DELIVERABLE

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D.4.4.5 CARARE TECHNICAL WORKSHOPS REPORT

Revision: final

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Revision History

Revision	Date	Author	Organisation	Description
0.9	16.11.2011	Stein Runar Bergheim	AVINET	Final draft report
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Statement of originality:

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Contents

Executive Summary

CARARE will make available to Europeana content from the archaeology, geo-information and 3D domains and includes a wide range of content provider institutions.

The project will establish a central information space, the CARARE Repository, where metadata on digital objects held by content provider partners will be ingested, transformed to the Europeana Data Model and subsequently passed on to the Europeana team to be ingested into the Europeana information space.

To achieve the information flow necessary to meet this goal, content provider partners must perform a series of steps:

1. Extract metadata from their local collection management systems
2. Establish a web service capable of transporting the metadata
3. Ingest their metadata into the CARARE repository using the MINT tool

CARARE partners are cultural heritage professionals with varying degrees of knowledge about technical issues and a training program was therefore devised to facilitate the smooth implementation of the above steps.

The workshops provided presentations and hands-on training in topics including but not limited to: XML, databases, metadata extraction, metadata normalization, metadata enrichment, OAI-PMH, installation and configuration of Repox, management and harvesting of repositories, ingestion and mapping of metadata.

Three workshops were held during the spring of 2011 at different locations in Europe to minimize travel and time costs for partners. Following the summer holidays, a "refresher" workshop was provided during in September 2011. The latter workshop also introduced the proceedings of the CARARE metadata repository which had advanced considerably at this stage.

Workshops were attended by all CARARE partners.

Introduction

The purpose of the CARARE training workshops were to enable CARARE content providers to make metadata about the digital objects held in their collections available for ingestion/harvesting through a decentralized OAI-PMH infrastructure, subsequently to be ingested into the CARARE repository.

The workshops included the following topics:

- Extract data from local RDBMS-based collection management systems into XML
- Install and configure OAI-PMH repository software
- Understanding how to interpret and use the CARARE metadata schema
- Using the CARARE metadata Mapping and INgestion Tool (MINT) to map local metadata schemas to the CARARE schema and ingest them into the CARARE repository

The training was conducted as three regional workshops across Europe during the months of March, April, May and September 2011. All CARARE content provider partners were required to attend both one of the independently hosted workshops 1.1, 1.2 or 1.3 in addition to workshop 2 co-located with the CARARE plenary meeting in September 2011.

In this report, the training workshops are described in greater detail in terms of preparations and requirements, structure, content and follow-up activities as well as information on speakers. Attendance lists and agendas are provided in the appendices section.

Preparation Requirements

Before attending the technical training workshops, participants were required to prepare by conducting a number of simple steps as described below.

The training workshops were structured in so as to allow participants to work with their own data and "real" challenges they would later face when implementing the data exchange infrastructure in their own production platforms.

In order to maximize the content providers' learning benefit, the training team requested that each participant should take the following preparatory steps in lieu of the training workshops:

- Prepare a sample of the data held in their local collection management systems as XML-files or Excel worksheets
- Familiarize with reading materials according to a list supplied by the coordinator of the training workshops
- Bring along a portable computer with the same operating system as the production platform of each partner and ensure that the participants user account has sufficient privileges to install and configure server software

List of Recommended Reading

The following list of online resources was distributed to registered participants prior to the workshops to allow CARARE content provider partners to familiarize with key terms and concepts used in the training material and the workshop presentations. This would ensure that participants would have general knowledge of the domain so as to be able to better benefit from the detailed topics taught in the training workshops.

Open Archives Initiative documentation

The Open Archives Initiative (OAI) is responsible for development of among other standards the OAI-PMH protocol which is the chosen "transport" protocol for exchange of data between content providers and the CARARE repository as well as between the CARARE repository and Europeana:

- OAI-PMH Protocol documentation: http://www.openarchives.org/OAI/openarchivesprotocol.html
- Guidelines on practical implementation: http://www.openarchives.org/OAI/2.0/guidelines.htm

Repository software documentation

REPOX is the name of a repository management software developed within the Europeana family of projects by Instituto Superior Tecnico in Portugal. REPOX implements the OAI-PMH web service protocol and was for simplicity and uniformity chosen as the platform for which training would be given to CARARE content provider partners.

