FINAL REPORT

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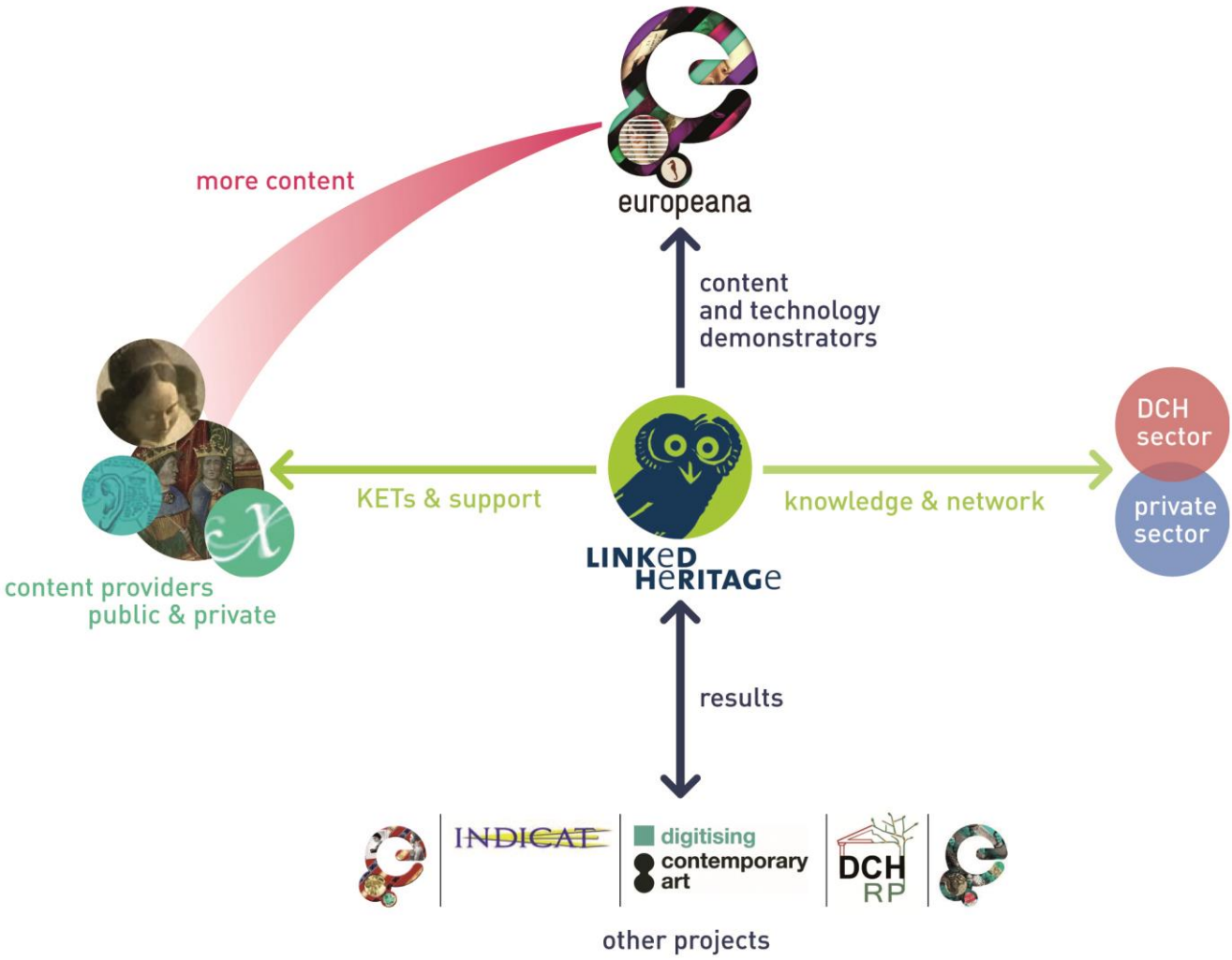
1 Executive Summary

The Linked Heritage project facilitated and delivered large-scale, long-term enhancement of Europeana and its services. This was achieved by:

- The contribution of over 2.7 million additional metadata records, linking to 7.5 million new digital items.
- Providing of key enabling technologies for diverse content providers to contribute to Europeana
- Delivering pragmatic technological solutions to the problem of non-standard descriptive terminologies; this enhances Europeana in terms of metadata richness, re-use potential, and uniqueness.
- Demonstrating the use of persistent identifiers in digital cultural heritage and their use in linked data.
- Simplifying the provision of private-sector metadata to Europeana, and the demonstrating the benefits of private sector interoperability to Europeana.

The achievements have been underpinned by bringing together ministries and government agencies, content providers and aggregators, leading research centres, publishers and SMEs, from throughout Europe in a best practice network of 38 beneficiaries, 10 affiliated partners and 12 additional external content providers..



Linked Heritage is a member of the Europeana ecosystem – a family of projects dedicated to providing content to the Europeana portal and research and development of new technologies to enhance the Europeana platform. The project contributes to Europeana along two axes – (a) the provision of **new metadata** and (b) the use of **new technology**.

Linked Heritage addresses several key **technical** issues for Europeana: interlinking with third party data sources via **linked data**, stability of resource location/retrieve using **permanent identifiers**, standardisation of **terminologies** across content providers and language/national boundaries, access to **private-sector** metadata, technical support.

On a broader sectoral level, Linked Heritage has established a **lasting collaborative network** of organisations and individuals who are committed to the further development of digital cultural heritage in Europe.

Objectives

The aims of the project were:

1. To deliver large quantities of **new content** to Europeana, from both the public and private sectors
2. To deliver the **key enabling technologies** for the delivery of large amounts of new **multi-source metadata** to Europeana, with optimal **quality assurance** and **intellectual property** management
3. To **support** and stimulate existing and new **content providers** around Europe to contribute to Europeana
4. Engagement with the **private sector** (especially publishers), identification of appropriate partnership models and input of their metadata to Europeana.
5. To **enhance the search** experience and improve the **quality of metadata** through standardisation of **terminologies**.
6. To demonstrate the use of **linked data** to support more expressive semantic processing within Europeana, as well as making Europeana information available to third parties.

7. To explore the use of **persistent identifiers** and their use for preventing duplicate records and broken links.
8. **Outreach, dissemination and training**, to maximise the impact and value of the project's work.

The Best Practice Network

The Linked Heritage consortium includes representatives of all the **key stakeholder groups from 20 EU countries**, together with Israel and Russia. These include ministries and responsible **government agencies**, **content providers** and aggregators, leading **research centres**, **publishers** and **SMEs**. Several partners participate in other projects of the Europeana group; this guarantees alignment with Europeana's evolution. In addition, new organisations have contributed content for the first time to Europeana, through Linked Heritage.

In order to maximise the network benefit, two categories of working groups were established: 4 Thematic Working groups (Linking Cultural Heritage Information, Terminology, Public Private Partnership, Dissemination and Training. Moreover a new working group was set up dealing with Digital and exhibitions, and a task force analysing issues connected to the Data Exchange Agreement (DEA).

Another added value of the Linked Heritage Best Practice Network was given by its **enlargement**. During the project several **cooperation agreements were set up with other institutions** who took part in the project in order to benefit from Linked Heritage expertise and learn about aggregation procedures, terminologies, standards etc. Many of them became contributors for Europeana via Linked Heritage.

Agreements with other European project, belonging not only to the Europeana ecosystem, were signed to share knowledge and good practises and to set up activities of cooperation.

The relationships with European were constant and fruitful during the whole project.

Outputs

Linked Heritage focused on **areas where, up to now, no clear and agreed solution has been identified,** as outlined above. By developing broad consensus, and by building on the work of other projects within the Europeana ecosystem, Linked Heritage has identified and validated solutions that will enjoy maximum endorsement and "take-up" across the ecosystem and across the European cultural heritage community.

The project was delivered as a portfolio of interconnected work-packages (WPs), each of which addressed a specific set of objectives.

- WP1 focussed on the coordination and management of the Consortium;
- WP2 examined **linked data** and the potential of **permanent identifiers.**
- WP3 addressed the issue of **terminologies**. An innovative terminology management platform (TMP) was developed.
- WP4 examined how to attract **private-sector content** onto Europeana.
- WP5 delivered the **key enabling technology** for large-scale aggregation.
- WP6 **supported** the content providers in the use of this technology and the contribution of content to Europeana.
- WP7 **disseminated** the work and results of the project to key target audiences in the cultural heritage sector and beyond, as well as creating a substantial **training** resource to help to build capacity and expertise in the sector.

The use of the project outcomes is described in the Consortium Agreement that specifies with respect to the project the relationship among the partners and the rights and obligations of the Consortium.

Linked Heritage has produced several **tangible** results:

- 17 public deliverables, available on the project website (http://www.linkedheritage.eu/index.php?en/142/documents-and-deliverables)
- a customised version of MINT to allow the integration from the partners repositories to Europeana, including several important enhancements of the platform aiming at improving the quality of the metadata submitted by partners and the improvement of the harvesting format LIDO
- the prototype of the Terminology Management Platform (http://www.culture-terminology.org/)
- a Linked Data Demonstrator
- a Virtual learning environment based on Moodle for producing modular Internet based courses (http://linkedheritage.cab.unipd.it/training/LO-00/en/overview.html)
- a personally tailored Training Programme available as an e-learning facility (Learning Objects) and focusing on key aspects of the project (Europeana, aggregation, metadata standards, linked data, permanent identifiers, multilingual terminologies, public-private partnerships): (https://elearning.unipd.it/cab/course/view.php?id=4).
- Finally the partners of Linked Heritage have engaged in a number of **networking** activities, presenting the project outputs in several national and international conferences and workshops and featuring widely in educational booklets, academic journals and scientific articles.

Sustainability

ICCU's positive experience of coordination over recent years demonstrates that the costs of maintaining the network are minimal. Over more than a decade, the framework for this kind of cooperation across national and sectoral boundaries has proven itself as an excellent working solution both in its efficiency and for its copious productivity as well for its contribution towards sharing, and building upon knowledge. This works two-ways in that these kinds of networks bring benefits both to the individual participants as well as to the entire Network which reap the many benefits of best practice, experience and distributed productivity.

The possibility of guaranteeing the sustainability of the service in the short-medium term (2-3 years) beyond the end of the Linked Heritage project in September 2013 has been already achieved, thanks to the resources ensured by the partner organisations and the support offered by the AthenaPlus project. Therefore, the services established by the Linked Heritage project will be assured beyond the life of the project and new results stimulated.

A synthetic roadmap was defined for the next two years, where the following aspects are outlined:

- Maintenance of the network and availability of the results
- Implementation of the Linked Heritage results at the national level
- Exploitation of the Linked Heritage results at the European and international level
- Aggregation for Europeana
- Ingestion system
- PIDs
- Terminology
- Private-Partnership
- Virtual Learning
- Publications
- Events
- Involvement in the definition of the national and transnational strategies
- New projects.

2 Work Undertaken and Key Results

2.1 Overview

The project was delivered as a portfolio of interconnected work-packages (WPs), each of which addressed a specific set of objectives. These are presented below. The **overall flow of the project** was as follows:

One work-package (WP1) focused on the **coordination** of the large consortium, the orchestrating of our efforts and the effective collaboration between teams at national and international levels. It applied a typical project management model, with Project Coordinator, Technical Coordinator, WP leaders, etc. Six work-packages addressed the core **research challenges** of the project.

- WP2 examined **linked data**, the increasingly important automatable linking of online resources by using RDF triples and specialised software, and the potential of **permanent identifiers** to underpin improvements in interoperability, search and long term preservation.
- WP3 addressed the issue of **terminologies**, and how different organisations and nations have different names for the same thing. An innovative terminology management platform (TMP) was developed.
- WP4 examined a key business topic – how to attract **private-sector content** onto Europeana, what obstacles exist and how to overcome them. While excellent metadata mapping results were achieved, the conflict between commercial drivers and the DEA appears intractable
- WP5 delivered the **key enabling technology** for large-scale aggregation of public and private-sector data and (most importantly) its automated **quality control** and submission to Europeana.
- WP6 **supported** our large population of content providers (which grew by 9 during the project) in the use of this technology and the contribution of content to Europeana.
- Finally, WP7 **disseminated** the work and results of the project to key target audiences in the cultural heritage sector and beyond, as well as creating a substantial **training** resource to help to build capacity and expertise in the sector.

The use of the project outcomes is described in the Consortium Agreement that specifies with respect to the project the relationship among the partners and the rights and obligations of the.

2.2 Key Enabling Technologies

Challenge: Metadata exists in a multitude of formats and levels of detail. Organisational policies for the re-use of such metadata vary considerably. Europeana requires the best possible quality of metadata, available under a consistent intellectual property model.

Aim: **Linked Heritage WP5** aimed to provide the technology required to map all content providers' metadata records to the Europeana metadata format (ESE) and then publish it to Europeana. This included integration with the terminology system (WP3), support for different models of intellectual property rights, and quality assurance of the metadata.

Work carried out: The team extended the service-oriented MINT platform, originally developed in ATHENA and enhanced in other Europeana ecosystem projects. The platform enables any XML schema to be mapped, using a graphical interface, to the LIDO intermediate metadata standard; from LIDO an existing service generated Europeana-compliant ESE metadata records, which were published using OAI-PMH. The MINT system was enhanced in several important ways

- by adding an **OAI-PMH** server with OAI-DC and improving **scalability** for large collections of metadata records
- by adding a **linked data** server to enable publication of a subset of Linked Heritage metadata as linked data
- by adding support for multiple levels of **intellectual property management** – this allowed users to specify what license/IP model to apply to their metadata
- by adding **quality verification** and checklists to underpin the submission of high-quality metadata by Linked Heritage to Europeana
- by enhancing the **preview** capabilities and thus adding confidence in the end result of the publication process
- by ensuring the sustainability of the aggregated records for the time span of the AthenaPlus project

These are in addition to the existing MINT system's powerful metadata mapping, publishing and preview/visualisation functions.

The system was used successfully by all content providers, and acted as the conduit for Linked Heritage metadata to Europeana.

LIDO – a critical building block

LIDO (lightweight information describing objects) is an XML harvesting schema which was specifically designed to facilitate the contribution of metadata and digital objects to portals and union resources. LIDO is particularly powerful at describing museum objects, but is also broadly applicable to capturing rich metadata schemas from a range of cultural heritage domains. It is compliant with CIDOC-CRM and has been used in a series of EU-funded projects in the Europeana ecosystem, notably ATHENA. The MINT system is a toolkit for converting arbitrary XML schemas to LIDO, thus enabling their further conversion to a range of destination metadata models, including those used by Europeana. For more, see http://network.icom.museum/cidoc/working-groups/data-harvesting-and-interchange/resources/

The MINT Service

MINT services, developed by NTUA, compose a web based platform that was designed and developed to facilitate aggregation initiatives for cultural heritage content and metadata in Europe. It is employed from the first steps of such workflows, corresponding to the ingestion, mapping and aggregation of metadata records, and proceeds to implement a variety of remediation approaches for the resulting repository. The platform offers a user and organization management system that allows the deployment and operation of different aggregation schemes (thematic or cross-domain, international, national or regional) and corresponding access rights. Registered organizations can upload (http, ftp, oai-pmh) their metadata records in xml or csv serialization in order to manage, aggregate and publish their collections. For more info, see:
http://mint.image.ece.ntua.gr/redmine/projects/mint/wiki/Introduction

2.2.1 Key Results

The metadata mapping, quality control and submission/publication system was implemented and maintained for all partners. Significant upgrades were carried out to the system, which remains available for third parties and other Europeana-feeder initiatives to use.

