DELIVERABLE

Project Acronym: CARARE
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D1.8 - Final Report

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Table of Contents

1 Project Objectives

CARARE has set out to put in place an infrastructure that will continue to increase the archaeological and architectural content available to Europeana by involving and supporting Europe's heritage national agencies and archaeological research institutions, museums and specialist digital archives. The project aimed to demonstrate the contribution to be made to Europeana by content from these institutions. At the same time, the project has sought to establish a network of institutions and people with the skills, expertise and motivation required to support researchers, archaeological field units, site museums and local institutions throughout Europe to make their content available.

Over its three year duration, this Best Practice Network has acted to improve the interoperability of the digital content held by archaeological and architectural institutions and make it accessible through the CARARE aggregation service to Europeana and in principle to other services, helping establish a network of interoperable OAI-PMH compliant repositories and content management systems.

CARARE has worked with Europeana to make 3D content accessible to Europeana's users and to demonstrate the potential for map-based search services for tourism and mobile applications. It has sought to work with Europeana to establish efficient and sustainable processes through which institutions can easily make their content available during and after the project, by defining the CARARE metadata schema as an EDM compliant application profile for the domain, promoting the use of the MINT tool and OAI-PMH repositories for metadata harvesting, establishing the MORE repository and a workflow from content provider to Europeana, and by promoting the Europeana Data Exchange agreement and the acceptance of the CC0 licence for metadata and in this way the move forward to semantically-enriched linked open data.

2 Consortium

The CARARE consortium was established with a set of partners with the profile needed for a best practice network of this kind including:

- A financial coordinator, the Danish Agency for Culture

- A project manager/scientific co-ordinator and experienced dissemination leader with responsibility for development and maintenance of the project information service and monitoring progress (MDR Partners).

- The Europeana Foundation, which provided technical, standards and other advice on interoperability with its infrastructure, and which supported the development of the Europeana Network and the framework for sustainability and expansion.

- Two technical partners (the National Technical University of Athens and the Digital Curation Unit of the Athena Research Foundation) responsible for providing the components of the CARARE aggregation service (MINT and MORE) and for providing support and technical advice to content in order to help them establish interoperability between their content repositories and the metadata mapping and ingestion tools of the CARARE service.

- One training partner (Asplan Viak Internet) with responsibility for delivering training to partners in order to enable them to install and operate the necessary tools, such as OAI-PMH repositories and to provide their content to Europeana via MINT and MORE.

- One partner with specialist expertise in 3D, Visual Dimension who provided advice, training and support to partners on preparing their 3D content for Europeana and business expertise.

- One partner with business expertise, N303, who provided input to the ongoing work on sustainability and business models

- One major institution in each of the 20 participating countries able to provide a substantial body of digital content and the capacity to implement the architecture and tools defined by CARARE for interoperability with Europeana. In several countries the CARARE partner worked in association with local content holders to provide an aggregation service at national level, which it then made interoperable with CARARE.

A full list of partners can be found at:

http://www.carare.eu/eng/About/Partners

3   Project Achievements

CARARE achieved a considerable success in having over 2 million items ingested by Europeana by the end of the project in spring 2013. This figure represents around 10% of all the content now accessible through Europeana. CARARE's contribution also provides a critical mass of content relating to archaeological monuments and historical buildings in Europe and a significant amount of 3D content.

At the start of the project, partners completed a content survey in which they identified 80 separate collections. These varied considerably in size and in terms of their "readiness" to be made available to Europeana and its users. Only 44 of the collections were available online; more than 55 different metadata schemas were in use; and metadata could be exported or remotely accessed from only 35 of the collections. By the end of the project, CARARE partners had successfully published content metadata for 75 separate collections in Europeana and their digital content available online for end-users to enjoy.

CARARE established an aggregation service and importantly a workflow for metadata harvesting from the content providers' repositories to Europeana. It defined the CARARE metadata schema as a harvesting protocol for the archaeological and architectural heritage domain and the schema is fully interoperable with the Europeana Data Model (EDM). CARARE has been one the first projects to implement EDM and is currently the largest provider of EDM metadata to Europeana.

Another achievements has been establishing 3D in www.europeana.eu. Understandably one of Europeana's goals is to promote the use of standard content formats to minimise the need for users to install plugins before viewing content. CARARE recommended 3D-PDFas a format suitable for publishing 3D models with contextual information for Europeana and its users. By working to promote the adoption of 3D-PDF by content institutions and other projects CARARE has had impact beyond the project consortium.

Notably CARARE has established a pilot map-based search interface. This demonstrates the potential for developing route planning and mobile applications for Europeana. The application also realises a long-held ambition amongst researchers and conservation managers of bringing together archaeological sites and monuments from across Europe in a common point of access and of enabling research across borders.

4 Target users and their needs

The main target user groups for CARARE were:

- Heritage agencies, archaeological museums, digital archives and aggregators of cultural content from archaeological or architectural research across Europe, who wished to establish interoperable services and needed sustainable methods by which to make their content available to Europeana and for wider exposure to users

- European and national policy makers who wished to see Europeana incorporate a critical mass of content and provide successful services based on that.