- REPOX documentation including installation and configuration instructions: http://repox.ist.utl.pt/doc/index.html

Metadata schema documentation

While OAI-PMH is the "transport" for content between local content providers and the CARARE repository, the CARARE metadata schema defines how the content should be encoded as a combination of XML elements, sourced from relevant vocabularies including CIDOC-CRM, Dublin Core, FOAF, and ISO 19115 etc. Content provider partners should be able to "map fields" from their collection management systems to corresponding entities in the CARARE metadata schema and must therefore have knowledge of the target elements in order to correctly interpret the mappings.

- An outline of version 1.0 of the CARARE metadata schema was made available at: http://www.carare.eu/eng/Resources/CARARE-metadata-schema-outline-v1.0

Guidelines and process documentation

In addition to the documentation directly relevant to the hands-on tasks addressed during the training workshops, CARARE also provide additional tools in to support of facilitating the metadata delivery process including, but not limited to the following documents:

- Overview of metadata mapping in the CARARE environment: http://www.carare.eu/eng/Media/Files/D2.2.3-Metadata-Mappings
- Briefing paper on the use of the CARARE metadata mapping and ingestion tool: http://www.carare.eu/eng/Media/Files/D3.4-Briefing-paper-on-metadata-mapping-and-the-use-of-mapping-tools
- Metadata mappings to commonly used schemes including MIDAS, LIDO, EDM and ESE: http://www.carare.eu/eng/Resources

Furthermore, CARARE provided a detailed workflow and business process for planning of each partner's implementation of content ingestion infrastructure from their local collection management systems into Europeana.

- The workflow documentation was made available at http://www.carare.eu/workflow

Additional reading material

Europeana Data Model (EDM) is the target data model to which the CARARE aggregator will provide metadata. Current documentation is very heavy – but fear not. The CARARE aggregation service will transform metadata into EDM format. First-hand knowledge of the Europeana Data Model was therefore not a prerequisite for attending the workshops – but the following documents were listed as "additional reading" for those with a particular interest in the subject matter:

- EDM Primer: http://version1.europeana.eu/c/document_library/get_file?uuid=718a3828-6468-4e94-a9e7-7945c55eec65&groupId=10605
- EDM Definition: http://version1.europeana.eu/c/document_library/get_file?uuid=aff89c92-b6ff-4373-a279-fc47b9af3af2&groupId=10605

Europeana Semantic Elements (ESE) was the first generation data model for delivery of metadata to Europeana. At the time of the workshops, this model had been deprecated and adopted into the EDM. The guidelines on metadata mapping and normalization were however still of value and were listed as "additional reading" as they were more user friendly than the most recent technical documentation concerning the EDM:

- ESE 3.3.1 http://group.europeana.eu/c/document_library/get_file?uuid=a830cb84-9e71-41d6-9ca3-cc36415d16f8&groupId=10602
- ESE Metadata mapping and normalization guidelines: http://version1.europeana.eu/c/document_library/get_file?uuid=0c69c667-967a-474c-bd75-e88caf3a4ac1&groupId=10602

Workshop Content

The workshops consisted of two sections:

1. Presentations and lectures providing background information on the technologies and of presentations followed by;
2. Guided exercises where trainers aided participants in performing the content ingestion steps using own or lab computers

The following topics were presented: databases, XML and metadata extraction; the concept of the OAI-PMH protocol; Repox repository software installation and configuration and; mapping metadata to the CARARE XML schema.

The following exercises were conducted: metadata extraction using PostgreSQL as an example; installation of virtual machine; installation of Repox; configuration of data source; test-harvesting.

