

**WORLD HERITAGE DIGITAL  
LIBRARY IN PORTUGAL:  
THE CONVENT OF THE ORDER OF  
CHRIST AND THE CASTLE OF THE  
ORDER OF THE TEMPLE**

José Ribeiro MENDES<sup>1</sup>, Andreia GALVÃO<sup>2</sup>, Iria CAETANO<sup>3</sup>, Célio Gonçalo MARQUES<sup>1</sup>, Ricardo CAMPOS<sup>1</sup>, Vasco GESTOSA DA SILVA, Cláudio ANTUNES

<sup>1</sup>*Polytechnic Institute of Tomar, Estrada da Serra, Quinta do Contador, Tomar, 2300-313, Portugal*

*Tel: +351 249 328 100, Fax: + 351 249 328 136,*

*Email: {jmendes,celiomarques,ricardo.campos,vasco.silva}@ipt.pt*

<sup>2</sup>*Institute for Managing the Architectural and Archaeological Heritage (IGESPAR), Palácio da Ajuda, Lisboa, 1349-021, Portugal*

*Tel: +351 213 631 617, Fax: +351 213 614 202, Email: agalvao@igespar.pt*

<sup>3</sup>*Convento de Cristo, Largo da Igreja do Castelo Templário, Tomar, 2300, Portugal*  
*Tel: +351 249 313 481, Fax: + 351 249 322 730, Email:covento.cristo@igespar.pt*

**Abstract:** Creating a Digital Library for the Convent of Christ and for the Templar Castle will gather a vast digital resources with information related to these monuments themselves, and related to themes within them (e.g. Templars, Discoveries) and to similar ones in Portugal and abroad. These resources displayed online in the website of the Convent of Christ can be available through the Europeana. The main objective of the Europeana is to display 2 to 5 million items from different museums and archives by 2010, and our main goal is to contribute significantly to that amount of items. Also with items coming from the other world heritage monasteries classified by Unesco in Portugal. Those contents may be not only architecture plans, manuscripts or photographs, but also publications of different origins today unknown or in dispersed owners. This project promotes better culture understanding, innovation, research and development, tolerance and a new awareness of the common European heritage by having it new and online.

## **1. Introduction**

The Portuguese Institute for Management of the Architectural and Archaeological Heritage (IGESPAR), which is responsible for World Heritage in Portugal, created the “Route through World Heritage Portuguese Monasteries” involving the creation of an open knowledge network.

The Route is an integrated project mainly based on the principle of bringing together three major monasteries located in the Centre Region (Convent of Christ in Tomar, Monastery of Batalha, and Monastery of Alcobaça) to be linked to the Monastery of Jerónimos in Lisbon.

Based on the principle that Heritage and social dimension are part of an integrated policy, the Polytechnic Institute of Tomar, in cooperation with IGESPAR promoted the initiative “Thousand Years of Wisdom, from the Middle Ages to the 21<sup>st</sup> century” aiming at applying Information and Communication Technologies to the Convent of Christ by creating new products, services and applications.

A new digital library is being created as a result either of digitization of some items or as an aggregation of scanned items. Those include contents such as texts (printed or hand written), maps, iconography, videos about the Convent of Christ or others. The concept is to replicate this experience at the Convent of Christ to other monasteries in the Route, as well as to any other European cultural heritage that is somehow connected through themes such as Art and Architecture, Religious Orders and Military Religious Orders (Cister Order, Templar Order and the Order of Christ), the Dynasty of Avis, the Discoveries, the Renaissance, the main battle grounds.

In this article, we will shed light on the information concerning the Route’s Monasteries, the way this information will be retrieved and organized in a database that will fulfill the requirements posed by Europeana in terms of metadata. Finally, we will focus on a group of new products and services that can be offered to the citizens.

## **2. Objectives**

Monasteries are groups of buildings concentrating richness, complexity and thematic multiplicity both within themselves and in terms of urban and territorial development. In the Middle Ages, large part of the economy, society and culture evolved around the monasteries. Monasteries were centers of territorial structuring and development that were based on the interaction of religious communities, and often military communities with the local community. In this globalization era, they will contribute to sustainable development, as well as social integration.

What better lessons can contemporary man draw from its heritage and cultural inheritance if not from the monasteries and their legacies?

As a matter of fact, their meaning throughout the ages constitute a reference of values with a remarkable meaning today, as keys to the transformation of “old” values into “new” values, and study centers that Religious Orders helped to develop.

