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TECHNOLOGICAL TOOLS FOR THE CONSERVATION OF SILK HERITAGE: IMPROVING THE CONSERVATION OF EUROPEAN RELIGIOUS TEXTILE CULTURAL HERITAGE

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ABSTRACT

This paper presents the interdisciplinary H2020 SILKNOW project coordinated by the Universitat de València with researchers from the ICT and SSH fields. SILKNOW is a three-year project funded by the EU's Horizon 2020 Programme under the two-stage call SC6-CULT-COOP-09 "European cultural heritage, access and analysis for a richer interpretation of the past". The consortium has a total of nine partners from six different European countries (Spain, France, Germany, Slovenia, Poland and Italy). There are a total of three universities, two SMEs, one international institution, and three research institutes. In this paper, we introduce SILKNOW which has as a goal to promote, conserve and disseminate silk textiles; secondly, we introduce a set of interactive tools related to the project that will especially enhance conservation of this heritage.

Keywords: silk heritage; interactive tools; thesaurus; virtual

INTRODUCTION

European history is woven in silk. Few materials have had such an outstanding impact: economic, technical, functional, cultural and symbolic. From flags to canopies, tapestries to furniture, fans to sword sheathes, wedding gowns to traditional costumes, we can find silk in countless contexts over the last millennia. One of the contexts where textile heritage acquired special significance was the religious one. Their typological differences, their symbolic function and their hierarchical meaning are essential to understand these textiles linked to Christian religion (clothing particularly), and to such a luxurious heritage. Nowadays, conservation of silk heritage is a priority among the institutions who are the custodians of this vast and fragile heritage. Its state of conservation, its non-typical museum presentation, the lack of specific research in the academia, make urgent to protect them. In this regard, there is some local research, however it usually is not interconnected, therefore it makes complicated to trace a multiplicity of relations: artistic taste, design evolution, different techniques and materials, collecting, workshops, and dissemination of ideas and commercial exchanges.

Silk fabrics are integrated in the biggest European national collections, but also, it can be found in smaller and medium-sized ecclesiastical museums, or even in parishes and cathedrals, silk heritage is a great part of the immense religious European heritage. Nevertheless, excepting National Museums, this heritage is not easily accessed, and the information related to it is partial and disconnected, in many cases, its identification and cataloguing is pending. This problem increases within the religious context as its custodians usually do not have enough tools to do proper research. This result in not applying a suitable methodology and restoration that should come from a deep knowledge of weaving techniques, materials, design and historical and artistical links in order to better preserve these goods. The consequence is that this important heritage remains unknown and in danger of disappearing. SILKNOW offers an important window for the reflection, appreciation, conservation, research, historical understanding, correct management and dissemination of silk heritage, which continues to be relevant for several audiences.

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OPERATIONAL GOALS

Cultural heritage is not set aside from new technologies. On the contrary, there are many examples where new technologies are integrated in cultural heritage, from documentation and preservation, to dissemination and interaction. We can name several examples of digital documentation of cultural heritage by means of three-dimensional scanners, high-resolution images, videos, multispectral images, thermal images, spectral curves, etc. [2, 4]. These tools provide conservators and researchers a high-level of details related to the cultural asset such as radiometry, geometry or even internal structures.

In this context, SILKNOW [3] is a European research project that aims to improve the understanding, conservation and dissemination of European silk heritage from the 15th to the 19th century. To this end, it applies computational, historical, artistical and geographical research to the needs of diverse users (museums, education, tourism, creative industries, media), with the aim of preserving the tangible and intangible heritage associated with silk. Based on pre-existent, digitized information about this endangered legacy, it aims to produce digital models of weaving techniques through automatic visual recognition, advanced spatio-temporal visualization, multilingual and semantically enriched access with digital data. This will preserve ancient weaving techniques, and at the same time, it will establish a visual spatio-temporal line of the historical evolution of silk heritage: it designs and the artistic networks of ideas and knowledge that took place in Europe, as well as its commercial routes and the economic impact about its territories.

The main objectives of the project are:
1.Advanced searching and semantically relating digitized European silk textile heritage, based on data interoperability across different collections. Moreover, we will focus on small to medium size heritage institutions, whose digital data tends to be obsolescent, insufficiently curated and not standardized.
2. Building a “Virtual Loom” to clone ancient weaving techniques. This digital tool will allow users to discover the complexity, artistic and artisanal values of ancient silk textiles and their weaving techniques, while preserving them for future generations.
3. Improvement of the understanding of the European silk heritage. Visual tools that show the spatiotemporal relationships of data will allow users to develop their personal or collective memories, by discovering the many connections that silk textiles can provide to European history.

RESULTS or OUTCOMES

The project aims to produce a set of relevant outcomes that will arise after the first year of the project for a variety of targeted end users, including humanities researches, ICT experts, educational and creative industries, etc. Some of these outcomes are described in the following sub-sections.