The Content Provision Process

The selection of training modules and topics was largely guided by the steps required for a content provider to make metadata available for ingestion into the CARARE repository through a sustainable OAI-PMH infrastructure.

Providing content for Europeana requires a number of steps to be made in sequence

1. Extraction of metadata from local collection management systems
2. Installation, configuration and population of OAI-PMH repository
3. Uploading/harvesting metadata from local repository into the CARARE repository

Each of these steps requires content providers to familiarize with one or more standards and/or technologies, all of which are described in the following sections.
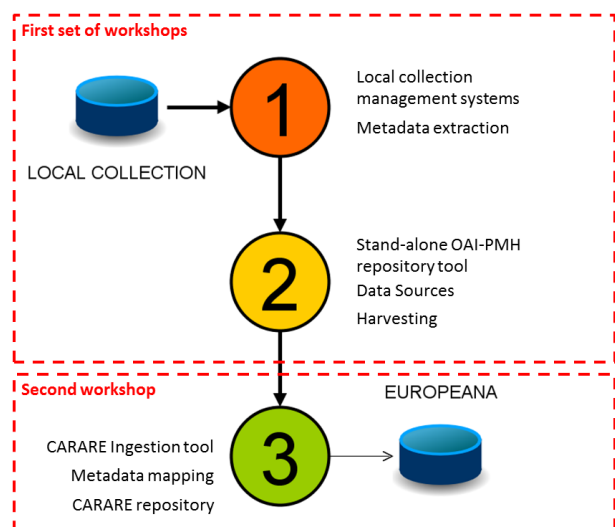

Data Extraction

Event: Workshops 1.1-3

It is an obvious challenge to establish an infrastructure capable of ingesting metadata from a wide range of distributed content providers who are heterogeneous both in terms of their metadata, their software and their skills and expertise in technical development.

The first step of the way is to create a data format which may be processed using the CARARE MINT tool. This requires content providers to extract metadata from their local collection management systems and write them to an XML-file. The training workshop did not include comprehensive data extraction exercises as content providers have different collection management systems, databases and operating systems. Exercises conducted on one platform would not necessarily have any knowledge transfer value to parties with other platforms than that used for demonstration.

The initial part of this session was dedicated to a "crash-course" in the terms, concepts and syntax of XML to ensure that content providers share a minimum technical vocabulary and understand required for the subsequent steps.

On-screen demonstrations were given of how data may be extracted from SQL-based relational database management systems into XML using built-in database commands such as "xmlelement", "xmlagg", "xmlforest" etc.

The main emphasis of this session was to demonstrate that data extraction, while requiring moderate technical skills, is not a very difficult task.

Additional topics covered included metadata normalization, metadata enrichment and the importance of interpretation of information at the time of extraction.

OAI-PMH

Event: Workshops 1.1-3

Once data extraction has been completed, the next challenge of the CARARE infrastructure is to set up a transport mechanism which makes it possible for data to be exchanged automatically between a central metadata store, the CARARE repository, and the content providers' collection management system.

The purpose of making this process automatic is to capture growth and changes in the local collections as they evolve over time – ensuring that the data exchange effort is not a manual one-time task – but a strategic infrastructure.

The Internet is the only conceivable way of transporting these data due to the distributed nature of the content providers and in order to enable the data to be ingested automatically, a web service should be present at each content provider, allowing a central metadata harvesting service to connect and download the metadata.

Web services can be structured in any number of ways – and in order to secure a harmonized approach, a common standard or protocol is necessary. Europeana has made a strategic decision to use OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting) for transport of metadata and CARARE consequently used the same.

By-and-by, OAI-PMH has become an ageing standard which primarily is tuned towards exchange of "records-based information". While this is in some contrast to the organic data structures of RDF/Linked Data, it fits quite well with the way data are created and managed within MLA institutions.

OAI-PMH is a protocol which allows metadata interoperability by harvesting metadata in "known formats" from (1) "metadata providers" to (2) "service providers". Most CARARE content providers will fit into the first of these two groups – but in order to understand the purpose of the infrastructure, it is also useful to know the mechanisms used by the "service providers".

