



D6.5: Sustainability and Exploitation Plan

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1 Executive Summary

LoCloud was funded under the European Commission's CIP ICT PSP programme with the overall goal of exploring the potential of cloud technologies to ease the task for smaller cultural institutions in making their content available to Europeana. Many cultural institutions face limitations in their IT infrastructure, in their funding and in accessing staff with the skills and experience of working with digitization and digital libraries.

LoCloud produced a range services that give cultural institutions and aggregators new tools to capture, enrich and share their data with online audiences and Europeana. These services have been used by the project to engage with cultural institutions and aggregation services whilst sourcing, preparing and adding new data to Europeana. In addition to establishing technical services, LoCloud has provided documentation, training materials, online learning and help desks to support and guide the staff and volunteers working in cultural institutions on digitization projects.

The involvement of a strong consortium with representatives from twenty-six countries across Europe, from different sectors (libraries, archives, museums, heritage, universities, public, not-for-profit and private) has increased the impact of the project's technical and human outcomes. Widespread dissemination has promoted the services to potential users. Translations of materials and interfaces have improved their accessibility to staff working in small institutions. The availability of support from both the technical developers and a institution based within a country or region has encouraged the adoption of services.

This report considers the sustainability of LoCloud's outcomes and provides an exploitation plan to inform future activities

2 Introduction

LoCloud¹ was funded under the European Commission's CIP ICT PSP programme with the overall goal of exploring the potential of cloud technologies to ease the task for smaller cultural institutions in making their content available to Europeana². Many cultural institutions face limitations in their IT infrastructure, in their funding and in accessing staff with the skills and experience of working with digitization and digital libraries.

During the three years of the project LoCloud has explored the potential of cloud computing technologies for both providing infrastructure (IaaS) and software services (SaaS). The focus of the project has been on:

- Easy to use and cost effective light-weight digital library solution for cultural institutions;
- Easy to use metadata enrichment services;
- An improved framework for metadata aggregation; and
- Innovative metadata capture solutions.

The work by LoCloud was carried out in the context of Europeana and its network of data providing cultural institutions, alongside a parallel project (Europeana Cloud³) working on cloud-based infrastructure and services for Europeana.

LoCloud's outcomes include a range services that give cultural institutions and aggregators new tools to capture, enrich and share their data with online audiences and Europeana. These services have been used by the project to engage with cultural institutions and aggregation services whilst sourcing, preparing and adding new data to Europeana. In addition to establishing technical services, LoCloud has provided documentation, training materials, online learning and help desks to support and guide the staff and volunteers working in cultural institutions on digitization projects.

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Sustainability has been on the agenda for LoCloud from the outset. It has influenced the development of the services, the involvement of users in testing and in the evaluation of the project's outcomes, and dissemination activities.

¹ <http://www.locloud.eu>

² <http://www.europeana.eu>

³ <http://pro.europeana.eu/structure/europeana-cloud>

2.1 Roles and responsibilities

In the context of a project, sustainability relates to the capacity of its products and results (or parts of these) to continue to exist after the end of the project funding. As such, the development of the sustainability and exploitation plan has involved the entire project consortium.

NRA and 2Culture Associates have been responsible for coordinating the development of the plan in their roles as project coordinator and project manager.

AIT, Avinet, Athena RC, IPCHS, NTUA, PSNC, UPV/EHU and VUKF (the eight technical partners) have developed plans for the sustainability of individual LoCloud services and for contributing to the joint action plans.

Finally, the data partners have developed plans for continuing to maximize the project's results in their country or region after the end of the project.

2.2 Methodology

To develop a sustainability and exploitation plan for LoCloud, the methodology was as follows:

Define services

The activities carried out in LoCloud produced distinct types of results, which are referred to collectively as services in this report. The term is used here for something that has the potential to continue to exist in the future and includes:

- Aggregation services: MINT, MORe
- Software services: Geocoding services, Metadata enrichment services, Vocabulary services, Historic Place Names service, Test lab.
- Capture services: Crawler ready tagging tools, Wikimedia application, LoCloud Collections
- Online learning courses and training materials
- Support services: help desk, documentation, expert advice, technical support

Define the context

A range of factors including the context in which they were delivered influences the potential for sustainability. Funding, costs, the make-up of the consortium, the IPR framework and licencing for the services are all factors to be considered.

Sustainability assessment and planning

The results from the evaluation of the project's operational outcomes and impact on end-users were assessed, along with the plans made for sustainability of individual services and for sustaining the activities of the data partner network.

SWOT

An analysis of strengths, weaknesses/areas for improvement, opportunities and threats was carried out to help to identify which services have the greatest potential for sustainability and where the risks lie.

Define the sustainability and exploitation plan

A sustainability and exploitation plan was then developed based on the results of the analysis.

3 Infrastructure and services

This section provides a brief overview of LoCloud services.

3.1 MORE aggregator with integrated micro-services

The MOument Repository (MORE)⁴, developed by the Digital Curation Unit of the Athena Research Centre, provides a store for the metadata aggregated from content providers and offers services including metadata validation and enrichment, and the delivery of content to Europeana.

MORE is a framework for services including metadata harvesting, ingestion, transformation, validation, enrichment and delivery. Micro services developed in LoCloud (MINT, LoCloud Collections, Geolocation API, Vocabulary Service, Vocabulary matching service, Background link service, Wikimedia app and the Crawler Ready Tagging tools) and other projects have been integrated into the MORE platform.

MORE is proprietary software and copyright of the Athena Research Centre.

3.2 LoCloud Collections

LoCloud Collections⁵, developed by PSNC, provides cultural institutions with a service for hosting their digitized collections and metadata in the cloud. It is designed to enable a new digital library to be created in a few minutes and provides a cataloguing interface, easy publication to a public website, and supports a publishing pipeline to MORE and remote harvesting for Europeana.

This service is available in the so-called Software-as-a-Service model. (Werla et al, 2014).

3.3 MINT

The MINT service⁶, developed by NTUA, is a web-based platform designed to support metadata mapping and ingestion for cultural heritage content and metadata in Europe.

MINT addresses the ingestion of metadata from multiple sources, the mapping of the imported records to the intermediate metadata schema and the transformation and storage of the metadata in a repository (Soufou et al, 2014). MINT provides a publishing pipeline to MORE and Europeana.

3.4 Historic Place Names Service

The Historic Place Names service⁷, developed by the Faculty of Communication of Vilnius University, provides a Thesaurus of Historical Place Names. It provides a service whereby

⁴ MORE: <http://more.locloud.eu/>

⁵ LoCloud Collections: <https://www.locloudhosting.net/>

⁶ MINT: <http://mint-projects.image.ntua.gr/locloud/>

⁷ Historical Place names service: <http://tautosaka.ilti.lt/en/unitedgeo/>

cultural institutions can contribute historical geo-information for aggregation, storage and long-term preservation, and a source of historical geo-information for use in the description of cultural heritage objects (Laužikas, et al, 2014). The Historic Place Names service is available as an online service and for integration into other services via its API.

3.5 Geolocation API

LoGeo is a geolocation API⁸ (application programming interface), developed by IPCHS, which aims to facilitate geographic enrichment of cultural heritage data. Using this tool, existing content can be parsed, place names recognized and tagged with coordinates and the persistent URIs of known geographical concepts in sources such as Geonames. (Zakrajsek et al, 2014). The Geolocation API is integrated into the Geo-coding service and also in MORE.

3.6 Geo-coding service

The Geocoding service, developed by AVINET, is designed to enable local heritage professionals to set up crowd-sourcing projects to enrich metadata records with geographical locations.

Source data to be geocoded can be uploaded from a local content management system to the service. Records can then be geocoded by manually locating a place on a map or by searching Geolocation APIs (including LoGeo) for geographical names and the persistent URIs of known geographical concepts in sources such as Geonames. Records that contain existing coordinate data can be validated against maps to check the locations and make any necessary corrections. Once completed, the geocoded data is exported from the service and can then be re-loaded into the original content management system and web applications (Zakrajsek et al, 2014)

3.7 Vocabulary service

The LoCloud vocabulary service, developed by AIT, provides a means for cultural heritage institutions collaborate in the development of multilingual vocabularies and enable their use semantic enrichment. The service is based the well-established open-source vocabulary platform, TemaTres. The platform supports the import of existing Skosified vocabularies, creation of new vocabularies online and the updating of vocabularies. The vocabularies can be browsed online through a user interface⁹ or accessed via an API, which enables integration in local cataloguing systems and MORE (Benda et al, 2014).

3.8 Vocabulary matching service

The Vocabulary matching micro-service¹⁰, developed by UPV/EHU, automatically links phrases in cultural heritage metadata records to relevant concepts in the provided vocabulary. The service is deployed on a virtual machine (VM) and provides a REST service, which is available for integration into local systems. The Vocabulary matching service is integrated into the MORE aggregator (Soroa et al, 2014).

⁸ <http://support.locloud.eu/Geolocation%20API%20technical%20documentation>

⁹ <http://vocabulary.locloud.eu/>

¹⁰ <http://support.locloud.eu/Metadata%20enrichment%20API%20technical%20documentation>

The LoCloud Vocabulary service is freely available under Apache General Public Licence version 2.0.

3.9 Background link service

The Background link micro-service¹¹, developed by UPV/EHU, automatically links phrases in cultural heritage metadata records to background information contained in Dbpedia pages. The background link micro-service relies on DBpedia Spotlight, a state-of-the-art tool for performing Named Entity Disambiguation (NED).

The service is deployed on a virtual machine (VM) and provides a REST service, which is available for integration into local systems. The Background link checking service is integrated into the MORE aggregator (Soroa et al, 2014).

The LoCloud Background link service is freely available under Apache Licence version 2.0.

