An Ontology for Multivocality: Embracing Diverse Perspectives in Machine-Readable Form

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In today's interconnected and diverse world, understanding and accommodating multiple perspectives, viewpoints, and languages is crucial. Multivocality refers to the coexistence of multiple voices or perspectives within a given context. The field of semantic technologies provides a powerful framework for representing knowledge in a machine-readable format through ontologies, also known as data models. By developing an ontology focused on multivocality, we can embrace diverse perspectives and foster a more inclusive and comprehensive machine-readable understanding of the world.

A definition of multivocality

Multivocality involves recognizing and incorporating the existence of multiple voices, languages, and cultural perspectives within a particular domain. It acknowledges that different stakeholders or communities may have their own distinct terminologies, concepts, and interpretations. By considering these diverse perspectives, we can overcome biases, promote inclusivity, and avoid the imposition of a single dominant viewpoint.

Multivocality in the Sloane Collections

The Sloane Collections encompass a vast array of cultural artefacts, natural history specimens, and manuscripts gathered by Sir Hans Sloane during his lifetime. These collections originate from diverse regions, cultures, and time periods, representing the rich tapestry of human history and knowledge. Embracing multivocality allows us to acknowledge and appreciate the various perspectives, traditions, and narratives associated with these objects. As these items hold multiple interpretations, it is important to capture them to move beyond a single, flat interpretation imposed by a single disciplinary lens.

In particular, historical collections like the Sloane Collections often carry the baggage of colonial histories, where objects were acquired through imperialistic practices.

Embracing multivocality allows us to acknowledge and address these biases by incorporating the perspectives and voices of communities whose cultural heritage may be represented within the collections. This approach promotes decolonization efforts and contributes to more inclusive and equitable narratives.

By doing so, it is possible to encourage public engagement with the Sloane Collections by providing ways for diverse communities to contribute their knowledge, stories, and interpretations. By actively involving a broader range of voices, the collections become more accessible, relatable, and engaging to a wider audience. This approach promotes inclusivity, breaks down barriers, and fosters a sense of ownership and pride among various communities.

Research questions to address are:

1. What key aspects should be considered when designing an approach or framework that embraces multivocality within the cultural heritage domain?
2. How to simultaneously represent contrasting viewpoints and interpretations derived from an observation?
3. How to address and represent often invisible and unacknowledged contributors to the collection, both explicit and implicit ones?

Related work

The concept of multivocality has been explored in various disciplines, including sociology, anthropology, and information science. This section presents an overview of the key works that have contributed to the development of the Multivocality Ontology.

Multivocality has been a central theme in sociology and anthropology. Clifford and Marcus (1986), for example, in their seminal work “Writing Culture: The Poetics and Politics of Ethnography”, emphasised the importance of acknowledging multiple voices in ethnographic accounts. Drawing on Foucault’s work (1973), the book emphasises the fact that representations are social facts, therefore hold a particular cultural concern.

In the context of the Sloane collections, multivocality and its significance have been explored by various scholars and researchers. Delbourgo's book, “Collecting the World: Hans Sloane and the Origins of the British Museum” (2018), serves as a seminal work in the field of Sloane studies. Delbourgo delves into the multivocality of the Sloane collections, emphasising how Sloane's collecting practices were influenced by a variety of voices, ranging from naturalists and explorers to indigenous peoples and enslaved individuals. By examining Sloane's collection as a product of diverse voices and cultural

encounters, Delbourgo highlights the multivocal nature of the Sloane collections and their significance in the formation of the British Museum.

Ortolja-Baird and Nyhan (2022) examine the subjectivities that shape data collection and management, with a specific focus on digitization projects and digital archives in galleries, libraries, archives, and museums (GLAM institutions). The authors conceptualise the absence of non-hegemonic individuals from the catalogues of Sloane as an instance of textual haunting, raising questions about the extent to which data-driven approaches further entrench archival absences and silences. It is argued digital tools are crucial in highlighting or recovering absent data.

Multivocality has also been explored in the context of information retrieval and knowledge representation. Hajibayova (2018) discussed the role of multivocality in enhancing the richness and diversity of information retrieval systems. Indeed, leveraging user insights has led to a significant transition, as previously, professionals in the field of knowledge organisation were deemed best placed to interpret and assign meaning to objects (Mai 2011). However, the emerging consensus leans towards enabling users to formulate their interpretations and representations of these objects themselves.

Mai (2011) further asserts that the reliability and authority of a system used for representation and organisation stem from the consensus among users about the best ways to depict a specific object. Therefore, the system's validation is rooted in the users' understanding of the object. In this sense, the users' interpretation of objects is grounded in what Bakhtin (1986) described as "dialogical contact": interactions with other objects or contexts, enriching the representation of the objects by integrating a spectrum of viewpoints into the representation of cultural expressions.

It is in this direction that Daquino et al. (2014) propose an ontology for describing the historical context of cultural heritage objects, allowing to represent and reason on reliability of argumentations around attributions by evaluating features such as motivations, types of cited sources or criteria, dates, relations with other claims (e.g. agreement/disagreement).

The multivocality ontology can also find practical applications in the "perspective web" (Vossen and Fokkens 2022). In the chapter written by Gangemi and Presutti (2022), the authors show a way to make the contextuality and fuzziness of statements explicit by modelling information objects and their possible representations. A natural use case for the project are thus nanopublications, as they facilitate transparent and focused information integration in how scientists conceptualise and communicate findings, with the aim of fostering trustworthy and interdisciplinary connections.

CRMinf[1] is a formal ontology intended to be used as a global schema for integrating metadata about argumentation and inference making in descriptive and empirical sciences. By integrating with *The Scientific Observation Model (CRMsci)*[2], the framework is intended to be used as a global schema for integrating metadata about scientific observation, measurements and processed data. The aim is having a comprehensive account on the management, integration, mediation, interchange and access to research data and reasoning activities by description of semantic relationships.

Together, these works and ontologies contribute to our understanding of multivocality, its application in different domains, and the importance of considering diverse voices, subjectivities, and absences in the representation and management of historical data, cultural heritage objects, and digital datasets.

Designing the Multivocality Ontology

Aims and objectives

The overarching aim of this research is to develop an ontology for multivocality that can capture and represent diverse perspectives in a machine-readable format. This ontology will be designed with a specific focus on the Sloane Collections, but with the potential for broader application in other domains[3]. The objectives of this research are to define and develop a multivocality ontology in the context of the Sloane collections, and provide the groundwork for future development in its evaluation and concrete implementation.