Web services conforming to the OAI-PMH standard accepts six different functions known as "verbs". These are:

- Identify – provides an XML with high-level metadata about the repository
- ListMetadataFormats – provides an XML with a list of metadata formats are available in the repository
- ListSets – provides an XML with a list of "sets" available in the metadata repository given a metadata format
- ListIdentifiers – provides an XML with metadata record identifiers given filter criteria
- ListRecords – provides an XML with full metadata records given filter criteria
- GetRecord – provides an XML with one single full metadata record given an ID

Each of the above "verbs" were discussed and demonstrated in detail during both the presentations and the exercise, ensuring that all content providers had a solid background for the subsequent steps.

More information about OAI-PMH can be found at http://www.openarchives.org/pmh/
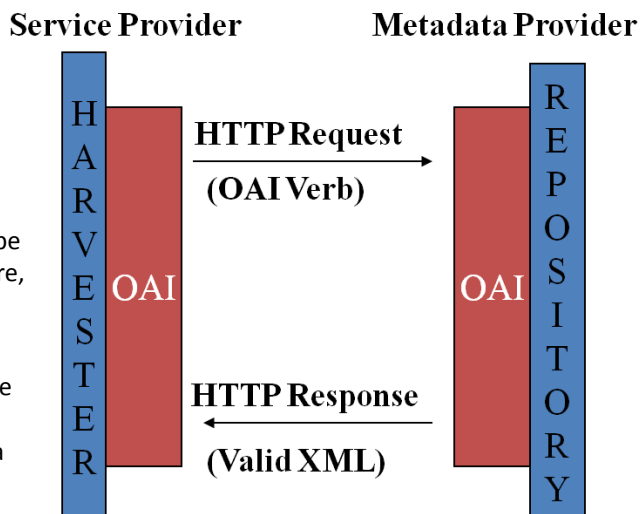
REPOX

Event: Workshops 1.1-3

Being a standard, OAI-PMH naturally has several implementations, many of which are comparable in performance and quality - but which may or may not be preferable to content providers depending on their existing collection management systems, databases, platforms.

For this reason, CARARE does not dictate a specific technology to be used – but for the purpose of training, a single software platform would have to be used. The choice fell on REPOX, an OAI-PMH repository software developed within the Europeana family of projects by the "Instituto Superior Tecnico" in Portugal.

The REPOX software is written in Java and comes as a single installation package complete with its own embedded web server (Jetty). Once installed, the software may be accessed through a web browser interface. It supports both metadata provider and service provider functionality and is, due to its compact nature, a very quick way to get started with OAI-PMH. During the workshops, partners without any prior experience in computer software installation managed to make it run on Windows, Linux and Mac platforms.

Using REPOX and a sample data, content providers were able to: (1) install and configure a repository; (2) create a data source and host the XML files extracted during the previous step and; (3) test all the OAI-PMH verbs on their own data.

More information about REPOX may be found at http://repox.ist.utl.pt/

CARARE Metadata Schema

Event: Workshops 1.1-3 and 2

Having completed the two first steps, "extraction" and "transport", the next logical step in the sequence is the mapping of source fields from local metadata formats to the elements of the CARARE metadata schema. At this stage, subject matter expertise is of greater importance than technical skills.
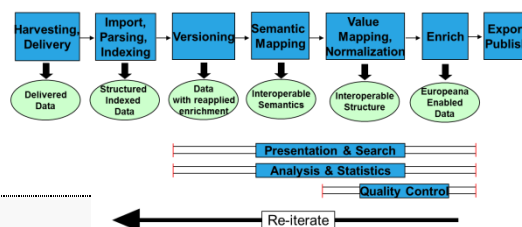
A comprehensive introduction to the elements of the CARARE metadata schema was given complete with real-world examples of interpretation.

