http://purl.org/crmeh#EHE0007\\_Context](http://purl.org/crmeh#EHE0007_Context)> [1]  
<[http://purl.org/crmeh#EHE0061\\_ContextUID](http://purl.org/crmeh#EHE0061_ContextUID)> [1]  
<[http://purl.org/crmeh#EHE1001\\_ContextEvent](http://purl.org/crmeh#EHE1001_ContextEvent)> [2]  
14 statements, using 9 predicate URIs:  
<<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>> [4]  
<<http://www.w3.org/2000/01/rdf-schema#label>> [1]  
<<http://www.w3.org/1999/02/22-rdf-syntax-ns#value>> [1]  
<[http://purl.org/NET/crm-ow#P87\\_is\\_identified\\_by](http://purl.org/NET/crm-ow#P87_is_identified_by)> [1]  
<[http://purl.org/NET/crm-ow#P87i\\_identifies](http://purl.org/NET/crm-ow#P87i_identifies)> [1]  
<[http://purl.org/NET/crm-ow#P7\\_took\\_place\\_at](http://purl.org/NET/crm-ow#P7_took_place_at)> [2]  
<[http://purl.org/NET/crm-ow#P7i\\_witnessed](http://purl.org/NET/crm-ow#P7i_witnessed)> [2]  
<[http://purl.org/NET/crm-ow#P120\\_occurs\\_before](http://purl.org/NET/crm-ow#P120_occurs_before)> [1]  
<[http://purl.org/NET/crm-ow#P120i\\_occurs\\_after](http://purl.org/NET/crm-ow#P120i_occurs_after)> [1]

```
STELLAR.Console v1.0
(type HELP for instructions)

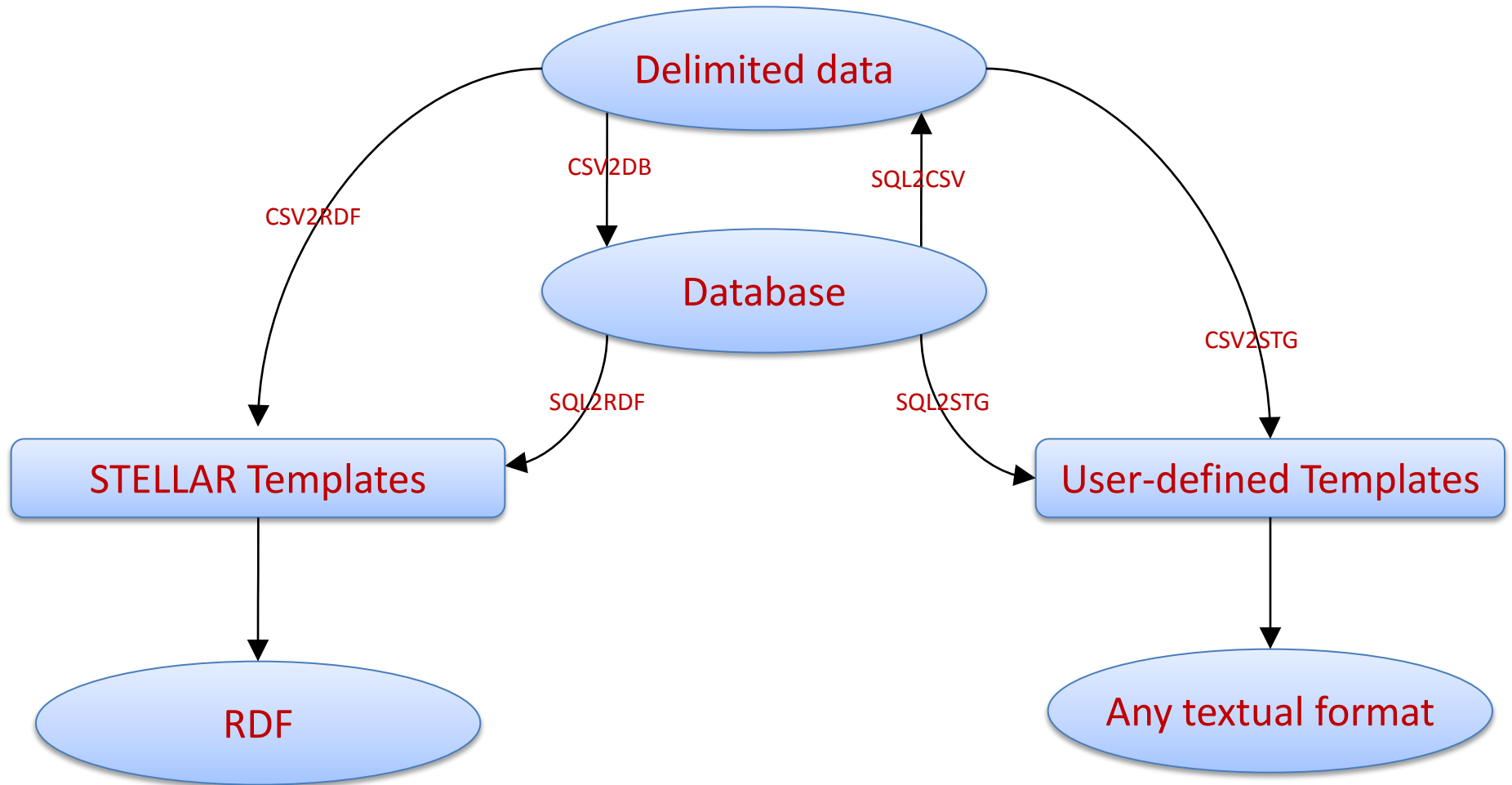
STELLAR.Console>help
For information on a particular command type HELP command
DBNAMES      List databases in a directory
DBTABLES     List tables in a database
DBCOLUMNS   List columns in a database table
DBROWCOUNT  Count rows in a database table
TAB2DB       Import tab delimited file to database table
CSU2DB       Import comma delimited file to database table
SQL2CSU      Run SQL, export result to CSU file
SQL2TAB      Run SQL, export result to tab delimited file
CSU2RDF      Convert comma delimited file to RDF file (via template)
TAB2RDF      Convert tab delimited file to RDF file (via template)
SQL2RDF      Run SQL, export result to RDF file (via template)
TEMPLATES    Display list of possible templates to use
CSU2STATS    Display statistics for comma delimited file
RDF2STATS    Display statistics for RDF file
EXIT         Exit the application

STELLAR.Console>
```

