DCH RP

DCH-RP

Digital Cultural Heritage Roadmap for Preservation

European Commission

CAPACITIES

e-infrastructure

ICCU

DIGITAL
CULTURAL HERITAGE
ROADMAP
FOR PRESERVATION

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THE DCH-RP PROJECT

Digital Cultural Heritage – Roadmap for Preservation (DCH-RP) is a coordination action supported by the European Commission under the e-Infrastructure Capacities Programme of the Seventh Framework Programme for Research (FP7).
The project, lasting for two years, aims to develop a Roadmap to implement a preservation infrastructure for digital cultural heritage (DCH) as a part of a more general vision towards an Open Science Infrastructure for DCH in 2020.

Impact and Objectives

The major impacts of DCH-RP will be on international cooperation, harmonised policies, common processes and protocols which will allow DCH organisations across Europe to access e-Infrastructures through shared procedures for access and usage.

The project's objectives are:

- To **design a sound Roadmap** for the implementation of an e-Infrastructure for preservation of DCH content; this task will be supported by practical experiments (proofs of concept) in the project partners' countries
- To set up a **network of common interest**; establishing such a network is intended to create a stable basis for a durable cooperation among its members
- To **disseminate the results of the project** to the wider cultural heritage and e-Infrastructure communities beyond the consortium, and to other regions outside the EU, in order to enable them to benefit from the research of the consortium and from the work of the project
- To carry out and analyse relevant **case studies** on trust building and on the use of grid and cloud technologies for DCH to extract knowledge and best practice
- To plan for the **sustainability of the infrastructure**, by investigating approaches and models from other similar initiatives for possible application to the DCH-RP project
- To foster **international cooperation** covering international projects related to digital preservation in the DCH sector and e-Infrastructures based research in the digital preservation field but also to encourage the integration of preservation priorities into the scope of existing international e-Infrastructures.

The targets of DCH-RP will be pursued through exploring:

- How to **harmonise data storage and preservation policies** in the DCH sector at European and international level
- How to progress with **the dialogue among DCH institutions, e-Infrastructures**, research, and private organisations
- How to establish the conditions for these sectors to **integrate their efforts** into a common framework
- Which are the most suitable models for the **governance, maintenance and sustainability** of such an integrated infrastructure.

Key points

What is an e-infrastructure? The term e-Infrastructure is used for the technology and organisations that support research undertaken through distributed regional, national and global collaborations enabled by the Internet. It includes networks, grids, data centres and collaborative environments, and can include supporting operations centres, service registries, single sign-on, certificate authorities, training and help-desk services.

The DCH-RP digital preservation Roadmap is mainly targeted at policy-makers on different levels and owners of digital preservation programmes at DCH institutions to help them plan ahead, but also at managerial teams to assist them in taking decisions related to digital preservation.

Target Audience

The DCH community includes a range of players with a wide variety of needs:

- **Cultural institutions** owning digital cultural repositories, which need the infrastructure to preserve their content and a solid Roadmap as a reference guide for decision making (e.g. cultural managers of national institutions and libraries, small institutions, private and public publishers, etc.)
- **Policy makers and programme owners** at national, regional and local levels, who invest in the construction of research infrastructures and need guidance before deciding on future actions
- **Individuals** who need the infrastructure to get safe access to data for their research and who are interested in the humanities and in particular in themes connected with digital technologies and cultural heritage (e.g. researchers, practitioners, scholars, teachers, students)
- **Teaching and learning bodies** (e.g. schools, training centres, universities)
- **Cultural and creative industry players** interested in using and re-using DCH content
- **Private archives**, providing commercial access to content
- **e-Infrastructure providers and R&D institutions** active in digital preservation.

AN E-INFRASTRUCTURE FOR PRESERVING DIGITAL CULTURAL HERITAGE

Unlike digitisation itself, where common approaches and best practices are well developed, digital preservation is still an area where workflows and easily applicable universal toolkits are not widely available. Current solutions normally require adaptation to the specific mandate of the individual cultural heritage institution, its existing technological infrastructure and the competences of its staff.

The cultural heritage sector is also producing large volumes of digital content that need to be safely stored, permanently accessed and easily re-used over time by different end-user groups. Improving digital preservation practices in cultural heritage institutions, therefore, is a strategic task. The need to address this situation – including understanding its magnitude – and to offer concrete and robust support to cultural heritage institutions efforts in digital preservation, was identified by the earlier INDICATE project. The importance of long-term preservation and its complementarity with digitisation efforts was also highlighted in the report of the Comité des Sages (an expert advisory group on bringing Europe's cultural heritage online).