2.2.2 Impact

MINT now represents an appealing avenue for content providers at all levels of technical sophistication to contribute material to Europeana. In particular, it supports the filtering of content so that different intellectual property models can be applied, and also supports quality assurance of metadata records. By delivering a pipeline all the way from native XML to ESE (via LIDO), the system greatly facilitates content provision to Europeana, most of all by smaller and local memory institutions.

2.3 Supporting Content Providers

Challenge: Content providers were often not familiar with the details of Europeana's technical and legal requirements. The MINT system, though powerful, could be challenging for new users to use to its full potential.

Aim: **Linked Heritage WP6** was entirely focused on supporting all partners throughout the process of provision, preparation and submission of their content. This facilitated the contribution of the maximum amount and quality of metadata to Europeana.

Work Carried Out

An **ingestion plan** was drawn up, which verified that the proposed content was still available for ingestion and set a schedule. Content providers were then given **training** on the use of the MINT technology, and familiarised with ESE, LIDO and other relevant background information. The **training materials** remain useful for present and future MINT users. An ingestion **helpdesk** was established and maintained throughout the project; this helped content providers to map and publish their metadata, and to understand and comply with the Europeana legal model.

This work-package collected **feedback** from content providers on the ingestion process and on the legal and process framework. This helped to inform the refinement of the MINT technical platform. **Monitoring** and feedback per content provider also informed the support process itself.

The evolution of the Europeana Data Exchange Agreement (DEA) during the lifetime of this project caused some issues for content providers. A **DEA task force** was established to discuss the problem and come up with a solution. This led to new functionality in the key enabling technology tools enabling fine-grained control of IP by content providers.

By providing full-time support for all aspects of data ingestion, and also for key policy and IP issues, content providers were greatly facilitated in contributing to Europeana.

2.3.1 Key Results

- An ingestion **helpdesk**, which supported our numerous content providers
- The delivery **of 2.7M metadata records to Europeana, representing some 7.5M digital objects**.
- The Linked Heritage network of providers grew to **23 countries, with 35 beneficiaries including 9 additional external contributors** who joined the project during the project execution.
- Higher quality metadata submitted to Europeana, thanks to the quality control processes implemented in WP5 and operationalised in WP6.

Aggregation facts and figures

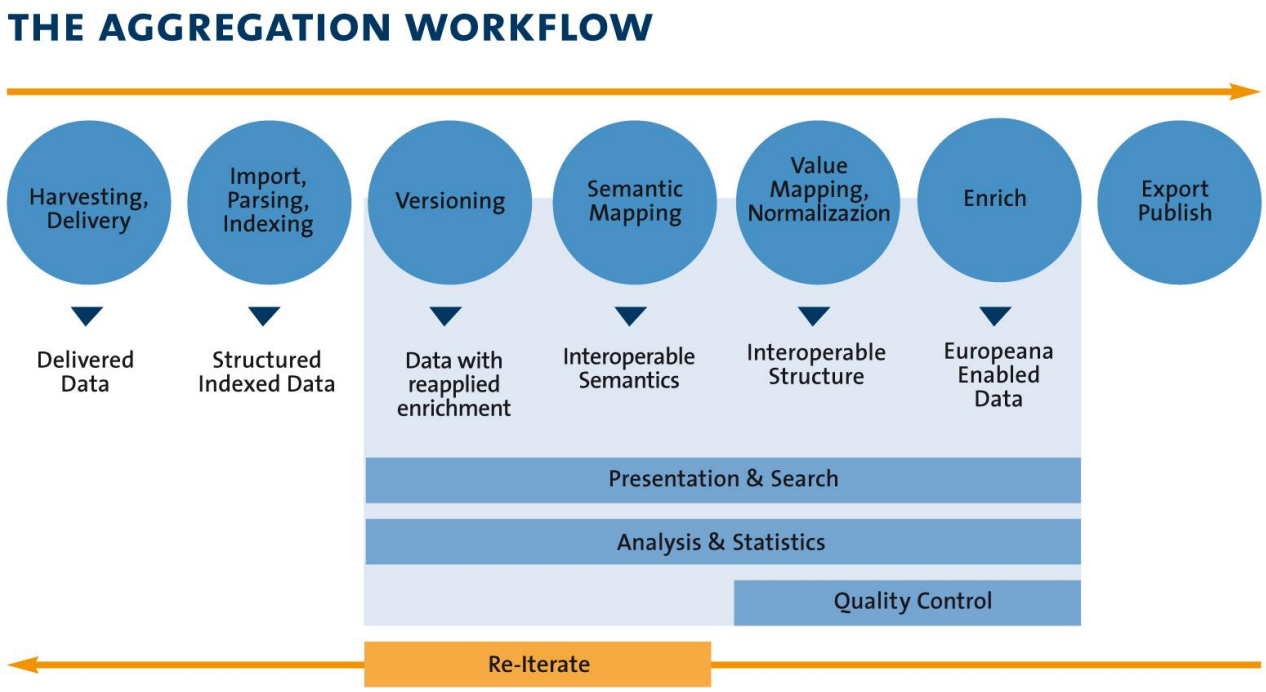
4 training workshops across 2011 and 2013

145 MINT registered users from 117 organisations

60 registered people in the helpdesk mailing list

2.3.2 Impact

By providing a support service to the content providers, this work-package ensured that issues or questions were rapidly resolved. For future initiatives with a similar goal, there is little doubt of the value of such a service. Feedback from end users helped in the specification, design and refinement of the technology.



2.4 Engagement with the Private Sector

Challenge: Relatively little private-sector content can be found on Europeana. This reflects a more general disconnect between the traditionally public-sector cultural heritage community and the commercial publishing world. The business and intellectual property rights models to underpin public-private partnership in cultural heritage metadata have not been fully explored.

Aim: **Linked Heritage WP4** aimed to overcome the obstacles to private-sector collaboration with the heritage sector in general, and with Europeana in particular. This included analysis of the business context in private sector, verifying metadata interoperability, exploration of rights agreements, and the validation of these results.

Work carried out: a comprehensive review of commercial sector best practice and standards in metadata management, legal frameworks and business models was carried out. This was analysed in the light of the DEA. The benefits offered by inclusion in Europeana were evaluated from the perspective of commercial metadata owners.

A commercial evaluation of applications and APIs to cultural heritage data was carried out. To date, few have made the transition to significant commercial products. Further development of this theme focused on the potential for commercial licensing of the digital objects themselves, with Europeana acting as a facilitator for the licensing of *content* (as opposed to *metadata* describing the content).

Proof-of-concept commercial data sets passed through the Linked Heritage work-flows, demonstrating the applicability of Linked Heritage technology to private-sector metadata transformation and contribution to Europeana. No data was actually ingested, however, due to IP issues.

Linked Heritage was the first project of the Europeana ecosystem which explored the issues of public-private partnership.

2.4.1 Key results

The Europeana DEA is a major obstacle to commercial-sector partnership. Commercial entities need to be offered **clear commercial benefits**, while IP models **must not disrupt** mission-critical commercial data services. This requires licensing models **not based on a CC0** rights waiver

Publication on Europeana offers few benefits to companies which already have high profiles, established business models, outlets and customer bases. This contrasts with the value (in terms of visibility and distribution) that Europeana offers 'typical' cultural heritage players. An alternative approach, involving the commercial licensing of cultural heritage **materials,** identified via (and possibly licensed through) Europeana, showed good potential.

LIDO was found to be able to capture almost the entire richness of the ONIX for Books 3.01 metadata standard. Initial results for music, film and TV metadata were positive. This opens doors to further interoperability of metadata standards across the public-private boundary.

2.4.2 Impact

The Linked Heritage outputs provide a uniquely informative overview of the interface between commercial and public-sector business models, metadata and services.

Additional work by the team has significantly contributed to Thema, a new international subject categorisation standard being coordinated by EDItEUR, with valuable input from several other partners.

A new project, **RDI**, will use MINT for media rights management. This can help to underpin new public-private partnerships based on shared metadata. Interaction with **Europeana Creative** is anticipated.

2.5 Improved search and higher-quality metadata through terminology management

Challenge: The Linked Heritage project connects data from cultural heritage organizations from many European countries. Hence, the controlled vocabularies used to describe collections come in **various languages and forms**. Incompatible terminologies impede effective searching by end users and are an obstacle for web services that rely on consistent metadata. In order to overcome problems of language and format, data must be made accessible following the principles of the semantic web: publishing in SKOS/RDF, mapping vocabulary concepts, enhancing vocabulary control etc.

Aim: **Linked Heritage WP3** addressed this challenge by creating an **open source tool** where **terminologies** can be uploaded or created from scratch in SKOS/RDF. The terminologies can be managed and exported in the desired format. Concepts from various terminologies are mapped using SKOS-mapping properties. This will allow better search results on the web and in Europeana.

Work carried out: Requirements for a terminology tool were captured by investigating key principles such as the semantic web, SKOS/RDF, multilingual thesaurus alignment, automatic import of various file-formats etc. An **open source tool** was developed with a public and login entry: the Terminology Management Platform (TMP).

A **state of the art** of all the **terminologies** used by Linked Heritage partners was analysed, serving as a starting point for importing controlled vocabularies from Linked Heritage partners in the TMP. **Mapping experiments** have been performed using multilingual terminologies in xTree (DigiCult).

Linked Heritage-content is delivered using the MINT tool, where data is mapped to ESE through the intermediate of LIDO. We looked at ways in which LIDO elements can be enriched in the MINT-tool. The **integration of an enriched meta-thesaurus** from the TMP in the MINT-tool was investigated, so content providers can map their in-house terminologies to a Europeana-compliant format, resulting in maximum value to Europeana and to services which use the Europeana API.

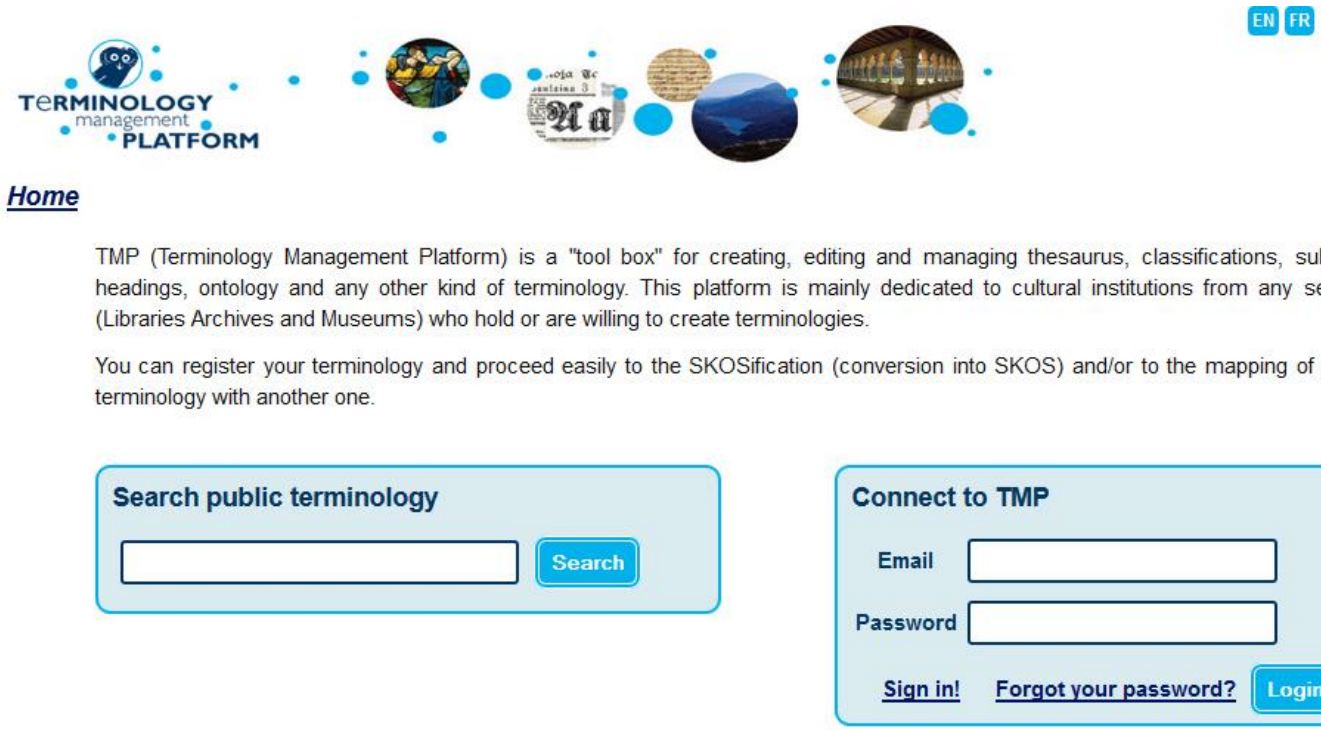
2.5.1 Key Results

- Development of a **Terminology Management Platform** (TMP) making it possible for partners to upload, edit, map and export terminologies in SKOS/RDF. A prototype is indefinitely available at: www.culture-terminology.org. Access is maintained on the project website and on the project showcase in DigitalmeetsCulture.net
- Publication of **guidelines** in "*Your terminology as a part of the semantic Web, recommendations for design and management*" with an easy step-by-step structure of the booklet allows non-experts to make their data visible and accessible on the web. Access to the booklet is maintained in the website: http://www.linkedheritage.org/getFile.php?id=244
- A **questionnaire** containing detailed information on 57 terminologies from 33 partners for future planning of TMP import.
- Manual **mapping** of multilingual and monolingual concepts from terminologies in xTree, using 6 reference terminologies in different languages.

- Implementation of 25 LIDO **event types** and 99 LIDO **actor roles** in the MINT-tool. The event types and roles were translated in 18 languages and then skosified.

Terminology Management Platform

The TMP (Terminology Management Platform) is a "tool box" for creating, editing and managing thesaurus, classifications, subject headings, ontology and any other kind of terminology. This platform is mainly dedicated to cultural institutions from any sector (Libraries Archives and Museums) who hold or are willing to create terminologies. Through the TMP, cultural institutions may register their terminologies and proceed easily to the SKOSification (conversion into SKOS) and/or to the mapping with another terminologies. See: http://www.culture-terminology.org/



2.5.2 Impact

The way to finally get to interoperable metadata has been a long way around and the necessity to get to a semantic interoperability has just emerged. The booklet on terminologies addresses the issue of the semantic Web for cultural institutions. The guidelines and recommendations provided in the booklet help them move towards the semantic web in a most economic and efficient way.

The Terminology Management Platform is a very concrete achievement which makes it easy for institutions to make their terminologies available as Linked Open Data. The Terminology management platform offers a scalable, bottom-up approach to terminology harmonisation but also offers an easy way to reach multilingualism and normalisation. Reuse of the Terminology Management Platform will be assured through other projects such as EuropeanaPhotography and EAGLE

2.6 Linking Cultural Heritage Information

Challenges: Expertise and capacity in critical technologies for collaboration and interoperability are not widespread in the digital cultural heritage community. Two particularly important technologies are linked data and permanent identifiers, because they address interoperability with external (linked data) data repositories, and because they overcome issues linked to natural site evolution and changes in URL address.