## STELLAR.Console

## STELLAR.Web

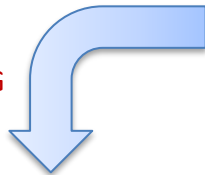
# Data conversions





# User defined templates

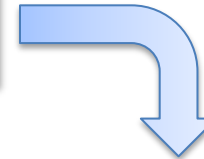
CSV2STG



isbn,title,author  
1234567890, Winnie the Pooh, A.A. Milne  
2345678901, Alice in Wonderland, Lewis Carrol  
3456789012, The Cat in the Hat, Dr. Seuss

Delimited (CSV) data file

CSV2STG



```
group books_to_html;  
  
HEADER() ::= <<  
  <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">  
  <html>  
  <head>  
    <title>List of books</title>  
  </head>  
  <body>  
  
>>  
  
FOOTER() ::= "</body></html>"  
  
MAIN(data) ::= <<  
  $HEADER()$  
  
  <h1>List of books:</h1>  
  <table border=1>  
    $data:{ record |  
      <tr>  
        <td>$record.isbn$</td>  
        <td>$record.title$</td>  
        <td>$record.author$</td>  
      </tr>  
    }$  
  </table>  
  
  $FOOTER()$  
>>
```

Template  
to convert  
the data  
to HTML

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">  
<html>  
<head>  
  <title>List of books</title>  
</head>  
<body>  
  
  <h1>List of books:</h1>  
  <table border=1>  
  
    <tr>  
      <td>1234567890</td>  
      <td>Winnie the Pooh</td>  
      <td>A.A. Milne</td>  
    </tr>  
  
