

Semantic Web Modelling: Challenges and Opportunities in Small and Large Museum Collections

Dr Andreas Vlachidis – UCL Department of Information Studies a.vlachidis@ucl.ac.uk



CrossCult – Identity Card

Empowering reuse of digital cultural heritage in context-aware crosscuts of European history

Large venue National Gallery London Semantic reasoning & Routing optimization Thematically similar venues **Call**: EU H2020 Aquae Patavinae, Lucus Augusti, Aquae **Topic**: REFLECTIVE-6-2015 Flaviae, Epidaurus Social networks & Gaming **Type of Action**: Innovation Action ROSS Timeline: 36 months, March 2016 -1LT Small low-visibility venue February 2019 Archaeological Museum of Tripoli Budget (EU Contribution):€3,503,358.25 • Content enrichment & Storytelling 11 core, 14 associate partners Multiple cities • Luxembourg, Valletta Location-based services & Crowdsourcing

Archaeological Museum of Tripolis (Greece)

Personalising Associations

Pilot 3: Non-typical itineraries through museum items



Pilot Case



Facilitate interconnections (Objects, Viewpoints, Venues) Interactivity Recollection Reflection



Non-typical viewings

Crosscutting and transversal

Beyond the typical presentation

Deeper levels of reflection,

• social aspects / power structures.

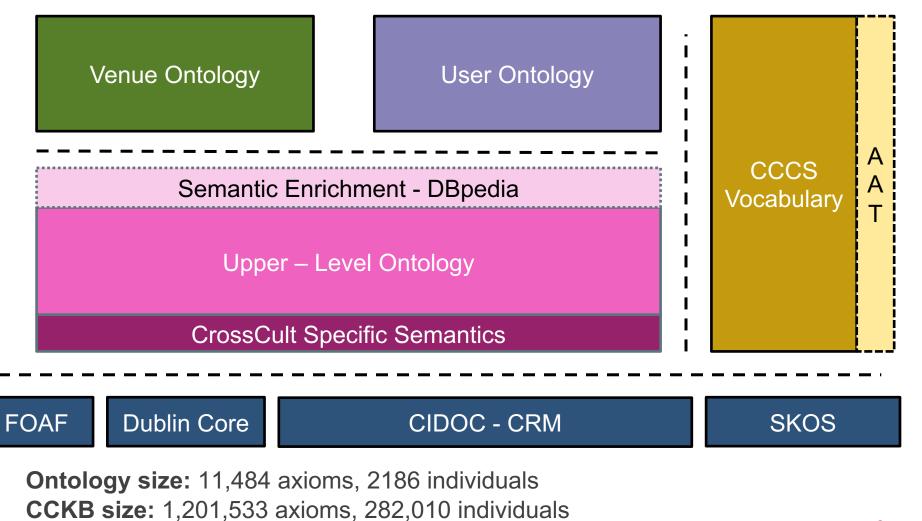


The Crosscult Knowledge Base

- A semantic knowledge base capable of interrelating a wide set of (existing and future) disparate digital cultural heritage resources
 - Repository for storage
 - Management and retrieval of semantic information.
 - Common Layer for Cultural Heritage Concepts and their relationships,
 - Facilitate interoperability and linking with Linked Data resources
 - Building on standard Semantic Web technologies



The CrossCult Knowledge Base



From Unstructured Data to Structured Data

Example Item Description

2279: Marble pediment tombstone with a representation of a family (enface). The female figure bears a chiton and a cloak. The male figure and the boy bear a short chiton. On the architrave there is the inscription ANTIOXIC ϕ OPTOYNATOY Θ YFATHP KA $\Lambda\Lambda$ I Σ TH.

Found in Herod Atticus villa in Loukou, Kynouria. Roman era work (middle Antonine era, 161 A.D - 180 A.D.).

Dimensions: Height 1.60m, Width 0.82m. Location: Room 15, 1st floor.





Mapping to CIDOC-CRM

- Item "2279" \rightarrow E22.Human-made Object
 - P1_is_identified_by \rightarrow E42.Identifier "2979"
 - P2_has_type \rightarrow E55.Type "Tombstone"
 - P3_has_note "the original textual description"
 - P43_has_dimension \rightarrow E54.Dimension "height 1.60m" and "width 0.82m"
 - P45_consists_of \rightarrow E55.Type "Marble"
 - P50_has_current_keeper → E40.Legal Body "The Archaeological Museum of Tripoli"
 - P55.has_current_location \rightarrow E53 Place "Room 15"
 - P102.has_title \rightarrow "Antiohis pediment tombstone"
 - P138i.has_represenation \rightarrow E38.Image "antiohis.jpg".
 - reflects \rightarrow CCRT "Worship"