As for the methodology, it followed the eXtreme Design Methodology (XD), whose main principles are collaboration, integration, testing, and the extensive use of Content Patterns according to the selected use cases (Presutti et al., 2009). XD has been inspired by good practices typically adopted by the eXtreme Programming (XP) software development methodology, such as pair programming, and customer involvement, and is thus an iterative process (Figure 1).

[1] https://www.cidoc-crm.org/crminf/home-4.
[2] https://cidoc-crm.org/crmsci/home-1.
[3] Resources and documentation are available on Github, https://github.com/dersuchendee/SLCommunityFellowship.

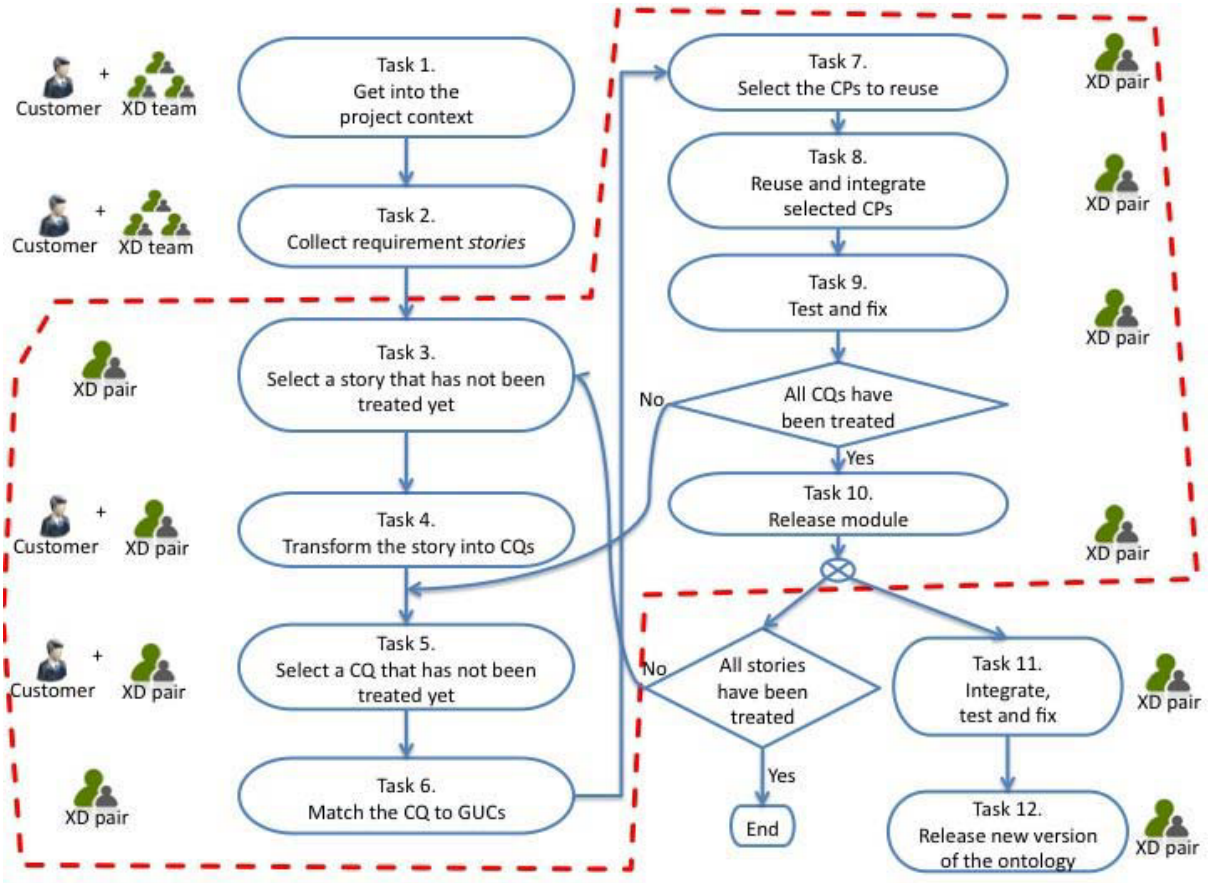

Figure 1: the XD iterative process (Presutti et al., 2009).

User requirements

Gaining a comprehensive understanding of users' needs and requirements is crucial in the development of successful systems and products, especially according to the XD methodology. The initial step in analysing users' requirements for this project involves gathering background information about possible target users and existing processes, to be confirmed in future developments through structured interviews. By employing this approach, an initial set of user stories[4] was formulated to establish an ontology that can effectively answer to specific user needs. This research primarily targets scholars who aim to access and/or enrich the different perspectives the Sloane Collection objects can be seen through, and interested people.

[4] https://github.com/dersuchendee/SLCommunityFellowship/tree/main/stories.

Ontology design

To create an ontology that captures multivocality, we must consider several key aspects:

1. Multiple Lexicons: The ontology should account for various possible terminologies, synonyms, and language variations associated with a given domain. By incorporating multiple lexicons, such as the controlled vocabularies used by the Sloane Data Atlas, we can facilitate communication across diverse communities and bridge the gaps caused by language differences.

2. Contextual Relationships: An ontology focused on multivocality should represent the contextual relationships between concepts and the different perspectives and agents associated with them. This allows for a nuanced understanding of how concepts are interpreted within specific cultural, linguistic, or disciplinary contexts.

3. Mapping and Alignment: Mapping and aligning concepts from different ontologies and vocabularies is essential to enable knowledge integration across diverse perspectives. This process involves identifying equivalent or similar concepts in different terminologies and creating relationships between them.

The conceptualisation of the ontology encompasses observations and arguments concerning specific topics, provided by different agents who may express agreement or disagreement with one another. These contributions serve as building blocks for formulating agents' research hypotheses. Additionally, the information objects within the model can include explicit or implicit contributors.

Validation of the conceptualisation using the CRM

The data model extends the *CRMinf* and *CRMsci* ontologies to incorporate the aforementioned aspects, specifically addressing multivocality within the Sloane Collections. During the analysis of related ontologies and patterns, and considering the requirement of aligning with the Sloane Lab data model, which builds upon *CRM*[5], *CRM* and its extensions were deemed the most suitable choice.

