D 1.2

Initial report on user needs

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4CH COMPETENCE CENTRE FOR THE CONSERVATION OF CULTURAL HERITAGE

D 1.2

Initial report on user needs

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Colophon

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Executive summary

This report describes the results of Tasks T1.2 and T1.4 concerning the mapping risk and user needs.

WP1 defines the basis for the achievement of project objective 1, collecting and relating experiences, skills and best practices acquired and implemented so far in the European Countries, with specific reference to EU-funded research. The WP's activities identify innovative approaches in initiatives, policies and strategies for the preservation and conservation of monuments and sites. In this way, it will help define in detail the fields which the Competence Centre will operate on.

Reflecting the overall concept, the methodology of WP1 is based on the implementation of 4 requirements and objects, which are explained below.

4CH PHASE 1 | Y1 CONCEPT | REQUIREMENTS AND OBJECTIVES

- Task T1.1 - Analysing the field
- Task T1.2 - Mapping risks
- Task T1.3 - Technological state of the art
- Task T1.4 - User needs

This report focuses on 2 objectives:

Task T1.2 - Mapping risks

Implementation of a map of all kinds of risks, including environmental ones and disasters deriving from the climate change, which can damage Cultural Heritage assets for prioritizing preservation and conservation activities.

Task T1.4 - User needs

Mapping existing analysis on user needs starting from EU-funded projects and other collective analysis covering different communities and including staff skills and their attitude to digitization, organizational issues and so on.

This report covers the activities carried out from month 1 to month 17 of the project.

1. Background

Holistic documentation of historic buildings, archaeological monuments and sites based on 3D digitization provides a basis for conservation, preservation and valorisation. It is fundamental to effective management and preventive maintenance. Active condition monitoring helps to avoid the effects of environmental decay and catastrophic events, such as earthquakes, floods and fire. High quality digital documentation also helps support reconstruction, rehabilitation and access. The knowledge captured in such documentation contributes to sustainable development, preservation of history and identity (the diversity of cultures and social bonds that Cultural Heritage embodies), while enabling social and economic development in local areas and regions.

Digital technologies play a key role in allowing innovation in management practices, proving the framework for objective monitoring and scientific evaluation. They facilitate innovative engagement of local citizens in their CH and in co-creation and bottom-up conservation solutions, for example involving local communities in monitoring their local heritage sites. High-quality 3D digitization lies at the heart of some highly innovative solutions.

The 4CH project envisages a holistic approach, which encompasses interdisciplinary contributions, where accurate and precise 3D documentation of the shape and appearance of monuments and sites is linked to relevant information and rich data ranging from the location and history of the CH asset to its structural behaviour, reports into its condition (past and present), state of conservation, and the monitoring of foreseen risks. Holistic documentation aims to create a “Heritage Digital Twin”, a digital replica of the asset linked to information and data used to support management, conservation and access. The benefit of creating a digital twin is that various scenarios can be tested on the digital model rather than on the real thing, for example to model the performance of the asset in different conditions, such as changes in tourism flow or to plan for disaster prevention. The 4CH approach will contribute to the design of the Heritage Digital Twin concept, digital twin capable of enriching itself by collecting data from monitoring devices concerning preservation and maintenance, interventions for conservation and restoration, and management. CH institutions will benefit from digitization solutions that are based on standardization, exploit advanced technology and services, while at the same time enabling them to adopt optimal strategies and to improve the skills of their staff, volunteers, and students.

4CH will establish the tools and frameworks needed by the European Competence Centre on Cultural Heritage to make this possible.

1.1 Project objectives

The main aim of the 4CH project is to design and set up a Competence Centre (CC) for the Conservation of Cultural Heritage. The Centre will offer knowledge (advice and support activities) and services to national and regional heritage agencies, cultural heritage institutions, professionals, and citizens. The 4CH project will promote state of the art ICT solutions including 3D digitization, which have great potential for documenting, monitoring, mitigating, and preventing damage caused by natural degradation, human-related developments, and disasters.

To achieve the main goal, as stated above, WP1 pursues a sub-set of objectives:

Project Objective 1 | Establishing the methodological framework for the Competence Centre focusing on advanced digitization for preservation and conservation of Monuments and Sites.

The objective is to design the methodological framework for the Competence Centre. The framework will collect and relate experiences, skills and best practices, innovative approaches, policies, and strategies for preservation and conservation of monuments and sites.
This objective will be pursued by **tasks T1.2 and T1.4 in WP1** concerning identification of all kinds of risks that can cause serious or irreparable damage to heritage assets together with monitoring and diagnostic activities, mitigating measures and repair interventions.

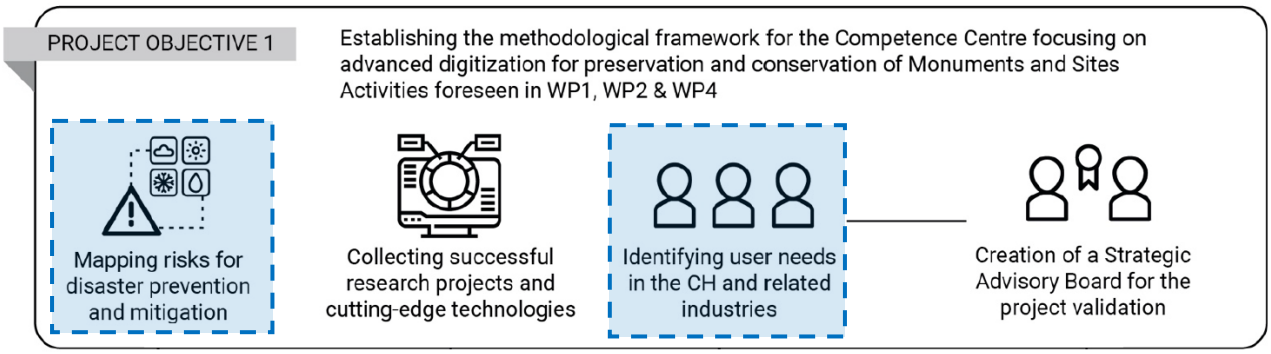


Figure 1.1 - Project Objective 1 for Task T1.2 and T1.4

1.2 Correlation between Tasks

WP1 define requirements and the field of activities of the future Competence Centre by four Tasks:

- **Task T1.1 - Analysis of experiences, skills and best practices acquired and implemented so far in the European Countries, in the field of preservation and conservation of monuments and sites.**
  This task will collect and analyse the current progress of conservation and preservation research and practice in Europe, in order to integrate them in the Centre's recommendations. The results will be mainly achieved with desk work on reports, publications and so on, integrated by surveys and direct contacts where necessary.

- **Task T1.2 - Implementation of a map of all kinds of risks which can damage Cultural Heritage assets for prioritizing preservation and conservation activities.**
  The task will analyse the current state of research linking causes to adverse effects. It will provide information to organize the knowledge base and the Centre's recommendations.

- **Task T1.3 - State of the Art, including update via Market Watch, of the technology in the fields in which the Competence Centre will operate: 1) digitization and 3D modelling, 2) conservation and preservation, 3) exploitation of CH assets.**
  This task concerns technology, both digital and analogic, as for example techniques and instruments for digitization; diagnostic techniques and their interpretation; materials and nanomaterials; novel methods and devices for visualization; and so on. It will feed information in the knowledge base and generate short reports to be distributed to the community. The information will be regularly updated, especially when new tools or methods appear in the market. Attention will be paid to international reports and to global approaches to the subject, e.g., related EU reports, UNESCO statements, and so on.

- **Task T1.4 - User needs: mapping existing analysis on user needs and defining their continuous update.**
  The task will integrate the user needs reports created with surveys e.g., by EU-funded projects and other collective analyses with targeted surveys covering aspects or communities not yet well analysed, e.g., staff skills and their attitude to digitization, organizational issues and so on.

In the following diagram it is possible to see the several inputs and outputs from each task and their indirect correlations.

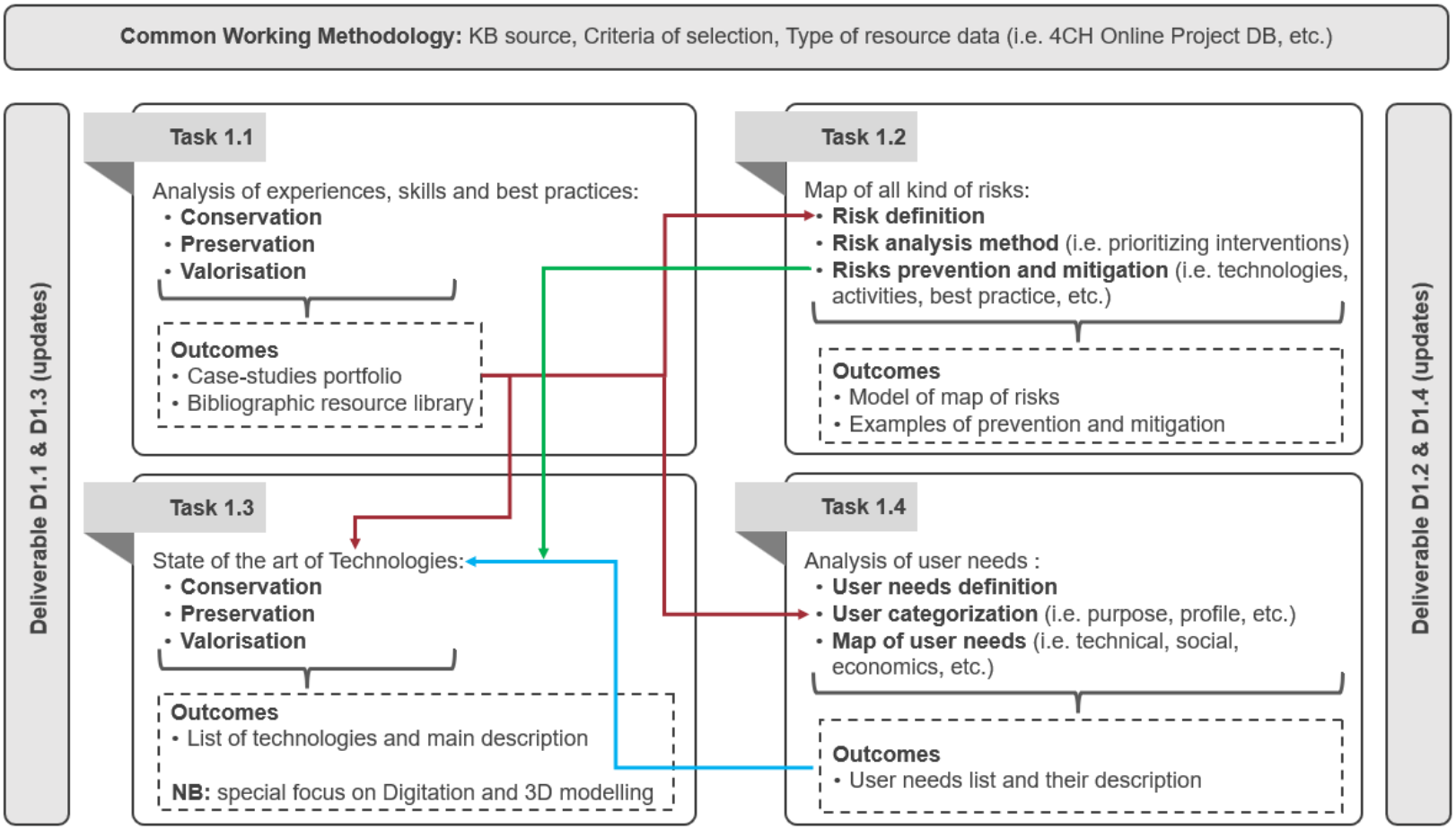


Figure 1.2 - Correlation between Tasks

1.3 WP1 working methodology

A shared working methodology has been defined for each task in order to be able to exchange inputs and outputs and have the same analysis strategy.

The working methodology has been used to identify the state of the art, relevant best practices, the main technologies and their possible application in CH, risks related to conservation and preservation and, finally, user needs.

With reference to this, preliminary work was shared between the WP1 tasks, regarding the CH description, the method (matrix) and terminologies. Subsequently, the individual tasks continued the work by detailing and modifying their relative matrices.

For each data source (EU projects, technical reports, interventions on CH assets, bibliographic references, etc.) specific selection criteria were applied to have a common assessment parameter. The aim of this approach is was to create a Knowledge Base (KB) identifying the elements of interest: technologies, case studies, possible applications.

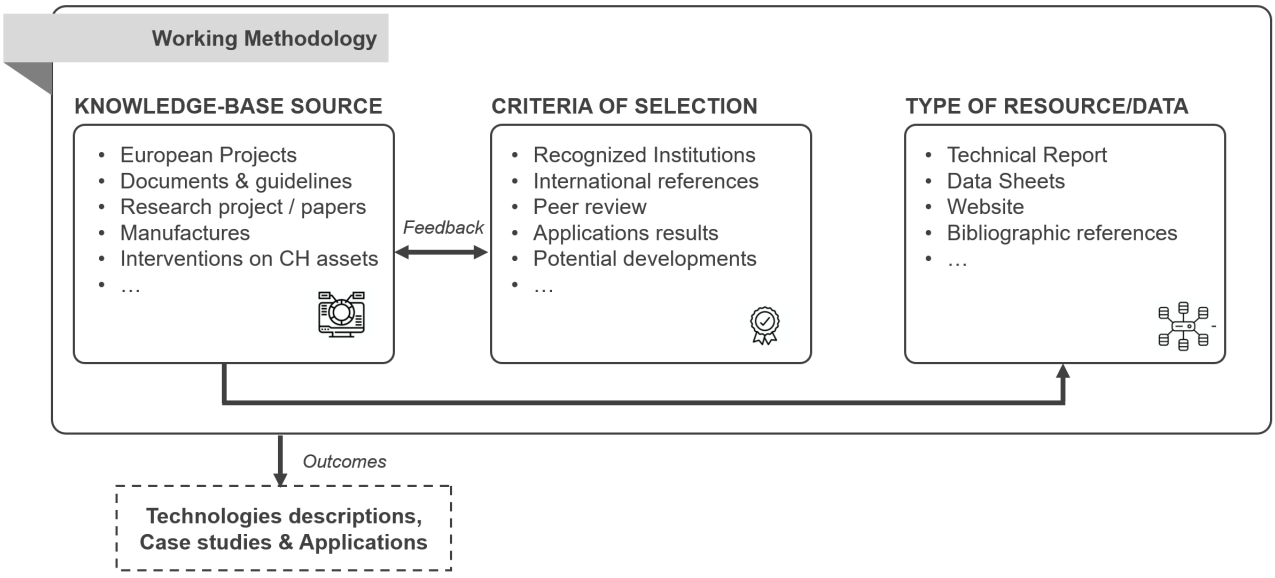


Figure 1.3 - Common working methodology

A Database of European projects on topics relevant for the 4CH work programme was created. These include among others 3D modelling for Cultural Heritage, Conservation and Preservation research, Cultural Heritage exploitation and communication with digital technologies, and more. The database contains hundreds of EU projects selected from FP3, FP4, FP5, FP6, FP7, Horizon 2020, CIP, Creative Europe, Interreg and other EU programmes, and is searchable according to different search parameters. The selection of the pertinent and relevant projects was carried out with the contribution of all the WP1 tasks, each for the topics of its competence. Summary information is presented for each project, with links to the project web site, project outcomes and reports where available.

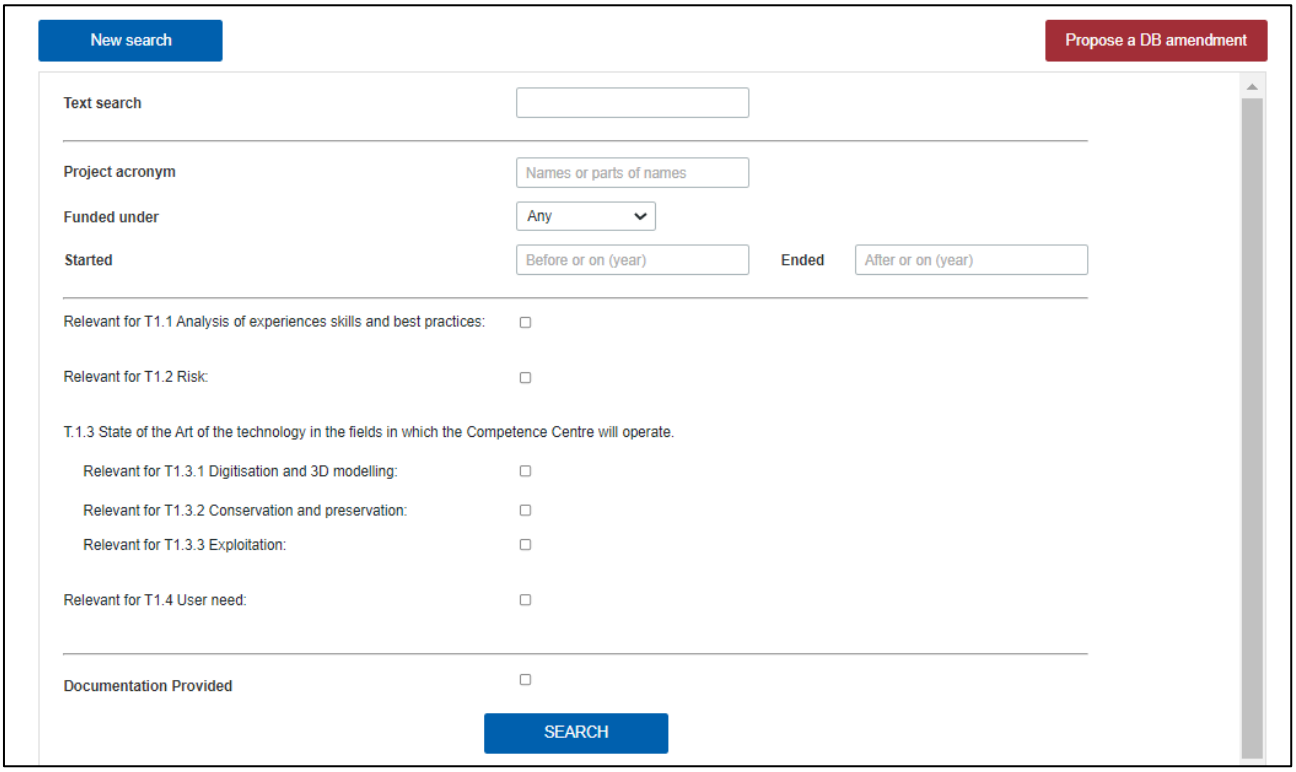


Figure 1.4 - Database of European projects on topics relevant for the 4CH work program

2. Implementation of a map of all kinds of risks which can damage Cultural Heritage assets for prioritizing preservation and conservation activities (Task T1.2)

2.1 Introduction

Task 1.2 aims to analyse the current state of research linking causes to adverse effects. It provides information to organise the knowledge base and the Competence Centre's recommendations. The Cyprus Institute (CyI) is the leader of Task 1.2, with the participation of INFN, INCEPTION and UNIBO. Task 1.2 started on month 1 (January 2021) and ended on month 17 (May 2022).

The initial phase of the work focused on the current situation assessment by analysing various European projects and relevant literature. Then, a map of all kinds of risks in Cultural Heritage has been developed: a matrix for hazards and threats in Cultural Heritage, which aims to align and evaluate diverse factors for the preservation, conservation, and valorisation of Cultural Heritage assets has been eventually created. The matrix is based on a division of two types of risks: natural and anthropic. Such division reflects a holistic approach to recognising the risks, their causes, overlapping, and eventually their prioritisation. Moreover, to be further developed, a preliminary schema for the map of all kinds of risks for Born-Digital Heritage has been created. The next step of the Task 1.2 activities consisted of testing the matrix on real cases, opportunely chosen to evaluate the methodology developed. A deeper analysis regarding the implementation of workflows and simulation through international pilot cases will be provided within Task 4.4 (Implementation of workflows and simulation through pilot cases) of Work Package 4. Finally, based on the test cases' results and their comparison, the CyI team has focused on developing preliminary guidelines according to the 4CH project's three main pillars: preservation, conservation, and valorisation of Cultural Heritage (CH).

2.2 State of the art

To build an overview of the research on risks, the T1.2 team collected information about European projects, selected the most relevant and exhaustive reports about the topic under analysis and evaluated relevant online platforms for the development of the task. Thus, the comprehensive state of the art of Risk analysis at the national and European levels has been based on current and finalised EU projects[1] and scientific publications. Here below are presented the main selections for the Task's outlook:

- EU-funded projects

Table 2. 1 - Selection of EU-funded projects

STORM-Project	http://www.storm-project.eu
JPI/HeAT-Project	https://ccrs.ku.dk/research/centres-and-projects/heat/
SHELTER Project	https://shelter-project.com
ProteCHt2save	https://www.interreg-central.eu/Content.Node/ProteCHt2save.html
HYPERION Project	https://www.hyperion-project.eu
HERACLES Project	http://www.heracles-project.eu
PROTHEGO	http://www.prothego.eu
SAVING CULTURAL HERITAGE Project	https://savingculturalheritage.eu/about/project
CHERISH-Project	http://www.cherishproject.eu/en/

[1] For a further analysis of relevant European projects, see D1.1 (Task 1.1) for best practices and the 4CH Data Browser for summary information about EU-funded projects dealing with topics related to the 4CH scope: https://www.4ch-project.eu/resources-activities/4ch-data-browser/

- International references

Table 2. 2 - Selection of International references

UNESCO- World Heritage in danger- List of Factors affecting CH	https://whc.unesco.org/en/factors/
SOC (State of Conservation Information system)	https://whc.unesco.org/en/soc
Convention concerning the protection of the World Cultural and Natural Heritage	http://whc.unesco.org/archive/2006/30com-en.htm
Panorama Solutions	https://panorama.solutions/en/explorer?theme%5B0%5D=49 6
European and Mediterranean Major Hazards Agreement	https://www.coe.int/en/web/europarisks/cultural-heritage1/-/asset_publisher/Z2tQEabq2rXZ/content/international-conference-on-culture-against-disasters-protecting-cultural-landscape-as-prevention-of-natural-disasters-?inheritRedirect=false
Group on Earth Observations (GEO)	https://www.earthobservations.org/index.php
ICOMOS World report 2000 on monuments and sites in danger	https://www.icomos.org/risk/world_report/2000/trends_eng.htm

- Reports

Table 2. 3 - Selection of reports

Heritage at risk: EU research and innovation for a more resilient Cultural Heritage	https://openarchive.icomos.org/id/eprint/2330/1/ZZAD18005ENN.en.pdf
CLIMA project	http://earth.esa.int/heritage/2015-events/15m38/Presentations/p18_Di_Iorio_et_al.pdf
The ABC Method: a risk management approach to the preservation of cultural heritage	https://www.iccrom.org/sites/default/files/2017-12/risk_manual_2016-eng.pdf
The Atlas of Climate Change Impact on european Cultural Heritage	https://www.researchgate.net/profile/Gaute-Svenningsen/publication/262809832_Windborne_sea_salt_aerosol/links/5bdab0e692851c6b279dd0df/Windborne-sea-salt-aerosol.pdf
ICOMOS-ISCS: Illustrated glossary on stone deterioration patterns- Glossaire illustré sur les formes d'altération de la pierre	https://www.icomos.org/publications/monuments_and_sites/15/pdf/Monuments_and_Sites_15_ISCS_Glossary_Stone.pdf
Report on the user requirements in the Copernicus domain to support Cultural Heritage management, conservation and protection	https://www.copernicus.eu/sites/default/files/2020-10/CC-2020-37_Copernicus-Cultural-Heritage-Task-Force-Report_0.pdf

- On-line platforms

Table 2. 4 - Selection of online-platforms

ACoR- Atlas des tecnique de la Construction Romaine	https://acor.huma-num.fr
Arpae Emilia Romagna	https://www.arpae.it/it
Informaciòn xeogràfica de Galicia	http://mapas.xunta.gal/servizos-wms
National Georegister	https://www.nationaalgeoregister.nl/geonetwork/srv/dut/catalog.search#/home
Eurostat- Statistics	https://ec.europa.eu/eurostat/web/environment
Orient Dams	https://www.orientlab.net/orientdams/
Climdex	https://www.climdex.org
EM DAT- The International disaster database	https://www.emdat.be
Sava GIS Geoportal	http://www.savagis.org/map;jsessionid=B132C2438C5C44E2A7242A794AF5B183

Cultural Heritage has a universal value for humans as individuals, communities and societies, it is a non-renewable resource, and in all its diverse forms, it needs to be safeguarded for future generations[2]. In 2000 ICOMOS[3] produced the first Global Report on Heritage at Risk[4], starting an important process that aims to improve the state of conservation of Cultural Heritage, monuments and sites worldwide. This report is based on several national, international or thematic perspectives and information reports. The content of the ICOMOS Global Report covers Heritage assets diversified for cultural, geographic or historical origins and types. According to this Heritage community's first main result, the concept of risk is connected to that of effective protection, of which it is a measure. Protection can be guaranteed by all sorts of actions on Heritage itself and its values: we care for those cultural assets mainly because of their intangible meanings and values. Adequate protection of a Cultural Heritage asset will ensure its physical preservation and cultural significance through time and changes. Consequently, conservation aims at securing the safe

[2] https://op.europa.eu/en/publication-detail/-/publication/1dcbe60b-79ba-11e8-ac6a-01aa75ed71a1
[3] https://www.icomos.org/en
[4] https://www.icomos.org/risk/world_report/2000/trends_eng.htm

transmission of such Cultural Heritage assets to future generations. The *ICOMOS World Report 2016-2019 on Monuments and Sites in Danger* is the latest volume of the whole series of World Reports started in 2000. This last one consists of contributions from 23 countries, among them reports from national and international scientific committees of ICOMOS, but also reports by individual experts, complemented by short information on the World Heritage Watch network, founded in 2014, and by press releases on the Europa Nostra programme "The Seven Most Endangered Heritage Sites in Europe" launched in 2013. All these reports on threats (not only regarding World Heritage Sites) result from continuous and preventive monitoring of the state of conservation, which lies in the responsibility of the advisory bodies ICOMOS, IUCN and ICCROM[5]. Furthermore, in relation to risks and damages, ICOMOS has also developed a relevant study on stone deterioration and conservation, where terminological confusions lead to significant communication problems between scientists. For this reason, ICOMOS deemed it of primary importance to set up a common language for damages. The results of these studies led to the International Scientific Committee for Stone (ISCS) glossary, which represents an important tool for scientific discussions on decay phenomena and processes.[6]

An increasing number of extreme events associated with climate change, natural hazards and human threats have led to significant problems in conserving and managing Cultural Heritage worldwide. Thus, documenting and monitoring the level of conservation and risks appears fundamental, and recognising all the risks is of constant urge. Moreover, improved climate change adaptation and enhanced hazard/threat mitigation strategies have become necessary over the last years. In this regard, Cultural Heritage assets (e.g. monuments, sites or natural parks) are essential components of a country's identity and are drivers of tourism. Indeed, disasters and catastrophes have affected the conservation of Cultural Heritage assets with their cultural, historical and artistic values and the safety of visitors, Cultural Heritage workers, and local communities. In addition, this condition has undoubtedly posed negative consequences for the local economies.

For what concerns the Risk reduction, in 1994, a United Nation World Conference on Disaster Risk Reduction brought together government officials, non-governmental experts and other professionals in order to face the growing incidence of natural disasters and eventually discuss preparation, response, and mitigation measures for Cultural Heritage. Since then, two other conferences have been organised: one in Kobe, Japan (January 2005), which adopted the Hyogo Framework for Action 2005 – 2015, and one in Sendai, Japan (March 2015), which adopted the Sendai Framework for Action 2015 - 2030.[7] In this regard, this last framework is focused on Disaster Risk Reduction (DRR) strategies and actions at the national and international levels[8] and is based on the following priorities:

- Understanding disaster risks
- Strengthening disaster risk governance to manage disaster risk

[5] https://openarchive.icomos.org/id/eprint/2430/1/hr20_2016_2019.pdf
[6] https://www.icomos.org/publications/monuments_and_sites/15/pdf/Monuments_and_Sites_15_ISCS_Glossary_Stone.pdf
[7] https://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf
[8] https://whc.unesco.org/en/disaster-risk-reduction/

- Investing in disaster risk reduction for resilience
- Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction

In relation to the "Sendai Framework for Disaster Risk Reduction", it is important to mention the Group on Earth Observations (GEO).[9] That is an intergovernmental partnership working on Earth observations' availability, access and use for a sustainable planet. The main scope of GEO is the promotion of open, coordinated and sustained data sharing and infrastructure for better research, policymaking, decisions and action across many disciplines. In addition to the "Sendai Framework for Disaster Risk Reduction", the GEO community focuses on other two global priority engagement areas: the United Nations 2030 Agenda for Sustainable Development and the Paris Agreement.
For all these reasons, during the last decade, EU-funded research projects have deeply investigated the preservation and the sustainable management of Cultural Heritage assets to increase their preservation and resilience. Innovative solutions and techniques, assessment systems, mitigation strategies, risk management models, disaster prevention, quick damage assessment, and ICT tools have been some of the major results successfully delivered by FP7 and H2020 projects in the field of Cultural Heritage.[10]

At the international level, together with the World Heritage List[11], UNESCO created the List of World Heritage in Danger[12]. This list has two main objectives: informing the international community of the conditions that threaten the characteristics of a cultural asset inscribed on the World Heritage List and calling for urgent actions. According to UNESCO, dangers can be ascertained or potential. The former refers to specific and proven imminent threats. The latter relates to a property faced with potential threats, and such threats could harm its World Heritage values. In support of the World Heritage community, the Information System was created[13]. Such a tool is one of the most comprehensive online monitoring systems of any international convention and offers a collection of reliable data on the state of conservation of World Heritage properties since 1979 and the threats they have faced in the past or even are currently facing. Among all the risks, conflicts and war, earthquakes and natural disasters, pollution, poaching, uncontrolled urbanization, and tourist development represent the major problems to World Heritage sites. Based on this selection, the World Heritage Committee has decided to include 52 cultural properties on the List of World Heritage in danger in accordance with Article 11(4) of the Convention[14]: most of them are located in the Middle East Regions and Africa[15].

An important initiative for risk reduction is the EUR-OPA Major Hazards Agreement. It is a platform for helping to protect Cultural Heritage against natural and technological disasters by promoting risk culture and disaster resilience. In both its tangible and intangible forms,

[9] https://earthobservations.org/index.php
[10] https://ec.europa.eu/info/sites/default/files/conferences/synopsis_cultural_heritage.pdf
[11] https://whc.unesco.org/en/list/
[12] https://whc.unesco.org/en/danger/
[13] https://whc.unesco.org/en/soc/
[14] https://whc.unesco.org/en/conventiontext/#Article11.4
[15] https://whc.unesco.org/en/danger/

Cultural Heritage plays a crucial role in fostering resilience by reducing vulnerabilities, and providing precious assets for an affected region's sustainable social and economic development during its recovery phase by attracting investment, creating employment, or providing renewable natural resources. That is why the protection of heritage in the event of a disaster is extremely important.[16] EUR-OPA works at the Council of Europe with the Faro Convention on the Value of Cultural Heritage for Society in order to protect tangible and intangible heritage as a vector for identity and collective memory that can consolidate and revitalise communities, and also with the European Landscape Convention in terms of protecting cultural landscapes[17].

Due to some natural disasters' increasing frequency and intensity , the climate change issue gained particular attention. Indeed, it exposes Cultural Heritage to new threats and increases the vulnerability of sites already at risk. European attention has been increasingly addressed to this subject, leading to the development of new agreements among the Heritage community, strategy plans, and online platforms for the preservation and conservation of Cultural Heritage.
For instance, the CLIMA Project (Cultural Landscape Risk Identification, Management And Assessment) is based on designing and implementing a WebGIS based multi-task platform to integrate different remote sensing technologies for the mapping, the diagnostic and monitoring purpose of cultural landscapes, including buried and exposed archaeological remains. The platform will provide specific products (e.g. periodic vulnerability and warning maps) to allow the cultural authorities to implement more effective maintenance plans and actions. This project addressed three specific objectives:

- Analysis of main risk factors and design of CLIMA platform
- Development of the GIS-based multi-task platform
- Demonstration activities[18]

The *Shelter Projects provide a*nother interesting example. Such projects aim to improve the capacity of humanitarian actors to meet the sheltering needs of disaster and conflict-affected populations and connected Heritage by disseminating shelter responses and learning from cases experiences[19].
Similarly, PANORAMA Nature-Culture focuses on sharing case studies where the interlinkages between nature conservation and the safeguarding of cultural heritage are essential for the sustainable management and development of heritage assets. It presents place-based and people-centred approaches which highlight the relationship between nature and culture and provide a source of exchange between World Heritage properties, heritage places and professionals[20].

[16] https://www.coe.int/en/web/europarisks
[17] https://whc.unesco.org/en/disaster-risk-reduction/
[18] https://earth.esa.int/heritage/2015-events/15m38/Presentations/p18_Di_Iorio_et_al.pdf; http://www.clima-project.eu/the-project/
[19] http://www.shelterprojects.org
[20] https://www.iccrom.org/it/node/3311

Generally, based on the current state of the art, the risk assessment can be defined as the determination of quantitative or/and qualitative value of risk related to a concrete situation and a recognised hazard. The qualitative risk assessment requires the calculation of two components of risk: the magnitude of the potential loss and the probability that the loss will occur. Thus, risk analysis is the hazard identification and the risk evaluation. Ultimately, risk management is the decision-making process following the risk assessment based on the identification, assessment and prioritisation of risks[21].

However, risk cannot be completely eliminated, but it can be assessed and managed in order to reduce the impact of disasters.

The risk assessment is based on the identification, assessment, and prioritisation of risk, and can also be defined as the determination of the quantitative and qualitative value of risk related to a concrete situation and a recognised hazard. This assessment, which starts with the identification of cultural assets, is peculiar to risk management and, ultimately, valorisation of the Cultural Heritage assets[22].

In conclusion, several research projects have shown an interest in hazards and threats, focusing on risk management and valorisation of cultural assets. However, the current literature has shown a lack of comprehensive and holistic tools which identify a cultural heritage asset and its risks with the threefold outcome: conservation, preservation and valorisation.

[21] https://www.iccrom.org/publication/guide-risk-management; https://link.springer.com/article/10.1007/s11069-020-04417-7

[22] https://www.iccrom.org/sites/default/files/2017-12/risk_manual_2016-eng.pdf

2.3 Methodology

Following the commonly agreed working methodology of Work Package 1, various reports, European and International projects, and Cultural Heritage online platforms have been selected and analysed for the field's state of the art assessment.
The literature review has focused on the threats and hazards of Cultural Heritage sites, vulnerability of Cultural Heritage, climate change, disaster risk management of Cultural Heritage, and Cultural Heritage value chain (e.g. creation, production, and transmission).
Specifically, the methodology developed for Task 1.2 consists of the following steps (Fig. 2.1):

1. Literature review
2. Development of the Matrix
3. Test cases selection and risks assessment
4. Guidelines drafting

Therefore, beyond the first step of the literature and projects' review in common with Work Package 1, the successive step consisted of analysing and comparing the collected sources in order to develop a map of all kinds of risks (Matrix). The matrix is based on a division of two types of risks: natural and anthropic. That selection and its development address a holistic approach for a complete understanding of the risks that can damage a cultural asset. However, it is also crucial to examine the interaction among risks and evaluate their impact, rate, and frequency.
The Matrix enables heritage professionals and institutions to map the risks, the actual and possible damages and prioritise the risks according to the specific needs in terms of methods, technologies, financial and human resources at disposal, tools, services, policies, and strategies. Once the Matrix has been created, the following step focuses on the selection of real case studies for testing the risks' maps and eventually adjusting and fine-tuning it.
Regarding the case studies, the testing phase of the Matrix has focused on some important Cultural Heritage assets located in Cyprus. Such test cases are iconic examples of past and present multi-layered heritage that need to be conserved, preserved and valorised for their local, national and international interests because they are subjected to several risks of different nature. The test case phase involved fieldwork activities for the direct analysis of the sites and monuments. This step is necessary for assessing all the risks the asset is subjected to and for the Matrix compilation. Finally, the last step consists of preparing guidelines useful to the successive strategies' planning aimed at the conservation, preservation and valorisation of the asset. The methodological pipeline allows always going back to the previous steps in order to update both the Matrix and the final guidelines in case of changes and new risks occurring to the assets.

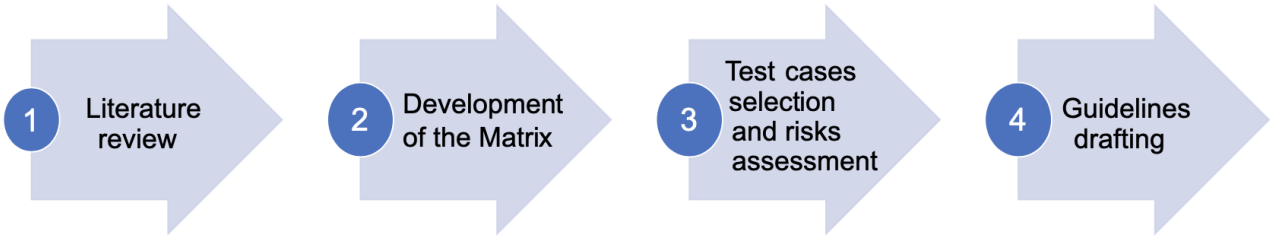


Figure 2.1 - T1.2 methodology

2.4 Map of all kinds of risks in Cultural Heritage: the Matrix

A Matrix has been developed to draw a map of the risks and carry out the necessary research activities. This tool provides professionals and researchers with a guide to define the cultural asset's type and its actual condition, then map the risks that can damage it and select digital tools, instruments, and strategies to be possibly employed for conservation, preservation and valorisation purposes.

Therefore, the main scopes of the matrix are:

- Identifying the asset's type
- Identifying all kinds of risks

Moreover, this tool is conceived as a complementary for:

- Assessing damages
- Identifying the best digital strategy for Cultural Heritage asset conservation, preservation and valorisation.

The first vertical column (Table 2.5) guides the user toward the cultural asset's identification throughout its main features. This identification takes into consideration general conditions and characteristics for a first general analysis of the asset. It is conventionally divided into two main groups: Monument/Site/Landscape and Artefact.

Table 2. 5 - Matrix: Cultural Heritage asset's type identification

Cultural Heritage	***monument/ site / landscape***	type	built
			carved
			natural
		location	on-ground
			underwater
			underground
			cave
		context	urban
			rural
			landscape
		biodiversity	fauna
			flora
			geology

		function	current
			past
		structure	stand-alone
			complex
			ensemble
		immaterial aspects	artisanship
			social activity
			performing art
	artefact	movable	utilitarian
			historic replica
			written evidences
			architectonic features
			ethnographic
			eco-facts
			art works
		immovable	frescoes
			graffiti
			carved
			mosaics
		immaterial aspects	artisanship
			social activity
			actions

According to each asset's analysis, it is fundamental to record all the previous documentation as listed below (Table 2.6), as well as provide all the information about each set:

Table 2. 6 - Matrix: Cultural Heritage asset documentation

Documentation	
Investigation / legal status	studied
	un-documented
	preserved
	recorded
	excavated
	archived
	exhibited

Cultural Heritage sites, monuments and artefacts are not only important components of a country's identity, but they also represent important drivers of the economy (e.g. tourism). Unfortunately, an increasing number of extreme events associated with the impacts of climate change, natural hazards and human threats significantly affect Cultural Heritage worldwide. Natural and human-made disasters all have an impact on Cultural Heritage and seriously damage or destroy monuments, historical and archaeological sites or cultural landscapes. In addition to the endangerment of people who visit those places, the degradation of heritage has a negative socio-economic impact on local communities, causing a consequent loss of values and cultural identity. Furthermore, local communities could also disappear for diverse reasons (due to, e.g. migration), and Heritage remains orphan. There is no one to take care of it in such a case, and it loses its relevance (value). Hence, identifying such problems for the conservation and management is essential, as well as improving climate change adaptation and enhancing hazard/threat mitigation strategies. The Matrix aims to identify the most common risks to Cultural Heritage sites, monuments, landscapes and artefacts. The type of risk can be identified into two macro areas: Natural and Anthropic.

Natural risks can be classified into cumulative processes and disasters. A process is a series of actions that achieves a particular result. Cumulative processes are environmental and biological, all forms of deterioration that accumulate gradually over time, or any intermittent, fluctuating process and event that occur more than once per year.

On the contrary, disasters are catastrophic events and often beyond human control. They can be invasive, such as severe weather and geological events. Disasters lead to emergencies and occur in diverse situations in all parts of the world, in both rural and urban regions and beyond their density in population, as well as in situations involving natural and human hazards. Disasters are often classified according to their onset speed, cause, or

scale.
Natural risks are more likely to be predictable depending on the appropriate scientific and technological means to foresee them (e.g. simulations for weather forecasts). However, natural processes or unexpected events threaten Cultural Heritage assets through catastrophes with high destructive potential; they also act as a permanent risk resulting from the environment of the heritage place or monument, such as the weathering or wearing[23].

This classification with each sub-section can be visualised in the relative section of the Matrix (Table 2.7):

Table 2. 7 - Matrix: natural risks

Natural risks				
(cumulative) processes		***disasters***		
environmental	***biological***	***invasive species***	***severe weather***	***geological events***
sea level raise	animal migration	fauna	fire	tsunami
glaciation	pest	flora	downpour	earthquake
erosion	vegetation		squall	landslide
silting	decay		flood	volcano
desertification	degradation		hail	
ground-water				
deposition				
vibration				

Human activities can equally be the reason for several threats to Cultural Heritage, such as creating incompatible activities close to Heritage places, changing their functions or causing

[23] https://www.iccrom.org/sites/default/files/2017-12/risk_manual_2016-eng.pdf

total destruction. The level of human impact on Cultural Heritage assets depends on the degree of community and institutions awareness, legal recognition and protection. Sometimes, the lack or inadequacy of rules and conservation frameworks can negatively affect Cultural Heritage preservation.[24]Both at the individual and collective levels, human behaviours can cause dangerous effects. Specifically, within the Matrix, Anthropic risks have been divided into intended and indirect (Table 2.8). Intended risks are connected to deliberate human acts that lead to unavoidable damage to the Cultural Heritage asset. This group of risks can be caused by management or heritage crimes.
On the contrary, indirect risks are connected to human action that does not mean threatening or damaging a cultural heritage asset. Therefore, they eventually do so, so they must be addressed. That group of risks is connected to the building, infrastructure, industry, land conversion, socio-cultural factors, heritage management or other factors (e.g., war conflicts).