The Semantics of Reflective Topic

Reflective Topic

- Create a network of points of view,
- Aid reflection and prospective interpretation over a topic,
- Enable interconnection between physical or conceptual things

is reflected by

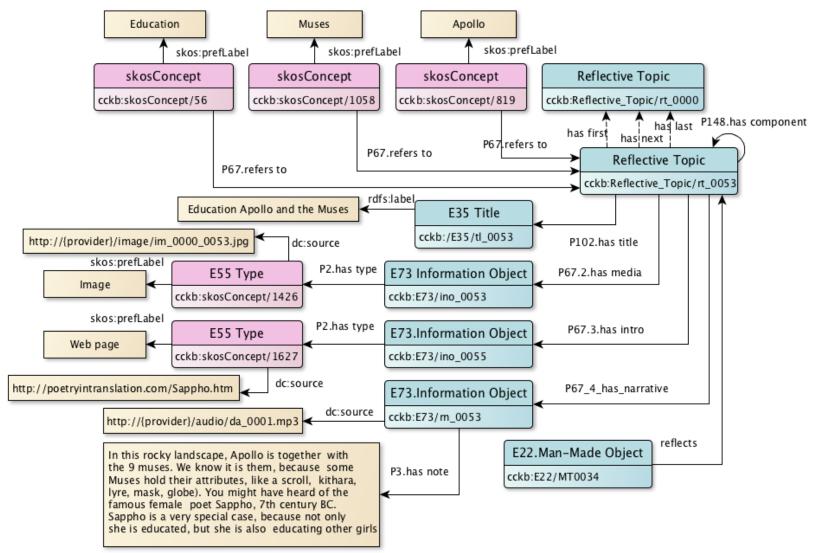
- any physical object or immaterial thing,
- accommodate a true paradigm of reflection a proposition

experienced as

• a composition or sequence of narrower Reflective Topics



The Semantics of Reflective Topic

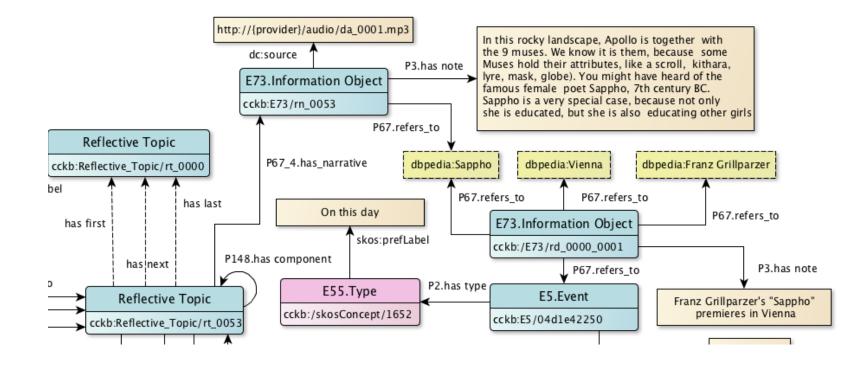




Semantic Enrichment

- Trigger reflection through enrichment
- Enriched a selected set of ontology individuals with links to standard and well-known Semantic Web resources such as
 - DBpedia
 - Getty AAT
- using appropriate properties from
 - OWL (owl:sameAs)
 - SKOS (skos:closeMatch)
- using Named Entity Linking
 - manually (by experts)
 - automatically (with DBpedia Spotlight)

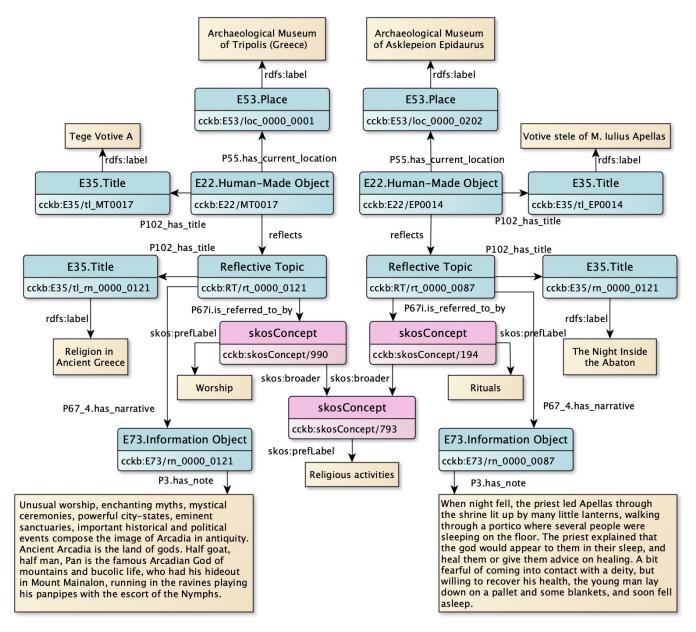
Example





Search Scenario

- Related narratives of artefacts across museums
 - find more items that reflect topics relating to worship, which might be located else where
- Results
 - semantically expanding on the topic through its broader concept "Religious Activities", the query retrieves the item EP0014, which is located in the Archaeological Museum of Asklepeion in Epidaurus