Aim: Linked Heritage WP2 demonstrated the publication of Linked Data to the digital cultural heritage community, including the establishment of a linked data server which delivers our metadata as linked data triples. To identify the most effective way for the cultural heritage sector to create, manage and apply permanent identifiers.
Work carried out: A survey across the project identified high levels of awareness of linked data, but limited practical experience of using (17.5%) or publishing (10%) linked data. Background research and input from the thematic working group fed into a best practice report on linked data (D2.1). Further research and discussion in the domain of persistent identifiers resulted in a research report (D2.2) and the specification of a management infrastructure for persistent identifiers (D2.4).
Following on from the research, the team established technical specifications for linked data in digital cultural heritage (deliverable D2.3), and then implemented a demonstrator server, which published some Linked Heritage metadata as linked data (RDF) triples and showed how they can be combined with external third party linked data.

2.6.1 Key Results

Metadata: The LIDO *metadata format* was identified as the most appropriate to use within Linked Heritage, and to recommend to the wider community. This reflects several years, many projects and millions of Europeana-items that have been underpinned by LIDO and the MINT system. A key recommendation is that, in order to continue to derive value from LIDO, funding organisations (e.g. national partners) should consider making its use mandatory in projects which focus on content aggregation and interoperability.

Licensing: An important finding in this work was that more than half of all linked data collections of triples ('packages') and of all triples are not 'open' (licensed in such a manner as to be freely available for re-use). In fact, 70% of the non-open packages have no **license** whatsoever- this impedes re-use and is very probably not what was intended by the publisher. A key lesson from the work carried out in Linked Heritage is that *any publication of linked data must be accompanied by a licence* statement, either a standard (Creative Commons) licence or a custom one.

Formats: while the amount of cultural heritage linked data at this time is relatively small, this population is growing. We strongly recommend that *proprietary linked data formats are not created*, but instead standard formats (RDF, dc or FOAF) be used.

Links: the large majority of links in the linked data cloud are to reference packages such as DBpedia and GeoNames, or (in the cultural heritage sector) Library of Congress Subject Heading, Dewey Decimal Classification, etc.). We advise publishers of linked data to *link to reference packages* such as those mentioned above.

Demonstrator: a demonstrator package was developed using material from two partners (CT and UNIMAR), and enhanced data integration and searching using information from the UK Government Art Collection (GAC) was demonstrated.

Persistent identifiers: there are many different PID schemes and providers. Europeana will need to *support a broad range* thereof, as there is no dominant or emerging leader. Memory institutions which plan to support PIDs must have a long-term commitment and clear responsibility, as longevity is central to PID value.

Future Use of Linked data in Cultural Heritage: we have demonstrated feasibility, but licensing and IP remain key issues. *New opportunities to deliver value through linked data should be p*ursued, as its potential is significant.

2.6.2 Impact

The interweaving of cultural heritage material with third party data from other sectors, and with reference data from within the cultural heritage domain, has enormous potential to facilitate new services, new forms of re-use, new business models and new benefits for the sector, for the public and for other stakeholders. We have delivered concrete demonstrations of how this can be done, as well as specific, clear recommendations for avoiding pitfalls and maximising success.

2.7 Dissemination & Training

Challenges: For the project to have as much impact as possible, it required a high profile and awareness in its target audiences, most notably content providers and other ecosystem projects. A perennial issue for DCH is a shortage of expertise in advanced technical topics.

Aim: **Linked Heritage WP7** addressed these two challenges: (a) to raise awareness of the project and its results across key target audiences and (b) to create a series of learning objects which address key elements of the Linked Heritage project (Europeana, aggregation, linked data, terminologies, etc.).

Work carried out: Dissemination: a public **website** was established (www.linkedheritage.org) with full information about the project, its team, etc. The site was enhanced with publications, deliverables and other outputs throughout the project lifetime. Extensive use has been made of online **video**, **LinkedIn**, Scoop.it and a wiki. Social media were in constant use, with all partners encouraged to post and tweet about the project. Leaflets, booklets and posters supplemented these online resources. The team also edited two issues of the Uncommon Culture journal. Collaborations with other projects (ATHENA, INDICATE, EuropeanaPhotography) led to **durable publications** intended to inform the cultural heritage community into the future, on topics such as Terminologies and Geocoding of Cultural Heritage. We also concluded a position paper with DC-NET. The project benefited from a permanent showcase in the **DigitalmeetsCulture.net** online magazine (www.digitalmeetsculture.net), site, an online magazine in the digital cultural heritage area featured by partner Promoter and dedicated to the themes of the digital technologies applied to cultural heritage and the arts. The project launch, two seminars and a final EU Presidency Digitisation Conference in Dublin were key dissemination events; these are supplemented by many third party seminars, conferences and workshops to which Linked Heritage contributed.

Work carried out: Training: a personalised learning environment was created on the Moodle platform, including a series of **learning objects** (LOs) aimed at key audiences (Teachers, LIS professionals, market experts, cultural institution decision makers). The LOs cover **topics** such as Europeana, aggregation, metadata standards and mapping, digitisation life-cycle, persistent identifiers, linked data, terminology, etc.), and address an identified shortage of awareness of these important topics in our target audience. All LOs were created in collaboration with the relevant WP teams. The LOs are **hosted** in the long-term preservation PHAIDRA[1] platform, and can be accessed via a range of channels (project website, partner sites, YouTube, via FreeLOMS[2]) under a relatively open creative commons **licence** (CC-BY-NC-SA).

2.7.1 Key Results

The key **dissemination** result for WP7 is the high **profile** of the project in the cultural heritage community, with excellent coverage in a range of media. This reflects an effective dissemination plan. The project has pushed the envelope of several technologies in the Europeana space, and **awareness** of our results is strong. The team has a track record of high-use **durable publications** from other projects, and we anticipate strong demand for the Linked Heritage outputs. Interactions with other projects have been mutually beneficial. Twelve new content providers joined the best practice network- a practical demonstration of the effectiveness of our dissemination.

The most important results in the **training** area are of course the set of learning objects and the Moodle course, which provide engaging visual and text analysis of technology and research topics that are of great interest and relevance to Europeana and (especially) new content providers. These were translated into multiple languages and are freely available on the Linked Heritage virtual e-learning environment developed by the University of Padova[3], on the project website and on the project showcase in DigitalmeetsCulture.net.

[1] PHAIDRA is a project of the University of Vienna - http://bibliothek.univie.ac.at/english/phaidra.html

[2] FreeLOMS is a learning object repository developed within the EU-funded projects SLOOP and SLOOP2DESC.

[3] http://linkedheritage.cab.unipd.it/training/LO-00/en/overview.html.

2.7.2 Impact

The best practice network has grown during the project by twelve additional content providers. The importance of effective communication and collaboration across the cultural heritage sector in Europe cannot be over-stated. The Linked Heritage network is an excellent avenue for the sharing of expertise and best practice across the EU.

Expertise and capacity in the technological enhancement of cultural heritage material remains in short supply across the sector. The **durable publications** will serve the cultural heritage community over the medium term, as requirements for expertise in terminologies and geo-enabled cultural heritage become increasingly common. They complement other guidances from related projects in topics such as digitisation, metadata standards, etc. The **learning objects** represent another approach to capacity building in the sector, with the added advantage of market-leading Moodle delivery.

3 Key Project Results – Summary

Linked Heritage has succeeded in achieving all of its aims as summarised below

WP	Key Objectives	Achievements
WP1 Network of Common Interest	To build and grow a strong collaborating network of DCH experts.	Best practice network with international (thematic) working groups and National working groups established. Twelve new content providers joined the network. Final size: 38 project beneficiaries, 10 affiliated partners, 12 additional external content providers
	To facilitate and orchestrate a large team with diverse levels of experience	A dedicated Technical Coordinator acted as a central point of contact and support for all partners, and a clearing-house for expertise and experience.
WP2 Linking Cultural Heritage Information	Explore and demonstrate how Europeana and other cultural heritage sources can be linked to third party data services (and be linked to, by them)	Demonstrator linked-data server was implemented and populated with Linked Heritage metadata.
WP3 Terminology	Improve the Europeana search experience and API results by addressing non-standard terminologies.	Terminology management platform implemented. This has been integrated with MINT, and is being further developed in the new Athena+ project. Recommendations and guidelines on terminology management and SKOS published. The multimedia vocabulary of EuropeanaPhotography integrated into TMP
WP4 Public Private Partnership	To identify best practice for metadata management in the private sector (models, rights, technology...)	Extensive best practice materials produced, of value to any public-private partnership in this area.
	To explore business models for commercial metadata on Europeana, and/or commercial licencing of Europeana content	Challenges and avenues for progress in defining mutually beneficial business models were explored in depth. The friction between commercial imperatives and the DEA was explored and found to be very challenging.
	To verify technical interoperability of public and private sector metadata standards, and the tools this requires.	LIDO and MINT were found to be very capable in capturing rich commercial metadata standards. ONIX for Books 3.01 was considered in depth; initial results for other media (TV, film, music) were very positive.
WP5 Technical Integration	Deliver key enabling technologies for aggregation and large-scale publication.	MINT platform extended and enhanced, enabling source XML → LIDO → ESE mapping and publication, including private sector formats.

	Improve metadata quality.	Quality assurance built into MINT publication process.
	Address issues with intellectual property and DEA	Multi-level intellectual property model implemented within MINT mapping process and tools
WP6 Coordination of Content	Deliver large volumes of content to Europeana (including from less experienced content providers and private sector), support mapping of metadata, track progress and gather feedback.	Circa 2.7 million metadata records, describing 7.5 million digital items, delivered. Training, monitoring and expert network re ingestion process. 145 MINT registered users from 117 organisations 60 registered people in the helpdesk Successful mapping of high quality metadata. Involvement of 22 different countries, including under-represented countries. High quality content including 20th century works.
WP7 Dissemination & Training	Spread awareness of Linked Heritage and its innovations, broaden the best practice network and engage the private sector.	Dissemination tools including website, web 2.0 resources, publications, promotional materials, on-line resources (Uncommon Culture, digitalmeetsculture.net, EuropeanaPro website and Europeana blog), Wiki on terminologies, scientific papers and articles, events, collaboration with other projects, engagement with Europeana, final leaflet and conference. Show-case on digitalmeetsculture online magazine
	Increase technical capacity in the cultural heritage sector and deliver training materials.	Training programme covering key topics, open access to a Virtual Learning Environment with learning objects covering best practices, methodological aspects and reference to standards.

4 Best Practice Network

Challenges: effectively delivering a project with (at project end) 60 beneficiaries, affiliates and external content providers, with a wide range of skills and expertise and very diverse resources and technologies is a significant challenge, as is establishing, growing and running an international network of common interest so that it delivers the maximum long-term benefit.

Achievement: **Linked Heritage WP1** focused on the orchestration of the efforts of all partners, from content providers to technologists, consultants to publishers. The capabilities of all partners were harnessed to deliver the project aims. Durable networks of contact and collaboration were established and/or reinforced, with long-term benefits.

The establishment of the Linked Heritage **best practice network** has been a fundamental building block for the achievement of our aims. The network includes the project partners, plus experts and stakeholders from across Europe who have an interest in the work of the project and of Europeana.

In order to maximise network benefit, two categories of working groups were established: **Thematic Working Groups** were set up at **European** level, focusing on specific pan-European challenges (and supporting work-packages with similar points of focus) and thematic or interdisciplinary **National** Working Groups set up in partner countries have worked on the same topics at national level. The best practice network has enabled the project to benefit from the input of a wide population of experts, over and above the consortium members.

The model of working through European and national working group was already successfully experimented in previous projects, such as **MINERVA** (www.minervaeurope.org) and **ATHENA** (www.athenaeurope.org).

Each Thematic Working Group consisted of a team of experts – belonging to the personnel of the partners, as well as included in they own portfolios of contacts and collaborators – who worked together to address the specific Linked Heritage topics analysed by WPs.

Synthetizing, the goal of the thematic working groups was to feed the discussion and to enrich the results of the relevant project WPs.

Taking part in the Linked Heritage Working Groups was beneficial for the experts involved and the institutions they represent. Among the main benefits and positive outcomes of participation, there are the following:

- Being part of an interdisciplinary cross-domain community, expert in digitisation topics, which sees a close cooperation with Europeana;
- Being able to contribute advice, expertise and ideas;
- Being kept informed on the progress made by digital cultural heritage research;
- Participation in dissemination and training activities;
- Benefiting from good practices;
- Being able to use project materials and outputs within professional and academic contexts.

Four thematic working group were set up within Linked Heritage (for the list of participants, see D1.1.1).

- **Linking Cultural Heritage Information**
- **Terminology**

- **Public Private Partnership**
- **Dissemination and training**

Before the end of the projects, partners involved in specific thematic working groups were asked how they would continue to contribute to future activities run at national and European level (see: D.1.1.2 Future Planning Report, from which the following paragraphs four were extracted). In general, all partners expressed their **willingness to continue to cooperate in the future**, and indeed are already implementing the results of the Linked Heritage Work Packages in the work they are doing on the **national level** concerning the coordination of digitisation, digital access, reuse of content and digital preservation. At the European level they will continue to share the results achieved in Linked Heritage through participation in **other European projects** and dedicated European and international working groups and networks.

In the field of **Linking Cultural Heritage Information**, what learnt in Linked Heritage will be capitalised in projects related to reuse digital museum objects in education through Open Data Technology, as well as in national aggregators like CulturaItalia. Belgian partners will organise in Flanders an hackaton in their country with open cultural datasets and launch a data awareness campaign. The work already started to complete the RDF representation of LIDO metadata and the development of linking mechanism including quality control features will be carried out by German partners. In Hungary, starting from the results of WP2 in Persistent identifies, a national working group will be activated in the library sector aiming at rethinking the usage of the NBN identifiers and specifying a new URN service.

The working group on **Terminology** worked very actively, contributing to the development and testing of the prototype of the Terminology Management Platform (TMP). The activities of this group will continue in a dedicated WP in the project AthenaPlus where the TMP will become a stable version. Competence centers at national level will in general increase the awareness about the TMP and include this tool in the register of useful tools on standards for digital cultural heritage. More specifically terminologies developed within Linked Heritage WP3 for controlling LIDO event type and actor role element will be further developed, in particular with focus on Linked Data publication. Several partners will continue to stimulate and support local national institutions (mainly GLAMs) to make thesauri already in use available for their use in the Terminology Management Platform. EDItEUR will transfer what learnt in Linked Heritage in the multilingual vocabularies Thema and ONIX, that both have global reach with thousand of terms. An important result is that the Event type terminology will be maintained by the CIDOC WG Data Harvesting and Interchange, and other terminologies like the actor role will become recommendations of the CIDOC WG. Cultural institutions and technological partners will also share the results of the activities related to terminology in other national and international projects, like Diska, Siera and dedicated working groups within universities and network of research centres.