Table 2. 8 - Matrix: anthropic risks

Anthropic risks						
intended		***indirect***				
management	***heritage crimes***	***building/infrastructure/ industry***	***other***	***land conversion***	***Heritage management***	***Socio-cultural***
modern re-use	vandalism	industrial activity	war	agriculture	negligence	change in value
corruption	arson	constructions		forestation	neglect	veneration
quarrying	theft	transportation			restoration	loss of traditional knowledge
political	illegal excavations	pollution			tourism industry	performances
	illicit trafficking	mining			visitors	veneration
	collectors				handling	

[24] https://www.icomos.org/risk/world_report/2000/trends_eng.htm; https://whc.unesco.org/en/factors/

Within the cultural asset analysis framework, after identifying and evaluating the risks it is subjected to, a series of sequential assessments have to be carried out to prioritise the risks and their further documentation. More specifically:

- the impact of the damages
- the level of the damaging
- the impact of the time
- the interaction among risks
- the overlapping of the risks
- the identification of the frequency or/and the rate of the risks

2.5 Born-digital Heritage: risks and threats

The Matrix presented above lists the risks and threats of physical Cultural Heritage assets. Nevertheless, it does not cover another type of asset created in the last decades by the Cultural Heritage community: Born-digital Heritage. That type of Heritage exists in only its digital form. Such resources have lasting value and significance and represent a cultural heritage that must be conserved and preserved for current and future generations. Born-Digital Heritage has no barriers in terms of time, geography, or culture. It might be related to a specific culture but potentially accessible to every person in the world. Minorities may speak to majorities, the individual to a global audience.
Over the last decades, individuals, organisations, and communities have increasingly used digital technologies not only to document, but also to create diverse digital cultural assets. These digital creations are equally essential to be preserved and inherited by future generations. For this reason, creating a map of risks for born-digital cultural heritage assets face (and possibly solve) a global issue relevant to all countries and communities, making sure that such heritage remains available throughout time.
Specifically, conserving, preserving and valorising Born-Digital heritage means:

- Assuring the integrity and authenticity of this specific Cultural Heritage
- Enabling future access and reuse opportunities
- Ensuring access to its information for as long as it is required and for whatever legitimate purpose
- Saving the data effectively
- Avoiding the threat of data loss

Thus, the main issues related to its preservation are:

- File formats change
- Complex rights holders
- Technologies disuse
- Accessibility and reuse

In addition, digital materials produced by the Cultural Heritage community may include:

- Texts
- Databases
- 3D data
- Images
- Audio
- Graphics
- Software
- Web pages

As mentioned in D1.1 (see 3.2 Digitization and 3D Modelling), this material can easily be altered or destroyed because of its nature. Indeed, the hardware and software used, either for creation, visualisation, or storage, are subjected to obsolescence. Thus, important aspects connected to digital assets are their collection, archiving, preservation,

maintenance, management and reuse. All these actions guarantee added value to the digital data (digitised or born-digital) and to the repositories in which they are stored, both for present and future use. Indeed, these operations improve information and data quality, mitigate their digital obsolescence, and keep them accessible to users in the long term.
A further scientific effort towards the digital curation of digital data is represented by the development of dedicated services that facilitate the inclusion of new datasets, enhance the semantics-based data description and ease the integration of multidisciplinary data with 3D visualisation datasets. For a specific in-depth about digital curation of 3D archaeological data and Digital Heritage to help Cultural Heritage assets at risk, see the internal 4CH report "Digitising and analysing Cultural Heritage. 3D Documentation of Archaeological Assets".[25] Through several case studies, the report describes the applications of 3D, for the analysis, conservation and valorisation of archaeological assets and finds, and presents examples and best practices for the preservation of digital cultural heritage data.

[25] Vassallo, Valentina, Nunziata, Luciarita, & Hermon, Sorin (2022). Digitising and Analysing Cultural Heritage. 3D Documentation of Archaeological Assets (1,0). Zenodo. https://doi.org/10.5281/zenodo.6463619

2.6 Test cases

After the creation of the Matrix, the successive step of the methodology consists of the selection of real case studies for testing the risks map. Specifically, the CyI team selected three important case studies located in Cyprus representing different types of cultural assets and differing by type, size, location, regulation, intended use, type of management, and showing diverse research inquiries according to the three main pillars of 4CH: conservation, preservation and valorisation. Moreover, the selected assets present several phases of use and reuse, and they are subjected to different kinds of risks. It has to be underlined that the choice of Cypriot case studies was due to the necessity of fieldwork activities for the sites' direct analysis necessary for assessing all the risks the asset is subjected to and for the Matrix compilation. The choice of local case studies optimised the Task activities. The further simulation and implementation of workflows through international pilot cases will be carried out within Task 4.4 (Implementation of workflows and simulation through pilot cases) of Work Package 4.

Moreover, in the frame of the 4CH projects, the chosen test cases are relevant for the complex segmentation of their stakeholders and users' needs. Particularly, for the task aims, the following steps guided the analysis of the test cases:

- Identification of the Cultural Heritage assets, their history and relevance
- Evaluation of the diverse layers of interest while mapping the risks
- Assessment of the risks according to the Matrix

The test cases selected for Task 1.2 are:

- The Paphos gate of the Nicosia city walls
- Ayia Napa Monastery
- Ayios Sozomenos site

2.6.1 Test case: the Paphos gate of the Nicosia city walls (Cyprus)

The so-called Paphos Gate of the Nicosia city walls has been chosen to test the Matrix due to the interesting and various nature of the site. Together with Famagusta Gate and Kyrenia Gate is one of the three gates of the Venetian Walls. The defensive walls surround the capital city of Nicosia in Cyprus; they are still largely intact and are among the best-preserved Renaissance fortifications in the Eastern Mediterranean.

Following the guide of the Matrix, Paphos Gate (Table 2.9) is identified as a built urban site that has been already studied, excavated, documented and preserved. The site presents an on-ground location with complex structures and biodiversity. The entire site holds immaterial aspects of social activity. Indeed, the spatial context of the site offers several points of interest for the conservation, preservation, and valorisation of the heritage asset, taking into consideration the overall spatial and cultural environment of the site.

Table 2. 9 - Paphos gate Cultural Heritage asset identification

Paphos gate	***monument/ site / landscape***	type	built
		location	on-ground
		context	urban
		biodiversity	fauna
			flora
			geology
		function	current
			past
		structure	standalone
		immaterial aspects	social activity

The points of interest for its cultural values and historical importance are listed below:

- The buffer zone[26] runs through the site and its narrowest section. Also, there is a narrow street which is one of the few areas across the Nicosia buffer zone included in bi-communal initiatives for the public as a checkpoint for crossing to the northside;
- The Holy Cross Catholic Church of Nicosia;
- The moat that runs around the Medieval walls encircling the old city;
- The United Nations station overlooking the site;
- The Kastelliotisa hall, used in the past as a female convent and originally part of the Lusignan Palace;
- The police headquarters was built on top of the Gate, modifying the structure and the form;
- The carcass of the Spitfire coffee shop across the road from the Gate.

The Pafos gate is also known as “The Upper Gate" and “Gate of San Domenico”. It is called the Upper Gate because it is located at ca. 150 m. above the sea level, a slightly higher elevation than the other gates. The name Gate of San Domenico refers to the fact that it replaced an earlier gate of the Frankish walls, called ‘Porta di San Domenico’ after the nearby abbey of San Domenico. This gate is the primary and smallest gate amongst the other wall openings and serves all the roads through the city’s main commercial area, leading to the western part of the island and operated without interruption during the Venetian, the Ottoman period and under British rule. During the Venetian administration of the Francesco Barbaro Proveditore, the Italian military engineer Giulio Savorgnan was appointed to build the defence system of Nicosia due to the Ottoman threats. The project started in 1567 under the supervision of Sovargnon and was concluded by his assistant Leonardo Roncone in 1568.[27] Until the beginning of the 20th century, the city’s gates functioned to separate outside from inside, rural from urban space, and the safe, known area from hostile and unknown ones.[28] At the beginning of the 20th century, the wall adjacent to the gate was demolished to allow the city’s growth. Since the 1974 war and the physical division of Nicosia, the Paphos gate has become an iconic symbol of division as it is located on the ‘Green Line’ that divides the city.[29]

Nevertheless, despite its long history, the area was forgotten and abandoned during the last couple of decades due to the gradual movement of the commercial and cultural activities away from the old city centre to other parts of Nicosia. During 2013 and 2014, the Cyprus Department of Antiquities excavated the outer part of the Paphos gate moat in collaboration

[26]The buffer zone, also known as ‘the Green Line’, traces the lines where the belligerents stood following the ceasefire of 16 August 1974, as recorded by United Nations Peacekeeping Force in Cyprus (UNFICYP), and it extends approximately 180 km across the whole island. This zone was established to avoid further conflicts between Greek-Cypriots and Turkish-Cypriots in Cyprus: https://unficyp.unmissions.org/about-buffer-zone

[27] Grivaud, G. Venice and the defence of the Regno di Cipro. Giulio Savorgnan’s Unpublished 1292 Cyprus Correspondence (1557-1570). Including Ascanio Savorgnan’s Descrittione delle cose 1293 di Cipro from the Collections of the Bank of Cyprus Cultural Foundation. Bank of Cyprus 1294Cultural Foundation: Nicosia, Cyprus, 2016.

[28] Artopoulos, Giorgos & Bakirtzis, Nikolas. (2014).*Virtual Narratives for complex urban realities: historic Nicosia as Museum*. 10.13140/RG.2.1.4399.3360.

[29] Artopoulos, Giorgos & Bakirtzis, Nikolas. (2014).*Virtual Narratives for complex urban realities: historic Nicosia as Museum*. 10.13140/RG.2.1.4399.3360.

with the Municipality of Nicosia. The works aimed to preserve the history of the area and the Medieval fortifications and reactivate this neighbourhood of the city. Thus, an access bridge was constructed over the excavated features and connected the sidewalk with the gate. On this occasion, a 3D documentation and 3D model reconstruction of the gate was created by the Cyprus Institute in collaboration with the Department of Antiquities[30]. Thanks to this work, the Paphos Gate was studied through interactive visualisation technologies for co-creation and co-management design practices in public space management aimed at guaranteeing the continuity of its historical and social value. From a valorisation point of view, this study produced a walking experience that aims to integrate the historic site into the pedestrian network of the contemporary city[31].

Figure 2.2 - Paphos gate: a) internal access of the Gate and b) the survived door (@authors)

From a structural point of view, the Gate presents: two broad staircases leading to the walls from its internal access, a covered sewage system along the edges of the access, a hendecagonal wall primarily made of earth filling and stone cover, ca. 7 km in diameter, and eleven bastions of similar size and shape located at ca. 260 m intervals one from the other (Fig. 2.2 a.). Moreover, the riverbed of the Pedeios river, in earlier periods crossing the city, was diverted as its waters would fill the stellar-shaped moat, ca. 80 m wide, surrounding the city. When the ground inside the gate was raised by circa half a metre to avoid flooding, the gate was closed, and a breach in the wall next to the gate was opened in order to allow the traffic into the city. The gate was constructed with building elements in secondary use, which were sourced during Medieval times from other nearby constructions. For example, a construction detail is visible on the gate's facade: a marble stone on the gate's internal arch,

[30] http://public.cyi.ac.cy/starcRepo

[31] Artopoulos, Giorgos & Charalambous, Panayiotis. (2018). Analysis of Spatio-temporal Data in Virtual Historic Spaces. 10.2312/egve.20181308 .

possibly from the reign of Sultan Mahmut the Second (ca. 1821), was added to the wall above the entrance to the gate's access tunnel. Also, on top of the gate, there is a series of concrete casemates built in haste during the Turkish invasion in 1974. Finally, the surviving door is made of vertical wood beams (predating the Venetian period) reinforced by horizontal metal long plates nailed into the wood with iron spikes (Fig. 2.2. b).

Thanks to the Matrix, the overall risks state of the Paphos Gate can be summarised as follows (Table 2.10):

Table 2.10 - Risks to which the Paphos gate is currently subjected

	Natural		**Anthropic**	
	processes	***disasters***	***Intended***	***Indirect***
Risks	• Vegetation • Decay • Degradation • Groundwater • Deposition	• fauna • flora • downpour	• vandalism • modern • reuse • construction • pollution	• negligence • neglect • tourism industry • visitors • change in value • performances • war (conflict)

Overall, the gate appears threatened more by anthropic factors than natural ones. Among the processes have been identified ground-water and deposition as environmental factors, and vegetation, decay and degradation as biological factors. Fauna and flora can be classified as invasive elements for disasters and possible downpours.
On the contrary, anthropic *intended* threats are constructions, pollution due to traffic, modern re-use and vandalism, whereas it is possible to identify *indirect* risks such as negligence and neglect, tourism industry, visitors, change in value and modern reuse.

2.6.2 Test case: Ayia Napa Monastery (Cyprus)

The monastery of Ayia Napa is located on the southeast coast of Cyprus. Due to the popularity of this area, in less than 50 years, the site experienced a massive change in its urban and socio-cultural landscape. However, despite the excellent state of preservation of the monument, recently restored, it has been chosen because it represents a critical test case framing the asset in the Matrix for its future role and function within the local and international society.
Following the Matrix (Table 2.11), Ayia Napa Monastery is identified as a built urban site which has been already studied, excavated, documented and preserved. The site has complex structures. Indeed, the entire site provides an example of the historical complex landscape through the multi-layered architectural heritage and its religious and social activities.

Table 2.11 - Ayia Napa Monastery Cultural Heritage asset identification

Ayia Napa Monastery	***monument/ site/ landscape***	type	built
			carved
		location	on-ground
			underground
			cave
		context	urban
		biodiversity	fauna
			flora
			geology
		function	current
			past
		structure	complex
		immaterial aspects	social activity
	artefact	movable	architectonic features
			art works
		immovable	graffiti
		immaterial aspects	social activity

This important site has Medieval origins. Its story develops around a natural cave in the rock, characterising the morphology of the area, where a church dedicated to the Virgin was built (Fig. 2.3 a). Specifically, the cave was enlarged to form a rock-cut church for the Christian community of the Byzantine period (11th century). Several important features, belonging to the category of *artefact* are also included in the cave and are subjected to risks and damages:

- an agiasma (holy water spring)
- a bema (altar)
- a holy icon of the Virgin Mary
- several historic graffiti dated back to the Ottoman period

Figure 2.3 - Ayia Napa Monastery: a) the Church and b) the icon of the Virgin in the cave (@authors)

During the Frankish period (13th-14th century), a manor of a Lord was built next to the cave church. When Cyprus was under the Venetians (15th century), the site became a Monastery. After the Ottoman conquest (1571), the monastery went under the Orthodox Church and during this time the eastern arcades were built and a fountain was constructed in the courtyard. In the 18th century, the monastery was abandoned, and its restoration started only in the 1940s by the Department of Antiquities. From 1978, the place was used as a conference centre for the Middle East Council of Churches. From 1974 onwards, after the Turkish military occupation of the northern part of the island and Famagusta, a famous tourism destination, the area of Ayia Napa experienced a sudden, substantial urban and economic development due to the tourism. Over the years, mass tourism has concentrated in this area, primarily for its natural beauty, decreeing an uncontrolled development threatening the landscape and the identity of this historical religious place.
Currently, the church is surrounded by a monastic complex consisting of rooms and a two-story building overlooking the large internal courtyard with a central fountain (Fig. 2.4).

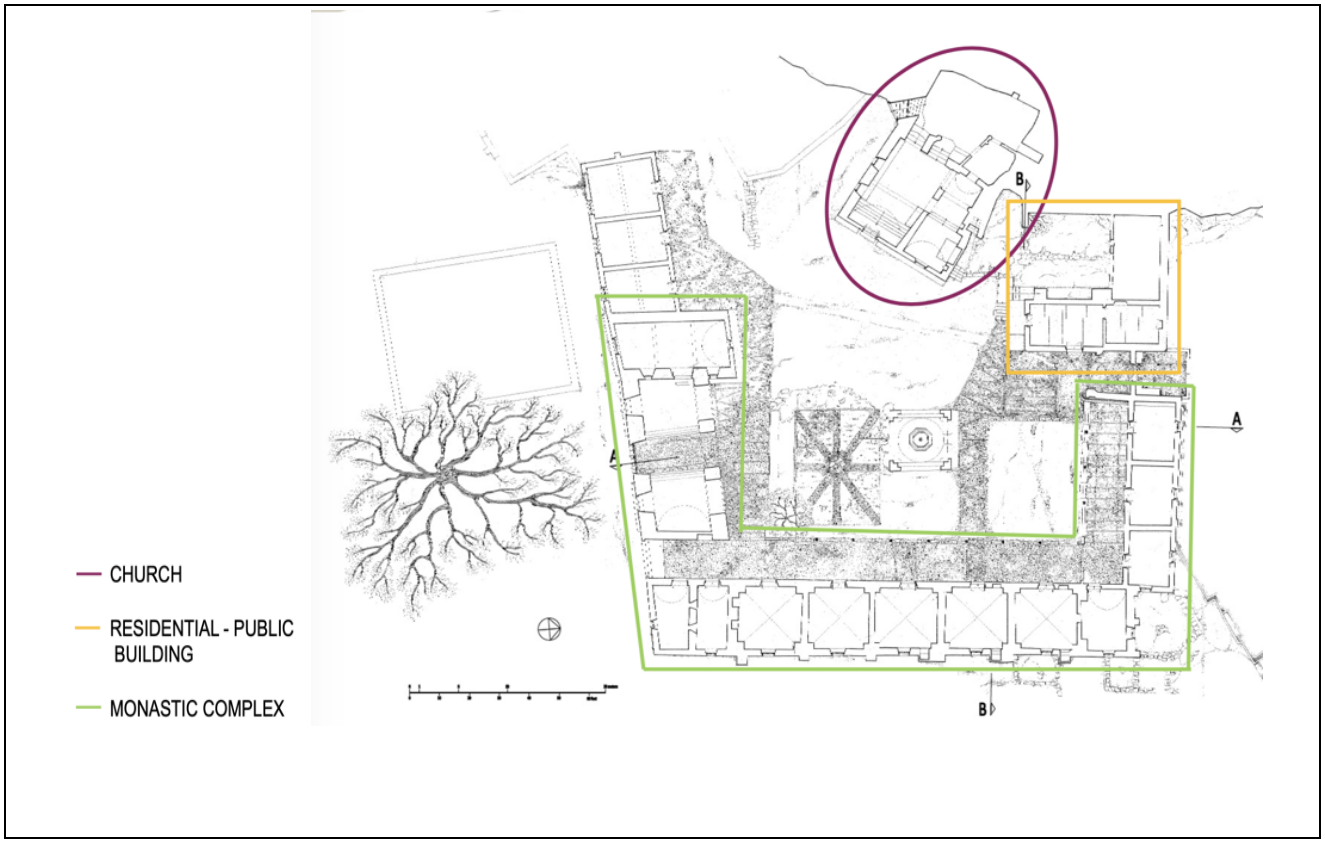


Figure 2.4 - Ayia Napa Monastery

This test case is relevant because it shows how the cult has been consolidated over the centuries and benefited from the presence of a water source inside the building. Indeed, inside the cave, a well was dug to provide water for the people who sought refuge during the pirates' raids. This site represents one of the main places of worship on the island up to the present day. Indeed, later, the well was considered sacred, and many people went there to be cured. At the same time, the presence of a holy girdle of Panayia of Ayia Napa testified that women who had difficulties during pregnancy and childbirth came over to venerate the relic and be helped. This information could be connected with the children's sepultures recently discovered next to the ancient church.

Thanks to the Matrix, the risks to which the Ayia Napa Monastery is subjected can be listed in the following way (Table 2.12):

Table 2.12 - Risks to which Ayia Napa Monastery is currently subjected

	Natural		**Anthropic**	
	processes	***disasters***	***Intended***	***Indirect***
Risks	• vegetation • decay • degradation • fauna • flora	• earthquake	• vandalism • construction • industrial activity • pollution	• war (conflict) • tourism industry • visitors • change in value • loss of traditional knowledge

Overall, Ayia Napa Monastery presents several natural risks that can affect its architectural and artistic value, while most anthropic risks have already affected the site in the last decades. Indeed, due to its location at the heart of the city and its complex urbanistic history, this area has experienced a vast mass tourism development that keeps threatening the Monastery.

The main natural risks are connected to several processes such as degradation or decay of the monastic complex and its famous cave, a growth in vegetation that can damage the site and a progressive deterioration due to street animals interaction or wildfowl. Due to the geological nature of the island and its geographical location, the earthquake is still a risk that could negatively impact this religious complex.

Anthropic damages and risks have always significantly affected this asset's intangible nature and value. To solve all the anthropic risks (Table 2.12), an important project developed by the Bishopric of Famagusta and the municipality of Ayia Napa aims to promote and valorise the site by organising a new and innovative museum that collects the site's history. Because of the difficulties determined by mass tourism, the municipality is now intended to integrate the Monastery into its new, more sustainable tourism strategy to highlight this site's cultural and religious identity within the island.[32]

[32] https://www.visitfamagusta.com.cy/en/destinations/ayia-napa.html

2.6.3 Test case: Ayios Sozomenos site (Cyprus)

Ayios Sozomenos is a deserted village in the Nicosia District of Cyprus, close to the Green Line and near the village of Potamia. This test case has been chosen because the site is an example of the historical complexity of the Cypriot landscape and because, in recent years, the site has became a popular attraction for pilgrims and tourists. Indeed, the site offers several points of interest for the continuous religious presence in the area.
Ayios Sozomenos is located approximately 25 km southeast of Nicosia, in a valley between the Alikes and Yialias rivers, the second-longest river in Cyprus. For this reason, it has always been a fertile place devoted to barley exploitation. The village is representative of the evolution of the community as a mixed village under Ottoman and later British rule. Turkish-Cypriot inhabitants abandoned it in 1964 due to the conflicts with Greek-Cypriots.

Following the Matrix (Table 2.13), Ayios Sozomenos is identified as a built rural site with an urban function in the past that has been already studied, excavated, documented and preserved. Nevertheless, the site presents a location with complex structures and biodiversity; such a landscape holds aspects of religious and social activity.[33] This cultural asset presents two ecclesiastical monuments, a cave chapel known as the hermitage of Saint Sozomenos, diverse houses of the abandoned village and an archaeological site near the current site. Due to the richness of traditions and evidence, several archaeological excavations and systematic interdisciplinary surveys directed by the Department of Antiquities have been conducted in the Potamia-Ayios Sozomenos area[34]. Also, this site has been analysed through dendrochronology by researchers from Cornell University and the Cyprus Institute. Eight samples at the Ayios Sozomenos site have been selected in order to obtain precise construction dates for the buildings of this village, gain information about the settlement history during a frequently neglected historical period in Cyprus, and learn about Ottoman-era forest use and Cypriot environmental history. From the results of these samples and other analyses in the Phoinikas village, most of the buildings in both villages are dated to the late 19th–early 20th century, a period of increased population, which is also reported in British census records[35]. For what concerns the valorisation of the site, despite its abandonment, during the last decade, many visitors and professionals from different fields have put their attention on Ayios Sozomenos, organising several workshops. For instance, the '*Traces of Memory in the Landscape; Ayios Sozomenos*' project aimed to reconnect memory fragments, reactivate and recover all the historical layers of the site[36].
The spatial context of the site offers several points of interest for the conservation, preservation, and valorisation of the Heritage asset, taking into consideration the overall spatial and cultural environment of the site. Indeed, it presents monuments and artefacts.

[33] Bakirtzis, Nikolas. (2019). Revisiting the monastic legacy of Saint Sozomenos near Potamia. In: The art and archaeology of Lusignan and Venetian Cyprus (1192-1571), 83-100
[34] Lécuyer, N., & Michaelides, D. (2004). Archaeological survey at Potamia-Ayios Sozomenos. *British School at Athens Studies*, *11*, 139–149. http://www.jstor.org/stable/40960379
[35] Lorentzen, Brita, Manning, W. Sturt, Gaggioli, Amanda, Bakirtzis, Nikolas, Faka, Marina & Georgiou, Ropertos (2021) Building Environments:Dendrochronology and Cultural Heritage in Cyprus. Poster
[36] Tsiouti, Andri (2014) Traces of memory in the landscape; Ayios Sozomenos. Diploma project. https://www.cy-arch.com/traces-of-memory-in-the-landscape-ayios-sozomenos/

Table 2. 13 - Ayios Sozomenos Cultural Heritage asset identification

Ayios Sozomenos site	***monument/ site / landscape***	type	built
			carved
		location	on-ground
			cave
		context	urban (in the past)
			rural
			landscape
		biodiversity	fauna
			flora
			geology
		function	current
			past
		structure	complex/ensemble
		immaterial aspects	social activity
			performing art (workshops in present days)
	artefact	immovable	frescoes
			graffiti

The site includes:

- The hermitage of Ayios Sozomenos (Fig. 2.5).

  The village was named after a cave chapel and former hermitage of the eponymous saint, Sozomenos ("the one who was saved"). This cave presents several wall paintings depicting the life of Saint Sozomenos and his miracles, an agiasma, and what seems to be the saint's tomb carved into the back of the cave, but the saint's remains were removed. Also, in the cave is possible to see niches with icons and candles as proof of current religious activities. The frescoes are three layers, with the latest dating to the 14th century and the earliest to the 10th century. Despite their poor condition, these paintings represent our best source for the Byzantine history of Ayios Sozomenos. Some damages result from humidity, or intentional removal (e.g. the faces of the depicted figures on walls), while some may be result from vandalism.

The hermit is likely to have lived in the 10th or 11th centuries. After his death, a cult developed around his healing powers led to the development of a church on the cave and a village around it.

a b

Figure 2.5 - Ayios Sozomenos: a) exterior and b) interior of the Cave

- The Gothic ruins of the never completed Latin Church (Fig. 2.6)

  Scarce information is available about this church. According to a modern placard, it seems it was dedicated to Ayios Mamas. . This monument features two arcosolia for the burial of elite donors. Furthermore, according to the general scholarly consensus, it was never completed. Such unfinished status was probably due to a lack of funds, as proved by unfinished stonework and other architectural details which stopped abruptly halfway up some of the arches. Based on the similarity to other churches in Cyprus, Ayios Mamas is dated 14th to 16th centuries and informs us that the cult was alive and well under Latin rule. Nowadays, it is a popular attraction for visitors. Furthermore, a few metres from this church is located another small edifice, known as the church of the Virgin. This architectural monument can be identified with a church depicted on the frescoes of the Hermitage. However, even though no evidence links between this small Church, Ayias Mamas and the Hermitage, the three points are testimonials of the local Byzantine and Medieval religious history[37].

[37] Bakirtzis, Nikolas. (2019). Revisiting the monastic legacy of Saint Sozomenos near Potamia. In: The art and archaeology of Lusignan and Venetian Cyprus (1192-1571) p. 83-100.

Figure 2.6 - Unfinished Latin Church in Ayios Sozomenos

- Graffiti (Fig. 2.7)

  Ayios Sozomenos is one of the few sites in Cyprus[38] with really continuous graffiti practice, from the pre-Ottoman period to recent years. They cover a wide range of devotional, political, and artistic practices. It is possible to see sketching, mediaeval graffiti scratched into the frescoes of the Hermitage, as well as nationalist slogans from the mid-twentieth century to football slogans from recent years.[39]

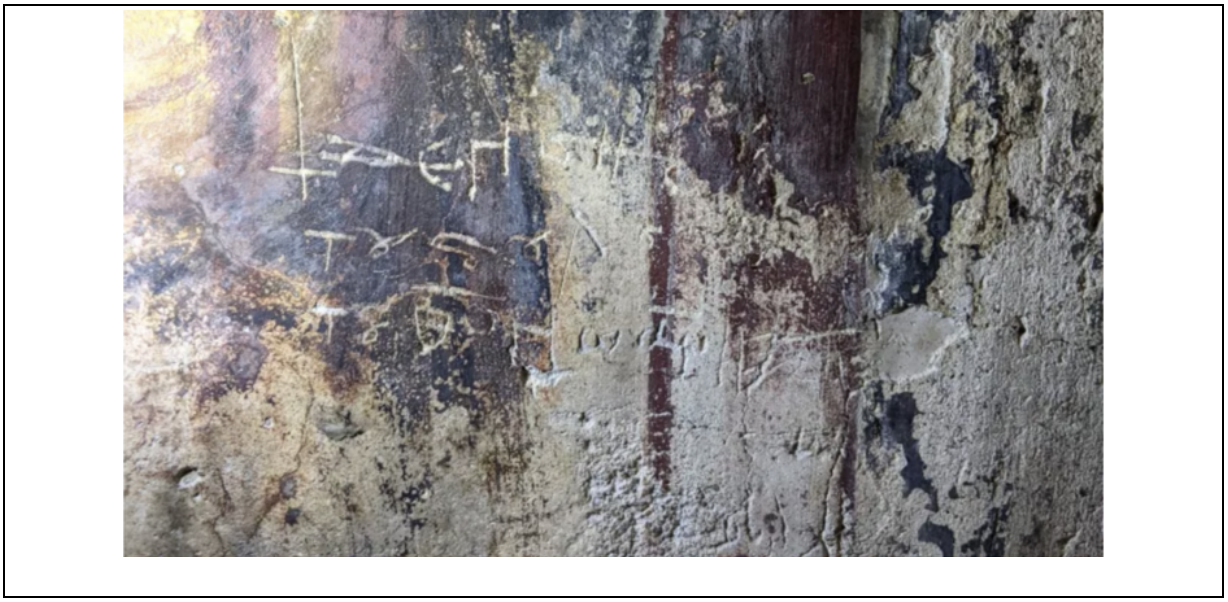


Figure 2.7 - Graffiti in Ayios Sozomenos (@authors)

[38] Cfr. https://www.ucy.ac.cy/marelab/en/research/karaboi
[39] Trentin, Mia Gaia (2010). Medieval and Post Medieval graffiti in the churches of Cyprus. 10.13140/RG.2.1.3845.3527.

Thanks to the Matrix, the overall state regarding the risks mapping of Ayios Sozomenos can be summarised in the following table (Table 2.14):

Table 2.14 - Risks to which Ayios Sozomenos site is currently subjected

	Natural		Anthropic	
	processes	***disasters***	***Intended***	***Indirect***
Risks	• vegetation • decay • degradation • fauna • flora	• earthquake • fire	• vandalism • modern reuse • theft	• war • pollution • agriculture • visitors • negligence • neglect • loss of traditional knowledge

Overall, the Ayios Sozomenos site, for its geographic position and complex history, appears threatened by several natural and anthropic factors.
Among them, the anthropic damages and risks have always had a significant impact on this asset'sarchitectural and intangible nature. Negligence and neglect factors, visitors, change in value and modern site reuse are the main aspects to face for conservation, preservation and valorisation strategies. Finally, besides its social and religious relevance, nowadays, this site lacks a management plan that secures the three pillars of the 4CH project.

The three test cases proposed have focused the attention on built heritage, the main object of Task 1.2. However, as shown in the Matrix (Table 2.11 and Table 2.13), artefacts are often parts of such structures, and, for this reason, they cannot be obliterated or not taken into consideration when working on risks and threats. Indeed, they face not only their own risks, but they can suffer from an overlap of the risks and threats of the built heritage where they are part of or are conserved. Therefore, various risks have to be analysed to guarantee their overall preservation.
In this context, a specific example of a built heritage asset is represented by museums since they cover two cultural positions: the one as a Cultural Heritage asset itself and the one as a "container" of other Cultural Heritage assets. Further attention could be focused on these types of cultural assets to be possibly further developed within Task 4.4 (Implementation of workflows and simulation through pilot cases).
In this regard, within the Task 1.2 research related to risk mapping, the CyI team has carried out an activity of survey at the Archaeological Museum of Siteia in Crete, a place conserving unique cultural pieces and subjected to several risks.[40] Beyond analysing the asset's risks, the activity also involved the 3D documentation of some important artefacts conserved and

[40] This research was conducted in collaboration with the TALOS-project (https://talos.minoan-aegis.net/accueil) run by the Université Catholique de Louvain, in collaboration with the British School in Athens, and the Greek Ministry of Culture/Archaeological Museum of Siteia, Crete

exhibited at the museum premises. Among these, the famous Kouros of Palaikastro, a unique chryselephantine (gold-and-ivory)[41] 54 cm high figure of a young man found fragmented in the Minoan settlement of Palaikastro (Crete).[42]
In the light of Task 1.2 and 4CH outcomes, the CyI team's actions aimed at developing strategies for prioritising the preservation and conservation activities of an archaeological museum as a Cultural Heritage asset, implementing a map of risks that took into consideration natural and anthropic factors that can damage the museum and its archaeological finds. The most relevant appeared to be: earthquakes, invasive environmental conditions, and museum visitors. The 3D documentation and consequent analysis contributed to the set of requirements and protocols for a science and technology-based conservation and preservation of the whole Cultural Heritage asset.

[41] It is essential to mention that most of the chryselephantine statues are extremely rare.
[42] Sackett, Hugh, Alexander MacGillivray, Jan Driessen, and Doniert Evely. "The Excavation." *British School at Athens Studies* 6 (2000): 21–34. http://www.jstor.org/stable/40916612.

2.7 Guidelines

The work carried out by Task 1.2 aims to provide a reference framework related to mapping the risks for Conservation, Preservation and Valorisation practices. Thanks to the Matrix, Cultural Heritage monuments and sites can be examined as the sum of their tangible aspects (e.g. geometric shapes, material properties) and intangible ones (e.g. traditions, rituals) within their natural and anthropic environment. The test cases represent multi-layered past and present realities for the Competence Center's aims. Such cases offered a trifold approach that covers archaeological sites, urban and rural landscapes, and various architectural structures connected with their artefacts. The results of the analyses carried out on these test cases, and their comparison led the CyI team to provide preliminary guidelines.

According to the present work, the analysis of the Cultural Heritage asset follows these steps:

1. *Identification of the asset*: it covers the actual status of the Cultural Heritage asset and provides the user with a path for reconstructing its previous documentation and damages following the risks section.
2. *Conservation, preservation and valorisation purposes*: framing the aim of the intervention on the Cultural Heritage asset and eventual alignment among these purposes.
3. *Identification of the risks:* assessment of the actual condition of the CH asset and the identification of risks and threats due to anthropic and natural factors.
4. *Documentation*: assessment of the documentation previously created and the needed one.

While the Identification of the asset (1) and the Identification of the risks (3) are covered by Task 1.2, the conservation, preservation, and valorisation purposes step (2) has to be framed in accordance with Task 1.1 (Analysis of experiences, skills and best practices acquired and implemented so far in the European Countries, in the field of preservation and conservation of monuments and sites) and Task 1.4 (User needs: mapping existing analysis on user needs and defining their continuous update). In this regard, Task 1.1 defined the objectives and activities of Conservation, Preservation and Valorisation that led to practical and functional definitions. The 4CH project had fixed specific definitions of the various activities divided and classified between the three concepts, even though a strong link is evident among them, and these concepts may overlap. Thus, a previous comparative and transversal approach highlighted that Conservation could be considered a sub-component of Preservation, while Valorisation may include or anticipate Conservation and Preservation practices. Finally, the Documentation step (4) is meant to be filled in together with the work carried out by Task 1.3 (State of the Art, including update via Market Watch, of the technology in the fields in which the Competence Centre will operate: 1) digitization and 3D modelling, 2) conservation and preservation, 3) exploitation of CH assets). Considering time, expertise and costs at disposal, the Matrix could be further integrated with a list of digital

tools for the digital documentation of Cultural Heritage assets and the best digitally preservation choices. Concerning the documentation of the asset, a pivotal solution is given by the Digital Twin concept, a real-time digital counterpart of a physical Cultural Heritage asset incorporating all the information about it. The Digital Twin is based on a semantic infrastructure of complex data and their inter-relationships. Thus, a Digital Twin enables users to perform the activities typical of working with Cultural Heritage, including accessing and retrieving information and its use to know, understand, preserve and valorise a Cultural Heritage asset.

A preliminary guideline scheme can be summarised as follows (Fig.2.8):

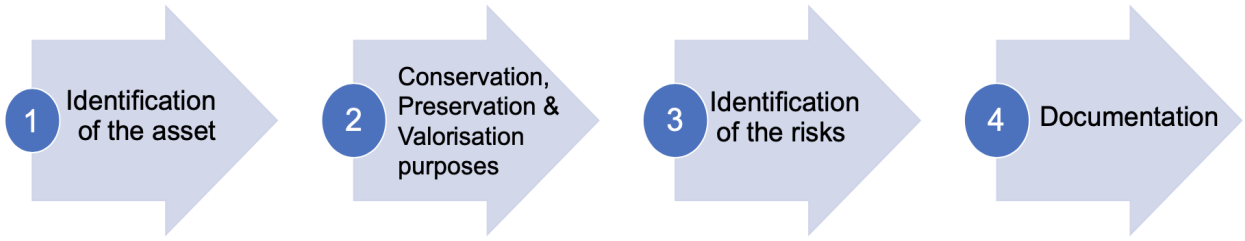


Figure 2.8 - Guidelines steps

In the light of these steps, it is possible to build up a mitigation strategy which aims to monitor the risks and prevent the damages. Thus, the Matrix's use leads to these further evaluations:

- how to monitor and prevent risks
- how to conserve the physical status of a Cultural Heritage asset
- how to preserve its cultural identity
- how to enable future access and use

The final version of the Matrix is attached in Appendix 1 *WP1_D1.2_T1.2_Matrix.*

2.8 Appendices lists

- Appendix 1 - WP1_D1.2_T1.2_Matrix

All the appendices are attached at the end of the present document.

3. User needs: mapping existing analysis on user needs and defining their continuous update (Task T1.4)

3.1 Aims and objectives

The aim of **Task 1.4** is to map existing user needs and requirements identified in previous EU funded project and literature as well as their skills and attitudes towards digitization, together with targeted surveys and dialogues to cover aspects not yet analysed or partially addressed. The research strategy has been designed to cover both top-down as well as bottom-up users' requirements to capture the overall needs and expectations of different profiles.

To this end, the following objectives guided the development of the Task:

- Identification of main users of digital cultural heritage, together with their associated expertise and motivation;
- Identification of Users Profiles and their role in preservation, conservation and valorisation of monuments and sites, according to the value proposition canvas;
- Evaluate the potential of Digital technologies in mitigating risks and challenges that cultural heritage is facing, identifying opportunities, barriers and possible limitations to the identified users;
- Define top-down users' needs through an exhaustive literature review and bottom-up users' needs of practitioners, site managers, curators through specific surveys and dialogues.

3.2 Methodology

3.2.1 Identification of key projects and relevant literature

In order to identify main users' needs and requirements associated to the digitization of cultural heritage, a desk-based and bibliographic research of scientific resources has been taken as a basis for deploying an explorative analysis to this end. The comprehensive state of the art of existing users' needs analysis at national and European level has been based on current and finalised EU projects and scientific publications.

3.2.2 Definition of a template for the analysis

A data gathering template has been developed to collect the relevant information from the analysed documents, which identifies general information on the document, users' characteristics and needs addressed. The template has been designed to gather information in a systemized way and to ensure comparability, by including, were possible, drop-down list of predefined options. These are mainly related to the type of users' categories, the purpose of digitisation and the scale addressed. Furthermore, in order to ensure a fluent communication and comparative analysis among WP1 Tasks results, a common vocabulary has been established which resulted in macro categories grouping the different options. These are specially related to the type of cultural heritage considered and the scale.

3.2.3 Type of users' categories and purpose of digitisation

Walsh et al.[43] conducted a literature review to compare how users have been categorised in the field of digital cultural heritage. Despite the variety of labels used in previous studies, it was possible to identify similarities and group them concerning their domain expertise, technical skills and motivation for engagement. The study strongly focuses on access and discovery of cultural heritage material, especially about collections and digital libraries. **Valorisation** of cultural heritage is one of the most recognised benefits associated with the digitalisation of cultural heritage as it becomes more accessible to people notwithstanding their location or their financial means[44] and increases visibility, an aspect which gained even more relevance with the spread of COVID-19 pandemic. The valorisation of cultural resources through digital content contributes to knowledge building and sharing and foster accessibility to all. It is mainly associated to the general public, users related to the tourism and creative sectors, education, as well as to collections curators, institutions or museums which aim at delivering improved visitors experiences. The value of cultural heritage digitization is also valuable for **conservation** purposes, enabling research, documentation, diagnosis, intervention and planning, with the objective of safeguarding its values for future generations, as well as contributing to restoration and reconstruction in sites affected by conflicts and natural disasters. Furthermore, 3D digitisation can contribute to better protect physical cultural heritage sites and objects by enabling research or discovery using 3D

[43] Walsh, D., Clough, P., Foster, J. (2016). User categories for digital cultural heritage, CEUR Workshop Proceedings, 1611

[44] Interreg Europe (2018). A Policy Brief from the Policy Learning Platform on Environment and resource efficiency

models instead of direct handling[45] . The type of digitalization, in terms of technology to be used, format and quality, related to conservation may vary a lot, considering the size of the asset and the final aim for which the digital representation has been generated. Users associated to this category also vary and may include decision-makers, institutions responsible for a cultural heritage site, associations and local communities, restores or companies offering conservation services. Digitisation in cultural heritage has also demonstrated its potential in **preservation**, contributing to the prevention, reduction and anticipation of damages in relation to natural degradation, climate change, human development and natural disasters, which can also include scenario simulations. As for conservation activities, preservation has a large variety of use cases, which require different equipment, strategies and quality level. Users will vary accordingly, together with the content of the digital resource, considering the role they have in the overall workflow and the skills required. These include institutions responsible for the management of buildings and sites, professionals working in preservation, decision-makers, local communities and researchers. According to the European Commission progress report on the implementation of the cultural material digitisation[46] , more than half of Member States prioritise digitisation of library and archival cultural resources and more than one-third of Member States reported funding programmes for digitisation of immovable cultural heritage such as monuments, historical buildings and archaeological sites, with increased development on 3D digitisation. Furthermore, the document states that the digitisation strategy is centralised at the Ministry level in more than two-thirds of Member States however, the role of national institutions is considered as key in the process.