Small Museums Challenges and Hindrances

Non-existent digital presence

Slow technology acceptance

Bureaucracy associated with decision-making

Geographical location

Low numbers of physical visitors

Lack of budget

Limited human resources



The Sloane LAB

Sloane an **exemplary case study** to unite surviving objects (current digital collections) and records across the NHM, BM and BL from the original catalogues.

Reunify and Extend digital collection Searchable and amenable to further analysis and interpretation





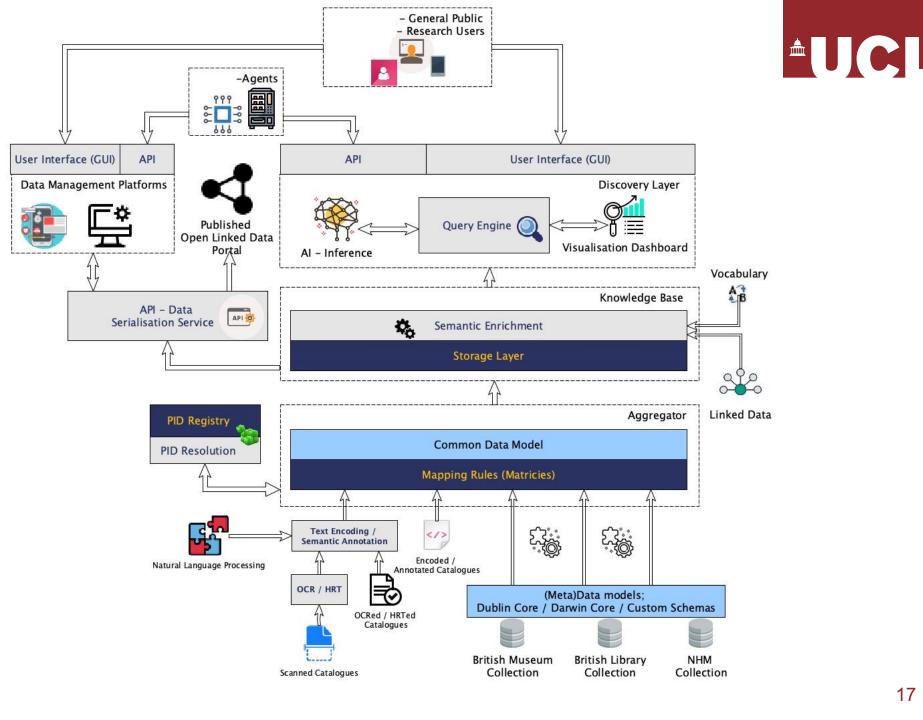












Sloane Lab Data Atlas

Charting all data available for Sir Hans Sloane and his collections

Insects vol 1	\rightarrow	Insects vol 1		Not transcribed
Insects vol 2	\rightarrow	Insects vol 2		Not transcribed
Minerals vol 1	\rightarrow	Minerals vol 1		Not transcribed
Minerals vol 2	\rightarrow	Minerals vol 2		Not transcribed
Minerals vol 3a	\rightarrow	Minerals vol 3a		Not transcribed
Minerals vol 3b	\rightarrow	Minerals vol 3b		Not transcribed
Minerals vol 4	\rightarrow	Minerals vol 4		Not transcribed
Echinoderms	→	Echinoderms		Not transcribed
Supplement	÷	Supplement		Not transcribed
Catalogus marmorum	÷	Catalogus marmorum		Not transcribed
Collection of Vegetables 1-3000	÷	Collection of Vegetables 1-3000	\rightarrow	Collection of Vegetables 1-3000
Collection of Vegetables 3001-6000	÷	Collection of Vegetables 3001-6000	÷	Collection of Vegetables 3001-60
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John Ray, Historia Plantarum Vol II (HS copy) John Ray, Historia Plantarum Vol III (HS copy)	\rightarrow	John Ray, Historia Plantarum Vol II John Ray, Historia Plantarum Vol III	\rightarrow \rightarrow	John Ray, Historia Plantarum Vol
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Collection Guides - Print		Collection Guides - Scanned		
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History) Historical Series Vol I, 1953-1959		Vol I, 1953-1959		
V. Pickering, Putting nature in a box: Hans		V. Pickering, Putting nature in a box: Hans Sloane's		
Sloane's Vegetable Substances collection,	\rightarrow	Vegetable Substances collection, unpublished		
unpublished thesis 2017		thesis 2017		
Sloane Herbarium bound volumes	\rightarrow	Sloane Herbarium bound volumes		
Folios		Folios - Scanned? and/or Catalogued?		
Sloane volume: folio and specimen level cat	\rightarrow	Sloane volume: folio and specimen level catalog		
Algae, Fungi and Plants		Algae, Fungi and Plants - DOI-registered collect		
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Sloane herbarium: Mark Catesby material	\rightarrow	Sloane herbarium: Mark Catesby material		
Sloane herbarium: Engelbert Kaempfer material	\rightarrow	Sloane herbarium: Engelbert Kaempfer material		
Vegetable Substances	\rightarrow	Vegetable Substances		
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Plukenet bound volume				
Petiver insect collection				
Sloane specimens (in boxes on shelves)				
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Sloane MS 3972 D		not digitised?	1	
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Sloane)	~			
