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BETTER PRESERVING THE EUROPEAN SILK HERITAGE WITH THE SILKNOW ONTOLOGY. A CRM EXTENSION FOR MODELIZING THE PRODUCTION PROCESS OF SILK ARTEFACTS

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The **H2020 SILKNOW project** (Silk heritage in the Knowledge Society: from punched card to Big Data, Deep Learning and visual/tangible simulations) aims to use digital technologies, more particularly those offered by the Semantic Web and Linked Data, to promote the European silk heritage (15th-19th century). This fragile and endangered heritage can greatly benefit from the contributions of these new technologies in terms of enhancement and dissemination of Cultural Heritage data.

Giving access to European silk heritage with the Semantic Web

On the one hand, these technologies provide an answer to the difficulties encountered by heritage institutions that are small in size and lack the financial, human and technical means to enhance rich collections that are not well known by the general public. On the other hand, large generalist heritage institutions with more substantial resources do not always enhance their textile collections, which therefore remain little known.

Moreover, while online catalogues provide access to the metadata describing the objects held by heritage institutions, they consist of **isolated inventories**. This means that users have to search multiple catalogues, and therefore to use different information systems, in different languages.

Coordinated by the University of Valencia (Spain) and involving nine partners, SILKNOW aims to propose solutions to both help less well endowed Cultural Heritage institutions, and to promote a lesser known heritage, by **reusing data** from about **twenty North American and European institutions** describing silk heritage objects produced or consumed in Europe between the 15th and 19th centuries.

Fully in line with the principles of the Semantic Web, SILKNOW aims at:

- **aggregate and publish structured data** on the Web to facilitate their reuse;
- allow **multilingual queries** thanks to a **multilingual thesaurus**;
- design and implement a **text analytic module** to populate the knowledge graph;
- design and implement an **image analytic module** for generating automatically semantic information from images.

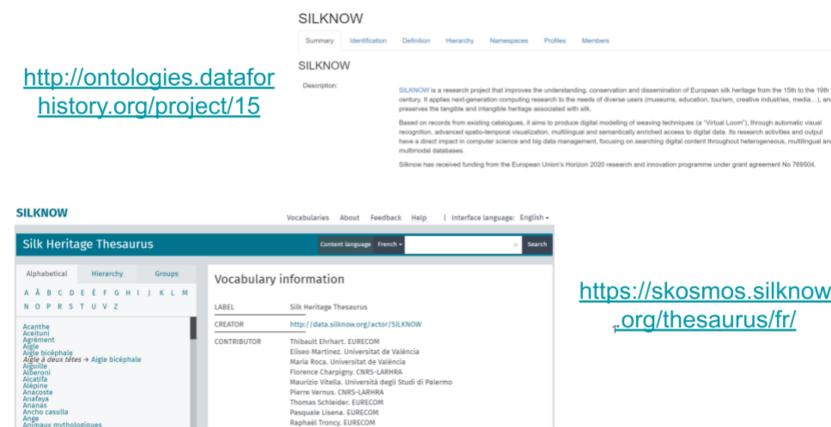


Fig. 1: The SILKNOW ontology and the Silk Heritage Thesaurus

Building an ontology with CIDOC CRM

The collected data sets all have their own specific structures. SILKNOW therefore had to develop a unique data model to facilitate their integration. To this end, we used the **CIDOC Conceptual Reference Model or CIDOC CRM**, which help to integrate Cultural Heritage information in a single environment, allowing users to make more general queries than those that could be formulated on separate sets of information.

Moreover, the CRM is **flexible and extensible**: as a core ontology it consists in a limited set of classes and properties but, if necessary, it is possible **to create new classes and properties for expressing new types of information**, without modifying the basic structure of the model.

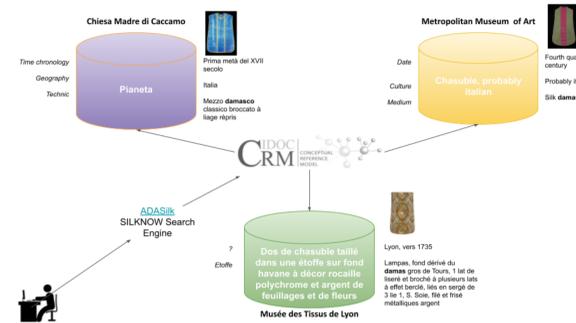


Fig. 2: ADASilk gives access to several catalogues simultaneously

The SILKNOW data model uses classes and properties from:

- **CIDOC CRM 6.2**
- **CRMdig 3.2**
- **CRMsci 1.2.3**
- **SILKNOW extension** (cf. below)

The resulting ontology is based on the **Erlangen implementation** of the CIDOC CRM. To provide the origin of information generated by the text and image analysis modules, SILKNOW also uses **Prov-O**.

All the selected and created classes and properties used by SILKNOW are available in **OntoMe, an ontology management system, developed by the LARHRA** research center where the SILKNOW profile has been documented.

Creating a CRM extension to describe silk-related artifacts

The CRM core and its existing extensions do not offer classes and properties for fully describing the structure and the process of production of silk fabrics or garments. We proposed to create such an **extension for dealing with the production of textile artefacts** - like FRBRoo for the creation, production and expression process in literature and the performing arts.

In particular, this allows us to provide **access to information extracted by the textual analysis** performed on metadata, especially on the free-text fields used by Cultural Heritage institutions to give information not only on the creation and production process of the fabrics, but also on their history and use.



Fig. 3: Examples of new classes

The SILKNOW thesaurus also provides additional information that users can access directly from the data they are studying. Thanks to these new classes and properties, it is therefore possible to **link these data**, whatever the language in which they are expressed, **to the thesaurus**. This not only enriches the users' experience, but also provides useful contextual information for a better understanding of the data themselves.

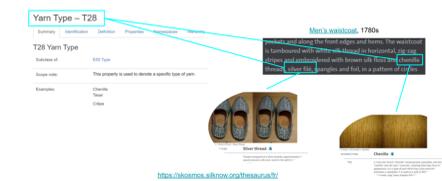


Fig. 4: Create links between the ontology and the thesaurus

Convert data into the ontology model

SILKNOW has created **ADASilk**, an exploratory search engine using knowledge graphs that represent the data contained in the catalogues of Cultural Heritage institutions and follow the SILKNOW ontology.

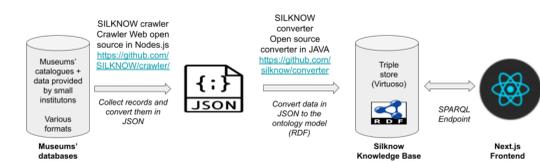


Fig. 5: General architecture



Fig. 6: ADASilk: <https://ada.silknow.org/>