Content providers raised interpretation issues they had experienced from working with their own data and

Metadata INgestion and mapping Tool (MINT)

Event: Workshops 1.1-3 and 2

The process of ingesting content from local repositories and establishing a mapping between metadata formats is potentially a very complex and demanding one –however, with the MINT tool developed by the National Technical University of Athens who is also a CARARE partner, the user threshold to perform such tasks is considerably leveraged.

An introduction to the tool and its principal functions was provided and exercises allowed CARARE content providers to ingest metadata from their repositories and map their local metadata formats to the CARARE metadata schema.

CARARE Repository

Event: Workshop 2

Europeana will not ingest content from individual CARARE content providers, rather metadata will be ingested from a centralized CARARE repository which in turn will harvest content from each content provider.

The CARARE repository is set up and managed by the partner DCU (Digital Curation Unit of the Athena Research Foundation) who also provided the presentations on the repository.

Follow-Up Activities

In follow-up to the training workshops, a number of tools were made available to content providers in support of their implementation activities:

- A special technical support section was added to the CARARE communication platform – Basecamp - where content providers could raise questions related to (1) infrastructure establishment and/or (2) metadata ingestion and mapping.
- A set of guidelines for mapping from local metadata schema to the CARARE metadata schema was prepared as a comprehensive PowerPoint presentation including.

Training Events

In order to split the CARARE content providers into groups of a suitable size for effective interaction, fit the schedules of more than twenty different institutions and minimize the time and cost of travel, the first set of (3) workshops were distributed over three geographic locations and a period of two months whereas the second workshop was co-located with a CARARE plenary meeting and repeated three times during the same day to allow for smaller groups.
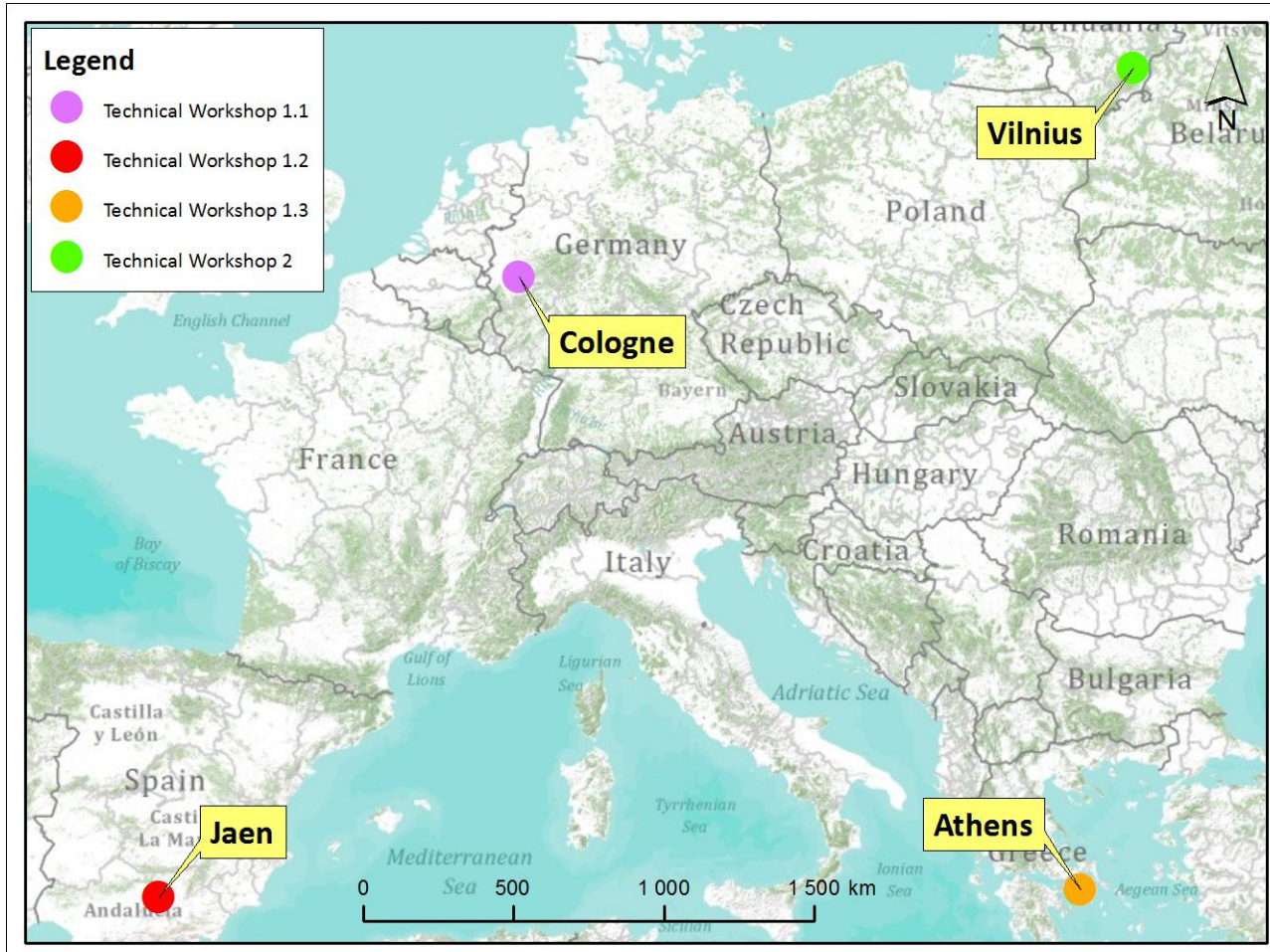
All events were hosted by CARARE partners who provided rooms, equipment and organized the on-site logistics of the training events.