The classes that were most relevant to the ontology, in particular, were "Belief" and "Belief adoption", along with "Proposition Statement", and related object and data properties.

[5] https://www.cidoc-crm.org.

At the same time, the types of Proposition Statements were not specified, aside from the Provenance Statement, proving the need to specify additional types. Moreover, the current *CRMsci* model does not currently include the representation of agreement or disagreement on belief values[6]. Lastly, it should be noted that while argumentations can be influenced by agents, the concept of contribution is distinct. For instance, a person who influenced a book has played a significant role in shaping its ideas or themes, whereas a person who contributed to a book has made tangible contributions to its creation, such as collecting specimens for an herbarium or providing previously unavailable knowledge.

The Multivocality Ontology

Benefits and Applications

This ontology model offers several benefits and applications:

1. Cross-Cultural Collaboration: By embracing diverse perspectives and incorporating multiple vocabularies, the ontology promotes collaboration and understanding across different cultures, languages, and communities, and represents a comprehensive view on the history of artefacts.

2. Enhanced Data Integration: The ontology facilitates the integration of data from diverse sources, enabling interoperability and knowledge sharing between different systems and domains.

3. Customization: The ontology can be tailored to individual users' preferences or specific community needs, allowing for personalised information retrieval and user-driven knowledge organisation.

4. Research and Decision-Making: The ontology supports comprehensive research and informed decision-making, for example in choosing exhibitions items and themes, by capturing various viewpoints, reducing biases, and providing a broader understanding of complex issues.

Competency questions and use cases

The proposed ontology model addresses the following competency questions:

[6] About the need to integrate “disbelief” in the model as well, see this issue, .https://www.cidoc-crm.org/crminf/Issue/ID-510-belief-adoption.

1. How many proposition statements are there about an artefact?
2. What are all the belief values for a specific information entity?
3. Is there anyone who made an observation about someone else's belief value?
4. What are the types of statements made about an artefact that are common across information entities?
5. Who are the contributors that contributed to an information entity?

Use cases for the Sloane Collections can be the following:

1. Accounts for different interpretations of plant specimens;
2. Addressing contribution of both documented and invisible collectors of plant specimens;
3. Representing contrasting opinions about material, provenance, technique, function, attribution of an object within information records;
4. Representing uncertainty about the function of an object;
5. The mention, or lack thereof, of an agent within information records;
6. Addressing contribution of both documented and invisible local knowledge sharers.

The resulting ontology can be drawn as follows according to the Graffoo[7] notation.

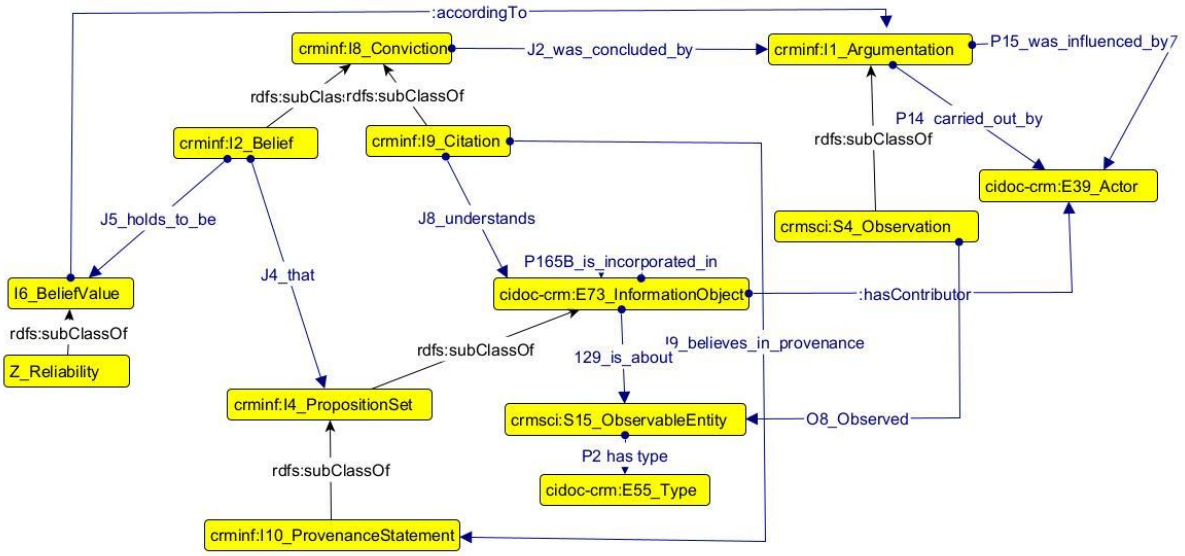

Figure 2: The Multivocality Ontology.

In particular, two main patterns are worthy of attention (Fig. 3 and Fig. 4).

[7] https://essepuntato.it/graffoo/.

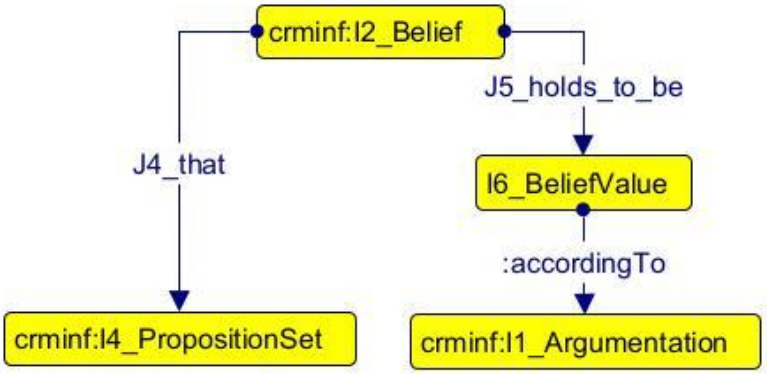

Figure 3: A belief concerning something can be True, False or Unknown according to someone's argumentation.