As regards **Public Private Partnership**, several Linked Heritage partners were memory institutions with scant experience in this field. Therefore, their contribution to the WP was more as auditors, with a keen interest in learning how to implement new forms of private partnership in the near future. Some of them translated in their languages the learning object on PPP, with the aim to disseminate them at the national level beyond the end of the project. From the point of view of private partners, EDItEUR is a membership organisation with an established business model. It will continue to develop metadata vocabularies for global use within the book trade, data mappings and to encourage both private sector and public sector data interoperability. An example of this is the ongoing work on ARROW and ARROWplus, which EDItEUR is contributing to. mEDRA is a PPP in its nature, since it has been created by one private and one public organisations, which still are the two shareholders. So, it is very interested in continuing and possibly launching new collaboration in the field. The Hungarian National Library declared that what learnt in this topic helped them to keep on negotiating and collaborating with private partners. Beyond publishers, they would like to cooperate with bodies which engage in collective rights management. For this reason they already started to encourage them to use ONIX for their copyright management systems.

An added value of the project, was the establishment of a working group on **digital exhibitions**. This working group started its activity autonomously in Germany three years ago, but then considering the interest of the topic by several partners, the working group was enlarged and integrated in Linked Heritage. It must be considered that many Linked Heritage partners took also part in in the INDICATE project who published the *Guidelines for the realisation of virtual exhibitions*. Thanks also to cooperation agreements, currently this Working Group is composed of experts coming from Germany, Greece, Hungary, Israel, Italy, Poland and Sweden. The results achieved through the exploration of current practices and professional literature, as well as in the development of a metadata schema

for describing digital exhibitions will be capitalised in the future by partners involved in the creation of services for the reuse of digital cultural content. The working group will be kept alive and enlarged in the framework of AthenaPlus and the German partner SPK will guarantee the maintenance of the dedicated website. At national level, it will reflect the results of the working group in the development of the German Digital Library, presenting and discussing results at European and national networks. An Italian working group, made of experts from all domain of cultural heritage has been created to work on the topics of digital exhibitions. ICCU has developed an open source tool for realising digital exhibitions, called MOVIO, which has integrated some of the results of the Linked Heritage digital exhibitions Working Group, in particular integrating some elements of the metadata schema for describing digital exhibitions. This tool will be shared and enriched in WP5 of the AthenaPlus project. ICCU is also periodically organising training on digital exhibitions where it always disseminate and promote the results of this Linked Heritage working group. The results of the Linked Heritage Working groups will also be shared by other participating partners in activities at national level, like the organisation of dedicated workshops and seminars, and in the development of new digital exhibitions.

Moreover, during the project a **task force** was set up in order to give guidelines concerning how to provide content to Linked Heritage, in the light of the new **DEA** published by Europeana. It draw a document which summarises all possible uses of the metadata provided by Linked Heritage Content Providers, both within the project and in Europeana, and acts as a technical reference for Linked Heritage Content Providers. It is valid for all Content Providers within Linked Heritage, both project partners and external contributors.

4.1 Enlargement

Another added value of the Linked Heritage Best Practice Network was given by its **enlargement**. During the project several **cooperation agreements were set up with other institutions** who took part in the project in order to benefit from Linked Heritage expertise and learn about aggregation procedures, terminologies, standards etc. Many of them became contributors for Europeana via Linked Heritage, without benefiting of European funding.

This is the list of the institutions who joined the Linked Heritage Best Practice Network.

- **Belgium**
  Museum Plantin-Moretus /Prentenkabinet, Antwerpen
- **Republic of Croatia**
  Ministry of Culture
- **Germany**
  Bibliotheksservice-Zentrum Baden-Württemberg (BSZ)
- **Hungary**
  Museum of Fine Arts, Budapest
- **Italy**
  Italy, BESS digital library
- **Lithuania**
  Lithuanian Art Museum, Vilnius
- **Russia**
  Centre PIC, University of Kazan
- **Serbia**
  National Library of Serbia, Belgrade
- **Spain**
  Treelogic at Asturias
- **Ukraina**
  Specialised Center BALI (LTD), Kiev

Thanks to the Russian and Ukrainian institutions who joined the network, several new institution aggregated content for Europeana:

Russian institutions

- Rybinsk Museum
- National Library of the Republic of Karelia
- Archangelsk Museum
- Cyclorama 'Kursk Battle, Belgorod Direction' Museum

Ukrainian institutions

- Research Library of the National Pedagogical University of Ukraine after M.P. Dragomanov
- The Maksymovych Scientific Library of the Taras Shevchenko Kyiv National University
- G. Denisenko Scientific and Technical Library, National Technical University of Ukraine "KPI"
- Central Scientific Library of V.N. Karazin Kharkiv National University
- The State Scientific and Pedagogical Library of Ukraine after V. Sukhomlynskyi

Agreements with other European projects were signed in order to formalize cooperation activities.

Some of them belong to the Europeana ecosystem:

EuropeanaPhotography
The cooperation was targeted to share knowledge on multiligualism. It produced the integration of the EuropeanaPhotography vocabulary into the Terminology Management Platform, developed as a prototype in Linked Heritage

Partage Plus and **Eagle**
The cooperation was targeted to share knowledge on multiligualism. The Partage Plus and Eagle consortia are evaluating the possibility to share their vocabularies in the TMP.

Europeana Collections 14-18
The cooperation with EuropeanaCollections 1914-1918 produced as important result that some Russian Institutions are providing content on the First World War through Linked Heritage

Digitising Contemporary Art (DCA)
The cooperation was targeted to share knowledge on IPR issues.

AthenaPlus
The cooperation was targeted to share knowledge on ingestion procedure, multilingualism, digital exhibitions.

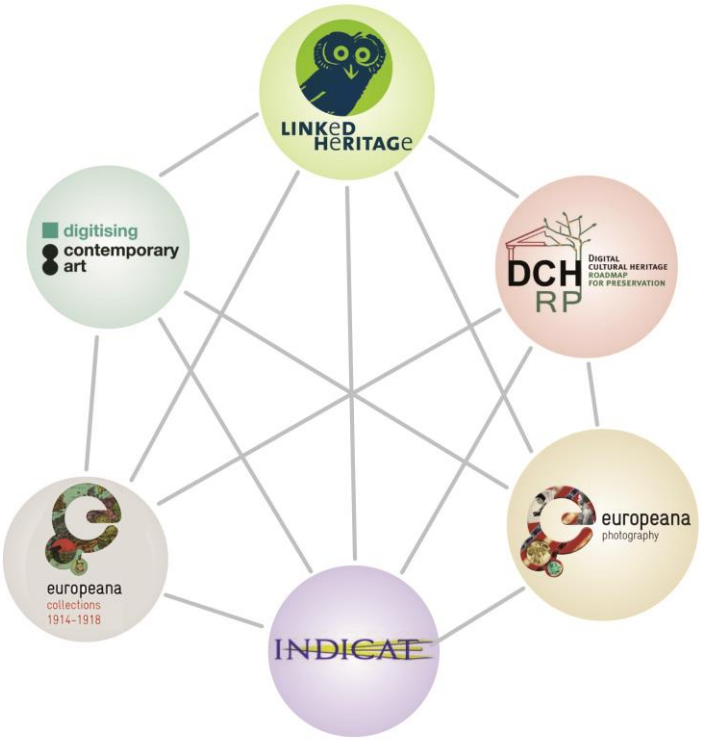
Moreover, cooperation was started with projects beyond the Europeana ecosystem, in particular:

INDICATE
INIDICATE (International Network for digital cultural heritage e-infrastructure) was a two-years project (September 2010-August 2012), funded in the framework of the Seventh framework programme (e-Infrastructure). The goal of the project was to coordinate policy and best practice regarding the use of e-Infrastructures for digital cultural heritage in countries all around the Mediterranean.
During the Indicate project, a deliverable on GIS in cultural heritage was produced. Linked Heritage transformed it in a publication of the series started during the ATHENA project: *Geocoded digital cultural content.*
Several Linked Heritage partners signed the Paris Declaration, the shared vision of the INDICATE consortium for the progress of Digital Cultural Heritage in future years.

Siera
SIERA (Integrating Sina Institute into the European Research Area" is an ongoing EU FP7 funded project in the field of multilingual and multicultural knowledge sharing technologies). The cooperation was targeted to share knowledge on multiligualism, in particular on Arabic thesauri.

DC-NET

DC-NET (Digital Cultural heritage NETwork) was an ERA-NET (European Research Area Network) project, financed by the European Commission under the e-Infrastructure - Capacities Programme of the FP7 (2009-2012). The main aim is to develop and to strengthen the co-ordination of the public research programmes among the European countries, in the sector of the digital cultural heritage. The Linked Heritage Project signed a joint position paper together with the DC-NET project. The title of this document is: *Public Consultation about the Green Paper on a Common Strategic - Framework for future EU Research and Innovation Funding. POSITION PAPER OF DC-NET AND LINKED HERITAGE PARTNERS*. The partners of both projects agreed on 7 points that represent the critical aspects for the progress of the research and innovation in the domain of the digital cultural heritage.



4.2 Relationships with Europeana

The relationships with Europeana were constant during the whole project.

WP5 and WP6 were constantly in contact with the Europeana technical team along all the ingestion process.

The Europeana communication channels (EuropeanaPro and blog) were the right channels for Linked Heritage to spread the project results among the Europeana community.

All Linked Heritage content providers are part of the Europeana network and during the project several partners participated in the Europeana General Assembly or dedicated workshops.

Several partners participated actively in some Europeana task forces, in particular:

Public Private Partnership (PPP) taskforce

During a first period, this Task Force worked on an outline framework for use by Europeana and Network members in launching and structuring discussions with private sector partners.This had the form of a schematic Mindmap. During the second period the Task Force intends to integrate the Mindmap with comprehensive descriptions and

produce a document in support of decision making. The Linked Heritage deliverables produced by WP4 were the base and fed the discussion of this taskforce.

Understanding the role of UGC in Europeana

Some partners participated in this task forse. The group has formalised its goals towards building a repository and point of contact for UGC practices both within Europeana and beyond. The identification of activities and actors who are developing UGC will inform the Task Force and serve to track the evolution of UGC across the Europeana ecosystem.

Europeana representatives at different levels participated actively in all the most important conferences and workshops organised by Linked Heritage.

Among them, we remind the International Digitisation Conference "Access, Use, Re - Use: Unlocking the Potential of Online Digital Cultural Content held in Dublin last 17 June 2013, organised by Linked Heritage in the framework of the Irish Presidency.

Morover, the participation of a Europeana representative was very fruitful in the Paris seminar on multilingualism and terminology, organised by Linked Heritage (18 April 2013). This was the occasion for several European projects working on terminologies to debate and know the state of the art on this topic. Europeana was very interested in the potential of the projects in the field of multilingualism.

5 Lessons Learnt

This section identifies the most important lessons learnt in the delivery of the project, that can inform similar initiatives. These lessons have resonance for the further development and evolution of Europeana and for the broader development of digital culture in Europe.

Content: the large size of the Linked Heritage consortium reflects the fact that the 'low hanging fruit' of very large collections of content are mostly now already in Europeana, or have explicitly declined to take part. Further large-scale expansion (in tens of millions of items) will be feasible, but will require incrementally more institutions and effort-per-item.

Facilitating ingestion: Further expansion requires that the ingestion process is as simple as possible, both technically and legally. The MINT technology used in Linked Heritage can deal with very diverse source metadata formats and can support any new content provider. But human expertise (in terms of both content and technology) is still required at the content provider, as is a help-desk or other support structure. More broadly, it can be concluded that large-scale ingestion will require human intervention an on an ongoing basis.

Communication: the project had an effective dissemination programme, with several events, a closing conference, an active website, a showcase in Digitalmeetsculture and two durable publications. These were important in helping to attract a dozen new content providers and demonstrate the scalability and broad value of the project.

Support: existing and new content providers were well supported throughout the project. This ongoing support for new providers made their contributing to Europeana more feasible than 'going it alone'. Strong technology and a willing help-desk support function were valuable to simplify the contribution process for new partners. New content providers realised the benefit of working with the Linked Heritage team and toolkit, rather than 'going it alone' in contributing to Europeana.

Linked data: the project demonstrated how metadata contributed to Europeana via Linked Heritage can be converted to linked data and published as a linked data 'package'. It also showed examples of new services that can be delivered, based on interweaving cultural heritage linked data with third party packages. A series of pragmatic recommendations are made, which apply to any cultural heritage publisher of linked data.

Legal aspects: during the delivery of Linked Heritage, the legal framework for Europeana changed significantly, with the introduction of the DEA and the requirement for public-domain (CC0) metadata. This led to a good deal of discussion, disquiet and (in some cases) resistance. The CC0 approach simplifies the landscape, in that the requirement placed on content providers is quite straightforward. It is, however, difficult for many content providers to agree with, or to feel comfortable with, after so agreeing. In the medium term, the intellectual property model used by Europeana may require revisiting. Clear **licensing of linked data** packages (CC0 or not) is also important, to underpin new linked data initiatives that re-use or link to cultural heritage content.

Technical aspects: the optimum use of digitised cultural heritage materials requires more than the now-routine digitisation and online publication. Increasingly, end users and re-users alike require content that is linked to other sources of data, or linkable from other data, be that via a linked-data triple or using a geo-code for positioning, with a stable online location and a description that includes standardised terms. Both new and (critically) existing digital cultural heritage materials need to be revisited, to be enhanced with new characteristics and made ready for applications which go far beyond the classical web page.

Sustainability of the technology: the technologies used in Linked Heritage have been shown to be very useful, both to content providers and in the service of Europeana. Linked Heritage built on, and enhanced, the MINT system, but also introduced and developed the **terminology management platform** (TMP). Such a system is essential if the search and retrieve functions of Europeana are to be optimised, and (more broadly) if semantic interoperability across organisational and national boundaries to be a reality. In common with MINT, the TMP is a 'many to one' tool, accepting terminologies from diverse sources, SKOSifying them and mapping them to a shared thesaurus. Sustaining the service over the medium and longer term represents a challenge, which deserves consideration from an international perspective.

Training: Linked Heritage developed an online Moodle courseware and a set of learning objects to address specific knowledge gaps in the cultural heritage sector. However, there is significant demand for more such material, and for

the flexible and personalised learning enabled by online virtual learning environments. Digital cultural heritage is central to the future of the cultural sector across Europe, and **more resources to build capacity** and expertise beyond the most commonly-involved bodies (most of which are national in scope) are needed. This is particularly the case for new and challenging technologies such as 3D-visualisation and augmented reality, as well as the management of 'big data' which is increasingly emerging from humanities research.

6 Impact of Linked Heritage

Linked Heritage has delivered benefit to Europeana, to the broader digital cultural heritage sector and to society in Europe as a whole.

6.1 Benefit to Europeana

Europeana is Europe's digital library, museum and archive and provides digital access to millions of books, paintings, films, photographs, archives, museum objects and other cultural media across Europe. Europeana is the EU's flagship enterprise in digital cultural heritage and its success is fundamental to the success of EU policy in the area. Enhanced quality and increased volume of content are critical to the advancement of the Europeana initiative.

6.1.1 Europeana - The Challenges

Significant challenges have faced Europeana in recent years in respect of the quality and quantity of the content provided, the accessibility of that content and the nature of the user experience. The problems experienced include:

1. Need to increase the **volume of digital items** accessible through Europeana.
2. Issues of **interoperability** and combining collections and external data sources.
3. Uneven (non-standard) **terminologies** – which impedes searching.
4. Lack of **persistent identifiers** (e.g. leading to duplicate records and broken links).
5. **Complex metadata** models (making content provision difficult) and **poor quality of metadata** provided.
6. Lack of content from the **private sector**.
7. Need to attract **wider spread of contributors**/lack of content from some European States.
8. Multiple approaches to **best practice**, technologies and processes.
9. Limitations in the **technical capacity** in the cultural heritage sector regarding Europeana.