    <tr>  
      <td>2345678901</td>  
      <td>Alice in Wonderland</td>  
      <td>Lewis Carrol</td>  
    </tr>  
  
    <tr>  
      <td>3456789012</td>  
      <td>The Cat in the Hat</td>  
      <td>Dr. Seuss</td>  
    </tr>  
  
  </table>  
  
</body></html>
```

## List of books:

1234567890	Winnie the Pooh	A.A. Milne
2345678901	Alice in Wonderland	Lewis Carrol
3456789012	The Cat in the Hat	Dr. Seuss

```
group books_to_rdf;  
  
HEADER() ::= <<  
  <?xml version="1.0" encoding="UTF-8"?>  
  
  <rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#" xmlns:xsd="http://www.w3.org/2001/XMLSchema#" xmlns:dc="http://purl.org/dc/elements/1.1/">  
  
>>  
  
FOOTER() ::= "</rdf:RDF>"  
  
MAIN(data) ::= <<  
  $HEADER()$  
  
  $data:{ record |  
    <rdf:Description rdf:about="http://tmp/$record.isbn$">  
      <dc:identifier>ISBN $record.isbn$</dc:identifier>  
      <dc:title>$record.title$</dc:title>  
      <dc:creator>$record.author$</dc:creator>  
      <dc:format>Book</dc:format>  
    </rdf:Description>  
  }$  
  
  $FOOTER()$  
>>
```

Template  
to convert  
the data  
to RDF

```
<?xml version="1.0" encoding="UTF-8"?>  
  
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#" xmlns:xsd="http://www.w3.org/2001/XMLSchema#" xmlns:dc="http://purl.org/dc/elements/1.1/">  
  
  <rdf:Description rdf:about="http://tmp/1234567890">  
    <dc:identifier>ISBN 1234567890</dc:identifier>  
    <dc:title>Winnie the Pooh</dc:title>  
    <dc:creator>A.A. Milne</dc:creator>  
    <dc:format>Book</dc:format>  
  </rdf:Description>  
  
  <rdf:Description rdf:about="http://tmp/2345678901">  
    <dc:identifier>ISBN 2345678901</dc:identifier>  
    <dc:title>Alice in Wonderland</dc:title>  
    <dc:creator>Lewis Carrol</dc:creator>  
    <dc:format>Book</dc:format>  
  </rdf:Description>  
  
  <rdf:Description rdf:about="http://tmp/3456789012">  
    <dc:identifier>ISBN 3456789012</dc:identifier>  
    <dc:title>The Cat in the Hat</dc:title>  
    <dc:creator>Dr. Seuss</dc:creator>  
    <dc:format>Book</dc:format>  
  </rdf:Description>  
  