Event Hosts

University of Cologne, Germany

Date: 30th – 31st of March
Place: Faculty of Arts and Humanities

The logistics and premises for **workshop 1.1** were organized by Mr Sven Ole Clemens, Scientific Coordinator for the CARARE project at the Archaeological Institute of the University of Cologne.

University of Jaen, Spain

Date: 6th – 7th of April
Place: Centro Andaluz de Arqueología Ibérica (CAAI)

The logistics and premises for **workshop 1.2** were organized by Dr Alberto Sanchez, Professor at the Centro Andaluz de Arqueología Ibérica and his colleagues.

National Technical University of Athens, Greece

Date: 3rd-4th of May
Place: Zografou Campus (Polytechnioupoli)

The logistics and premises for **workshop 1.3** were organized by Dr Vassilis Tzouvaras, of the National Technical University of Athens and his colleagues. Dr Tzouvaras has been closely involved with the development of the CARARE Metadata Mapping and INgestion Tool.

University of Vilnius, Lithuania

Date: 23rd of September
Place: Vilnius University Faculty of Communication

Workshop 2 was co-located with the CARARE plenary meeting, hosted by the University and the logistics and premises were organized by Ms Ingrida Vosyliute of Faculty of Communication of the Vilnius University.

Speakers

The following people provided presentations during the CARARE training workshops (in alphabetical order):