These challenges impede Europeana in reaching its full potential.

6.1.2 Linked Heritage - The Solutions

1. **More Content**: One of the biggest challenges currently facing Europeana is the expansion of its collection. Linked Heritage has directly contributed 2.7 million new items to Europeana (representing 7.5 million digital items) from a broad range of contributors, including **new** and **private-sector** content providers. Apart from sheer volume, the content provided by Linked Heritage is of very high quality, including masterpieces, unique material and material with high re-use potential. Linked Heritage also helps support future growth by facilitating the delivery of content from new sources (e.g. through mapping to the private-sector ONIX metadata standard).
2. **Interoperability via Linked Data**: The project has demonstrated how cultural heritage metadata can join the linked data 'cloud', where they can be accessed by third parties, adding value to many applications. The content used for the demonstration has been converted to Linked Data RDF triples and published as a LD package, for contribution to the LD "cloud". The Linked Heritage LD package may be used as a model by other initiatives, and can be up-scaled to enable the entire Europeana dataset to be published as LD.
3. **Terminology Standards**: Linked Heritage has delivered cross-domain multilingual terminologies enabling more precise searching and more relevant search results. The Linked Heritage terminologies are focused mainly on controlled vocabularies concerning People, Locations and Concepts; they can be extended, refined and maintained by members of the Europeana community. The thesaurus delivers more precise user searches, as well as more relevant and targeted search results.
4. **Persistent Identifiers**: We have identified and disseminated best practice for persistent identifiers, thus addressing the issues of broken links and duplication and improving the search experience. Content has been tagged with a persistent unique identifier, allocated using a scalable and effective management model, to ensure that identifiers are truly unique, and that a one-to-one mapping between items and identifiers is assured. Several pragmatic recommendations are made for cultural heritage organisations which intend to support permanent identifiers, now or in the future.

5. **Metadata Models**: Linked Heritage has provided metadata models, best practice tools and techniques to facilitate content contribution and the enhancement and aggregation of content from content providers. Linked Heritage content records contain a rich metadata set, through the use of an intermediate mapping specification which captures the **rich metadata** before transforming it to the Europeana specification (present and/or future) in a manner which **minimises information loss**. The Linked Heritage model provides quality-controlled metadata which is also DEA-compliant. The Linked Heritage aggregation used a checklist at publication time, to ensure the metadata provided was as complete as possible, leading to more meaningful and fruitful search and retrieve potential.
6. **Private Sector Contribution:** In addition to direct contribution by the private sector through Linked Heritage, the project has also laid the foundations and framework for significant future collaborations with the private sector, through, for example, support for the ONIX metadata standard.
7. The large consortium, and particularly the addition of new content providers during the project, meant that content is now being provided to Europeana from a significant number of **new sources**. Several of these are from **under-represented countries**.
8. **Best practice**: The consensus-based approach used by Linked Heritage means that common solutions to Europe-wide issues have been identified and validated. The broad representation and involvement of many stakeholders means that the best practice guidance from the project is likely to be accepted consistently.
9. **Dissemination and training**: A comprehensive training and dissemination programme has produced numerous publications, training resources and on-line tools, building awareness of the project and developing technical capacity in the sector.

Europeana challenges and the solutions delivered by Linked Heritage are summarised here.

Europeana Challenges	**Solutions**	**Outputs**
More content needed	**2.7 million** metadata records, describing **7.5 million** new items.	New metadata. Key enabling technologies for aggregation
Poor **private sector** cover	Support for ONIX metadata opens door to massive private sector collections. However, commercially attractive business models must first emerge.	Detailed semantic mapping of ONIX for Books 3.0.1 to LIDO and thus ESE. Proof of concept data sets prepared. Improved support for intellectual property models in MINT.
Limitations in use of **linked data**	Demonstrating of linked data from metadata. Demonstrating the use of external linked data in Europeana search results.	Best practice report on cultural heritage linked data (and metadata standards). Specification of the technologies for large-scale implementation of cultural heritage linked data. Pragmatic recommendations and guidelines. Linked Data Demonstrator Server
Incompatible **terminologies** impeding search and re-use	Platform for cross-domain multilingual **terminology** harmonisation	Terminology Management Platform (TMP). Multilingual LIDO *event type* terminology (will become an official recommendation for the LIDO standard). Durable guidance publication on terminology, events, Wiki
Lack of **persistent identifiers**, causing broken links and duplicate records.	Identified and disseminated best practice for **persistent identifier**s in Europeana context.	State of the art report on persistent identifier standards and management tools Best Practice Report – Public Private Partnership

		(re use of persistent identifiers). Guidelines and pointers for those considering implementing PIDs
Poor **metadata quality**, caused by loss of detail in the ingestion process.	Delivered best practice approaches to encoding and retrieving **richer metadata** sets. Added QA to ingestion pipeline.	Best practice reports on linked data and metadata standard and re-use of private sector metadata Metadata interoperability between content providers and Linked Heritage repository. Implemented metadata gateway for transformation to established standards and remediation. Quality control implemented within MINT.
Need to ensure **wider spread of contributors** of digital content to Europeana.	35 content providers from 23 countries, including under-represented. Linked Heritage facilitates new content providers through technology and support network.	Broad geographic spread of contributors through Linked Heritage, including under-represented countries.
Multiple approaches to digital cultural heritage issues	**Common solutions to issues have been** identified and validated. Inclusive pan-European approach	Established best practice network. Agreed best practice approaches to common challenges
Shortages of technical capacity in the cultural heritage sector	Best practice identified Tools and technologies provided Knowledge and support resources developed	Help Desk, Website, publications Virtual Learning Environment & Learning Objects Durable guidance publications (Terminology, Geocoding) Project Website (30,000 unique visitors since its creation in May 2011).

6.2 Benefit to Cultural Heritage Sector

The global cultural heritage sector ('the sector') is in a state of continuing dynamic evolution. The mission of the sector is changing rapidly, with the emphasis shifting from curation to collaboration, repositories to re-use. Increasingly, DCH collections are seen as critical digital data sources for a multitude of purposes, from education to tourism to creative industries.

6.2.1 The Sector – Challenges

The imperative to interwork with other actors, including the contribution of material to Europeana, leads to a series of challenges, experienced across the sector:

1. The need to **deliver interoperable metadata**. This of course includes contributing to Europeana, but has been a key challenge since DCH organisations first started to collaborate. While mapping of metadata to standards (e.g. Dublin Core) is a well-established model, it often leads to loss of richness in the metadata.
2. A related issue is the use of **different terminologies**, where organisations use different terms to describe the same entity or concept. This impedes effective searching and efficient re-use of Europeana content by third parties.
3. The need to **interlink with third party data sources**, both within and beyond the cultural heritage sector. Increasingly, individual initiatives are seen as open data sources, and combined innovatively to develop new services. The cultural heritage sector must not be left behind.

4. The need to **protect intellectual property** – content providers are often rather protective of their content (reflecting the fact that it is typically their most important organisational asset). The Europeana DEA is a particular challenge for some content providers.
5. The need to **learn from one another** - the sector is very large and diverse - most problems will have been encountered, and solved, by someone else. Access to best practice and expertise is crucial.
6. The need to engage the **private sector** to a greater degree in collaborated digital cultural heritage initiatives
7. The shortage of **technical expertise** – the sector as a whole continues to lack sufficient personnel with the combination of cultural heritage and technological skills to deliver optimal digital cultural heritage services.
8. The 'project-based' nature of much digital cultural heritage funding encourages '**research silos'** and impedes effective sharing of results across projects

6.2.2 Linked Heritage – the Solutions

1. Linked Heritage's **key enabling mapping and publication technologies** are available to the entire sector on a zero-cost open source basis. The tools support mapping from any source metadata format to ESE; other destination formats can readily be added. A particular focus is on **maintaining metadata richness** as far as possible.
2. A registry and **management system for terminology harmonisation** is an important output of the project, which will remain available and valuable to the sector.
3. We have demonstrated the creation of a **linked data** package, using metadata generated in the project (and ingested into Europeana). This demonstration is an important early step to web-2.0-enabling of other cultural heritage resources. We have also explored the use of **persistent identifiers**, which are critical to the durable interlinking of online resources.
4. Our key enabling technology platform explicitly supports **different levels of licensing** of metadata, in order to allow content providers to specify the license they wish to apply for different end-purposes (e.g. Linked Heritage experiments, as opposed to Europeana publication) and for different metadata sets.
5. The Linked Heritage **best practice network** brings together a substantial team (>100 individuals) with a range of specialisations and experience from across the sector. These networks of contacts and shared experience will persist long after the project has ended, and will stimulate the flow of information from one organisation to another.
6. We engaged from the very start with the **private sector** and several such companies are partners in Linked Heritage. An important output is the demonstration mappings between private sector metadata models (notably ONIX) and public-sector models (notably LIDO and ESE). However, the business models promoted by Europeana (notably the CC0 DEA) are not commercially feasible.
7. Our **training** activities have already benefited the sector, and remain an important part of our legacy. This includes both online learning objects and durable publications, as well as the project website and resources.
8. Linked Heritage had a strong focus on **inter-project collaboration**, and has meaningful engagement with several other projects (INDICATE, EuropeanaPhotography, DCA, DCH-RP, Europeana Collections 1914-1918 etc.).
9. To communicate and establish a factual dialogue with the community of cultural heritage organisations, to promote Europeana and to encourage them to join Europeana; this has been realised with several complementary instruments, i.e.: the project's website, the show-case on digitalmeetsculture online magazine, the Uncommon Culture magazine, booklets and other dissemination material.

6.3 Benefit to Society as a Whole

The provision of an effective digital cultural heritage platform (such as Europeana) is important for a number of reasons. Linked Heritage has made a valuable contribution to furthering the socio-economic benefits identified below, through its impact on Europeana and the digital cultural heritage sector as a whole.

Cultural impact: Europe has a vast, varied, multi-lingual cultural heritage. Ensuring optimal access to Europe's digital cultural heritage has cultural benefits for the general public across the continent and ensures that cultural heritage is maintained for, and appreciated by, future generations. The impact leads to improved quality of life for European citizens, re-use of content for general social and recreational purposes and an increased appreciation for European cultural patrimony.

Educational impact: A more user-friendly Europeana, with more effective search provides significant benefits to students, academics and researchers (e.g. developing learning and educational content), thereby delivering educational and academic benefits.

Commercial impact: The availability of an optimal digital cultural heritage resource also has significant commercial benefits e.g. the reuse and leverage of content for the travel and tourism sectors and the creative. The potential for significant economic impact is reflected by the inclusion of cultural heritage in the Digital Agenda for Europe.

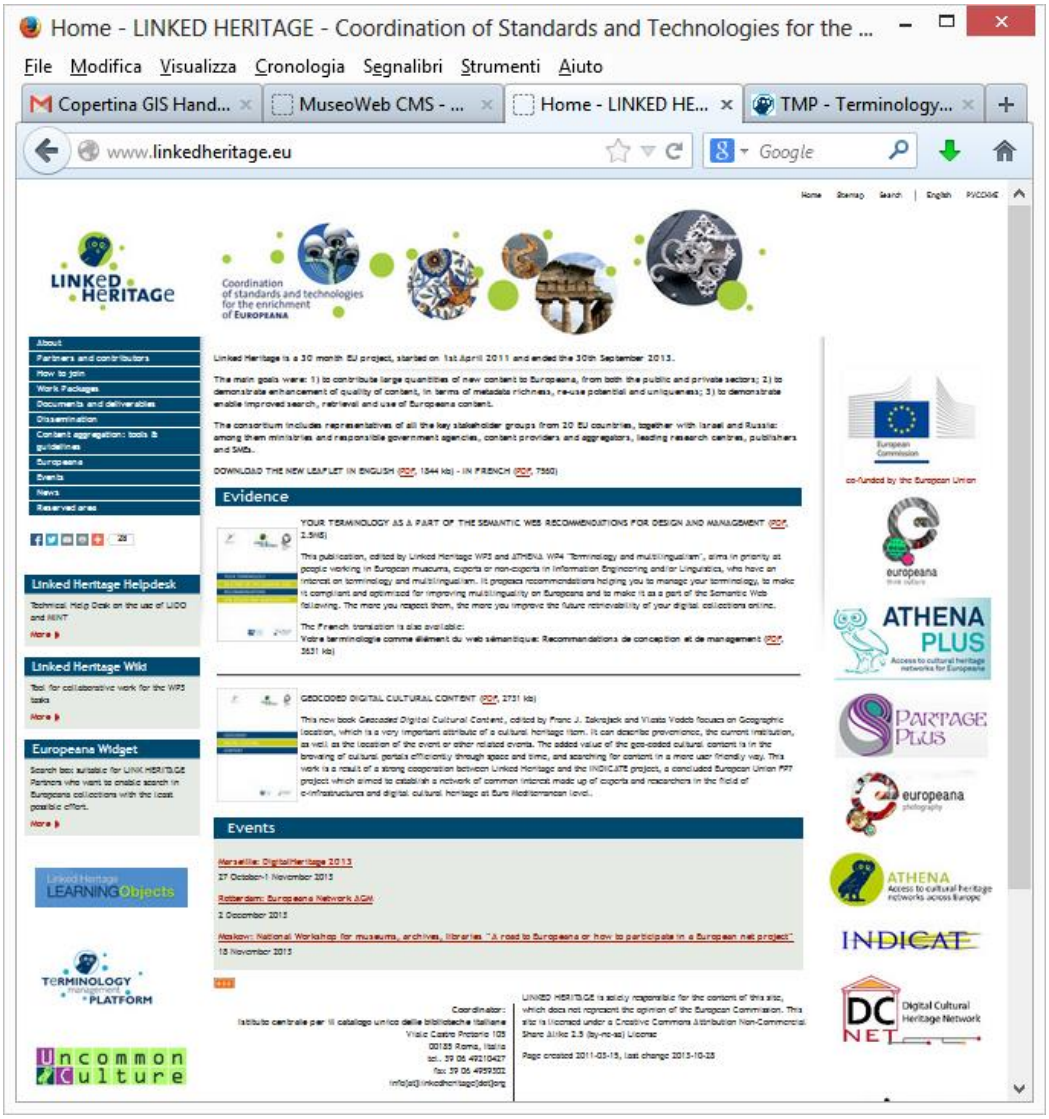
7 Dissemination

The dissemination of the Linked Heritage activities and results has primarily been aimed at content providers and other projects, but also to the entire community of stakeholders working in the field of digital cultural heritage. This reflects the nature of the project as a 'feeder' project to Europeana and as a technology validation initiative. But it was also targeted to the whole community of experts, researchers, stakeholders involved in the development of digital cultural heritage.

All the dissemination activities, which saw the involvement of all Linked Heritage partners. were fully described in the Final dissemination plan (D7.6). Here we list the main achievements.

7.1 Website

The website at **www.linkedheritage.org** contains comprehensive information about the project, partners, work-plan, outputs, aggregation guidelines etc. A broad portfolio of publications, assets, and deliverables are available for download. Amongst others, the website is also an access point to the Terminology Management Platform and the Learning Objects.