Books and Manuscripts collected by Sloane		Books and Manuscripts - Catalogued		Books and Manuscripts - Scanned
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Sloane Letters MSS 4075-4078		Some letters digitised 3	1	

Royal Society

Draft Minutes - Manuscripts		Draft Minutes - Fully Digitised
Meetings of the Royal Society, 1686-1691	\rightarrow	Meetings of the Royal Society, 1686-1691
Meetings of the Royal Society, 1693-1698	\rightarrow	Meetings of the Royal Society, 1693-1698
Meetings of the Royal Society, 1699-1702	\rightarrow	Meetings of the Royal Society, 1699-1702
Meetings of the Royal Society, 1702-1707	\rightarrow	Meetings of the Royal Society, 1702-1707
Meetings of the Royal Society, 1707-1711	\rightarrow	Meetings of the Royal Society, 1707-1711

Credit: Dr Foteini Valeonti

Sloane's Manuscript Catalogues Today

Natural History Museum

Sloane Manuscript Catalogues		Manuscript Catalogues - Digitised		Manuscript Catalogues - Transcriptions
Fossils vol 1	\rightarrow	Fossils vol 1 1	\rightarrow	Fossils vol 1 ¹
Fossils vol 2	\rightarrow	Fossils vol 2		
Fossils vol 3	\rightarrow	Fossils vol 3		
Fossils vol 4	\rightarrow	Fossils vol 4		
Fossils vol 5	\rightarrow	Fossils vol 5 ²	\rightarrow	Fossils vol 5 ²
Fossils vol 6	\rightarrow	Fossils vol 6		



Colour index Colour-coding is only applicable to cells relating to data sources Digital - Available digitally and available publicly

Digital - Available digitally but within the institution

- Digital In the process of becoming available
- Tangible artefact
- Permanently destroyed

Enlightenment Architectures

Manuscript Catalogues - Fully Digitised (TEI)

⁷ Digital edition of MS 3972C Vol VI, Sloane's catalogue of books and printed ephemera ⁸ Digital edition of Sloane MS 3972B of folios listing manuscript material removed from a ⁹ Digital edition of Sir Hans Sloane's Catalogues of Miscellanies, Antiquities, Seals, Picture ¹⁰ Digital edition of Sir Hans Sloane's Catalogue of Fossils including Coralls, Serpents, Ech Digital edition of Sir Hans Sloane's Catalogue of Fossils including Fishes.

Sloane Letters

Digitised Letters written to and from Sloane	
12 5,320 Searchable Letters	

Footnotes for multiple instances

- 1 Also available in Enlightenment Architectures as "Digital edition of Sir Hans Sloane's Cata 2 Also available in Enlightenment Architectures as "Digital edition of Sir Hans Sloane's Cata
- 3 Available in Sloane Letters as "5,320 Searchable Letters"
- 4 Also available in Enlightenment Architectures as "Digital edition of Sloane MS 3972B of fe 5 Also available in Enlightenment Architectures as "Digital edition of MS 3972C Vol VI, Sloa
- 6 Also available in Enlightenment Architectures as "Digital edition of Sir Hans Sloane's Cata
- 7 Also available in British Library as "Sloane MS 3972 C VI"
- 8 Also available in British Library as "Sloane MS 3972 B" 9 Also available in British Museum as "Miscellanea vol"
- 10 Also available in Natural History Museum as Fossils vol 1
- 11 Also available in Natural History Museum as Fossils vol 5
- 12 Available in British Library as "Sloane Correspondence"