- National policy makers who wished to promote the archaeological and architectural heritage of their region and its conservation to audiences for tourism, education and research of all kinds.

- End users including researchers, students and teachers, tourists and visitors who seek easy and reliable access to content in their field of interest, especially those with an interest in the archaeological and architectural heritage, and the historic localities of Europe.

Partners in CARARE faced a variety of technical and organisational challenges including:

- those associated with OAI-PMH infrastructure and content management systems

- complying with international metadata and standards

- availability of qualified staff

- finance

- copyright/IPR issues

- issues related to making very large 3D models in bespoke formats accessible for general public users.

Target users attending a national workshop

5 Underlying content

The content made available by the CARARE network has added substantial value to Europeana and its users, by:

- greatly expanding and enriching the range of freely available and accessible content for archaeological sites, monuments and historically important buildings to be found by users through the Europeana portal, including items of World, European and National Heritage importance ('treasures');

- providing a significant mass of geographically referenced content sourced from heritage agencies and in this way increasing the potential for Europeana to develop map-based services and mobile applications for tourism, education and other uses;

- establishing 3D as a content type in Europeana and 3D-PDF as a user friendly, accessible format suitable for adoption by content providing institutions;

- including material relevant to the unique archaeological and architectural heritage from Member States previously under-represented in Europeana's coverage.

Cerveny Kamen Castle, Slovak Republic

6   Summary of activities

A summary of the activities that were carried out within CARARE is as follows:

- <u>A review of existing content and practice</u>. During the first year of the project surveys were carried out to determine the range of available content and metadata, the formats, repositories in use, online availability and support for remote harvesting in the participating heritage agencies, research institutions and digital archives;

- <u>Defining a metadata schema and approach for mapping and normalization.</u> Following an investigation of the existing standardized metadata schemas (including MIDAS, LIDO and the CIDOC CRM) and the metadata available from content partners, the CARARE metadata schema was defined, documented and made available as an XSD for use in the CARARE aggregation service in the first year of the project. During the second year of the project work was completed with Europeana to establish a process, coded in an XSLT, by which CARARE metadata was transformed to the Europeana Data Model (EDM) format and normalized for ingestion to the Europeana portal;

- <u>Establishing an aggregation service.</u> The overall technical architecture for the CARARE aggregator included the MINT metadata mapping and ingestion tool developed by the National Technical University of Athens, and the MORE repository developed by the Digital Curation Unit of the Athena Research Centre. Both components were customized for CARARE involving the installation of the CARARE metadata schema, defining the workflow to support the transfer of packages of metadata from MINT and their ingestion to MORE, establishing preview services for content providers of their metadata in EDM, ESE and Europeana, enrichment services, statistical tools and quality assurance, and implementing an OAI-PMH target to enable harvesting of the content by Europeana;

- <u>Training and knowledge transfer.</u> CARARE ran a series of training workshops to support content providers in preparing their content and metadata for harvesting. The first series of workshops covered installing and configuring OAI-PMH repository software, understanding the CARARE metadata schema and Europeana metadata models, extracting local data into XML files, using the MINT metadata mapping and ingestion tool, and using the CARARE MORE repository. Additional workshops were offered on preparing 3D content for online publication and geographic information. Participants in the workshops shared experiences, good practices and also problems encountered in the process of implementing OAI-PMH metadata harvesting infrastructure. Training materials, documentation and case studies were made available on the project website, and a Support Basecamp was established to enable partners to ask for help and to receive answers both from technical partners and fellow content providers. A strong base of knowledge and expertise was built up in this way;

- Content providers' workflow A strong base of knowledge was gained through the preparatory work and carried out in the first year of CARARE and the subsequent testing of the repositories, metadata and metadata mappings. By the end of the first year, the great majority of CARARE partners were able to build on this base and were either uploading their metadata to MINT and mapping the elements to the CARARE or configuring an XML export in CARARE schema format from their native repositories. Partners were able to use the statistics and preview services provided in the MINT tool to validate their mappings before publication to the MORE repository. Following ingestion to MORE and transformation of their metadata into EDM format and enrichment, content providers were able to make further quality assurance checks before harvesting by Europeana;

- Test bed for EDM. CARARE was the first project to provide EDM metadata to Europeana as part of its live harvesting services and has acted as a 'test bed' for Europeana while work has been underway to implement EDM in Europeana's ingestion toolkit and user interfaces;

- Content harvesting, aggregation and ingestion. The second year saw the launching of the main implementation phase of the project according to a timetable and plan established as part of the project's overall planning. By the end of 2011 Europeana had harvested the first content from the CARARE aggregator, with the first 3D content being made available by the middle of 2012 and most of the remainder coming on stream during 2012. Many of the partners are continuing to make updates and new content available for subsequent ingestion by Europeana;