3.10 Wikimedia application

The Wikimedia application, developed by the Digital Curation Unit of the Athena Research Centre, has been built as a web service (REST based) and uses the Wikimedia API in order to communicate with Wikimedia. The application can be used to harvest metadata from Wikimedia for a specific user, to parse the metadata and identify useful entities that can be mapped to EDM for ingestion.

The application is connected to the LoCloud infrastructure through its REST services. The LoCloud aggregator (MORE) uses the service to allow users to initiate a harvest and get content. The mapped EDM records are then delivered to MORE, where they can be enriched and provided to Europeana (Gavrilis et al, 2014).

3.11 Crawler ready tagging tools

The LoCloud crawler-ready tagging tools (CRTT)¹², developed by AVINET, are a set of tools capable of crawling in a website and extract metadata information directly into EDM. The CRTT is deployed as a cloud based application and is capable of harvesting any kind of web site. The user has to define a collection and submit web URLs for sites to crawl. The extracted records are encoded in EDM and packages in the same (SIP) format that MINT uses to publish content to MORE.

An experimental prototype, the CRTT aims to demonstrate whether the crawling/indexing method applied by the mainstream search engines could be a viable, simplified supplement to mainstream metadata harvesting for Europeana. The tools were tested on capturing metadata from the websites of small cultural heritage institutions that do not have other mechanisms established for providing metadata to Europeana (Bergheim and Slettvåg, 2014).

¹¹ <http://support.locloud.eu/Metadata%20enrichment%20API%20technical%20documentation>

¹² The tool is available at <http://crtt.avinet.no/> to test the service see <http://support.locloud.eu/CRTT>

3.12 Support portal and documentation

The LoCloud support portal¹³, developed by the Digital Curation Unit of the Athena Research Centre, AVINET and PSNC, provides for partners and members of the public technical and user documentation, training materials included videos and a question-and-answer service. The support portal provides access to the help-desk functionality and to a suite of online training courses (Bergheim, Angelis et al, 2014).

3.13 Online learning courses and training materials

A suite of training materials has been developed. An online training course and set of video were developed by PSNC with contributions from Athena RC, NTUA, AVINET, VUKF, UPV/EHU and AIT. The online courses provide an introduction to LoCloud services for end-users (Werla and Wróz, 2015). The course incorporates links to a set of training videos, recorded in 2015, which provide demonstrations of each of the LoCloud services given (Werla, 2015).

3.14 Help desk

A help-desk ticket system was set up by AVINET for the life-time of the project. The system enables users to ask for help with each of the LoCloud services. Support is provided by the technical partners (for their service) and by 2Culture Associates (support with metadata mapping etc.) (Bergheim, Angelis et al, 2014).

¹³ <http://support.locloud.eu/>

4 Context for LoCloud services

This section looks at the context in which LoCloud's services have been delivered.

4.1 Funding

LoCloud project funding under the European Commission's CIP ICT PSP programme – 4 million euros over 3 years.

The costs relevant for sustainability include:

- Salaries and overheads
- Maintenance costs relating to storage and services
- Variable storage costs relating to the amount of content being uploaded
- Variable costs relating to the installation of new instances
- Variable costs relating to the management and support of users
- Economies of scale – use of cloud storage and services

4.2 Consortium

The LoCloud project consortium comprises of the following main groups of partners:

- Technical partners with responsibility for developing the LoCloud services
- National and regional aggregation services, and cultural institutions responsible for providing content for aggregation by LoCloud and for acting as pilot implementers of the LoCloud services.
- A group of partners with specific expertise in evaluation, dissemination etc.

26 European countries are represented in the consortium including 22 EU member states (Austria, Czech Republic, Belgium, Bulgaria, Croatia, Cyprus, Denmark, France, Germany, Greece, Ireland, Italy, Lithuania, Netherlands, Poland, Portugal, Romania, Spain, Slovakia, Slovenia, Sweden and the UK) plus Iceland, Norway, Serbia and Turkey.

4.2.1 Partners who developed LoCloud services

The technical partners are those who have created services in the LoCloud project.

4.2.1.1 Angewandte Informationstechnik Forschungsgesellschaft mbH

AIT is an Austrian software and research company founded in 1979. Research work is done primarily in the field of information management (e.g. distributed databases, collection management and knowledge engineering).

AIT is responsible for the LoCloud Vocabulary Service and contributes to the Support Portal.

4.2.1.2 Asplan Viak Internet AS

Asplan Viak Internet AS (AVINET) is a commercial company specialised in the area of interoperable geospatial web applications, catalogue services and metadata. Since its start-up, the company has been actively involved in national and European Research & Development initiatives and it has offered a range of map-based applications to public sector, cultural heritage tourism and e-learning institutions and bodies.

AVINET is responsible for the Geo-Coding application and the Crawler Ready Tagging Tools, and contributes to the Support Portal.

4.2.1.3 Athena Research Centre, Digital Curation Unit

Athena Research and Innovation Centre in Information, Communication and Knowledge Technologies is a public research organisation, operating under the auspices of the Greek Ministry of Education. The Digital Curation Unit (DCU) is part of the Athena Research Centre's Institute for the Management of Information Systems. Its mission is to conduct research, develop technologies and applications, provide services and training, and act as a national centre in the field of digital curation.

DCU is responsible for MORE and the Wikimedia application, and contributes to the Support Portal.

4.2.1.4 Javni Zavod Republike Slovenije za Varstvo Kulturne Dediscine

The Institute for the Protection of Cultural Heritage of Slovenia (IPCHS) is a national public institution established by the Slovenian State to carry out the public service pursuant to the Heritage Protection Act. It is responsible for the implementation of administrative and technical tasks relating to the protection of cultural heritage.

IPCHS is responsible for the Geolocation API and contributes to the Support Portal.

4.2.1.5 National Technical University of Athens

The National Technical University of Athens (NTUA) is a public research institution.

The Image, Video and Intelligent Multimedia Systems Lab is part of the School of Computer and Electrical Engineering of NTUA. The members of the Lab are actively involved in research and R&D projects.

NTUA is responsible for MINT and contributes to the Support Portal.

4.2.1.6 Poznań Supercomputing and Networking Centre

PSNC is affiliated to the Institute of Bioorganic Chemistry of the Polish Academy of Sciences. It was founded in 1993 to build and develop a computer infrastructure for science and education in Poznań and in Poland. PSNC undertakes research and development in the field of new generation computer networks, high performance - parallel and distributed - computations and archive systems, cloud computing, grid technologies, with a particular focus on projects, products & tools for the management of grid resources.

PSNC is responsible for LoCloud Collections and contributes to the Support Portal.

4.2.1.7 Universidad del País Vasco (University of the Basque Country)

The University of the Basque Country (UPV in Spanish and EHU in Basque) is a research institution.

The IXA Research Group of the University was created with the aim of promoting the modernization of the Basque Country by means of developing advanced computational resources and systems.

UPV/EHU is responsible for the Vocabulary Matching and Background Links Services and contributes to the Support Portal.

4.2.1.8 Vilniaus universiteto Komunikacijos fakultetas

Vilnius University is a research institution. The Faculty of Communication within the university (VUKF) is the leading higher education establishment working in the broad field of information and communication professions in Lithuania.

VUKF with VšĮ “Atviro kodo sprendimai“ is responsible for the Historic Place Names Service and contributes to the Support Portal.

4.2.2 Data providing and other partners

The LoCloud consortium includes national and regional aggregation services, cultural institutions, research institutions and others. Their responsibilities included providing content for aggregation by LoCloud, acting as pilot implementers of the LoCloud services and contributing specific expertise.

The operating context for these partners included:

Ministries

Denmark - Danish Ministry of Culture, the Danish Agency for Culture (KUAS)

Iceland - Minjastofnun Íslands /The Cultural Heritage Agency of Iceland

Netherlands – Ministry of Education, Culture and Science, Cultural Heritage Agency (RCE)

Norway – Ministry of Culture, National Archives of Norway (NRA)

Spain - Ministry of Education, Culture and Sport, Directorate General for Fine Arts and Cultural Assets and Archives and Libraries (MECD)

Public institutions

Czech Republic - Narodni pamatkovy ustav (National Heritage Institute)

Belgium – Provincie Limburg, Provincial Centre for Cultural Heritage

Bulgaria - Pencho Slaveykov Regional Library in Varna

Croatia - Gradska knjiznica Rijeka (Rijeka City Library)

Cyprus - Cyprus University of Technology

France - Conseil Général de la Gironde - Archives Départementales de la Gironde

Germany - University of Duisburg-Essen

Ireland – Discovery Programme

Portugal - Fundação Museu Nacional Ferroviário (National Railway Museum)

Romania - Biblioteca Județeană O.Goga Cluj

Serbia - Biblioteka grada Beograda (Belgrade City Library)

Slovakia - Univerzita Komenského Prírodovedecká fakulta Katedra aplikovanej a environmentálnej geofyziky (Comenius University in Bratislava)

Slovenia - Javni Zavod Republike Slovenije za Varstvo Kulturne Dediscine (Institute for the Protection of Cultural Heritage of Slovenia)

Sweden - ABM Resurs Västernorrland is owned and run by the Regional State Archive in Härnösand, the County Library of Västernorrland and the County Museum of Västernorrland

Turkey - Hacettepe University

UK – University of York, Archaeology Data Service

Not for profit institutions

Greece - Future Library is a non-profit organisation founded as a spin-off initiative of the Veria Central Public Library aimed at multiplying its impact at the national level. The “Stavros Niarchos” Foundation funds the Future Library Implementation Plan (2011 -2015) with the aim of developing a sustainable network of public and municipal libraries and of introducing innovation and creativity into the agenda of cultural institutions.

Italy - Fondazione Ranieri di Sorbello is a non-profit organisation aimed to promote and develop the cultural heritage of the Ranieri di Sorbello family through historical and cultural projects and exhibitions.