Speaker	Short-bio and topic of presentation
Alkemade, Henk (State Service for Cultural Heritage)	Mr Alkemade, Head of the e-Knowledge department at the Rijksdienst voor het Cultureel Erfgoed of the Netherlands, was coordinating the planning and execution of the technical training workshops.
Bergheim, Stein Runar (Asplan Viak Internet)	An all-rounder within information technology and geo-information, Bergheim has 14 years of experience from European projects and is currently taking part in several Europeana-related activities. Being at the helm of technical work packages in the EuropeanaLocal project, Bergheim has gained significant and relevant experience with implementation of OAI-PMH repositories. Bergheim was responsible for the execution of the workshops and delivered presentations and technical training on metadata extraction and OAI-PMH.
Dallas, Costis, Dr (Athena Research and Innovation Centre, DCU)	Dr Dallas is a professor of cultural heritage management and advanced technologies at the Department of Communication, Media and Culture of Panteion University. He is also a research fellow of the Digital Curation Unit - IMIS, *Athena Research Centre* in which capacity he is partner in the CARARE project. His responsibilities in the project include the specification, design and implementation of a repository-based architecture for the management, enrichment and curation of site, building and archaeological feature-related metadata. During workshops 1.3 and, Dr Dallas presented respectively the guidelines for mapping towards the CARARE metadata schema and the CARARE metadata repository, assisted by DCU colleague Dimitris Gavrillos.
Fernie, Kate (MDR Partners)	In addition to her role as project manager of CARARE and her professional background as an archaeologist Fernie also has extensive knowledge and overview of the metadata and standardization domain. During the workshops in Cologne and Jaen, Fernie provided a detailed walkthrough of the CARARE metadata schema (presentation prepared by Athena Research and Innovation Centre, DCU). Fernie was also a key contributor to the organization of the events.
Gavrillos, Dimitris (Athena Research and Innovation Centre, DCU)	Closely involved with the development of the CARARE repository, author or co-author of many of the CARARE guidelines and a significant contributor to the CARARE metadata schema, Mr Gavrillis is working with the Digital Curation Unit of the Athena Research and Innovation Centre. During workshops 1.3 and 2, Mr Gavrillos presented the guidelines for mapping towards the CARARE metadata schema and the CARARE metadata repository, the latter via Skype.
Skjævestad, Frode (Asplan Viak Internet)	A senior advisor in Asplan Viak Internet as, Mr Skjævestad chaired the second workshop. New to the cultural heritage sector, Mr Skjævestad is an old-timer in standardization and metadata within the geo-information sector, having headed up and taken part in many national, European and global initiatives.
Stabenau, Arne (National Technical University of Athens)	Mr Stabenau has been a software engineer at the National Technical University of Athens since 2007. He has been closely involved with the development of the Metadata INgestion and mapping Tool and provided training on the practical use of

Speaker	Short-bio and topic of presentation
	the tool during all four workshop events.
Tuften, Olav (Asplan Viak Internet)	Having worked with document management, archiving and metadata within the domains of legal/judicial, cadastral and cultural heritage information for more than 30 years, Tuften has significant experience in the domain. For the past three years he has provided technical support for EuropeanaLocal partners in setting up OAI-PMH repositories and in the CARARE training workshops he assisted during the technical exercises.
Tzouvaras, Vassilis, Dr (National Technical University of Athens)	A senior researcher with the Image, Video and Multimedia Systems Laboratory (IVML) since 2005, Dr Tzouvaras is active in a wide range of development tasks associated with Europeana performing research within areas such as knowledge representation, ontology engineering, reasoning and semantic search. In addition to CARARE, Dr Tzouvaras is or have been active in projects including Athena, Videoactive, Euscreen, EuropeanaConnect, Europeana V01 and Eclap. Dr Tzouvaras provided training on the MINT tool during workshop 1.3 in Athens.
Xenikoudakis, Fotis (National Technical University of Athens)	Mr Xenikoudakis has been a software engineer at the National Technical University of Athens since 2009. He has been closely involved with the development of the Metadata INgestion and mapping Tool and provided training on the practical use of the tool during all four workshop events.

Appendix 1: Attendance Matrix

Partner name	Event			
	Cologne	Jaen	Athens	Vilnius
Asplan Viak Internet	X	X	X	X
MDR Partners	X	X	X	X
National Technical University of Athens	X	X	X	X
Deutsches Archaologisches Institut	X			X
Erfgoed Nederland				X
Fornleifavernd Rikisins	X			X
Institutul de Memorie Culturala	X			X
Koninklije Nederlandse Akademie Van Wetenschappen	X			X
Ministerie Van Onderwijs, Cultuur en Wetenschap	X			X
Narodni pamatkovy ustav	X			X
Riksantikvarieambetet	X			X
Scuola Normale Superiore di Pisa	X			X
Vilniaus Universitetas	X			X
Archaeology Data Service		X		X
Hellenic Ministry of Culture and Tourism		X		X
Kulturarvsstyrelsen		X		X
Ministère de la Région de Bruxelles-Capitale/Ministerie van het Brussels Hoofdstedelijk Gewest		X		X
Narodowy Instytut Dziedzictwa (formerly Krajowy Ośrodek Badań i Dokumentacji Zabytków)		X		X
The Cyprus Research and Educational Foundation		X		X
Universidad de Jaen		X		X
Athena Research and Innovation Center in Information Communication & Knowledge Technologies			X	X
Eesti Vabariigi Kultuuriministeerium			X	X
National Institute of Archaeology with Museum, Bulgarian Academy of Science			X	X
Heritage Malta				X
Pamiatkovy urad Slovenskej republiky				X
Javni Zavod Republike Slovenije Za Varstvo Kulturne Dediscine				X