UCL

Sloane Manuscript Catalogues

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Sloane Manuscript Catalogues
Fossils vol 1
Fossils vol 2
Fossils vol 3
Fossils vol 4
Fossils vol 5
Fossils vol 6
Insects vol 1
Insects vol 2
Minerals vol 1
Minerals vol 2
Minerals vol 3a
Minerals vol 3b
Minerals vol 4
Echinoderms
Supplement
Catalogus marmorum
Collection of Vegetables 1-3000
Collection of Vegetables 3001-6000
Collection of Vegetables 6001-12523
Collection of Vegetables Index [part 1]
John Ray, Historia Plantarum Vol I (HS copy)
John Ray, Historia Plantarum Vol II (HS copy)
John Ray, Historia Plantarum Vol III (HS copy)

Manuscript Catalog	gues - Digitised
Fossils vol 1 ¹	
Fossils vol 2	
Fossils vol 3	
Fossils vol 4	
Fossils vol 5 ²	
Fossils vol 6	
Insects vol 1	
Insects vol 2	
Minerals vol 1	
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lls relating to data sou	ol III

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- Digital Available digitally and available publicly
- Digital Available digitally but within the institution
- Digital In the process of becoming available

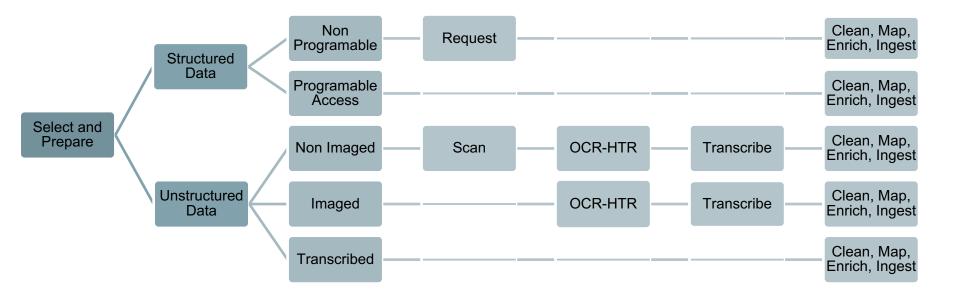
Tangible artefact

Permanently destroyed

Credit: Dr Foteini Valeonti



Towards Unification



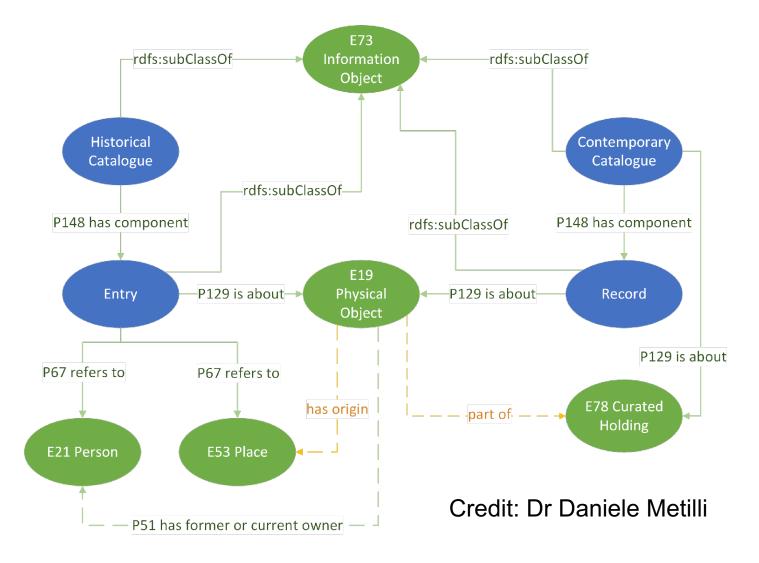


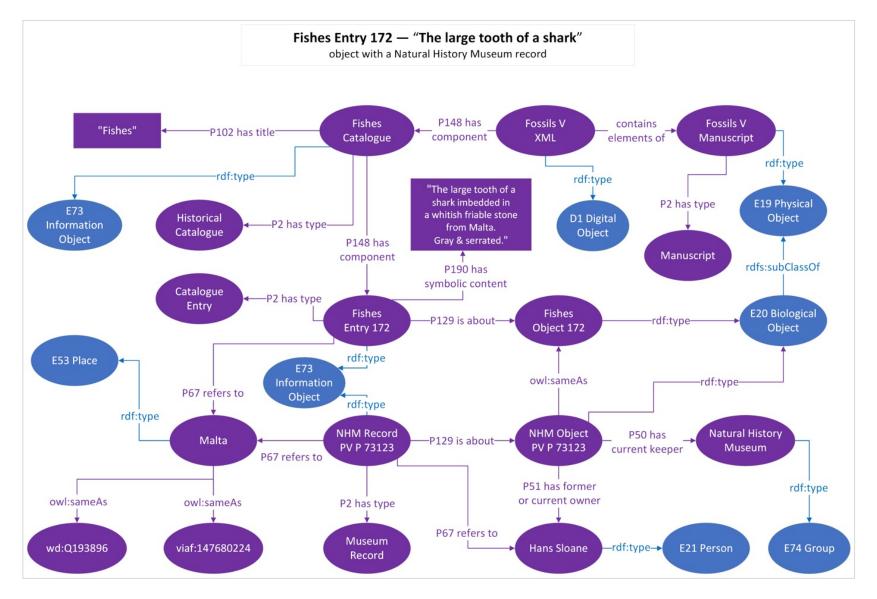
Data Model