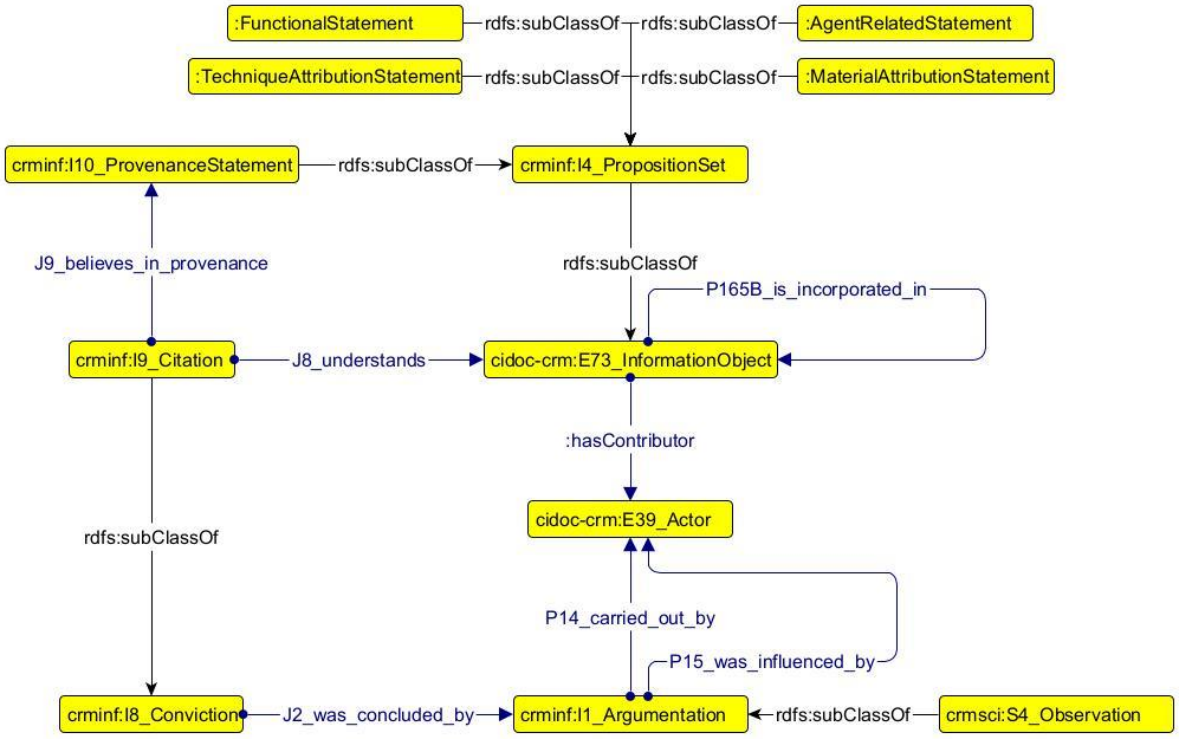

Figure 4: Pattern of proposition sets and contributors.

Examples

Example 1

In this example, the following case is portrayed[8]:

Lowe (in Harcourt, 1851a: 143) stated: "Polygonum Hydropiper, Linn., is not uncommon in Madeira, but Polygonum Minus, to which this description seems to point, does not occur there now". Based on the specimen, however, we determine the plant as P. hydropiper, which, as Lowe noted, does occur in Madeira. Contrary to Sloane's contention, this species is absent from Jamaica (Adams, 1972).

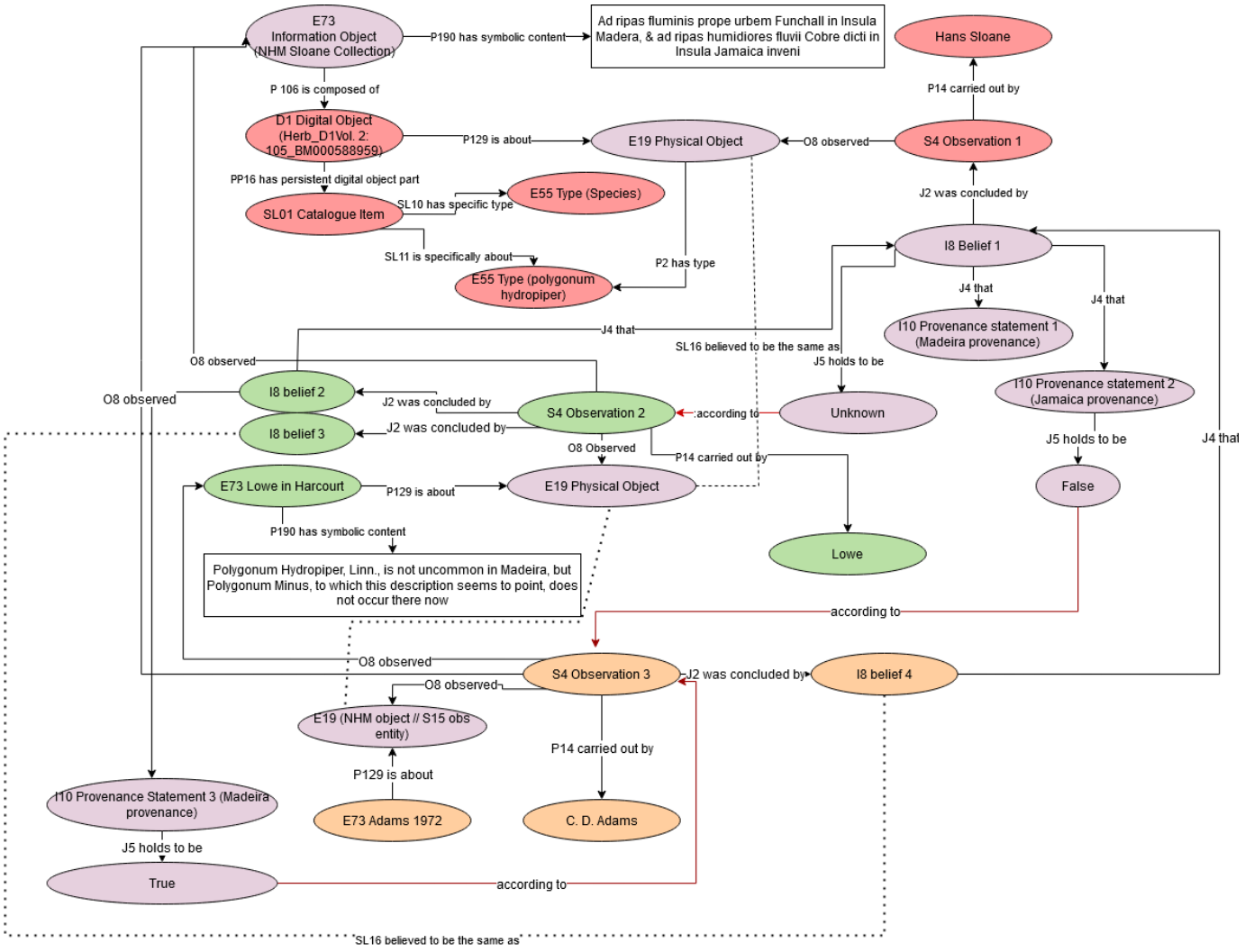

Fig. 5: Example 1.