3.2.4 Value proposition canvas

The process to identify and gathered users' needs was built upon the methodology Value Proposition Canvas. Introduced by Osterwalder et al.[47], this method is a plug-of the Business Model Canvas. While the Business Model Canvas helps to create value for the business, the Value Proposition Canvas is intended to create value for the customer. More concretely, it assists companies to deepen the features of their Value Propositions appropriate to potential target Customer Segments, enabling the company to evaluate the "fit" between the value created and the customers' expectations.
Being similar to customers' needs, when the users' needs are discovered, the new product, services or product-service systems can be more accurately developed. In this sense, to achieve the task's objective aforementioned, those needs usually have a bearing on the added value intended to be offered through new digital cultural heritage solutions.
Figure 3.1 shows the graphical representation of the Value Proposition Canvas with two sides: the Customer Profile (right side of the picture), where it is possible to clarify the

[45] European Commission. Directorate-general for communications networks, content and technology. Data Interactive Technologies, Digital for Culture and Education Expert Group on Digital Cultural Heritage and Europeana (2020). Basic principles and tips for 3D digitisation of tangible cultural heritage for cultural heritage professionals and institutions and other custodians of cultural heritage
[46] European Commission. Directorate-General For Communications Networks, Content and Technology (2019). Implementation of Commission Recommendation on the digitisation and online accessibility of cultural material and digital preservation (2011/711/eu). Consolidated Progress Report 2015-2017
[47] Osterwalder, A. et al. (2014). Value Proposition Design: How to Create Products and Services Customers Want. Hoboken: John Wiley & Sons

customer understanding, and the Value Map (left side), where it is possible to describe how the company intend to create value for the identified customer.

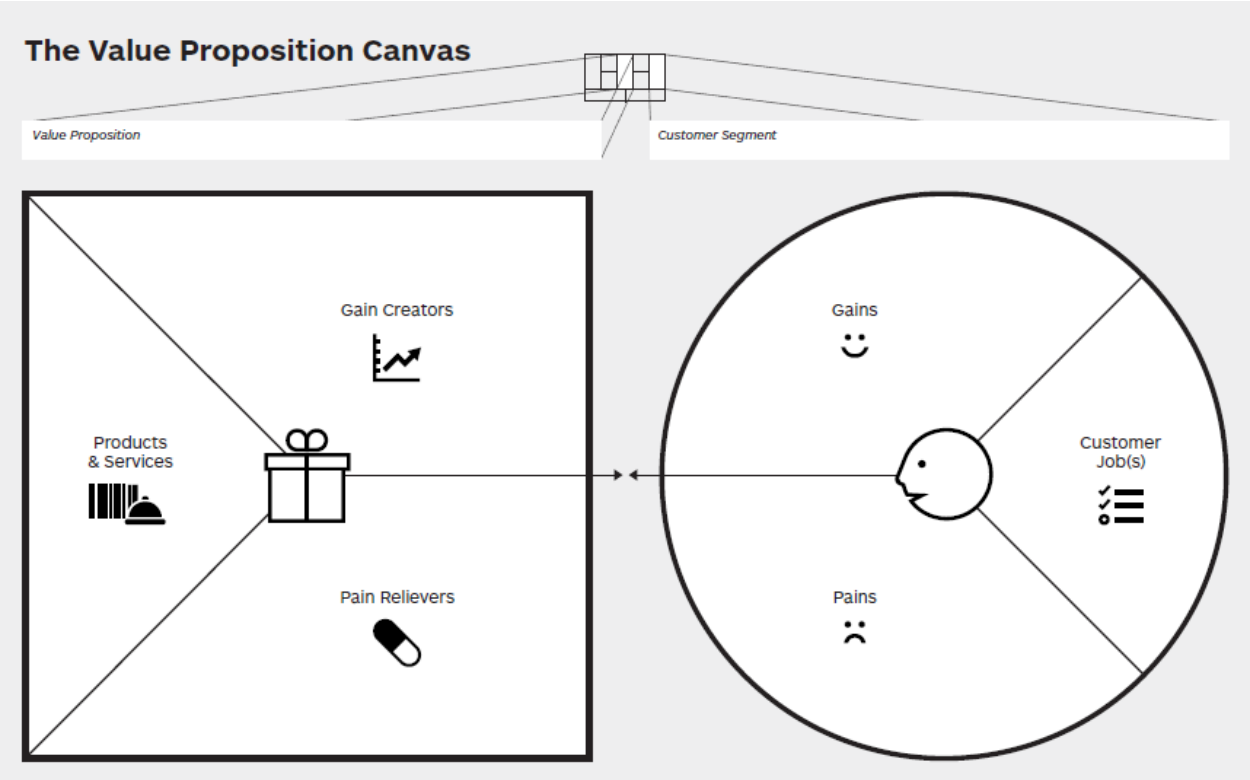


Figure 3.1 - Value Proposition Canvas

The final aim is to achieve a fit between the two sides and use this information to adapt the new digital solutions at a later stage.

Therefore, the following aspects were evaluated through the aforementioned projects' review as Table 3.1 shows:

Table 3.1 - Details of categorisation step

Categorisation	
USER CATEGORY	*Please, select the main user category. If it is a multiple choice, please include a new row per category*
PURPOSE OF DIGITALISATION	*Please, select the main purpose of digitalisation among the proposed categories*
SCALE	*Please, select the CH scale it addresses*
USERS JOBS	*Based on the USER CATEGORY, please list the main problems users are trying to solve; or tasks that users are trying to perform in their work; the objectives they try to achieve.*
USERS PAINS	*Please describe the obstacles that could affect users while they are performing the actions listed in the "users jobs" (main difficulties and challenges; negative social consequences; risks)*
USERS GAINS	*Describe benefits users expect/desire/would be surprised to obtain while performing the activities listed in the "users jobs" (savings, quality, easiness of procedure, what are they looking for?)*

Since we are dealing with the users' needs identification, the Value Propositions to "alleviate" those pains through appropriate digital solutions will be addressed in WP2.

3.2.5 Survey and dialogues

The first set of users' needs, derived from the top-down approach, was validated through the 4CH community. A survey was launched among stakeholders to determine how important, according to their experience, were the needs identified, in relation to conservation, preservation and valorisation of artifacts, collections, and archives, as well as monuments, sites and landscapes. The aim was to discard those users' needs that were not considered as important by the majority of stakeholders and to focus on the ones that were considered most important. The analysis performed helped to identify gaps related to some fields and type of stakeholders. To cover them and better understand the lack of information related to these categories, target dialogues will be designed and carried out during the next phase. Results will serve to update and complete the expected second version of this document.

3.3 Design of the literature review

A literature review addressing past and on-going EU funded projects as well as scientific papers was designed and carried out. Cordis and Scopus data bases were searched to find projects with the following queries:

- CORDIS: "DIGITAL AND HERITAGE"
- SCOPUS: (TITLE-ABS-KEY (digital AND heritage AND users AND requirements) OR (TITLE-ABS-KEY (digital AND heritage AND users AND needs))

Cordis results were restricted to projects, belonging to the H2020 and FP7 Programmes, while Scopus results were restricted to English language, relevant fields, conference or papers and with a defined author. The following table summarises the number of projects and papers identified:

Table 3. 2 - Number of projects and papers analysed

Access date	Database	Query	Number of entries	Number of restricted entries
12.04.2021	Cordis	Digital heritage	2699	154
	Scopus	Digital heritage users requirements OR digital heritage users needs	393	268

A first screen was done to identify relevant projects that were classified as follows:

0 The project does not seem to be relevant to 4CH project

1 The project seems interesting and may include information on users' needs

Papers abstracts were classified as follows:

0 The paper does not seem to be relevant to 4CH project

1 The paper could be interesting, but it is necessary to read more

2 The paper refers to general needs (not specific to users categories) or a specific technology

3 The paper is focused on digitalisation of monuments and sites and clearly addresses users' needs

In order to systematise the information, a second screening of the projects with relevancy 1 and papers with relevancy 2 or 3 was performed and considered the following aspects:

- Identification of the user category:
  - Public and/or private heritage institutions responsible for managing monuments and sites
  - Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization
  - Professionals and SMEs providing services or products for preservation, conservation and restoration
  - Associations, NGOs, local communities and citizens aiming at maintaining and communicating cultural heritage
  - Companies from the creative industry producing heritage-based content, apps, games, education and tourism services
  - General and educational users and visitors, tourists
  - Museums curators
  - Professional researchers
  - Others

- Identification of the main purpose of digitalisation and associated macrocategory (conservation, preservation and valorisation):
  - Historic and bibliographic research
  - Studies on CH
  - Documentation of CH
  - Communication of CH
  - Preventive conservation
  - Diagnostic activities
  - Identification of the risks and deterioration patterns
  - Materials conservation tests
  - Pre-consolidation, cleaning, consolidation and protection of CH materials
  - Reinforcement of CH buildings
  - Monitoring
  - Maintenance practices
  - Management and administration practices
  - Promotion and support of interventions for conservation
  - Project of restoration
  - Reconstruction
  - Adaptive re-use of CH
  - Accessibility
  - Dissemination through publications
  - Organisation of events and festivals
  - Encounters with communities
  - Creation of partnership and networking
  - Advertisements with CH
  - Gamings with CH

- Cultural Heritage scale considered:
  - Artifact
    - Collection
    - Archive/ library
    - Open air/ landscape
    - Intangible
  - Monuments / groups of buildings / sites (and landscape)
    - Stand-alone / individual
    - Group
    - Complex
    - Settlement
    - Landscape
    - Route
    - Intangible
- Identification of users' jobs (Main problems users are trying to solve; Task users are trying to perform; Objectives they try to achieve)
- Identification of users' pains (obstacles that could affect users while they are performing the actions listed in the "users jobs")
- Identification of users' gains (benefits users expect/desire/would be surprised to obtain while performing the activities listed in the "users jobs")
- Description of the user need(s)

CORDIS DATABASE "DIGITAL AND HERITAGE" Limited to Projects H2020 and FP7 Accessed 12/04/2021									Step 2: First scanning		Step 2: Reviewers	Step 3: General information				
CODE	Acronym	Title	ID	Teaser	Programme	Start date	End date	URL	Relevant (YES/NO)	Why it is relevant for Task 1.4	Reviewer	User needs analysed in the project? (Y/N)	Document title	Year of publication	Public/restricted	Link to publication
												Does the project provide a deliverable/information addressing users needs?	*Please provide the Title of the document referring to users needs*	*Year of publication of the document*	*Is it a public or confidential deliverable?*	

Step 3: Categorisation								Needs	
User Category	Purpose of digitization	Purpose macrocategory	CH Type	Structure/scale	Users jobs	Users pains	Users gains	User need description	Comments
Please, select the main user category. If it is a multiple choice, please include a new row per category					*Please list main problems users are trying to solve; Task users are trying to perform in their work; Objectives they try to achieve*	*Please describe the obstacles that could affect users while they are performing the actions listed in the "users jobs" (main difficulties and challenges; negative social consequences; risks)*	*Describe benefits users expect/desire/would be surprised to obtain while performing the activities listed in the "users jobs" (savings, quality, easiness of procedure, what are they looking for?)*		

Figure 3.2 - Data collection template

3.4 Reports' analysis and conclusions

3.4.1 Projects and papers analysis

In the first scanning, 154 projects and 268 scientific papers were analysed, of these, 36 projects and 99 papers were considered as interesting for the 4CH project and finally 22 projects and 95 papers have been deeply analysed as they provided available information specifically addressing users' needs.

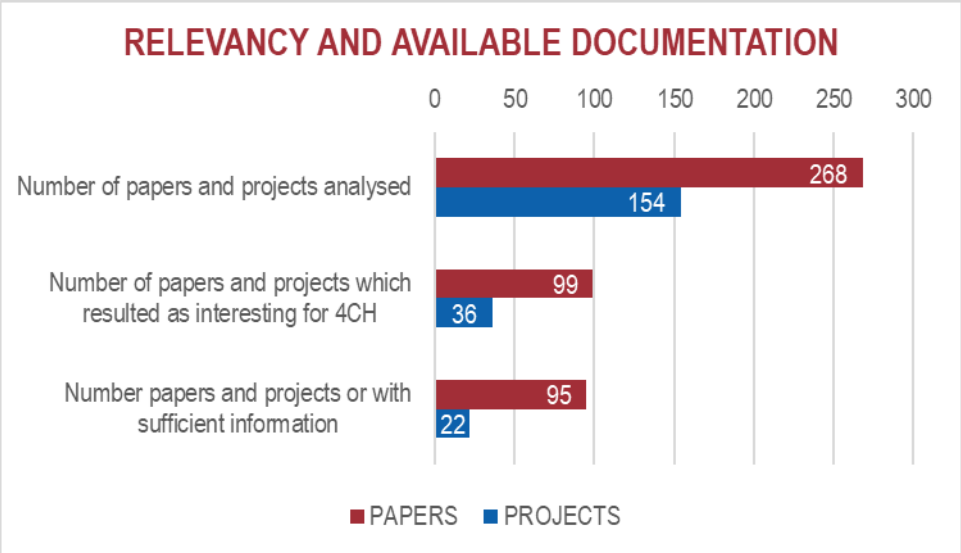


Figure 3.3 – Projects and papers relevancy and available documentation

The following graphs show the statistical distribution of the analysed documentation in relation to the Cultural Heritage type, the digitization purpose and the user category:

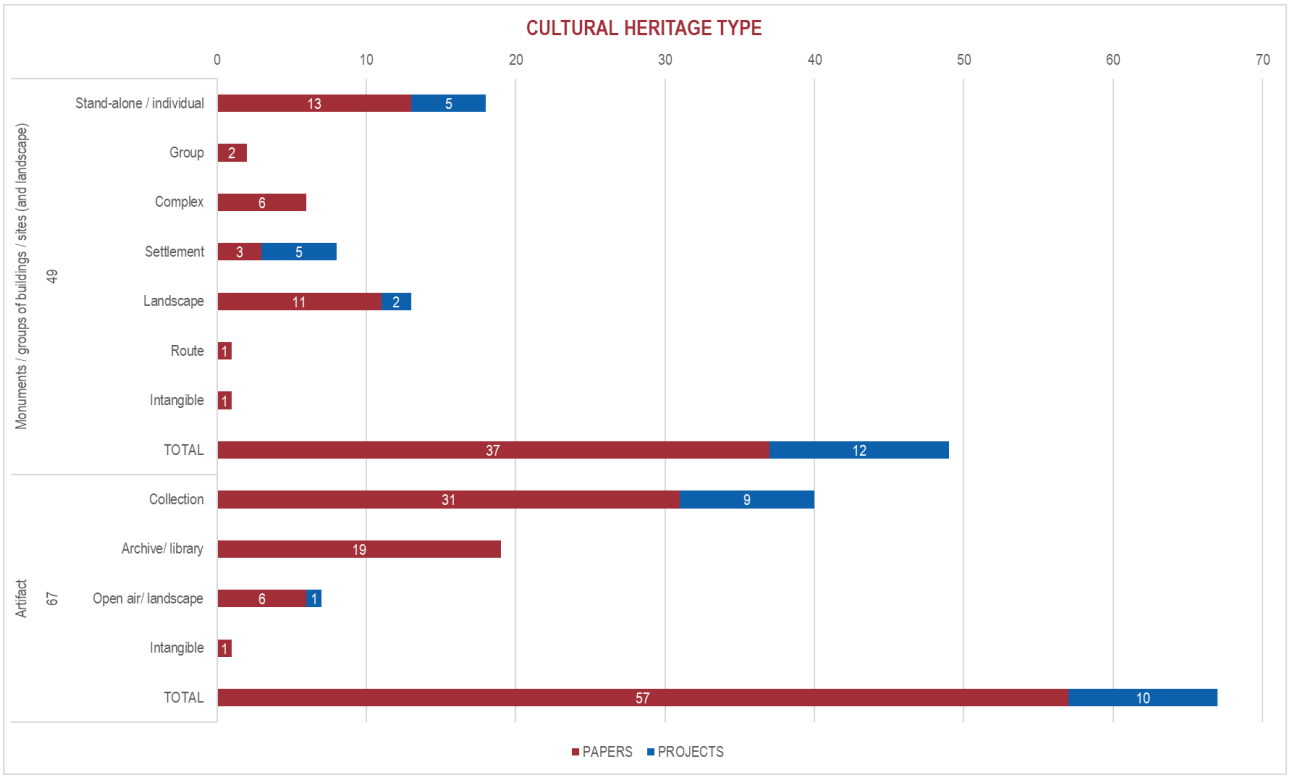


Figure 3.4 - Relationship between analysed projects and papers and cultural heritage type

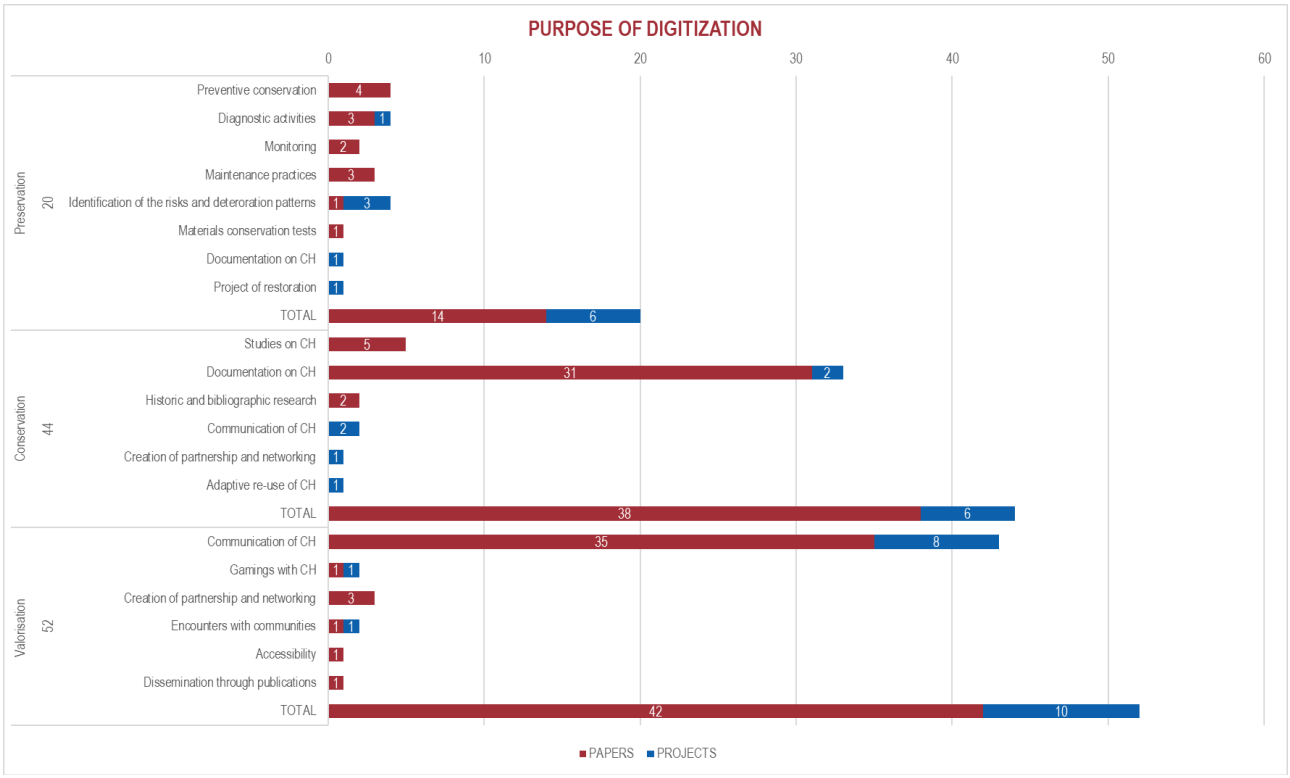


Figure 3.5 - Relationship between analysed projects and papers and purpose of digitization

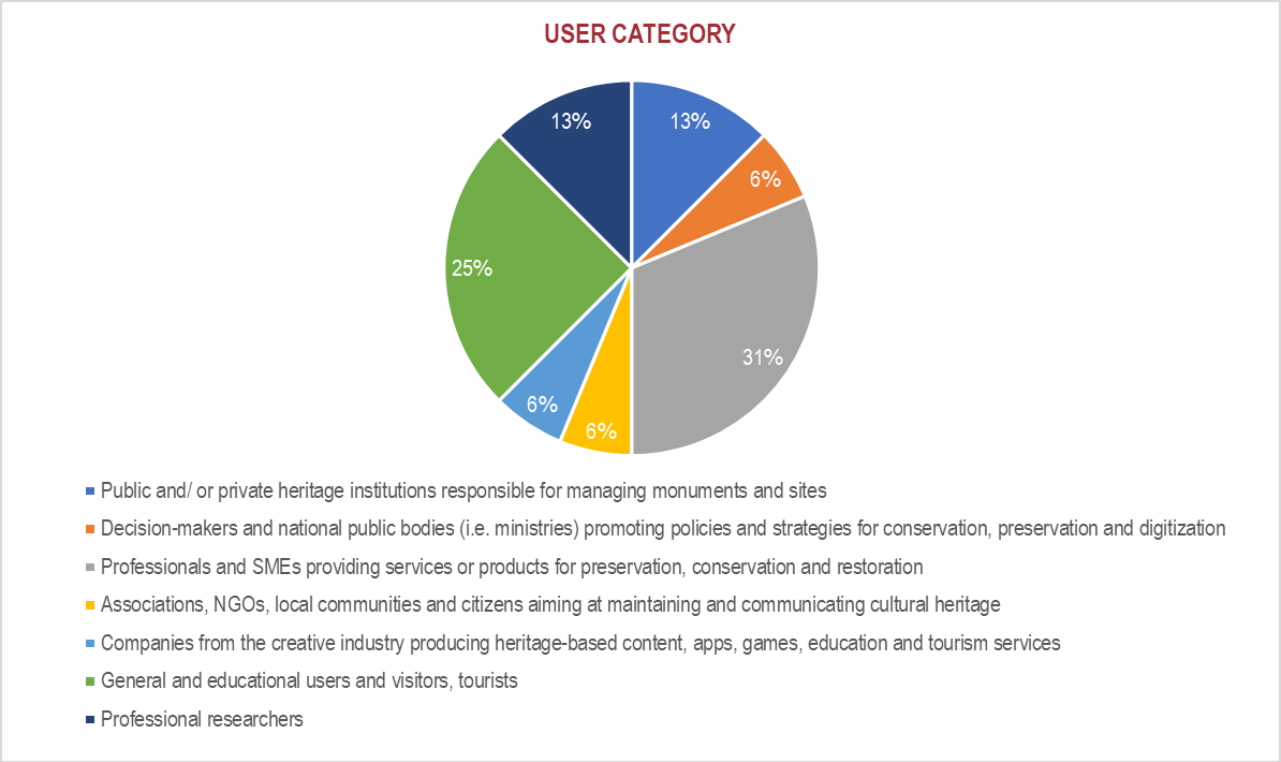


Figure 3.6 - Relationship between analysed projects and type of user categories

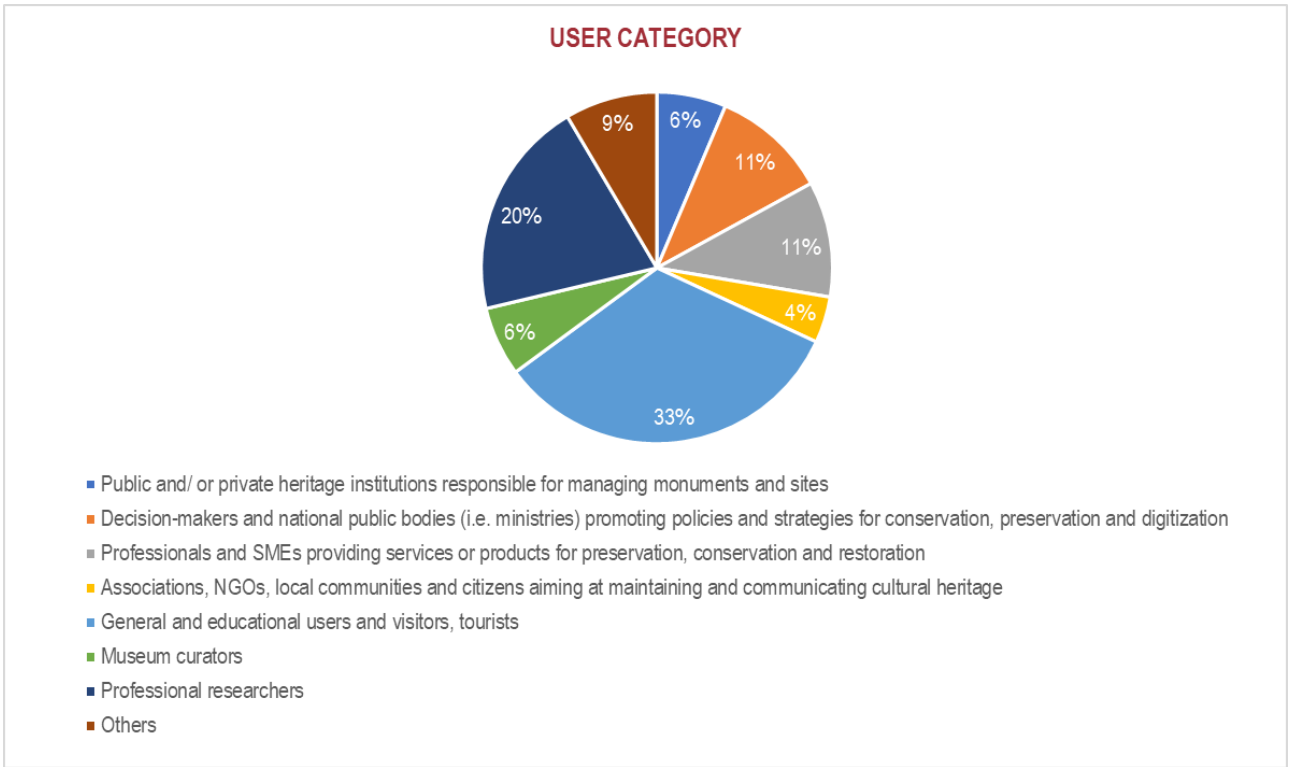


Figure 3.7 - Relationship between analysed papers and type of user categories

The information has been systematized and classified, according to the user needs analysis. The following tables show the representativeness of the fields and requirements addressed by type of users, purpose and cultural heritage type:

Table 3. 3 – Fields associated to user category, purpose and CH type

CH type	Purpose	User category	Field					Related projects and papers
			Technologies/ models	ICT in museums	Knowledge sharing and visualisation	Education	Digital archives	
Artifact	Conservation	Professional researchers	■				■	EU-26; DHUR-02; DHUR-07; DHUR-50; DHUR-53; DHUR-68; DHUR-82; DHUR-83; DHUR-85; DHUR-240; DHUR-241; DHUR-260
		General and educational users and visitors, tourists	■		■		■	DHUR-05; DHUR-73; DHUR-152; DHUR-171; DHUR-172
		Museum curators					■	EU-80; DHUR-56; DHUR-147
		Decision-makers and national public bodies					■	DHUR-102
		Professionals and SMEs providing services or products			■			DHUR-110
		Public and/ or private heritage institutions	■					DHUR-256
		Others	■				■	DHUR-71; DHUR-139
	Valorisation	Professional researchers					■	DHUR-61
		General and educational users and visitors, tourists	■	■	■	■	■	EU-04; EU-08; DHUR-03; DHUR-25; DHUR-39; DHUR-48; DHUR-49; DHUR-54; DHUR-60; DHUR-65; DHUR-66; DHUR-77; DHUR-107; DHUR-192; DHUR-197; DHUR-199
		Museum curators	■	■	■			EU-05; EU-12; EU-19; EU-24, EU-81; DHUR-38; DHUR-64; DHUR-122; DHUR-157
		Decision-makers and national public bodies					■	DHUR-42; DHUR-58

CH type	Purpose	User category	Field					Related projects and papers
			Technologies/ models	ICT in museums	Knowledge sharing and visualisation	Education	Digital archives	
		Professionals and SMEs providing services or products			■			DHUR-95; DHUR-126
		Associations, NGOs, local communities and citizens	■				■	DHUR-62; DHUR-116
		Others	■		■			DHUR-225; DHUR-246
	Preservation	Professional researchers					■	DHUR-04
		Professionals and SMEs providing services or products	■					EU-06; DHUR-51; DHUR-108; DHUR-237
		Others	■					DHUR-99
Monument / site / building	Conservation	Associations, NGOs, local communities and citizens	■					EU-44
		Professional researchers	■			■	■	EU-42; DHUR-06; DHUR-24; DHUR-226; DHUR-251
		Public and/ or private heritage institutions	■					EU-01; DHUR-22; DHUR-84
		Professionals and SMEs providing services or products	■	■				EU-62; DHUR-20; DHUR-57
		Decision-makers and national public bodies	■				■	DHUR-21; DHUR-92; DHUR-129; DHUR-130
		Others	■					DHUR-28; DHUR-86; DHUR-119
	Valorisation	Companies from the creative industry	■					EU-17
		General and educational users and visitors, tourists	■	■	■			EU-09; EU-14; DHUR-78; DHUR-131; DHUR-132; DHUR-160; DHUR-174; DHUR-180; DHUR-181; DHUR-196; DHUR-203; DHUR-205
		Associations, NGOs, local communities and citizens			■			DHUR-70; DHUR-156
		Professional researchers	■					DHUR-32
	Preservation	Professionals and SMEs providing services or products	■				■	EU-54; EU-61; EU-99; DHUR-19; DHUR-23

CH type	Purpose	User category	Field					Related projects and papers
			Technologies/ models	ICT in museums	Knowledge sharing and visualisation	Education	Digital archives	
		Professional researchers						DHUR-101
		Decision-makers and national public bodies						EU-28; DHUR-44; DHUR-59; DHUR-63
		Public and/ or private heritage institutions						EU-37; DHUR-161; DHUR-234; DHUR-257

3.4.2 Surveys

The users' needs survey was launched and kept active during the month of April 2022. A total of 48 responders were accounted, being 22 professional researchers, followed by 7 "others", 6 decision-makers and national public bodies, 4 associations, NGOs, local communities and citizens, 3 professionals and SMEs, 3 public and/ or private heritage institutions, 2 companies from the creative industries and 1 museum curator, as shown in the following figure:

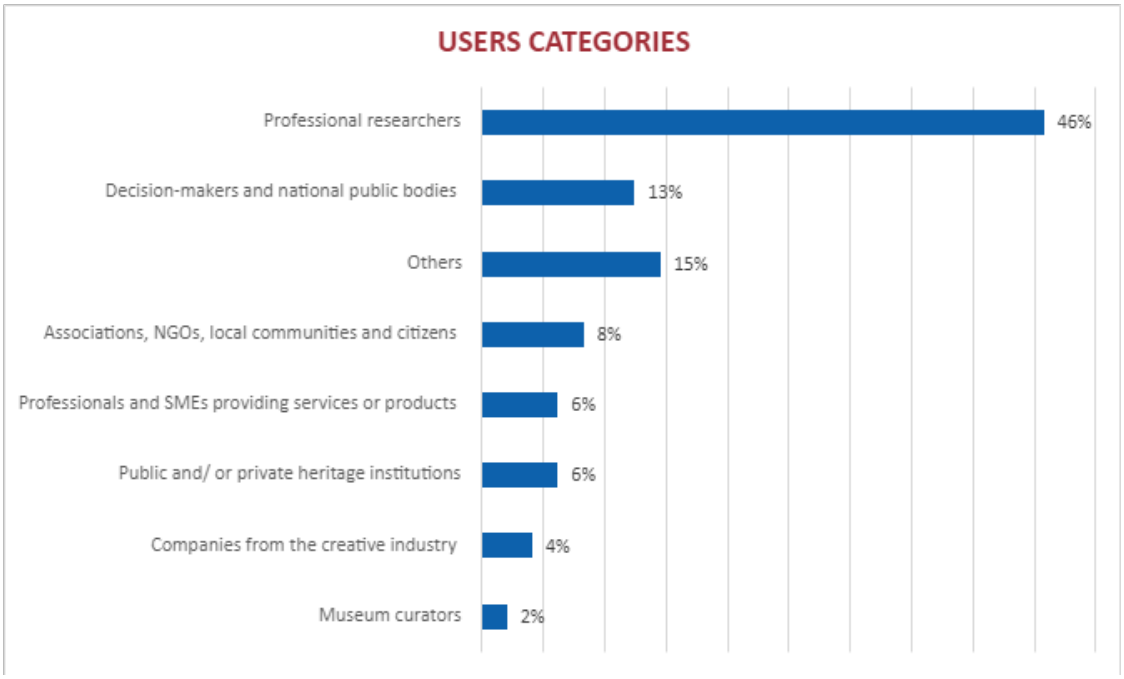


Figure 3.8 – Survey respondents per type of user category

Stakeholders were asked to vote the importance of the each identified need with a scale from 1 (not at all important) to 5 (very important). The following tables show, per each identified user need, the percentage of responded giving a high (4 or 5), medium (3) or low (1 or 2) ranking rate, considering the applicability of the need to artifacts and/ or monuments and sites. High rankings above 75% are highlighted in green, medium ranking above 25% are highlighted in yellow and low ranking above 20% are highlighted in light red. Graphs

included in the tables show the percentage of high ranking rates for type of user (in red values associated to artifacts, in blue values associated to monuments and sites.

Table 3.4 - Ranking rates per type of CH and user category for UN01

UN-01	Optimized, cost-efficient and time-saving procedures for data capturing and processing		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	85%	High ranking rate	81%
Medium ranking rate	8%	Medium ranking rate	11%
Low ranking rate	6%	Low ranking rate	9%

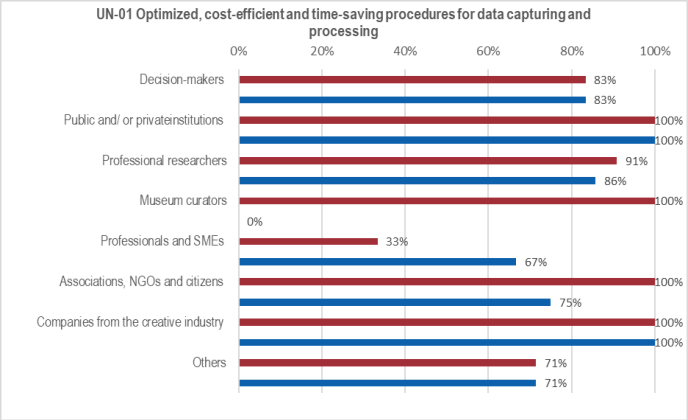


Table 3.5 - Ranking rates per type of CH and user category for UN02

UN-02	Solutions for adapting content aiming to an inclusive, accessible and barrier-free museum		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	67%	High ranking rate	N/A
Medium ranking rate	24%	Medium ranking rate	N/A
Low ranking rate	9%	Low ranking rate	N/A

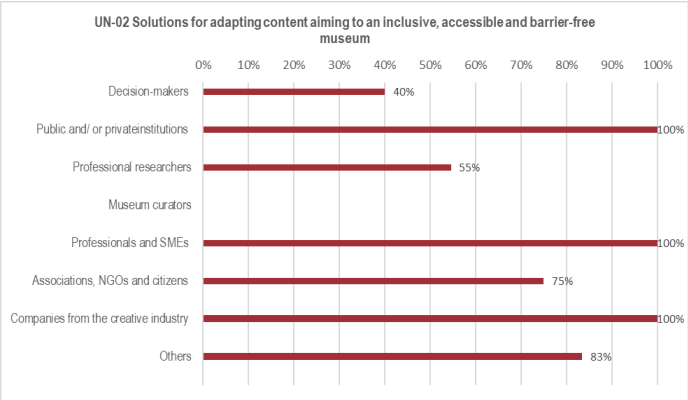


Table 3.6 - Ranking rates per type of CH and user category for UN03

UN-03	Creating interactive museum experiences to better connect visitors		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	70%	High ranking rate	70%
Medium ranking rate	17%	Medium ranking rate	19%
Low ranking rate	13%	Low ranking rate	11%

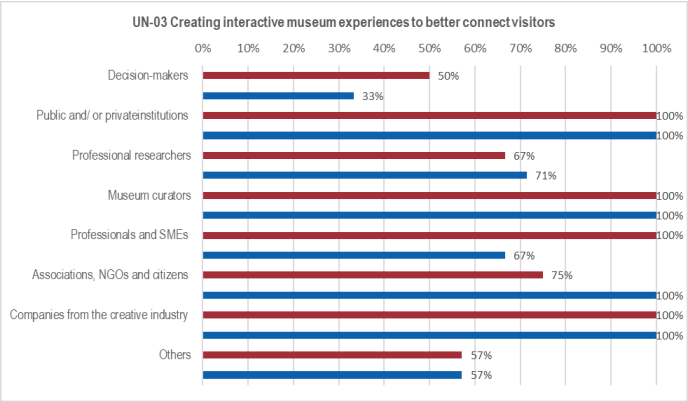


Table 3.7 - Ranking rates per type of CH and user category for UN04

UN-04	The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	62%	High ranking rate	63%
Medium ranking rate	15%	Medium ranking rate	22%
Low ranking rate	23%	Low ranking rate	15%

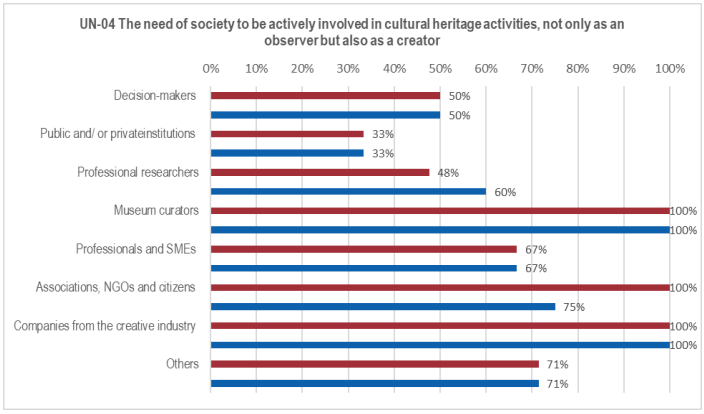


Table 3.8 – Ranking rates per type of CH and user category for UN05

UN-05	Enhancing and making accessible underwater or inaccessible heritage		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	67%	High ranking rate	57%
Medium ranking rate	19%	Medium ranking rate	23%
Low ranking rate	15%	Low ranking rate	19%

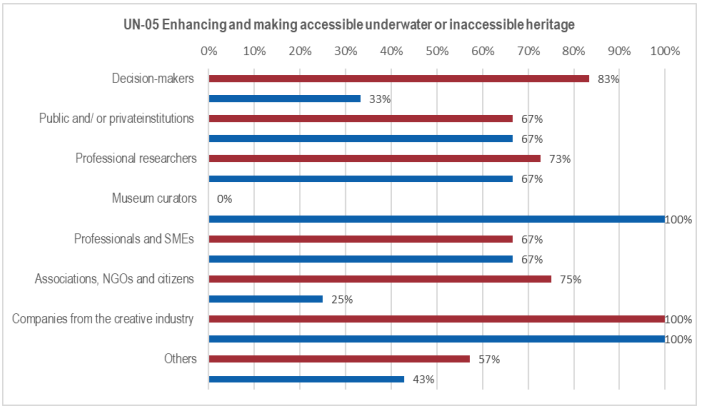


Table 3.9 – Ranking rates per type of CH and user category for UN06

UN-06	The need of comprehensive risk assessment methods for cultural heritage affected by climate change and natural hazards		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	N/A	High ranking rate	81%
Medium ranking rate	N/A	Medium ranking rate	11%
Low ranking rate	N/A	Low ranking rate	9%

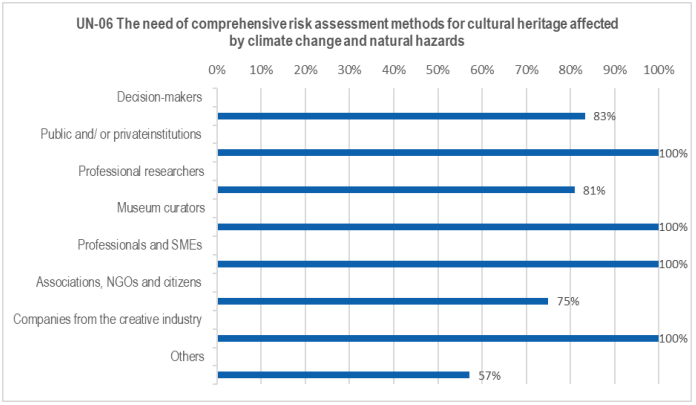


Table 3.10 – Ranking rates per type of CH and user category for UN07

UN-07	Spreading knowledge on remote sensing applications for cultural heritage sites		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	70%	High ranking rate	64%
Medium ranking rate	19%	Medium ranking rate	30%
Low ranking rate	11%	Low ranking rate	6%