There isn’t in Portugal an integrated collection to be made available to the public, as its photographic, documentary and artistic holdings are spread in different places as a result of conflicts and natural disasters. The purpose of this work was therefore to create a digital library with contents from world heritage monasteries.

## **3. Methodology**

Civil, military and religious entities, public and private, national and international are involved in collecting information for the Route.

As far as technology is concerned, digital libraries are one of the most advanced and complex systems of information, as they often involve collaborative support, digital

preservation of documents, database management, hypertext, information filtration and retrieval, instruction modules, copyrights and intellectual property rights, multimedia information services, reference systems, resource research and selective dissemination of information.

A new look into traditional library information services will only be possible as a result of the digital preservation of contents in two different perspectives: digitizing physical documents and preserving web documents. Within this context, search engines are a priority element in the new paradigm of knowledge creation, as they can capture, store and give access to resources, while making a digital library available in each computer with internet access.

#### 4. Technology Description

The development of digital libraries dates back several years but, in the beginning they were confined to the digitalization of contents. In 1996 it was created the Internet Archive, the first Project of digitalization of webpages. In the next Figure 1 it is possible to observe different versions kept in the Internet Archive from the Google website.

Search Results for Jan 01, 1996 - Nov 09, 2008											
1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
2 pages	12 pages	73 pages	685 pages	154 pages	61 pages	205 pages	910 pages	348 pages	458 pages	24 pages	
Nov.11.1998	Jan.17.1999	Feb.29.2000	Jan.18.2001	Jan.23.2002	Feb.02.2003	Jan.03.2004	Jan.01.2005	Jan.01.2006	Jan.01.2007	Jan.02.2008	*
Dec.02.1998	Jan.25.1999	Mar.01.2000	Jan.19.2001	Jan.24.2002	Feb.04.2003	Jan.13.2004	Jan.01.2005	Jan.01.2006	Jan.01.2007	Jan.02.2008	*
	Feb.08.1999	Mar.01.2000	Jan.19.2001	Jan.24.2002	Feb.05.2003	Jan.21.2004	Jan.02.2005	Jan.01.2006	Jan.02.2007	Jan.14.2008	*
	Apr.22.1999	Mar.02.2000	Jan.19.2001	Feb.06.2002	Feb.08.2003	Jan.26.2004	Jan.02.2005	Jan.02.2006	Jan.02.2007	Jan.16.2008	*
	Apr.23.1999	Mar.03.2000	Jan.19.2001	Feb.22.2002	Feb.14.2003	Jan.29.2004	Jan.03.2005	Jan.02.2006	Jan.03.2007	Jan.19.2008	*
	Apr.27.1999	Mar.04.2000	Jan.19.2001	Feb.23.2002	Feb.15.2003	Feb.08.2004	Jan.05.2005	Jan.03.2006	Jan.03.2007	Jan.22.2008	*
	Apr.28.1999	Apr.07.2000	Jan.19.2001	Mar.31.2002	Feb.17.2003	Feb.11.2004	Jan.06.2005	Jan.03.2006	Jan.04.2007	Jan.28.2008	*
	May.08.1999	Apr.08.2000	Jan.19.2001	Apr.02.2002	Feb.17.2003	Feb.15.2004	Jan.06.2005	Jan.03.2006	Jan.04.2007	Feb.07.2008	*
	Oct.01.1999	Apr.09.2000	Jan.19.2001	May.23.2002	Mar.24.2003	Feb.18.2004	Jan.07.2005	Jan.03.2006	Jan.05.2007	Feb.08.2008	*
	Oct.12.1999	May.10.2000	Feb.01.2001	May.25.2002	Mar.28.2003	Feb.25.2004	Jan.07.2005	Jan.03.2006	Jan.05.2007	Feb.09.2008	*
	Nov.06.1999	May.10.2000	Feb.24.2001	Jun.02.2002	Mar.29.2003	Feb.27.2004	Jan.07.2005	Jan.04.2006	Jan.06.2007	Feb.11.2008	*
	Nov.29.1999	May.10.2000	Feb.26.2001	Jun.04.2002	Apr.02.2003	Mar.06.2004	Jan.08.2005	Jan.04.2006	Jan.06.2007	Feb.13.2008	*

Figure 1 Results obtained in the Internet Archive for google website.