Example 2

In this example, the following case is portrayed:

[8] From de Sequeira et al. (2010).

In this record of the British Museum Collections, the material of the object is described as soapstone or steatite, while H. Sloane describes it as alabaster or rice[9]. Therefore, there are two material statements contrasting with each other.

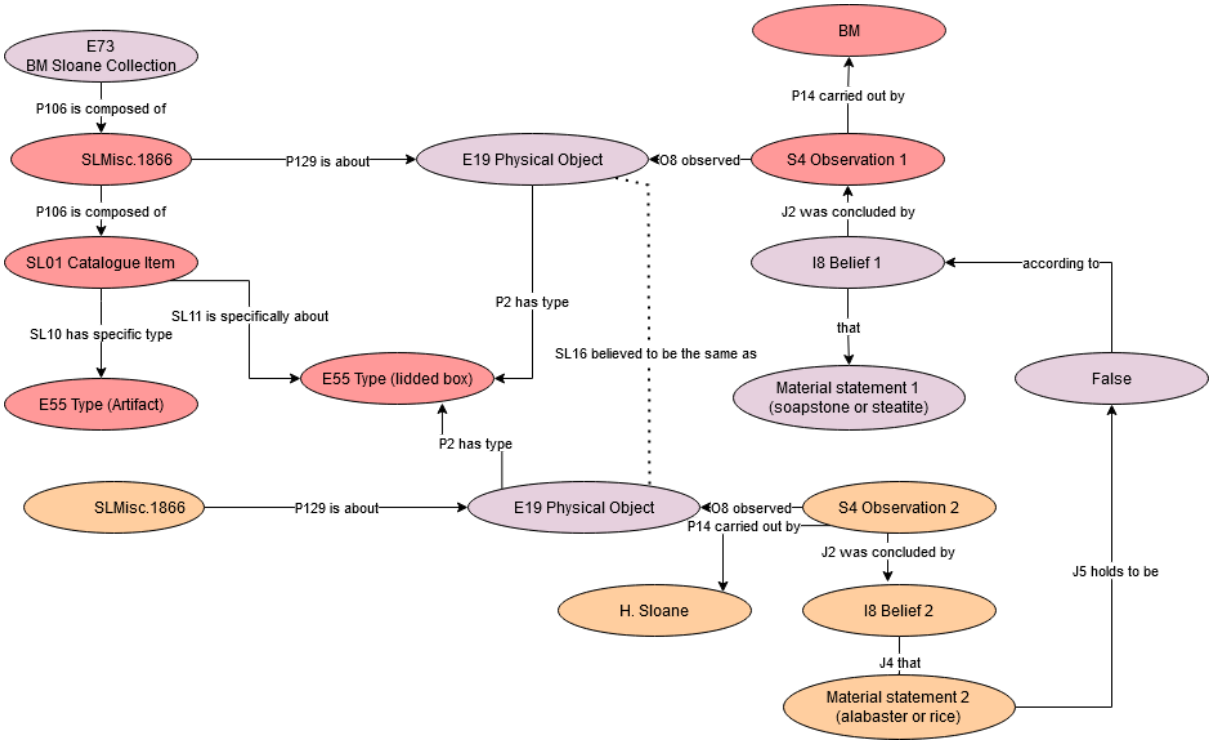

Fig. 6: Example 2.

Example 3

In this example, the following case is represented:

In this record of the British Museum collections, is described an object whose use is deemed as unknown by H. Sloane (presence of question mark)[10].

[9] https://www.britishmuseum.org/collection/object/A_SLMisc-1866.
[10] https://www.britishmuseum.org/collection/object/G_1756-0101-797.