Slovenia - Zavod Jara is a non-governmental and non-profit organisation, which cooperates with public libraries and other learning and cultural organisations. It is responsible for the Slovenian portal of local cultural heritage KAMRA.

Enterprises

UK - 2Culture Associates is a small private company, which specializes in working with museums, libraries, archives, archaeological heritage bodies and other cultural heritage organisations.

4.3 Intellectual property in LoCloud Services

Foreground means the results, including information, materials and knowledge, generated in a given project, whether or not they can be protected. It includes intellectual property rights (such as rights resulting from copyright protection, related rights, design rights, patent rights, etc.), similar forms of protections (e.g. sui generis right for databases) and unprotected know how (e.g. confidential material).

Thus, foreground includes the tangible (e.g. prototypes, source code and processed images) and intangible IP results of a project.

Results generated outside a project (i.e. before, after or in parallel with a project) do not constitute foreground and referred to the "background".

In LoCloud the rules relating to Intellectual Property (ownership, publicity, protection, access rights) were defined in the grant agreement with the European Commission and in the project's consortium agreement

4.3.1 Background information and rights

UPV/EHU declared the following background (held prior to their accession to the grant agreement and needed for the project) in the consortium agreement:

- Know-how/background that has been, and/or will be derived outside the project, which is covered under specific research agreements and confidentiality agreements and therefore subjected to third party rights the UPV/EHU is not able to grant access rights:
- All know-how in patents and current patent applications;
- Background developed under the terms of any other agreement with other parties.
- All Background generated by employees of the UPV/EHU other than those directly involved in the Project;
- All Background generated by employees of the UPV/EHU that are directly involved in the Project, which is outside the scope of the Project;

4.3.2 Foreground created by the project

Ownership of foreground

The grant agreement specifies that Foreground (the tools, applications and services develop in the project) are the property of the partner who carried out the work. Joint ownership (where several partners jointly carry out work on the foreground) is covered but does not apply in LoCloud; as individual partners developed the services.

Protection of the foreground

Where foreground is capable of commercial exploitation, the grant agreement calls for its owner to provide adequate and effective protection, with regard to both its own interests and the interests (especially the commercial interests) of the other beneficiaries.

Access rights to the foreground

The grant agreement gives project partners access rights to the foreground if this is needed:

- For their work under the project
- To use their own foreground

The grant agreement goes on to specify that requests for access rights may be made up to one year after the end of the project, and that they shall be granted on a royalty-free basis.

4.3.3 Licences for LoCloud services

The LoCloud services and applications are made available under the following licences:

Service	Licence	Availability	Link
MORe	Proprietary software	N/A	
MINT	GPL	GitHub	https://github.com/mint-ntua/Mint2
LoCloud Collections	GPL	Available on request	
Historic Place Names	GNU general public licence	GitHub	https://github.com/justinasjaronis/hpn
Geolocation API	Various*		
Geocoding service	GPL	GitHub	https://github.com/runarbe/LoCloud.Geocoding
Vocabulary Service	GPL	Sourceforge	http://sourceforge.net/projects/tematres/
Vocabulary Matching	Apache 2.0	GitHub	https://github.com/ixa-ehu/locloud_vmatch
Background Linking	Apache 2.0	GitHub	https://github.com/ixa-ehu/locloud_bglink
Wikimedia		GitHub	https://github.com/dcu-imis/locloud_wikimedia
Crawler ready tagging tools	GPL	GitHub	https://github.com/runarbe/LoCloud.Crawler
Online Course	CC BY-NC SA 3.0		http://support.locloud.eu/courses/

Table 1: Licences for LoCloud Services

*Geolocation services uses software and services, some are open source and some proprietary.

The **LoCloud e-learning courses** are licensed under a Creative Commons Attribution, Non-Commercial, Share-Alike License (CC BY-NC-SA 3.0). In practice this means that anyone is allowed to:

- Use any of the LoCloud e-learning courses in their own copy of Moodle as it is,
- Modify/adapt/translate any part of the LoCloud course content,
- Include any part of the LoCloud content into their existing courses.

Anyone who uses the courses in this way needs to attribute (in form of text and a link) the Poznan Supercomputing and Networking Center and LoCloud as the creators of the original version of the course (or part of course).

LoCloud

All derivatives should be made available under the terms of the same licence as the original work (CC BY-NC-SA 3.0).

Anyone who wishes to develop any kind of paid certification program on top of the LoCloud courses, or any other form of business-oriented activity, should respect the non-commercial and non-for-profit character of the work.

5 Sustainability assessment and planning

Sustainability is the capacity of the project to continue and use its results after the end of the funding period. This section summarises the results of an evaluation of the technical outcomes LoCloud services, their impact on end-users and the sustainability plans made for individual services and by members of the consortium for their data-partner networks.

5.1 Evaluation of technical outcomes

The operational outcomes and impacts of LoCloud services and tools were evaluated by the project during the second half of 2015 (Fernie et al, 2016, D5.2). The evaluation of the project's technical outcomes covered the methodology and standards followed when developing the LoCloud services, the quality of access and cloud-related characteristics such as resource pooling, elasticity, self-service, on-demand services, pricing, quality of services and usage.

The results confirmed that LoCloud services were developed based on well-known and well-established technical and domain standards. The quality of access to the services was measured during the project-period and no long-term lack of service was reported. The majority of the LoCloud services fulfill the features of cloud-based offerings (see table 2 below). Those aspects that are currently missing relate to the specificity of the service or its usage in the LoCloud project. For example, some of the services are not fully self-service as users need to apply for an account – this was a deliberate choice to keep control during the project-period, not a technical flaw.

Table 2 – Evaluation of the cloud characteristics of LoCloud services

Service	Partner	RESOURCE POOLING	ELASTICITY	USAGE MONITORING	SELF-SERVICE	ON-DEMAND SERVICES
MORE	ATHENA	YES	YES	YES	YES	NO
MINT	NTUA	YES	NO	YES	YES	YES
LoCloud Collections	PSNC	YES	YES	YES	YES	YES
Historic Place Names	VUKF	NO	YES	YES	YES	NO
Geolocation API	IPCHS	YES	YES	YES	YES	YES
Geocoding service	AVINET	YES	YES	YES	YES	YES
Vocabulary Service	AIT	YES	YES	YES	YES	NO
Vocabulary Matching	UPV/EHU	YES	YES	YES	YES	YES

Service	Partner	RESOURCE POOLING	ELASTI CITY	USAGE MONITORING	SELF-SERVICE	ON-DEMAND SERVICES
Background Linking	UPV/EHU	YES	YES	YES	YES	YES
Wikimedia	ATHENA	N/A	N/A	N/A	N/A	N/A
Crawler tools	AVINET	YES	YES	NO	YES	YES
Support Portal	ATHENA / AVINET / PSNC	YES	YES	YES	YES	YES

5.2 User impact study

LoCloud had the overall goal of supporting small and medium-sized institutions in making their content and metadata available to Europeana. During the second half of 2015 the impact of LoCloud services on cultural institutions, aggregators and Europeana was evaluated (Alkemade et al, 2016, D5.3).

A series of surveys were carried out. It is important to note that the survey results provide a snap-shot based on a small sample population taken at a time when LoCloud's services had been available for a short period. Not all respondents had used all of the services.

Small and Medium Sized cultural institutions

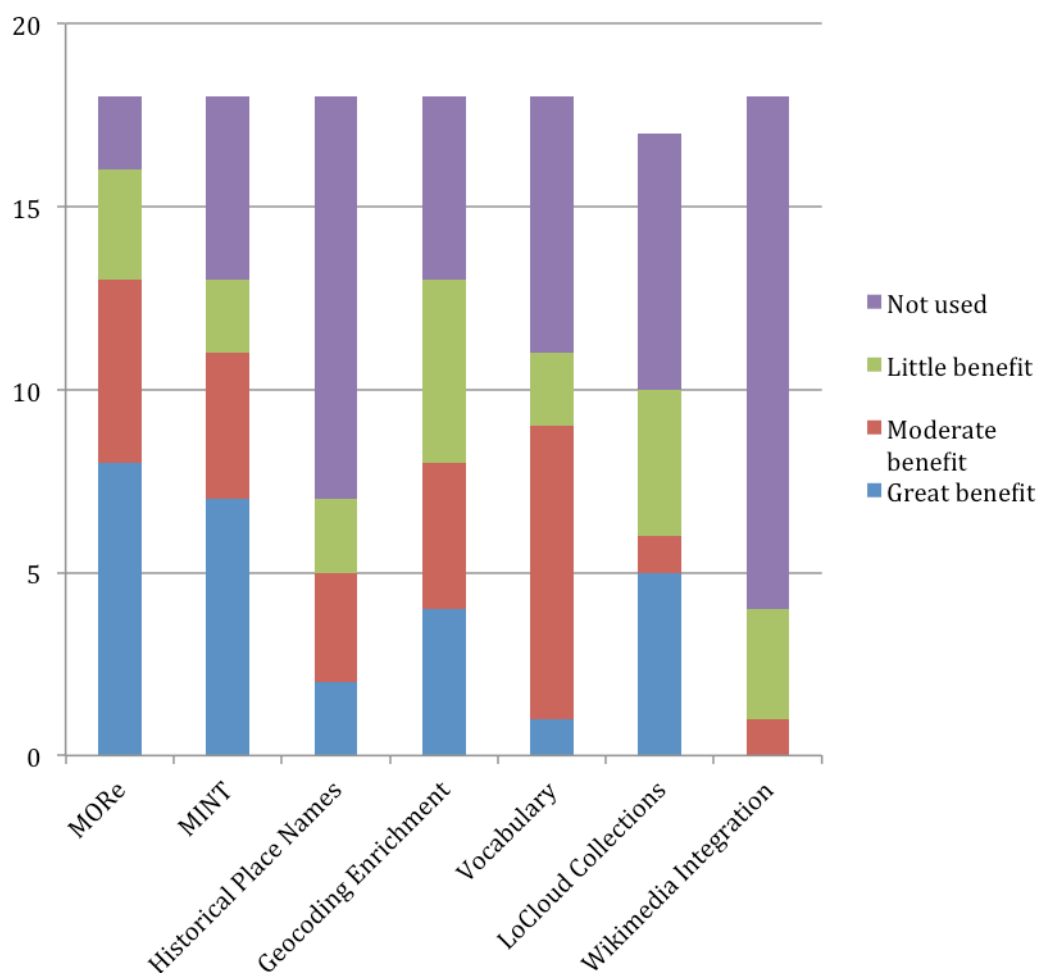
- Lack of technical staff and support was the biggest resourcing problem for institutions in making their content available online. A specific requirement for training and knowledge in metadata was identified.
- LoCloud Collections service was reported as being of great benefit to the institutions; providing increased access, visibility and usage of their digital collections. It was the most frequently used of the LoCloud services by small institutions.
- MORE and MINT were the next most used services, the geocoding and vocabulary enrichment services were used by few of the institutions who took part in the survey. In general smaller institutions may not use many of the LoCloud services directly, as harvesting and enrichment services are implemented for them by aggregators.