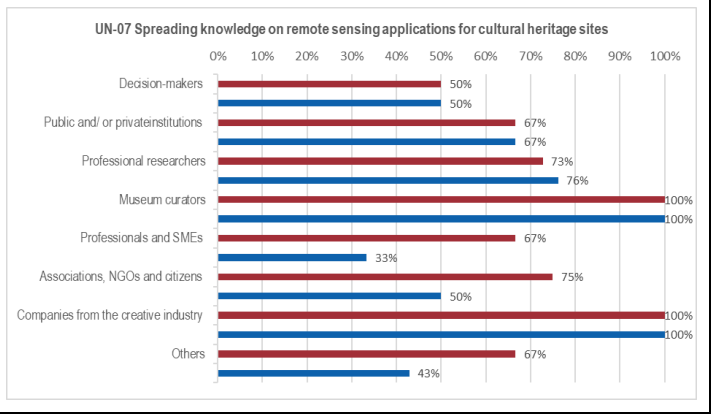


Table 3.11 – Ranking rates per type of CH and user category for UN08

UN-08	Common protocols, implementation guidelines and sharing of lessons learned for regeneration and adaptive reuse of historic city centers		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	N/A	High ranking rate	79%
Medium ranking rate	N/A	Medium ranking rate	11%
Low ranking rate	N/A	Low ranking rate	11%

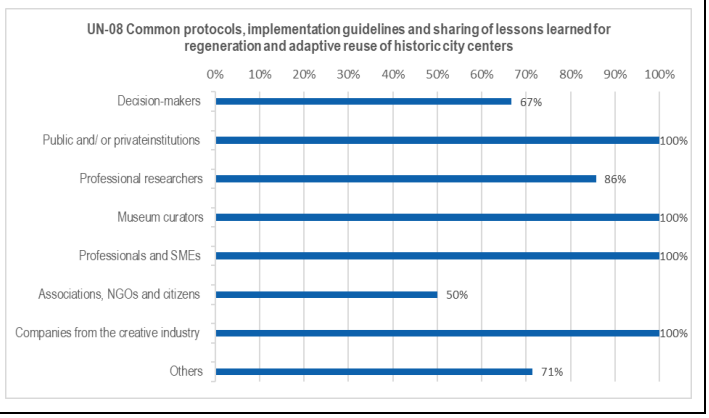


Table 3.12 – Ranking rates per type of CH and user category for UN09

UN-09	Creating immersive, populated, interactive reconstructions of archaeological sites to enhance users experiences		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	60%	High ranking rate	70%
Medium ranking rate	29%	Medium ranking rate	19%
Low ranking rate	10%	Low ranking rate	11%

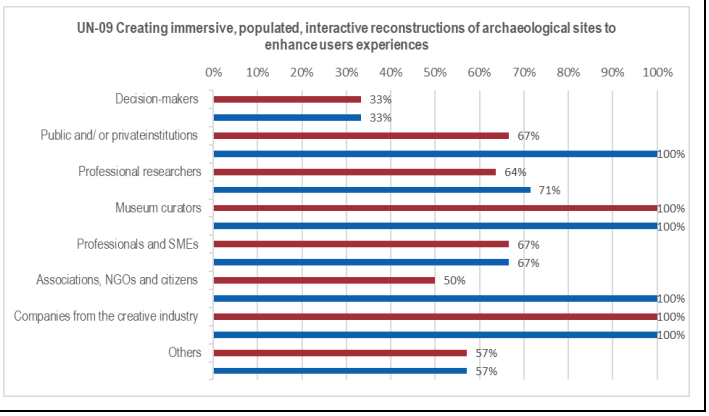


Table 3.13 – Ranking rates per type of CH and user category for UN10

UN-10	The need of high-resolution interactive 3D visualization tools		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	67%	High ranking rate	70%
Medium ranking rate	21%	Medium ranking rate	20%
Low ranking rate	13%	Low ranking rate	11%

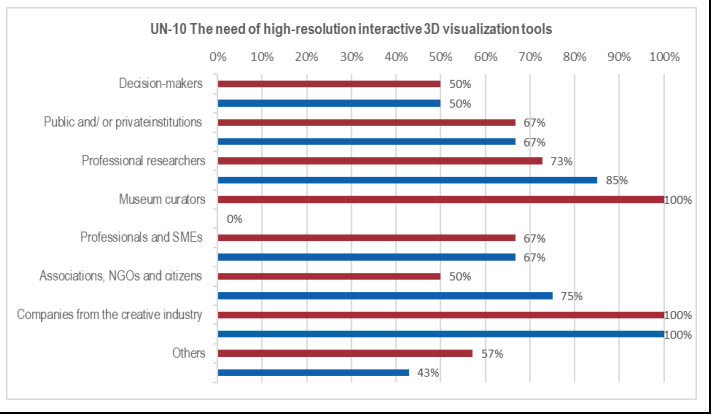


Table 3.14 – Ranking rates per type of CH and user category for UN11

UN-11	Smart monitoring systems with minimally invasive installation and analysis systems to identify deterioration processes		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	N/A	High ranking rate	74%
Medium ranking rate	N/A	Medium ranking rate	13%
Low ranking rate	N/A	Low ranking rate	13%

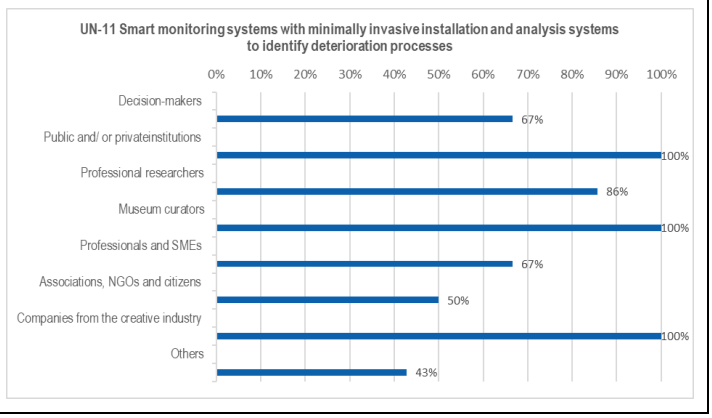


Table 3.15 – Ranking rates per type of CH and user category for UN12

UN-12	Facilitate digital models sharing and information exchange		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	90%	High ranking rate	90%
Medium ranking rate	8%	Medium ranking rate	10%
Low ranking rate	2%	Low ranking rate	0%

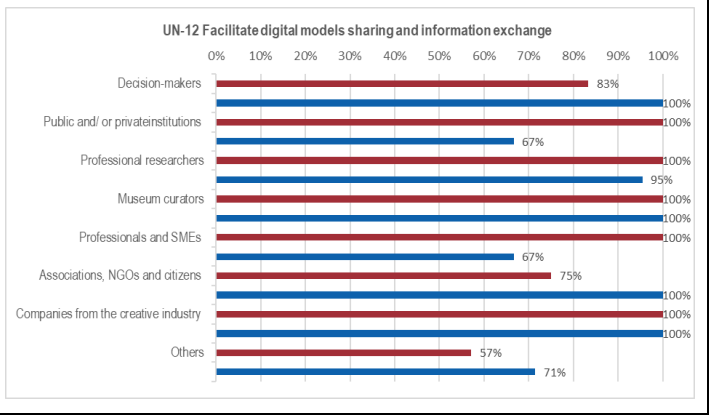


Table 3.16 – Ranking rates per type of CH and user category for UN13

UN-13	Highly accurate digital surrogates for conservation method selection and simulation of ageing effects		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	59%	High ranking rate	N/A
Medium ranking rate	22%	Medium ranking rate	N/A
Low ranking rate	20%	Low ranking rate	N/A

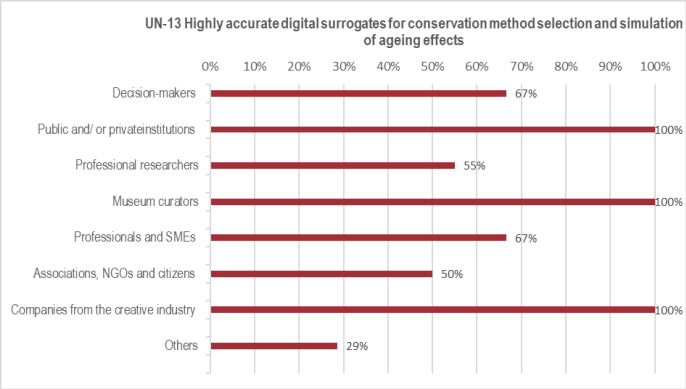


Table 3.17 – Ranking rates per type of CH and user category for UN14

UN-14	Reduced specialized equipment knowledge for diagnosis studies		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	N/A	High ranking rate	59%
Medium ranking rate	N/A	Medium ranking rate	26%
Low ranking rate	N/A	Low ranking rate	15%

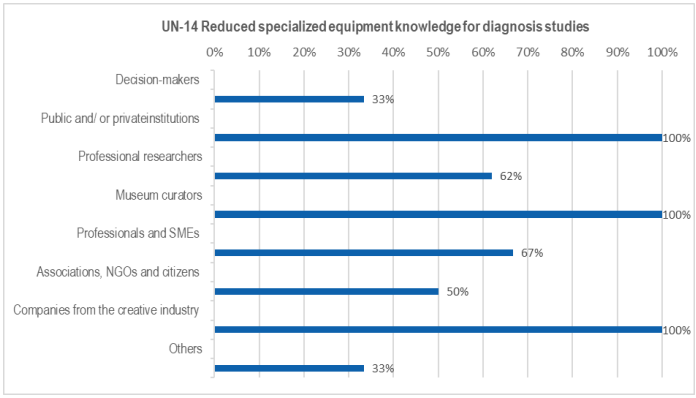


Table 3.18 – Ranking rates per type of CH and user category for UN15

UN-15	The need to have a digital replica for studies and conservation purposes		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	71%	High ranking rate	N/A
Medium ranking rate	17%	Medium ranking rate	N/A
Low ranking rate	13%	Low ranking rate	N/A

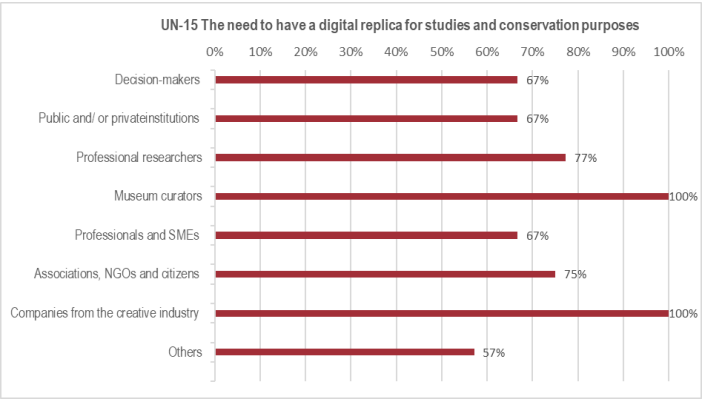


Table 3.19 – Ranking rates per type of CH and user category for UN16

UN-16	Time upgradable 3D modelling		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	N/A	High ranking rate	70%
Medium ranking rate	N/A	Medium ranking rate	23%
Low ranking rate	N/A	Low ranking rate	6%

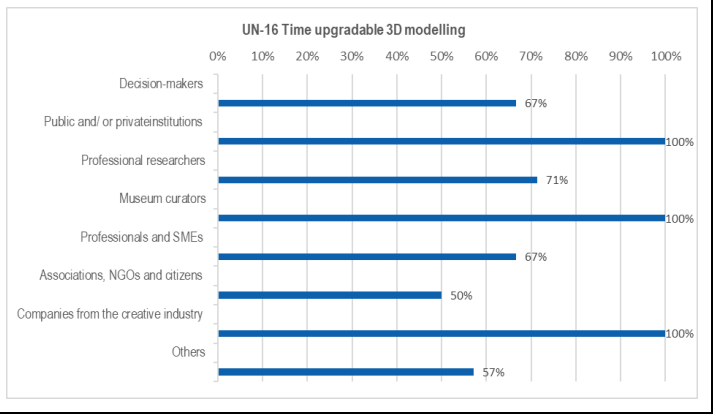


Table 3.20 – Ranking rates per type of CH and user category for UN17

UN-17	Visually organize 3D digital archives by the display of different level of information		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	N/A	High ranking rate	76%
Medium ranking rate	N/A	Medium ranking rate	15%
Low ranking rate	N/A	Low ranking rate	9%

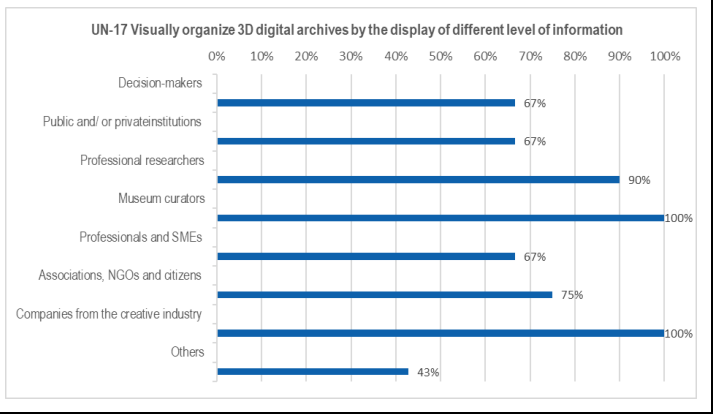


Table 3.21 – Ranking rates per type of CH and user category for UN18

UN-18	Provision of infrastructure and services for data sharing, access and re-use		
ARTIFACTS		**MONUMENTS & SITES**	
High ranking rate	92%	High ranking rate	83%
Medium ranking rate	8%	Medium ranking rate	13%
Low ranking rate	0%	Low ranking rate	4%

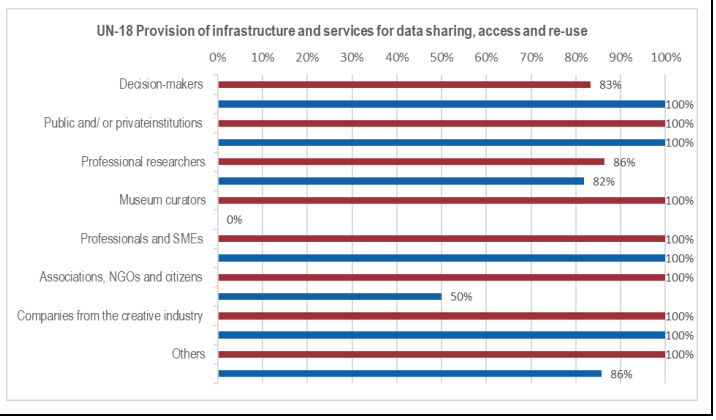


Table 3.22 – Ranking rates per type of CH and user category for UN19

UN-19	Availability of tools to gather and integrate diverse digital materials, archive them appropriately and make the information accessible			
ARTIFACTS		**MONUMENTS & SITES**		
High ranking rate	92%	High ranking rate	79%	
Medium ranking rate	4%	Medium ranking rate	15%	
Low ranking rate	4%	Low ranking rate	6%	

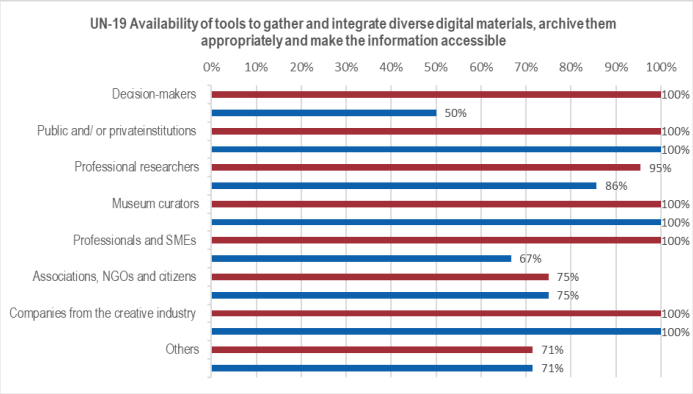


Table 3.23 – Ranking rates per type of CH and user category for UN20

UN-20	Generating and customizing visualization that allow users to dynamically and creatively experience digital contents			
ARTIFACTS		**MONUMENTS & SITES**		
High ranking rate	85%	High ranking rate	66%	
Medium ranking rate	6%	Medium ranking rate	15%	
Low ranking rate	8%	Low ranking rate	19%	

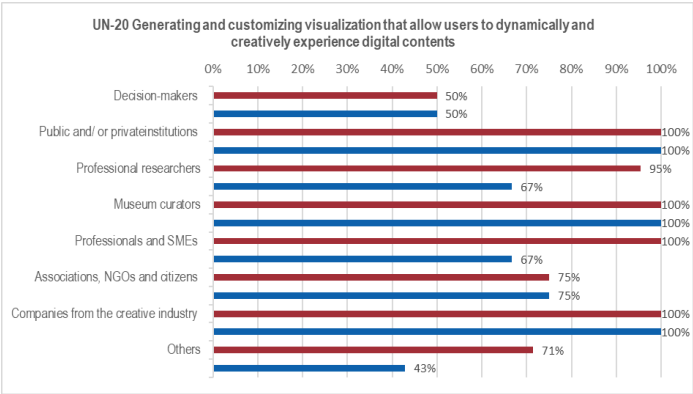


Table 3.24 – Ranking rates per type of CH and user category for UN21

UN-21	Long-term preservation framework for large volumes of digital data			
ARTIFACTS		**MONUMENTS & SITES**		
High ranking rate	88%	High ranking rate	N/A	
Medium ranking rate	10%	Medium ranking rate	N/A	
Low ranking rate	2%	Low ranking rate	N/A	

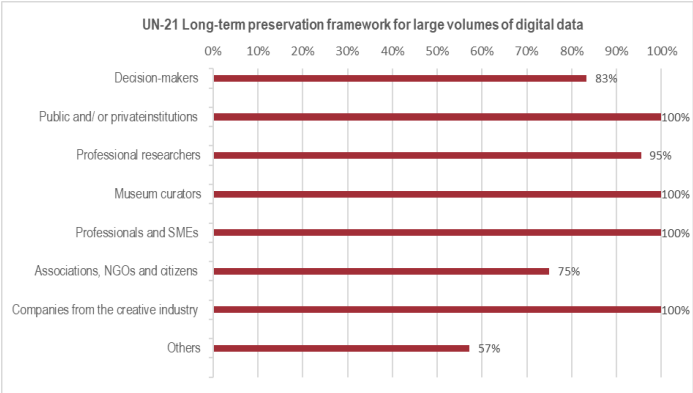


Table 3.25 – Ranking rates per type of CH and user category for UN22

UN-22	Availability of digital archiving standards			
ARTIFACTS		**MONUMENTS & SITES**		
High ranking rate	88%	High ranking rate	N/A	
Medium ranking rate	10%	Medium ranking rate	N/A	
Low ranking rate	2%	Low ranking rate	N/A	

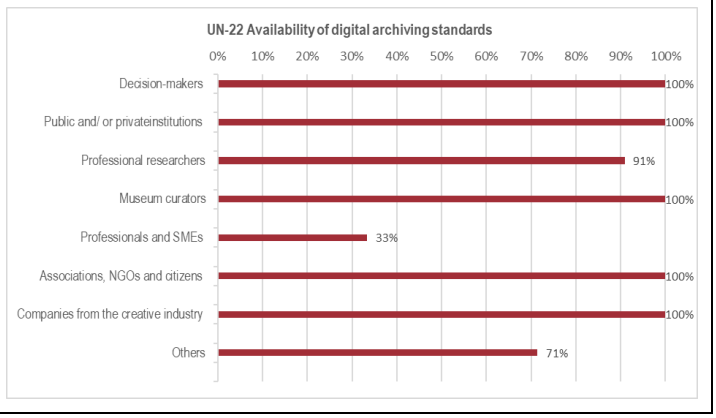


Table 3.26 – Ranking rates per type of CH and user category for UN23

UN-23	Reuse and recontextualization assessment standards			
ARTIFACTS		**MONUMENTS & SITES**		
High ranking rate	81%	High ranking rate	N/A	
Medium ranking rate	15%	Medium ranking rate	N/A	
Low ranking rate	4%	Low ranking rate	N/A	

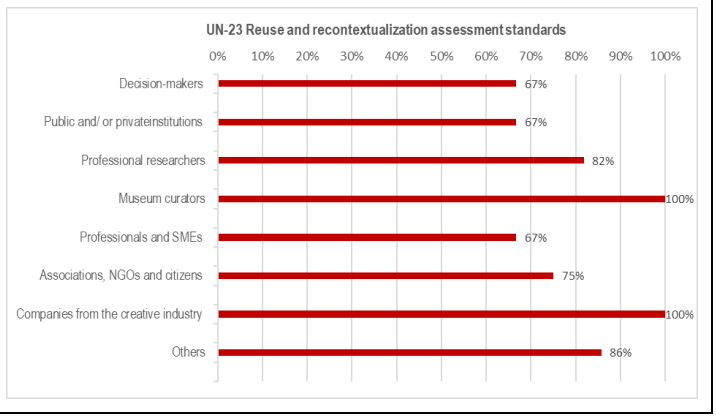


Table 3.27 – Ranking rates per type of CH and user category for UN24

UN-24	Facilitate networking and share resources in the touristic sector through common communication system based on digital information			
ARTIFACTS		**MONUMENTS & SITES**		
High ranking rate	N/A	High ranking rate	60%	
Medium ranking rate	N/A	Medium ranking rate	22%	
Low ranking rate	N/A	Low ranking rate	18%	

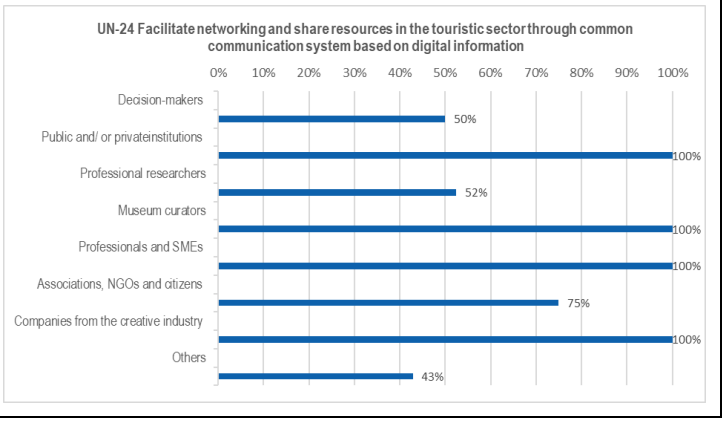
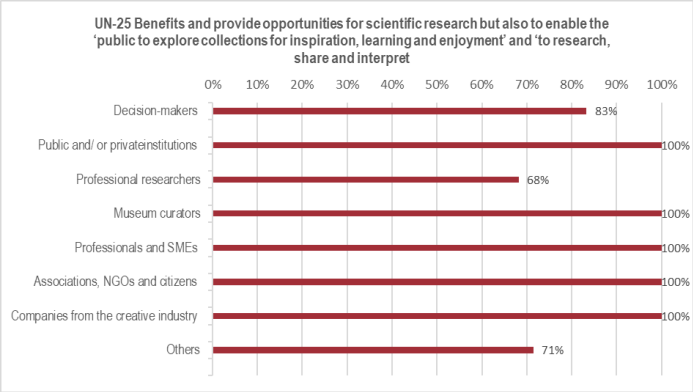


Table 3.28 – Ranking rates per type of CH and user category for UN25

UN-25	Benefits and provide opportunities for scientific research but also to enable the 'public to explore collections for inspiration, learning and enjoyment' and 'to research, share and interpret

ARTIFACTS		MONUMENTS & SITES	
High ranking rate	79%	High ranking rate	N/A
Medium ranking rate	19%	Medium ranking rate	N/A
Low ranking rate	2%	Low ranking rate	N/A



3.5 Summary of main recommendations

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN01</td></tr>
<tr><td colspan="4">Optimized and time-saving procedures for data capturing and processing</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Public and/ or private heritage institutions responsible for managing monuments and sites
• Museums curators
• Professionals and SMEs providing services or products for preservation, conservation and restoration
• Companies from the creative industry producing heritage-based content, apps, games, education and tourism services
• Professional researchers
• Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization
• Associations, NGOs, local communities and citizens aiming at maintaining and communicating cultural heritage</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)
• Artifacts</td><td>SUBCATEGORY</td><td>• Stand-alone / individual; group; complex
• Collections; open air/ landscape; archive/library</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Documentation of CH
• Communication of CH
• Diagnostic activities
• Gamings with CH
• Project of restoration
• Maintenance practices
• Dissemination through publications
• Preventive conservation</td><td>FIELD</td><td>• Technologies/models
• ICT in museums</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Analyse different surveys and documentation for CH management and restoration.
• Offer interactive games and personalised content for museums visitors meeting the expectations of the general public.
• Analyse the surface appearance and identify materials' properties to characterize the state of conservation and define the most appropriate restoration intervention.
• Architectural design related to existing or historical buildings and their environments to study and visually communicate design options.
• Design of virtual environments related to TV series and VR video games.
• Digital documentation of cultural artefacts (to prevent permanent loss), creating educational resources, creating digital replicas (to avoid damages when manipulating).
• Increase competitive research and extend innovation capacity in digital preservation of artefacts.
• Develop educational resources.
• Documentation as method to give meaning, understanding, definition, and recognition of the values of cultural heritage.
• Provide portable solutions.
• Apply material analysis techniques.</td></tr>
</table>

	• Enhance the accessibility of the digitized cultural objects to both the scientific community. • To help preserving the historical monuments creating digital architectural archives.
USER PAINS	• The management of complex sites requires a deep understanding of the current situation and expected results for evidence decision-making. • Difficulties in using or adapting to new different software and hardware. • Lack of enough digital information explaining the content available. • Risks associated to objects manipulation and safety of operation. • Understand effectivity of restoration and maintenance treatments according to their evolution over time and their applicability under particular environment conditions. • Acquisition of digital models of existing architecture and related spatial elements from various content providers. • Challenging and expensive computing and storing resources and need of specialized users for data acquisition and reconstruction. • Low-cost software on the commercial market that do not match the rigorousness of classical photogrammetric methods. • Lack of tools required by Cultural Heritage documentation: organized and coordinated storage and management of historical data, easy analysis and query, time management, 3D modelling of irregular shapes, etc. and constant updating of information and processing of different data. • Intensive cooperation between several fields. • Increasing the gap between specialist and non-technical users in heritage documentation. • Users don't have access and don't fully exploit all data information. • Lack of solutions enabling to cover the whole processing chain that ranges from content creation and digital archiving to content publishing and sharing. • Lack of shared regulatory references and guidelines as far as semantic data are concerned.
USER GAINS	• Data models to improve information integration and easily accessible for all user groups. • Advanced abilities for viewing or interacting with digital models. • Reuse and availability of existing digital assets. • Service oriented solution that doesn't require for specialised skills in digital reconstruction. • Increase productivity, quality and speed of a restoration process. • Metadata related to the survey and modelling should be included to certify the process and the final product. • New approaches for managing data and driving the decision-making process. • Procedure to optimize the workflow of information for existing artefacts. • Interaction between users from different specialties. • To allow conservators to access different forms of information and to view a variety of image types simultaneously. • To simplify the production of content from real artifacts, producing faithful digital imprints and avoiding the tedious and time consuming task of a manual modelling. • Architectural archives of monuments and historic buildings, complemented with geographical information of the surroundings.
REFERENCES	EU-01, EU-05, EU-06, EU-17, EU-26, EU-61, DHUR-20, DHUR-22, DHUR-51, DHUR-63, DHUR-64, DHUR-84, DHUR-108, DHUR-116, DHUR-234, DHUR-237, DHUR-256

<table>
<tr><td rowspan="2">USER NEED</td><td colspan="4">UN02
Solutions for adapting content aiming to an inclusive, accessible and barrier-free museum</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• General and educational users and visitors, tourists</td></tr>
<tr><td>CH TYPE</td><td>• Artifacts</td><td>SUBCATEGORY</td><td colspan="2">• Collections</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Communication of CH</td><td>FIELD</td><td>• ICT in museums</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• There are two types of users: a) People with difficulties associated with perception, memory, cognition or communication; b) Citizens in general and especially older people, scholars, etc.
• Disabled people have different access preferences in their CH visiting experiences: 1) they want to be autonomous and independent citizens and 2) reduce or eliminate not only physical barriers to inclusion but also attitudinal and institutional, often based on stereotypes and prejudices.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Not receiving appropriate or qualified support in those experiences: people with physical support needs, people with hearing loss, people with interpretation needs, people with a visual impairment and people with partial sight, people with learning difficulties</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Adapted and amazing museum activities to their disabilities</td></tr>
<tr><td>REFERENCES</td><td colspan="4">EU-04</td></tr>
</table>

USER NEED	*UN03*		
	Creating interactive museum experiences to better connect visitors		
	CONSERVATION	PRESERVATION	VALORIZATION

USER CATEGORY	• General and educational users and visitors, tourists • Museum curators		
CH TYPE	• Monuments / groups of buildings / sites (and landscape) • Artifacts	SUBCATEGORY	• Stand-alone / individual • Collections
PURPOSE OF DIGITIZATION	• Communication of CH • Documentation of CH • Gamings with CH	FIELD	• ICT in museums • Technologies/models • Knowledge sharing and visualization
USER JOBS	• Provide a powerful storytelling engine and a set of rich digital media assets that can be used to create detailed characters and narratives • Create more personal experiences • Foster innovative digital practice to engage more people • Receive dramatic, emotionally engaging stories that can be experienced while at a cultural site or remotely • Customized views to experience digital cultural heritage collections • Access and interpret heritage information		
USER PAINS	• Organisational and practical challenges for designing digital visitor experiences, as technology sometimes dominate design projects • Existing collections metadata tends to focus on traditional 'object focused' museological and historical interpretations, rather than alternative 'people focused' interpretations • Multimedia guide can detract visitors' attention from real objects and artifacts and mobile visitors' guide might put individual visitors in a 'technological bubble' making it difficult for them to keep track of their companions or family members • Enjoying in a virtual and diversified way, through the use of digital technology, some objects that are not visible to the public. • Users (often without much background knowledge) are left on their own to browse and search through massive online portals without the typical guidance of the carefully curated museum exhibitions.		
USER GAINS	• Wherever visitors are, they can follow characters, look for clues and explore environments alone or with family and friends. • Facilitate more democratic forms of knowledge construction and create other forms of narratives. Experiencing personalized interactive stories and create narrative-driven cultural "adventures" through hybrid structures, which adapt continuously to their visitors, extend over space and time. • Artworks become active artefacts that react on users' attention and emotions and provide more information about them. • Implement educational content by enhancing the vision of the real object enriched by digital content • Experiment innovative and empathetic categories of visiting, especially for the areas not accessible to visitors because of issues related to security/ maintenance, inaccessibility or architectural barriers		

	• Growing museum competitivity; discovering new potentiality for the museum guide, which nowadays is living a severe crisis, with new skills, such as digital storytelling. • More efficient and accurate user modelling methods to build ore complete and substantive personalized experiences
REFERENCES	EU-05, EU-08, EU-12, EU-19, EU-24, EU-81, DHUR-03, DHUR-25, DHUR-38, DHUR-39, DHUR-48, DHUR-49, DHUR-60, DHUR-78, DHUR-107, DHUR-110, DHUR-122, DHUR-197, DHUR-199

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN04</td></tr>
<tr><td colspan="4">The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator</td></tr>
<tr><td>CONSERVATION</td><td colspan="2">PRESERVATION</td><td>VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• General and educational users and visitors, tourists
• Associations, NGOs, local communities and citizens aiming at maintaining and communicating cultural heritage
• Professional researchers
• Professionals and SMEs providing services or products for preservation, conservation and restoration
• Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization
• Museum curators
• Others</td></tr>
<tr><td>CH TYPE</td><td>• Monuments / groups of buildings / sites (and landscape)
• Artifact</td><td>SUBCATEGORY</td><td colspan="2">• Stand-alone/ individual; landscape; settlement; intangible
• Archive/ library; collection; open air/ landscape</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Encounters with communities
• Documentation of CH
• Creation of partnership and networking
• Materials conservation tests
• Communication of CH
• Accessibility</td><td>FIELD</td><td>• Knowledge sharing and visualization
• Technologies/models
• Digital archives</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Achieve appropriate user’s engagement in CH activities and share local knowledge and everyday experience, together with the contribution of cultural institutions.
• To create new ways of seeing and navigating digital collections.
• Generating and customizing views that enable users to creatively experience digital cultural heritage collections.
• Manage crowdsourcing projects.
• Interactive visual analysis of multispectral and hyperspectral image data.
• Live streams to showcase traditional cultural art forms and artifacts, i.e., intangible cultural heritage.
• To offer inclusive tourism, especially at heritage destinations where full accessibility is often limited.
• Engaging users, both in producing and benefiting of the content.
• Consider users as proactive metadata creators rather than passive consumers.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Society to be actively involved in cultural heritage activities (as observer & creator)
• The lack of tools tailored for CH requirements: organized and coordinated storage and management of historical data, easy analysis and query, time management, flexibility, user-friendliness, etc.
• Devise alternative methods for the design and production of an interpretative digital cultural heritage: 1)Promote ease of use, 2) attract and sustain user interest, 3) foster a community of users and 4) show users that their work is contributing to the institution and society.</td></tr>
</table>

	• Improving the quality of collections' metadata. • Lack of effective tools to support learning or knowledge sharing. • Lack of stimulating activities for visitors, narratives metaphors, and emotional impact. • Devise alternative methods for the design and production of an interpretative digital cultural heritage. • Digital collections are dependent upon the interfaces through which they are explored and those interfaces do not necessarily encourage the modes of discovery that can provide new insights. • While high-quality 3D visualization of spaces and artifacts is a desired element in virtual heritage applications, it is not alone adequate to ensure that the user experience will be as engaging and fruitful as expected. • This shift requires social and political organisational changes and re-conceptualisation of existing models, tools and practices.
USER GAINS	• Social networking platform for cultural heritage, which gives voice to the citizens across Europe, enables them to safeguard and enrich the European cultural heritage landscape. • Empowering European citizens to be actively involved in cultural heritage activities and act not only as observers, but also as maintainers, creators, major influencing factors and more importantly as ambassadors of their country's Culture and History. • Create a single information space, where the data and the services owned by European heritage institutions can be discovered and accessed through a single search facility. • Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. • Transforming the visitor experience into an active experience, through the most recent forms of edutainment. • Provide intuitive access to the raw image data. • To enable streamers to better engage and communicate with viewers by supporting them in preparation of content, creating novel forms of streams, engaging viewers, and maintaining their communities • Accessible heritage tourism experiences through virtual reality, with a focus on visitors with mobility impairments. • Geo-crowdsourcing as a potential problem-solving tool for public management. • Interactive 3D environments allow users to freely navigate and explore the content, as well as provide engaging features such as interactive digital stories or mini-games related to the historical and cultural context of the subject.
REFERENCES	EU-09, DHUR-05, DHUR-70, DHUR-82, DHUR-86, DHUR-95, DHUR-99, DHUR-102, DHUR-126, DHUR-157, DHUR-160, DHUR-172, DHUR-180, DHUR-181, DHUR-192, DHUR-203, DHUR-205, DHUR-255

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN05</td></tr>
<tr><td colspan="4">Enhancing and making accessible underwater or inaccessible heritage</td></tr>
<tr><td>CONSERVATION</td><td colspan="2">PRESERVATION</td><td>VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• General and educational users and visitors, tourists
• Professionals and SMEs providing services or products for preservation, conservation and restoration
• Public and/ or private heritage institutions responsible for managing monuments and sites
• Museum curators</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)
• Artifact</td><td>SUBCATEGORY</td><td>• Stand-alone / individual; settlement; landscape
• Collection</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Communication of CH
• Documentation of CH
• Monitoring
• Gamings with CH</td><td>FIELD</td><td>• Technologies/ models
• Knowledge sharing and visualization</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Bring unreachable underwater cultural heritage to the wide public.
• Reusing existing 3D data of underwater shipwrecks and sites.
• Games thought social media, to facilitate information exchange among users.
• Provide novel technology that supports the preservation of cultural heritage by allowing the acquisition of digital models in hard-to-access environments.
• Owing to the ever-growing availability of free data and software.
• Creating robotic cultural game for visiting the museum’s inaccessible areas.
• Making heritage information more accessible to an ever-widening public audience.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Difficulties to reach an interactive and engaging digital storytelling. Too long stories to keep the attention of users and too much information not well structured that makes users bored.
• The content is missing the motivational factor which would keep the user engaged until all of it is explored.
• The content does not give satisfactory user experience to all audience groups.
• Serious games for cultural heritage are too easy or too difficult for playing.
• Powerful computational processing capacities are required to manage all data and to run the different algorithms.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• To allow experts, virtual tourists and potentially construction companies to carefully inspect otherwise inaccessible historic sites.
• To provide flexible user-interfaces providing different levels of autonomy and addressing the needs of different user groups.
• To compare and assess the performance of different machine-learning classification algorithms, in terms of the obtained classification accuracy.
• Experiment innovative and empathetic categories of visiting and enjoy in a virtual and diversified way, through the use of digital technology, areas not accessible to visitors or objects that are not visible to the public.
• Transforming the visitor experience into an active experience, through the most recent forms of edutainment.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">EU-14, EU-54, DHUR-38, DHUR-122, DHUR-161</td></tr>
</table>

USER NEED	*UN06* *The need of comprehensive risk assessment methods for cultural heritage affected by climate change and natural hazards*		
	CONSERVATION	PRESERVATION	VALORIZATION
USER CATEGORY	• Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization • Public and/ or private heritage institutions responsible for managing monuments and sites		
CH TYPE	• Monuments / groups of buildings / sites (and landscape)	SUBCATEGORY	• Settlement; landscape
PURPOSE OF DIGITIZATION	• Identification of the risks and deterioration patterns • Monitoring	FIELD	• Technologies/models
USER JOBS	• Development of preventive strategies aimed at protecting EU cultural buildings and sites. • Selection and prioritization of the interventions, handling and managing funds, regulating privately owned properties. • Risk and disaster management of CH sites. • Mapping and monitoring of archaeological sites and cultural landscapes by remote sensing images.		
USER PAINS	• More reliable maintenance, quick restoration and long-term conservation of the Cultural Heritage assets. • Failure of existing policies and validation of new knowledge in government understanding to better act in the prevention (to mitigate the effect of climate phenomena) and intervention (when a disaster occurs) phases. • The heritage management could create opportunities and threats and can impose constraints on decision making. Most of these impact factors are beyond the direct control of CH managers, but nevertheless, affect heritage site strategies, final impacts and outcomes. • Decide how a monitoring and/or a restoration action will be implemented. • "Data availability and accessibility. • High professional skills in domain of satellite remote sensing analysis and interpretation are needed.		
USER GAINS	• Novel predictive models and methodology for the mitigation and adaptation to natural hazards and the assessment or management of corresponding threats. • Preventive measures on conservation of historic structures and emergency measures beyond the current practices. • A real supporting decision system including tools for effective prioritization and planning of the interventions, integration of modelling tools encompassing different disciplines. • To detect and monitor, through remote sensing, destruction and looting of heritage in areas affected by armed conflicts with no or low possibility for site control on the ground. Risk assessment and mitigation of effects of climate change.		
REFERENCES	EU-28, EU-37, DHUR-44		

USER NEED	*UN07*		
	Spreading knowledge on remote sensing applications for cultural heritage sites		
	CONSERVATION	PRESERVATION	VALORIZATION
USER CATEGORY	• Professional researchers • Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization • General and educational users and visitors, tourists • Public and/ or private heritage institutions responsible for managing monuments and sites		
CH TYPE	• Monuments / groups of buildings / sites (and landscape) • Artifact	SUBCATEGORY	• Landscape • Open air/landscape; archive/ library
PURPOSE OF DIGITIZATION	• Creation of partnership and networking • Monitoring • Documentation of CH • Preventive conservation	FIELD	• Education • Technologies/ models • Knowledge sharing and visualisation • Digital archives
USER JOBS	• Increase research capabilities and create a network allowing transfer of knowledge. • Mapping and monitoring of archaeological sites and cultural landscapes by satellite imagery. • Use of geographic information systems and mobile location-based services in CH data. • Applying IoT technologies to CH for remote monitoring of factors affecting the conservation state of artworks in order to improve their long-term preservation and to promote their values.		
USER PAINS	• Gap in research capabilities between low-performing and leading institutions. • Data availability and accessibility. • High professional skills in domain of satellite remote sensing analysis and interpretation needed.		
USER GAINS	• Access to the Center infrastructures for Remote Senesing to CH, strengthening high-quality collaboration in and outside the EU and access to high-quality information and services for the user communities, in particular also making benefit of European Copernicus initiative. • Contribution of satellite remote sensing to heritage monitoring, protection and management to detect and monitor destruction and looting of heritage in areas affected by armed conflicts with no or low possibility for site control on the ground. Risk assessment and mitigation of effects of climate change. • To optimize resources and avoid expensive in-situ installations, allowing massive supervision of artefacts, historical buildings, open-air archaeological sites, etc and to have a precise diagnosis of the key factors affecting art displays.		
REFERENCES	EU-42, DHUR-44, DHUR-73, DHUR-257, DHUR-260		

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN08</td></tr>
<tr><td colspan="4">Common protocols, implementation guidelines and sharing of lessons learned for regeneration and adaptive reuse of historic city centres</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Associations, NGOs, local communities and citizens aiming at maintaining and communicating cultural heritage</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)</td><td>SUBCATEGORY</td><td>• Settlement</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Adaptive re-use of CH</td><td>FIELD</td><td>• Technologies/models</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Involvement of users and citizens in co-creation process of spaces and policies. The development of the area is managed in an organic way, with as little legislation as possible, in cooperation with the end users.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Transform historic city centres afflicted by physical decay, social conflicts and poor life quality into Creative and Sustainable Districts.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Systemic approach to promote the effective regeneration and adaptive reuse in historic city centres by replicating successful heritage-led regeneration initiatives.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">EU-44</td></tr>
</table>