Afterwards, the boom and the use of the Internet never ceased to increase. Internet is considered today a huge information center, nevertheless not yet a Digital Library due to the disappearance of millions of webpages, usually 44 days after its creation.

In this extremely quick and permanent evolution and the almost exclusive characteristic of the publication of the online contents, most projects are focused only on the process of digitalization. If nothing is done to prevent the situation a great number of web contents will disappear, thus making the web a one-dimensional (Figure 2) space with only one version of each page.

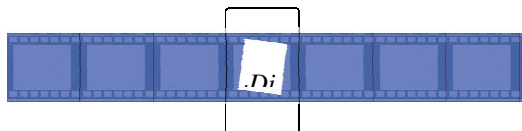


Figure 2 One Dimensional Web.

A new perspective to promote these Digital Libraries assumes two forms: physical digitalization and preservation of web pages, both of considerable growth in the coming years [3].

At an international level a number of initiatives in the area of web preservation (see table 1) have been explored and led by research teams, yet restricted to the capture of a specific team or area of research, but none in the field of history and culture. Our project is

therefore centered in the contribution to the preservation of digital culture and knowledge protection and by doing so preventing the loss or disappearance of contents.

Such preservation will enable future users and researchers to analyze history and culture and its evolution through centuries or just allow access to information of a page no longer existing.

*Table 1: List of web archive initiatives*

<b>Country, Project, Website</b>	<b>Leader of the Project, Website</b>
Sweden, Kulturarw3, --	Swedish Royal Archive, <a href="http://www.kb.se/ENG/kbstart.htm">www.kb.se/ENG/kbstart.htm</a>
Finland, EVA, <a href="http://www.lib.helsinki.fi/eva/english.html">http://www.lib.helsinki.fi/eva/english.html</a>	Helsinki University Library, <a href="http://www.lib.helsinki.fi/english/">http://www.lib.helsinki.fi/english/</a>
Denmark, NetArchive, <a href="http://netarchive.dk/">http://netarchive.dk/</a>	Kongelige Bibliotek, <a href="http://www.kb.dk/index-en.htm">http://www.kb.dk/index-en.htm</a> The State and University Library, <a href="http://www.statsbiblioteket.dk/english/">http://www.statsbiblioteket.dk/english/</a>
Australia, Pandora, <a href="http://pandora.nla.gov.au/index.html">http://pandora.nla.gov.au/index.html</a>	National Library of Australia, <a href="http://www.nla.gov.au/">http://www.nla.gov.au/</a>
Canada, E-Collection, <a href="http://www.lac-bac.gc.ca/electroniccollection/003008-300-e.html">http://www.lac-bac.gc.ca/electroniccollection/003008-300-e.html</a>	Library and Archives, <a href="http://www.collectionscanada.ca/index-e.html">http://www.collectionscanada.ca/index-e.html</a>
Austria, AOLA, <a href="http://www.ifs.tuwien.ac.at/~aola">http://www.ifs.tuwien.ac.at/~aola</a>	Austrian National Library, <a href="http://www.onb.ac.at">http://www.onb.ac.at</a> Information Software and Engineering Group, <a href="http://www.ifs.tuwien.ac.at">http://www.ifs.tuwien.ac.at</a>
France, --, --	Bibliothèque Nationale de France, <a href="http://www.bnf.fr/">http://www.bnf.fr/</a> French National Institute for Research in Computer Science and Automatic Control, <a href="http://www.inria.fr/index.en.html">www.inria.fr/index.en.html</a>
Czech Republic, WebArchiv, <a href="http://en.webarchiv.cz/">http://en.webarchiv.cz/</a>	National Library of the Czech Republic, <a href="http://www.nkp.cz/en/index.php3">http://www.nkp.cz/en/index.php3</a>
Lithuania, AER, --	The Martynas Mažvydas National Library of Lithuania, <a href="http://www.lnb.lt/lnb/selectLanguage.do?language=en">http://www.lnb.lt/lnb/selectLanguage.do?language=en</a>
Netherlands, e-Depot, <a href="http://www.kb.nl/dnp/e-depot/dm/inleiding-en.html">http://www.kb.nl/dnp/e-depot/dm/inleiding-en.html</a>	Koninklijke Bibliotheek, <a href="http://www.kb.nl/">http://www.kb.nl/</a>
USA, Minerva, <a href="http://www.loc.gov/minerva">www.loc.gov/minerva</a>	The Library of Congress, <a href="http://www.loc.gov/index.html">http://www.loc.gov/index.html</a>
USA, Internet Archive, <a href="http://web.archive.org/">http://web.archive.org/</a>	<a href="http://www.archive.org">http://www.archive.org</a>
Portugal, Tomba, <a href="http://tomba.tumba.pt/">http://tomba.tumba.pt/</a>	XLDB – University of Lisbon, <a href="http://xldb.fc.ul.pt/">http://xldb.fc.ul.pt/</a>