- 3D. CARARE has worked with Europeana to establish a methodology for 3D content to be offered to Europeana's users. The project has recommended 3D-PDF as a user-friendly publication format while new technologies such as HTML5 and GML are evolving. 3D-PDF has been widely accepted by as a good presentation format that allows 3D models to be encapsulated and presented to users with contextual information and links to viewpoints within models. The format has been adopted in CARARE and other Europeana related projects such as 3D-ICONS and Protage. As part of the process, Europeana has updated the EDM (and also the Europeana Semantic Elements or ESE) document, its content checker and ingestion toolkit and the end-user interface to enable the inclusion of 3D as a content type;

- Geographic information. Following a review and analysis of the geographic information services made available through the Europeana Connect project, and of the potential to enrich place-name services in Europeana through data provided by CARARE partners a pilot web-mapping system was developed and made available through the project website. The pilot service is based on CARARE data accessed through the Europeana API (application programming interface) and coordinate data from the CARARE repository. It provides a demonstration for Europeana of the

potential for browsing and searching data via a map interface, and of a mobile application and a route planning application that allows users to plan a walk along a route and be provided with information about the historic buildings and archaeological sites along their route.

- <u>Dissemination and awareness raising</u> was an important aspect of activities of CARARE. Partners were encouraged to become active members of the Europeana Network with several going on to participate in working groups on Users, Sustainability and Technical issues. The Europeana Data Exchange Agreement, the Public Domain Charter and the potential of Linked Open Data were actively promoted to the CARARE network; all members of the CARARE consortium and their content providers have signed the Europeana Data Agreement and are making their metadata available under the public domain licence. A project website www.carare.eu was established in line with Europeana branding and design guidelines and was continuously developed throughout the project with key documentation and resources being published. Project news and information was disseminated to the wider network and community through a regular newsletter and online channels including Twitter, Facebook and LinkedIn.   A key activity and focus for CARARE in the third year of the project involved the organisation of national meetings in each participating country in which the project's results and Europeana were disseminated to important actors in the national cultural heritage sector. A final project conference was organised to bring together CARARE partners, stakeholders and related initiatives to share results, success stories, experiences and to discuss future activities.   In addition to these events, CARARE partners have also participated in a number of national and international events to promote their experiences more widely;

Sharing success stories at the CARARE final conference

7 Impact and sustainability

In all, CARARE has been a pioneering project within the Europeana 'family'. The following summarises its main areas of impact:

- a leading contributor of content to Europeana, demonstrating the important contribution to be made by heritage agencies responsible for the conservation, management and promotion of archaeological and architectural heritage sites;

- an aggregation service for Europeana, playing a key role in establishing a workflow and methodology for content providers to enable them to make their metadata interoperable on a European level;

- through its representation in 20 countries it has brought about an improvement in the geographical coverage of content in Europeana contributing content from countries such as Lithuania, Poland, the Czech Republic, Iceland, Denmark, Malta, Bulgaria and Romania which were previously under-represented in Europeana.

- Building a network and community of people and organisations with an interest and commitment in making digital content for the archaeological and architectural heritage interoperable and accessible to the broad public on European level.

- the first project to deliver data to Europeana in EDM format as part of its production workflow;

- played a key role in defining the functional specification for Europeana to include 3D content and in recommending best practices and publishing formatted for content providers;

- helped Europeana to demonstrate the potential of geographic information for developing new audiences and applications suitable for mobile devices;

- provided of input and feedback in support of the implementation of the Europeana Data Model (EDM) in Europeana tools, documentation and guidelines for content providers and aggregators;

- 100% of the organisations involved in CARARE have signed the Europeana Data Exchange Agreement and have made their metadata available as Linked Open Data;

Sustainability

Through this work, CARARE has supported the participating cultural institutions in establishing a sustainable repositories and harvesting infrastructure from which they can continue to provide their content to Europeana. With project funding, CARARE created a service for aggregating content from partners' repositories. The project has investigated

possible business models for Europeana aggregation services and contributed its findings to the on-going discussion amongst the Europeana network about sustainability. The diverse nature of the organisations who have participated in CARARE has provided a perspective on the evolving aggregation landscape, which includes regional and national aggregators, domain aggregators for libraries, museums and archives, and research infrastructures for the Arts and Humanities (such as DARIAH and Ariadne).

The experience of participating in CARARE and the commitment amongst partners to making their information resources available online and accessible to users has contributed to the emergence of spin-off projects, including 3D ICONS (a project to digitise world heritage sites in 3D) and LoCloud (a network which is focussing on making local heritage content available to Europeana's users). Several CARARE partners are participating in the Ariadne and DARIAH research infrastructures. Together these it is hoped these initiatives will contribute to the long-term sustainability of the MINT tool and the MORE repository.

An important vehicle for maintaining momentum will be the CARARE community interest group, which has been established. This group will meet, in collaboration with Ariadne, at the European Archaeologist's Association annual conference in September 2013. The Europeana Network in which CARARE partners are actively involved will also provide a substantial opportunity to continue discussion into digitisation and aggregation strategies and stakeholders.

8   Further information

A video promoting CARARE results is freely available from the website at:
http://www.carare.eu.

9 References

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