Researchers in the so-called "hard sciences" are already demonstrating that their capabilities can be advanced by the use of e-Infrastructures offering high-speed connections, shared computing and storage resources, sophisticated authentication and authorisation mechanisms, etc. A basic assumption is, therefore, that existing e-Infrastructures for research and academia (including NRENs, NGIs and other data infrastructures) could also be efficient channels for the delivery of advanced services that can be used by the digital cultural heritage sector. Another foundation of the work is the assumption that it will be possible to establish common policies, processes and protocols which will allow DCH organisations to access e-Infrastructures, despite the fact that NRENs and NGIs are national entities, often with different policies and procedures for access and usage.

e-Infrastructures include services as diverse as the physical supply of backbone connectivity, single- or multi-purpose computing grids, supercomputer infrastructure, data grids and repositories, data management, storage and preservation, tools for visualization, and simulation, as well as remote access to research instruments and very large research facilities.
The impact of e-Infrastructures on virtual research communities will especially be affected by:

- The regulation and governance of e-Infrastructures
- The integration of e-Infrastructures at national and disciplinary levels
- Different organizational and business models
- Whether cultural research community needs and practices can be accommodated in the services provided by e-Infrastructures.

Digital cultural heritage challenges

The challenges that cultural heritage institutions are facing today in maintaining the accessibility and usability of digital resources over time are in many ways related to notable differences between digital and paper or other physical materials. Some key factors are as follows:

Machine Dependency - digital materials require specific hardware and software in order to access them.

Technological obsolescence - the speed of changes in technology means that the timeframe during which action must be taken is very much shorter than for paper. It is measured in a few years compared to decades or even centuries when preserving traditional materials. Technological obsolescence is, therefore, generally regarded as the greatest technical threat to ensuring continued access to and use of digital resources.

Fragility of the media - the media on which digital materials are stored are inherently unstable and can deteriorate very quickly without suitable storage conditions and management, even though they may not appear to be damaged externally.

Loss of integrity - the ease with which changes can be made and the need to make some changes in order to manage the material means that there are challenges associated with ensuring the continued integrity, authenticity, and history of digital materials.

Doing nothing is not an option - the implications of allocating priorities are much more severe than for paper. A digital resource that is not selected for active preservation treatment at an early stage will very likely be lost or unusable in the near future.

Preservation prior to creation - the nature of the technology requires a life-cycle management approach to be taken to the maintenance of digital resources. A continual programme of active management is needed from the design and creation stage of a computer system and onwards, if preservation of that system and the content it holds is to be successful.

Benefits of using e-Infrastructures for distributed digital preservation

Some of the potential benefits available by using shared public e-Infrastructures include the following:

- Backbone connectivity, effective data storage and computing resources, leading to cost reductions for the cultural institutes involved
- Cost reduction on digital curation workflows, cataloguing and metadata generation by substituting expensive human workforces with cheaper machine processes
- Facilitated storage and preservation, ranging from short to long term
- Access to high-end distributed computing and to large-scale distributed databases
- Access to new software/applications, standards, advanced visualization or remote instruments
- Enhanced processing and visualisation of complex cultural data (e.g. 3D modeling and VR representations) through the computing resources provided by research e-infrastructures (grid, cloud)
- Dynamic distributed virtual organisations, facilitating collaboration with information and resource sharing (e.g. virtual conferences, document sharing, blog and cooperation platforms, etc.)
- Standardisation in the data world, e.g. by developing a common reference model for the DCH sector
- A cross-disciplinary approach and sharing of best practice between disciplines.

Over the course of the DCH-RP project, members discussed and considered a number of alternative visions and goals for a roadmap to preservation. With the experiments conducted in the Proofs of Concept, trust building and community involvement activities, and the roadmap development itself, the concept of Cloud services and service oriented infrastructure provisions offer a promising way forward – integrating technology evolution with service provisions without unnecessary dependency on any particular technology beyond what is required for the digitisation process itself.
When considering and discussing an e-Infrastructure for preserving digital cultural heritage, two fundamental aspects need addressing early on:

- What is the scope and delivery model of the e-Infrastructure, and
- Who are the stakeholders of that e-Infrastructure?