We propose a system (see Figure 3) designed for research, collection, preservation and retrieval of information in this specific area based on the digitization of physical material and on the preservation of digital contents. Considering the main area of interest of this project the retrieval of information in a first phase should be based upon a selective capture of contents by opposition to a random selection.

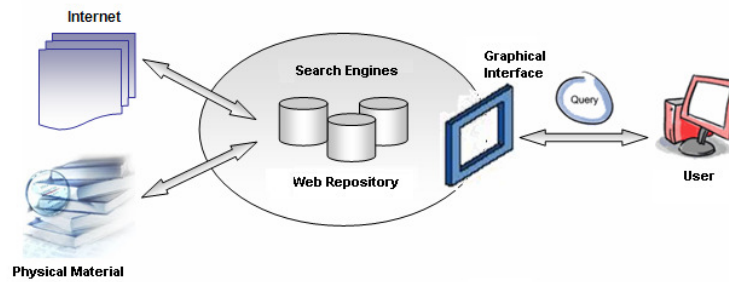


Figure 3: Architecture.

If it is true that the existence of the Digital Library within information systems is a step forward in the contents preservation it is no less true that it should be executed with a clear definition of an access online to the resources [4].

In this context a research system is a key element for a new paradigm of the creation of knowledge when it captures, stores and displays accesses to resources creates a new digital library in each computer with access to the Internet.

The system is designed to allow the management of digital objects including text, images, audio and video, metadata, the access and display of such items and a database for the users to search and browse through metadata in the personalized indexes. It also allows advanced search through free text in full text documents, visualize digital objects and store, print and send by email the desired registers thus allowing managing a great variety of digital objects in different formats such as: text (DOC, PDF, RTF); image (GIF, JPEG, TIFF); audio (MP3, RAM, WAV); and video (MPG, QuickTime, RM).

The system is based on item cataloguing through the use of metadata. Today coexist different standards of metadata differentiated by the number of elements, its characteristics, the language code[6] and so on.

For this specific project we consider more adequate to the development of the Digital Library of the Convent of Christ the use of the structure Dublin Core identified by the ISO 15836-2003 e NISO Z39.85-2001.

This structure has been developed since 1995 with the objective of improving the research of digital contents and received the contribution of librarians, digital libraries researchers, contents specialists and metadata experts [7]. This Content Management System (CMS) has two levels – simple Dublin Core and Qualified Dublin Core.

The simple Dublin Core has 15 elements and the Qualified Dublin Core has 18 as well as a group of descriptors making the search more accurate [7]. Dublin Core metadata structure is translated into 25 languages, including Portuguese, and has already been adopted formally by 7 governments [8].

This metadata structure code may be achieved through meta elements HTML/XHTML [9], using the language XML [10] or the language RDF/XML [11].

The Illinois Digital Cultural Heritage Community Project, The Networked Digital Library of Theses and Dissertations, The Iowa Digital Library, The National Library of New Zealand, The Thomas McGreevy Archive and the Europeana are already among a great number of digital libraries using the standard Dublin Core.

The Europeana was launched by the European Commission in 2005 to open to the citizens the scientific and cultural heritage of the 27 member states. Through this portal is possible to search, and simultaneously browse, the digitalized collection of European libraries, archives and museums. The need to ensure that the Convent of Christ Digital Library is accessed through Europeana (<http://www.europeana.eu>) made us consider, from the very beginning, all the metadata fields (see Table 2) as defined by Europeana Semantic Elements (ESE).