- The data model allows us to represent the knowledge collected in the project
- Based on Semantic Web standards and built on top of the CIDOC CRM reference model
- Centred on the record instead of the object, to support multiple perspectives over the same object



Data Mode

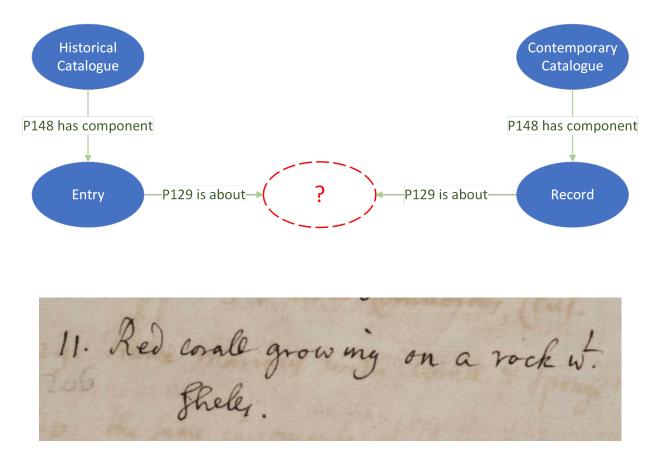






The Object Problem

- Often we cannot rely on objects to connect historical and contemporary catalogues
- Moreover, it is challenging to "identify the boundaries between 'object names' and their qualifying descriptions"



Credit: Dr Daniele Metilli



Challenges

- Aggregating records and integrating them into a single knowledge base
- Handling uncertainty in records
- Modelling inconsistencies among the records
- Identifying data absences and attempting to remedy them

-1100. A large reed pipe from the great Mogols country from

M^r. Dupuys.

b√245.

smoking-pipe

Object Type

<u>smoking-pipe</u>

Museum number

As,SLMisc.1100

Description

Bamboo smoking pipe with hole drilled in centre, through only one side. Bands of incised geometric patterns mainly to each end, but also a floral design to one side of the drilled hole.

Production date

18thC

Production place

Made in: <u>India (pre-1947)</u> (?) Asia: South Asia: India (pre-1947)





Identifiers

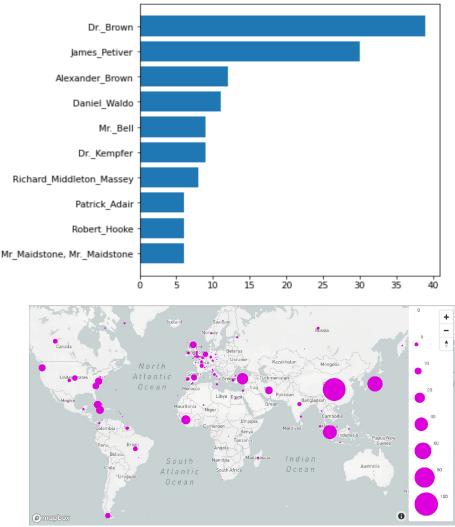
Multiple identifiers, Not persistent Not always unique