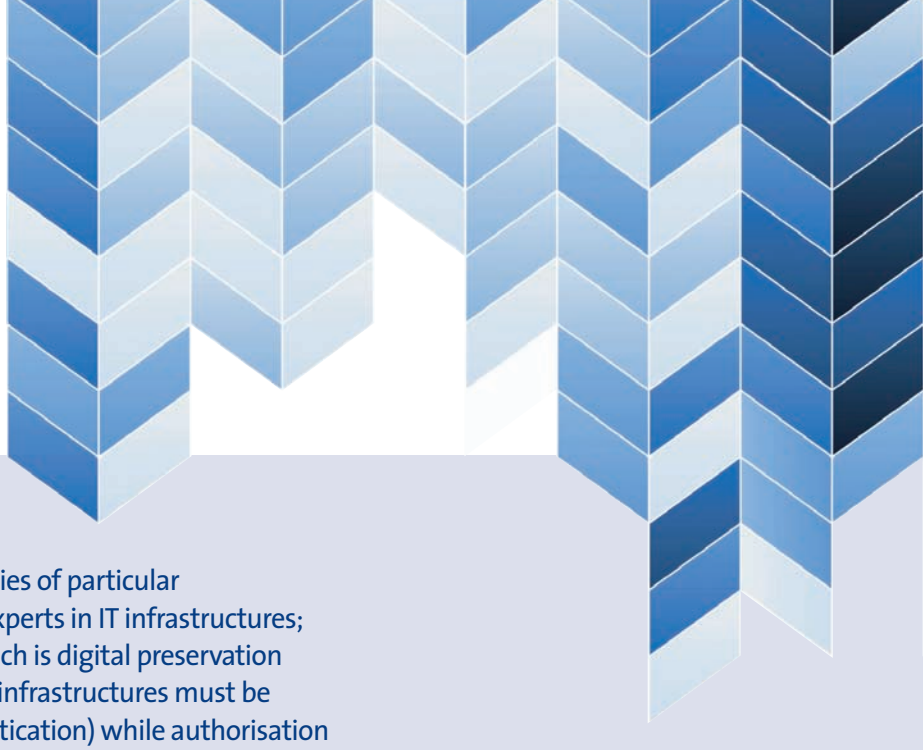
Taking a number of assumptions into account, the following briefly illustrates what such an infrastructure might look like, and who the related stakeholders might be.

The provisionally named "Digital Preservation as a Service (DPaaS)" platform clearly will have to be a distributed platform delivered by many service providers, as it is clear that digitised (or borne digital) data will not be centrally stored on an outsourced storage service for the entirety of CH data produced across Europe – even though the odd exception might prove this assumption. The following conceptual "thought experiment" indicates five key service areas that might be part of such a distributed DPaaS platform.

Federated, distributed storage

It might be that preservation storage will be located at individual institutes, or a few national centres such as national libraries or national centres of excellence. However, while data governance and curating might remain a national duty, DCH as a whole will benefit from consistent and uniform capabilities across local and/or national storage services offering the following capabilities:

- Transparent, configurable **data replication**: Configured in master/slave deployment as many replica repositories may be configured as are necessary or required. Replicas are accessible only by the master
- **Consistent data management interfaces**: Data management activities concern everything *about* the preserved data, not the preserved data itself; this includes Persistent Identifier management, data set curation etc. Repositories should provide a consistent API for these kinds of functions
- **Elastic data repositories**: Data repositories may expand or shrink as required by the user, without complicated and slow provisioning procedures
- **Auditable bit-preservation**: Particularly when outsourcing the storage service, users must be reassured that data is safely preserved at the bit level
- **Common, distributed data access interfaces**: Irrespective of the repository accessed, the access protocol should be consistent across Europe
- **Pluggable Authentication**: Data repositories should be flexible in terms of accepted methods of user authentication.



Federated Identity Management

Users should be not concerned with idiosyncrasies of particular infrastructures – they do not need to become experts in IT infrastructures; their time is best spent on the task at hand, which is digital preservation and data curation. Existing user authentication infrastructures must be integrated into DPaaS (ie. individualised authentication) while authorisation for data access should be commonalised across repositories in Europe.

Data authenticity and provenance services

The authenticity of data and its use in research and other activities external to the pure preservation function itself need to be tracked and maintained, similar to the functions of a flight recorder in an airplane (except for the time limit of provenance information). Each authenticated access to preserved data should be registered with such a service (and may become a target for preservation itself).

Data standards compliance and transformation

Preserving data over a very long period of time eventually requires transforming data from one format to another (e.g. from TIFF to JPEG2000 format) for instance if a data format becomes obsolete or a new format is mature and offers more features. In such circumstances it is necessary to translate data from one format into another (requiring huge computational resources over a relatively short period of time).

Data access re-enactment services

Data that cannot be transformed into new formats requires that software be preserved to access that data, to allow access even into the distant future.

Looking further into the detail, these services might not be as easily defined as it may first appear. For example, while a small cultural institute is bound by national policy to host all cultural data under its auspices, the institute might not have, and may not want to have the necessary IT expertise and skills to manage the data storage infrastructure by itself. Outsourcing the data storage service is clearly out of the question, so which solution solves this dilemma? One possible approach is to *outsource infrastructure operation & maintenance* while the necessary infrastructure is physically deployed in-house. This solution is very similar to those used for gas boilers and heating infrastructure, for which service contracts are routinely agreed with external companies.

This simple example illustrates how and why the DCH community needs to think carefully about stakeholders and actors likely to be involved in establishing and using any DPaaS infrastructure.