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN09</td></tr>
<tr><td colspan="4">Creating immersive, populated, interactive reconstructions of archaeological sites to enhance users experiences</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Professionals and SMEs providing services or products for preservation, conservation and restoration
• General and educational users and visitors, tourists
• Others</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)
• Artifact</td><td>SUBCATEGORY</td><td>• Settlement; complex; landscape
• Open air/landscape</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Communication of CH
• Studies on CH
• Documentation of CH</td><td>FIELD</td><td>• ICT in museums
• Technologies/models</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Archaeological virtual reconstructions
• Improve the capacity to produce, store, visualize and manage both archaeological and 3D data.
• To foster data analysis, interpretation, and curation in a realistic and highly interactive virtual environment.
• To engage with the visualization, study, and interpretation of a complex archaeological site that is far located or that is not accessible.
• To visualize, explore, analyse and evaluate both raw-data and 3D reconstructions in CH and archaeology.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Increase flexibility in audience and environments to better understand past societies.
• The cost of proprietary software may be prohibitive for some promoters.
• Compatibility problems may arise since the standards are not the same for different operating systems.
• New technologies have constant evolution leads to many difficulties due to the obsolescence of solutions implemented at any given time. Constantly changing standards, formats and tools.
• Services providers are sometimes poorly aware of what the owners of the site really require.
• Operational problems associated with bulkiness and portability of equipment.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• To design and evaluate experiences that would enhance understanding, social relevance and enjoyment of Cultural Heritage.
• To offer various technical solutions that allow users to view, search and also analyse, modify or acquire geographical data from the web.
• Use of digital imaging in real time and 3D modelling to study inaccessible natural sites and provides non-destructive observation.
• Visitors can access various resources according to its profile.
• Novel interactive and analytical tools that are not available in existing software.
• To visualize, manipulate, rotate, transform, measure, and slice stratigraphic units and building features in real-time.
• To generate a digital environment in which results can be analysed in detail both in space and time.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">EU-62, DHUR-28, DHUR-57, DHUR-71, DHUR-119, DHUR-196</td></tr>
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<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN10</td></tr>
<tr><td colspan="4">The need of high-resolution interactive 3D visualization tools</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Museum curators
• Professional researchers
• General and educational users and visitors, tourists</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)
• Artifact</td><td>SUBCATEGORY</td><td>• Stand-alone/ individual
• Collection; open air/ landscape</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Documentation of CH
• Communication of CH</td><td>FIELD</td><td>• Technologies/ models</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Development and evaluation of interactive 3D visualisation and presentation techniques to provide access to the enriched high-resolution digital rock-art for scientists, museum visitors, school children and web users.
• To offer a 4D model to be integrated into an interactive digital environment designed for a museum exhibit.
• To display high resolution 3D models.
• Development of a low-cost, holistic method utilizing AR (Augmented Reality) technologies to represent digital heritage.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Provide alternatives to heritage that cannot be accessed or appreciable in concrete timeframes.
• Engage with 3D objects outside of 3D software packages or games.
• 3D datasets are presenting problems affecting their storage and dissemination (size of the datasets).</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Allow archaeologists to scan in high resolution, at multiple scales and in less time.
• Compare similar type of heritage between each other and at other locations.
• Link various documentary sources (both text-based and iconographic) and testimonials to the 4D model.
• Methodology for museums and cultural institutions for prototyping a 3D viewer within a webpage.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">EU-80, DHUR-32, DHUR-77, DHUR-83</td></tr>
</table>

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN11</td></tr>
<tr><td colspan="4">Smart monitoring systems with minimally invasive installation and analysis systems to identify deterioration processes</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Professionals and SMEs providing services or products for preservation, conservation and restoration
• Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)</td><td>SUBCATEGORY</td><td>• Stand-alone / individual; complex</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Identification of the risks and deterioration patterns
• Diagnostic activities</td><td>FIELD</td><td>• Technologies/ models</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Conserve historic structures understanding the deterioration processes mainly caused by the environment.
• Develop virtual inspection systems that help experience and disseminate cultural heritage.
• Quantify the possible inundation of the temple complex according to different scenarios.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Structural resistance is just calculated from the measurements and not determined by sufficient sensors.
• Most monitoring systems require cabling, which is neither aesthetically appealing nor in some cases applicable due to the needed fastening techniques.
• User-friendly interface that an untrained population can find intuitive and engaging.
• Evaluate effectiveness of implemented solutions.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• A software which can be continuously updated and broadened to handle specific questions arising at objects, steer various combinations of sensors and be open for extensions in the future.
• Reliable tool for forecasting environmental change and future change scenarios on cultural heritage through non-invasive and non-destructive tools.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">EU-99, DHUR-23, DHUR-59</td></tr>
</table>

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN12</td></tr>
<tr><td colspan="4">Facilitate digital models sharing and information exchange</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Public and/ or private heritage institutions responsible for managing monuments and sites
• General and educational users and visitors, tourists
• Professional researchers
• Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization
• Professionals and SMEs providing services or products for preservation, conservation and restoration</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)
• Artifact</td><td>SUBCATEGORY</td><td>• Stand-alone / individual; complex
• Open air/ landscape; archive/ library; collection; intangible</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Documentation of CH
• Communication of CH
• Studies on CH</td><td>FIELD</td><td>• Technologies/ models
• Digital archives
• Education
• Knowledge sharing and visualization</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Analyse different surveys and documentation for CH management and restoration.
• Development and evaluation of interactive 3D visualisation and presentation techniques to provide access to the enriched high-resolution digital content for scientists, museum visitors, school children and web users.
• Consider users as proactive metadata creators rather than passive consumers.
• Production, processing and interpretation of complex digital objects and the dissemination of valuable and diverse information to a broad spectrum of audience
• Developing advanced 3D modelling for accessing and understanding European cultural assets and to close the gap between effective user experiences of Cultural Heritage and the enrichment of the scientific knowledge.
• Accessing, understanding and strengthening European cultural heritage.
• To modernize the provision of infrastructure and services for data sharing, discovery, access and re-use.
• Making heritage information more accessible to an ever-widening public audience.
• To educate the general public about the current situation of heritage and conservation effort by experts for its better appreciation and preservation.
• Creating a new cross domain portal covering museums, archives, libraries and audio visual archives.
• Access to archival resources that responds to user and interoperability requirements
• Showcase traditional cultural art forms and artifacts, i.e., intangible cultural heritage.
• Present the results in surveying available web technology for applicability in metadata aggregation in cultural heritage.</td></tr>
</table>

USER PAINS	• The management of complex sites requires a deep understanding of the current situation and expected results for evidence decision-making. • Difficulties in using or adapting to new different software and hardware. • More researchers with various backgrounds (e.g. material scientists), aspire to integrate the aspect of 3D virtualization within their work but there are limitations concerning the amount of the data that have to be managed. • Combine knowledge base features with content management and information retrieval (IR) technologies • Integration and enrichment of semantic attributes. • Semantic enrichment of heritage 3D models. • Inexistence of shared library for historical elements. • Large amount of data to capture. • Issues to naming each architectural element that composes a building. • The lack of tools tailored for CH requirements: organized and coordinated storage and management of historical data, easy analysis and query, time management, flexibility, user-friendliness, etc. • Allow the general public to conduct active learning by simulating the real practice on the cultural heritage site. • Improving the quality of their collections' metadata. • Lack of effective tools to support learning or knowledge sharing.
USER GAINS	• Interoperable data models and easily accessible for all user groups • Users as proactive metadata co-creators. • 3D documentation as an affordable, practical and effective mechanism for long term documentation of tangible cultural heritage. • Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. • Transforming the visitor experience into an active experience, through the most recent forms of edutainment. • Accessing, understanding and strengthening European cultural heritage. • Enhance the dialogue between ICT technologies, different Cultural Heritage experts, users and different disciplines, both social and technical. • To achieve interoperable models able to enrich the interdisciplinary knowledge of European cultural identity. • Innovative technologies for creating 3D models with an inclusive approach. • Geo-crowdsourcing (GeoCS) as a potential problem-solving tool for public management. • Metadata quality improvement, enrichment and engagement and awareness on cultural heritage assets among users. • Engage communicate with viewers.
REFERENCES	EU-01, EU-80, DHUR-05, DHUR-06, DHUR-07, DHUR-32, DHUR-50, DHUR-54, DHUR-65, DHUR-66, DHUR-68, DHUR-85, DHUR-102, DHUR-126, DHUR-129, DHUR-130, DHUR-152, DHUR-174, DHUR-238, DHUR-240, DHUR-241

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN13</td></tr>
<tr><td colspan="4">Highly accurate digital surrogates for conservation method selection and simulation of ageing effects</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Professionals and SMEs providing services or products for preservation, conservation and restoration</td></tr>
<tr><td>CH TYPE</td><td>• Artifact</td><td>SUBCATEGORY</td><td colspan="2">• Collection</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Diagnostic activities</td><td>FIELD</td><td>• Technologies/ models</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Analyse the surface appearance and identify materials' properties to characterize the state of conservation of an artwork and define the most appropriate restoration intervention.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Reduce risks associated to objects manipulation and increase safety of operation.
• Understand effectivity of restoration and maintenance treatments according to their evolution over time and their applicability under particular environment conditions.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Facilitate conservation, by indicating spots/segments of cultural objects that are in eminent conservation need and require special care and suggestions over conservation methods that should be followed.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">EU-06</td></tr>
</table>

USER NEED	*UN14*		
	Reduced specialised equipment knowledge for diagnosis studies		
	CONSERVATION	PRESERVATION	VALORIZATION
USER CATEGORY	• Professionals and SMEs providing services or products for preservation, conservation and restoration		
CH TYPE	• Monuments / groups of buildings / sites (and landscape)	SUBCATEGORY	• Stand-alone/ individual
PURPOSE OF DIGITIZATION	• Project of restoration	FIELD	• Technologies/ models
USER JOBS	• Precision conservation and restoration interventions based on analytical studies.		
USER PAINS	• Costly analytic services and instrumentation that requires specialised knowledge.		
USER GAINS	• Increase productivity, quality and speed of a restoration process.		
REFERENCES	EU-61		

USER NEED	*UN15*		
	The need to have a digital replica for studies and conservation purposes		
	CONSERVATION	PRESERVATION	VALORIZATION

USER CATEGORY	• Professional researchers		
CH TYPE	• Artifact	SUBCATEGORY	• Collections
PURPOSE OF DIGITIZATION	• Communication of CH	FIELD	• Technologies/ models
USER JOBS	• Digital preservation of cultural artefacts (to prevent permanent loss), creating educational resources, creating digital replicas (to avoid damages when manipulating). • Increase and extend innovation capacity in digital preservation of artefacts. • Develop educational resources.		
USER PAINS	• Reduce risks associated to objects manipulation and increase safety of operation. • Challenging computing and storing resources and need of specialized users for data acquisition and reconstruction.		
USER GAINS	• Service oriented solution that doesn't require for specialised skills in digital reconstruction.		
REFERENCES	EU-26		

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN16</td></tr>
<tr><td colspan="4">Time upgradable 3D modelling</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Public and/ or private heritage institutions responsible for managing monuments and sites
• Professional researchers</td></tr>
<tr><td>CH TYPE</td><td>• Monuments / groups of buildings / sites (and landscape)</td><td>SUBCATEGORY</td><td colspan="2">• Stand-alone / individual; settlement</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Documentation of CH</td><td>FIELD</td><td>• Technologies/ models
• Digital archives</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Analyse different surveys and documentation for CH management and restoration.
• Digitalized acquisition of the architectural heritage.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• The management of complex sites requires a deep understanding of the current situation and expected results for evidence decision-making.
• Difficulties in using or adapting to new different software and hardware.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Data models to improve information integration.
• Interoperable data models and easily accessible for all user groups.
• Architectural elements must be preserved and accessible for stimulating fruition for those users interested in historical and cognitive research.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">EU-01, DHUR-24</td></tr>
</table>

<table>
<tr><td rowspan="2">USER NEED</td><td colspan="4">UN17</td></tr>
<tr><td colspan="4">Visually organize 3D digital archives by the display of different level of information</td></tr>
<tr><td></td><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization
• Professional researchers</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)</td><td>SUBCATEGORY</td><td>• Group; settlement; complex</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Documentation of CH</td><td>FIELD</td><td>• Technologies/models
• Digital archives</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Manage information of different types and with different levels of detail.
• Digitalized acquisition of the architectural heritage.
• Developing advanced 3D modelling for accessing and understanding European cultural assets and to close the gap between effective user experiences of Cultural Heritage and the enrichment of the scientific knowledge.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Data interoperability.
• Integration and enrichment of semantic attributes.
• Cultural, environmental and management barriers.
• Inexistence of shared library for historical elements.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Integration between BIM (Building Information Modelling) and GIS (Geographic Information System) to manage, from a spatial point of view, different scales of detail.
• Accessing, understanding and strengthening European cultural heritage by means of enriched 3D models.
• To enhance the dialogue between ICT technologies, different Cultural Heritage experts, users and different disciplines, both social and technical.
• To achieve interoperable models able to enrich the interdisciplinary knowledge of European cultural identity.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">DHUR-21, DHUR-24, DHUR-129</td></tr>
</table>

<table>
<tr><td rowspan="2">USER NEED</td><td colspan="4">UN18</td></tr>
<tr><td colspan="4">Provision of infrastructure and services for data sharing, access and re-use</td></tr>
<tr><td></td><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Professionals and SMEs providing services or products for preservation, conservation and restoration
• Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization
• Professional researchers
• General and educational users and visitors, tourists
• Associations, NGOs, local communities and citizens aiming at maintaining and communicating cultural heritage</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)
• Artifact</td><td>SUBCATEGORY</td><td>• Stand-alone / individual; landscape
• Archive/ library; collection</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Diagnostic activities
• Creation of partnership and networking
• Documentation of CH
• Communication of CH
• Historic and bibliographic research
• Studies on CH</td><td>FIELD</td><td>• Digital archives
• Knowledge sharing and visualization
• Education</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Survey and advanced multimedia representations for the selection of restoration interventions.
• Creating a new cross domain portal covering museums, archives, libraries and audio visual archives.
• Access to digital archives for CH research.
• Exploitation of intelligent techniques in each step of the document processing, from the acquisition to the layout analysis, from classification to interpretation, from text categorization to semantic indexing for information retrieval purposes.
• To modernize the provision of infrastructure and services for data sharing, discovery, access and re-use.
• Data acquisition, organization, analysis, and presentation of research results of individual projects.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Management of multiple data sources and type of information, imperfect synchronization and a lack of understanding between those collecting the information and the researchers.
• Lack of integration and incomplete access to digital resources.
• Objects are often not easily accessible for interested users because of the distributed allocation of the content in different repositories and the variety in data structure and standards.
• Users (often without much background knowledge) are left on their own to browse and search through massive online portals without guidance.
• Lack of knowledge and tools for easy sharing of visual resources and to support remote visual analysis.
• The lack of tools tailored for CH requirements: organized and coordinated storage and management of historical data, easy analysis and query, time management, flexibility, user-friendliness, etc.</td></tr>
</table>

USER GAINS	• Use of systems of representation and data management allowing the transmission and analysis of data collected and also creating access to users not experts in the field of 3D graphics. • Increase the collaboration at technical and semantic levels as well as human and political (peer group collaboration). • Integrated point of access to cultural heritage resources. • Keep contents accessible in their integrity and intelligible according to their meaning; to cope with the incrementality and the need for continuous updating, in order to improve accuracy according to new available documents. • To create a single information space, where the data and the services owned by European heritage institutions can be discovered and accessed through a single search facility. • Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. • Transforming the visitor experience into an active experience, through the most recent forms of edutainment. • Engage and communicate with viewers.
REFERENCES	DHUR-19, DHUR-42, DHUR-53, DHUR-54, DHUR-61, DHUR-62, DHUR-65, DHUR-66, DHUR-152, DHUR-171, DHUR-199, DHUR-226, DHUR-251

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN19</td></tr>
<tr><td colspan="4">Availability of tools to gather and integrate diverse digital materials, archive them appropriately and make the information accessible</td></tr>
<tr><td>CONSERVATION</td><td colspan="2">PRESERVATION</td><td>VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization
• Professional researchers
• General and educational users and visitors, tourists</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)
• Artifact</td><td>SUBCATEGORY</td><td>• Stand-alone/ individual; complex
• Archive/ library</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Documentation of CH
• Communication of CH
• Maintenance practices</td><td>FIELD</td><td>• Digital archives
• Technologies/models</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• To create new ways of seeing and navigating digital collections.
• Generating and customizing views that enable users to creatively experience digital cultural heritage collections.
• Present the results in surveying available web technology for applicability in metadata aggregation in cultural heritage.
• The process of cultural heritage preservation is an unceasing practice that requires relevant data to be captured, analysed, filtered, recorded, monitored and regularly updated.
• To enhance the discovery and use of the content made available in digital libraries.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Accurate representation of user's interests to perform personalized search or browsing agents.
• Integrating technology.
• Intensive cooperation between several fields.
• The availability of digitalization tools is limited to experts and highly costly.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Create a single information space, where the data and the services can be discovered and accessed through a single search facility.
• Simplifying the implementation of the metadata aggregation scenario in cultural heritage.
• Interaction between users from different specialties.
• Organising collections of documents and contributing to create a set of user-focused evaluation metrics that can be used to determine hierarchy and mapping quality.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">DHUR-63, DHUR-85, DHUR-92, DHUR-238, DHUR-240</td></tr>
</table>

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN20</td></tr>
<tr><td colspan="4">Generating and customizing visualization that allow users to dynamically and creatively experience digital contents</td></tr>
<tr><td>CONSERVATION</td><td colspan="2">PRESERVATION</td><td>VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Professional researchers
• Museum curators
• General and educational users and visitors, tourists
• Professionals and SMEs providing services or products for preservation, conservation and restoration
• Others</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)
• Artifact</td><td>SUBCATEGORY</td><td>• Landscape
• Archive/library; collection</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Studies on CH
• Documentation of CH
• Preventive conservation
• Communication of CH</td><td>FIELD</td><td>• Digital archives
• Technologies/models
• Knowledge sharing and visualization</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• To create new ways of seeing and navigating digital collections.
• Generating and customizing views that enable users to creatively experience digital cultural heritage collections.
• Create virtual databases for accessing geological heritage information in “real time” for scientific, educational, and cultural purposes.
• Bring the user into the design process on creating a new product or service.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Digital collections are dependent upon the interfaces through which they are explored and those interfaces do not necessarily encourage the modes of discovery that can provide new insights.
• Interoperability.
• Accurate representation of a user’s interests to perform personalized search or browsing agents.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Provide external users an interactive interface that can be employed for generative interpretation and investigation of online digital collections.
• The very large file size of each image that needs more computing resources lead to a search for a more efficient workflow process.
• To show tourists geological history of sites and to evaluate the scientific, educational, and tourism quality.
• More efficient and accurate user modelling methods.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">DHUR-02, DHUR-56, DHUR-101, DHUR-110, DHUR-132, DHUR-225</td></tr>
</table>

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN21</td></tr>
<tr><td colspan="4">Long-term preservation framework for large volumes of digital data</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Professional researchers</td></tr>
<tr><td>CH TYPE</td><td>• Artifact</td><td>SUBCATEGORY</td><td colspan="2">• Archive/ library</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Preventive conservation
• Documentation of CH</td><td>FIELD</td><td>• Digital archives</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Access to digital archives for CH research.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Lack of integration and incomplete access to digital resources.
• Approaches to digital preservation are often still ad hoc and based on a single institution focus and frequently do not take into consideration the needs of the variety of actors who will come into contact with a system throughout the preservation lifecycle.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Integrated point of access to cultural heritage resources.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">DHUR-04, DHUR-53</td></tr>
</table>

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN22</td></tr>
<tr><td colspan="4">Availability of digital archiving standards</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization
• Professional researchers</td></tr>
<tr><td>CH TYPE</td><td>• Artifact</td><td>SUBCATEGORY</td><td colspan="2">• Archive/ library; collection</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Communication of CH
• Documentation of CH</td><td>FIELD</td><td>• Digital archives</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• Innovation in the standards of digital archiving related to public service.
• Investigation of new models of access to archival resources that responds to user and interoperability requirements.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Financial cost and legal practices such as copyright.
• Lack of quality in metadata contents in most of the cases; difficulty in accessing metadata contents due largely to limited user's knowledge on the content of the metadata; heterogeneity of the data at the level of schemas which makes the access even more difficult.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Information accessible and useful in terms of the characteristics of the digital media possesses and to create user inspired digital archives.
• User orientation of archives, where usability and findability of resources are priorities.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">DHUR-07, DHUR-58, DHUR-68</td></tr>
</table>

<table>
<tr><td rowspan="3">USER NEED</td><td colspan="4">UN23</td></tr>
<tr><td colspan="4">Reuse and recontextualization assessment standards</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Museum curators
• Others</td></tr>
<tr><td>CH TYPE</td><td>• Artifact</td><td>SUBCATEGORY</td><td colspan="2">• Archive/ library</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Documentation of CH</td><td>FIELD</td><td>• Digital archives</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• The majority of librarians and information specialists in cultural heritage organizations collect use statistics. However, not as many community practitioners actively and consistently collect reuse statistics.
• Assessing the impact of data reuse in order to better understand, and tell the story of, what has been learned or gained by a user when they repurpose a digital object.</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Lack of standardized assessment approaches, time, assessment tools to support collection and analysis, appropriate software and/or system constraints, training and expertise in interpreting collected data.
• Understand the users and uses of digital collections by applying a new type of assessment lens.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Assessing digital repository content reuse.
• Have a vehicle to consistently track usage of their images in any forum.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">DHUR-139, DHUR-147</td></tr>
</table>

<table>
<tr><td rowspan="2">USER NEED</td><td colspan="4">UN24
Facilitate networking and share resources in the touristic sector through common communication system based on digital information</td></tr>
<tr><td>CONSERVATION</td><td>PRESERVATION</td><td colspan="2">VALORIZATION</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER CATEGORY</td><td colspan="4">• Associations, NGOs, local communities and citizens aiming at maintaining and communicating cultural heritage</td></tr>
<tr><td>CH TYPE</td><td colspan="2">• Monuments / groups of buildings / sites (and landscape)</td><td>SUBCATEGORY</td><td>• Route</td></tr>
<tr><td>PURPOSE OF DIGITIZATION</td><td colspan="2">• Communication of CH</td><td>FIELD</td><td>• Knowledge sharing and visualisation</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>USER JOBS</td><td colspan="4">• To provide innovative ICT infrastructure specifically designed and optimized for the tourism sector that facilitates the tourists' routes, as well as mining attractions and specific thematic routes across the territory.
• Provision and display of contents in different ways: Web portals, fixed installations (totem), mobile devices (smartphones and tablets).</td></tr>
<tr><td>USER PAINS</td><td colspan="4">• Managing multiple information with interoperable and multi-channel approach.
• Replicability of systems to different cultural and natural sites.</td></tr>
<tr><td>USER GAINS</td><td colspan="4">• Creation of the single cloud-based architecture that allows the management of multiple multimedia contents, to be exploited in various platforms.
• Development of the unique content management system for several small municipalities of a same territory to share cultural and touristic information.
• Monitoring user's preferences and needs by collecting users' generated data.
• Providing local administration with useful and meaningful statistics about the tourists, tested and verified in real scenario with real users.</td></tr>
<tr><td>REFERENCES</td><td colspan="4">DHUR-156</td></tr>
</table>

USER NEED	*UN25*		
	Benefits and provide opportunities for scientific research but also to enable the 'public to explore collections for inspiration, learning and enjoyment' and 'to research, share and interpret"		
	CONSERVATION	PRESERVATION	VALORIZATION

USER CATEGORY	• Others		
CH TYPE	• Artifact	SUBCATEGORY	• Collection
PURPOSE OF DIGITIZATION	• Communication of CH	FIELD	• Technologies/models
USER JOBS	• Provide technological possibilities for digital documentation, analysis and research, exhibition display and education.		
USER PAINS	• No comprehensive understanding of what constitute 3D image qualities for a digital artefact, from the point of view of a heritage professional.		
USER GAINS	• New technological possibilities for digital documentation, analysis and research, exhibition display and education.		
REFERENCES	DHUR-246		

3.6 Appendices lists

- Appendix 1 - WP1_D1.2_T1.2_Matrix
- Appendix 2 – Projects results All
- Appendix 3 – Projects results short list
- Appendix 4 – Papers results All
- Appendix 5 – Projects results

All the appendices are attached at the end of the present document.

4. Conclusions

The aim of Task 1.2 has been to analyse the current state of research linking causes to adverse effects and aim of Task 1.4 was to map existing users' needs associated to the digitization of cultural heritage. Both tasks are linked and provide information to organise the knowledge base and the future Competence Centre's recommendations. Indeed, the analyses of users' needs and activities are fundamental for a holistic understanding of a Cultural Heritage and define a risk mitigation strategy as well as requirements for conservation, preservation and valorisation purposes. The activities involved desk work on reports, publications and other pertinent documents, together with fieldwork for the analysis through case studies. Also, preliminary attention has been put on Born-digital Heritage, its fundamental threats and risks to be further addressed in the future. The results contribute to implementing a Knowledge Base for CH Conservation, Preservation and Valorisation initiatives and actions.

Task 1.2 activities led to the development of a Matrix of risks identification. Such a result allowed to fill a gap existing in the field, providing a solution for a holistic analysis of risks in Cultural Heritage. Heritage professionals and institutions will be able to refer to the Matrix to analyse a Cultural Heritage asset, especially built Heritage. In this regard, the Matrix acts as a starting point for the examination of CH assets analysis. Further research can be assessed by crossing the identification of the risks with those connected with the CH assets materials properties (e.g. the material of the building or artefact as partly addressed by the ICOMOS in the ICOMOS-ISCS: Illustrated glossary on stone deterioration patterns[48]). This implementation of the cultural asset identification will help assess each damage and risk mitigation strategy following the Natural and Anthropic divisions.

Task 1.4 activities led to the development of a matrix bringing together the main user categories of digital cultural heritage, their associated expertise and role in conservation, preservation and valorisation, the purpose of digitization as well as the associated type of heritage. The result of the analysis of the matrix, based on existing literature review, was a list of 25 users' needs, which was then validated through a survey with stakeholders. This helps to identify opportunities, barriers and possible limitation of the use of digital technologies in mitigating risk and challenges cultural heritage is facing.

This report does not claim to be exhaustive but is intended to represent analysis and identification of the Risks with a particular focus on building heritage and users' needs, with an impact on the main purposes of the Competence Centre: conservation, preservation and valorisation.

[48] Cfr. https://www.icomos.org/publications/monuments_and_sites/15/pdf/Monuments_and_Sites_15_ISCS_Glossary_Stone.pdf

Appendices

Appendix 1 – WP1_D1.2_T1.2_Matrix


Types of Risks
risk map identity descriptors
Natural
Anthropic
(cumulative) processes
disasters
intended
indirect
environmental
biological
invasive
severe weather
geological events
management
heritage crimes
building / infrastructure / industry
heritage management
Socio-cultural
sea level
glaciation
erosion
silting
desertific
ground-
depositi
vibrati
animal
pes
vegeta
deca
degrada
fauna
flora
fir
down
squa
flo
ha
tsuna
earthq
lands
vole
modern
corrup
politi
quaryi
vanda
arson
thef
illegal
illicit
colle
constru
industrial
transport
pollu
mini
war
agricul
foresta
negli
neglec
restorat
handling
tourism
visitor
change
loss of traditional
performa
veneration
Cultural Heritage
monument / site / landscape
type
built
carved
natural
location
on-ground
underwater
underground
cave
context
urban
rural
landscape
biodiversity
fauna
flora
geology
function
current
past
structure
stand-alone
complex
ensemble
immaterial aspects
artisanship
social activity
performing art
artefact
movable
utilitarian
historic replica
written evidences
architectonic features
ethnographic
eco-facts
art works
immovable
frescoes
grafitti
carved
mosaics
immaterial aspects
artisanship
social activity
actions
DOCUMENTATION
Investigation / legal status
studied
un-documented
preserved
recorded
excavated
archived
exhibited

Appendix 2 – Projects results All

CORDIS DATABASE
"DIGITAL AND HERITAGE" Limited to Projects H2020 and FP7
Accessed 12/04/2021

Step 2: First scanning

CODE	Acronym	Title	ID	Teaser	Programme	Start date	End date	URL	Relevant (YES/NO)
EU-01	INCEPTION	Inclusive Cultural Heritage in Europe through 3D semantic modelling	665220	INCEPTION realises innovation in 3D modelling of cultural heritage through an inclusive approach for time-dynamic 3D reconstruction of artefacts, built and social environments. It enriches the European identity through understanding of how European cultural heritage...	H2020-EU.3.6.3.	1/6/2015	31/5/2019	https://cordis.europa.eu/project/id/665220	1 -The project seems interesting and may include information on users requirements
EU-02	SILKNOW	SILKNOW. Silk heritage in the Knowledge Society: from punched cards to big data, deep learning and visual / tangible simulations	769504	Silk was a major factor for progress in Europe, mostly along the Western Silk Roadâ€™s network of production and market centres. Silk trade also allowed for exchange of ideas and innovations. Punched cards were first used in Jacquard silk looms, long before modern computers...	H2020-EU.3.6.3.1.	1/4/2018	31/8/2021	https://cordis.europa.eu/project/id/769504	1 -The project seems interesting and may include information on users requirements
EU-03	TROMPA	Towards Richer Online Music Public-domain Archives	770376	Classical music is one of the greatest treasures of Europeâ€™s cultural heritage. Although a historical genre, it is continually (re)interpreted and revitalised through musical performance.Today, most of the classical repertoire is in the public domain; massive numbers of...	H2020-EU.3.6.3.1.	1/5/2018	30/4/2021	https://cordis.europa.eu/project/id/770376	0 -The project does not seem to be relevant to 4CH project
EU-04	ARCHES	Accessible Resources for Cultural Heritage EcoSystems	693229	The popularisation of digitisation techniques has boosted the generation of digital cultural heritage assets in recent years. However, such techniques should not be regarded as an end in and of themselves, but as a means for enabling European citizens to engage with cultural...	H2020-EU.3.6.3.	1/10/2016	31/12/2019	https://cordis.europa.eu/project/id/693229	1 -The project seems interesting and may include information on users requirements
EU-05	DigiArt	The Internet Of Historical Things And Building New 3D Cultural Worlds	665066	DigiArt seeks to provide a new, cost efficient solution to the capture, processing and display of cultural artefacts. It offers innovative 3D capture systems and methodologies, including aerial capture via drones, automatic registration and modelling techniques to speed up...	H2020-EU.3.6.3.	1/6/2015	30/11/2018	https://cordis.europa.eu/project/id/665066	1 -The project seems interesting and may include information on users requirements
EU-06	Scan4Reco	Multimodal Scanning of Cultural Heritage Assets for their multilayered digitization and preventive conservation via spatiotemporal 4D Reconstruction and 3D Printing	665091	Scan4Reco will develop a novel portable, integrated and modular solution for customized and thus cost-effective, automatic digitization and analysis of cultural heritage objects (CHOs), even in situ. A multi-sensorial 3D scanning - facilitated by a mechanical arm will...	H2020-EU.3.6.3.	1/10/2015	30/9/2018	https://cordis.europa.eu/project/id/665091	1 -The project seems interesting and may include information on users requirements
EU-07	ArchAIDE	Archaeological Automatic Interpretation and Documentation of cEramics	693548	The objectives of ArchAIDE are to support the classification and interpretation work of archaeologists with innovative computer-based tools, able to provide the user with features for the semi-automatic description and matching of potsherds over the huge existing ceramic...	H2020-EU.3.6.3.	1/6/2016	31/5/2019	https://cordis.europa.eu/project/id/693548	0 -The project does not seem to be relevant to 4CH project
EU-08	EMOTIVE	Emotive Virtual cultural Experiences through personalized storytelling	727188	Storytelling applies to nearly everything we do. Everybody uses stories, from educators to marketers and from politicians to journalists to inform, persuade, entertain, motivate or inspire. In the cultural heritage sector, however, narrative tends to be used narrowly, as a...	H2020-EU.3.6.3.1.	1/11/2016	31/10/2019	https://cordis.europa.eu/project/id/727188	1 -The project seems interesting and may include information on users requirements
EU-09	PLUGGY	Pluggable Social Platform for Heritage Awareness and Participation	726765	Pluggable Social Platform for Heritage Awareness and Participation (PLUGGY) will support citizens in shaping cultural heritage and being shaped by it. PLUGGY will enable them to share their local knowledge and everyday experience with others. The participation will include...	H2020-EU.3.6.3.1.	1/12/2016	30/11/2019	https://cordis.europa.eu/project/id/726765	1 -The project seems interesting and may include information on users requirements
EU-10	NewsEye	NewsEye: A Digital Investigator for Historical Newspapers	770299	Newspapers collect information about cultural, political and social events in a more detailed way than any other public record. Since their beginnings in the 17th century they are recording billions of events, stories and names, in almost every language, every country and...	H2020-EU.3.6.3.1.	1/5/2018	31/1/2022	https://cordis.europa.eu/project/id/770299	0 -The project does not seem to be relevant to 4CH project
EU-11	CROSSCULT	CrossCult: Empowering reuse of digital cultural heritage in context-aware crosscuts of European history	693150	CROSSCULT aims to make reflective history a reality in the European cultural context, by enabling the re-interpretation of European (hi)stories through cross-border interconnections among cultural digital resources, citizen viewpoints and physical venues. The project has two...	H2020-EU.3.6.3.	1/3/2016	28/2/2019	https://cordis.europa.eu/project/id/693150	0 -The project does not seem to be relevant to 4CH project

EU-12	GIFT	Meaningful Personalization of Hybrid Virtual Museum Experiences Through Gifting and Appropriation	727040	"A main challenge with the development of virtual museums is establishing meaningful user experiences that allow for personal, complex and emotional encounters with art and cultural heritage. The GIFT project suggests creating meaningful personalization through digital gifting...	H2020-EU.3.6.3.1.	1/1/2017	31/12/2019	https://cordis.europa.eu/project/id/727040	1 -The project seems interesting and may include information on users requirements
EU-13	I-Media-Cities	Innovative e-environment for Research on Cities and the Media	693559	I-Media-Cities is the initiative of 9 European Film Libraries, 5 research institutions, 2 technological providers and a specialist of digital business models to share access to and valorise audiovisual (AV) content from their collections for research purposes in a wide range...	H2020-EU.3.6.3.	1/4/2016	31/3/2019	https://cordis.europa.eu/project/id/693559	0 -The project does not seem to be relevant to 4CH project
EU-14	iMARECULTURE	Advanced VR, iMmersive serious games and Augmented REality as tools to raise awareness and access to European underwater CULTURal heritagE.	727153	iMARECULTURE is focusing in raising European identity awareness using maritime and underwater cultural interaction and exchange in Mediterranean sea. Commercial ship routes joining Europe with other cultures are vivid examples of cultural interaction, while shipwrecks and...	H2020-EU.3.6.3.1.	1/11/2016	31/1/2020	https://cordis.europa.eu/project/id/727153	1 -The project seems interesting and may include information on users requirements
EU-15	EU-LAC-MUSEUMS	Museums and Community: Concepts, Experiences, and Sustainability in Europe, Latin America and the Caribbean	693669	"The EU-LAC-MUSEUMS project directly meets the challenge of fostering EU-CELAC relations by studying the close connections between Europe and Latin America and the Caribbean (LAC) in the field of community museology. To address this challenge, EU-LAC-MUSEUMS assembles a team...	H2020-EU.3.6.	1/9/2016	31/1/2021	https://cordis.europa.eu/project/id/693669	0 -The project does not seem to be relevant to 4CH project
EU-16	Time Machine	Time Machine : Big Data of the Past for the Future of Europe	820323	Europe urgently needs to restore and intensify its engagement with its past. Time Machine will give Europe the technology to strengthen its identity against globalisation, populism and increased social exclusion, by turning its history and cultural heritage into a living...	H2020-EU.1.2.3.	1/3/2019	29/2/2020	https://cordis.europa.eu/project/id/820323	0 -The project does not seem to be relevant to 4CH project
EU-17	V4Design	Visual and textual content re-purposing FOR(4) architecture, Design and video virtual reality games	779962	V4Design will develop a platform that provides architects, video game creators and designers of any expertise with innovative tools necessary to enhance and simplify the creative phase of the designing process. The main idea behind V4Design is to reuse (i) visual: movies...	H2020-EU.2.1.1.	1/1/2018	31/3/2021	https://cordis.europa.eu/project/id/779962	1 -The project seems interesting and may include information on users requirements
EU-18	IPERION CH	Integrated Platform for the European Research Infrastructure ON Cultural Heritage	654028	IPERION CH aims to establish the unique pan-European research infrastructure in Heritage Science by integrating national world-class facilities at research centres, universities and museums. The cross-disciplinary consortium of 23 partners (from 12 Member States and the US)...	H2020-EU.1.4.1.2.	1/5/2015	31/10/2019	https://cordis.europa.eu/project/id/654028	1 -The project seems interesting and may include information on users requirements
EU-19	ARtSENSE	Augumented RealiTy Supported adaptive and personalized Experience in a museum based oN processing real-time Sensor Events	270318	ARtSENSE tackles a very important problem in the modern usage of ICT in cultural heritage domain: bridging the gap between the digital world with the physical in a highly flexible way in order to enable a novel, adaptive cultural experience.ARtSENSE aims to develop an active ...	FP7-ICT	1/2/2011	18/11/2012	https://cordis.europa.eu/project/id/270318	1 -The project seems interesting and may include information on users requirements
EU-20	ITN-DCH	Initial Training Networks for Digital Cultural Heritage: Projecting our Past to the Future	608013	"Cultural Heritage (CH) is an integral element of Europe and vital for the creation of a common European identity and one of the greatest assets for steering Europeâ€™s social, economic development and job creation. However, the current research training activities in CH are fr...	FP7-PEOPLE	1/10/2013	30/9/2017	https://cordis.europa.eu/project/id/608013	0 -The project does not seem to be relevant to 4CH project
EU-21	STACHEM	SCIENCE AND TECHNOLOGY FOR ARCHAEOLOGY AND CULTURAL HERITAGE IN THE EASTERN MEDITERRANEAN	228130	The Eastern Mediterranean is one of the worldâ€™s richest areas in terms of archaeological remains, and cultural heritage in general; it has yielded an extraordinary variety of finds spanning all aspects of human activity. However, due to the scarcity of scientific and technolo...	FP7-INFRASTRUCTURES	1/11/2008	30/4/2010	https://cordis.europa.eu/project/id/228130	0 -The project does not seem to be relevant to 4CH project
EU-22	Terpsichore	Transforming Intangible Folkloric Performing Arts into Tangible Choreographic Digital Objects	691218	"Intangible Cultural Heritage (ICH) content means ""the practices, representations, expressions, knowledge, skills â€“ as well as the instruments, objects, artefacts and cultural spaces associated therewith"". Although, ICH content, especially traditional folklore performing...	H2020-EU.1.3.3.	1/4/2016	31/3/2020	https://cordis.europa.eu/project/id/691218	0 -The project does not seem to be relevant to 4CH project
EU-23	AniAge	High Dimensional Heterogeneous Data based Animation Techniques for Southeast Asian Intangible Cultural Heritage Digital Content	691215	"Although computer animation technology has been extensively used for films and games, it remains largely labour-intensive and expensive, with recent blockbuster films (e.g. Avatar, Gravity) costing around $1 million per minute of footage. A lot of research efforts and...	H2020-EU.1.3.3.	1/1/2016	31/12/2019	https://cordis.europa.eu/project/id/691215	0 -The project does not seem to be relevant to 4CH project
EU-24	CHESS	Cultural Heritage Experiences through Socio-personal interactions and Storytelling	270198	Cultural heritage institutions nowadays face the important challenge of making their collections more engaging to visitors, especially the young 'digital natives', while exploiting, in new forms of cultural interactive experiences, the recently developed digital libraries. An...	FP7-ICT	1/2/2011	31/3/2014	https://cordis.europa.eu/project/id/270198	1 -The project seems interesting and may include information on users requirements
EU-25	CULTURA	CULTivating Understanding and Research through Adaptivity	269973	A key challenge facing curators and providers of digital cultural heritage across Europe and Worldwide is to instigate, increase and enhance engagement with digital humanities collections. To achieve this, a fundamental change in the way cultural artefacts are experienced and...	FP7-ICT	1/2/2011	31/1/2014	https://cordis.europa.eu/project/id/269973	0 -The project does not seem to be relevant to 4CH project