1. *Web Portal with a Multilingual Thesaurus*
Conservation of cultural heritage includes a set of direct and indirect actions in order to ensure the physical persistence of objects, in order to do so, prior knowledge is extremely important. The registration of a cultural asset in an inventory or its inclusion in a catalog assumes its recognition as an element that requires its conservation and protection. Nowadays, museums around the world are generating tools that allow the development of a systematic and coherent cataloging of museum collections and the improvement of a standardized model, in order to avoid the lack of common criteria when dealing with these kinds of records. Silk heritage is characterized by large, rich and heterogenous data sets. Its vocabulary comes from multiple

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sources that had been mixed up across time and space. For instance, local variations of a term are rarely considered (e.g., "espolín" changes its meaning in some areas within Spain). This has led to the use of different terminology in specialized organizations in order to describe their artefacts. SILKNOW will build a web portal that allows the advanced search and representation of information related to silk textile heritage. Regarding religious silk heritage, the thesaurus will provide with accurate terminology related to iconographic themes, specific colours and materials relevant to religious heritage.

2. *Spatio-Temporal Visualization*
Religious silk textiles involve a series of objects related to space and time. Textiles that might seem geographically distant might have similar characteristics (fabrics, styles, motives, etc.), furthermore, designs evolve in time and can be traced in different epochs, taking up those that might seem forgotten and readapting them according to the tastes of each period. In SILKNOW, highly interactive graphs will be produced in order to represent the data related to silk textiles according to their spatiotemporal dimensions. Through the web portal, the results of users' searches will be graphically shown, considering both the spatial and temporal dimensions of the related data. Small and medium-sized museums will be able not only to show their hidden collections (especially ecclesiastical museums) but also it will allow researchers to study from where they come from, to trace their connections around Europe and their evolution in time. As there is an immense religious silk textile heritage, museums will be able to discover if their designs are unique or if on the contrary, are copies from other textiles.

3. *Cloning and Tangible Reproductions of Historical Textiles*
Textile heritage is particularly fragile, and not only because of its material condition. In this context, the reproduction or reconstruction of textile pieces by digital, automated means, can open up an entirely new approach to this fragile heritage. In SILKNOW we will preserve the fragile ancient art of weaving by directly "cloning" the way it was woven by means of a Virtual Loom software module. This module will be accessible through the web portal and as an independent application. By means of this tool, high resolution 3D models of the textiles will be produced from images. These models will be graphically accessible and will be materialized by means of 3D printing technology. These models will be available in both visual and tangible forms and will be highly interactive. These largescale 3D printing for textile replicas of woven fabrics can become a successful didactic prop for teaching purposes, within heritage institutions and providing wider access for the general public to the fragile silk heritage safeguarded in museums storages.

CONCLUSIONS

Silk is art. The art of weavers, embroiderers and *velluters*, which formed part of the luxurious new fashion that had a huge impact in Europe: from taffetas to brocades, the quality of these works depended on its character as a compound work, with more than one weft or warp and its multiple weaves derived from the main combination. Silk is therefore a heritage that undoubtedly stands out for its material dimension. But, at the same time, is history and art, as it offers a symbolic dimension where the luxury of the materials used (silk, silver and gold metals, precious stones or coral) must be considered as a whole associated with the religious power and the socio-cultural transmissions of each period. This research applied to religious textile heritage will allow to expand new horizons thanks to changes in the forms of communication and access to information. On one hand, it will help to establish new historical and artistical connections as it will allow to connect several historical and cultural realities by bridging the gap among diverse local realities, connecting and generating new networks and synergies, that might be infinites as they allow a multiplicity of "dialogical experiences" [1]. On the other hand, it will allow to generate new conservation practices in silk heritage as it will go further in the study of its physical and material study without using invasive techniques.

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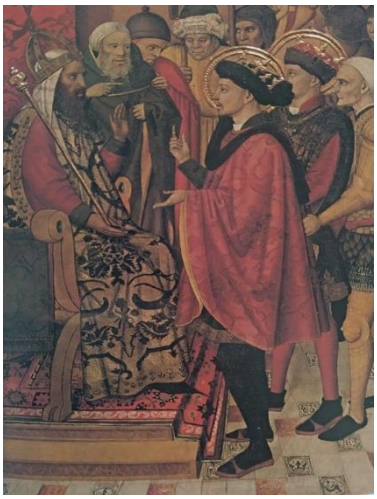

Fig. 1 – Detail of the silk vestments in the altarpiece dels "Sants Mags". Santa María de Terrassa. Jaume Huguet.1458.

Fig. 2 – Venetian velvet silk and metal. S XV. Metropolitan Museum of Art

Fig. 3 – Alemania. Garin 1820 S.A. 20th century (first half).