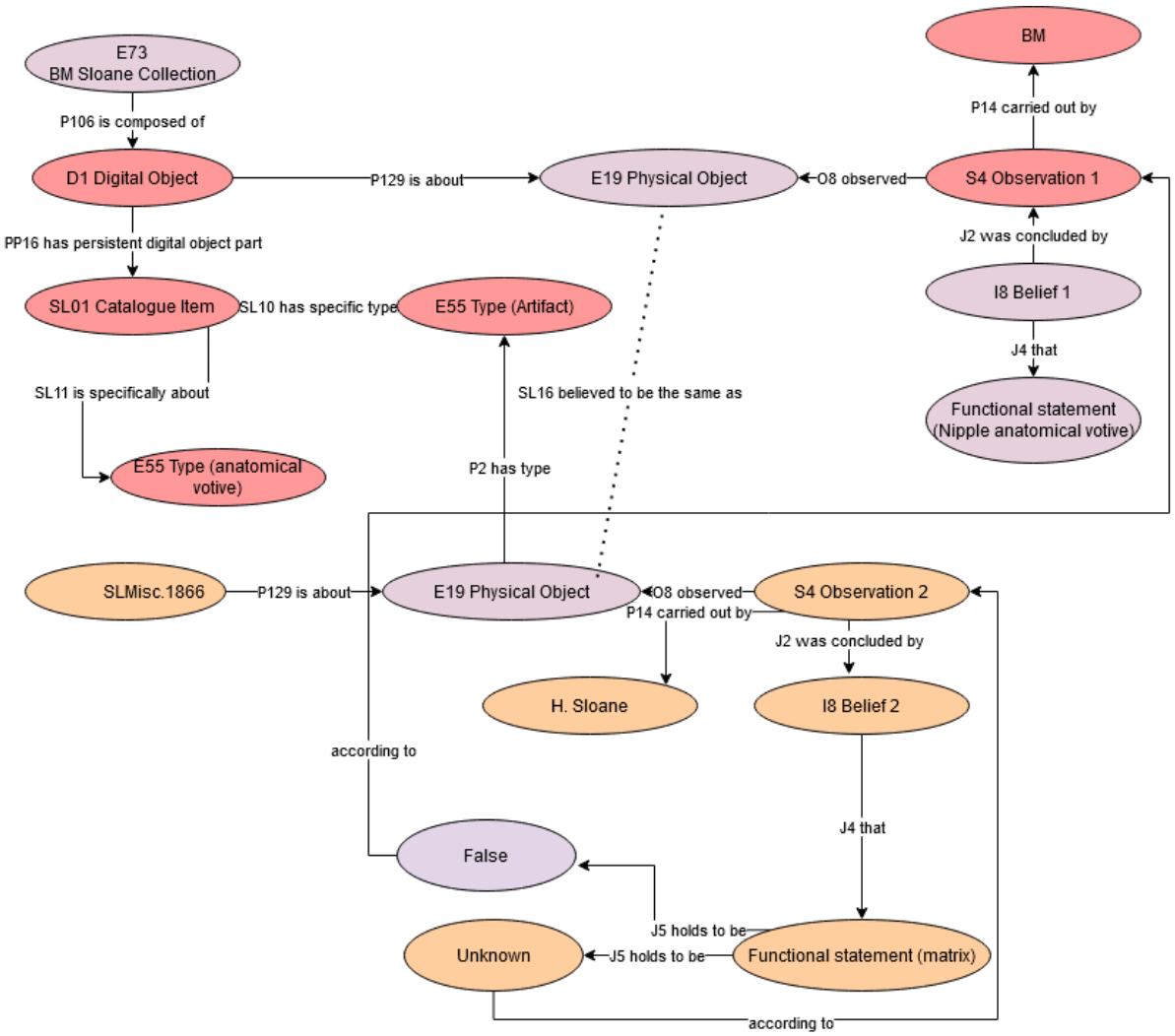

Fig. 7: Example 3.

Example 4

In this example, the following case is portrayed[11]:

Writing about the so-called 'hog doctor- tree', H. Sloane remarked that 'a very understanding black assur'd me he saw a wounded hog go to this tree for relief'. In this model, it is therefore necessary to represent the contribution of an unknown person who contributed to A voyage to the islands with his knowledge.

[11] From Delbourgo (2019), p.99.

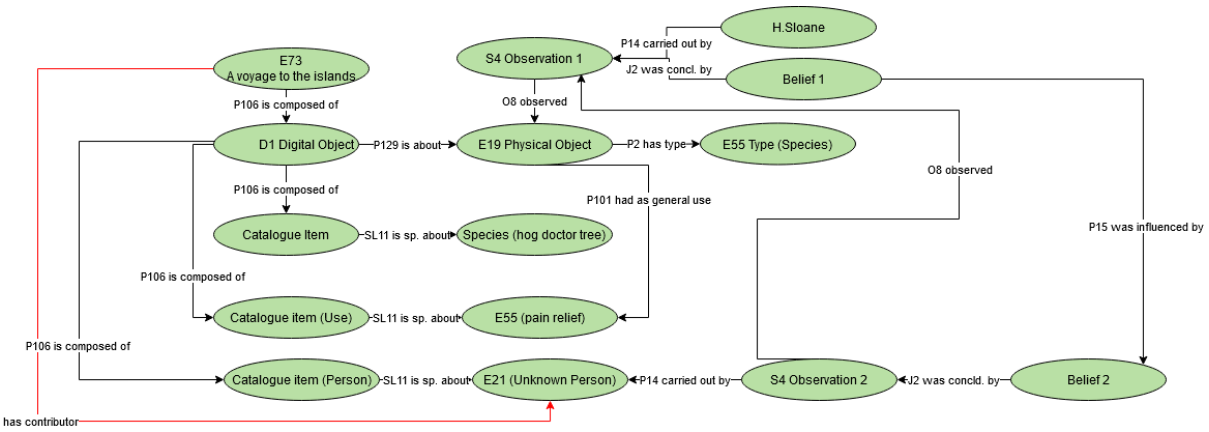

Fig. 8: Example 4.

Sample SPARQL queries

In future work, sample SPARQL queries could be the following:

1. Retrieve all instances of I10_Provenance_Statement:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX crminf: <http://www.cidoc-crm.org/extensions/crminf/>

SELECT ?provenanceStatement
WHERE {
  ?provenanceStatement rdf:type crminf:I10_Provenance_Statement .
}
```

2. Retrieve the belief values associated with a specific observation:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX crminf: <http://www.cidoc-crm.org/extensions/crminf/>
PREFIX crmsci: <http://www.cidoc-crm.org/extensions/crmsci/>

SELECT ?beliefValue
WHERE {
  ?beliefValue crminf:J5_holds_to_be ?observation .
  ?observation rdf:type crmsci:S4_Observation .
}
```

3. Retrieve all statements about agents:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX : <https://w3id.org/multivocality-ontology#>

SELECT ?agentStatement
WHERE {
  ?agentStatement rdf:type :Agent_Related_Statement .
}
```

4. Retrieve all statements about material attribution:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX : <https://w3id.org/multivocality-ontology#>

SELECT ?materialStatement
WHERE {
  ?materialStatement rdf:type :Material_Attribution_Statement .
}
```

5. Retrieve the contributors of a specific information object:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX : <https://w3id.org/multivocality-ontology#>
PREFIX cidoc-crm: <http://www.cidoc-crm.org/cidoc-crm/>