</rdf:RDF>
```



## Using the RDF data

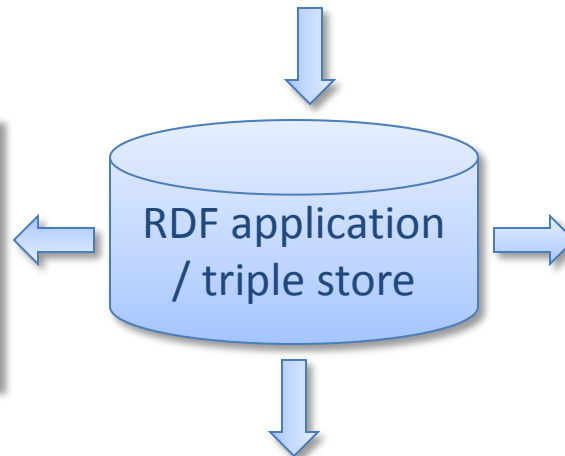
```
<crmeh:EHE0007_Context rdf:about="http://stellar/silchester/EHE0007_1017">
  <rdfschema:label>1017</rdfschema:label>
  <ns:P87_is_identified_by>
    <crmeh:EHE0061_ContextUID rdf:about="http://stellar/silchester/EHE0061_1017">
      <rdf:value>1017</rdf:value>
      <ns:P87i_identifies rdf:resource="http://stellar/silchester/EHE0007_1017" />
    </crmeh:EHE0061_ContextUID>
  </ns:P87_is_identified_by>
  <ns:P7i_witnessed rdf:resource="http://stellar/silchester/EHE1001_1017" />
</crmeh:EHE0007_Context>
<crmeh:EHE1001_ContextEvent rdf:about="http://stellar/silchester/EHE1001_1017">
  <ns:P7_took_place_at rdf:resource="http://stellar/silchester/EHE0007_1017" />
  <ns:P120i_occurs_after rdf:resource="http://stellar/silchester/EHE1001_1015" />
  <ns:P120i_occurs_after rdf:resource="http://stellar/silchester/EHE1001_1302" />
</crmeh:EHE1001_ContextEvent>
```

## RDF data output from STELLAR

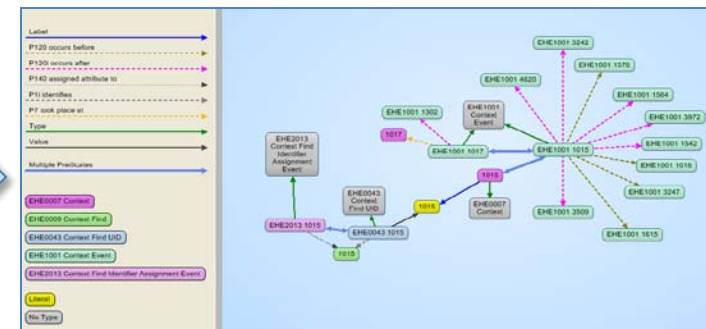
```
PREFIX ecrm: <http://erlangen-crm.org/101001/>
PREFIX crmeh: <http://purl.org/crmeh#>