Stakeholders and actors

A layered or stacked model of the indicated service platform helps identify stakeholders and actors with whom the DCH community needs to engage. Since sustainability plays an important role for the DCH community, it is advisable to aim for as many general-purpose software and service components as possible to satisfy DCH requirements for the DPaaS platform. The more generic a service or software is, the larger its potential market will be, driving down costs for all participants. Clearly, the main stakeholders in this platform are the European memory institutes taking on the responsibility for curating and preserving cultural heritage (in this case in digital form). However, it is also clear that other stakeholders will play a role, at times with different agendas than those of the memory institutes. The following briefly illustrates some of the main stakeholders and their possible involvement in the hypothetical DPaaS:

- **Data preservation stewards:** Institutes and organisations charged with preserving digital data. They represent the primary stakeholders of this platform, and at the same time its primary customers. Examples are KIK-IRPA, RA, ICCU, KANUT from the DCH community, but also CERN from the high-energy physics domain, ESA from the Earth observation community, and many others

- **General-purpose e-Infrastructure providers:** In this context, organisations able to provide a generic e-Infrastructure for academic and scientific use across Europe. Examples are EGI (through EGI.eu), EUDAT, GEANT

- **Research infrastructure (RI) providers:** Preserved data is not considered part of a research infrastructure, but a resource that RIs may make use of. RIs represent (a subset) of data customers, providing services to a specific scientific domain. They are considered customers of the data preservation stewards, who grant access to the preserved data. One example might be an RI designed for linguistic research accessing historic recordings of extinct languages.

- **Commercial customers:** If preserved data is available for commercial exploitation, a number of rules and regulations must be considered (e.g. data access, IP, licencing)

- **Preservation Service Providers:** The DPaaS platform outlined here may be underpinned with general-purpose e-Infrastructures, but is likely to include services that are specific to digital preservation and hence of little or no interest to general-purpose service providers. With data preservation stewards deciding not to acquire necessary ICT skills, they must rely on external providers for services around digital preservation. Specialised service DP service providers may be commercial (e.g. document management companies) or non-commercial entities. Examples of these are INFN-Catania for the e-Cultural Science Gateway, or Engineering Italia for the HAPPI service.

Key points

e-Infrastructures radically change the way research is conducted, overcoming physical distance to support a growing multitude of virtual research communities across the globe.

DCH-RP proposes a roadmap and methodologies for creating a distributed set of digital preservation services through e-Infrastructure providers.

DCH-RP ACTIVITIES

The main goal of the project is to elaborate a Roadmap for the introduction of a shared preservation infrastructure for the digital cultural heritage community. This is also seen as the main channel for the delivery of advanced preservation services to the DCH sector.

Development of the Roadmap is supported by activities structured in five Work Packages, each involving cultural heritage institutions, e-Infrastructure providers and other contributors.

Preservation Roadmap

The DCH-RP Roadmap makes it possible for each cultural heritage institution to define its own practical action plan with a realistic timeframe for the implementation of its stages.

A short-term action plan is proposed by the DCH-RP project in order to initiate the development of a preservation services infrastructure on a level that will be self-sustainable and continue to progress on its own. Beyond the duration of the project itself, the Roadmap identifies two further planning periods: **medium-term** (approximately two years after the end of DCH-RP) and **long-term** for the logical continuation of the DCH-RP work into the future.

Defining a Preservation Roadmap for DCH encompasses a number of activities:

- Exploring the state of the art in cultural heritage and e-Infrastructure
- Developing a Registry of services and tools
- Investigating how Infrastructure as a Service (IaaS) can contribute to digital preservation services for DCH
- Considering how standards and interoperability principles can be adopted by the cultural heritage and e-Infrastructure communities.

The DCH-RP Roadmap is supplemented by practical tools for decision makers, including:

- **Best practices** to promote future interoperability and the adoption of common standards, tools, approaches and business models
- The design of **a new trust model** appropriate for the use of e-Infrastructures and including recommendations for user authentication and access control system(s), and for engaging with commercial partners.

The following figure presents a consensed version of the intermediate Roadmap. The final version is under finalisation and it will be soon available on the project website.

Step 1
Where are we now and where we want to get to?

Before starting planning for the use of distributed digital preservation solutions, there are some basic considerations:

- Agree on a vision – what will distributed digital preservation look like?
- Decide about challenges to target
- Have a clear understanding of advantages to explore

Step 2
Take actions in major identified areas of the roadmap

Harmonise data storage and preservation
- Define critical system requirements (general and specific) - understand and articulate your requirements
- Choose a suitable AA control system
- Look into IaaS

Improve interoperability
- Review best practice and how-to guides (avoid re-inventing the wheel)
- Consider aspects of internal interoperability to avoid building digital silos within the organization – set up a mandate

Establish conditions for cross-sector integration
- Decide about standards to use and look into available tools for guidance
- Use the DCH-RP registry of preservation tools to find what suits your organization best

Establish a governance model for infrastructure integration
Decide on high level models for
- General governance
- Trust
- Business

Step 3
Choose services to address

Decide about addressing services according to:

- Functional areas
- Service types and objects
- Type of architecture
- Level of maturity
- Licence conditions

Key points

- The overall vision for the DCH-RP Roadmap is to implement a **federated infrastructure**, dedicated to support the application of open science in the arts and humanities, which will make digital cultural heritage more accessible and usable in the long term
- The key to success is the **use of existing e-Infrastructures** for research and academia (including NRENs, NGIs and the newer data infrastructures) as an efficient channel for extending the delivery of advanced services to the digital cultural heritage
- Using these facilities in the DCH sector will also contribute to developing the research capacities of this sector.