Aggregators

- Over two-third of the Aggregators reported difficulties in providing metadata from small and mediums sized cultural institutions to Europeana. They expressed a need for tools to enable them to enrich the metadata being provided.
- The aggregators noted a marked improvement in the publishing process following the introduction of the MORE service, particularly the process of metadata enrichment.
- The MORE and MINT services were reported as providing the greatest benefits to aggregators with only moderate to little additional costs - MINT and MORE were the most frequently used of LoCloud's services. The vocabulary and geographic enrichment services were also well used.

- LoCloud Collections was used by only 28% of the aggregators who participated in the survey. However, it was considered to provide a low cost solution for online publishing and to offer smaller insitutions with a key tool in making their content available to a wider audience.
- Aggregators reported that LoCloud services helped to overcome technical challenges associated with metadata aggregation. Improvements in the processes of online publishing, metadata enrichment and metadata validation were all reported.
- Other reported benefits of using LoCloud services related to skills and learning. The abilities (of staff and volunteers) within organisations with regard to digitisation, metadata creation, online publishing and digital asset management were reported to have improved.

Figure 1 The relative benefits of the different LoCloud services as perceived by aggregators in the 2015 survey



Europeana

The 2015 user impact study focused on the relationship between Europeana and small to medium sized cultural institutions.

- Europeana reported benefits from the inclusion of small and medium sized organisations who display great enthusiasm, adaptability and strong understanding of their domains.
- Metadata quality was reported as the most significant issue for Europeana currently, this is an issue relating to data from all institutions whatever their size.
- Technical issues include: limitations in server capacity and bandwidth, a lack of digitising facilities to enable the production of high quality digital content.
- Lack of skills and the need for training was identified as an issue for all institutions.
- Europeana noted a requirement for easy to use tools and that the LoCloud service are a great chance to make it very simple for small to medium sized organisations to work within their process.

The Europeana respondents who took part in the 2015 user impact study had not used the LoCloud services in practice but reported hoping to start applying them and become familiar with their usage over the next few months. With regard to LoCloud services, the respondents noted:

- The Europeana toolsets is due to be redesigned and there has been discussion to what extent the experiences and tools developed within LoCloud can be incorporated into this redesign.
- Together, Europeana and LoCloud, need to address the scalability of the LoCloud approach across the rest of Europeana.
- MORE is the most interesting of all the services but it requires full assessment of the benefit for Europeana.
- LoCloud collections was seen as being of most benefit to smaller cultural institutions as the service is very easy to work with. Europeana noted that it would be great to integrate many of the (enrichment) services into LoCloud collections but suggested doing this incrementally over time.
- The enrichment services were seen as beneficial for both aggregators and cultural institutions.
- The Historical Place Names and Vocabulary Services were considered provide services that Europeana requires (although have not yet been evaluated by Europeana).
- Europeana noted that LoCloud services show the direction in which the process is going. There is a move towards flexible and loosely coupled systems, that allow data to be created in a networked environment with effort being distributed across the processing pipeline. However, they also noted that this requires the content providers to learn how to work in a networked way and not catalogue in isolation.
- Finally, the Europeana respondents noted that the LoCloud services require consolidation in the coming years to enable their full benefit to be demonstrated in the long term.

5.3 Sustainability planning for individual LoCloud services

LoCloud technical partners considered the future of their services as part of the work on operational outcomes and impacts of LoCloud services carried out during the second half of 2015 (Ferne et al, 2016, D5.2). Aspects such as the maintenance and development of the services, charging for services and the provision of support were considered. All of the partners are committed to continuing to distribute and maintain the services after the end of the project period. In general the partners plan to continue offering a level of service for free in the coming years, with the free service limited to a certain volume of data or number of users. In most cases the code for community versions of the services has been made available for distribution without cost. In some cases partners are considering offering charged-for premium versions of the service (with additional features, or for larger volumes of data and numbers of users).

The following section summarises the planning for each service:

5.3.1 MORE

The MORE platform is currently being used by a number of projects in addition to LoCloud including CARARE a domain aggregator and the ARIADNE research infrastructure. Athena RC participates in the Europeana DSI for CARARE. The flexibility of the MORE platform and its re-use capabilities enable it to operate in multiple domains in both the public and in the private sector.

Athena RC plans to continue to support system operations, hardware, software updates and maintenance in future. A MORE help desk is being put in place for CARARE.

The development of an open source community version of MORE is planned over the next 1-3 years. Development would be considered earlier if there were a project or client that specifically requested an open source version and could help to fund the work.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
MORE	Yes, software updates/ maintenance	Pricing basis on the size of institution	Full functionality for small institutions	Planned, Operation in multiple domains	Yes, system operations, hardware

5.3.2 LoCloud Collections

PSNC will continue to run LoCloud Collections service after the end of the project. It will be promoted to new users and developed using PSNC's own resources. PSNC plans to include the service in its future projects on both national and international levels. Europeana has expressed interest in incorporating LoCloud Collections into the DSI as a service for small institutions and to capture content generated by users during roadshows. PSNC currently participates in the DSI as a technology provider for Europeana Cloud.

PSNC plans to maintain the documentation for the service, currently available in the form of wiki pages, e-learning course and training videos. A help desk will be put in place, either a continuation of LoCloud's help desk (depending on its sustainability after the project) or PSNC's

general help desk facilities. Providing support for users outside Poland via an **international help desk** requires cooperation with LoCloud partners in other countries.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
LoCloud Collections	Yes	Pricing basis – volume of datasets stored (above 500 MB)	Full functionality for smallest datasets (up to 500 MB)	Yes, via PSNC resources and possibly DSI.	Yes, Help desk

5.3.3 MINT

MINT is currently being used by: Europeana, several Europeana aggregators (CARARE, Europeana Fashion, European Film Gateway, Europeana Screen, HOPE and Museo), and the German Digital Library, National Library of Israel, Amsterdam Museum (ModeMuze), European Broadcasting Union and the Italian Ministry of Culture (ICCU). NTUA participates in the DSI on behalf of the domain aggregators, which enables it to sustain and expand MINT.

NTUA plans to continue to maintain the user manual for MINT and to develop it as changes are implemented.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
MINT	Yes, via Europeana DSI	Pricing basis – a usage base fee is under consideration		Yes, via Europeana DSI	Yes, via Europeana DSI

5.3.4 Historic Place Names service

The HPN service is integrated into MORE. At national level the HPN service has been integrated into VUFK's ARUODAI information system, which is part of the national roadmap for research infrastructures. With ARUODAI it may be exploited in national digitization projects in future.

The HPN service is hosted on the servers of VŠĮ „Atviro kodo sprendimai“.

VUKF is looking for opportunities to help ensure the sustainability of the service through use and re-use in other projects such as: Europeana, research infrastructures (such as DARIAH) and national systems.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
Historic Place Names	Planned via national infrastructure	N/A	Full service functionality	Planned by integration into other platforms	Planned via national infrastructure

5.3.5 Geolocation API

The service will be maintained by IPCHS. Further development depends on demand and the availability of funding.

Help and support for using the basic existing web-based console and API will be provided to all potential users for free.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
Geolocation API	Yes	N/A	API access with limited number of requests per IP per day.	Yes, via new projects	Yes

5.3.6 Geocoding Service

AVINET plans to develop the service further to provide a stand-alone SaaS service where users can setup new accounts and upload their data in a self-service environment. Users will be able to upload limited data volumes for free. Premium features may be offered through a pay-wall type of business model.

AVINET plans to transfer the support for the geocoding service to its corporate help-desk after the completion of the LoCloud project.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
Geocoding service	Yes	Pricing basis – data volumes + premium features	Yes, with limited data amount	Yes	Yes, Per-product basis and help desk

5.3.7 Vocabulary Service

AIT plans to maintain the existing status of the service and to look for new project opportunities to enhance the services in future.

AIT plans to continue to cooperate with the help desk and to offer second level support for the Vocabulary Service.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
Vocabulary Service	Yes	Data storage with fixed price or usage-based price.	Depending on the overall approach of project consortium after the project.	Yes, via new projects	Yes, Help desk and second level support

5.3.8 Vocabulary Matching service

UPV/EHU has made the software publicly available on GitHub and it is distributed under the Apache licence (a free licence). This ensures that developers can deploy the code on their machines. Because the source code is available, anybody can use, inspect, and expand it.