These were the final statistics of the Linked Heritage Website:

YEAR	Unique visitors	No. visits	Pages	Hits	Visit duration
2011	5046	9772	46916	163161	375s
2012	19908	36519	127927	482807	316s
2013	21903	49465	156919	372746	244s
Total	**46857**	**95756**	**331762**	**1018714**	**312s**

and these the Top 10 number of file downloads:

D2.1 Best practice report on cultural heritage linked data and metadata standards	8292
Your terminology as a part of the semantic webrecommendations for design and management	6627
Linked Heritage dissemination material: Leaflet	2985
D4.1 - Best Practice Report – Public Private Partnership	2639
Votre terminologie comme élément du web sémantique: Recommandations de conception et de management	2373
D7.2 Dissemination materials	2170
LH, Training Workshop. Roma, 26-27 September 2011: Stein	2137
D3.1 Best practice report - Terminology	2090

Geocoded Digital Cultural Content (final version)	2052
LH, Training Workshop. Roma, 26-27 September 2011: McKenna	1938

Partners were encouraged to disseminate Linked Heritage activities and outcomes on their own institutional websites in their own language, periodically updating news, and links to relevant documentation.

See pages in their relevant language:

http://www.idu.cz/cs/linked-heritage-koordinace-standardu-a-technologii (Czech)

http://www.icimss.edu.pl/Projekty/index.php?id=12 (Polish)

http://www.tib-hannover.de/de/forschung-und-entwicklung/projekte/linked-heritage/ (German)

http://www.ldm.lt/LDM/projektai_igyvendami_2010.htm (Lithuanian)

http://www.kis.gov.lv/projekti/muzejiem/linked-heritage/ (Latvian)

http://www.iccu.sbn.it/opencms/opencms/it/main/attivita/internaz/pagina_0007.html (Italian)

http://digisam-ra.blogspot.se/2012/08/workshop-om-europas-digitala-kulturarv.html (Swedish)

http://www.packed.be/nl/projects/readmore/linked_heritage/ (Dutch)

http://www.cordiaconsulting.eu/en/projects-and-referencies/linked-heritage/ (English)

http://www.promoter.it/linked-heritage (English)

http://www.editeur.org/112/Linked-Heritage/ (English)

http://www.linkedheritage.org/index.php?ru/1/home (Russian)

http://www.michael-culture.eu/european-projects (English)

http://www.yppo.gr/5/e5151.jsp?obj_id=54453 (English)

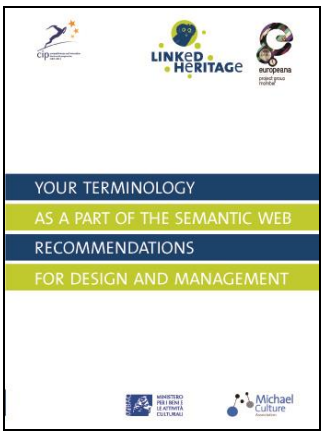
7.2 Publications

7.2.1 Booklets

The first booklet *Your terminology as a part of the semantic web recommendations for design and management* was published in the initial phase of the project and described in D7.5.

Both are available for download from the project website and have been printed and distributed as hard copy.

Following the fruitful memorandum of understanding between the INDICATE project (www.indicate-project.org) and Linked Heritage, another publication was edited in May 2013: *Geocoded Digital Cultural Content*, by Franc J. Zakrajsek and Vlasta Vodeb. Geographic location is one of the most important attributes of a cultural heritage item. It can describe provenience, the current institution, as well as the location of the event or other related events.



These two booklets increased the series of publications already started during the Athena project (http://www.athenaeurope.org/index.php?en/198/athena-booklets). Thanks to Linked Heritage dissemination, also the first 4 booklets (Digitisation standard landscape, Guidelines for geographic information, Persistent identifiers recommendations, LIDO) were continued to be disseminated with more than **34.000 downloads** in total until now.

7.2.2 Uncommon Culture

Uncommon Culture is the professional journal (ISSN 2083-0599 (online); 2082-6923 (print)) directed by ICIMSS, born during the ATHENA project. It provides unique perspectives on a rich variety of cultural activities in Europe. Examining cultural institutions and their collections, this magazine gives new insight into diverse cultural activities.

http://www.uncommonculture.org

During the Linked Heritage project, Vol 2, no. 3/4 "From Closed Doors to Open Gates" was printed in 500 copies, that have been and will be continued to be distributed at all major events where Linked Heritage is presented.

The table of contents and the articles of this issue are available at the following URL:

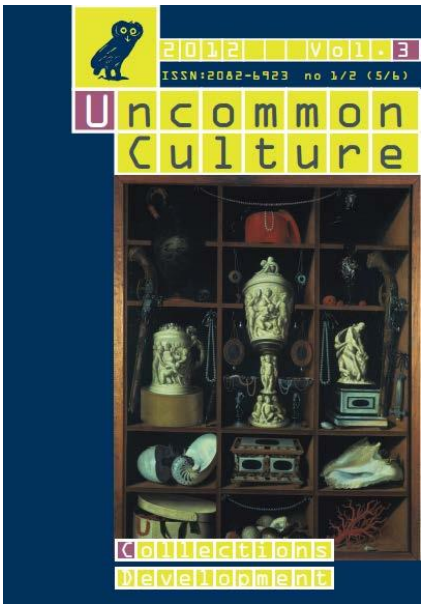
http://uncommonculture.org/ojs/index.php/UC/issue/view/327

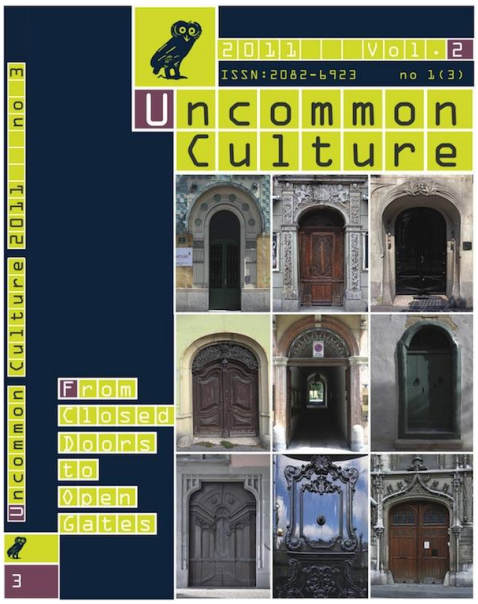
This issue was also distributed in the occasion of the Europeana Network Annual Meeting in Berlin last 27 November 2012 and the Europeana Foundation held 100 copies for its own distribution as the Introduction to this issue was co-written by Jon Purday, the Communication Manager of the Europeana Foundation,

An additional issue (Vol, 3, n. 5/6) was prepared before the end of the project, printed in 500 copied and already distributed among partners for distribution in near future events.

The table of contents and the articles of this issue are available at the following URL:

http://uncommonculture.org/ojs/index.php/UC/issue/view/391/showToc





7.2.3 Scientific articles and papers

All partners were encouraged to author papers in national and European journals, as well as conference proceedings where partners were invited to present their papers. Here the list of all papers produced from the oldest to the more recent.

Language	When	Where	What
EN	2011	CIDOC 2011	N. Drosopoulos, V. Tzouvaras, N. Simou, A. Christaki, A. Stabenau, K. Pardalis, F. Xenikoudakis, E. Tsalapati and S. Kollias, An aggregation system for cultural heritage content, CIDOC Conference, September 2011, Sibiu, Romania
EN	2012	Springer Link	Valentina Vassallo, Marzia Piccininno, Aggregating Content for Europeana: A Workflow to Support Content Providers , Lecture Notes in Computer Science, 2012, Volume 7489, Theory and Practice of Digital Libraries, Pages 445-454
EN	2012	CIDOC 2012	Eleni Tsalapati, Nikolaos Simou, Nasos Drosopoulos, Regine Stein, *Evolving LIDO based aggregations into Linked Data,* CIDOC 2012 Helsinki
IT	2013	SCIRES-IT	Marzia Piccininno, Il progetto Linked Heritage, SCIRES-IT vol. 3, Issue 1 (2013) (Italian)
EN	2013	DL 2013	E. Tsalapati, G. Stoilos, G.Stamou, G.Koletsos, Query Rewriting Under Ontology Evolution, International Workshop on Description Logics (DL 2013), Ulm, Germany, July 23-26, 2013
EN	2013	Archeomatica	A. Fresa, Linked Heritage: achievements and next steps, Archeomatica, [S.l.], v. 4, n. 1, may. 2013. ISSN 2037-2485
EN / IT	2013	JLIS	Rossella Caffo, Global interoperability and linked data in libraries: ICCU international committment
EN / IT	2013	JLIS	Mauro Guerrini, Introduction to the Seminar Global interoperability and linked data in libraries
EN / IT	2013	JLIS	Marie-Veronique Leroi, Linked Heritage: a collaborative terminology management platform for a network of multilingual thesauri and controlled vocabularies
EN / IT	2013	JLIS	Graham Bell, Commercial and cultural sectors: potential for data collaboration?
EN / IT	2013	JLIS	Patrizia Martini, Bibliographic standards and Linked Data. Towards a collaboration between cultural and commercial sectors
EN / IT	2013	JLIS	Gordon McKenna, Linked Heritage Experience in Linking Heritage Information
IT	2013	Digitalia	M. Piccininno, V. Vassallo, Il flusso di lavoro nei progetti di aggregazione di contenuti culturali digitali. Buone pratiche e controllo della qualità, Digitalia 2/2013. (Printed version)
IT	2013	Digitalia	Maria Teresa Natale, Linked Heritage: multilinguismo e terminologie. Resoconto del seminario di Parigi,

			Digitalia, VIII (2013), n. 1
EN	2013	In print	V. Vassallo, E. Athanasiou, S. Hermon, I. Eliades, Publishing Cultural Heritage content for Digital Libraries: the case of the collections of the Byzantine Museum and Art Gallery of the Archbishop Makarios III Foundation. Peer-reviewed paper in 2013 Digital Heritage International Congress (DigitalHeritage), 28 Oct – 1 Nov 2013 Marseille, France (Eds. A. C. Addison, L. De Luca, G. Guidi, S. Pescarin), IEEE (Catalog Number: CFP1308W-USB; ISBN: 978-1-4799-3169-9)
EN	2013	In print	V. Vassallo, N. Kyriacou, S. Hermon, I. Eliades, Tracing provenance of lost and found Cypriot Byzantine icons. Peer-reviewed paper in 2013 Digital Heritage International Congress (DigitalHeritage), 28 Oct – 1 Nov 2013 Marseille, France (Eds. A. C. Addison, L. De Luca, G. Guidi, S. Pescarin), IEEE (Catalog Number: CFP1308W-USB; ISBN: 978-1-4799-3169-9

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7.2.4 Online fast communication

Partners have been encouraged to promote Linked Heritage activities and outcomes in their institutional newsletters, e-bulletins and over their social media marketing tools. Here the list of all papers produced from the oldest to the more recent.

Language	When	Where	What
LT	2011	LM ISC LIMIS	Ernestas Adomaitis, Tarptautinis „Linked Heritage“ projekto susitikimas Lisabonoje (Portugalija)
LT	2011	LM ISC LIMIS	Tarptautinė konferencija „Linked Heritage“
LT	2011	LM ISC LIMIS	Tarptautiniai „Linked Heritage“ mokymai: Roma 2011
CT	2011	CITILAB	Workshop 22 de novembre de 2011, Citilab, Cornellà-Barcelona, Europeana, agregació de continguts i Linked Data pel patrimoni cultural
GR	2011	Cyprus newsletter	Valentina Vassallo, Linked Heritage: συντονισμός προτύπων και τεχνολογιών για την ενίσχυση της Europeana, European Office of Cyprus Newsletter, 2011, p. 3
CZ	2011	Informacni servis	A. Souckova, IDU se zapojil do projektu Linked Heritage, Informacni servis, roc. 14, c. 6, cerven 2011
CZ	2011	IDU	Linked Heritage – koordinace standardů a technologií za účelem obohacení Europeany, IDU, 17 May 2011
IT	2012	CulturaItalia portal	INTERVISTA: Jill Cousins: "Da CulturaItalia e dagli altri aggregatori nazionali un grande contributo per il successo di Europeana"
EN	2012	CulturaItalia portal	INTERVIEW: Jill Cousins: "Europeana's success receives a boost from CulturaItalia and other national aggregators"
ITA	2012	MiBAC portal	Renzo De Simone, Bruxelles, i ministri della cultura europei fanno il punto sull’agenda digitale
ITA	2012	DigItalia	Marzia Piccininno, *Europeana e altri progetti europei dell’ICCU*, VII, 2012, n. 2, p. 122-131
LT	2012	LM ISC LIMIS	Trečiasis „Linked Heritage“ projekto plenarinis susitikimas Stokholme
EN	2012	COLLECTIONS LINK	Thesaurus Management Tool, The Linked Heritage project, 12 April 2012, Collections Link012 http://www.collectionslink.org.uk/programmes/european-projects/1119-linked-heritage
IT	2013	Pionero – Digital Innovation	Linked heritage: il genere di “innovazione” e’ femminile!
GE	2013	TIB Blog	Linked Heritage: 3 Millionen neue Metadaten für die Europeana und wir sind dabei
GE	2013	TIB Blog	Access, Use, Re-Use: Unlocking the Potential of Online Digital Cultural Content
GE	2013	TIB Blog	Warum die Europeana so wichtig ist,
GE	2013	TIB Blog	AV-Metadaten in Europeana
CZ	2013	CTENAR	A. Souckova, Linked Heritage – koordinace standardu a technologii a ucelem obohaceni Europeany, Ctenar, roc. 65, c. 6 (2013) [Full text in czech is accessible only for subscribers, news on IDU website]
CZ	2013	CULTURENET	Digitální sbírky Institutu umění – Divadelního ústavu v Europeaně

CZ	2013	DIVADLO	Digitální sbírky IDU v Europeaně

7.2.5 Digitalmeetsculture.net

The project was showcased on the Digitalmeetsculture online magazine (http://www.digitalmeetsculture.net/heritage-showcases/linked-heritage/), a sector-specific publication in the European digital cultural heritage sector with currently over 10,000 visitors per month. Linked Heritage has a button permanently featured on the homepage, providing easy access to information about the project, including the latest news, documents and over a dozen highlighted articles. Furthermore, Linked Heritage also featured in the Digitalmeetsculture newsletters, which are distributed to over 5,000 readers.