Registry of Services for digital preservation purposes

The Registry, available on-line via the project's website (http://www.dch-rp.eu/), collects and describes information and knowledge related to tools, technologies and systems that can be applied for the purposes of digital cultural heritage preservation. It also reviews existing and emerging services developed and offered by R&D projects, public organisations and commercial solution vendors.

Whilst providing a broad overview of the existing solutions, the Registry initiative focuses particularly on analysing those services and tools that can enable cultural heritage institutions to benefit from the capacities of e-Infrastructures including cloud and grid systems.

Tools and services are categorized by purpose, technologies required, resource formats supported and domain-specific application, among many other criteria. Alongside this functional description, an attempt has been made (for a subset of the tools and services covered) to provide assessments of each. In the first iteration, the chosen assessment criteria are: popularity, support level, portability, scalability, licensing model, and modularity/ openness of architecture.

The registry concept, and in particular the assessment mechanism, has been "road tested" in conjunction with the Proofs of Concept, carried out within the project's work.

Collaboration between DCH-RP and the APARSEN project (Alliance Permanent Access to the Records of Science in Europe Network), which prepared its own registry, has been established in order to identify synergies and provide DCH communities with the most complete information possible.

Key points

- **The aim of the DCH-RP tools & services Registry is to help decision makers** in reorganizing DCH preservation processes in the context of new opportunities and challenges, and selecting high quality, mature, sustainable (maintained) and portable tools
- **It provides a list of tools and services with comments on their usability** in remote outsourced models, portability, compliance with standards and scalability
- **It contains solution assessment** and rating mechanisms that can be used by project participants and registry users.
- **The Registry supports users in submitting information** on new products and DCH-RP adopted a peer-reviewed editing model to moderate the content.

Case studies and best practices

Starting from the results of existing projects and initiatives, relevant case studies are being analysed to extract knowledge and best practices to promote future interoperability and the adoption of common standards, tools, approaches and business models. This analysis, together with an ongoing discussion with e-Infrastructures and DCH organisations, is being used to validate the Preservation Roadmap for DCH that the project is developing.

A virtual discussion platform has been established where DCH organisations and e-infrastructures alike can share their experiences and best practices for preservation of digital cultural heritage. Participation in this virtual platform is not restricted to project partners and the platform has a membership that covers a large part of Europe. This membership is, among other routes, being used to channel questionnaires to a wider audience.

Trust, authentication and access control are important factors when providing data and storing data external to the DCH organisation. It is also important that access to the data can occur in a controlled and secure way. In this context the project is paying much attention to the trust issue by designing a trust model and exploring existing user authentication and access control methodologies.

Case study on Authentication and Authorization systems

One key aspect of e-Infrastructures is the authentication and authorization of users. One technology that is widely used today is federated access.

DCH-RP studied a model to introduce the key principles underlying federated access to the cultural heritage community. This model foresees that:

- The user's credentials (typically organizational affiliations) are handled by the user's organisation, also called the Identity Provider (IdP)
- The user can log in using the same credentials to different resource providers that have agreed to accept those credentials.

In other words, authentication and authorization are decoupled: the former is done by the user's organisation, while the latter is done by the resource provider. To explore CH-specific needs on this topic DCH-RP project has launched the survey "Questionnaire on authentication and authorisation in the cultural heritage community" available via the project website (http://www.dch-rp.eu/index.php?pageId=111&draft=0&sespre=MW_).

Key points

- **A pan-European integrated authentication and authorization infrastructure** (AAI) is one of the key tools to enable researchers to use services provided by e-infrastructures, while reducing barriers to new users
- **Federated access** effectively reduces the number of credentials for the users, increases security as users have to remember less credentials and improves the users' experience by offering "single sign-on" – sign in once, access more resources.

Partnership with publishers and journals preservation agencies

The project is reaching out to the international publishing community with two aims. First of all we are exploring whether partnerships with DCH-RP activities can be mutually productive and contribute to the sustainability of the project's outputs. Secondly, it has been recognised that several established preservation activities in the area of online learned journals may offer useful lessons, some of which may be transferrable into the cultural heritage domain.

Leading commercial publishing companies are often eager to explore partnerships that may give them access to new content or other offerings. In principle, the greatest overlap of interest with DCH-RP might be expected for publishers who focus on the arts and humanities, although there may be other areas of intersection.
This case study has sought to establish an informal network of interest with a number of publishers and also representative bodies such as national or international publishers' associations.

By means of informal interviews and questionnaires, we are investigating which factors or conditions are most likely to encourage publisher participation, such as favourable licensing terms, embargoed access to newly digitised content before it becomes open to all, new or novel content, etc.