The service is currently hosted on the LoCloud Test Lab, which was made available by AIT for the project's lifetime and immediate post-project period. For the future, UPV/EHU could explore ways to deploy the services on other hosts, such as Europeana Cloud or Amazon Cloud, provided there is interest and funding available.

UPV/EHU can provide support for any interested party who wishes to install the code on their own machines.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
Vocabulary Matching Service	Yes	Data storage with fixed price or usage-based price.	Depending on the overall approach of project consortium after the project.	Yes, via new projects	Yes, Help desk and support for installations.

5.3.9 Background Link service

UPV/EHU has made the software is publicly available GitHub and it is distributed under the Apache licence (a free licence). This ensures that developers can deploy the code on their machines. Because the source code is available, anybody can use, inspect, and expand it.

The service is currently hosted on the LoCloud Test Lab, which was made available by AIT for the project's lifetime and immediate post-project period. For the future, UPV/EHU could explore ways to deploy the services on other hosts, such as Europeana Cloud or Amazon Cloud, provided there is interest and funding available.

UPV/EHU can provide support for any interested party who wishes to install the code on their own machines.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
Background link Service	Yes	Data storage with fixed price or usage-based price.	Depending on the overall approach of project consortium after the project.	Yes, via new projects	Yes, Help desk and support for installations.

5.3.10 Wikimedia application

Athena RC developed the app as a proof of concept to demonstrate the potential to capture content deposited by individuals on Wikimedia. A community version of the app has been deposited on GitHub.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
Wikimedia	Yes, community version	N/A	Community version in GitHub.		Yes, via MORE

5.3.11 Crawler ready tagging tools

AVINET developed the prototype service as a proof of concept to demonstrate at meetings with Europeana, to contribute to discussions about future development directions of the central technology stack. A community version of the software will be maintained on GitHub to secure the availability of LoCloud results for re-use.

No support is planned by AVINET for the CRTT unless it becomes part of an aggregator or Europeana.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
Crawler ready tagging tools	Yes, community version	N/A	free usage but requires self-hosting Community version in GitHub.		Not planned

5.3.12 Support portal and help desk

PSNC will continue hosting LoCloud Support portal, but the maintenance of the portal content depends on agreements with the technical partners.

The responsible technical partner provides support for each service. Several partners are putting in place help desks for their specific service, for example AVINET for the geo-coding service, Athena RC for MORE etc.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
Support portal	Yes, depends on contributions from technical partners	N/A	Yes		Depends on contributions from technical partners

5.3.13 Online course and training materials

PSNC developed an online course and suite of training materials for LoCloud with contributions from all of the technical partners. Athena RC, NTUA, AIT, VUKF, UPV/EHU and AVINET all provided materials, participated in video recording sessions demonstrating their services and contributed to the development of the resources in general.

PSNC plans to continue making the e-learning course available.

It has been released under a CC-BY-NC licence, which means that other partners are able to incorporate the course within their learning platforms.

LoCloud Service	Maintenance	Paid usage	Free usage	Further Devt	Support
Online course	Yes, depends on contributions from technical partners	N/A	Yes		

5.4 Sustainability planning by data providers

The LoCloud consortium includes “data providing partners” who were responsible for developing plans to disseminate LoCloud to local cultural institutions in their country or region. This section describes the plans for the future of a selection of partners.

5.4.1 Austria - Angewandte Informationstechnik Forschungsgesellschaft mbH (AIT)

AIT plans to continue to serve Austrian LoCloud content partners via the LoCloud aggregation infrastructure. Its partners include the Don Juan Archive Vienna, the Interarch-Arch Steiermark data at Universalmuseum Joanneum, the Universitäts- und Landesbibliothek Tirol and the University Library of Vienna. It has content partners who wish to new data to Europeana after the end of the LoCloud including the Europa Nostra Archive and the Landesbibliothek Steiermark (the regional county library of Styria).

AIT prepares metadata mappings for its content providers. It plans to continue using the LoCloud micro-services and aggregation facilities. AIT aims to incorporate LoCloud services into the EuropeanaLocal Austria aggregator, which is located at AIT and has been aggregating and preparing local Austrian content for Europeana since 2008.

AIT will continue promoting the LoCloud Services.

5.4.2 Croatia - Gradska knjiznica Rijeka (GKR)

GKR would like to continue using LoCloud’s infrastructure to provide content to Europeana on a no payment basis (free use). If charges are introduced it will compare LoCloud’s services conditions with those of the national aggregator.

GKR and its local partners will continue using LoCloud Collections under the same conditions (free use) in future until it is no longer satisfied with it or finds a better solution. The collections are small and to now, GKR has not had concerns about costs.

It would be good to have the possibility of using the vocabulary service, historic place names service, and geocoding service outside the LoCloud infrastructure.

GKR will continue with dissemination about LoCloud products if there is outside interest.

5.4.3 Cyprus – Cyprus University of Technology (CUT)

CUT has involved more than sixty-five local institutions from Cyprus in providing content to Europeana as a result of LoCloud and its active engagement in the preservation of the Cypriot Cultural Heritage. The stakeholders (including villages, municipalities, cultural institutions and business archives) are actively working with CUT and/or using its infrastructure for the e-documentation and harvesting to Europeana. CUT plans to continue using LoCloud tools and infrastructure as long as these are available on a no-payment basis.

CUT is searching for EU funding in the Digital Heritage field to continue working actively in this area. It has created a team of eight people who are working on a daily basis on digitalization and harvesting for Europeana.

5.4.4 Czech Republic - Národní památkový ústav (NPU)

The experience with LoCloud was very important for NPU and contributed to improvements in its information systems, which are used to make its content available online in its own website and for Europeana. NPU would like to continue using LoCloud's infrastructure, especially the MINT and MORE services, to provide content to Europeana in future. The only dependency is the availability of budget to adjust its new information systems.

NPU has currently one local partner – SOVAMM – which uses NPU's information system (MIS). It considers that use of LoCloud collections by new partners is a possibility in future. But NPU doesn't intend to use the LoCloud micro-services.

NPU is interested in any possibilities for funding its activities in this field.

5.4.5 France - Archives Départementales de la Gironde (CG33)

CG33 will launch a new website in 2017 and may use LoCloud's infrastructure to map and enrich its data as part of its workflow for contributing data to national and European archive networks. CG33 is not currently planning to use LoCloud micro-services but these may be re-considered as part of the project to build its new website.

Some of CG33's local partners plan to continue to use LoCloud's infrastructure to provide new content to Europeana. Other partners use LoCloud collections; this is sometimes their only way of publishing their content online. Some partners may add content during the year, for example Pôle de la Mémoire Locale du Bourgeais and the Société archéologique de bordeaux. Cost is a consideration for local partners in using LoCloud Collections.

LoCloud had a very positive impact for CG33 on its technological abilities and project management skills. These abilities will serve the development of electronic records platform,

digital sustainability and other local networks in Gironde. CG33 updated its OAI-PMH platform to contribute to LoCloud.

The experience of LoCloud initiated a strategic consideration about the different opportunities available for CG33 to participate in regional, national and European networks in the archives domain.

CG33 will continue to disseminate LoCloud to its partners.

5.4.6 Greece - Future Library

Future Library considers that the LoCloud infrastructure is important because it enables small institutions with limited funding and expertise to publish their content to Europeana. It introduced LoCloud Collections to two local libraries in Greece: Drama Public Library and Papacharalampeios Hellenic American Municipal Library of Nafpaktos. Future Library has helped them to create digital collections and publish their content to Europeana. Its partners are dedicated to uploading more content to the LoCloud Collections.

Future Library plans to continue using the LoCloud infrastructure in the foreseeable future. During the project, it became familiar with all LoCloud services but finally focused on using LoCloud Collections, Mint and MORE. It is interested in using these tools in the future if they continue to be available with a reasonable and modest fee.

Future Library plans to disseminate LoCloud's outcomes at local library meetings and conferences with the aim of encouraging more local libraries to use the services it in the future.

The LoCloud project created a lot of impact and possibilities for Future Library. People from our local partners were introduced to the digital libraries domain and gained expertise in metadata, digitisation and preservation because of the project. It looks forward to using this expertise in similar work in the future.

5.4.7 Iceland - Minjastofnun Íslands (CHAI)

The Cultural Heritage Agency for Iceland (CHAI) found that LoCloud services made providing content to Europeana a lot easier. The agency is currently developing its domestic database and doesn't have any immediate plans to provide data to Europeana. It would use LoCloud services again if they are available to provide data to Europeana in future.

CHAI will continue to provide a link to LoCloud on its website so other institutions and agencies can access it.

5.4.8 Italy - Fondazione Ranieri di Sorbello (FRS)

FRS's art collection is catalogued in Samira Catalogo Umbria Cultura, which is harvested by CulturalItalia the national aggregator. CulturalItalia regularly provides data to Europeana. During LoCloud, FRS interrupted the publication of its content in CulturalItalia to test the LoCloud services. Publication to CulturalItalia will resume after the end of the LoCloud project

FRS may continue to use LoCloud services for its bibliographic collections. However it is currently looking for funding to continue digitisation, cataloguing and provision of data to Europeana.

During the LoCloud project, FRS began collaborating with a number of partners in Perugia who have been using LoCloud Collections and the LoCloud aggregation services. Its local partners are currently discussing the possibility of continuing to use LoCloud services.

FRS itself is most interested in continuing to use the Vocabulary service.

FRS will continue to collaborate with local partners and to disseminate LoCloud services.

Participation in LoCloud by FRS created an interest around digital culture in its region and amongst its contacts. It foresees creating a network of institutions using LoCloud services and providing content to Europeana, with attention to the quality of metadata and images. In this way, LoCloud could represent the start of new job possibilities.

5.4.9 Netherlands – The Cultural Heritage Agency (RCE)

The Cultural Heritage Agency will continue to deliver built heritage data to Europeana using MINT and MORE tools as long as this is the most convenient way.

