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Linking potter, pots and places: a LOD approach to samian ware

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Motivation

Research in samian ware advanced considerably in recent years based on a dataset collected by several scholars in the past decades [1]. It comprises detailed and reviewed data of potters, pots and related places in the northern provinces of the Roman Empire. The spatial distribution and chronological pattern as well as the identification of kiln sites of individual potters are key research questions. Based on this data, Mees proposed a reconstruction and analysis of pottery trade networks considering archaeological material [2]. The nature of the data makes it reasonable to approach it utilizing the concept of Linked Open Data (LOD).

The goal of the study presented in this poster is to evaluate whether, and if so, how these analyses open up new research possibilities by a new implementation and modeling concept [3]. To reach that goal, a subset of this data (Fig. 1) is migrated into an appropriate structure which makes it accessible through URIs and a REST interface. Furthermore, the place resources should be linked to existing LOD resources in the web. Finally, the query of the links between potters, pots and places should be possible through a web based interface.

Another aspect is the chronological information entailed in the dataset. A LOD time interval algebra could allow for simulating changes in the relative chronology by providing immediate access to all implications on related datasets.

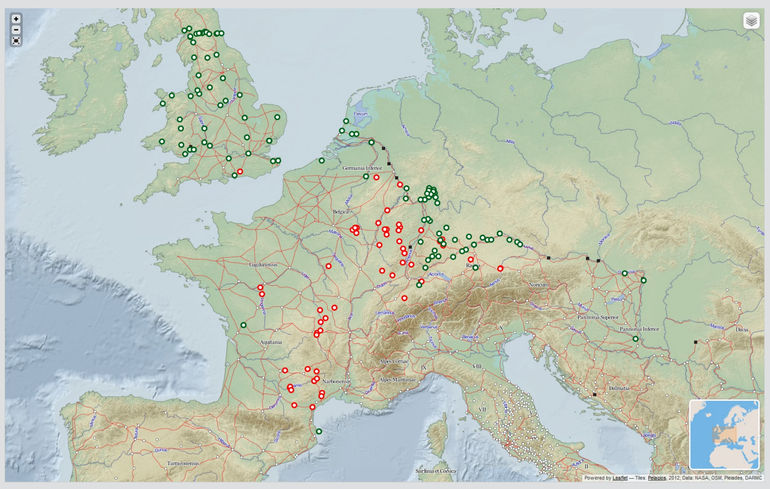

Fig. 1: Distribution of kiln sites (red) and find-spots (green) based on the data subset represented by OGC services

Migrate samian data subset to LOD

Potter, pots and places and their attributes could be conceptually modeled using the CIDOC-CRM [4]. In the study, but, a direct linking of individual objects to mature ontologies widely used in the Semantic Web, such as FOAF, whoIS, Pleiades, Dublin Core, SKOS and GEO, was preferred [5].

Potters are modeled as persons deploying the FOAF [6] concept (Fig. 4); they are living persons in present history research. FOAF provides useful possibilities, e.g. to model relations between individual potters and their attributes.

Places such as find-spots and kiln sites are represented by name, function and coordinates and locations aggregated to places. A place (abstract concept of an area) can contain one or more locations (specific find-spot). The Pleiades ontology [7] is able to model these aspects. The Place representation as SKOS concepts [8] allows mapping options to other place concepts.

Fragments are a part of a pot. Authoritative resources, concepts and ontologies in this topic are currently not available. For that reason, CIDOC-CRM as a widespread concept to model the building process and life time circle of man-made objects [4] is used. In respect to the prototypical approach only a basic mapping to the CIDOC-CRM was drafted using the entity man-made object (E22) with its immediate nodes.

Linking Places to Pleiades

The idea of LOD is to couple related resources to build up an interlinked web of data. In the context of the study it was investigated what kind of suitable web resources are available from which the samian ware resources could benefit. On the one hand, web accessible repositories for fragments and potters are missing. On the other hand, Pleiades provides a large number of places to support geographical annotations of textural sources or archaeological objects [9].