Language	When	What
ENG	10/2013	Linked Heritage training programme, Digital Meets Culture, October 2013
ENG	10/2013	Linking Cultural Heritage Information, Digital Meets Culture, October 2013
ENG	10/2013	Improve search and higher quality metadata thorugh terminology management, Digital meets culture, October 2013
ENG	08/2013	Linked Heritage presents results (source Europeana blog)
ENG	08/2013	Linked Heritage dissemination goes on,
ENG	07/2013	Linked Heritage presented at the Festival of Avignon, Digital Meets Culture,
ENG	06/2013	Conference about "Use, Re-use and Access", prestigious event in Dublin,
ENG	04/2013	Geocoded Digital Content
ENG	03/2013	Linked Heritage: Seminar on Multilingualism and Terminology
ENG	02/2013	Linked Heritage Fifth Plenary meeting in Italy
ENG	12/2012	LINKED HERITAGE: achievements and next steps
ENG	03/2012	Metadata management to facilitate access to content
ENG	03/2012	Cultural Heritage and Information Technologies. Museum as an information system
ENG	10/2011	ISRAEL MUSEUMS GOING DIGITAL
ENG	10/2011	Linked Heritage: main goals on the dissemination
ENG	09/2011	Linked Heritage – Coordination of Standards and Technologies for the enrichment of Europeana

7.2.6 Europeana Professional

Linked Heritage was favourably reviewed in recent posting on the Europeana Pro blog (http://pro.europeana.eu/pro-blog/-/blogs/1896343):

> 30 months on, its results are impressive. 38 partners from 26 countries, together with 10 more external contributors recruited during the project including Lithuania, Russia, Croatia and Ukraine, coordinated the aggregation of over 2.7 million items to Europeana, making it one of Europeana's biggest aggregators. The *Linked Heritage aggregation* includes data from archives, museums, libraries, research centres and universities, and covers 3D models, manuscripts, ancient prints, medieval antiquities, archaeological artefacts, monuments, Greek and Latin inscriptions, fossils, ancient and modern paintings, ethnographic collections and more. (***from the Europeana pro blog***)

Furthermore, Linked Heritage training programme was disseminated through Europeana Pro (http://pro.europeana.eu/web/guest/pro-blog/-/blogs/1952841).

7.3 Events

Linked Heritage Consortium presented projects results at numerous international and national events : workshops, seminars and conferences organized by sister institutions, Europeana, and other European projects, etc., as well as national and international fairs and exhibitions.

Partners' participation in these events has been monitored by means of two **Events reporting forms**, filled in by partners after each event.

- **Linked Heritage Events reporting form**: This form must be used when a partner is organising a Linked Heritage event
- **External events reporting form**: This form must be used when a partner is presenting and disseminating Linked Heritage outcomes in events organized by other institutions.

7.3.1 International Conferences

Three International Conferences were organised during the Linked Heritage project:

Hungary, Budapest, 22 June 2011, Linked Heritage Public Launch

Goal: To inform cultural institutions in Europe about the Linked Heritage initiative, supported by the European Commission in the frame of the CIP – ICT Policy Support Programme. Welcome and keynote (invited speakers from EC, Europeana, Hungarian Ministry of National Resources)

Programme:

http://www.linkedheritage.org/index.php?en/146/events/37/budapest-linked-heritage-conference

http://lh.oszk.hu/home

Participants: 80 (LH partner institutions, Hungarian cultural heritage institutions, press representatives)

The event achieved the expected result where the partners, the EU and Europeana representatives and other cultural institutions in Europe were able to receive full information on the Linked Heritage project in its initial stage.

Italy, Florence, 18-19 June 2012, Seminar "Global interoperability and linked data in libraries", organized in cooperation with Linked Heritage was promoted by:

The Università degli studi di Firenze, Istituto centrale per il catalogo unico delle biblioteche italiane (ICCU), Biblioteca nazionale centrale di Firenze (BNCF), Casalini Libri, Comune di Firenze, Conferenza dei rettori delle università italiane (CRUI), Associazione italiana biblioteche (AIB), Istituto di teoria e tecniche dell'informazione giuridica del Consiglio nazionale delle ricerche (ITTIG-CNR), Fondazione Rinascimento digitale

The seminar dealt with the following topics: Web of data, Linked bibliographic data, Management of data and distribution in libraries, Open data exchange, Semantic web techniques and technologies, Knowledge sharing and connection of data, Development of open technical standards, Best practices for publishing and connecting structured data on the web, Open archives, Open access, Conceptual models, Knowledge Organisation Systems (KOS), Consuming and using library data, Standard vocabularies, Open library data,

Linked Heritage WP leaders took parts in several workshops. The website of the conference was managed directly by Linked Heritage coordinator_ http://www.linkedheritage.org/linkeddataseminar/

Participants: 300 (academic, librarians)

Particularly from the perspective of Linked Heritage WP3, the LH dissemination in this seminar was very successful. The feedback from the attendees was interesting mainly because of most of them were librarians and the Terminology Management Platform that had been developed within the LH WP3 is cross-domain. Librarians use well known subject headings and their vocabularies are more limited than those of museums or other institutions but the LH Dissemination was particularly useful as it shows how vocabularies could be transformed in order to be part of the Linked Data and especially how vocabularies from libraries can connect with vocabularies from museums.

Ireland, Dublin, 17 June 2013, International Digitisation Conference "Access, Use, Re-Use: Unlocking the Potential of Online Digital Cultural Content"

This international conference was hosted by the Irish Presidency of the European Union and Linked Heritage partner the Local Government Management Agency,

Programme:
http://www.linkedheritage.eu/index.php?en/146/events/89/dublin-international-digitisation-conference-access-use-re-use-unlocking-the-potential-of-online-digital-cultural-content

Participants: 100 (Glams, ministries, companies, academics)

Conference attendees provided feedback to the speakers in active question and answer sessions. Fruitful and interesting conversations focused on education, re-use, relevant web developments and the potential for cultural tourism. Thanks were expressed by all presenters and participants to the hosting organisations.

7.3.2 Linked Heritage Workshops

12 workshops were organised directly by the project partners. These workshops took place in the following countries: Belgium, France, Germany, Israel, Italy, Russia, Spain, United Kingdom, Sweden. In these occasions, all Linked Heritage activities were widely disseminated, reaching an audience of about **850 attendees** (Museums, libraries, archives, educational and research institutions, public bodies, IT in culture, master students, audio-visual developers, architects, lawyers, cultural policy makers, plastic and performing artists working in the digital realm). Here, we give the list of workshops, which are fully descrived in D7.6, chapter 6.2.

- Israel, Jerusalem, 14-16 November 2011, Eva-Minerva 2011: the 8th Jerusalem conference on the digitisation of cultural heritage
- Moskow, Russia, 18 November 2011, National Workshop for museums, archives, libraries “A road to Europeana or how to participate in a European net project”
- Moskow Russia, 29 November 2012, Workshop “Share culture, link content: Europeana and supporting projects” at the XIII annual international conference “EVA 2011 Moscow”
- Spain, Barcelona, 22 November 2011, Workshop on Europeana, aggregation of content and Linked Data for the Cultural Heritage
- Bristol, UK, 4 April 2012, Guest lecture (part of Masters in Information and Library Management)
- Sweden, Stockolm 23 May 2012, European Cultural Heritage online. Aggregation and semantic web
- Sweden, Stockholm, 23 May 2012, MICHAEL Culture workshop on virtual exhibitions
- Italy, Padova, 6 March 2013, Il patrimonio culturale digitale verso Europeana e CulturaItalia: aspetti tecnici e metodologia
- Bristol, UK, 9 April 2013, Guest lecture (part of Masters in Information and Library Management)
- France, Paris, 18 April 2012, Seminar on terminology and multilingualism, organised by Linked Heritage WP3
- Brussels, Belgium, 5 September 2013, Workshop on Terminology

7.3.3 Linked Heritage participation in other events

Linked Heritage partners disseminated Linked Heritage activities through presentations and posters in 22 events in the following countries: Austria, Belgium, Cyprus, France, Germany, Greece, Hungary, Israel, Italy, Karelia, Romania, Slovakia, Ukraine, United Kingdom. In these occasions, all Linked Heritage activities were widely disseminated, reaching an audience of over **1500 attendees** (GLAM experts, researchers, public bodies, SMEs, publishers, artists, etc.). Some of these events were the occasions for networking activities with other European projects belonging to the Europeana ecosystem and other frameworks. Here, we give the list of these events, which are fully described in D7.6, chapter 6.3.

Italy, Firenze, 5 May 2011, EVA Florence 2011

Presentation of Linked Heritage in the Workshop "Ten years of networking for digital cultural heritage

Romania, 4-9 September 2011, CIDOC 2011 - Knowledge management and museums

Coorganisation of the Workshop, “Linked data for cultural heritage”, by Regine Stein (Unimar). Linked Data is currently one of the hot topics in the area of “Knowledge management and museums”, ad is often mentioned in many conference talks and papers on the future prospects for access to cultural heritage. This workshop offered an introductory tutorial on Linked Data for the cultural heritage sector. It covered techniques for publishing and consuming Linked Data, requirements for cultural Linked Data, and actual Linked Data developments in the cultural heritage area.

Organisation of Workshop III, “LIDO: a practical introduction”, by Regine Stein (Unimar). This workshop offered a methodical introduction to the LIDO format and presented practical mapping exercises to the LIDO format.

Presentation on “Linked Data: Some preliminary results of the Linked Heritage Project, by Regine Stein (Unimar) and Gordon McKenna (Collections Trust)

Italy, Padova, 23 September 2011, Venetonight - the European researchers’ night in Veneto

The Researchers’ Night was promoted by the European Commission with the aim of giving citizens the opportunity to meet researchers, reinforcing the relationship between science, school and society and encouraging young people to explore the world of research. Inside this initiative the Library System of the University of Padua presented the Linked Heritage project.

Germany, Frankfurt, 13 October 2011, Frankfurt Book Fair 2011

Participation in the workshop: “When Publishers Meet Europeana”. This seminar, organised jointly by the Federation of European Publishers and the Europeana Foundation, included reports from pilot uploads of publishers’ and commercial aggregators’ metadata, and views on the opportunities and challenges for full-scale contributions by representatives of high-profile publishers such as Penguin, Pearson and Brill. Michael Hopwood presented initial findings of Linked Heritage Work Package 4, Public Private Partnership, highlighting the existing state of play and potential solutions to licensing difficulties.

United Kingdom, London, 12 December 2011, KULTIVATE Project Linked Data Workshop,

Participation in the “Linked Heritage Data” Workshop. This workshop was organised in the context of the KULTIVATE project, one of several projects run by VADs (Visual Arts Data Service) to engage researchers and research repositories with art, arts research data, and research outputs. The presentations and discussions focussed on the potential for creating and publishing Linked Data in these contexts, and included updates on a wide variety of projects including Linked Heritage. Two presentations on Linked Heritage’s work to date were delivered, covering Work Packages 2 and 4.

Belgium, Brussels, 25 January 2012, Carare workshop

Presentation on the data interoperability project of KMKG-RMAH. There was some time to talk about its involvement in Linked Heritage as WP leader, the development of the Terminology Management Platform, the work of the other workpackages.

Italy, Milano, 15 March 2012, BiblioStar

Participation in the workshop: “Gestione dei metadati e servizi per l'accesso”, a series of 6 presentations on identifiers and metadata, primarily in the book publishing world, and through the lens of European projects including ARROW plus, Linked Heritage, LIA and Linked Content Coalition

Hungary, Veszprém, 13 April 2012, Networkshop

Participation in the workshop: Tartalomszolgáltatók: könyvtárak, levéltárak, múzeumok (Content providers: libraries, archives, museums). All the Hungarian memory institutions had the possibility in this session to present about the current content and service developments, national and international projects

Italy, Florence, 9-11 May 2012, EVA Florence 2012

Presentation of Linked Heritage in the workshop “Europeana awareness: initiatives and projects of The central institute for the union catalogue of the Italian libraries”

Cyprus, Nicosia , 9-11 May 2012, Virtual Heritage School od Digital Cultural Heritage

Participation in the workshop: Session: ‘3D documentation, imaging technologies and knowledge repositories’

United Kingdom, 17-18 May 2012, CEPIC Congress: IPTC Photo Metadata Day; IPTC Heritage Image Data Fringe meeting

The metadata conference within the CEPIC annual gathering of photo agencies, photo libraries and related professionals – and a special session devoted specifically to the requirements of image professionals in cultural heritage.

Ukraina, Sudak, 5 June 2012, Nineteenth International Conference “Crimea 2012”

Presentation at the session “Global Information Society. Challenges for Libraries” in order to promote LH activities and provide information to future content providers

France, Chambery, 7-8 June 2012, TOTh 2012 International Conference on Terminology & Ontology: Theories and applications

The TOTh conferences aim to bridge the gap between terminology and ontology by highlighting the contributions that one makes to the other and by opening up new perspectives for both theoretical and practical developments.

Austria, Salzburg, 12-15 June 2012, IKS Salzburg Event

Participation in the workshop “Semantic enterprise technologies in action”, with the goal to show IKS software integration in TMP; show the TMP to IKS project and to “people”; ask IKS for some features useful for TMP; speak with IKS project managers

France, Paris, 13 June 2012, Culture 2020

Dissemination material and networking

Republic of Karelia, Petrozavodsk, 21 June 2012, 16th annual international Scientific-practical conference ADIT-2012 "cultural heritage and information technologies. Museum as an information system"

Centre PIC presentation at the Section “IT for Preservation, Research and Presentation of Cultural Heritage: World Tendencies and Practices”.

France, Paris, 23 June 2012, Futur-en-Seine

European brokerage event. The Lounge was animated with European clusters pitches, presentations of forthcoming European ICT calls for projects, round tables, demonstrations, networking cocktails etc.

Italy, Lucca, 18-20 October 2012, Lu.Be.C 2012

Participation in the workshop “Poli e distretti per i beni culturali: quale impatto sulle imprese?” in order to make LH dissemination and networking

Slovakia, Jasna, 22-24 October 2012, Libraries 2015-2030: 6th annual Digital Library workshop

LH material dissemination and networking, in particular to understand how the ONIX can be contributed to Linked Heritage

Israel, Jerusalem, 13-14 November 2012, Eva-MINERVA Jerusalem 2012

Presentation of Linked Heritage project and the work of WP3 on the Terminology Management Platform (TMP)

Italy, Milano, 14-15 marzo 2013, Bibliostar 2013

Participation in the Workshop ”European experiences in metadata exchances between publishers and Libraries”

Cyprus, Nicosia, 27-30 May 2013, Cultural Heritage School on Digital Cultural Heritage (3D Documentation, knowledge repositories and creative industries)

The goal of Linked Heritage participation was to disseminate the research carried out within the Linked Heritage project by the Cyprus Institute – STARC to expand the network of stakeholders and enhance the collaboration with other relevant projects: LinkSCEEM-2, V-Must, ARCLAND, 3D-Icons

Greece, Athens, Carare project, 2013 workshop, Ευρωπαϊκά έργα για την ανάδειξη και τις e-υποδομές πολιτιστικού περιεχομένου: η συμβολή της ΔΙΠΤ

The goal of Linked Heritage participation was to disseminate the activities of the project and to find future ways of cooperation.

7.3.4 Meetings with sister projects in the Europeana ecosystem

Linked Heritage met with other projects of the Europeana Ecosystem during specific workshop and during the numerous Europeana events, like for example the annual assembly.

The networking was more fruitful with the following projects: Apenet, AthenaPlus, Carare, DM2E, EFG1914, Europeana Collections 1914-1918, DCA, Europeana Fashion, European Film Gateway, Europeana Inside, Europeana Judaica, Europeana Libraries, EuropeanaPhotography, MIMO, Partage Plus, 3D Icons, V-Must.