While recognizing the possibilities and advantages of LoCloud Collection in certain circumstances, RCE doesn't see an added value for Dutch museums. Most small Dutch museums already have access to light weight collection registration systems that comply with international data model standards.

RCE would like to continue using the vocabulary service, historic place names service, geocoding service outside the LoCloud infrastructure where this possible and appropriate.

5.4.10 Norway – National Archives of Norway (NRA)

NRA will continue to host a webpage in Norwegian about LoCloud and its services on its Homepage. Some of the content partners, among them the Munch Museum are interested in continuing to use LoCloud's services to deliver their content to Europeana.

During the lifetime of the project NRA organized several learning workshops and on demand such workshops will be organized in the future. The Arts Council of Norway, which acts as national aggregator showed interest several times in using LoCloud's services, particularly in using MORE. NRA will continue to encourage this decision.

NRA itself will continue to provide content to Europeana via Archives Portal Europe and the national aggregator, but it doesn't exclude using LoCloud's infrastructure for some new datasets.

5.4.11 Portugal - Fundação Museu Nacional Ferroviário (FMNF)

The National Railway Museum (FMNF) will be able to provide content to Europeana through the national content aggregator for museums in future and so it is not planning to continue using the LoCloud infrastructure. FMNF works with several small and medium cultural associations that are planning to use LoCloud Collections.

FMNF will continue to disseminate and promote LoCloud services to its local partners with the main focus on LoCloud collections.

At a recent technical workshop LoCloud Collections was presented to small institutions who considered it important because it enables small institutions, with limited funding and

expertise, to publish their content in Europeana. There were queries about the future costs for using LoCloud Collections at the workshop; the institutions present would consider paying for the service in the future provided that the costs are reasonable and in accordance with their income.

5.4.12 Serbia – Belgrade City Library

The LoCloud project brought a new perspective to digitization activities in Serbia. Small heritage institutions were interested in testing LoCloud products, especially LoCloud Collections. There is no national aggregation infrastructure for Europeana; the solutions that LoCloud project offered were of particular interest to the Serbian professional community. As a project partner, Belgrade City Library had a great opportunity to take part in testing and implementing LoCloud services.

During the past three years a number of dissemination activities were carried out in Serbia and neighbouring Balkan countries. Encouraged by the dissemination activities and interactions with professionals, Belgrade City Library believes that it would be extremely useful for professional community in Serbia to continue using LoCloud services once the project is formally over.

Belgrade City Library has decided to support cultural heritage institutions in development of their digital collections. Planned activities include:

- Hands-on workshops, as part of a course certified by National Library of Serbia Committee for Professional Education Development, across Serbia. The course will offer basic training for building digital collections on a cloud platform using LoCloud Collection; preparation of metadata with minimum requirements for Europeana aggregation; use of enrichment services (Geolocation, Vocabulary, Historical place names) and other tools (Mint, More...). The number of workshops will depend on the number of professionals interested in registering.
- E-learning courses. Courses developed in AccessIT and AccessIT Plus and made available in Serbian were frequently used. BCL intends to promote the use of the up-to-date e-learning courses: *LoCloud Services and Tools*, *Digital Repositories for Small Memory Institutions*, *Cooperation with Europeana*. These provide a useful source of systematic educational material for every phase of the digitization workflow and the Europeana context.
- Two years ago, BCL together with other key players in the field of cultural heritage protection initiated activities to develop a national aggregator. On 11th February 2016, a Coordination group for the establishment of a Serbian national aggregator was appointed by the director of the National Library of Serbia. With the support of Ministry of culture and information and the DARIAH-RS project it is planned to have aggregator ready, up and running by January 2017.

5.4.13 Slovakia – Univerzita Komenského Prírodovedecká fakulta (PrifUK KAEG)

Univerzita Komenského Prírodovedecká fakulta Katedra aplikovanej a environmentálnej geofyziky (PrifUK KAEG) would like to continue using LoCloud's infrastructure to provide content to Europeana, in particular MORE. It will also continue using LoCloud Collections; the

pricing plan will depend on available finances. It doesn't plan to use any micro-services outside the LoCloud infrastructure.

PrifUK KAEG will continue to promote LoCloud Collections to potential local partners, and to disseminate about LoCloud services to its partners and potential local partners.

It has no particular concerns about the costs.

PrifUK KAEG considers that its experience with LoCloud will have a direct impact for the future of digitizing cultural heritage content by small and medium size institutions.

5.4.14 Spain - Ministerio de Educacion, Cultura y Deporte (MECD)

MECD will use the national aggregator Hispana once the LoCloud project has ended. It would continue to use LoCloud Collections and the LoCloud Microservices if these can be integrated into the data flow in Hispana.

MECD's experience with LoCloud has been very positive; the project has enabled it to get to know new tools and new possibilities for working with data.

5.4.15 Turkey - Hacettepe University (HU)

In LoCloud Records Hacettepe University's Information Management Department has made items from the collections of Koç University's Vehbi Koç Ankara Studies Research Centre (VEKAM) accessible in Europeana.

VEKAM uses a digital asset management platform (ContentDM). The records were modified to conform to the standards for the Europeana Data Model standard and were enriched with geographic information. The records were provided to Europeana by Hacettepe University using LoCloud's MINT and MORE services.

VEKAM will continue to provide access to its digital platform with support from Koç University Library's Digital Services and Information Technologies Department. Koç University Library is ready to provide access to its special cultural heritage collections, which are available on the same digital platform.

5.4.16 UK - University of York, Archaeology Data Service (UoY ADS)

The Archaeology Data Service (UoY ADS) considers that archaeological resources are an important aspect of Europeana, and plans to continue to work to broaden access to these resources in Europeana, and beyond.

UoY ADS will continue to use the LoCloud infrastructure to make its archives discoverable within Europeana, and plans to add new content after the end of project. It uses the MINT and MORE services, which make updating, withdrawing and republishing its collections quite easy. It plans to provide updates for its Grey Literature Library collection most likely on an annual basis.

UoY ADS will continue to advocate for LoCloud Collections and the microservices developed within the project to its contacts in archaeology, as we feel they are useful tools for the domain.

UoY ADS monitors the statistics for referrals from Europeana to its website, as this shows its depositors the added value of making their resources freely and openly available. Exploring a

variety of dissemination channels, including Europeana, helps us to further the case for open access with current and potential resource providers, encouraging them to provide more resources. This is a key element in completing the open data cycle, and Europeana is an important part of this.

5.4.17 Summary of data providers' plans

Country	National Aggregator available	Would like to continue using LoCloud services	Training delivery planned	Dissemination planned
Austria	Regional aggregator established through Europeana Local	Yes, aims to incorporate LoCloud micro-services into its aggregator.	-	Yes
Croatia	Yes	Yes – on a no-cost basis Would evaluate options if charges are introduced	-	Yes
Cyprus	Yes	Yes – on a no-cost basis	-	Yes
Czech Republic	-	Yes – MINT and MORE	-	-
France	Yes	Yes – LoCloud Collections, MINT and MORE	-	Yes
Greece	Yes	Yes – MINT, MORE, LoCloud collections for a modest fee	-	Yes
Iceland	No	Yes	-	-
Italy	Yes	Yes	-	Yes
Netherlands	-	Yes – MINT, MORE, historic place names, vocabulary and geocoding services	-	-
Norway	Yes	Potentially – MORE and other services	Yes	Yes
Portugal	Yes	Yes – LoCloud Collections	-	-
Serbia	In development	Yes – particularly LoCloud collections + aggregation services	CPD workshops planned Online course	Yes
Slovakia	-	Yes, MORE and LoCloud	-	Yes

Country	National Aggregator available	Would like to continue using LoCloud services	Training delivery planned	Dissemination planned
		Collections		
Spain	Yes	Potentially, LoCloud Collections and micro-services	-	-
Turkey	No	Yes, MINT and MORE	Online course	-
UK	Yes	Yes, MINT and MORE	-	Yes

Table 3: Summary of data partners plans for the future

6 SWOT analysis

To review the potential of LoCloud services for sustainability and exploitation we carried out a SWOT analysis. Table 4 below evaluates the strengths, weaknesses/areas for improvement, opportunities and threats of the services. This combined with the assessment (section 5 above) helps to inform which of the services have a higher potential for sustainability and exploitation.

Table 4: SWOT analysis

	LoCloud	Strengths	Weaknesses/ Areas for improvement	Opportunities	Threats
Technology	Cost effective solutions for smaller institutions	LoCloud collections: easy to use Available in several languages Lowering the threshold for publishing of content and structured data	Pricing model isn't clear to users. Free services preferred Some translation work needed.	Integration of vocabulary and enrichment services. Collaboration with national aggregators / Europeana.	Not enough revenue generated through paid storage plans. Alternatives available in the market, e.g. Omeka.
	Modular services	Various implementation scenarios: aggregators, local systems, online services	Revenue model isn't clear. Additional vocabularies / languages would improve services.	Future cooperation Services marketplace	Multiple developer partners with different business models for individual services.
	Cloud-based services	Sharing of resources, scalability and on-demand services		Institutions of different sizes are looking for cloud-based alternatives to desktop systems	Not enough revenue generated from customers to develop and maintain.
	Improved aggregation framework	MORe platform: demonstrates integration of micro-services, pipelines to MINT and LoCloud collections	Revenue model isn't clear. Documentation and interfaces are in English. Single sign-in would be an improvement	Implementation by national and regional aggregators, research infrastructures, Europeana.	Sustainability of individual micro-services. Existing platforms in place: resistance to change

	LoCloud	Strengths	Weaknesses/ Areas for improvement	Opportunities	Threats
	Syndicate of developers	Expertise of individual organisations.		Future cooperation Services marketplace	Organisations go their separate ways post project. Competition in market.
	Crawler ready tagging tools	Proof of concept	Stage 1 prototype, stage 2 would involve testing on larger collections.	Alternative to metadata harvesting model currently implemented in Europeana.	Resistance to change. Lack of funding for stage 2 research.
Network	Strong consortium	Includes national and regional aggregators, large and small cultural institutions, universities and enterprises.	Vendors of cataloguing systems could be better represented in the consortium	Continued dissemination of LoCloud services. National / regional contact points providing support to smaller institutions	Network dissipates with the end of project funding.
	Regional and national network	Connections with small and medium sized cultural organisations	Limited awareness of Europeana	Adoption of solutions.	Limitations in financial and other resources
Support	Online course + training materials	Covers the entire digital content capture and publication process, and LoCloud services	Workflow and technology are changing rapidly. Improvements to meet local institutions' contexts.	There are few comparable resources. Translation/ adaptation for use in specific countries/ regions	Difficulty in generating revenue to enable maintenance and development of the courses.
	Help desk	Syndicated help from developer partners.	Could be better coordinated. Response times could be improved.		Risk of fragmentation post project

The SWOT analysis shows that the LoCloud services have a strong foundation and many strengths. The services are easy to use and significantly lower the barrier for institutions taking

their first steps in to digital publishing and digital metadata handling. There is room for improvement in certain areas and both opportunities and threats on the horizon.