These places are used by the Pelagios project that links data from more than 20 partners to get additional information to an abstract Pleiades place concept [10]. In this study find-spots and kiln sites are mapped to Pleiades places to get additional data from the Pelagios partners. The locations in the samian dataset are reviewed and show much higher precision than the Pleiades places. Thus, confining the connection of the data to simply linking to the Pleiades place implies a loss of information.

This mapping challenge is met by the Open Annotation ontology (OA) to generate a loose coupling of the different concepts. OA uses annotations to model an association between objects as target and body [11]. Using the Pelagios API [12] allows for gathering information on related material (e.g. coins) connected to the find-spot or kiln site in the samian dataset.

OA has proved to be useful to model other challenges in interlinking objects. Samian fragments originate from factories rather than from individual potters hands. Moreover, the relation between fragment and find spot is the subject of extensive archaeological discussion. OA allows for linking the objects without constraining the semantic implications to inappropriate conclusions (Fig. 5). The query of the links between potters, pots and places as well as linked resources are possible through a web-based interface (Fig. 2).

Relative chronology

Potter, pots and places entail relative chronological and topological information. The relative temporal distribution of objects in space is essential to archaeological research. Therefore, dates stored as absolute values in the original dataset are transformed into relative time intervals. The RDF representation facilitates the system to simulate changes and identify contradictions in relative chronology.

Our approach of a relative time chronology is based on Allen's interval algebra [13] and further considerations of Freksa [14], also considered in the Topotime project [15]. By providing immediate access to all implications on related datasets, the linked data approach assists in identifying open questions via a real-time visualization in a graph or timeline (Fig. 3).

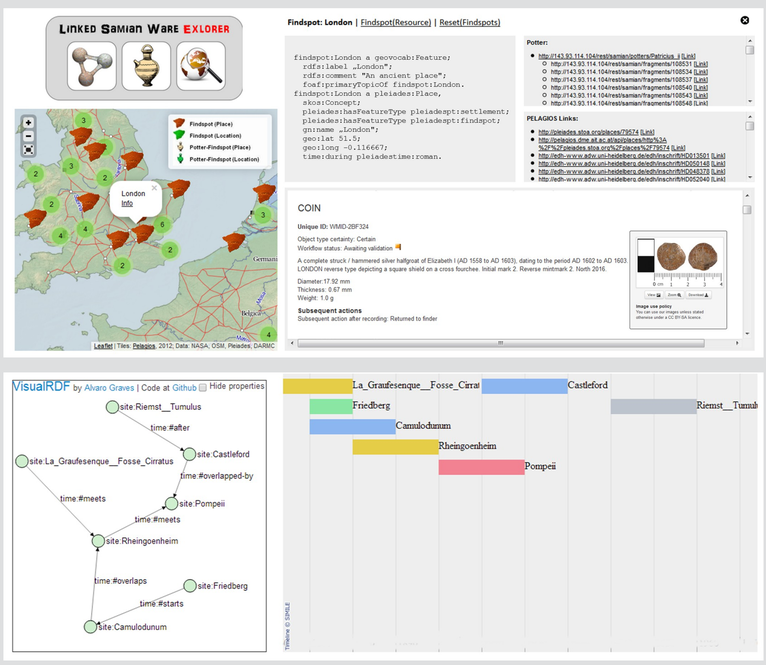

Fig. 2: Web based interface (Samian Ware Explorer)
Fig. 3: Visualization of a relative chronology as graph and timeline

Fig. 4: FOAF representation of an individual potter
Fig. 5: Open Annotation for relations and mapping

Conclusion

The results of the study yield that research on samian ware can benefit from implementing the concept of LOD. Flexible access without a closed, relational database, the potential in time modeling as well as an immediate retrieval of relevant archaeological data in the web, are just a few examples of the extended opportunities. It is very simple to extend the data model involving further objects like dies and coins out of the original dataset, because every fragment as well as every potter and place is accessible via a URI. Once the data is published it could contribute to the international cross-linking of archaeological information. Moreover, the data is ready for semantically modeling the relations in an ontology to foster the disclosure of knowledge hidden in the data. This outlook promises to considerably contribute to more generic research questions, e.g. the history of ancient economy and trade.

References

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