SELECT DISTINCT ?g
WHERE
{
  ?f a crmeh:EHE0009_ContextFind;
    ecrm:P45_consists_of [rdfs:label 'Animal Bone'];
    ecrm:P53_has_former_or_current_location ?c .
  ?c a crmeh:EHE0007_Context;
    ecrm:P89_falls_within ?g .
  ?g a crmeh:EHE0005_Group .
}
LIMIT 5
```

## SPARQL queries



## Linked data browsers



## RDF enabled applications

# Machine readable vs machine understandable



## What we say to the machine:

<h1>The Cat in the Hat</h1>

<ul>

<li>ISBN: 0007158440</li>

<li>Author: Dr. Seuss</li>

<li>Publisher: Collins</li>

</ul>

## What the machine understands:

<h1>ασδ πλυ βγ ιτη μψσ</h1>

<ul>

<li>φωφρ: 0007158440</li>

<li>τυψροκ: Δρ. Σευσσ</li>

<li>Πυβλισηερ: Χολλινσ</li>

</ul>

## (more) machine understandable



### What we say to the machine:

<h1>Title: The Cat in the Hat</h1>

<ul>

<li>ISBN: 0007158440</li>

<li>Author: Dr. Seuss</li>

<li>Publisher: Collins</li>

</ul>

### What the machine understands:

<h1>ασδ πλυ βγ ιτη μψσ</h1>

<ul>

<li>φωφρ: 0007158440</li>

<li>τυψροκ: Δρ. Σευσσ</li>

<li>Πυβλισηερ: Χολλινσ</li>

</ul>

# (getting more) machine understandable



What we say to the machine:

<h1>Title: The Cat in the Hat</h1>

<ul>

<li>ISBN: 0007158440</li>

<li>Author: Dr. Seuss</li>

<li>Publisher: Collins</li>

</ul>

What the machine understands:

<h1>ασδ πλν βγ ιτη μψσ</h1>

<ul>

<li>φωφρ: 0007158440</li>

<li>ψυψροκ: Δρ. Σευσσ</li>

<li>Πυβλισηερ: Χολλινσ</li>

</ul>

Book

ID



Author

Publisher

metadata

structure

(ontology)



# (getting more) machine understandable



What we say to the machine:

<h1>**Title:**The Cat in the Hat</h1>

<ul>

<li>**ISBN:** 0007158440</li>

<li>**Author:** Dr. Seuss</li>

<li>**Publisher:** Collins</li>

</ul>

**Theodor  
Geisel**

What the machine understands:

<h1>ασδ πλυ βγ ιτη μψ</h1>

<ul>

<li>φωφρ: 0007158440</li>

<li>ψυψροκ: Δρ. Σευσσ</li>

<li>Πυβλισηερ: Χολλινσ</li>

</ul>

Book

ID



Author

Publisher

metadata

structure

(ontology)

vocabularies for  
terminology and  