Smaller, medium-sized and bigger institutions are increasingly looking to cloud-based offerings. Some are just starting out and have little technical competence while others are looking to replace old desktop systems. Cloud-based services are presently in high demand and the LoCloud infrastructure and services are in a good position to take a market share.

The LoCloud project established a strong consortium that includes organisations on national, regional and local levels with good connections and outreach within their communities. It is pleasing to report that most of the data providers present in the consortium have said they will continue using and disseminating LoCloud services in the future (see 5.4.15 Summary of data providers' plans). This means that there is an opportunity for reaching potential new users via the partners in the consortium. One area in which the consortium could be strengthened is by making connections with vendors of the cataloguing systems used by cultural institutions in their day-to-day cataloguing.

An important aspect when trying to reach non-technical users is the need for thorough instructions and documentation. This is doubly important where users are accessing services infrequently as is the case with metadata harvesting for Europeana. In LoCloud providing documentation and training has been a high priority from the start with not only extensive technical documentation but also user guides, training videos and On-line Training Courses being produced. Some of these materials have been translated into national languages, further translations and localisation to national contexts are both areas in which the support can be improved and opportunities for future development.

The user studies carried out in LoCloud confirm that the project has contributed to providing cost effective and practical solutions for smaller and medium-sized institutions. LoCloud Collections in particular has shown that quite advanced services can be easy to use and affordable for this target. LoCloud Collections provides an appealing and user-friendly interface, where the end-user can simply create digital collections with structured data. But alternatives exist and there are competitors in the market place, including the free open source product (Omeka) that LoCloud Collections builds on. The user studies suggest that there are opportunities for PSNC to tailor LoCloud Collections with the addition of specific plugins enabling conversion to EDM, integrating the vocabulary and enrichment services.

The services developed in LoCloud have been designed in a modular way. This is a modern approach to software architecture, which means that each service is small, completes specific tasks, works independently from the rest of the system and is not dependant on a specific infrastructure. This approach gives individual organisations the chance to focus on their specific expertise and core business. A major strength of the modular approach is the potential for integration. LoCloud services can be integrated in to other services, existing systems and aggregation workflows. This gives opportunities for cooperation with partners inside and outside of the consortium in developing new services.

In LoCloud project, the micro-services services have been integrated in to the MORE aggregation platform this allows users to take full advantage of the services within a coherent environment. Publishing pipelines from MINT and LoCloud Collections to MORE, together with the seamless integration of micro-services in MORE has produced a significantly improved aggregation framework. Single sign-on to the entire suite of services would offer an improvement for users.

LoCloud

Interest in using MORE and LoCloud services expressed by several organisations on national and European level, such as national aggregators, research infrastructures and Europeana, provide opportunities for exploitation and development in future.

The technical collaboration in the LoCloud project has proved to be efficient, fruitful, and a good basis for further cooperation. Distributed development is not without difficulties; different cultures, languages and distance all demand work in coordinating and establishing trusting relationships between partners. LoCloud has shown that a syndicate can be an advantage where all partners' benefit.

The possibility that each organisation goes its own ways after the project is a real risk, but because the services complement each other and there is potential for development and collaboration in future a services marketplace has been proposed (see section 7 below).

7 Exploitation

This section describes high-level exploitation strategy by which the partners will help secure the sustainability of LoCloud's results.

Feedback that has been received by the project indicate that LoCloud services are providing a good starting point for a one-stop-shop with integrated services that are accessible, understandable and usable for small institutions. Although the services were planned and designed to meet the needs of smaller institutions they have gained attention from larger institutions, research teams and aggregators.

7.1 Customer segments

The survey of LoCloud's operational outcomes identified three main usage scenarios for LoCloud services:

- Integration into the Aggregation workflow (MORE);
- Integration into local cataloguing systems; and
- Use as online applications.

The survey identified potential beneficiaries/customers for each of the LoCloud services, which can be segmented as follows:

- Cultural institutions (small, medium and large)
- National and domain aggregators
- Europeana Foundation and Europeana Cloud
- Research Infrastructures
- Tourism
- Database administrators

These customer segments are described below.

7.1.1 Cultural institutions

"Cultural institution" includes museums, libraries, archives, galleries, historical societies, house museums, scientific societies, zoological associations, film archives, audio-visual archives, etc. They can be public, not-for-profit and private institutions.

In the context of LoCloud, "cultural institutions" means an organisation that holds a collection of cultural content for conservation, public access, education, research etc.

Cultural institutions use cataloguing systems, content management and digital library systems to manage their collections, produce metadata and publish content online.

7.1.2 Aggregators

Aggregators collect metadata (and sometimes other content) from data providing cultural institutions, and make the metadata available online. Aggregators operate at regional and

national levels, and for subject domains. Some publish their metadata in their own portals, all make their metadata available for remote harvesting by Europeana and others.

Aggregators use metadata mapping tools, repositories, metadata enrichment and metadata validation services, etc.

7.1.3 Europeana and Europeana Cloud

The Europeana Foundation has about 50 staff, based mainly in The Hague. It reports to a 17-strong Governing Board of representatives from professional associations of cultural and scientific heritage organisations, who advise on policy and strategy.

Europeana has a network of around 3,300 institutions and aggregators who provide cultural heritage collections for publication on Europeana. The EU has funded many projects that have contributed content to Europeana, have improved or used Europeana services.

Europeana provides a platform that allows end-users to explore the digital cultural heritage. Through this platform it brings together the organisations that have heritage to share with the people and sectors who want to view, share and build with that heritage.

The [Europeana Network Association](#) is made up of hundreds of people working in a huge range of cultural and technology organisations across Europe. Members of the Association elect a Members Council, which in turn elects a Management Board of six people who sit on the Europeana Foundation Governing Board.

Europeana DSI

Europeana has received funding as a Digital Service Infrastructure under the European Commission's Connecting Europe Facility (CEF) trans-European Telecommunications Networks Work programme. The core objectives of the Europeana DSI are to innovate the aggregation infrastructure, boost the distribution infrastructure and work towards long-term financial stability of Europeana through business model innovation. The DSI includes as partners several domain aggregators, technology providers and others providing specific expertise in content re-use, access, users and the cultural heritage domain.

Europeana Cloud

Europeana Cloud is a project funded under the European Commission's CIP ICT PSP programme to work towards establishing a cloud-based infrastructure for Europeana.

Europeana Cloud has established a storage repository in the cloud and an initial set of services including metadata and content hosting, basic metadata transformation, EDM search and support for IIF. These services will be launched in spring 2016. Europeana Cloud plans to offer new services in future.

7.1.4 Research Infrastructures

"Research infrastructures" are facilities, resources and services used by the research community. They can include research installations, collections, libraries, databases, archives, high-capacity/high-speed communication networks, distributed computing facilities, data infrastructures, and other facilities.

The European Commission has funded a series of networked research infrastructures under the Framework 7 programme. For the social sciences these include DARIAH, ARIADNE, CENDARI and EHRI.

Research infrastructures are establishing services to integrate distributed datasets and other resources and use services such as repositories, metadata mapping, and vocabularies.

7.1.5 Tourism

Tourism services include websites established by towns or regions to highlight places of interest within their area. These may hold small collections and may be interested in light-weight digital library systems that aid online publication of these collections.

7.1.6 Database administrators/developers

People who are responsible for developing cataloguing and content management systems for cultural institutions, with an interest in using solutions for managing vocabularies, geo-coding and metadata enrichment.

7.2 Modes of exploitation

The assessment of LoCloud services foresees various scenarios including support services, licensing for developers, free community solutions, fee-based premium solutions, research and further development. The main modes of exploitation are defined in this section.

7.2.1 Community solutions

Two modes of exploitation are proposed under this strategy: open source and collaborative developments.

Many of the LoCloud services have been made available under **Open Source** licences and the code has been made available to the developer community via GitHub. Some LoCloud services are bundled products, which exploit Open Source and other software, Linked Open Data and other databases. The open source model gives opportunities for sustaining the project's results through:

- Engaging with developers and end users
- Enabling new products and services to be developed using LoCloud code
- Providing support and consultancy services for Open Source software.

Open source software does not mean that there are no costs to end-users. There are many companies in the software market place whose business is based on providing support, offering customization or to build versions with richer features based on open source code.