EU-26	eHERITAGE	Expanding the Research and Innovation Capacity in Cultural Heritage Virtual Reality Applications	692103	Cultural heritage has always been an effervescent subject among historians, sociologists, naturalists, scientists and researchers alike. The physical and intangible legacy of previous generations is passed via this channel to future members of the society. It is a deliberate...	H2020-EU.4.b.	1/11/2015	31/10/2018	https://cordis.europa.eu/project/id/692103	1	-The project seems interesting and may include information on users requirements
EU-27	DIME4HERITAGE	Digital Media for Heritage: Refocusing Design from the Technology to the Visitor Experience	302799	The 21st century museum mission has been re-interpreted. Heritage institutions are called to improve and find new ways to present content in order to convey knowledge and engage visitors. Arguably, digital media have an increasingly prominent role in the communication and int...	FP7-PEOPLE	1/10/2012	30/9/2015	https://cordis.europa.eu/project/id/302799	0	-The project does not seem to be relevant to 4CH project
EU-28	STORM	Safeguarding Cultural Heritage through Technical and Organisational Resources Management	700191	Starting from previous research experiences and tangible outcomes, STORM proposes a set of novel predictive models and improved non-invasive and non-destructive methods of survey and diagnosis, for effective prediction of environmental changes and for revealing threats and...	H2020-EU.3.5.,H2020-EU.3.7.	1/6/2016	31/5/2019	https://cordis.europa.eu/project/id/700191	1	-The project seems interesting and may include information on users requirements
EU-29	HERITAGE PLUS	ERA-NET Plus on Cultural Heritage and Global Change Research	618104	The main objective of the HERITAGE PLUS proposal is to pool the necessary financial resources from the participating national programmes and the European Community and to launch a single Joint Call for Proposals for research projects in the cultural heritage field that will b...	FP7-ENVIRONMENT	1/10/2013	30/9/2018	https://cordis.europa.eu/project/id/618104	0	-The project does not seem to be relevant to 4CH project
EU-30	SmARTS	Smart technology for analysis and monitoring of Cultural Heritage materials	708527	The recent advances in open-source and low-cost software and hardware are increasing the number of technologies based on the â€˜sharing-knowledgeâ€™ philosophy, allowing users to develop their own instruments according to their analytical needs. The aim of SmARTS is to...	H2020-EU.1.3.2.	1/7/2016	28/7/2018	https://cordis.europa.eu/project/id/708527	1	-The project seems interesting and may include information on users requirements
EU-31	ENGHUM	Engaged humanities in Europe: Capacity building for participatory research in linguistic-cultural heritage	692199	The Faculty of â€œArtes Liberalesâ€ at the University of Warsaw aims at reaching the scientific excellence in the area of participatory action research in linguistic-cultural heritage and revitalization of endangered languages. The project will make it possible to bridge...	H2020-EU.4.b.	1/1/2016	31/12/2018	https://cordis.europa.eu/project/id/692199	0	-The project does not seem to be relevant to 4CH project
EU-32	REGOTHICVAULTDESIGN	Design Principles in Late-Gothic Vault Construction · A New Approach Based on Surveys, Reverse Geometric Engineering and a Reinterpretation of the Sources	284373	The project is dealing with the study of the design of Late Gothic vaults by correlating the existing knowledge with surveys performed on existing structures. The aim is to gain a better understanding of how the design of these highly complex structures was performed, searchi...	FP7-IDEAS-ERC	1/2/2012	31/7/2017	https://cordis.europa.eu/project/id/284373	0	-The project does not seem to be relevant to 4CH project
EU-33	TITANIUM	Software Components for Robust Geometry Processing	727334	The TITANIUM proposal aims to develop a software demonstrator for geometry processing and 3D urban modeling, in order to facilitate the pre-commercialization of novel software components for the Computational Geometry Algorithms Library. The proposed demonstrator will include...	H2020-EU.1.1.	1/1/2017	30/6/2018	https://cordis.europa.eu/project/id/727334	1	-The project seems interesting and may include information on users requirements
EU-34	SMARTCULTURE	SMART CULTURE	319987	The SmartCulture project aims to provide a sustainable access to cultural heritage to a wider range of users by the use of digital technologies. Digital technologies will help to transform passive audiences into active practitioners of culture. The consortium will promote the...	FP7-REGIONS	1/12/2012	30/11/2015	https://cordis.europa.eu/project/id/319987	1	-The project seems interesting and may include information on users requirements
EU-35	KEEP	Keeping Emulation Environments Portable	231954	KEEP (Keeping Emulation Environments Portable) will develop an Emulation Access Platform to enable accurate rendering of both static and dynamic digital objects: text, sound, and image files; multimedia documents, websites, databases, videogames etc. The overall aim of the pr...	FP7-ICT	1/2/2009	29/2/2012	https://cordis.europa.eu/project/id/231954	0	-The project does not seem to be relevant to 4CH project
EU-36	TISCH	Terahertz Imaging and Spectroscopy for Cultural Heritage	330442	The purpose of this proposed project is to establish terahertz technology as a viable, nondestructive, and noninvasive tool for the study of cultural heritage; which will contribute to the conservation and sustainability of artifacts. Terahertz spectroscopic imaging is a nasc...	FP7-PEOPLE	17/2/2014	16/2/2016	https://cordis.europa.eu/project/id/330442	1	-The project seems interesting and may include information on users requirements
EU-37	HERACLES	HEritage Resilience Against CLimate Events on Site	700395	HERACLES main objective is to design, validate and promote responsive systems/solutions for effective resilience of CH against climate change effects, considering as a mandatory premise an holistic, multidisciplinary approach through the involvement of different expertise...	H2020-EU.3.5.,H2020-EU.3.7.	1/5/2016	30/4/2019	https://cordis.europa.eu/project/id/700395	1	-The project seems interesting and may include information on users requirements
EU-38	COORDINATINGforLIFE	Coordinating for life. Success and failure of Western European societies in coping with rural hazards and disasters, 1300-1800	339647	Societies in past and present are regularly confronted with major hazards, which sometimes have disastrous effects. Some societies are successful in preventing these effects and buffering threats, or they recover quickly, while others prove highly vulnerable. Why is this? Inc...	FP7-IDEAS-ERC	1/3/2014	28/2/2019	https://cordis.europa.eu/project/id/339647	0	-The project does not seem to be relevant to 4CH project
EU-39	TOMOSLATE	New uses for X-ray Tomography in natural building stones: characterization, pathologies and restoration of historical and recent roofing slates	623082	Europe is nowadays the worldâ€™s leading producer and consumer of roofing slate. Slate quarries are found in most European countries. However, despite their importance as a building stone, roofing slates are a relatively unexamined material. In comparison with other building st...	FP7-PEOPLE	1/1/2015	31/12/2016	https://cordis.europa.eu/project/id/623082	0	-The project does not seem to be relevant to 4CH project

EU-40	TRANS-SAHARA	Trans-SAHARA: State Formation, Migration and Trade in the Central Sahara (1000 BC - AD 1500)	269418	Scholarly preoccupations and much of the available evidence have tended to emphasise the Islamic era as the historic time period when the Mediterranean seaboard was firmly and regularly connected with the Sub-Saharan zone across the Sahara. Recent research in southern Libya s...	FP7-IDEAS-ERC	1/7/2011	30/6/2017	https://cordis.europa.eu/project/id/269418	0 -The project does not seem to be relevant to 4CH project
EU-41	Fragsus	Fragility and sustainability in restricted island environments: adaptation, cultural change and collapse in prehistory	323727	Sustainability of societies in a restricted or fragile environment forms a perpetual question, past and present underpinning questions of the rise and fall of civilisation. Today, the eroded Maltese islands support one of the densest human populations in the world. When first...	FP7-IDEAS-ERC	1/5/2013	30/4/2018	https://cordis.europa.eu/project/id/323727	0 -The project does not seem to be relevant to 4CH project
EU-42	ATHENA	Remote Sensing Science Center for Cultural Heritage	691936	The â€œATHENAâ€ proposal aims to establish a Center of Excellence in the field of Remote Sensing for Cultural Heritage in the areas of Archaeology and Cultural Heritage through the development of an enhanced knowledge base and innovative methods. This center will be...	H2020-EU.4.b.	1/12/2015	30/11/2018	https://cordis.europa.eu/project/id/691936	1 -The project seems interesting and may include information on users requirements
EU-43	Geopark	Geoparks: Heritage, Education and Sustainable Development - an Innovative Methodology for Southern Countries. Case Study in Morocco (Atlas Mountains, Marrakech)	644015	According to the Charter of the European Geoparks Network adopted in Greece the 5th June of 2000, a European Geopark â€œis a territory which includes a particular geological heritage and a sustainable territorial development strategy supported by a European programme to...	H2020-EU.1.3.3.	1/1/2015	31/12/2018	https://cordis.europa.eu/project/id/644015	0 -The project does not seem to be relevant to 4CH project
EU-44	ROCK	Regeneration and Optimisation of Cultural heritage in creative and Knowledge cities	730280	ROCK aims to develop an innovative, collaborative and circular systemic approach for regeneration and adaptive reuse of historic city centres. Implementing a repertoire of successful heritage-led regeneration initiatives, it will test the replicability of the spatial approach...	H2020-EU.3.5.6.	1/5/2017	31/12/2020	https://cordis.europa.eu/project/id/730280	1 -The project seems interesting and may include information on users requirements
EU-45	JHEP	Coordination action in support of the implementation of a Joint Programming Initiative (JPI) on Cultural Heritage and Global Change : a new challenge for Europe	277606	Europeâ€™s cultural heritage is the worldâ€™s most diverse and rich patrimony attracting millions of visitors every year to monuments, historical city centres, archaeological sites and museums. Moreover, heritage is an important component of individual and collective identity. In...	FP7-ENVIRONMENT	1/10/2011	31/3/2015	https://cordis.europa.eu/project/id/277606	0 -The project does not seem to be relevant to 4CH project
EU-46	CHIEF	Cultural Heritage and Identities of Europe's Future	770464	Today, the twinned ideas of respect towards minoritiesâ€™ rights and cultural diversity that have been projected as values derived from the European historical experience are facing wel documented challenges. These include: the current radicalisation of young people in...	H2020-EU.3.6.3.2.	1/5/2018	30/4/2021	https://cordis.europa.eu/project/id/770464	0 -The project does not seem to be relevant to 4CH project
EU-47	PRESIOUS	PREdictive digitization, reStoration and degradatIOn assessment of cultUral heritage objectS	600533	Europe must proactively exploit markets in which it has strategic advantages in order to develop products that will make it a leading player. One such area is Cultural Heritage (CH). Having studied the needs of CH for a number of years, the project team is now in a position t...	FP7-ICT	1/2/2013	31/1/2016	https://cordis.europa.eu/project/id/600533	1 -The project seems interesting and may include information on users requirements
EU-48	CulturalGeosemantics	Geosemantics for Cultural Heritage Documentation â€" Domain specific ontological modelling and implementation of a Cultural Geosemantic Information System based on ISO specifications	299998	The goal of this project is the integration of semantic Cultural Heritage applications with professional Geoinformation. Based on recent developments in both disciplines it will now be possible to create the conceptual basis and to implement systems that have the advantages o...	FP7-PEOPLE	1/9/2012	28/1/2015	https://cordis.europa.eu/project/id/299998	0 -The project does not seem to be relevant to 4CH project
EU-49	IMPACT	IMProving ACcess to Text	215064	Text that is not digital is virtually invisible. Today's readers search the internet for electronically accessible texts rather than visit the reading room of a library. Born-digital and digitised contemporary materials contain the richness that allows tools such as text mini...	FP7-ICT	1/1/2008	30/6/2012	https://cordis.europa.eu/project/id/215064	0 -The project does not seem to be relevant to 4CH project
EU-50	ICEDIG	Innovation and consolidation for large scale digitisation of natural heritage	777483	Modern science requires digital access to data. European collections account for 55% of the natural sciences collections globally, holding more than 1 billion objects, which represent 80% of the worldâ€™s bio- and geo-diversity. Only around 10% of these have been digitally...	H2020-EU.1.4.1.1.	1/1/2018	31/3/2020	https://cordis.europa.eu/project/id/777483	0 -The project does not seem to be relevant to 4CH project
EU-51	SYDDARTA	SYstem for Digitization and Diagnosis in ART Applications	265151	Cultural heritage monitoring comprehends a sum of technologies, protocols and studies which need to be modernized and automated to reduce costs and process time. Current spectroscopy permits the study and characterisation of the surface of artworks by the inspection of specif...	FP7-ENVIRONMENT	1/10/2011	31/3/2014	https://cordis.europa.eu/project/id/265151	1 -The project seems interesting and may include information on users requirements
EU-52	PresWoodenHeritage	Preserving Wooden Heritage. Methods for monitoring wooden structures: 3D laser scanner survey and application of BIM systems on point cloud models	746215	Wooden Heritage has been recognized today as an object of growing interest in scientific research even on international scale, not only from the architectural point of view but also from theoretical approaches. Over the times many technological systems concerning timber have...	H2020-EU.1.3.2.	1/6/2017	7/10/2019	https://cordis.europa.eu/project/id/746215	0 -The project does not seem to be relevant to 4CH project
EU-53	VAST	Values across Space and Time	101004949	The discussion on values is now as pertinent as ever. The vision of VAST is to bring (moral) values to the forefront in the field of advanced digitisation. VAST seeks to study European values across space and time and to exploit the digitised tangible and intangible cultural...	H2020-EU.3.6.2.2.,H2020-EU.3.6.3.1.	1/12/2020	30/11/2023	https://cordis.europa.eu/project/id/101004949	0 -The project does not seem to be relevant to 4CH project

EU-54	ROVINA	Robots for Exploration, Digital Preservation and Visualization of Archeological Sites	600890	Mapping and digitizing archeological sites is an important task to preserve cultural heritage and to make it accessible to the public. Current systems for digitizing sites typically build upon static 3D laser scanning technology that is brought into archeological sites by hum...	FP7-ICT	1/2/2013	31/7/2016	https://cordis.europa.eu/project/id/600890	1 -The project seems interesting and may include information on users requirements
EU-55	SIGN-HUB	The Sign Hub: preserving, researching and fostering the linguistic, historical and cultural heritage of European Deaf signing communities with an integral resource	693349	SIGN-HUB aims to provide the first comprehensive response to the societal and scientific challenge resulting from generalized neglect of the cultural and linguistic identity of signing Deaf communities in Europe. It will provide an innovative and inclusive resource hub for the...	H2020-EU.3.6.	1/4/2016	30/4/2020	https://cordis.europa.eu/project/id/693349	0 -The project does not seem to be relevant to 4CH project
EU-56	DURAFILE	Innovative Digital Preservation using Social Search in Agent Environments	605356	Digital preservation (DP) represents the management of digital information over time to guarantee their accessibility and preserved quality. It includes processes and activities that ensure access to information and all types of records, scientific and cultural heritage that ...	FP7-SME	1/10/2013	30/9/2015	https://cordis.europa.eu/project/id/605356	0 -The project does not seem to be relevant to 4CH project
EU-57	DIXIT	Digital Scholarly Editions Initial Training Network	317436	The Digital Scholarly Editions Initial Training Network (DiXiT) is concerned with one of the most dynamic and pioneering research areas at the intersection of the humanities and computer sciences focused on digital scholarly editions. While the digital turn has challenged the...	FP7-PEOPLE	1/9/2013	31/8/2017	https://cordis.europa.eu/project/id/317436	0 -The project does not seem to be relevant to 4CH project
EU-58	PREPARINGDARIAH	Preparing for the construction of the Digital Research Infrastructure for the Arts and Humanities	211583	The grand vision for the Digital Research Infrastructure for the Arts and Humanities (DARIAH) is to facilitate access to research material for the humanities and for supporting the preservation of digital heritage material in Europe. DARIAH connects information users (researc...	FP7-INFRASTRUCTURES	1/9/2008	28/2/2011	https://cordis.europa.eu/project/id/211583	0 -The project does not seem to be relevant to 4CH project
EU-59	LAPITH	Locating and Performing Irish Theatre Histories	618909	"LAPITH aims to embed in Trinity College Dublin substantial, new methodological expertise in the use of 3D modelling and virtual worlds in arts and humanities research, by investigating historiographical approaches to and historical understandings of patterns of theatre devel...	FP7-PEOPLE	1/10/2013	31/12/2015	https://cordis.europa.eu/project/id/618909	0 -The project does not seem to be relevant to 4CH project
EU-60	ETHIO-SPARE	Cultural Heritage of Christian Ethiopia: Salvation, Preservation and Research	240720	Ethiopia is one of the countries with the most ancient Christian history, and the only country in Africa where Christianity became official religion as early as in the 4th century A.D. It is also the only country in the region where the history has been documented in written ...	FP7-IDEAS-ERC	1/12/2009	31/5/2015	https://cordis.europa.eu/project/id/240720	0 -The project does not seem to be relevant to 4CH project
EU-61	XPECAM	A New Portable Spectral Camera System for the Cultural Heritage Conservation Market	811764	Art conservators & Cultural Heritage preservation institutions need more analytical means to control their interventions in order to guarantee the maximum possible quality in their work. For that they need to know and understand their subject of work - the art piece - and the...	H2020-EU.3.,H2020-EU.2.3.,H2020-EU.2.1.	1/5/2018	31/7/2020	https://cordis.europa.eu/project/id/811764	1 -The project seems interesting and may include information on users requirements
EU-62	LEAP	LEarning of Archaeology through Presence	625537	Virtual Archaeology (VA) is a well established area at the intersection of Cultural Heritage (CH) and Information and Communication Technologies (ICT). The main goal of VA is currently to build 3D reconstructions of objects and sites for research and dissemination. However, t...	FP7-PEOPLE	1/5/2014	14/7/2016	https://cordis.europa.eu/project/id/625537	1 -The project seems interesting and may include information on users requirements
EU-63	UPLOAD	Upload. Urban Politics of London Youngsters Analyzed Digitally	332318	The main aim of the proposed study is to investigate the lived experience of cultural difference among young Londoners (between 12-18 years) of different cultural backgrounds. Internet applications such as the video sharing platform YouTube, the social-networking site Faceboo...	FP7-PEOPLE	2/9/2013	1/9/2015	https://cordis.europa.eu/project/id/332318	0 -The project does not seem to be relevant to 4CH project
EU-64	PrestoPRIME	PrestoPRIME	231161	Audiovisual content collections are undergoing a transformation from archives of analogue materials to very large stores of digital data. As time-based digital media and their related metadata are edited, re-used and re-formatted in a continuously evolving environment, the co...	FP7-ICT	1/1/2009	30/11/2012	https://cordis.europa.eu/project/id/231161	0 -The project does not seem to be relevant to 4CH project
EU-65	MONDILEX	Conceptual Modelling of Networking of Centres for High-Quality Research in Slavic Lexicography and Their Digital Resources	211938	The main objective of the project is to design the conceptual scheme of a research infrastructure supporting the networking of centres for high-quality research in Slavic lexicography, fostering their scientific capacity, integrating their digital resources and opening them u...	FP7-INFRASTRUCTURES	1/4/2008	31/3/2010	https://cordis.europa.eu/project/id/211938	0 -The project does not seem to be relevant to 4CH project
EU-66	DIGISTONE	Development of an Innovative Digital Concrete Screen for outdoor digital signage applications	314978	The DIGISTONE consortium, a group of European SME in the electronics and construction material sector, aims to address a major market opportunity in the supply of large, concrete multimedia displays primarily for outdoor digital signage and commercial applications. The consor...	FP7-SME	1/11/2012	28/2/2015	https://cordis.europa.eu/project/id/314978	0 -The project does not seem to be relevant to 4CH project
EU-67	SHAMAN	Sustaining Heritage Access through Multivalent ArchiviNg	216736	The aim of the SHAMAN Integrated Project is to investigate and develop a long-term next generation digital preservation (DP) framework and corresponding application solution environments for analysing, ingesting, managing, accessing and reusing information objects and data ac...	FP7-ICT	1/12/2007	30/11/2011	https://cordis.europa.eu/project/id/216736	0 -The project does not seem to be relevant to 4CH project

EU-68	Triangulum	Triangulum: The Three Point Project / Demonstrate. Disseminate. Replicate.	646578	The Triangulum project will demonstrate how a systems innovation approach based around the European Commissionâ€™s SCC Strategic Implementation Plan can drive dynamic smart city development. We will test the SIP across three lighthouse cities: Manchester, Eindhoven and...	H2020-EU.3.3.1.3.	1/2/2015	31/1/2020	https://cordis.europa.eu/project/id/646578	0	-The project does not seem to be relevant to 4CH project
EU-69	DFitHH	Digital Forensics in the Historical Humanities: Hanif Kureishi, The Mass Observation Archive, Glyn Moody	794164	The use of personal computers has fundamentally changed the historical record. Â‘Born digitalâ€ documents â€“ private digital archives, legal and public digital repositories, websites and social media content, digital art â€“ have entered the historical record and become...	H2020-EU.1.3.2.	1/9/2018	31/8/2019	https://cordis.europa.eu/project/id/794164	0	-The project does not seem to be relevant to 4CH project
EU-70	Co-VAL	Understanding value co-creation in public services for transforming European public administrations	770356	The main goal of Co-VAL is to discover, analyse, and provide policy recommendations for transformative strategies that integrate the co-creation of value in public administrations. The project aims to accomplish these objectives by conducting research on the paradigm shift...	H2020-EU.3.6.3.	1/11/2017	30/4/2021	https://cordis.europa.eu/project/id/770356	0	-The project does not seem to be relevant to 4CH project
EU-71	ENLARGE	ENLARGE â€“ ENergies for Local Administrations: Renovate Governance in Europe	727124	Co-design and co-production processes are promising horizontal governance tools to innovate public administrations and the public sector in general. In particular, co-design processes aim at improving policy effectiveness by including a wide range of viewpoints in the...	H2020-EU.3.6.3.	1/10/2016	30/9/2018	https://cordis.europa.eu/project/id/727124	0	-The project does not seem to be relevant to 4CH project
EU-72	CITADEL	Empowering Citizens to TrAnsform European PubLic Administrations	726755	High quality public services constitute the backbone of citizensâ€™ social welfare and are also essential to a regionâ€™s competitiveness and business entrepreneurship. Delivery of high quality public services is instrumental so that society and its economy can function...	H2020-EU.3.6.3.	1/10/2016	30/9/2019	https://cordis.europa.eu/project/id/726755	0	-The project does not seem to be relevant to 4CH project
EU-73	ISOIL	Interactions between soil related sciences - Linking geophysics, soil science and digital soil mapping	211386	As formulated in the Thematic Strategy for Soil Protection prepared by the European Commission soil degradation is a serious problem in Europe. The degradation is driven or exacerbated by human activity and has a direct impact on water and air quality, biodiversity, climate a...	FP7-ENVIRONMENT	1/6/2008	30/11/2011	https://cordis.europa.eu/project/id/211386	0	-The project does not seem to be relevant to 4CH project
EU-74	UNREST	Unsettling Remembering and Social Cohesion in Transnational Europe	693523	The main purpose of this project is to deliver new empirical yet also theoretically informed knowledge of those memory agents, practices and contexts capable of countering fixed and essentialist war and conflict memories, opening them to reflexive reinterpretation and change...	H2020-EU.3.6.	1/4/2016	31/3/2019	https://cordis.europa.eu/project/id/693523	0	-The project does not seem to be relevant to 4CH project
EU-75	COURAGE	Cultural Opposition: Understanding the Cultural Heritage of Dissent in the Former Socialist Countries	692919	The project proposes both to create an electronic registry of representative online and offline, private and public collections of cultural opposition in all former socialist countries in Europe and to study the origins, uses and changing roles of these collections in their...	H2020-EU.3.6.	1/2/2016	31/1/2019	https://cordis.europa.eu/project/id/692919	0	-The project does not seem to be relevant to 4CH project
EU-76	INNET	Innovative Networking in Infrastructure for Endangered Languages	284415	Due to globalization and an enormous technological innovation cultures and languages are subject to extreme changes and many of them will become extinct in the coming decades and with them much knowledge about nature and history. Digital archives have been setup to preserve c...	FP7-INFRASTRUCTURES	1/10/2011	30/9/2014	https://cordis.europa.eu/project/id/284415	0	-The project does not seem to be relevant to 4CH project
EU-77	PRODIMA	PRODIMA: PRObabilistic Data and information Integration with provenance MAnagement	302397	"The PRODIMA project investigates provenance-based probabilistic information integration in the semantic web. During the project, a notion of uncertain provenance will be defined for probabilistic information integration frameworks suitable in the semantic web context. Proper...	FP7-PEOPLE	1/3/2013	28/2/2015	https://cordis.europa.eu/project/id/302397	0	-The project does not seem to be relevant to 4CH project
EU-78	PHILLIPPS	Reconstructing the Phillipps Manuscript Collection: using Linked Data technologies to analyse the creation and dispersal of a major European cultural heritage collection	626696	This project aims to test and evaluate the value and applicability of innovative e-research methodologies in an important and significant field of cultural heritage research: the history and transmission of cultural objects between different collections and owners over many c...	FP7-PEOPLE	12/5/2014	11/5/2016	https://cordis.europa.eu/project/id/626696	0	-The project does not seem to be relevant to 4CH project
EU-79	CARESSES	Culture Aware Robots and Environmental Sensor Systems for Elderly Support	737858	The groundbreaking objective of CARESSES is to build culturally competent care robots, able to autonomously re-configure their way of acting and speaking, when offering a service, to match the culture, customs and etiquette of the person they are assisting. By designing robots...	H2020-EU.3.1.4.	1/1/2017	31/1/2020	https://cordis.europa.eu/project/id/737858	0	-The project does not seem to be relevant to 4CH project
EU-80	3D-PITOTI	3D acquisition, processing and presentation of prehistoric European rock-art	600545	There is ancient rock-art in most European countries and it is more common than cave art, with pictures and geometric shapes cut into rather than painted onto rock. This art exists in open-air surfaces exposed to the weather rather than inside caves. This wealth of Europe's c...	FP7-ICT	1/3/2013	29/2/2016	https://cordis.europa.eu/project/id/600545	1	-The project seems interesting and may include information on users requirements
EU-81	displays in museums	Large displays in museums	276990	The goal of this project is to examine novel ways in which large situated displays can be used in cultural heritage sites for the benefit of visitors. Museums and cultural heritage sites today are augmented with technologies aimed to enhance the visitorâ€™s experience. Handheld...	FP7-PEOPLE	1/6/2011	31/5/2014	https://cordis.europa.eu/project/id/276990	1	-The project seems interesting and may include information on users requirements

EU-82	READ	Recognition and Enrichment of Archival Documents	674943	"The overall objective of READ is to implement a Virtual Research Environment where archivists, humanities scholars, computer scientists and volunteers are collaborating with the ultimate goal of boosting research, innovation, development and usage of cutting edge technology...	H2020-EU.1.4.1.3.	1/1/2016	30/6/2019	https://cordis.europa.eu/project/id/674943	0	-The project does not seem to be relevant to 4CH project
EU-83	DIGIGLASSES	Development of 3D digital glasses for enhancing mobility of visually impaired people to open strategic product lines for participant SMEs	315127	"In DIGIGLASSES project a group of SMEs aims to develop a marketable digital tool for the visually impaired, which will be able to provide 3D vision for the users, corrected and customized for the special symptoms of the userâ€™s eye disease. By this combined solution, not only...	FP7-SME	1/8/2012	31/7/2014	https://cordis.europa.eu/project/id/315127	1	-The project seems interesting and may include information on users requirements
EU-84	CENDARI	Collaborative EuropeaN Digital/Archival Infrastructure	284432	The Collaborative EuropeaN Digital Archive Infrastructure (CENDARI) will provide and facilitate access to existing archives and resources in Europe for the study of medieval and modern European history through the development of an â€˜enquiry environmentâ€™. This environment will...	FP7-INFRASTRUCTURES	1/2/2012	31/1/2016	https://cordis.europa.eu/project/id/284432	0	-The project does not seem to be relevant to 4CH project
EU-85	Ruggedised	Rotterdam, Umea and Glasgow: Generating Exemplar Districts In Sustainable Energy Deployment	731198	The RUGGEDISED project will create urban spaces powered by secure, affordable and clean energy, smart electro-mobility, smart tools and services. The overall aims are:1. Improving the quality of life of the citizens, by offering the citizens a clean, safe, attractive...	H2020-EU.3.3.1.	1/11/2016	31/10/2021	https://cordis.europa.eu/project/id/731198	0	-The project does not seem to be relevant to 4CH project
EU-86	TROPICO	Transforming into Open, Innovative and Collaborative Governments	726840	The TROPICO project (Transforming into Open, Innovative and Collaborative Governments) aims to comparatively examine how public administrations are transformed to enhance collaboration in policy design and service delivery, advancing the participation of public, private and...	H2020-EU.3.6.3.	1/6/2017	30/11/2021	https://cordis.europa.eu/project/id/726840	0	-The project does not seem to be relevant to 4CH project
EU-87	ACTECH	Ancient ConstructionTECHniques between East and West. Building traditions, technological innovations and workmanship circulation: from Roman Arabia to Medieval Europe.	703829	This proposal is designed to study the circulation of ancient construction knowledge in the Mediterranean through an innovative and multidisciplinary approach to the analysis of built heritage. Particular attention will be given to the study of a specific construction...	H2020-EU.1.3.2.	1/3/2017	28/2/2019	https://cordis.europa.eu/project/id/703829	0	-The project does not seem to be relevant to 4CH project
EU-88	Sharing Cities	Sharing Cities	691895	Sharing Cities has four key objectives. 1) To achieve scale in the European smart cities market by proving that properly designed smart city solutions, based around common needs, can be integrated in complex urban environments. This will be done in a way that exhibits their...	H2020-EU.3.3.1.3.	1/1/2016	31/12/2021	https://cordis.europa.eu/project/id/691895	0	-The project does not seem to be relevant to 4CH project
EU-89	TIEM	TRACING IDENTITY IN THE EASTERN MEDITERRANEAN; A Digital Survey of Late Medieval Monuments in the Eastern Mediterranean Islands	231023	This project proposes the interdisciplinary examination of the monumental heritage of the Medieval Mediterranean. Specifically, the programâ€™s objective is the creation of a comprehensive digital repository of the late medieval monuments of the islands of the Eastern Mediterra...	FP7-PEOPLE	1/6/2009	31/5/2013	https://cordis.europa.eu/project/id/231023	0	-The project does not seem to be relevant to 4CH project
EU-90	CHARISMA	Cultural heritage Advanced Research Infrastructures: Synergy for a Multidisciplinary Approach to Conservation/Restoration	228330	CHARISMA is an Integrated Infrastructure Initiative that brings together 22 leading European institutions developing research on artwork materials and their deterioration finalised to the conservation of cultural heritage. The consortium has the objective to optimise the use ...	FP7-INFRASTRUCTURES	1/10/2009	31/3/2014	https://cordis.europa.eu/project/id/228330	1	-The project seems interesting and may include information on users requirements
EU-91	DaphNet	Dynamic Preservation of Interactive Art: The next frontier of Multimedia Cultural Heritage	703937	This project addresses the theoretical and methodological questions of embodied interaction with multimedia installation artthrough body movement and the use of mediation technology. The ultimate goal is the definition of an effective model for thepreservation of interactive...	H2020-EU.1.3.2.	1/2/2017	31/1/2019	https://cordis.europa.eu/project/id/703937	0	-The project does not seem to be relevant to 4CH project
EU-92	CityxChange	Positive City ExChange	824260	Trondheim, Limerick, Alba Iulia, Pisek, Sestao, Smolyan and Voru and their industry and research partners are joining forces to co-create the future we want to live in. As aspiring Lighthouse and Follower Cities, respectively, they have detailed out their ambitions into the...	H2020-EU.3.3.1.3.	1/11/2018	31/10/2023	https://cordis.europa.eu/project/id/824260	0	-The project does not seem to be relevant to 4CH project
EU-93	EXTEND	Resolution Revolution to Extend Reality	812167	The resolution of Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR) devices on the market today is just 1/100 of what the average human eye can see. This means that all visual details are lost due to heavy pixelization, which makes these devices rather...	H2020-EU.3.,H2020-EU.2.3.,H2020-EU.2.1.	1/4/2018	31/3/2020	https://cordis.europa.eu/project/id/812167	0	-The project does not seem to be relevant to 4CH project
EU-94	FLEXIBLEROBOTBEHAV	Flexible Behaviors for Humanoid Robots and Digital Humans	221319	The main application considered in this research and training project is walking humanoid robots, a second application being digital humans. The core scientific and technological results should however have a strong impact on other fields such as industrial manipulator robots...	FP7-PEOPLE	1/6/2008	31/5/2011	https://cordis.europa.eu/project/id/221319	0	-The project does not seem to be relevant to 4CH project
EU-95	RISE	Research Center on Interactive Media, Smart System and Emerging Technologies	739578	Innovation activities targeting the Smart Specialisation Strategy of Cyprus-S3Cy require a solid scientific and research basis. Despite having the highest ratio of tertiary education among adults in Europe and well performing academic institutions research is currently...	H2020-EU.4.a.	1/11/2017	31/10/2024	https://cordis.europa.eu/project/id/739578	0	-The project does not seem to be relevant to 4CH project

EU-96	REVEAL	Realising Education through Virtual Environments and Augmented Locations	732599	State-of-the art Virtual Reality (VR) technologies designed for gaming offer new opportunities for social and economic benefits in their application to education. This project will pioneer the use of mainstream PlayStation VR technologies for innovative educational...	H2020-EU.2.1.1.	1/1/2017	31/12/2018	https://cordis.europa.eu/project/id/732599	0	-The project does not seem to be relevant to 4CH project
EU-97	Home2nite	Home2nite is an innovative guest engagement platform that aims to empower the independent hotels as AirBnb did for the travel hosts.	778533	AirBnb has disrupted the travel industry by empowering ordinary people. Those ordinary people became the biggest hotel group in the world with 2.3 million rooms - Marriott group, which has recently acquired Starwood Hotels, could only became the second with 1.1 million rooms...	H2020-EU.3.6.,H2020-EU.2.3.1.	1/8/2017	31/1/2020	https://cordis.europa.eu/project/id/778533	0	-The project does not seem to be relevant to 4CH project
EU-98	Pop-Machina	Collaborative production for the circular economy; a community approach	821479	POP-MACHINA aims to demonstrate the power and potential of the maker movement and collaborative production for the EU circular economy. We draw from a number of cut-edge technologies (factory-of-the-future, blockchain) and disciplines (urban planning, architecture) to provide...	H2020-EU.3.5.4.,H2020-EU.3.5.2.	1/6/2019	31/5/2023	https://cordis.europa.eu/project/id/821479	0	-The project does not seem to be relevant to 4CH project
EU-99	SMOOHS	Smart Monitoring of Historic Structures	212939	Historic structures are often of extraordinary architecture, design or material. The conservation of such structures for next European generations is one of the main future tasks. To conserve historic structures it is more and more required to understand the deterioration pro...	FP7-ENVIRONMENT	1/12/2008	30/11/2011	https://cordis.europa.eu/project/id/212939	1	-The project seems interesting and may include information on users requirements
EU-100	COOLNESS	COoperative transmission and crOss-Layer techNiques for sEcure wireless Sensor networkS	218163	During the last decade we have witnessed an intensive growth of digital wireless and mobile communications systems. Among the different wireless technologies, Wireless Sensor Networks (WSN) have emerged recently as a new networking environment that provides end users with int...	FP7-PEOPLE	1/6/2008	31/5/2011	https://cordis.europa.eu/project/id/218163	0	-The project does not seem to be relevant to 4CH project
EU-101	PASS	Privacy Architectures for System Services	208971	The proliferation of Internet services and, perhaps unavoidably, Internet crime, has left users more vulnerable than ever before. Taken in conjunction with the expanded deployment of wireless networks and the popularity of mobile devices, this trend is exerting tremendous pre...	FP7-PEOPLE	1/12/2008	30/11/2012	https://cordis.europa.eu/project/id/208971	0	-The project does not seem to be relevant to 4CH project
EU-102	ThinkNature	Development of a multi-stakeholder dialogue platform and Think tank to promote innovation with Nature based solutions	730338	Nature-based solutions (NBS) aim to help societies to address a variety of environmental, social and economic challenges in sustainable ways. They are actions which are inspired by and supported by nature. Some involve using and enhancing existing natural solutions to...	H2020-EU.3.5.1.,H2020-EU.3.5.2.	1/12/2016	30/11/2019	https://cordis.europa.eu/project/id/730338	0	-The project does not seem to be relevant to 4CH project
EU-103	CHANSE	Collaboration of Humanities And Social Sciences in Europe	101004509	CHANSE, Collaboration of Humanities and Social Sciences in Europe, is a joint initiative of 27 research funding organisations from 24 countries. The CHANSE Programme builds on the experience of two existing networks: HERA (Humanities in the European Research Area) and NORFACE...	H2020-EU.3.6.2.2.,H2020-EU.3.6.2.1.	1/1/2021	28/2/2026	https://cordis.europa.eu/project/id/101004509	0	-The project does not seem to be relevant to 4CH project
EU-104	ACCELERATE	ACCELERATing Europe's Leading Research Infrastructures	731112	CERIC-ERIC (CERIC) is a distributed research infrastructure for fundamental and applied research on novel materials and biomaterials. The RI has been in operation for 2 years and provides open access to a broad range of instruments and expertise across research communities, in...	H2020-EU.1.4.1.1.	1/1/2017	30/6/2021	https://cordis.europa.eu/project/id/731112	0	-The project does not seem to be relevant to 4CH project
EU-105	BIHC	BIHC- Bio-inspired models of human crowds	655226	With current consumer-grade personal computers, it is possible to display 3d virtual scenes with thousands of animated individual entities at interactive frame rates. Crowd simulations are, however, too often limited to characters lacking individuality and wandering in an...	H2020-EU.1.3.2.	1/7/2015	31/12/2017	https://cordis.europa.eu/project/id/655226	0	-The project does not seem to be relevant to 4CH project
EU-106	REMOURBAN	REgeneration MOdel for accelerating the smart URBAN transformation	646511	REMOURBAN aims at the development and validation in three lighthouse cities (Valladolid-Spain, Nottingham-UK and Tepebasi/Eskisehir-Turkey) of a sustainable urban regeneration model that leverages the convergence area of the energy, mobility and ICT sectors in order to...	H2020-EU.3.3.1.3.	1/1/2015	30/6/2020	https://cordis.europa.eu/project/id/646511	0	-The project does not seem to be relevant to 4CH project
EU-107	PASIMA	Perceptual Analysis and Simulation of Real-World Materials Appearance	239294	The main goal of this project is to identify relationships between human perception of real-world materials properties and corresponding computational features. We will use Bidirectiona Texture Functions as state-of-the-art digital representation of illumination and view dep...	FP7-PEOPLE	1/2/2010	31/1/2013	https://cordis.europa.eu/project/id/239294	0	-The project does not seem to be relevant to 4CH project
EU-108	SINE2020	World class Science and Innovation with Neutrons in Europe 2020 â€“ SINE2020	654000	Todayâ€™s society is being transformed by new materials and processes. Analytical techniques underpin their development and neutrons, with their unique properties, play a pivotal role in a multi-disciplinary, knowledge-based approach. Industry and the neutron research...	H2020-EU.1.4.1.1.	1/10/2015	30/9/2019	https://cordis.europa.eu/project/id/654000	0	-The project does not seem to be relevant to 4CH project
EU-109	SONART	Sounds of Rock Art. Archaeoacoustics and post-palaeolithic Schematic art in the Western Mediterranean	627351	The proposed research project will contribute to enhance and improve the study of the archaeoacoustics of post-paleolithic rock art, a line of research still in its infancy in Europe. In the human and social sciences, research on intangible heritage is on the rise, and archae...	FP7-PEOPLE	15/9/2014	14/9/2016	https://cordis.europa.eu/project/id/627351	0	-The project does not seem to be relevant to 4CH project

EU-110	ROBUST	Rural-Urban Outlooks: Unlocking Synergies	727988	Mutually beneficial relations along rural â€“ peri-urban â€“ urban trajectories can contribute substantially to Europeâ€™s smart, sustainable and inclusive growth agenda. Success in creating synergies is largely determined by decisions made at local and regional levels...	H2020-EU.3.2.1.3.	1/6/2017	31/5/2021	https://cordis.europa.eu/project/id/727988	0 -The project does not seem to be relevant to 4CH project
EU-111	WhoLoDancE	Whole-Body Interaction Learning for Dance Education	688865	Whole-Body Interaction Learning for Dance Education WhoLoDance is aiming at both researching and innovating contemporary learning theories of embodied cognition and dance education, building on advances on neuroscience, pedagogical and learning theories, educational psychology...	H2020-EU.2.1.1.	1/1/2016	31/12/2018	https://cordis.europa.eu/project/id/688865	0 -The project does not seem to be relevant to 4CH project
EU-112	ESPACE	European Satellite PArtnership for Computing Ephemerides	263466	This ESPACE project aims at strengthening the collaboration and at developing new knowledge, new technology, and products for the scientific community in the domains of the development of ephemerides and reference systems for natural satellites and spacecraft by conjugating e...	FP7-SPACE	1/6/2011	31/5/2015	https://cordis.europa.eu/project/id/263466	0 -The project does not seem to be relevant to 4CH project
EU-113	De-RISC	De-RISC: Dependable Real-time Infrastructure for Safety-critical Computer	869945	The De-RISC project addresses computer systems within the space and aviation domains. De-RISC â€“ Dependable Real-time Infrastructure for Safety-critical Computer â€“ is a proposed project where an international consortium will introduce a hardware and software platform based...	H2020-EU.3.,H2020-EU.2.1.	1/10/2019	31/3/2022	https://cordis.europa.eu/project/id/869945	0 -The project does not seem to be relevant to 4CH project
EU-114	OPEN GARMENTS	Consumer Open Innovation and Open Manufacturing Interaction for Individual Garments	213461	The overall objective of Open Garments is the Manufacturing Service Provider (MSP) Business Model enabling individual garments. This model will enable a new way of design, production and sales of consumer designed and configured garments, based on the provision of individuali...	FP7-NMP	1/9/2008	31/8/2011	https://cordis.europa.eu/project/id/213461	0 -The project does not seem to be relevant to 4CH project
EU-115	TiBET	Tibetan Book Evolution and Technology	328247	Worldwide interest in books as artefacts and ritual objects has raised new questions as digital technology is radically transforming book production and circulation. What is a book? Can it be really reduced to its content and therefore easily made obsolete by more efficient m...	FP7-PEOPLE	1/5/2013	30/4/2015	https://cordis.europa.eu/project/id/328247	0 -The project does not seem to be relevant to 4CH project
EU-116	SOMEART	Sociological identification of the actors, practices, discourses and technologies involved in the conservation of media-art works	254783	The increasing engagement of artists with film, video, computers and the internet, has enabled the emergence of an unprecedented variety of â€˜media-artâ€™ forms, such as video-art, audio-visual installations, multimedia art, digital-art or net-art. However, the dependence of the...	FP7-PEOPLE	1/7/2010	30/6/2013	https://cordis.europa.eu/project/id/254783	0 -The project does not seem to be relevant to 4CH project
EU-117	NOMAD	Policy Formulation and Validation through non moderated crowdsourcing	288513	Collaboration and crowdsourcing are the realities of today's public Internet. The so-called "Web 2.0" represents a precious repository of thematic information, thanks to the heterogeneous content that is inserted daily and spontaneously updated by its users. Very recently, a ...	FP7-ICT	1/1/2012	31/12/2014	https://cordis.europa.eu/project/id/288513	0 -The project does not seem to be relevant to 4CH project
EU-118	FUTURES	Forefront UAV Technology for Underpinning Rainforest Environmental Sustainability	777845	The proposed FUTURES project will use the novel UAV-Lidar technology conceived and developed in the current ERC-funded PAST project, in collaboration with the Brazilian National Institute for Space Research, in an entirely different socio-economic application aimed at helping...	H2020-EU.1.1.	1/1/2018	30/6/2019	https://cordis.europa.eu/project/id/777845	0 -The project does not seem to be relevant to 4CH project
EU-119	HULDA	Hulda, the European Arts and Sciences Sailing Festival	217651	The Hulda project is the launching of an innovative travelling festival using M/S Hulda, a centennial sailing boat, as an attractive infrastructure for coordinating events raising the interest of youth, non-specialised public, universities, CSOs and science centres for bridge...	FP7-SIS	1/5/2008	31/12/2010	https://cordis.europa.eu/project/id/217651	0 -The project does not seem to be relevant to 4CH project
EU-120	SERVIVE	SERVice Oriented Intelligent Value Adding nEtwork for Clothing-SMEs embarking in Mass-Customisation	214455	SERVIVE net proposes the enlargement of the assortment of customizable clothing items currently on offer, the enhancement of all co-design aspects (functionality and fun) and the development and testing of a new production model based on decentralized networked SME cells.The ...	FP7-NMP	1/9/2008	31/8/2011	https://cordis.europa.eu/project/id/214455	0 -The project does not seem to be relevant to 4CH project
EU-121	SIMTISYS	Simulator for Moving Target Indicator System	263268	Within the framework of the FP7 3Â° call several policies are related to the maritime surveillance for safety purposes as border surveillance, traffic safety, fishery control and environmental protection and monitoring (i.e. sea platform infrastructures and sea ports). Within ...	FP7-SPACE	1/6/2011	30/11/2013	https://cordis.europa.eu/project/id/263268	0 -The project does not seem to be relevant to 4CH project
EU-122	CS-ORION	Compressed Sensing for Remote Imaging in Aerial and Terrestrial Surveillance	251605	In this project, our focus is on the design, testing, and evaluation of compressive sensing (CS) architectures for enhancing the high-quality video acquisition and delivery capabilities of remote sensing devices that will enable them to provide efficient remote imaging in aer...	FP7-PEOPLE	1/9/2010	31/8/2014	https://cordis.europa.eu/project/id/251605	0 -The project does not seem to be relevant to 4CH project
EU-123	SESAME	Securing the European Electricity Supply Against Malicious and accidental thrEats	261696	Threats for the supply of electricity have changed dramatically throughout the last decade: additional to the natural and accidental ones, the new threat of malicious attacks needs to be considered. Such attacks might be jointly imparted so as to affect large portions of the ...	FP7-SECURITY	1/5/2011	31/8/2014	https://cordis.europa.eu/project/id/261696	0 -The project does not seem to be relevant to 4CH project