knowledge  
organization

# (getting more) machine understandable

## Complementary use?



What we say to the machine:

<h1>Title: The Cat in the Hat</h1>

<ul>

<li>ISBN: 0007158440</li>

<li>Author: Dr. Seuss</li>

<li>Publisher: Collins</li>

</ul>

What the machine understands:

<h1>ασδ πλυ βγ ιτη μψ</h1>

<ul>

<li>φωφρ: 0007158440</li>

<li>ψυψροκ: Δρ. Σευσσ</li>

<li>Πυβλισηερ: Χολλινσ</li>

</ul>

Book ID  
Author Publisher

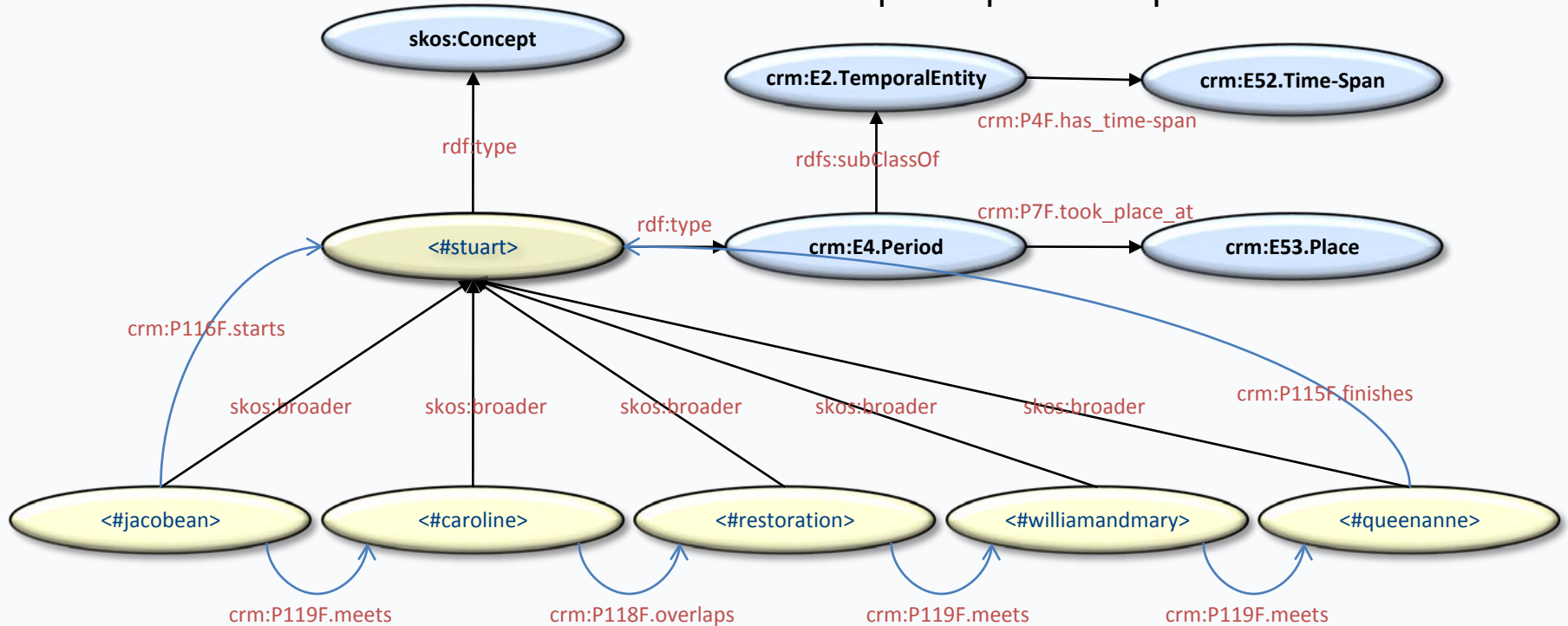
metadata  
element sets

(ontology)

Value  
vocabularies  
(KOS)

# Combining SKOS Concepts + CRM Classes

Time period concepts have  
implicit spatio-temporal context



# Complementary use?

search - Mozilla Firefox

File Edit View History Bookmarks Tools Help

search +

http://eculture.cs.vu.nl/europeana/session/search?query=berlin&type=http%3A%2F%2Fculture.multimedien.nl%2Fns%2F...

login | help | feedback | admin | English

**metadata element sets (ontology)**

**Value vocabularies (KOS)**

keyword:berlin artefact

▼ works created by matching person (10)

Amphore à col à figu...  
Peintre de Berlin

Stamnos à figures ro...  
Peintre de Berlin

Amphore à figures ro...  
Peintre de Berlin

Amphore à col à figu...  
Peintre de Berlin

Cratère en cal...  
Peintre de B

▼ works showing Resource (6)

Gevel met ramen van ...  
Fastenaekens, Gilbert

Kriegsmarine  
Anonymous

Leden van de FDJ, de...  
ADN-Zentralbild

Erich Honecker  
ADN-Zentralbild

Herdenking aan gesne...  
ADN-Zentralbild

▼ works related to Resource (23)

humboldt

artefact

portret Alex von Humboldt  
carte-de-visite Linde, E.

concept view all 7 results

Humboldt  
philologist

Humboldt  
natural scientist

Humboldt current  
ocean current

location

Humboldt (Canada)

person

Humboldt

Humboldt, Alexander von  
German draftsman 1769 1859

Humboldt, Friedrich Wilhelm Hein...  
1769 1859



# Complementary use?

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Hein...  
1769 1859

Cratère en cal  
Peintre de B