Here we list, the most important events where this networking activity took place:

Barcelona, Spain **22 November 2011**	Workshop on Europeana, aggregation of content and Linked Data for the Cultural Heritage	Europeana Judaica
The Netherlands, Rotterdam, 6 December 2011	First Council of Content Providers & Aggregators Annual General Meeting & Conference	All active projects
Belgium, Brussels **25 January 2012**	CARARE Workshop	Carare
Cyprus, Nicosia **9-11 May 2012**	Virtual Heritage School on Digital Heritage	Carare, V-Must
Sweden, Stockholm **23 May 2012**	European Cultural Heritage online. Aggregation and semantic web	Apenet
Sweden, Stockholm **24-25 May 2012**	Linked Heritage Third plenary meeting	Europeana 14-18
Israel, Jerusalem **13-14 November 2012**	EVA-MINERVA Jerusalem 2012	DM2E, Europeana Fashion, Europeana Libraries, EFG1914: European Film Gateway, Europeana Collections 1914-1918, Europeana Inside
Germany, Berlin, 27 November 2012	Second Annual General Meeting (AGM) of the Europeana Network	All active projects

Portugal, Lisbon 29-30 November 2012	Linked Heritage Fourth Plenary meeting	DCA
Italy, Padova, 5 March 2013	Linked Heritage Virtual Exhbitions Working Groups	Europeana Inside
Paris, France, 18 April 2013	Linked Heritage Seminar on Multilingualism	PartagePlus, EuropeanaPhotography, MIMO
Cyprus, Nicosia, 27-30 May 2013	Cultural Heritage School on Digital Cultural Heritage	V-Must, 3D Icons
Den Haag, 26-27 September 2013	Europeana Project Group	All active projects
Greece, Athens, 2013	CARARE workshop	Carare

8 Sustainability

8.1 Where next?

The Best Practice Network of Linked Heritage is composed of experts and stakeholders from government agencies and ministries, GLAMs (galleries, libraries, archives, museums), universities, technical Partners, PPP and SMEs. Several Partners have been cooperating for more than ten years (associated with the MINERVA, MICHAEL, ATHENA, and currently Linked Heritage projects).

ICCU's positive experience of coordination over recent years demonstrates that the costs of maintaining the network are minimal. Over more than a decade, the framework for this kind of cooperation across national and sectoral boundaries has proven itself as an excellent working solution both in its efficiency and for its copious productivity as well for its contribution towards sharing, and building upon knowledge. This works two-ways in that these kinds of networks bring benefits both to the individual participants as well as to the entire Network which reap the many benefits of best practice, experience and distributed productivity.

More specifically:

1) The Project Coordinator will maintain the website, the wiki and the mailing lists after the end of the project to insure the long-term sustainability of the Network. Maintaining the website, all the deliverables, publications and other documentation will be downloadable from the project website. All partners have committed to maintain on their websites all information about Linked Heritage.
2) Linked Heritage will keep the content that is already digitised and aggregated online. The technical maintenance of the system will be guaranteed by NTUA who is taking care of the dedicated server in Athens.
3) The quite 3 millions metadata managed by, and located in institutions and through aggregators and on servers which became visible through the aggregation work done by Linked Heritage. will be maintained and updated by these institutions and aggregators. Each of these organisations operates in its own specific institutional environment, with its own funding. The digital cultural content will continue to be accessible and maintained as part of the life cycle of such institutions and continue to be made accessible through Europeana. The outreach of these institutions to additional target populations – such as their own online users, multimedia producers, researching scholars, students, teachers etc. – will enable these institutions to develop new business models and so maintain the digitised resources, update their metadata as required by evolving standards while maintaining their interoperability with Europeana and adopting sustainable measures. When content providers are interoperable with national aggregators, national aggregators will monitor the persistence of the access to digital resources.
4) The partners Promoter and Michael Culture Association will also maintain their web platforms, respectively DigitalMeetsCulture and the AISBL portal to capitalise on the results of the project and contribute to the viability and vigour of the Network.
5) Partner ICIMMS will maintain the printed and digital journal "Uncommon Culture" which will be enriched with new issues thanks to other European projects.
6) Partner UniPD will maintain the access to the Learning Objects produced.
7) The partner Michael Culture Association will also make its platform available to capitalise on the results of the project and contribute to the viability and vigour of the Network.
8) Experts, who already know each other, will continue to meet virtually or at European cultural heritage events, which they will be attending for their own agendas. In those instances, the coordinator and the partners will continue to distribute Linked Heritage publications and brochures.
9) Metadata managed by and located in institutions that became visible via Linked Heritage will be maintained and updated by these institutions. Each of these institutions operates, in its own specific institutional environment, with its own funding. The digital cultural content will continue to be maintained as part of the life cycle of such institutions and continue to be made accessible through Europeana.

10) When the above-mentioned Content Providers are interoperable with national aggregators, national aggregators will monitor the persistence of the access to digital resources.
11) Partners are already participating in other European projects where they will share what was learnt in Linked Heritage.

Most significantly the development of the network will be enabled by the continued participation of the majority of Linked Heritage participants in a new consortium A**thenaPlus** (www.athenaplus.eu) that commenced on the 1st of March 2013.

AthenaPlus (www.athenaplus.eu) is a CIP best practice network started in March 2013 and ending in August 2015. The consortium is composed of 40 partners from 21 Member States countries. The principal objectives of the AthenaPlus project are to:

- Contribute more than 3.6 millions metadata records to Europeana, from both the public and private sectors, focusing mainly on museums content, with key cultural stakeholders (ministries and responsible government agencies, libraries, archives, leading research centres, SMEs).
- Improve search, retrieval and re-use of Europeana's content, bettering multilingual terminology management, SKOS export and publication tool/API for Content Providers;
- Experiment with enriched metadata their re-use adapted for users with different needs (tourists, schools, scholars) by means of tools that support the development of virtual exhibitions, tourist and didactic applications, to be integrated into Europeana repositories and the repositories of national aggregators or individual Content Providers.

Thanks to AthenaPlus, the **following results of Linked Heritage will continue to be capitalised** and developed.

- Working Groups (Terminology, Digital Exhibitions)
- Standards (LIDO)
- Technologies (MINT, TMP)
- Training
- Publications, e-journal, learning objects.

A Consortium Agreement signed by all Linked Heritage partners regulates rights and duties of all beneficiaries for the access and (re)use of all project outcomes.

8.2 Roadmap 2013-2015

The possibility of guaranteeing the sustainability of the service in the short-medium term (2-3 years) beyond the end of the Linked Heritage project in September 2013 has been already achieved, thanks to the resources ensured by the partner organisations and the support offered by the AthenaPlus project. Therefore, the services established by the Linked Heritage project will be assured beyond the life of the project and new results stimulated.

A synthetic roadmap follows:

Maintenance of the network and availability of the results

ICCU will maintain all the professional mailing lists in order to keep the partners informed about news, events and future opportunities.

It will maintain the project website alive in the server of the Italian Ministry of Cultural Heritage, in order to guarantee the access to all the project outputs (deliverables, documents, publications etc.).

All partners declared that they will continue to disseminate Linked Heritage results, maintaining Linked Heritage information pages on their websites, with relevant links to the main outputs.

The Michael Culture Association via its portal and Promoter via the digital magazine DigitalMeetCulture will maintain the Linked Heritage's showcase, providing easy access to relevant information, news, documents and highlighted articles.

The University of Padua will maintain and promote the Learning objects produced during the project.

The records aggregated via MINT will be maintained in the NTUA server.

Implementation of the Linked Heritage results at the national level

Almost all partners expressed their willingness to continue to cooperate in the future, implementing the results of the Linked Heritage Work Packages in the work they are doing at the national level concerning the coordination of digitisation, the digital access and the reuse of content. In particular, several partners already declared that they will continue to share their knowledge in Linked Data, Terminologies, PIDs, PPP, in national working groups.

Exploitation of the Linked Heritage results at the European and international level

At the European level the Linked Heritage partners will continue to share the results achieved in Linked Heritage in other European projects not yet ended of just started, belonging not only to the Europeana ecosystem.

Several experts belonging to the Linked Heritage Best Practice Network will continue to share the projects results within professional and technical working groups (CIDOC, IFLA, ICOM, LIDO)

Aggregation for Europeana

During the aggregation process Linked Heritage partners improved their knowledge and skills in the enhancement on digital collections management, data legacy and metadata modelling, metadata mapping and ingestion workflow, legal issues acknowledgement, knowledge sharing and methodology of work as part of a best practice network, aggregation functions on behalf of local heritage institutions and facilitator in knowledge transfer. The aggregation workflow and the technical requirements of Europeana are now familiar to the whole consortium; this consciousness will make easier and quicker the aggregation in other national and Europeana environments. In fact a large majority of content providers is willing to digitize and make available new content through Europeana in the medium-long term (3-5 years) through AthenaPlus and other European projects.

The partner institutions will continue to work with the existing content provider network to improve quantity and quality of the content available. The possibility to extend the network of content providers has been agreed by most partner countries. Additionally, the improvement of the functionality of the Linked Heritage system (specifically by enriching its metadata, and adapting its structure to new requirements) has been confirmed by the technical partners.

The main obstacle to the sustainability of aggregation in the future is due to the budget limitations in digitization caused by he reduction of the national funds for culture across Europe; and digitization in particular, which can limit the incremental rate of new content to be sent to Europeana.

The Linked Heritage coordinator, which is also the coordinator of AthenaPlus will organise in Fall 2014 an international meeting among aggregators in order to foster the exchange of experiences at national level and to improve the cooperation with Europeana in view of a better service.

Ingestion system

Ongoing and future projects will give the opportunity for an extension of the services related to the effective and robust ingestion system set-up (MINT), and by the facility to use the LIDO standard format for museums and other domains, including the private sector. MINT – that was developed in its first release within the ATHENA project – is now widely used in other European projects feeding Europeana as well as by Europeana itself.

PIDs

The studies on persistent identifiers were beneficial for the whole community of content providers because they raised the awareness on such important topic that is crucial for the long term sustainability of the aggregated content.

The Linked Heritage Consortium will lobby for the creation of a new dedicated working group in Europeana dedicated to PIDs for digital cultural heritage. In fact, Europeana already set up a working group in this sense, but it ended without delivering a report.

Terminology

Terminology and multilingualism are other fields of close cooperation in the near future; they raised the interest not only of the Linked Heritage partners but also of other European projects. The Terminology Management Platform, whose online persistence is guaranteed by ICCU and UNISAV, is probably the project result that can have the largest diffusion within the digital cultural heritage context. At the beginning of 2014, the TMP demonstrator created during the Linked Heritage project, will become a stable version thanks to AthenaPlus. The feeding of the platform with new terminologies will start from the involvement of the institutions being part of the Linked Heritage Best Practice Network. So, the network will be kept alive for continuing to share and map terminologies, build new reference terminologies, share best practices in terminology management, share return of experience in this field.
The Linked Heritage and AthenaPlus coordinator will propose to present the opportunities given by the TMP during the next MSEG meeting foreseen in Spring 2014.

Private-Partnership

Several Linked Heritage partners are public memory institutions with scarce experience of public private partnership. Although they contributed to WP4 was only as observers, they were very interested in learning how to implement in the future new forms of public-private partnership and what the private sector demands to Europeana. Several partners will take part or benefit from the results of the Europeana Taskforce on PPP. During a first period, this Task Force worked on “An outline framework for use by Europeana and Network members in launching and structuring discussions with private sector partners, drawn from the work of the Task Force.” This had the form of a schematic Mindmap. Benefiting also from the results of Linked Heritage deliverable on PPP, this Task Force intends now to integrate the Mindmap with comprehensive descriptions and produce a document in support of decision making. A proposal will be formulated for a forum for continuous dialogue and exchanging ideas on the topic of PPP. The Consortium of Linked Heritage will lobby for the creation of this forum, and the role of partner EdiTeur will be crucial.

Virtual Learning

The Linked Heritage virtual learning environment, with several learning objects translated in many languages will be a pillar for the training of new junior experts on the different themes related to the digital cultural heritage tackled by our project (Europeana, aggregation, metadata standards, linked data, persistent identifiers, multilingual terminologies, public-private partnership). Their online persistence and use will be guaranteed by the University of Padova, which will care for the maintainance of the Los in the repository **FreeLOMS** (EU-funded projects "SLOOP:Sharing Learning Objects in an Open Perspective", on the webpage on **MERLOT**(Multimedia Educational Resource for Learning and online Teaching- California State University). The Learning Programme will be promoted among UNIPD project partners: **Erasmus** professionals and students, **Phaidra** international team, **OCLC** (worldwide library cooperative which produces WorldCAT), **Coimbra Group** (association of 40 European universities, some among the oldest and most prestigious in Europe, developing best practice and knowledge transfer among their staff and students).

Publications

Partner ICIMSS will assure the further publication of the Uncommon Culture journal in the framework of other European projects (PartagePlus, EuropeanaPhotography, AthenaPlus).
The successful series of the booklets, started within ATHENA and continued in ATHENA Plus, will be integrated during AthenaPlus.

Events

All lesson learnt in Linked Heritage, mainly in Aggregation, Terminology Management and Linking Data and all other issues concerning the digitisation of cultural heritage, will be shared in future conferences, seminars, workshop and professional meetings and will be included in the writing of new projects dealing with similar topics. Just to make an example, ICCU organised an AthenaPlus workshop on terminology and the reuse of cultural content, within the TEI Conference 2013 which took place in Rome the 2nd October 2013. This was an occasion to present in detail the TMP

demonstrator developed in Linked Heritage to a new public. Another occasion of disseminating the Linked Heritage outputs will be the next Europeana Network AGM, foreseen in Rotterdam next 2 December 2013.

Involvement in the definition of the national and transnational strategies

It is evident that one of the main strengths of the Linked Heritage service comes from the governmental role of several partners, as well as their direct involvement in the definition of the national and transnational strategies and programmes for digitization at European level (also by their active participation in the Europeana's decision making and technical groups). Thanks to strategic partners, cooperating together for more than 10 years, the results of the Best Practice Network will be disseminated and developed during the Greek EU Presidency in the 1st half of 2014, and the Italian Presidency in the 2nd half of 2014.

New projects

In the last phase of the projects, the Linked Heritage coordinator asked the partners which where, according to them the **potential gaps** that still need to be exploited in the future (the results of this survey are in D7.6):

- The digital content to be aggregated should be of better quality. A further improvement of MINT and the aggregation guidelines should be developed. It would also be advisable to improve the technology to make it easier to use and maintain the data by the content/data providers
- The connection between metadata, data and vocabularies at European level is still poor. Europeana should work to become, in cooperation with the projects, a real multilingual tool, enhancing quality of data.
- Rather than continuing to focus on aggregating metadata, it would be more useful to explore new solutions for the re-use of digital content via linked data and new services like digital exhibitions creative applications and augmented reality.
- Better investigating solutions for public-private partnerships and standards for mapping cultural contents from different sectors, to be used in innovative user-centered multimedia applications.
- Better investigation on the real benefits of publishing data as linked open data.
- Better investigation of legal issues of using copyrighted material.
- Strengthening the relationship with the private sector and with the creative industries to find creative ways of re-using Europeana's content.
- Improvement of the learning objects produced within Linked Heritage, that at this stage are useful for initial training on the relevant topics, while expert staff needs more detailed material that could be developed in further projects.
- Taking into account the possibilities offered by the e-infrastructures to store, access and preserve digital cultural data and to provide connecting facilities and information services based on these facilities (ICCU, Promoter).

The effort that has been done to build the Best Practice Network of Linked Heritage should not be lost. Therefore, in the near future, opportunities for new projects in the above mentioned fields will be investigated, analysing the calls which will be open in 2014-2015, in particular in the framework of Horizon 2020 and Creative Europe.

Starting from the results achieved until now, our network will work for proposals, involving cultural heritage institutions, Europeana, research infrastructures, and e-infrastructures providers, as well as creative industries.

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