SELECT ?contributor
WHERE {
  ?informationObject rdf:type cidoc-crm:E73_Information_Object .
  ?informationObject :hasContributor ?contributor .
}
```

RDF* to represent multivocality in the Sloane Collections

Apart from regular RDF, the model can also be represented in RDF*. Here is an overview of its potential application in the context of the Sloane Collections.

What is RDF*

RDF* (RDF-star) is an extension of the Resource Description Framework (RDF) designed to enhance the expressiveness and flexibility of representing knowledge in semantic web applications. While traditional RDF represents information using subject-predicate-object triples, RDF* introduces the concept of "named graphs" or "quads" and supports nested triples within them.

In RDF*, triples can be grouped together within double angle brackets ("<< >>") to form a named graph, allowing for the representation of more complex relationships and additional metadata. This enables the modelling of statements about statements, attaching metadata to individual triples, and capturing contextual information.

The use of RDF* has several benefits. First, it enables the representation of higher-order knowledge, allowing for statements about statements and the interpretation of metadata associated with those statements. Second, RDF* facilitates more nuanced representations of relationships, enabling the attachment of metadata, such as dates, attribution, or confidence values, to triples. This enhances the richness and contextuality of the represented knowledge. Third, RDF* supports the integration and interoperability of data across different datasets, as it aligns with the principles of Linked Data and can be combined with existing RDF-based technologies and tools.

Use cases in the Sloane Collections

RDF* finds applications in the Cultural Heritage domain, including the Sloane collections, to enhance the representation of the collected items, their relationships, and associated metadata. Below, we explore several ways in which RDF* can be used in this domain.

1. Representing Item Relationships

Hans Sloane collections consist of various items, such as artefacts, specimens, books, and artworks. RDF* can be used to represent the relationships between these items. For example, it is possible to use RDF* triples to indicate that a certain specimen was part of a particular collection.

Example: content of books and catalogue records

We can take the example of the *Erythrina corallodendron L.*, which was collected in Jamaica and recorded in "Voy. Isl. Madera, Barbados, Nieves, S. Christophers and Jamaica" by H. Sloane (1725). It is also recorded in the NHM collections[12].

```
<< crm:book-3683232 :P94_wasCreatedBy crm:creationEvent1 >> :relationshipType
"creation" .

<< crm:catalogue-number-BM000593775 crm:P129_isAbout
crm:specimen-8799501f-6d8f-4925-93b9-abf981ef45e7  >> :relationshipType
"inclusion" .

<< crm:specimen-8799501f-6d8f-4925-93b9-abf981ef45e7 :collectedFrom
crm:Location456 >> :relationshipType "origin" .

<< crm:transferofcustody1 :P30_transferredCustodyOf
crm:specimen-8799501f-6d8f-4925-93b9-abf981ef45e7 >> crm:P7_tookPlaceAt
"Jamaica" .
```

Example: provenance, acquisition date, specific details

This example illustrates the book "Voy. Isl. Madera, Barbados, Nieves, S. Christophers and Jamaica" by H. Sloane (1725) and when it was acquired by a library.

```
<< :crm:creationEvent1 crm:P14_carriedOutBy crm:HansSloane >> :date
"1707"^^xsd:Year .

<< crm:book-3683232 crm:P24_changedOwnershipThrough crm:AcquisitionEvent1 >>
:provenance "Acquired between 1769 and 1802. Recorded in RAA Library, Catalogue,
1802."^^rdfs:literal .

<< crm:book-3683232 crm:P102_hasTitle crm:Title1 >> :description "The imprint of the
second volume reads, 'London: Printed for the Author. 1725.' This account of the
natural history of Jamaica is based on the collections which Sir Hans Sloane made
```

12 https://data.nhm.ac.uk/dataset/56e711e6-c847-4f99-915a-6894bb5c5dea/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/4707827.

```
there in 1687-1689, while physician to the Governor, the Duke of Albemarle. These collections afterwards became the nucleus of the holdings of the British Museum (and later of the Natural History and Geological Museums). Most plates in Volume I show plants; those of Volume II show plants and animals."^^xsd:literal .
```

2. Capturing Historical Context

Hans Sloane collections have historical significance. RDF* can be used to capture and represent the historical context of the items. For instance, it is possible to use RDF* to link an item to relevant historical events, people, or places. This allows for a more nuanced understanding of the items within their historical context.

Example : spatio-temporal contextualisation

This artefact[13] is taken as an example. It is from the period of Ottoman Dynasty, therefore pertaining to the Middle East department, and has origin in Turkey.

```
<< crm:artifact-1928-0323-0-46-22 crm:P8_witnessed crm:OttomanDynasty >>
:department "MiddleEast" .

<< crm:artifact-1928-0323-0-46-22 crm:P8_witnessed crm:OttomanDynasty >>
:location "Turkey" .

<< crm:artifact-1928-0323-0-46-22 crm:P8_witnessed crm:HistoricalPlace123 >>
:relationshipType "origin".
```

Example: connection to events and to people

This artefact[14] has been transferred to the British Museum in 1974 and is explicitly associated with Engelbert Kämpfer, who made some of the drawings.

```
<< crm:artifact-1974-0617-0-1-38 crm:P30_custodyTransferredThrough
crm:TransferringEvent2 >> :eventDate "1974"^^xsd:date .
```

[13] https://www.britishmuseum.org/collection/object/W_1928-0323-0-46-22.
[14] https://www.britishmuseum.org/collection/object/W_1974-0617-0-1-38.

```
<< crm:artifact-1974-0617-0-1-38 :hasContributor crm:BIOG11220 >> :associationType "contributor".
```

3. Managing Attribution

Attribution is crucial in collections, particularly when it comes to acknowledging the contributors, researchers, and curators involved. RDF* can be employed to attribute statements, annotations, or other metadata to individuals or organisations, documenting their contributions or expertise in the context of the collection.

Example: attribution

This artefact[15] is now attributed to Aurelio Luini by the British Museum collections, but in the past it had another attribution (Palma il Vecchio).

```
attribute-assignment-author-aurelio-luini :P141_assigned :aurelio-luini

<< attribute-assignment-author-aurelio-luini :P140_wasAttributedBy :TheBritishMuseum >> :P177_assignedPropertyOfType :AuthorshipAttribution
```

4. Representing statements and interpretation

With RDF*, statements can be associated with their interpretations, providing valuable context and insights into the meaning and implications of the statements. Experts, scholars, and analysts can contribute their interpretations, expanding the understanding and depth of knowledge. In this way, a more comprehensive and nuanced representation of knowledge is achieved. This opens up possibilities for capturing multiple perspectives, facilitating collaborative research, and enabling more sophisticated data analysis and reasoning.

[15] https://www.britishmuseum.org/collection/object/P_SL-5237-34

Example: types of statements, interpretations and sources

According to the Multivocality ontology, it is possible to model in RDF* notes and comments about observations, beliefs and statements, along with their validity according to different perspectives.

```
<< crminf:Observation1 crminf:J2_wasConcludedBy crminf:Belief1 >> :note "This statement suggests a correlation between X and Y." .

<< crminf:Belief1 crminf:that :ObjectIdentityStatement1 >> crminf:holdsToBe "Unknown" .