abacus		
Object Type abacus	ELECTION CONTRACTOR	
Museum number As,SLMisc.594	0	
Description		
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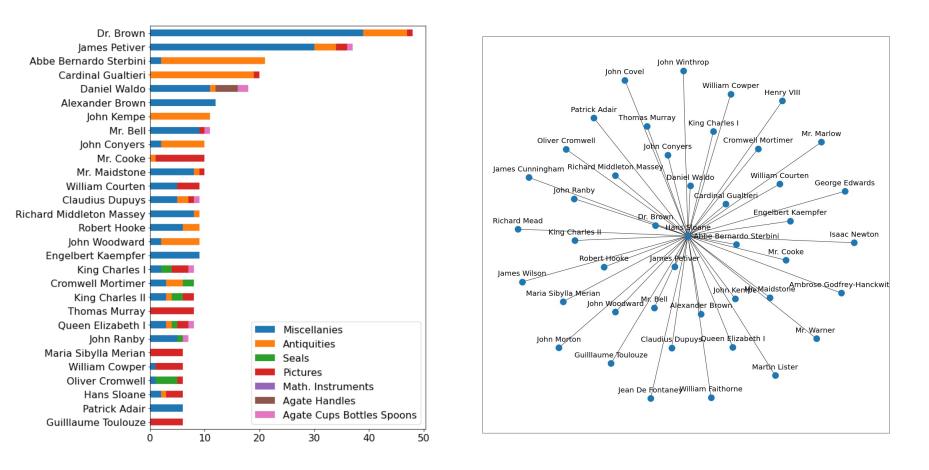
Opportunities – People and Places

- If we successfully identify the people and places, we can map their distribution in the catalogues
- We can also try to reconstruct Sloane's social network
- Then we can use computational methods to analyse the data



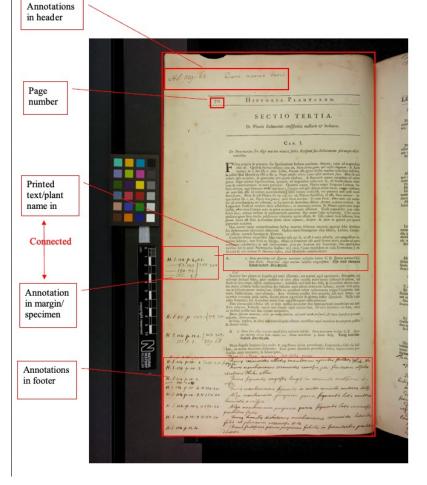


Network Analysis



Credit: Dr Daniele Metilli

Data Mobilisation



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Credit: Dr Jawad Sadek



Challenges

Mix Latin and Gothic scripts:

Latin Script Accuracy > 90%, Gothic Script ≈ 75% up to 85% when combined with Transcribus

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Hand-written numbers:

Accuracy ≈ 75 % - Required 100%

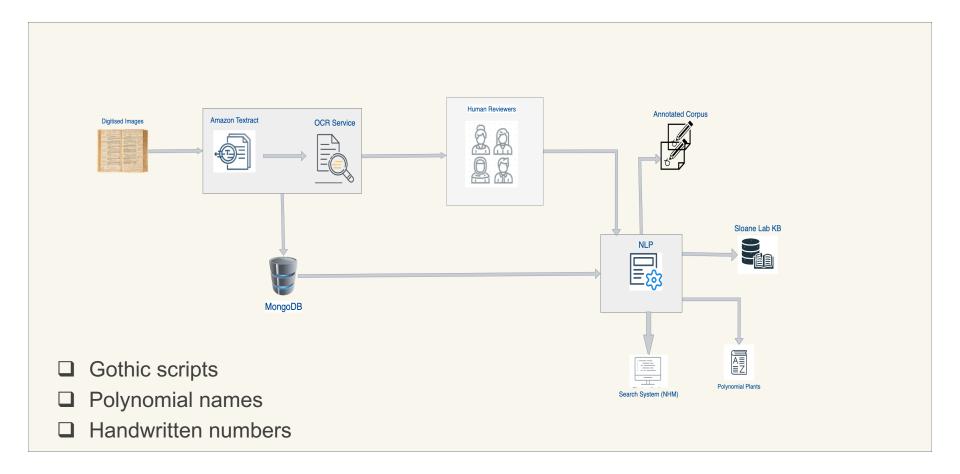
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Credit: Dr Jawad Sadek



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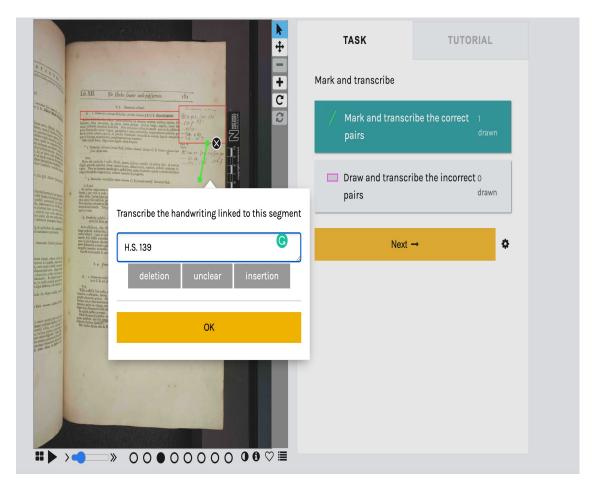