EU-124	VISION	Immersive interface technologies for life-cycle human-oriented activities in interactive aircraft-related virtual products	211567	"Although Virtual Reality (VR) has demonstrated a significant potential for interactive applications on product and process development, the proven quality of the underlying technologies is still far from satisfying the real-life needs of aerospace industrial practice. VISION...	FP7-TRANSPORT	1/11/2008	30/6/2011	https://cordis.europa.eu/project/id/211567	0 -The project does not seem to be relevant to 4CH project
EU-125	Ephemeral GSI	How do groundwater-surface water interactions control recharge from ephemeral streams?	299091	The aim of this Fellowship is to develop the first detailed process understanding for how groundwater-surface water interactions (GSI) control indirect recharge in ephemeral stream catchments. Such research is urgently needed to underpin sustainable water resources management...	FP7-PEOPLE	1/11/2012	31/10/2015	https://cordis.europa.eu/project/id/299091	0 -The project does not seem to be relevant to 4CH project
EU-126	Dialing	Diagnostics of linguistic change: Mapping language change in real and apparent time	321760	The project aims to investigate the mechanisms of language change across the life-span and across the community. It provides the applicant with a platform to advance her research on linguistic change at Leipzig University by exploiting a corpus she has assembled in the last 5...	FP7-PEOPLE	1/2/2013	31/1/2017	https://cordis.europa.eu/project/id/321760	0 -The project does not seem to be relevant to 4CH project
EU-127	ULTRAMAGNETRON	Ultrafast All-Optical Magnetization Reversal for Magnetic Recording and Laser-Controlled Spintronics	214469	The aim of the proposed research is to develop â€œopto-nano-magnetismâ€ as a novel approach for future magnetic recording and information processing technology at the junction of coherent nonlinear optics, nanophotonics and magnetism. In particular, we are aiming to investigate ...	FP7-NMP	1/12/2008	30/11/2011	https://cordis.europa.eu/project/id/214469	0 -The project does not seem to be relevant to 4CH project
EU-128	HIRF SE	HIRF Synthetic Environment	205294	The HIRF SE research project has the goal of providing the aeronautics industry with a framework which can be used during the development phase to mitigate the EM aspects. In addition it will provide a considerable reduction in the certification/qualification tests required o...	FP7-TRANSPORT	1/12/2008	31/5/2013	https://cordis.europa.eu/project/id/205294	0 -The project does not seem to be relevant to 4CH project
EU-129	ADS3DV	ADS 3D Viewer: a 3D Real-Time System for the Management and Analysis of Archaeological Data	625636	ADS3DV will focus on the development of a 3D real-time system (3D viewer) for the management and analysis of archaeological data. The aim of this interactive application is not just the visualization of 3D archaeological data, but also the creation of an effective tool for th...	FP7-PEOPLE	1/10/2014	30/9/2016	https://cordis.europa.eu/project/id/625636	1 -The project seems interesting and may include information on users requirements
EU-130	3DUNDERWORLD	RAPID SCANNING AND AUTOMATIC 3D RECONSTRUCTION OF UNDERWATER SITES	268256	The primary objective of this project is the development of an innovative hardware and software solution for the rapid scanning and 3D reconstruction of objects. The system will address the complexities and problems associated with the data acquisition, processing and reconst...	FP7-PEOPLE	1/12/2010	30/11/2014	https://cordis.europa.eu/project/id/268256	1 -The project seems interesting and may include information on users requirements
EU-131	GMES-PURE	GMES - Partnership for User Requirement Evaluation	312256	"The GMES Initial Operations Programme Regulation places the lead of user interaction under EU responsibility. Supporting this, we propose to implement on behalf of the EC a transparent process for user involvement in the definition of user requirements for the Copernicus Mar...	FP7-SPACE	1/1/2013	31/12/2014	https://cordis.europa.eu/project/id/312256	0 -The project does not seem to be relevant to 4CH project
EU-132	VHiSSI	Very High Speed Serial Interfaces	284389	Space-based Earth observation and scientific instrumentation currently under development will push the limits of on-board data-handling technology. In the past Mil-Std 1553 and proprietary data-links were used to get instrument data from the instruments to the on-board mass m...	FP7-SPACE	1/1/2012	31/10/2014	https://cordis.europa.eu/project/id/284389	0 -The project does not seem to be relevant to 4CH project
EU-133	AAPD	Application and Analytics Platform Demonstration	606179	"The project AAPD is the follow-up of RAISME, the very successful 'Research for SMEs' project (Grant Agreement number 262469), that came to a successful conclusion on 31st of August 2012. RAISME was aimed at providing a configurable platform for rapid development of software ...	FP7-SME	1/7/2013	31/12/2014	https://cordis.europa.eu/project/id/606179	0 -The project does not seem to be relevant to 4CH project
EU-134	ECOGEL CRONOS	High productivity manufacturing process of composite parts based on zero emissions fast curing coatings and heated moulds	609203	The proposed project aims to the development of an ecological and innovative coating for composite parts which may be able to eliminate the styrene emissions from the workplace. Additionally, this type of coating will deliver improved production perfomance in terms of quality...	FP7-NMP	1/9/2013	31/8/2016	https://cordis.europa.eu/project/id/609203	0 -The project does not seem to be relevant to 4CH project
EU-135	SUBCOAST	A collaborative project aimed at developing a GMES service for monitoring and forecasting subsidence hazards in coastal areas around Europe	242332	The objective of SubCoast will be to develop a service for monitoring the extent and impact of subsidence in coastal lowlands and demonstrate its capability in various pilots for a variety of settings around Europe. The service will be designed to appropriately determine the ...	FP7-SPACE	1/4/2010	30/9/2013	https://cordis.europa.eu/project/id/242332	0 -The project does not seem to be relevant to 4CH project
EU-136	SPACEKIDS	Kinetic Inductance Detectors â€“ a New Imaging Technology for Observations In and From Space	313320	We propose to develop advanced imaging arrays of kinetic inductance detectors (KIDs) for space-based observations at mm-far-infrared (mm-FIR) wavelengths. This development addresses the FP7 topic SPA.2012.2.2-01: Key technologies enabling observations in and from space. Futur...	FP7-SPACE	1/1/2013	31/3/2016	https://cordis.europa.eu/project/id/313320	0 -The project does not seem to be relevant to 4CH project
EU-137	DISTRIBUTION TESTING	Algorithms for Testing Properties of Distributions	231077	In a wide variety of computational settings, where the input data is most naturally viewed as coming from a distribution, it is often crucial to determine whether the underlying distribution satisfies various properties. Examples of such properties include whether two distrib...	FP7-PEOPLE	1/9/2008	31/8/2012	https://cordis.europa.eu/project/id/231077	0 -The project does not seem to be relevant to 4CH project

EU-138	ACTRIS-2	Aerosols, Clouds, and Trace gases Research InfraStructure	654109	ACTRIS-2 addresses the scope of integrating state-of-the-art European ground-based station for long term observations of aerosols, clouds and short lived gases capitalizing work of FP7-ACTRIS. ACTRIS-2 aims to achieve the construction of a user-oriented RI, unique in the...	H2020-EU.1.4.1.2.	1/5/2015	30/4/2019	https://cordis.europa.eu/project/id/654109	0 -The project does not seem to be relevant to 4CH project
EU-139	SUCCESS	Strategic Use of Competitiveness towards Consolidating the Economic Sustainability of the european Seafood sector	635188	SUCCESS is bringing together an integrated team of scientists from all fields of fisheries and aquaculture science with industry partners and key stakeholders to work on solutions which shall improve the competitiveness of the European fisheries and aquaculture sector. The...	H2020-EU.3.2.	1/4/2015	31/3/2018	https://cordis.europa.eu/project/id/635188	0 -The project does not seem to be relevant to 4CH project
EU-140	ECOPOTENTIAL	ECOPOTENTIAL: IMPROVING FUTURE ECOSYSTEM BENEFITS THROUGH EARTH OBSERVATIONS	641762	Terrestrial and marine ecosystems provide essential services to human societies. Anthropogenic pressures, however, cause serious threat to ecosystems, leading to habitat degradation, increased risk of collapse and loss of ecosystem services. Knowledge-based conservation...	H2020-EU.3.5.5.	1/6/2015	31/10/2019	https://cordis.europa.eu/project/id/641762	0 -The project does not seem to be relevant to 4CH project
EU-141	WINN	European Platform Driving KnoWledge to INNovations in Freight Logistics	314743	European Platform Driving KnoWledge to INNovations in Freight Logistics-WINN is a step forward to increase collaboration and consensus building of the different stakeholders dealing with freight transport and logistics to define and implement research and innovation measures ...	FP7-TRANSPORT	1/10/2012	31/3/2015	https://cordis.europa.eu/project/id/314743	0 -The project does not seem to be relevant to 4CH project
EU-142	MOBI3CON	Developing Mobile 3D Data Collection, Processing and Dissemination Solution for Construction SME-s	218374	European Construction Industry Federation (FÃ©dÃ©ration de l'Industrie EuropÃ©enne de la Construction - FIEC), representing 2.4 million SME-s and The Belgian Building Research Institute (Le Centre Scientifique et Technique de la Construction - CSTC) with contributing members of ...	FP7-SME	1/1/2009	31/12/2011	https://cordis.europa.eu/project/id/218374	1 -The project seems interesting and may include information on users requirements
EU-143	L-ÂµPPT	Innovative Liquid Micro Pulsed Plasma Thruster system for nanosatellites	283279	The rapid emergence of new application domains and mission types has had a large impact on the evolution of spacecraft design. The current interest for micro-spacecrafts essentially proceeds from the wider availability of enabling technologies (micro/nano-fabrication), and fr...	FP7-SPACE	1/11/2011	31/10/2014	https://cordis.europa.eu/project/id/283279	0 -The project does not seem to be relevant to 4CH project
EU-144	SPACECAST	Protecting space assets from high energy particles by developing European dynamic modelling and forecasting capabilities	262468	Solar activity can trigger sporadic bursts of energetic particles and increase the number of high energy (MeV) particles trapped inside the Earthâ€™s radiation belts. These high energy particles cause damage to satellites and are a hazard for manned spaceflight and aviation. Th...	FP7-SPACE	1/3/2011	28/2/2014	https://cordis.europa.eu/project/id/262468	0 -The project does not seem to be relevant to 4CH project
EU-145	Climate-fit.City	Pan-European Urban Climate Services	730004	Urban areas are very vulnerable to climate change impacts, because of the high concentration of people, infrastructure, and economic activity, but also because cities tend to exacerbate climate extremes such as heat waves and flash floods. The objective of the Pan-European...	H2020-EU.3.5.1.	1/6/2017	29/2/2020	https://cordis.europa.eu/project/id/730004	0 -The project does not seem to be relevant to 4CH project
EU-146	PERCEIVE	Perception and Evaluation of Regional and Cohesion policies by Europeans and Identification with the Values of Europe	693529	The PERCEIVE (Perception and Evaluation of Regional and Cohesion policies by Europeans and Identification with the Values of Europe) project aims at both mapping and explaining inte and intra-regional variations in: a) the experiences and results of cohesion policy...	H2020-EU.3.6.	1/9/2016	31/8/2019	https://cordis.europa.eu/project/id/693529	0 -The project does not seem to be relevant to 4CH project
EU-147	REALMARS	RESEARCH ON LOCATION ESTIMATION IN MULTI-CARRIER SYSTEMS	231042	Multi-carrier (MC) transmission, in particular orthogonal frequency division multiplexing (OFDM), is employed in various systems mainly due to its robustness. In particular, with the deployment of WiMAX (and the upcoming LTE) systems, research in OFDM hastened. In OFDM system...	FP7-PEOPLE	15/7/2009	14/7/2011	https://cordis.europa.eu/project/id/231042	0 -The project does not seem to be relevant to 4CH project
EU-148	FLARECAST	Flare Likelihood and Region Eruption Forecasting	640216	Space weather can have detrimental, and in some cases catastrophic, effects upon a multitude of technologies on which we depend as part our daily lives. Adverse space weather is now known to result from solar flares and coronal mass ejections released from the turbulent and...	H2020-EU.2.1.6.	1/1/2015	31/12/2017	https://cordis.europa.eu/project/id/640216	0 -The project does not seem to be relevant to 4CH project
EU-149	COLHD	Commercial vehicles using Optimised Liquid biofuels and HVO Drivetrains	769974	A consortium of industrial and academic leading players covering the entire value chain of road transport has joined forces to commonly address the need to prove feasible and environmental-friendly cases of alternative fuels to fossil diesel for road transport, acknowledging...	H2020-EU.3.4.	1/11/2017	31/10/2020	https://cordis.europa.eu/project/id/769974	0 -The project does not seem to be relevant to 4CH project
EU-150	FASTEN	Fine-Grained Analysis of Software Ecosystems as Networks	825328	A popular form of software reuse involves linking open source software (OSS) libraries hosted on centralized code repositories, such as Maven or PyPI. Developers only need to declare dependencies to external libraries, and automated tools make them available to the workspace...	H2020-EU.2.1.1.	1/1/2019	31/12/2021	https://cordis.europa.eu/project/id/825328	0 -The project does not seem to be relevant to 4CH project
EU-151	ADINE	Art and Death in Neolithic Europe	301990	"In Neolithic Western Europe, monumental tombs were frequently decorated with engraved and painted art. Archaeologists have rarely asked why there is such an association between art and death. How was art used to create spaces appropriate for the performance of deathways? Sin...	FP7-PEOPLE	1/9/2012	31/8/2014	https://cordis.europa.eu/project/id/301990	0 -The project does not seem to be relevant to 4CH project

EU-152	SWORM	"Stone-working across the ancient Mediterranean. Building techniques, artisans and cultural identities: a view from North Africa"	272340	"The proposed research concerns a multi-disciplinary study of stone-working techniques in the ancient Mediterranean starting from an archaeological analysis of built structures. In particular it focuses on the so-called opus Africanum, a group of masonry techniques characteri...	FP7-PEOPLE	1/11/2011	31/10/2013	https://cordis.europa.eu/project/id/272340	1	-The project seems interesting and may include information on users requirements
EU-153	THE LAST SONG	The Last Song of the Troubadours: Linguistic Codification and Construction of a Literary Canon in the Crown of Aragon (14th and 15th centuries)	241070	This project aims at the edition, study and interpretation of the troubadour poetry written in the Crown of Aragon between the 14th and 15th centuries, with special attention to its reception by a learned public of connoisseurs haunted by the myth of courtly love and its asso...	FP7-IDEAS-ERC	1/11/2009	30/6/2013	https://cordis.europa.eu/project/id/241070	0	-The project does not seem to be relevant to 4CH project
EU-154	MECHANICS	IAPP MeChanICs - Marie Curie linking Industry to CERN	251427	The aim of Marie Curie linking Industry to CERN (MeChanICs) is to enhance knowledge exchange in the field of precision manufacturing. The project gathers five specialised precisior manufacturer companies of excellence, of which one is an SME, to enhance their existing researc...	FP7-PEOPLE	1/9/2010	31/8/2014	https://cordis.europa.eu/project/id/251427	0	-The project does not seem to be relevant to 4CH project

Appendix 3 – Projects results short list

CORDIS DATABASE
"DIGITAL AND HERITAGE" Limited to Projects H2020 and FP7
Accessed 12/04/2021

			Step 2: First scanning	**Step 3: General information**					**Step 3: Categorisation**											
CODE	**Acronym**	**Title**	**Relevant (YES/NO)**	**User needs analysed in the project? (Y/N)** *Does the project provide a deliverable/information addressing users needs?*	**Document title** *Please provide the Title of the document referring to users needs*	**Year of publication** *Year of publication of the document*	**Public/restricted** *Is it a public or confidential deliverable?*	**Link to publication**	**User Category** *Please, select the main user category. If it is a multiple choice, please include a new row per category*	**Purpose macrocategory**	**Purpose of digitization**	**CH Type**	**Structure/scale**	**Users jobs** *Please list main problems users are trying to solve; Task users are trying to perform in their work; Objectives they try to achieve*	**Users pains** *Please describe the obstacles that could affect users while they are performing the actions listed in the "users jobs" (main difficulties and challenges; negative social consequences; risks)*	**Users gains** *Describe benefits users expect/desire/would be surprised to obtain while performing the activities listed in the "users jobs" (savings, quality, easiness of procedure, what are they looking for?)*	**FIELD**	**NEED01**	**NEED02**	**NEED03**
EU-01	INCEPTION	Inclusive Cultural Heritage in Europe through 3D semantic modelling	1 -The project seems interesting and may include information on users requirements	YES	1) Establishment of stakeholder panel, value-added assessment and State of the Art; 2) Knowledge management and collaboration method; 3) Use case definition responding to	1) 2016 2) 2016 3) 2016 4) 2017	Public	https://cordis.europa.eu/project/id/665220/results	Public and/ or private heritage institutions responsible for managing monuments and sites	Conservation	Documentation of CH	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Analyse different surveys and documentation for CH management and restoration	The management of complex sites requires a deep understanding of the current situation and expected results for evidence decision-making Difficulties in using or adapting to new different software and hardware	Data models to improve information integration Interoperable data models and easily accessible for all user groups	TECHNOLOGIES/ MODELS	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	UN12 - Facilitate digital models sharing and information exchange	UN16 - Time upgradable 3D modelling
EU-04	ARCHES	Accessible Resources for Cultural Heritage EcoSystems	1 -The project seems interesting and may include information on users requirements	YES	1) Towards a participatory museum. How-to-Guide on inclusive activities 2) D3.1 "Report on system architecture definition"	1) 2019 2) 2017	Public	1) https://www.arches-project.eu/wp-content/uploads/2019/07/EnglishGuide_Hyperlinks.pdf 2) https://www.arches-project.eu/deliverables/	General and educational users and visitors, tourists	Valorisation	Communication of CH	Artifact	Collection	There are two types of users: a) People with difficulties associated with perception, memory, cognition or communication; b)Citizens in general and especially older people, scholars, etc. Disabled people have different access preferences in their CH visiting experiences: 1) they want to be autonomous and	Not receiving appropiate or qualified support in those experiences: people with physical support needs, people with hearing loss, people with interpretation needs, people with a visual impairment and people with partial sight, people with learning difficulties	Adapted and amazing museum activities to their disabilities	ICT IN MUSEUMS	UN02 - Solutions for adapting content aiming to an inclusive, accessible and barrier-free museum		
EU-05	DigiArt	The Internet Of Historical Things And Building New 3D Cultural Worlds	1 -The project seems interesting and may include information on users requirements	YES	Testing Protocol, Evaluation Results & Revised Requirements (I and II)	1) 2017 2) 2018	Public	https://cordis.europa.eu/project/id/665066/results	Museum curators	Valorisation	Communication of CH	Artifact	Collection	Offer interactive games and personalised content for museums visitors meeting the expectations of the general public	Lack of enough digital information explaining the content available in the museum	Advanced abilities for viewing or interacting with digital models	ICT IN MUSEUMS	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	UN03 - Creating interactive museum experiences to better connect visitors	
EU-06	Scan4Reco	Multimodal Scanning of Cultural Heritage Assets for their multilayered digitization and preventive conservation via spatiotemporal 4D Reconstruction and 3D Printing	1 -The project seems interesting and may include information on users requirements	YES	1) End-User based Evaluation Report 2) Scientific end-user and public requirements	1) 2015 2) 2017	Public	https://cordis.europa.eu/project/id/665091/results https://scan4reco.iti.gr/public-deliverables	Professionals and SMEs providing services or products for preservation, conservation and restoration	Preservation	Diagnostic activities	Artifact	Collection	Analyse the surface appearance and identify materials' properties to characterize the state of conservation of an artwork and define the most appropiate restoration intervention	Reduce risks associated to objects manipulation and increase safety of operation Understand effectivity of restoration and maintenance treatments according to their evolution over time and their applicability under particular environment conditions	Facilitate conservation, by indicating spots/segments of cultural objects that are in eminent conservation need and require special care and suggestions over conservation methods that should be followed.	TECHNOLOGIES/ MODELS	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	UN13 - Highly accurate digital surrogates for conservation method selection and simulation of aeging effects	
EU-08	EMOTIVE	Emotive Virtual cultural Experiences through personalized storytelling	1 -The project seems interesting and may include information on users requirements	YES	Storytelling for cultural heritage	2016-2019	Public	https://emotiveproject.eu/	General and educational users and visitors, tourists	Valorisation	Communication of CH	Artifact	Collection	For heritage professionals: provide a powerful storytelling engine and a set of rich digital media assets that can be used to create detailed characters and narratives featuring archaeological sites or collections of artefacts For visitors: receive dramatic, emotionally engaging stories that	Organisational and practical challenges for designing digital visitor experiences	Wherever visitors are, they can follow characters, look for clues and explore environments alone or with family and friends	ICT IN MUSEUMS	UN03 - Creating interactive museum experiences to better connect visitors		
EU-09	PLUGGY	Pluggable Social Platform for Heritage Awareness and Participation	1 -The project seems interesting and may include information on users requirements	YES	D2.2 Users Engagement Report	2016	Public	https://www.pluggy-project.eu	General and educational users and visitors, tourists	Valorisation	Encounters with communities	Monuments / groups of buildings / sites (and landscape)	landscape	Achieve appropriate user's engagement in CH activities and share local knowledge and everyday experience, together with the contribution of cultural institutions	Society to be actively involved in cultural heritage activities (as observer & creator)	Social networking platform for cultural heritage, which gives voice to the citizens across Europe, enables them to safeguard and enrich the European cultural heritage landscape. Empowering European citizens to be actively involved in cultural heritage activities and act not only as observers, but also as	KNOWLEDGE SHARING AND VISUALISATION	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator		
EU-12	GIFT	Meaningful Personalization of Hybrid Virtual Museum Experiences Through Gifting and Appropriation	1 -The project seems interesting and may include information on users requirements	YES	Recommendations on: Experience Design – these recommendations were developed by testing design approaches as part of making experiments			https://gifting.digital/experience-design/ https://gifting.digital/organisational-change/	Museum curators	Valorisation	Communication of CH	Artifact	Collection	Create a digital visitor experience and more personal experiences Fostering innovative digital practices to engage more people	Organisational and practical challenges for designing digital visitor experiences Tech ideas sometimes dominate design projects Existing collections metadata tends to focus on traditional 'object focused' museological and historical interpretations, rather than	Friendly and easy tools and methods for imporving experiences in the museum sector Facilitate more democratic forms of knowledge construction and create other forms of narratives	ICT IN MUSEUMS	UN03 - Creating interactive museum experiences to better connect visitors		
EU-14	iMARECULTURE	Advanced VR, iMmersive serious games and Augmented REality as tools to raise awareness and access to European underwater CULTURal heritagE.	1 -The project seems interesting and may include information on users requirements	YES	1) Requirements from User Community 2) Analysis of pedagogical and cognitive framework	1) 2017 2) 2017	Public	https://cordis.europa.eu/project/id/727153/results	General and educational users and visitors, tourists	Valorisation	Communication of CH	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Bring unreachable underwater cultural heritage within digital reach of the wide public using virtual visits and immersive technologies; Reusing existing 3D data of underwater shipwrecks and sites; Games thought social media, to facilitate information exchange among users	Technological requirements / issues Difficulties to reach an interactive and engaging digital storytelling (interface, information, contents, ecc.) Too long stories to keep the attention of users Problems with navigation	Possibility for users to choose their way Novel way of presenting information, invokes curiosity founded on known denotations and motivates users to stay with it till the end	TECHNOLOGIES/ MODELS	UN05 - Enhancing and making accessible underwater or inaccessible heritage		
EU-17	V4Design	Visual and textual content re-purposing FOR(4) architecture, Design and video virtual reality games	1 -The project seems interesting and may include information on users requirements	YES	D6.2 Technical requirements and architecture	2018	Public	https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5bee79d19&appId=PPGMS	Companies from the creative industry producing heritage-based content, apps, games, education and tourism services	Valorisation	Gamings with CH	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Architectural design, related to existing or historical buildings and their environments to study and visually communicate design options Design of virtual environments, related to TV series and VR video games	Acquisition of digital models of existing architecture and related spatial elements from various content providers	Reconstructions of the general geometry and related spatial elements (textures) and surrounding elements Reuse and availability of existing digital assets	TECHNOLOGIES/ MODELS	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing		
EU-19	ARtSENSE	Augumented RealiTy Supported adaptive and personalized Experience in a museum based oN processing real-time Sensor Events	1 -The project seems interesting and may include information on users requirements	YES	Digital Libraries and Digital Preservation	2019	Public	https://cordis.europa.eu/project/id/270318	Museum curators	Valorisation	Communication of CH	Artifact	Collection	Lead to the new generation of mobile museum guides based on the novel concept of Adaptive Augmented Reality (A2R).	Multimedia guide can detract visitors' attention from real objects and artifacts and mobile visitors' guide might put individual visitors in a 'technological bubble'	With A2R, artworks become active artefacts that react on users' attention and emotions and provide more information about them.	ICT IN MUSEUMS	UN03 - Creating interactive museum experiences to better connect visitors		
EU-24	CHESS	Cultural Heritage Experiences through Socio-personal interactions and Storytelling	1 -The project seems interesting and may include information on users requirements	YES	The CHESS project (1) + Digital Libraries and Digital Preservation (2)	1) 2011-2016 2) 2017	Public and Restricted	http://www.chessexperience.eu ; https://cordis.europa.eu/project/id/270198	Museum curators	Valorisation	Communication of CH	Artifact	Collection	Integrate interdisciplinary research in personalization and adaptivity, digital storytelling, interaction methodologies, and narrative-oriented mobile and mixed reality technologies, with a sound theoretical basis in museological, cognitive, and learning sciences	Create 'people focused' interpretations	The experiencing of personalized interactive stories for visitors of cultural sites and the creation of narrative-driven cultural "adventures" through hybrid structures, which adapt continuously to their visitors, extend over space and time.	ICT IN MUSEUMS	UN03 - Creating interactive museum experiences to better connect visitors		
EU-26	eHERITAGE	Expanding the Research and Innovation Capacity in Cultural Heritage Virtual Reality Applications	1 -The project seems interesting and may include information on users requirements	YES	3D Reconstruction as a Service – Applications in Virtual Cultural Heritage Author(s): Octavian-Mihai Machidon, Cristian-Cezar Postelnicu, Florin-Stelian Girbacia	2016	Public	3D Reconstruction as a Service – Applications in Virtual Cultural Heritage | SpringerLink	Professional researchers	Conservation	Communication of CH	Artifact	Collection	Digital preservation of cultural artefacts (to prevent permanent loss), creating educational resources, creating digital replicas (to avoid damages when manipulating) Increase competitive research and extend innovation capacity in digital preservation of artefacts	Reduce risks associated to objects manipulation and increase safety of operation Challanging computing and storing resources and need of specialized users for data acquisition and reconstruction	Service oriented solution that doesn't require for specialised skills in digital recontruction	TECHNOLOGIES/ MODELS	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	UN15 - The need to have a digital replica for studies and conservation purposes	
EU-28	STORM	Safeguarding Cultural Heritage through Technical and Organisational Resources Management	1 -The project seems interesting and may include information on users requirements	YES	D3.2: System and User Requirements D10.4: Stakeholders Group Report v1 D10.5: Stakeholders Group Report v2	2016 2016		Safeguarding Cultural Heritage through Technical and Organisational Resources Management | STORM Project | H2020 | CORDIS | European	Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization	Preservation	Identification of the risks and deteroration patterns	Monuments / groups of buildings / sites (and landscape)	settlement	Preventive strategies aimed at protecting EU cultural buildings and sites Cultural heritage authorities - the main decision makers and play an important role in deciding what kind of intervention can be undertaken. They also have the responsibility of: handling and	More reliable maintenance, quick restoration and long-term conservation of the Cultural Heritage assets Failure of existing policies and validation of new knowledge in government understanding to better act in the prevention (to mitigate the effect of climate phenomena) and intervention (when a	Preventive action on the conservation of historic structures, emergency measures (to mitigate natural or climate change-caused disasters), and a network of shared knowledge and tools among all European partners, bring a valuable contribution that will allow stakeholders to go far beyond the current practices	TECHNOLOGIES/ MODELS	UN06 - The need of comprehensive risk assessment methods for cultural heritage affected by climate change and natural hazards		
EU-37	HERACLES	HEritage Resilience Against CLimate Events on Site	1 -The project seems interesting and may include information on users requirements	YES	Deliverable D1.2-Definition of the end users requirements with emphasis on HERACLES test-beds.	2018	Public	http://www.heracles-project.eu/sites/default/files/pages/documents/d1.2-1-55.pdf http://www.heracles-project.eu/sites/default/files/pages/d	Public and/ or private heritage institutions responsible for managing monuments and sites	Preservation	Identification of the risks and deteroration patterns	Monuments / groups of buildings / sites (and landscape)	settlement	Risk and disaster management of CH sites: The heritage management could create opportunities and threats, and can impose constraints on decision making. Most of these impact factors are beyond the direct control of	CH managers, but nevertheless, affect heritage site strategies, final impacts and outcomes. Furthermore, many of the factors are inter-related, for example, local economy could affect heritage site funding or the policy context could affect the legislative framework. *Decide whether and how to carry out a monitoring and/or a	Tools to be delivered - not only data repository, but a real supporting decision system: The presence of monitoring network a global vision of the CH assets/structures and of the territory To have necessary tools for an effective prioritization/planning of	TECHNOLOGIES/ MODELS	UN06 - The need of comprehensive risk assessment methods for cultural heritage affected by climate change and natural hazards		
EU-42	ATHENA	Remote Sensing Science Center for Cultural Heritage	1 -The project seems interesting and may include information on users requirements	YES					Professional researchers	Conservation	Creation of partnership and networking	Monuments / groups of buildings / sites (and landscape)	landscape	Increase research capabilities and create a network allowing transfer of knowledge	Gap in research capabilities between low-performing and leading institutions	Providing and supporting transnational access to the Center infrastructures for RS to CH strengthening high-quality collaboration in and outside the EU and access to high-quality information and services for the user communities (research, CH protection authorities, etc.), in particular also making benefit of	EDUCATION	UN07 - Spreading knowledge on remote sensing applications for cultural heritage sites		
EU-44	ROCK	Regeneration and Optimisation of Cultural heritage in creative and Knowledge cities	1 -The project seems interesting and may include information on users requirements	YES	participatory approaches and social inclusion in cultural heritage	2019	Public	https://rockproject.eu/documents-list	Associations, NGOs, local communities and citizens aiming at maintaining and communicating cultural heritage	Conservation	Adaptive re-use of CH	Monuments / groups of buildings / sites (and landscape)	settlement	Involvement of users and citizens in co-creation process of spaces and policies as well. The development of the area is managed in an organic way, with as little legislation as possible, in cooperation with the end users, i.e. the future residents	Transforme historic city centres afflicted by physical decay, social conflicts and poor life quality into Creative and Sustainable Districts	Systemic approach to promote the effective regeneration and adaptive reuse in historic city centres by replicating successful heritage-led regeneration initiatives	TECHNOLOGIES/ MODELS	UN08 - Common protocols, implementation guidelines and sharing of lessons learned for regeneration and adaptive reuse of historic city centres		
EU-54	ROVINA	Robots for Exploration, Digital Preservation and Visualization of Archeological Sites	1 -The project seems interesting and may include information on users requirements	YES	Paper 1: A user perspective on the ROVINA project Paper 2: Robots for Exploration, Digital Preservation and Visualization of Archeological Sites	1) 2015 2) 2016	Public	1) http://hdl.handle.net/11573/924701 2) http://www.rovina-project.eu/system/papers/pdfs/000/000/029/original/rovina16aich.pdf?1	Professionals and SMEs providing services or products for preservation, conservation and restoration	Preservation	Documentation of CH	Monuments / groups of buildings / sites (and landscape)	settlement	To provide novel technology that supports the preservation of cultural heritage by allowing the acquisition of digital models in hard-to-access environments. ROVINA will provide flexible user-interfaces providing different levels of autonomy and addressing the needs of different user	Digitization in hard environment	To allow experts, virtual tourists and potentially construction companies to carefully inspect otherwise inaccessible historic sites. To provide flexible user-interfaces providing different levels of autonomy and addressing the needs of different user groups	TECHNOLOGIES/ MODELS	UN05 - Enhancing and making accessible underwater or inaccessible heritage		
EU-61	XPECAM	A New Portable Spectral Camera System for the Cultural Heritage Conservation Market	1 -The project seems interesting and may include information on users requirements	YES	Description of the technology in the Website of the project		Public	https://xpecam.com	Professionals and SMEs providing services or products for preservation, conservation and restoration	Preservation	Project of restoration	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Precision conservation and restoration interventions based on analytical studies	Costly analytic services and instrumentation that requires specialised knowledge	Increase productivity, quality and speed of a restoration process	TECHNOLOGIES/ MODELS	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	UN14 - Reduced specialised equipment knowledge for diagnosis studies	
EU-62	LEAP	LEarning of Archaeology through Presence	1 -The project seems interesting and may include information on users requirements	YES	LEAP User Group	2014-2016	Public	https://www.upf.edu/web/leap/grup-usuaris-leap	Professionals and SMEs providing services or products for preservation, conservation and restoration	Conservation	Communication of CH	Monuments / groups of buildings / sites (and landscape)	settlement	Archaeological virtual reconstructions	Increase flexibility in audience and environments to better understand past societies	To design and evaluate experiences that would enhance understanding, social relevance and enjoyment of Cultural Heritage.	ICT IN MUSEUMS	UN09 - Creating immersive, populated, interactive reconstructions of archaeological sites to enhance users experiences		
EU-80	3D-PITOTI	3D acquisition, processing and presentation of prehistoric European rock-art	1 -The project seems interesting and may include information on users requirements	YES	1) Definition of stakeholders and future scenarios (D1.1) 2) Multi-user 3D interaction techniques for archaeological exploration of rock-engravings (D5.1 – D6.2 – D6.3)	D1.1_November 2013 D5.1_August 2015 D6.2-D6.3_February 2016	D1.1_Public D5.1_Confidential D6.2-D6.3_Confidential	D1.1: https://cordis.europa.eu/project/id/600545/reporting	Museum curators	Conservation	Documentation of CH	Artifact	Open air/ landscape	Development and evaluation of interactive 3D visualisation and presentation techniques to provide access to the enriched high resolution digital rock-art for scientis, museum visitors, school children and web users.	PITOTI are now so badly eroded that they can only be seen when the light shines on them from a certain direction.	Allow archaeologists to scan in high resolution, at multiple scales and in less time — regardless of the number of engravings Large numbers of Pitoti can be compared between each other and to rock art at other locations.	TECHNOLOGIES/ MODELS	UN10 - The need of high resolution interactive 3D visualization tools	UN12 - Facilitate digital models sharing and information exchange	
EU-81	displays in museums	Large displays in museums	1 -The project seems interesting and may include information on users requirements	YES	The Influence of a Location-Aware Mobile Guide on Museum Visitors' Behavior	2013	Public	https://www.researchgate.net/profile/Joel-Lanir/publication/258023251_The_Influence_of_a_Location-Aware_Mobile_Guide_on_Museum	Museum curators	Valorisation	Communication of CH	Artifact	Collection	Ethnographic observations of visitor behavior in order to improve their educational exhibits	Multimedia guide can detract visitors' attention from real objects and artifacts using a mobile visitors' guide might put individual visitors in a 'technological bubble'making it difficult for them to keep track of their companions or family members, and converse about what they	Promote ways in which technology can enhance rather than reduce group experience use navigational support and recommendation capabilities in order for the system to proactively suggest group-oriented ideas to visitors who split	ICT IN MUSEUMS	UN03 - Creating interactive museum experiences to better connect visitors		
EU-99	SMOOHS	Smart Monitoring of Historic Structures	1 -The project seems interesting and may include information on users requirements	YES	Fact Sheet: Objective + Reporting: Final Report Summary	2019	Public	https://cordis.europa.eu/project/id/212939	Professionals and SMEs providing services or products for preservation, conservation and restoration	Preservation	Identification of the risks and deteroration patterns	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Conserve historic structures understanding the deterioration processes mainly caused by the environment.	In certain cases continuous monitoring systems have been installed to obtain information about the deterioration processes. However, most of these monitoring systems were just weather or air pollution data acquisition systems and use only basic models for data analysis. The real influence of the environment to the structure or	A software which can be continuously updated and broadened to handle specific questions arising at objects, steer various combinations of sensors and be open for extensions in the future	TECHNOLOGIES/ MODELS	UN11 - Smart monitoring systems with minimally invasive installation and analysis systems to identify deterioration processes		

Appendix 4 – Papers results All

SCOPUS DATABSE

(TITLE-ABS-KEY (digital AND heritage AND users AND requirements) OR TITLE-ABS-KEY (digital AND heritage AND users AND needs)) AND (EXCLUDE (PREFNAMEAUID , "Undefined#Undefined")) AND (EXCLUDE (SUBJAREA , "PHYS") OR EXCLUDE (SUBJAREA , "CENG") OR EXCLUDE (SUBJAREA , "CHEM") OR EXCLUDE (SUBJ