Appendix 2: Workshop 1 Agenda

Workshop 1 was repeated three times, the agenda included here has the timings used during the Workshop 1.2 in Jaen on the 6th and 7th of April 2011. The same agenda was used in Cologne and Athens but with variations on the time schedule.

Timeslot		Agenda Item
09:00		Meeting at CAAI, **building C6.**
09:15	*9:30*	**Building A3, room 286.** Welcome and presentation of host and participants. Information about logistics and practicalities such as the venue, dinner etc. *by representative of hosts*
09:30	*09:45*	Introduction to the CARARE training workshop agenda. *by Stein Runar Bergheim, Asplan Viak Internet as*
		Session 1: Extraction
9:45	*10:15*	Introduction to data extraction *by Stein Runar Bergheim, Asplan Viak Internet as*
10:15	*10:45*	Data extraction exercises *All, led by AVINET*
10:45	*11:15*	*Coffee Break*
		Session 2: Repository installation
11:15	*12:00*	Introduction to OAI PMH *by Stein Runar Bergheim, Asplan Viak Internet as*
12:00	*12:45*	Introduction to Repox *by Stein Runar Bergheim, Asplan Viak Internet as*
13.00		*Lunch*
14:15	*15:45*	Repository installation and configuration exercise *All, led by AVINET*
15:45	*16:00*	*Coffee break*
		Session 3: Metadata ingestion and mapping
16:00	*17:45*	Introduction to the CARARE metadata schema by example *by Dimitris Gavrillis, Digital Curation Unit, IMIS, Athena R.C.*
17:45		*Close of day 1*

Day 2

Timeslot		Agenda Item
		Session 3 continued
09:00	*10:00*	Introduction to the CARARE ingestion tool, interactive demonstration Fotis Xenikoudakis & Arne Stabenau / NTUA, all
10:00	*10:30*	*Coffee break*
10:30	*11:45*	CARARE ingestion tool continued.
11:45	*12:15*	Round-up of workshop and discussions
12:15		*Close of workshop*
13:15		*Lunch*

Appendix 3: Workshop 2 Agenda

The workshop was held in three repetitions during day 2 of the CARARE plenary meeting in Vilnius.

Time Slot	Parallel Sessions	
	Session 1	**Session 2**
9.00 – 11.00	CARARE training workshop – Group A • Refresher on metadata mapping and ingestion • Intro to CARARE repository • Question and Answer AVINET	GIS working group initial meeting (group D) IPCHS
11.00 – 11.15	Coffee	Coffee
11.15 – 13.15	CARARE training workshop – Group B • Refresher on metadata mapping and ingestion • Intro to CARARE repository • Question and Answer AVINET	3 D content workshop (group E) • Conversion to PDF • Metadata preparation • Question and answer Visual Dimension
13.15 – 14.15	Lunch	Lunch
14.15 – 16.15	CARARE training workshop – Group C • Refresher on metadata mapping and ingestion • Intro to CARARE repository • Question and Answer AVINET	3 D content workshop (group F) • Conversion to PDF • Metadata preparation • Question and answer Visual Dimension
16.15	Coffee	
16.30	Project Management, Kate Fernie and Sheena Bassett, MDR Partners	
17.15	Next steps, Kate Fernie and Christian Ertmann-Christiansen	
17.30	Meeting closes	