Zooniverse – Human Transcription

Trained Human reviewers will transcribe hand-written numbers on left/right margins

Produce accurate references to Herbarium





Conclusions

The Promise

- Foster Connection and Contextualisation
- Define Concepts and Facilitate Multifaceted Retrieval
- Harmonised View, Reasoning, Recommendation
- Understand Perceptions, Recollections, Viewpoints

The Complexity

- Data integration and knowledge reuse
- Level of Digitization
- Institutional Legacies and Curational Practice
- Policies and Copyrights

The Absence

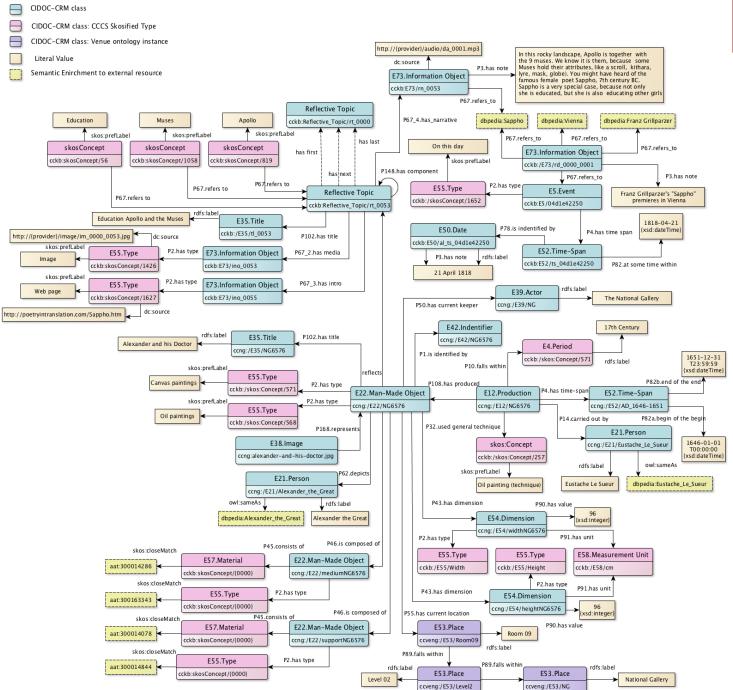
• When we attend to the who, what and how of data it is likely that we will also need to attend to the who-not, what-not and how-not, or absences of that data (Prof Julianne Nyhan)



Semantic Web Modelling: Challenges and Opportunities in Small and Large Museum Collections

Dr Andreas Vlachidis – UCL Department of Information Studies a.vlachidis@ucl.ac.uk

CrossCult Upper-level Ontology





Evaluation

- Conducted in two rounds between March and July 2018
 - 4 Humanities Experts
 - 81 other users
 - non-expert users from among students of diverse degrees in the University of Vigo in Spain and the Arab Academy in Egypt.
- The Evaluation Task
 - tag precomputed associations for three (synthetic) personae
 - experts received a total of 136 associations
 - Non- experts (potential visitors) received 323 associations

Association

Due to your interest in Women and Mythology, let us tell you about an event that happened exactly 104 years ago:



10 March – 1914: Suffragettes in London damage Rokeby's painting Venus of Velasquez

Local exhibit

This date, linked to **Venus**, takes us to this item from our collection:



Marble tombstone with a representation of a woman and a young athlete (mother and The female son). figure bears a reaching to the feet sleeved chiton and a cloak covering her head and the lower part of her body. The young man is represented nude, in an enface position and holding a strigil in his right hand. The heads of the figures are broken. Originated from Mantinea and dated in the end of the 5th century B.C.

Height: 0.95m Width: 0.47m Location: Room 15, 1st floor.

Reflective narrative

On 10 March 1914, the suffragette Mary Richardson walked into the National Gallery and attacked Velázquez's canvas with a meat cleaver and left 7 slashes on the painting, the most notable between the figure's shoulders. The incident has come to symbolize a particular perception of feminist attitudes towards the female nude (and, in a sense, a stereotypical image of feminism as a whole).

Do you think the picture above does portray women in a disadvantageous position? Or is it liberating them? What about our marble statue, that depicts women in the opposite way, and that was also vandalized in the past?

Sample Association Description used in Evaluation