The second strand of this case study is examining the lessons of the past decade of preservation activities in the journals business. Specifically, the widespread switch from printed to online or "e-journals" from the mid 1990s, stimulated the emergence of a number of agencies and initiatives such as LOCKSS, CLOCKSS, Portico, and the e-Depot of the Dutch National Library - all of them focussing on preserving what were seen as increasingly valuable digital publications.

We are reaching out to a number of these agencies to help explore what has worked best in the e-journals preservation sphere and what might usefully be incorporated into our DCH-RP proposals.

Case study on trust building

Traditionally cultural heritage institutions enjoy a high level of trust in society, which is largely based on their controlling the full life-cycle of objects in their care. When outsourcing some of the core services (storage, preservation, access) to e-Infrastructures, the trust models between memory institutions and their stakeholders will change. The existing methods for assessing the trustworthiness of a digital repository through audit or self-assessment have significant shortcomings when applied to distributed preservation architectures. The DCH-RP case study on trust building is exploring new trust models of distributed digital preservation and proposes a risk analysis tool for the continuing engendering of trust in the traditional stakeholders of cultural heritage institutions.

E-Culture Science Gateway

The DCH-RP e-Culture Science Gateway (eCSG, http://ecsg.dch-rp.eu/) aims at proposing a model to enable transparent access to Digital Cultural Heritage contents for as many researchers around the world as possible. However, the management of authorisation procedures, if implemented in a traditional way, i.e. assigning credentials to each new user and maintaining them during their lifecycle, would imply a significant overhead for the eCSG. In the meantime, end users would also get an additional set of credentials to be remembered and kept private, with the usual drawbacks: usage of weak passwords, re-use of the same password (thus weakening security levels) and risk of identity theft. For these reasons, we have decided to implement Federated Access to the eCSG. This approach offers a number of advantages:

- The pool of potential users dramatically increases and it is immediately extended to all end users belonging to existing identity federations supported by the eCSG
- The eCSG manager is relieved of the responsibility for creating and keeping on its servers the users' credentials, as they are managed by Identity Providers at single Federated organizations which connect to the eCSG
- End users do not need to obtain, manage and remember a new set of credentials, and use the usual credentials provided by their home organization.

So far, the DCH-RP eCSG is integrated into IDEM (www.idem.garr.it), the Italian AAI Federation dedicated to Research, Education and Culture, managed by GARR (www.garr.it), and GrIDP (http://gridp.garr.it), a "catch-all" federation also managed by GARR. Through IDEM, the DCH-RP eCSG is also a Service Provider of the eduGAIN (www.edugain.org) inter-federation.

Instructions about how to access the DCH-RP e-Culture Science Gateway can be found at http://ecsg.dch-rp.eu/register-to-sign-in.

The DCH-RP e-Culture Science Gateway also comes as an app for mobile devices, such as smartphones and tablets, available both on App Store (https://itunes.apple.com/us/app/dch-rp-ecsg-mobile/id742094899?ls=1&mt=8) and Google Play (https://play.google.com/store/apps/details?id=it.infn.ct.dchrpSGmobile)

Proofs of Concept

Through a range of Proofs of Concept, **cultural institutions and e-Infrastructure providers work together to experiment with distributed computing and storage infrastructures** (NREN, grids, clouds, newer data infrastructures) to store and manage cultural digital resources, starting from the targeted specific services identified in the Roadmap, and from real scenarios and user stories provided by cultural institutions.

Organised in two phases of experimentation (PoC 1 & PoC 2), the results of these experiments inform the roadmapping and best practices activities in DCH-RP with their intermediate (PoC 1), and final results (PoC 2).

The results of the first round of experiments clearly demonstrated two key lessons to be learned for the DCH community. When beginning to collaborate with external service providers (such as academic e-Infrastructure providers), the community of CH researchers will have to learn new skills to be able to make such collaborations a success: not all service providers are domain experts (though it is desirable that they are or will be). Moreover, whichever tools and services are considered for inclusion in preservation platforms, service providers and integrators *must* take into account that the typical preservation scientist is not an IT savvy person. Hence tools must be easy to use and easy to install (if this is necessary at all), and the management & configuration of the tools must be easy too.

In contrast, the second Proofs of Concept experiments focus more on usable solutions and services that have the potential of being integrated into existing solutions due to their promising functionality – all the way towards experimenting with assembling a preservation platform fit for purpose. Responding to the recommendations made by the intermediate roadmap and the project's trust building report (D4.1) the experiments are covering CAPE's Matchbox tools, SCIDIP-ES HAPPI service, as well as EUDAT's B2SHARE and B2SAFE services. Underpinned with strategic memoranda of understanding signed between DCH-RP and partner initiatives and projects such as SCAPE, APARSEN, SCIDIP-ES, ARIADNE and EUDAT the experiments contributed valuable feedback and recommendations to the final DCH Roadmap not only about technology itself, but almost more importantly in terms of how exactly a DCH e-Infrastructure should be set up, which business services are necessary and how they would be delivered and by whom.