The second mode of exploitation identified under this category is collaborative development. LoCloud has taken the approach of actively involving the user community in its activities. Partners have contributed to the localisation of services by providing translations of interfaces, documentation and training materials; and also to the expansion of services by providing vocabularies and gazetteers of historic place names. This kind of community solution helps to share the cost of delivering a service in a new territory.

7.2.2 Enterprise solutions

LoCloud did not take the approach of developing a single platform. The projects results are modular solutions using cloud technologies. This reflects the current trend in software architecture for producing services that complete specific tasks in a robust, reliable and highly scalable way.

Individual services have dependencies on technologies, data and people; have different opportunities for development and face different threats. To be suitable for commercial exploitation, services must have market potential, clear IPR, simple to use and have a clear cost and pricing structure.

Two modes of exploitation are proposed under this category:

- Sale of plans based on volumes of data, includes free entry-level plans for very small collections.
- Sale of licences based on usage/the size of institutions, includes free entry-level plans for very small institutions.

Entry-level free plans do not mean that there are no costs to the service provider or to the end user. There are numerous examples online of businesses offering free services online (e.g. Drop Box and Twitter) based on either a model of offering charged-for services for higher volumes/enriched services or generating revenue from advertising. LoCloud partners have proposed offering free entry-level plans. There is a need to investigate this business model in twelve months time.

7.2.3 Scientific exploitation

Several of LoCloud's services have reached maturity and have entered production; several have potential for further research and development.

One mode of scientific exploitation is to use the experience in LoCloud for research publications. Other modes include participating in task forces and in comparative trials (e.g. on the performance of semantic enrichment). UPV/EHU, AIT, Athena RC and other partners have been active in this area.

Several LoCloud partners are involved in the Europeana DSI and other projects, through these LoCloud services may be further developed.

7.3 Exploitation plan

7.3.1 LoCloud Services

LoCloud's technical partners have committed to maintaining and supporting the services that they developed (see Section 5.3). In cases where services integrate other LoCloud services (e.g. MORE) it is the responsibility of the partners to reach bilateral agreements to continue the access after the end of the project period.

Each partner is responsible for its own costs in bringing its LoCloud service forward. Any revenue generated from its efforts shall cover the costs incurred. Any profits shall go to the

responsible partner; in cases where services are integrated any profits shall be divided between partners according to their bilateral agreement.

It is the responsibility of each partner to implement a marketing strategy for its service in line with the communication plan (see 7.4 below).

The LoCloud services prioritised for exploitation are:

- MORE (Athena RC)
- LoCloud Collections (PSNC)
- MINT (NTUA)
- Vocabulary Service (AIT)
- Geocoding Service (AVINET)
- Vocabulary Matching Service (UPV/EHU)
- Geolocation API (IPCHS)
- Historic Place Names Service (VUKF)
- Background Link Service (UPV/EHU)

7.3.2 LoCloud services marketplace

LoCloud's approach of developing cloud-based micro-services has proved to be very flexible. LoCloud's experience of implementing virtual machines in the cloud-based Testlab environment and the MORE framework provides the starting point for a joint market place scenario.

The marketplace would provide a space in which developers could host their services and make them available for exploitation by the Europeana DSI, aggregators, cultural institutions, and other developers. It would provide a good basis for further technical achievements and enhanced products. It would also enable services to be promoted to the user community.

This idea has been discussed with Europeana who have requested LoCloud carries out a business study to identify the needs, priorities and requirements for a developer marketplace.

The LoCloud consortium is not a legal entity that may be used as a vehicle in joint enterprises or projects. The establishment of an entity (e.g. a European Economic Interest Group, EEIG) will be investigated as part of the business study.

7.3.3 Knowledge and results

There are two action lines under this heading:

- Seeking opportunities for continued applied research
- Seeking opportunities to deliver training

Under the first action line, LoCloud consortium members are actively seeking funding opportunities that would enable continue research on the topics that have been the focus of the project. One possible area is exploring the potential to establish a "Europeana Services Network" to provide a complementary solution to collecting data for Europeana without relying

on a central infrastructure. The actions fall within the area of scientific exploitation including publications, independent research and follow-up projects that build on LoCloud services.

The second action line concerns seeking opportunities to expand the availability of training (in digitization and digital libraries) for the culture sector. LoCloud established online courses and a suite of training materials based on the experience in the Access-IT project. User studies emphasise the need for training and support in this area for staff in cultural institutions and the community sector (the voluntary sector).

7.3.4 Network

The LoCloud project established a strong consortium that included many organisations who had worked together in previous projects such as Europeana Local and CARARE. The consortium members include culture organisations active on national, regional and local levels with good connections and outreach within their communities. Partners are committed to continuing to disseminate about LoCloud and Europeana to their networks. Many of the data providing partners have indicated that they wish to continue using LoCloud services. Some data providing partners offer support and training to data providers within their communities.

LoCloud partners have contributed to community solutions providing translations of LoCloud materials and interfaces for their user communities, and by contributing vocabularies or gazetteers of historic place names for use by the wider community within LoCloud Services.

The actions fall within the area of community solutions including collaborative developments, enrichment of services, sharing of costs and follow-on projects.

Every partner is responsible for disseminating LoCloud in line with the communication plan.

7.4 Communication plan

The aim of the communication plan is to communicate the value proposition for LoCloud Services:

- Easy to use and cost effective solutions for smaller institutions
- Adaptable and flexible modular services
- Cloud based services
- Improved framework for metadata aggregation
- Innovative metadata capture solutions
- Support, guidance and training
- Strong consortium and user community

Roles and responsibilities

Coordination team (NRA and 2Culture) is responsible for:

- Disseminating LoCloud Services to maximize their potential use.
- Communicating with the consortium and related projects.
- Sharing leads or expressions of interest in LoCloud services with partners.

LoCloud

- Maintaining the LoCloud website.
- Maintaining a basic set of dissemination materials based on the LoCloud brand.
- Participating in workshops, conferences and events; publications.
- Evaluating the sustainability and exploitation plan with the technical partners.

Technical partners (Athena RC, PSNC, NTUA, AIT, AVINET, EHU/UPV, VUFK, IPCHS) are responsible for:

- Developing a marketing strategy for their service.
- Communicating with users of their service.
- Providing excellent support and services to their users.
- Disseminating about other LoCloud services to maximize their potential use and sharing leads with fellow LoCloud developers.
- Developing a set of dissemination materials for their service based on the LoCloud brand.
- Participating in workshops, conferences and events; producing research publications.

Consortium members are responsible for:

- Disseminating LoCloud Services to maximize their potential use.
- Communications within their networks.
- Sharing expressions of interest with the relevant partner.
- Participating in workshops, conferences and events; publications.

Timetable

- March-June 2016 LoCloud technical partners define marketing strategy for each service; confirm pricing models where applicable.
- April 2016 – Europeana Aggregator Forum
- Ongoing 2016-17 – presentations, participation in workshops, publications
- Ongoing 2016/17 - approach potential new users; explore project opportunities
- July-September 2016 business study for LoCloud services marketplace.
- September-October 2016 – Europeana AGM
- March 2017 evaluate sustainability and exploitation plan.

Evaluation of the results

To evaluate the sustainability strategy for LoCloud services:

- Technical partners are responsible for providing a short report on the users of their services on 1st March 2017 (one year post project).
- Consortium members are responsible for providing a short report on their activities and expressions of interest in LoCloud services in their networks.

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Appendix 1: Pricing plans

8.1 LoCloud Collections pricing plans

LoCloud Collections is provided in a Software-as-a-Service model. To use the service, institutions simply register, create an account, create a digital collections system and choose a pricing plan.

The service has been provided for free under the project period. The pricing levels planned are based on size of storage:

Size	Storage space	Cost
Zero	Up to 500 MB of storage space, should be enough to store: <ul style="list-style-type: none"> • 436,906 pages of plaintext (1,200 characters/page) • 166 digital pictures (with 3MB average file size) • 125 MP3 audio files (with 4MB average file size) 	Free
XS	Up to 2 GB of storage space, should be enough to store: <ul style="list-style-type: none"> • 1,789,568 pages of plaintext (1,200 characters/page) • 682 digital pictures (with 3MB average file size) • 512 MP3 audio files (with 4MB average file size) 	2 EUR / month
S	Up to 5 GB of storage space, should be enough to store: <ul style="list-style-type: none"> • 4,473,920 pages of plaintext (1,200 characters/page) • 1706 digital pictures (with 3MB average file size) • 1280 MP3 audio files (with 4MB average file size) 	4 EUR / month
M	Up to 10 GB of storage space, should be enough to store: <ul style="list-style-type: none"> • 8,947,840 pages of plaintext (1,200 characters/page) • 3412 digital pictures (with 3MB average file size) • 2560 MP3 audio files (with 4MB average file size) 	8 EUR / month
L	Up to 25 GB of storage space, should be enough to store: <ul style="list-style-type: none"> • 22,369,600 pages of plaintext (1,200 characters/page) • 8530 digital pictures (with 3MB average file size) • 6400 MP3 audio files (with 4MB average file size) 	16 EUR / month
XL	Up to 50 GB of storage space, should be enough to store: <ul style="list-style-type: none"> • 44,739,200 pages of plaintext (1,200 characters/page) • 17060 digital pictures (with 3MB average file size) • 12800 MP3 audio files (with 4MB average file size) 	24 EUR / month

8.2 MORE: indicative pricing plans

* This indicative pricing plan is still under consideration by Athena RC.

	Customers	Quotas	Features	Costs
Lite	Designed for personal collections, very small museums and archives	Up to 3 publications per year Up to 1000 items		Free
Professional	Small to medium sized cultural institutions	Up to 6 publications per year Up to 100,000 items	Preservation services, multiple schema	30-40 euros per month
Enterprise	Medium to large institutions	Unlimited publications per year Unlimited items	Preservation services, multiple schemas, multiple projects	Request a quote