Table 2: the Europeana Semantic Elements (ESE) [12]

Element	Refinements	Data Set	Definition
Title		DCMES	A name given to the resource.
	title alternative	DCMES	An alternative name for the resource.
creator		DCMES	An entity primarily responsible for making the resource.
subject		DCMES	The topic of the resource
description		DCMES	An account of the resource.
	tableOfContents	DCMES	A list of subunits of the resource.
publisher		DCMES	An entity responsible for making the resource available.
contributor		DCMES	An entity responsible for making contributions to the resource.
date		DCMES	A point or period of time associated with an event in the lifecycle of the resource.
	created	DCMES	Date of creation of the resource.
	issued	DCMES	Date of formal issuance (e.g., publication) of the resource.
type		DCMES	The nature or genre of the resource.
format		DCMES	The file format, physical medium or dimensions of the resource.
	extend	DCMES	The size or duration of the resource.
	medium	DCMES	The material or physical carrier of the resource.
identifier		DCMES	An unambiguous reference to the resource within a given context.
source		DCMES	A related resource from which the described resource is derived in whole or in part.
language		DCMES	A language of the resource.
relation		DCMES	A related resource.
	isVersionOf	DCMES	A related resource of which the described resource is a version, edition, or adaptation.
	hasVersion	DCMES	A related resource that is a version, edition, or adaptation of the described resource.
	isReplacedBy	DCMES	A related resource that supplants, displaces, or supersedes the described resource.
	Replaces	DCMES	A related resource that is supplanted, displaced, or superseded by the described resource.
	isRequiredBy	DCMES	A related resource that requires the described resource to support its function, delivery or coherence.
	Requires	DCMES	A related resource that is required by the described resource to support its function, delivery or coherence.
	isPartOf	DCMES	A related resource in which the described resource is physically or logically included.
	hasPart	DCMES	A related resource that is included either physically or logically in the described resource.
	isReferencedBy	DCMES	A related resource that references, cites, or otherwise points to the described resource.
	References	DCMES	A related resource that is referenced, cited, or otherwise pointed to by the described resource.
	isFormatOf	DCMES	A related resource that is substantially the same as the described resource, but in another format.
	hasFormat	DCMES	A related resource that is substantially the same as the pre-existing described resource, but in another format.
	conformsTo	DCMES	An established standard to which the described resource conforms.
	Is Shown By	Europeana	An unambiguous URL reference to the digital object

		on the content provider's web site in the best available resolution/quality.
isShownAt	Europeana	An unambiguous URL reference to the digital object on the content provider's web site in its full information context.
coverage	DCMES	The spatial or temporal topic of the resource, the spatial applicability of the resource, or the jurisdiction under which the resource is relevant.
spatial	DCMES	Spatial characteristics of the resource.
temporal	DCMES	Temporal characteristics of the resource.
rights	DCMES	Information about rights held in and over the resource.
provenance	DCMES	A statement of any changes in ownership and custody of the resource since its creation that are significant for its authenticity, integrity and interpretation.
userTag	Europeana	This is a tag created by a user through the Europeana interface.
unstored	Europeana	This is a container element which includes all relevant information that otherwise cannot be mapped to another element in the ESE.
object	Europeana	An unambiguous URL (not URI) reference to the digital object in the best resolution available on the content provider's web site to generate a thumbnail or sample.
language	Europeana	A language assigned to the resource with reference to the content provider.
provider	Europeana	Name of the organization that holds the digital object (digitized or born digital).
type	Europeana	The general type of the resource.
uri	Europeana	An unambiguous URI to the resource within Europeana's context.
year	Europeana	A point or period of time associated with an event in the life of the original analog or born digital object.
hasObject	Europeana	Indicates the availability of thumbnails of digital objects for the Europeana system to understand and process them.
country	Europeana	This is the name of the country in which the content provider is based or "Europe" in the case of Europe-wide projects.

## 5. Developments




In the very beginning of the project, it was developed a database using Simple Dublin Core (see Figure 4) which enabled the store of all digital resources related to the Convent of Christ during the development of its portal ([www.conventocristo.pt](http://www.conventocristo.pt))

## REGISTO DE RECURSOS DIGITAIS

Tipo  Data   
 Título   
 Assunto   
 Fonte   
 Direitos   
 Relação   
 Editor   
 Língua   
 Identificador   
 Formato   
 Descrição   
 Criador   
 Cobertura   
 Outro contribuinte   
 Observações   
 Localização   
 Monumento:

Figure 4: Registration form for digital contents of the Convent of Christ

To meet the standards of the Europeana, the missed metadata fields were added and an insert content system was developed (see Figure 5).