e-Infrastructure Concertation workshop

During its second year, the DCH-RP project organized an e-Infrastructure Concertation meeting in order to discuss in more detail the strategy and recommendations presented in the intermediate version of the Roadmap and to prepare for future cooperation. This event was held in Tallinn on the 23rd and 24th of April 2014 at the University of Tallinn. The 25 attendees were carefully selected in order to provide a balanced mix of experts in both the Digital Cultural Heritage and the e-infrastructures areas. The most relevant recommendations resulting from the panel discussions held were:

- Make the roadmap less technical and cover political, legal, financial,organisational and socio-economic aspects;
- Concentrate on services;
- Retain the sections about trust and security
- Cover the sustainability of the roadmap and of the final endpoint of the roadmap (the preservation infrastructure itself)
- Explain the value chain anticipated by making use of e-infrastructures for preservation
- Add in argumentation about what to preserve and strategies for different types of digital objects
- Consider the need for raising awareness and for training;
- Add use cases as part of the roadmap
- Add recommendations for the different target groups identified.

The concertation workshop was very fruitful and proved to be an important part of the stakeholder consultation process. The final version of the roadmap took into account these recommendations and moved to recommending a (federated) preservation infrastructure as a service.

Dissemination of project outcomes

DCH-RP website

The main dissemination tool employed by DCH-RP to promote the Project and its outcomes is the DCH-RP website: h**ttp://www.dch-rp.eu**

The website allows access to documentation, promotional materials, information and news. The website's content is addressed to the formal project Partners, as well as to experts in the DCH and e-Infrastructure fields, and to all those interested in the activities carried out.

Through the Project website it is possible to reach the DCH-RP social network pages (Google+, Facebook, Twitter and LinkedIn), subscribe to and read the project's newsletter, fill in the questionnaires proposed, and access the e-Culture Science Gateway and the Registry of Services & Tools.

A show-case on digitalmeetsculture.net

Digitalmeetsculture.net is an interactive online platform for cooperation and information in the field of digital technologies applied to cultural heritage and the arts. Since the beginning of the Project, DCH-RP has been showcased on Digital meets Culture with a button permanently featured on the homepage and in the "digital heritage" section of the portal, providing easy access to a dedicated page providing general information about the project, including the latest news and events, useful material and several highlighted articles.

The showcase, which can be visited at **http://www.digitalmeetsculture.net/heritage-showcases/dch-rp**, is a living page, which combines information coming from inside the project with discussion on digital preservation themes that are occurring outside the project. This combination of internal and external information offers a creative dimension to the communication of DCH-RP, contributing to the coordination objectives of the project. In this light, the showcase of DCH-RP on digitalmeetsculture.net is complementary to the project website; in particular it represents a very useful instrument to widen the communication of the project towards a larger audience, including both professionals and the general public.

Partners

The Consortium is composed of 15 partners from 8 European Countries, representing the different key stakeholders.

The Central Institute for the Union Catalogue of Italian Libraries and for Bibliographic Information (ICCU), Italy
Project Coordinator
http://www.iccu.sbn.it
The Central Institute for the Union Catalogue of Italian Libraries and for Bibliographic Information (ICCU) promotes cataloguing and documentation activities in the area of library heritage, producing standard rules for cataloguing and digitisation under the authority of the Italian Ministry of Cultural Heritage, Activities and Tourism.

Promoter Srl (PROMOTER), Italy
Technical Coordinator
http://www.promoter.it
Promoter is an SME based in Pisa. It was founded in 1996, integrating competencies and experience in the areas of technological innovation, business promotion and project management. Promoter operates in several fields, including technical development of ICT platforms and web-design, multimedia production, electronic and web publishing, corporate consulting, and dedicated online services for the promotion of culture and tourism. Promoter is Technical Coordinator of DCH-RP, contributing to the coordination of the partners as well as monitoring and assessing the progress of the project.

The National Archives (RA), Sweden
http://riksarkivet.se/
The National Archives (Riksarkivet) is one of the oldest public agencies in Sweden with a history reaching back to the Middle Ages. The National Archives supervises the public records of all state agencies with the aim of preserving, organising and caring for these records.

Service Public Federal de programmation politique scientifique (BELSPO), Belgium
http://www.belspo.be/
The Belgian Federal Science Policy Office (BELSPO) offers scientific support to the policy-making and is the national e-Infrastructure for research (BELNET + Belgian national Grid project BEGrid), the funding of networks of excellence in fundamental research; space research; nuclear research; and the research activities and public scientific service of ten federal scientific institutions. It has a co-ordination mission aimed at building the European Research Area.

Ministry of Culture (EVKM), Estonia
http://www.kul.ee
Within the Estonian Government, the Ministry of Culture is responsible for organising and coordinating state cultural policy. The task of the Ministry of Culture is to make sure that necessary and favourable conditions, both legislative and financial, are created for the functioning of culture, heritage and sports. Estonian cultural institutions actively digitise collections and therefore there is growing demand for new services in the fields of long-term preservation and access to digital content.