<< :False :accordingTo :Observation2 >> :perspectiveType "Disagreement" .
```

5. Supporting Linked Data Integration

RDF* provides a standardised representation that aligns well with the principles of Linked Data. By using RDF* to model the Hans Sloane collections, you can facilitate integration with other linked datasets, enabling connections and knowledge discovery across diverse collections and domains.

Example: Linked Data integration

This example shows how two objects from two different digital records are believed to be the same.

```
<< :SloaneLabDataAtlasObject1 :linkedTo :BritishMuseumObject2 >> :integrationType ":believedToBeTheSameAs" .
```

6. Facilitating Querying and Analysis

RDF* allows for flexible querying and analysis of the collection data. By representing the collections and associated metadata using RDF*, you can leverage SPARQL queries and other RDF-based tools and frameworks to explore, analyse, and gain insights from the collection data.

Example: SPARQL queries

In this section, it is possible to find sample SPARQL queries for the future implementation of the model.

1. Retrieve the creation event details of a specific book:

```
PREFIX crm: <http://www.cidoc-crm.org/cidoc-crm/>

SELECT ?creationEvent
WHERE {
  << crm:book-3683232 :P94_wasCreatedBy ?creationEvent >> :relationshipType
"creation" .
}
```

2. Retrieve a specimen and its inclusion details:

```
PREFIX crm: <http://www.cidoc-crm.org/cidoc-crm/>

SELECT ?specimen ?inclusion
WHERE {
  << crm:catalogue-number-BM000593775 crm:P129_isAbout ?specimen >>
:relationshipType "inclusion" .
  ?inclusion crm:P129_isAbout ?specimen .
}
```

3. Retrieve the origin location of a specific specimen:

```
PREFIX crm: <http://www.cidoc-crm.org/cidoc-crm/>

SELECT ?originLocation
WHERE {
  << crm:specimen-8799501f-6d8f-4925-93b9-abf981ef45e7 :collectedFrom
?originLocation >> :relationshipType "origin" .
}
```

4. Retrieve the transfer of custody details for a specific specimen in a specific location:

```
PREFIX crm: <http://www.cidoc-crm.org/cidoc-crm/>

SELECT ?transfer ?location
WHERE {
  << crm:transferofcustody1 :P30_transferredCustodyOf
crm:specimen-8799501f-6d8f-4925-93b9-abf981ef45e7 >> crm:P7_tookPlaceAt
?location .
  ?transfer :P30_transferredCustodyOf
crm:specimen-8799501f-6d8f-4925-93b9-abf981ef45e7 .
  ?transfer crm:P7_tookPlaceAt "Jamaica" .
}
```

RDF*: conclusions

By leveraging RDF* in Hans Sloane collections, it is possible to create a more comprehensive and interconnected representation of the items, their relationships, and associated metadata. This facilitates better data management, knowledge discovery, and contextual understanding of the collections.

Challenges and limitations

This section elucidates the principal challenges encountered in the course of this project and their implications.

The initial challenge revolves around the data. In the absence of specialised guidance, undertaking a personal selection of data posed substantial difficulties due to the unique considerations required for each case. This issue was partially mitigated by incorporating examples from existing academic literature and initiating regular discussions for a more profound understanding of the subject matter.

The subsequent challenge pertains to the computational complexity intrinsic to the model. During the data population phase of the ontology, the model would gain clarity and specificity. However, this would result in increased computational complexity. This

complexity could be further magnified by the necessity to represent multiple arrays of perspectives and beliefs, though the application of RDF* somewhat could alleviate this.

The final challenge arises from the model's design, which lacks comprehensiveness and necessitates continual feedback from a diverse user base and the broader community. The construction of an inclusive data model requires the assimilation of varied sources and references, including multilingual content.

Recognition and management of these limitations would allow the project to evolve, potentially transforming it into a more robust and valuable resource for its intended audience.

Conclusions and future work

In conclusion, the development of an ontology for multivocality provides a powerful tool for embracing diverse perspectives in a machine-readable form. By recognizing and incorporating multiple voices, languages, and cultural perspectives, we can foster inclusivity, promote equitable narratives, and overcome biases. In the context of the Sloane Collections, multivocality allows us to acknowledge the varied agents, interpretations and traditions associated with the objects, address colonial legacies, and engage with communities whose cultural heritage is represented within the collections. By actively involving diverse voices and creating platforms for public engagement, the collections become more accessible and meaningful to a wider audience. By extending existing ontologies, such as *CRMinf* and *CRMsci*, in the iterative process of ontology design, we can effectively capture and represent the complexities of multivocality within the Sloane Collections while adhering to current standards and aligning with the Sloane Lab data model, contributing to a shared and interoperable understanding of cultural heritage.

In the future, the implementation and evaluation of this work will be essential in determining its effectiveness and practicality. Evaluating the ontology involves assessing its cognitive soundness, which necessitates involving humans in the process to gather their feedback and insights following the process described in Jaradeh et al. (2019).

A goal-oriented evaluation will be conducted to assess the effectiveness of the developed data model in facilitating the knowledge access process for humans, with a focus on achieving specific goals. The primary objectives will be to determine user performance, identify major positive and negative aspects of the system, and gauge user acceptance and perception of the system.

The evaluation process would consist of two components: (1) instructed interaction sessions and (2) a short evaluation questionnaire. During the sessions, the participants will be given a brief explanation of the system's underlying principles and then engaged with the system without further guidance, with the option to seek assistance from instructors if needed. The time taken to complete the tasks, instructor's notes, and participant comments were recorded for each session. Additionally, participants will be invited to complete a qualitative questionnaire, to gather further insights into their user experience.

This evaluation will consider how well the ontology supports users in accomplishing their desired outcomes, such as accessing relevant information, exploring narratives, or conducting research. By evaluating the ontology's performance in relation to these goals, valuable insights can be gained on its overall effectiveness and usability in practical scenarios.

It is worth noting that the evaluation should encompass a diverse range of users, including scholars, researchers, and other stakeholders who have a vested interest in the Sloane Collections. Their input and feedback will provide valuable perspectives and help identify potential areas for improvement. By iteratively refining and enhancing the ontology based on user evaluation, it can better serve the needs of its intended audience and contribute to facilitating the knowledge access and exploration process in the context of the Sloane Collections.

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