Bem-Vindo, Administrador  
[Logout](#)

GERAL ▾ CONTEÚDOS ▾ COMPONENTES ▾ AJUDA ▾

Página Inicial » Conteúdos » Biblioteca Digital

### Inserção de conteúdos digitais

|

**Título:**

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**Autor(es):**

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**Assunto:**

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**Descrição:**

Figure 5: Content insert resource layout



For those tasks, two web applications were developed and a database was created. The database was created using the open-source Sun (MySQL) for its clear advantages. The management of the database was made using phpMyAdmin.

We create front and back office applications to allow the user to browse or search the contents or to insert, add, edit or erase the contents in the system, given the necessary username and password. These tools also permit to define the profile of the users who can interact with the system, permissions and tasks, and all the system management, what it is called our Content Management System.

## 6. Results

To meet the needs of the information about world heritage monasteries in Portugal, of which Convent of Christ is part, together with Alcobaça, Batalha and Jerónimos, is a huge task requiring different levels of simultaneous search of diversified and dispersed information. This can be achieved through creating virtual exhibitions or participating in exhibitions or searching the digital library throughout the world.

One of the strategic objectives of the Portuguese Institute for Management of the Architectural and Archaeological Heritage, IGESPAR, concerns the Education for Heritage and it is part of the European recommendation<sup>1</sup> to reinforce citizenship and European identity.

The digital library created at the world heritage monument, Convent of Christ, is designed to be accessible to the public in general but also to teachers, students and researchers enhancing the sharing of data to a universal level. It also allows that the contents of important libraries such as the Convent of Mafra and University of Coimbra can be linked to this Library with benefits for all citizens.



Figure 6: Digital Library of the Convent of Christ

<sup>1</sup> Recommendation No R (98) 5 concerning heritage education, adopted by the Committee of Ministers on 17 March 1998.

## **7. Business Benefits**

The creation of a Digital Library of the Convent of Christ generates business benefits namely in what concerns the development of a diversified offer of new services and products in a perspective both cultural and tourist.

New specific merchandising products can be designed with an innovative and artistic spirit. As an example, we may refer the creation of items based on the iconography of the Templar rotunda or from the cross of the Christ or the cross of the Temple or from a selection of a variety of the mythology and Angels, among others that the monument displays. Another example can be the selling of facsimile documents.

Also, thinking about tourism, we can associate to the monasteries route different packages of cultural and environmental touring. For example, from an advanced search on the digital library, it can be selected a theme that enable the visitor to prepare a personalized tour. Again as an example, we have themes related to the Orders of Templars, Christ and Cister, architectural, artistic and scientific, and also relating to personalities so important as Henry the Navigator, or Pedro and Ines and their tragic love story.

## **8. Conclusions**

The Digital Library of the Convent of Christ can improve services, as well as the quantity and quality of digital contents, and provide access to cultural assets that were previously scattered or not scanned. As a result, a considerable part of our European collective memory will be available online for study, research, creativity, learning and leisure.

Besides, this system will enable citizens to appreciate their heritage along their lives in a multicultural and Multilanguage context. Online access to the richness and diversity of our European culture will ensure its protection from irreparable damage. The results of scientific intervention, conservation and restoration of built heritage, studies, research, articles in journals, presentations, proceedings monographs, and books will be compiled and included in the digital library. Scientific information that is spread out in various higher education institutions will be compiled, while scientific discoveries will be made available.

As a consequence, all citizens will have to gain from being able to visit the monasteries from their homes or from their classrooms in preparation of the real visit.

As more metadata is added to fulfill the requirements of Europeana, more information will be available about European heritage.

Besides, this cultural material provides new value-added services and contributes to the increase of sectors like tourism, education and the media. Cultural contents for education and lifelong learning will be improved, which will also be reflected in cultural and creative skills.

The “corpus” to be created will serve the existing public and create a new public, will shed light into different epochs of fundamental importance for the History of Mankind and will become a repository of modern studies for researchers, scientists and experts from all over the world.

The existence of a digital library will ensure a renewed interest not only in our monumental complex – the largest in Europe – but also as a way of preserving eternal values such as memory, authenticity and identity that are common to different countries and continents.

The objective is to apply the example of the Convent of Christ to other monuments, namely the Mafra Convent and others. The library of the Convent of Mafra has over 40.000 books of major importance and rivals, in grandeur, with the greatest Libraries in the world.

This project is also meant to involve other European institutions in a network of crucial importance to the access to European cultural heritage and scientific knowledge.

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