European Grid Initiative (EGI.eu), the Netherlands
http://www.egi.eu
EGI.eu was established as a Dutch Foundation – an independent legal entity – in February 2010 and is located at the Science Park in Amsterdam, the Netherlands. Defined by its statutes (https://documents.egi.eu/document/18), its main objective is to coordinate pan-European distributed computing activity within Europe on behalf of its stakeholders (NGIs, EIROs, and others).

Collections Trust, United Kingdom
http://www.collectionstrust.org.uk/
Collections Trust is the UK's independent organisation for collections. CT is an independent registered charity with over 30 years of experience. It leads on cultural collections management and the cultural digital agenda in the UK. It works in partnership with a wide range of organisations both nationally and internationally, including museums, libraries, archives, community archives, higher education institutions, and government agencies and departments.

Pozna-Supercomputing and Networking Center (PSNC), Poland
http://www.man.poznan.pl
Pozna/ Supercomputing and Networking Center is affiliated to the Institute of Bio-organic Chemistry of the Polish Academy of Sciences. PSNC employs about 250+ people divided into four departments. It is an HPC Center, Systems and Network Security Center, as well as R&D Center of New Generation Networks, Grids and Portals. PSNC is also the operator of the Polish National Research and Education Network PIONIER, which is connected to the GEANT2 network, and Operator of the Pozna Metropolitan Area Network POZMAN.

Italian National Institute of Nuclear and Particle Physics (INFN), Italy
http://www.infn.it
INFN (Istituto Nazionale di Fisica Nucleare) is the Italian National Institute of Nuclear and Particle Physics. Founded in 1952, INFN is a governmental research organisation, which promotes, co-ordinates and funds nuclear, particle and high-energy physics research. INFN runs a country-wide grid infrastructure for e-science and, since the year 2000, has taken part as a stakeholder in many European Grid Projects such as DataGrid, DataTag, Coregrid, GridCC, EGEE, EELA. It is the coordinator of the CHAIN, EUMEDGRID-Support and EU-India Grid2 projects.

National Information Infrastructure Development Institute (NIIFI), Hungary
http://www.niif.hu
Nemzeti Informacios Infrastruktura Fejlesztesi Intezet (NIIF Institute or NIIFI, the National Information Infrastructure Development Institute) is the organisation responsible for developing and operating the Hungarian e-Infrastructure for science, education, and public collections.
That e-Infrastructure is based on the academic and research network and its services, and comprises such components of the e-Infrastructure as supercomputing facilities, grid and cloud applications, digital repositories/archives, collaboration tools etc.

EDItEUR, United Kingdom
http://www.editeur.org/
EDItEUR, UK is the international group coordinating development of the standards infrastructure for electronic commerce in the book and serials sectors. Established in 1991, EDItEUR is a truly international organisation with over 100 members from 17 countries. EDItEUR is a leader in the creation and promotion of global standards for the exchange of bibliographic information and of e-commerce messages in the book and journal supply chains.

Trans-European Research and Educational Networking Association (TERENA), the Netherlands
http://www.terena.org/
TERENA is the association of National Research and Education Networks in Europe and in 2011 celebrated its 25th year of existence. The organisation represents 41 national members, two international members (CERN and ESA) and a number of associate members (including DANTE, NORDUnet and several industrial organisations, which are normally highly involved in cooperation activities and projects with the research and education networking community). The mission of TERENA is to promote and participate in the development of high-quality international information and telecommunications infrastructure and services for the benefit of research and education.

MICHAEL Culture Aisbl (MCA), Belgium
http://www.michael-culture.eu/
Devoted to European cultural heritage valorisation, Michael Culture Association represents a European network on the theme of digitisation and promotion of cultural heritage. Created in 2007, the association counts today 15 formal members, from 11 countries that each maintain a broad network, representing 150 institutions from 20 countries. The main goals of Michael Culture Association are to develop the network of professionals working in the field of cultural heritage digitisation.

Associated partners
- Hellenic Ministry of Education and Religious Affairs, Culture and Sports. General Secretariat for Culture, Greece
- Central National Library of Florence, Italy
- Marciana National Library, Venice, Italy

For more details see:
http://www.dch-rp.eu/index.php?en/64/join-our-community

The **DCH-RP Roadmap** makes it possible for each cultural heritage institution to define its own practical action plan with a realistic timeframe for the implementation of its stages

The overall vision is to implement a federated infrastructure, dedicated to support the application of open science in the arts and humanities, which will make digital cultural heritage more accessible and usable in the long term

The **DCH** sector by using e-Infrastructures can form a community of practice or a Virtual Research Community that transcends discipline and national boundaries

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DCH RP

DIGITAL CULTURAL HERITAGE ROADMAP FOR PRESERVATION

www.dch-rp.eu/