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Kriegsmarine

Leden van de FDJ, de...  
ADN-Zentralbild

Erich Honecker  
ADN-Zentralbild

works created by matching person (10)

works showing Resource (6)

works related to Resource (23)

via

Upper ontology explicitly linked  
to reengineered thesauri?

Lot of work to 'clean' structure?

or

Leaf node mapping?

Does that help logical reasoning?

or (STAR/EDM)

Connected via instance attributes?

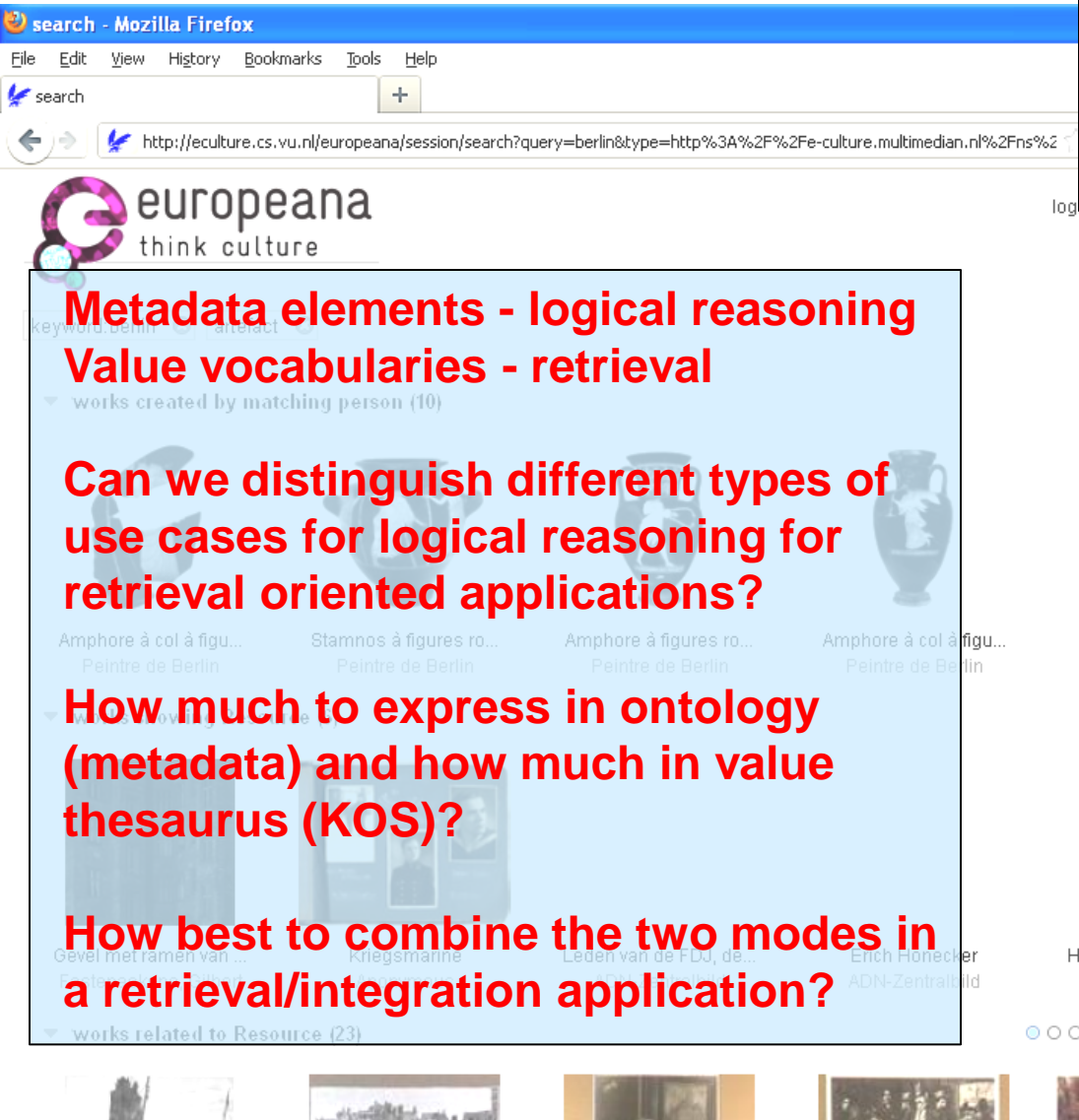
metadata  
element sets  
(ontology)

Value vocabularies  
(KOS)

# Complementary use?

**metadata  
element sets  
(ontology)**

**Value vocabularies  
(KOS)**



The screenshot shows the Europeana search results for the query 'berlin'. The page displays various search results, including 'Amphore à col à figu...', 'Stamnos à figures ro...', 'Peintre de Berlin', 'Cratère en cal...', 'Herdening aan gesne...', and 'ADN-Zentralbild'. The page is titled 'europeana think culture' and includes a search bar and navigation links.

humboldt

artefact

portret Alex von Humboldt  
carte-de-visite Linde, E.

concept view all 7 results

Humboldt  
philologist

Humboldt  
natural scientist

Humboldt current  
ocean current

location

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person

Humboldt

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German draftsman 1769 1859

Humboldt, Friedrich Wilhelm  
Hein...  
1769 1859

**Metadata elements - logical reasoning**  
**Value vocabularies - retrieval**

**Can we distinguish different types of  
use cases for logical reasoning for  
retrieval oriented applications?**

**How much to express in ontology  
(metadata) and how much in value  
thesaurus (KOS)?**

**How best to combine the two modes in  
a retrieval/integration application?**

# Contact Information

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<http://hypermedia.research.glam.ac.uk/kos/STAR/>

<http://hypermedia.research.glam.ac.uk/kos/STELLAR/>

<http://data.archaeologydataservice.ac.uk>