Accessed 12/04/2021

Step 2: First scanning

CODE	Authors,Title,Year,Source title,Volume,Issue,Art. No.,Page start,Page end,Page count,DOI,Link,Abstract	User needs analysed in the projec *Does the project provide a deliverabl*
DHUR-01	Agosti M., Ferro N., Silvello G.,"Digital library interoperability at high level of abstraction",2016,"Future Generation Computer Systems","55",,,"129","146",,"10.1016/j.future.2015.09.020","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84945217882&doi=10.1016%2fj.future.2015.09.020&partnerID=40&md5=0c0bc94cd210a24b7ff9990c784a0a55","Digital Library (DL) are the main conduits for accessing our cultural heritage and they have to address the requirements and needs of very diverse memory institutions, namely Libraries, Archives and Museums (LAM). Therefore, the interoperability among the Digital Library System (DLS) which manage the digital resources of these institutions is a key concern in the field. DLS are rooted in two foundational models of what a digital library is and how it should work, namely the DELOS Reference Model and the Streams, Structures, Spaces, Scenarios, Societies (5S) model. Unfortunately these two models are not exploited enough to improve interoperability among systems. To this end, we express these foundational models by means of ontologies which exploit the methods and technologies of Semantic Web and Linked Data. Moreover, we link the proposed ontologies for the foundational models to those currently used for publishing cultural heritage data in order to maximize interoperability. We design an ontology which allows us to model and map the high level concepts of both the 5S model and the DELOS Reference Model. We provide detailed ontologies for all the domains of such models, namely the user, content, functionality, quality, policy and architectural component domains in order to make available a working tool for making DLS interoperate together at a high level of abstraction. Finally, we provide a concrete use case about digital annotation of illuminated manuscripts to show how to apply the proposed ontologies and illustrate the achieved interoperability between the 5S and DELOS Reference models. © 2015 Elsevier B.V. All rights reserved."	1 - The paper could be interesting but it is neccessary to read more
DHUR-02	Agosti M., Orio N.,"User requirements for effective access to digital archives of manuscripts",2012,"Journal of Multimedia","7","2",,"217","222",,"10.4304/jmm.7.2.217-222","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84861912809&doi=10.4304%2fjmm.7.2.217-222&partnerID=40&md5=cfe90a58ffc0e2b0c501081d5f1a67fe","The availability of digital multimedia resources for cultural heritage poses challenging questions about the kind of interaction that is necessary to foresee to make them available to distinct categories of users. We report on a study on user requirements carried out on two groups of users: domain professional researchers, who need to carry out their research exploiting the functions of digital archives, and nondomain researchers, who need to enhance their experience of digital content and do not have a specific research interest for the digital content. A digital archive of illuminated manuscripts, called IPSA, has been used as a case study for recollecting user requirements. The results highlighted a number of additional requirements by specialized and by non-domain users. The relations between these outcomes provide relevant insights into the role of digital resources for the study and dissemination of cultural heritage. © 2012 ACADEMY PUBLISHER."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-03	Aiello D., Fai S., Santagati C.,"VIRTUAL MUSEUMS AS A MEANS for PROMOTION and ENHANCEMENT of CULTURAL HERITAGE",2019,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","42","2/W15",,"33","40",,"10.5194/isprs-archives-XLII-2-W15-33-2019","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85072175610&doi=10.5194%2fisprs-archives-XLII-2-W15-33-2019&partnerID=40&md5=f2ebac887d7b04119404d8e984e89139","The use of virtual reality and ICT in the museum context provides a new key to understand and promote Cultural Heritage: thanks to these technologies the user has the opportunity to experience without the need to come into contact with the real objects. For the museum institutions VR and ICT are a valuable tool that allows them to perform different cultural tasks, addressing the public in a much more effective way than has previously been possible. Especially through VR, it is possible to reconstruct the original context of the artworks through the interconnection of contents: the virtual visitor, while viewing the artwork, can consult useful contents for the learni process. Another revolutionary element introduced by the new technologies is linked to the possibility of creating virtual exhibitions through which it is possible to exhibit works that are not accessible or not visible. These reflections and these theoretical principles were the basis for the development of the project proposal presented in these pages, that was born as a collaboration between the R3D Lab of the Museo della Rappresentazione of University of Catania and the CIMS Lab of Carleton University, Ottawa. It consists in the creation of a virtual museum, the Timeless Museum, in order to create an educational experience, able to make the users reflect on topics such as the value of history, the sense of beauty, the relationship with our past and our future, the protection and transmission to future generations of the artistic heritage we have. © 2019 International Society for Photogrammetry and Remote Sensing. All rights reserved."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-04	Aitken B., Innocenti P., Ross S., Konstantelos L.,"User requirements for a next generation digital preservation framework: Analysis and implementation",2010,"Archiving 2010 - Preservation Strategies and Imaging Technologies for Cultural Heritage Institutions and Memory Organizations, Final Program and Proceedings",,,,"48","52",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-79956149530&partnerID=40&md5=e1b86fc755ee93d7296aef1203a14c5d","The EU-funded SHAMAN (Sustaining Heritage Access through Multivalent ArchiviNg, http://www.shaman-ip.eu/) project is investigating the long-term preservation of large volumes of digital data in a distributed environment, by developing a preservation framework that is verifiable, open and extensible. During the initial stages of the project, a detailed user requirements analysis led by HATII at the University of Glasgow was conducted across three domains: memory institutions, industrial design and engineering, and e-science. This research pinpointed the needs and expectations that end-users and service providers feel should be met by such a preservation framework. This paper gives an overview of the requirements that were gathered, formulated and adopted by this project. It then discusses the outcomes of this empirical research and indicates both how these outcomes are being implemented within SHAMAN and how external parties may also benefit from the findings. Approaches to digital preservation are often still ad hoc and based on a single institution focus. They frequently do not take into consideration the needs of the variety of actors who will come into contact with a system throughout the preservation lifecycle. This paper provides an insight into the preservation practices that a broad range of real-world organisations would like to follow and provides a discussion of how SHAMAN intends to meet the needs of the identified users."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology

DHUR-05	Alemu G.,"Metadata Enrichment for Digital Heritage: Users as Co-Creators",2018,"International Information and Library Review","50","2",,"142","156",,"10.1080/10572317.2018.1449426","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85047945777&doi=10.1080%2f10572317.2018.1449426&partnerID=40&md5=38e5d392f342b312e480dc1a42847e4a","This paper espouses the importance of enriching digital information objects with descriptions pertaining the about-ness of information objects. Such richness and diversity of description, it is argued, could chiefly be achieved by involving users in the metadata creation process. This paper presents the importance of the participatory paradigm for metadata enriching and metadata filtering for the cultural heritage domain. Metadata enriching states that a priori metadata that is instantiated and granularly structured by metadata experts is continually enriched through socially-constructed (post-hoc) metadata, whereby users are pro-actively engaged in co-creating metadata. The principle also states that metadata that is enriched is also contextually and semantically linked and openly accessible. In addition, metadata filtering states that metadata resulting from implementing the principle of enriching should be displayed for users in line with their needs and convenience. In both enriching and filtering, users should be considered as prosumers, resulting in what is called collective metadata intelligence. © 2018, Published with license by Taylor & Francis © 2018, © Getaneh Alemu."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-06	Alexakis E., Kapassa E., Touloupou M., Kyriazis D., Georgopoulos A., Moropoulou A.,"Computer-aided innovative methodology for management and personalized representation of big data in cultural heritage",2018,"IMCIC 2018 - 9th International Multi-Conference on Complexity, Informatics and Cybernetics, Proceedings","2",,,"151","154",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85050199247&partnerID=40&md5=8772c03aa695c118e24bceef61f6d2b0","This study, aims to achieve a straightforward methodology for affordable but of high quality and precision modeling of cultural heritage data and its exploitation towards the delivery of personalized content. Nowadays, as more and more scientific disciplines are engag within the wider field of cultural heritage, high tech means have subsequently permeated in the field resulting in systematic generation of data by the respective experts, that in turn suggests a gap to be bridged not only in the level of the data diversity but also in the level of data archiving and interoperability. For example, three-dimensional (3D) representation has been an effective mean for studying and disseminating the built environment particularly the one of the cultural heritage. Especially during the past decade, the extended grow of the technical means and the development of standard algorithms have enabled a standardized process for automatic or semiautomatic 3D model generation. This has led to more and more researchers with various backgrounds (e.g. material scientists), to aspire to integrate the aspect of 3D virtualization within their work but there are limitations concerning the amount of the data that have to be managed. To facilitate these restraints, there is the need of a scalable platform to manage this cultural heritage data in three discreet modular levels: a) lower level of (raw) data collection (acquisition and storage), b) middle level of data analytics (correlation, contextualization, knowledge extraction and user-specific annotations) and c) higher level of data representation (interpretation and visualization). For a successful implementation, the interoperability of the data is a prerequisite as it allows the interlinking and correlation among them. The case study over which the methodology has been implemented is the recently rehabilitated Holy Aedicule of the Holy Sepulchre in Jerusalem. The interdisciplinary approach followed in every rehabilitation stage-phase produced a vast amount of data that that must be integrated in order to fulfill the prerequisite of data interoperability. To address this issue, the present study will provide the missing layer that enables the semantic labeling of multiple object categories: data processing and filtering, data type and properties, spatial representation/visualization data etc. As a result, the derivatives georeferenced high-resolution 3D models are transformed concluding in a multi-resolution model management on an interactive web platform. © 2018 International Institute of Informatics and Systemics IIIS. All rights reserved."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-07	Alma'aitah W.Z., Talib A.Z., Osman M.A.,"Opportunities and challenges in enhancing access to metadata of cultural heritage collections: a survey",2020,"Artificial Intelligence Review","53","5",,"3621","3646",,"10.1007/s10462-019-09773-w","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85074502832&doi=10.1007%2fs10462-019-09773-w&partnerID=40&md5=649a4208dec58a37b573f056187d1e9f","Machine processable data that narrate digital/non-digital resources are termed as metadata. Different metadata standards exist for describing various types of digital objects. Several researches have reported on how to address issues related to accessing of metadata resources. Most studies on metadata involve cultural heritage domain, and this is an indication of the importance of this domain in metadata research and development. Research on metadata in cultural heritage mainly revolves around three fundamental issues: (1) lack of quality in metadata contents in most of the cases, (2) difficulty in accessing metadata contents due largely to limited user's knowledge on the content of the metadata, and (3) heterogeneity of the data at the level of schemas which makes the access even more difficult. The lack of quality in metadata makes it difficult for the users to retrieve and explore information that satisfies their needs. So, in order to make its contents more accessible, enhancing the metadata content is required, especially for cultural heritage collections which consist of digital objects (structured documents) described by a variety of metadata schemas. This paper presents issues and challenges in enhancing access to metadata by reviewing the existing approaches in metadata environment with a particular emphasis on cultural heritage collections. In this paper, firstly, we look at the classification of metadata which is divided into two categories namely data retrieval and information retrieval. Then, we present the analysis, findings and suggestions on how to address issues in enhancing access to metadata contents especially in cultural heritage collections. A detailed comparison is given between information retrieval and data retrieval, and it focuses on the applicability of one approach over the other. A framework that aims to improve the effectiveness of retrieval when searching metadata is also proposed and tested. The proposed framework consists of approaches and methods that are expected to enhance access to metadata especially in cultural heritage collections and be useful for those with limited knowledge on cultural heritage. The experiments were conducted on CHiC2013 which is a collection on cultural heritage. The results show a considerable enhancement over other IR approaches that use the expansion methods. © 2019, Springer Nature B.V."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-08	Amato F., Moscato V., Picariello A., Sperlì G.,"KIRA: A System for Knowledge-Based Access to Multimedia Art Collections",2017,"Proceedings - IEEE 11th International Conference on Semantic Computing, ICSC 2017",,,"7889559","338","343",,"10.1109/ICSC.2017.59","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85018342777&doi=10.1109%2fICSC.2017.59&partnerID=40&md5=1913eeced7838d3da70a1edd1614e277","One of the most important research area that during the last decade has taken advantage by the multimedia technologies is certainly the Cultural Heritage Information Management. In this paper, we present KIRA (Knowledge-based Information Retrieval from Art collections), a system to query, browse and analyze cultural digital contents from a set of distributed and heterogeneous multimedia repositories. KIRA provides all the necessary retrieval and presentation functionalities to search information of interest and present it to the users in a suitable format and according to their needs. By means of a set of ad-hoc APIs, our system can also support several applications: Mobile multimedia guides for cultural environments, web portals to promote the cultural heritage of a given organization, multimedia recommender and storytelling systems and so on. We describe the main ideas that support the system, showing its use for several applications. © 2017 IEEE."	0 - The paper does not seem to be relevant to 4CH project
DHUR-09	Amato F., Moscato V., Picariello A., Sperlì G.,"Knowledge-based access to art collections: The KIRA system",2017,"25th Italian Symposium on Advanced Database Systems, SEBD 2017",,,,"82","89",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85034972054&partnerID=40&md5=fdf56dfe89b9a71df0164ea9048c2ee9","This discussion paper represents an extended abstract of a recent publication where we presented KIRA (Knowledge-based Information Retrieval from Art collections), a system to query, browse and analyze cultural digital contents from a set of distributed and heterogeneous repositories. KIRA relies on a Big Data infrastructure with the following features: capability to gather information from different data sources advanced data management techniques and technologies ability to provide useful and personalized data to users based on their preferences and context. KIRA thus provides retrieval and presentation functionalities to search information of interest and present it to the users in a suitable format and according to their needs. Using ad-hoc APIs, our system can also support several applications: mobile multimedia guides, web portals to promote the Cultural Heritage, multimedia recommender and storytelling systems and so on. We discuss the main ideas that characterize the system, showing its use for several applications."	0 - The paper does not seem to be relevant to 4CH project

DHUR-10	Amato F., Moscato V., Picariello A., Sperlì G.,"Knowledge-based access to art collections: the KIRA system",2017,"CEUR Workshop Proceedings","2037",,,"","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85041431457&partnerID=40&md5=2e91d1a6adf415a6268a9cdcf5419d2e","This discussion paper represents an extended abstract of a recent publication where we presented KIRA (Knowledge-based Information Retrieval from Art collections), a system to query, browse and analyze cultural digital contents from a set of distributed and heterogeneous repositories. KIRA relies on a Big Data infrastructure with the following features: capability to gather information from different data sources advanced data management techniques and technologies ability to provide useful and personalized data to users based on their preferences and context. KIRA thus provides retrieval and presentation functionalities to search information of interest and present it to the users in a suitable format and according to their needs. Using ad-hoc APIs, our system can also support several applications: mobile multimedia guides, web portals to promote the Cultural Heritage, multimedia recommender and storytelling systems and so on. We discuss the main ideas that characterize the system, showing its use for several applications."	0 - The paper does not seem to be relevant to 4CH project
DHUR-11	Amin A., Van Ossenbruggen J., Hardman L., Van Nispen A.,"Understanding cultural heritage experts' information seeking needs",2008,"Proceedings of the ACM International Conference on Digital Libraries",,,,"39","47",,"10.1145/1378889.1378897","https://www.scopus.com/inward/record.uri?eid=2-s2.0-57649210179&doi=10.1145%2f1378889.1378897&partnerID=40&md5=01b018a0d8c136b47ee26ba18459b8d4","We report on our user study on the information seeking behavior of cultural heritage experts and the sources they use to carry out search tasks. Seventeen experts from nine cultural heritage institutes in the Netherlands were interviewed and asked to answer questionnaires about their daily search activities. The interviews helped us to better understand their search motivations, types, sources and tools. A key finding of our study is that the majority of search tasks involve relatively complex information gathering. This is in contrast to the relatively simple fact-finding oriented support provided by current tools. We describe a number of strategies that experts have developed to overcome the inadequacies of their tools. Finally, based on the analysis, we derive general trends of cultural heritage experts' information seeking needs and discuss our preliminary experiences with potential solutions. Copyright 2008 ACM."	0 - The paper does not seem to be relevant to 4CH project
DHUR-12	Amoruso G.,"Drawing as an experience. an advar representation scenario for culture",2019,"DISEGNARECON","12","23",,"1","10",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85090727734&partnerID=40&md5=3c3a37eaa0cb706eaa04aa23e7d4f345","The chapter, starting from the new social condition inspired by the learning society, introduces issues and questions about how designers are dealing with the need to promote an effective experience of interiors. Representing culture and human heritage in the digital age is the contemporary challenge for designers that are figuring out interiors for community centers, like a museum or a library or the new hybrid spaces designed as urban interiors. Drawing as experience makes possible to achieve multiple forms of representation. Computer graphics and digital imaging are changing the relations between designers, users, environment, physical and virtual public space, cultural places, educational contents, archives, libraries and museum collections. Participation, interaction, and sharing of information mediated by users and synthesized by means of drawing, rendering, mapping, and modeling, should also lead to in-novative solutions for environments wellbeing, safety, and ergonomics, and ensure wider access to high-quality cultural contents. Case studies and best practices introduce critical issues to face the challenges of capturing and designing a physical space or envisioning a cultural space that is set up with innovative ICT technologies including a process of citizen participation in decision maKing. 3D data, archives, projection, modeling, sensors, light, digital representation, user interaction, responsive surfaces need mul-tidisciplinary methodologies encompassing several topics: Places for culture, digital heritage, access to culture and education, design of urban environments and interiors. © 2019 University of L'Aquila, Department of Civil Construction, Building and Architecture, Environmental Engineering. All rights reserved."	0 - The paper does not seem to be relevant to 4CH project
DHUR-13	Ardito C., Costabile M.F., De Angeli A., Lanzilotti R.,"Enriching archaeological parks with contextual sounds and mobile technology",2012,"ACM Transactions on Computer-Human Interaction","19","4",29,"","",,"10.1145/2395131.2395136","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84872381532&doi=10.1145%2f2395131.2395136&partnerID=40&md5=afea2068820b115bf69f3a46ff8db3e3","The importance of cultural heritage in forging a sense of identity is becoming increasingly evident. Information and communication technologies have a great potential to promote a greater awareness and appreciation of cultural heritage. This article presents some findings on how mobile technology can be used to foster a better understanding of an archaeological site by reconstructing the ancient environment and life. Children aged 11-13 years old are the target of our research. To motivate and engage them, a pervasive educational game has been developed and implemented in Explore!, a system aimed at supporting children exploring sites of cultural interest. Special attention has been devoted to the design of a soundscape that may improve players' navigation in degraded physical environments and enrich their overall experience. A field study indicated that children judged their experience both useful and entertaining: not only did they enjoy playing the game, but they also learned historical notions and facts related to ancient Roman life. Contextual sounds were found to have a facilitating effect on space navigation, reducing the need for map reading and improving spatial orientation. This work provides insights into the design of educational games for use with cultural heritage and a model to enrich historical sites through the creation of soundscapes which can help visitors to navigate a site and feel its historical atmosphere. © 2012 ACM."	0 - The paper does not seem to be relevant to 4CH project
DHUR-14	Bansode S.,"Creation of digital library of manuscripts at Shivaji University, India",2008,"Library Hi Tech News","25","1",,"13","15",,"10.1108/07419050810877508","https://www.scopus.com/inward/record.uri?eid=2-s2.0-43149093328&doi=10.1108%2f07419050810877508&partnerID=40&md5=a272aa735cb798ff18f888d828b4aa8f","Purpose - The purpose of this paper is to describe the digitization of rare materials in one Indian university. Design/methodology/approach - This paper highlights the digitization activities undertaken by Shivaji University Library to preserve rare materials. It attempts to calculate the costs incurred in the digitization process. Findings - The paper finds that digitization is the solution for the preservation of, and access to, rare manuscripts. Practical implications - The paper provides the complete budget required for the digitization of manuscripts and also suggest best possible preservation and access strategy according to the local needs of the users. Originality/value - The paper provides valuable insight into the development of digital libraries in India. It is useful for setting the infrastructure required for digitization and a guideline for preservation and access to the rare materials."	0 - The paper does not seem to be relevant to 4CH project
DHUR-15	Barazzetti L., Binda L., Cucchi M., Scaioni M., Taranto P.,"Photogrammetric reconstruction of the my son ""G1"" temple in Vietnam",2009,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","38","5W1",,,"","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84924654034&partnerID=40&md5=8819d81e50a9c8902fbe20b8886a32ac","My Son Sanctuary comprehends several ancient Hindu temples and is the most foremost heritage site of this nature in Vietnam. Part of the complex is today seriously damaged and needs restoration works. The temple G1 addressed in this work represents a pilot case to establish a workflow for both documentation and conservation purposes. Both aims required as primary need the 3-D digital reconstruction of the object. The current conditions of the temple and the presence of inhomogeneous textures on its walls made the reconstruction process quite complex. Due to the impossibility of using a terrestrial laser scanning for economic and environmental problems, a low-cost photogrammetric solution was adopted to carry out data acquisition, image orientation and 3-D reconstruction of the temple. The small cost of the camera (a Nikon D80) and the user-friendliness of the SW PhotoModeler 6 Scanner allowed also people not fully skilled in photogrammetry to give an important contribution to this project. In addition, an algorithm for automatic orientation of marker-less image sequences through a Structure and Motion strategy was used to check its applicability for further surveys, in order to speed up and to make automatic the process. The paper will also shows different types of final products that can be yielded and delivered (3-D vector model, orthophotos, anagliphic images for 3-D stereo visualization)."	0 - The paper does not seem to be relevant to 4CH project

DHUR-16	Barbuti N., Di Giorgio S., Valentini A.,"The Project BIBLIO–Boosting Digital Skills and Competencies for Librarians in Europe: An Innovative Training Model for Creating Digital Librarian",2019,"International Information and Library Review","51","4",,"300","304",,"10.1080/10572317.2019.1669935","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85075242901&doi=10.1080%2f10572317.2019.1669935&partnerID=40&md5=e929710bf8321032b531a49bd269aee4","The role of digital libraries is changing, offering new services supporting the user's activities. Libraries and librarians are facing the need of a reinvention of models, ways of working and techniques. The project BIBLIO–Boosting digital skills and competencies for librarians in Europe: A new perspective for curation of Digital Cultural Heritage addresses the skills gap in the library sector due to the digital transformation that is changing the role of libraries and library professionals. The paper describes how the project is planning to facilitate the acquisition of digital and transversal competencies for library professionals, by setting up a system for competencies assessment, learning offer and validation and recognition. © 2019, © 2019 T Author(s). Published with license by Taylor & Francis Group, LLC."	0 - The paper does not seem to be relevant to 4CH project
DHUR-17	Bardoel J., D'Haenens L.,"Public service broadcasting in converging media modalities: Practices and reflections from the Netherlands",2008,"Convergence","14","3",,"351","360",,"10.1177/1354856508091086","https://www.scopus.com/inward/record.uri?eid=2-s2.0-61049358099&doi=10.1177%2f1354856508091086&partnerID=40&md5=1d13c6b042a016634915cd7c6a07a94d","This contribution makes a case for the convergence between technologies as a basis for public access to digital cultural heritage in an age where citizens increasingly seek alternative sources of information and have the power to choose, compare, and publish opinions of their own online. The stage on which European public broadcasters perform nowadays is being thoroughly transformed, and although the preconditions for multimedia strategies seem to be much more advantageous than just a few years ago, public broadcasters will need to decide to extend their portfolio of platforms and channels if they want to reach out to all generations, including the young ones. The Dutch public broadcaster seems to adopt an active strategy in the digital domain, however, this strategy is still expressed in technological and economical terms and takes insufficient account of the viewers' present and future media use. This touches on another angle from which to view the link between public broadcasting and ICT: the necessity for PSB to capture new user groups with innovative content, consistently clustered, and in line with the public service mandate. Copyright © 2008 Sage Publications."	0 - The paper does not seem to be relevant to 4CH project
DHUR-18	Baruzzo A., Casoto P., Challapalli P., Dattolo A., Pudota N., Tasso C.,"Toward semantic digital libraries: Exploiting Web2.0 and semantic services in cultural heritage",2009,"Journal of Digital Information","10","6",,"","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-76649091276&partnerID=40&md5=ce2a4cd440ae02eb7e82da58147eddfd","Developing and maintaining a digital library requires substantial investments that are n simply a matter of technological decisions, but include also organizational issues (user roles, workflows, types of contents, etc.). These issues are often handled by approaches based on a physical perspective that treats the stored information either in terms of data formats or physical space needed to archive them. All these perspectives completely ignore the semantic aspects of the digital contents. In this paper, we address such a semantic perspective. More specifically, we propose a service-oriented architecture that explicitly includes a semantic layer which provides primitive services to the applications built on top of the digital library. As part of this layer, a specific component is described: the PIRATES framework. This module assists end users to complete several tasks concerning the retrieval of the most relevant content with respect to a description of their information needs (a search query, a user profile, etc.). Techniques of user modeling, adaptive personalization, and knowledge representation are exploited to build the PIRATES services in order to fill the gap existing between traditional and semantic digital libraries."	1 - The paper could be interesting but it is neccessary to read more
DHUR-19	Battini C.,"New systems for the management of data. the case study of the chapter house of santa maria novella in florence",2013,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","40","5W1",,"21","25",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84924363776&partnerID=40&md5=a5e43739a35c76ee10d7058c40a72321","The technological solutions, made available today, offer opportunities of great interest for the detection in the field of cultural heritage, gallery interactives instrumentation for the survey and advanced multimedia representations for objects of archaeological, artistic, architectural. Since we changed the type of information, not more interpretation consists of a single piece of data, but from a set of data, must be changed, consequently, also the systems for their management or better, if until now the only situation of interest was that of having to deal with the data representing only the text, data are now made up of sounds, images, video and three-dimensional models. For these reasons and others, we can discuss in continuation, systems and storage structures classics are still not sufficient to manage these new realities. An architectural structure is a set of three-dimensional components that define spatially a form and a project idea so that the representation of the architecture may not avail itself simply means two-dimensional graphs to describe it and describe it in all its parts, but need, and it is now possible, systems that provide for the possibility to analyze from multiple points of view the forms that compose it. The communication media can play a very important role to get directions on the actions of restoration and enhancement of the cultural and environmental heritage. Help can be provided by information and its simulation systems of virtual reality with which, in addition to conveying information, you can view models to better describe the development that the well has had in history. This research starts from the need to develop new systems of representation and data management. Objective of the project is to increase and share knowledge of architecture and the environment. Dynamic representations, relational databases, devices use data, are the main tools of this research. The study addressed led to the creation of a system that allows the transmission and analysis of data collected and, at the same tim also creates the possibility of access to users not experts in the field of 3D graphics this has been made possible through the development the project ""3DWS"" (3D | WEB | SURVEY). The project involved the creation of a container structured as a web site, in which were placed the materials collected and processed including sketches, photographs, vector data, three-dimensional models and analysis issues. Within this system, three-dimensional models developed were then used as a communication tool with immediate visual link to sub-pages with a greater degree of definition. It is a simple and intuitive tree structure that allows both the visitor to the specialist scholar to focus on portions too small and detail of the product, without losing sight of the general configuration of departure. To make feasible a further degree of usability of information, the system has been implemented with image viewers metrics in high definition. The images produced are a fundamental basis, strictly from the point of view of science and technology, for the conservation, management and enhancement of the historical and artistic heritage. The case study investigated is the Chapter House of Santa Maria Novella in Florence."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-20	Bitelli G., Balletti C., Brumana R., Barazzetti L., D'Urso M.G., Rinaudo F., Tucci G.,"Metric documentation of cultural heritage: Research directions from the Italian gamher project",2017,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","42","2W5",,"83","90",,"10.5194/isprs-archives-XLII-2-W5-83-2017","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85030218848&doi=10.5194%2fisprs-archives-XLII-2-W5-83-2017&partnerID=40&md5=56b964913b46ef4e678dff53f14d53f8","GAMHer is a collaborative project that aims at exploiting and validating Geomatics algorithms, methodologies and procedures in the framework of new European regulations, which require a more extensive and productive use of digital information, as requested by the Digital Agenda for Europe as one of the seven pillars of the Europe 2020 Strategy. To this aim, GAMHer focuses on the need of a certified accuracy for surveying and monitoring projects with photogrammetry and laser scanning technologies, especially when used in a multiscale approach for landscape and built heritage documentation, conservation, and management. The approach used follows a multi-LoD (level of detail) transition that exploits GIS systems at the landscape scale, BIM technology and ""point cloud based"" 3d modelling for the scale of the building, and an innovative BIM/GIS integrated approach to foster innovation, promote users' collaboration and encourage communication between users. The outcomes of GAMHer are not intended to be used only by a community of Geomatics specialists, but also by a heterogeneous user community that exploit images and laser scans in their professional activities. © Authors 2017. CC BY 4.0 License."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology

DHUR-21	Bruno N., Rechichi F., Achille C., Zerbi A., Roncella R., Fassi F.,"Integration of historical GIS data in a HBIM system",2020,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","43","B4",,"427","434",,"10.5194/isprs-archives-XLIII-B4-2020-427-2020","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85091556498&doi=10.5194%2fisprs-archives-XLIII-B4-2020-427-2020&partnerID=40&md5=87e53cc0288a0b6f4586e85ba771e356","The integration between BIM (Building Information Modeling) and GIS (Geographic Information System) is currently a highly debated research topic. However, the effective integration of the two workflows in a unique information system is still an open research field, especially when dealing with Cultural Heritage (CH). The paper describes an ongoing research on the development of a web information system able to integrate BIM and GIS data, with particular focus on the analysis of the historicized city and its main buildings over time. Three main aspects, in particular, are considered more relevant: (i) conceptual data organization to integrate GIS and BIM in a single environment (ii) integration of data belonging to different historical periods for analyses over time (4D) (iii) integration into the system of datasets already structured in pre-existing HGIS and HBIM. Most (if not all) of the attributes must be linked with both 2D and 3D entities. The system should be queryable and with the possibility to edit the information regardless of the actual focus of the current user, either if he is more BIM or GIS oriented. This is one of the main requirement for the system not to be just a simple viewer of BIM and GIS data in a unique software environment. The system can manage, from a spatial point of view, different scales of detail, allowing the connection between data from the architectural scale to the territorial one and, from a temporal point of view, data belonging to different periods. All these features have been designed to meet, in particular, the requirements of CH and realize a Historical BIM-GIS system. Besides, the web architecture allows sharing information even between actors with different digital skills, without the need for specific software installed, and ensures portability and access from mobile devices. © 2020 Authors."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-22	Bruno N., Roncella R.,"A restoration oriented HBIM system for cultural heritage documentation: The case study of parma cathedral",2018,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","42","2",,"171","178",,"10.5194/isprs-archives-XLII-2-171-2018","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85048364331&doi=10.5194%2fisprs-archives-XLII-2-171-2018&partnerID=40&md5=6827d7c720eafd9c45313a7766436b03","The need to safeguard and preserve Cultural Heritage (CH) is increasing and especially in Italy, where the amount of historical buildings is considerable, having efficient and standardized processes of CH management and conservation becomes strategic. At the time being, there are no tools capable of fulfilling all the specific functions required by Cultural Heritage documentation and, due to the complexity of historical assets, there are no solution as flexible and customizable as CH specific needs require. Nevertheless, BIM methodology can represent the most effective solution, on condition that proper methodologies, tools and functions are made available. The paper describes an ongoing research on the implementation of a Historical BIM system for the Parma cathedral, aimed at the maintenance, conservation and restoration. Its main goal was to give a concrete answer to the lack of specific tools required by Cultural Heritage documentation: organized and coordinated storage and management of historical data, easy analysis and query, time management, 3D modelling of irregular shapes, flexibility, user-friendliness, etc. The paper will describe the project and the implemented methodology, focusing mainly on survey and modelling phases. In describing the methodology, critical issues about the creation of a HBIM will be highlighted, trying to outline a workflow applicable also in other similar contexts. © Authors 2018."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-23	Bugalia N., Kumar S., Kalra P., Choudhary S.,"Mixed reality based interaction system for digital heritage",2016,"Proceedings - VRCAI 2016: 15th ACM SIGGRAPH Conference on Virtual-Reality Continuum and Its Applications in Industry","1",,,"31","37",,"10.1145/3013971.3014000","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85009736015&doi=10.1145%2f3013971.3014000&partnerID=40&md5=83726d9c7a21c593a043cd87fb8f5238","User interfaces that leverages vivid computer graphics and virtual reality technologies provide effective means for exploring and inspecting cultural artifacts. Such virtual inspection systems help experience and disseminate cultural heritage. For such systems to be truly ubiquitous, they need to expose a user-friendly interface that an untrained population can find intuitive and engaging. In this paper, we present one such mixed reality (MR) based interaction system that can be used to visualize as well as explore cultural heritage. The system is demonstrated by an interactive exploration of 15th century 'Vittala Temple' located at a UNESCO world heritage site, Hampi. Our system investigates the augmentation of computer generated imagery with a physical replica to increase immersion and awareness. It uses monoscopic projection mapping on the 3D-printed replica laid out on a tabletop along with a vertical projection wall behind the tabletop, on which a 3D-rendered view is displayed. Projection on the physical layout is synchronized with the 3D rendering to allow projection of texture, navigation path, users current position, etc. on the tabletop. Users can interact with this system by simply waving a laser pointer to select structures or to define a path. We have additionally explored the benefit of using a steering wheel to further control the camera direction. Such a system creates and maintains a semantic relation between users actions and the resulting effect. The UI enables two major functionalities: interactive inspection of an architectural complex and the multimedia data attached to various components and artifacts. © 2016 ACM."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-24	Calisi D., Tommasetti A., Topputo R.,"Architectural historical heritage: A tridimensional multilayered cataloguing method",2011,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","38","5W16",,"599","606",,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84924739095&partnerID=40&md5=8a219caf324c852ea518dadfce268629","In the Future the digital filing system will be the method for storing and cataloguing heritages, private assets and arts collections. Today this elaborate process is confined only to the library, painting or parietal heritage. What is missing is a digitalized acquisition of the architectural heritage, which is described at multiple levels of representation. Taking a critical look at the urban setting until you reach the single buildings in their complexity, there is a clear need to establish an open and up-to-date system in order to communicate the different degrees of interaction with the architectural elements that must be preserved and accessed to like a work of art. The breakdown and cataloguing at tridimensional levels affects the different scales of the representation of the city at the stage of stimulating and interactive fruition for those users interested in historical and cognitive research and at the stage of active and project implementation well. The hierarchy of layers of data storage city based should be lived and experienced on a superficial stage as a simple user of the knowledge offered by the digital language of animation and interactivity. It may be the case of a tourist or a citizen who is eager to deepen his awareness of a building, a neighbourhood together with its layering of history and architectural value. This article proposes the development of a database that will be used and extended from time to time with new information related to surveys, projects and restorations of the existing."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements

DHUR-25	Capece S., Chivăran C.,"The sensorial dimension of the contemporary museum between design and emerging technologies*",2020,"IOP Conference Series: Materials Science and Engineering","949","1", 012067,"","",,"10.1088/1757-899X/949/1/012067","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85096880582&doi=10.1088%2f1757-899X%2f949%2f1%2f012067&partnerID=40&md5=a494238f66b6ff1d52d2288d8ec55195","Nowadays, society passes through a moment of transition, in which technological progress has offered the possibility, as well as the challenge, of gathering and transmitting an infinity of information in such short time. In this context, the museum transforms, it becomes a sensitive organism that modifies the visitor-artwork relationship, introducing new models of interaction and fruition. Design in line with digital technologies play a determinative role in this transformation, generating new languages and experimentations that multiply the levels of artwork narration, introducing new temporal dimensions and exhibition paradigms. Despite the considerable progress accomplished in recent years both by research and industry in the fields of acquisition techniques, digitalization, computer graphics, visualization, most of the applications for the communication of cultural heritage on site and on line still have many limitations concerning their ability of engaging the users. They often lack narrative metaphors, sensorial and emotional involvement, while interaction interfaces may appear hostile for a considerable part of the visitors. Starting from the most appropriate learning style to the characteristics regarding the user's identity, he has the necessity to enter a space, be it real or virtual, able to stimulate him towards future insights and knowledge acquisition. Storytelling and perception come into play in order to build experience, which needs to engage the visitor emotionally, but it must also be capable of not subtracting him to the real visit. It has to offer valid hints, but it must not become a substitute of reality, while technologies must not transform into barriers, but into an opening towards a future accessible to all. With the forthcoming objective of understanding how to overcome limitations and build enhanced fruition and adaptive, personalised interaction models where the visitor stays at the centre of the design scene, this paper analyses the current transformations, providing a general view of national and international experiences that use the technological potential in an innovative way, defining best practices in the field. The connections between user and technology related to space and time will be highlighted, as well as the storytelling methods and the interactive, engaging and sensorial visitor - museum experiences. © 2020 Institute of Physics Publishing. All rights reserved."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-26	Carmichael J., Larson M., Marlow J., Newman E., Clough P., Oomen J., Sav S.,"Multimodal indexing of digital audio-visual documents: A case study for cultural heritage data",2008,"2008 International Workshop on Content-Based Multimedia Indexing, CBMI 2008, Conference Proceedings",,, 4564933,"93","100",,"10.1109/CBMI.2008.4564933","https://www.scopus.com/inward/record.uri?eid=2-s2.0-51849151694&doi=10.1109%2fCBMI.2008.4564933&partnerID=40&md5=f6d369ab06843559843477c0b2533cc2","This paper describes a multimedia multimodal information access sub-system (MIAS) for digital audio-visual documents, typically presented in streaming media format. The system is designed to provide both professional and general users with entry points into video documents that are relevant to their information needs. In this work, we focus on the information needs of multimedia specialists at a Dutch cultural heritage institution with a large multimedia archive. A quantitative and qualitative assessment is made of the efficiency of search operations using our multimodal system and it is demonstrated that MIAS significantly facilitates information retrieval operations when searching within a video document. ©2008 IEEE."	0 - The paper does not seem to be relevant to 4CH project
DHUR-27	Casillo M., Clarizia F., D'Aniello G., De Santo M., Lombardi M., Santaniello D.,"CHAT-Bot: A cultural heritage aware teller-bot for supporting touristic experiences",2020,"Pattern Recognition Letters","131",,,"234","243",,"10.1016/j.patrec.2020.01.003","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85078479323&doi=10.1016%2fj.patrec.2020.01.003&partnerID=40&md5=461e2a56250c0471d21998ea310e4d1a","Cultural heritage is an important resource that allows us to know and promote a territory. In this respect, it is important to experiment with the enhancement of cultural heritage by adopting approaches that meet the dynamic needs of various types of users. The aim of this paper is to introduce a recommender system capable of developing adaptive tourist routes. In fact, the proposed system suggests points of interest and related services according to both the profile of the tourist and contextual aspects. In particular, the interaction of the user with the system occurs through a chatbot that allows to build a real dialog. In order to show the potential of the proposed approach, a prototype was developed to support the user in building a customized tourist route related to some of the most important cultural sites in Campania (a region in Southern Italy): Herculaneum, Paestum and Pompeii. © 2020"	0 - The paper does not seem to be relevant to 4CH project
DHUR-28	Cayla N.,"An Overview of New Technologies Applied to the Management of Geoheritage",2014,"Geoheritage","6","2",,"91","102",,"10.1007/s12371-014-0113-0","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84901778742&doi=10.1007%2fs12371-014-0113-0&partnerID=40&md5=16bc84564180c78a6c7d96d4c8584a47","In recent years, as in other spheres of activity, new technologies have gradually entered different phases of geoheritage management. The EDYTEM laboratory has led a technology watch and some experimentation, as part of a European LEADER programme, to better understand, test and develop the uses of these innovative practices in the field of geoheritage. This article presents a review of existing and emerging technologies in the depiction and interpretation of geosites. Three main topics are analysed in particular. First, the georeferencing and mapping of geoheritage, especially with recent developments in web mapping and mobile access to map data. Then, digital imaging (primarily 3D modelling based on techniques of photogrammetry), laser scanning or scan volume and also the real time observation of natural phenomena through a webcam. Finally, some experiments of interpretation of geoheritage using augmented reality, a process which enriches discovery through digital media, or virtual reality technologies that create a virtual universe with which one can engage. This paper shows that the diversity of practices, tools and experiences meets some basic needs: geolocation, geovisualisation, interpretation and understanding of the geosites. Finally, a discussion of the innovations inherent in the development of these practices, their interests and scopes allows us to put them into perspective with respect to their efficiency, reliability and appropriation by different users. © 2014 The European Association for Conservation of the Geological Heritage."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-29	Chaari A., Drira F., Alimi A.M., E.-Zsigmond E., Lebourgeois F.,"New protocol design for wordspotting assistance system: Case study of the collaborative library model - ARMARIUS",2012,"Proceedings - International Workshop on Frontiers in Handwriting Recognition, IWFHR",,, 6424492,"780","785",,"10.1109/ICFHR.2012.242","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84874279061&doi=10.1109%2fICFHR.2012.242&partnerID=40&md5=6719d013d255ba71a5bb7fdd79c242a3","The cultural heritage is full of important manuscript collections preserved in digital libraries. The need to annotate and enrich the scanned documents is claimed by some users to keep traces in the system for a further use. Moreover, the reuse of annotations could help other users to accomplish repetitive tasks in a semi-automatic way. One manuscript annotation technique is the wordspotting. It is a process that seeks in a document for all the fragments that are similar to the one specified by the user. The main focus of this research work is to propose a solution integrating and encapsulating the wordspotting algorithm in digital libraries. This solution involves, in particular, the specification and the implementation of an architecture to integrate the image processing tool using Restful Web services. The proposed prototype is tested on the ARMARIUS digital library. This library is one of the collaborative digital archiving models that stores ancient digitized manuscripts. © 2012 IEEE."	0 - The paper does not seem to be relevant to 4CH project
DHUR-30	Challa N.P., Mehta R.V.K.,"Evaluation of automatic metadata schema for indian palm leaf manuscripts",2019,"International Journal of Innovative Technology and Exploring Engineering","8","5",,"77","84",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85062937099&partnerID=40&md5=ffec89e9209b2f95690579c5945449be","India is home for various treasures of knowledge which are inscribed, stored and passed on from one generation to the next through a unique medium – palm leaves. In the present scenario, the need to preserve our rich heritage and provide an easy interface is the major challenge, using modern technology and techniques, thereby enhancing accessibility, applicability and appreciation for the repository of knowledge. A well-built catalogue is a primary requirement to facilitate effective and efficient information retrieval. The main aim of this research is to provide users with a standard means for intellectual access to digitized materials. Hence the outcome of this research can be useful in two ways firstly to prioritize the least/high damaged manuscript to perform restoration and secondly to obtain accurate search results from two methods proposed using TF-IDF and crowdsourcing approach. These can be widely utilized in various digital libraries across the globe. This metadata schema can be incorporated into an enhanced search engine for obtaining better precision and recall results. © BEIESP."	0 - The paper does not seem to be relevant to 4CH project

DHUR-31	Chapman S., Abrams S.L.,"Steering resources to safe-harbor repositories: The need for reliable, accurate and affordable ingest services",2004,"Final Program and Proceedings of IS and T's 2004 Archiving Conference",,,,"98","102",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-14244268735&partnerID=40&md5=e5e064506d1ebb3b4c6949be9f457aac","With the emergence of centralized, large-scale digital archives, geography becomes a key factor in the preservation of cultural heritage materials. Objects ""inside"" archives will be actively monitored and managed, whereas those ""outside"" will be at greater risk of loss and obsolescence. Developing ingest systems and services to process, package and transport objects into managed safe-harbor repositories is an immediate need.1 Standards, frameworks, and business models for digital archiving must also evolve in due time to support these services. Ingest solutions must address a range of challenges: legal, technical, and financial. Software development, however, is a logical starting point, since tools that automate pre-archiving tasks meet technical requirements for viability and economic ones for affordability. The key tasks to automate are production of preservation metadata, transformation and validation of formats, and creation of repository-compliant transfer packages. The Harvard University Library (HUL) Office for Information Systems (OIS) has developed two applications to promote use of the HUL Digital Repository Service. JHOVE, developed with JSTOR, is a format-validation program Dmart is a batch deposit tool for audio preservation packages. In Harvard's experience, the target user for such applications has typically been a professional depositing agent with technical expertise, who consults as needed with curatorial experts. With greater understanding of ingest requirements, and the profiles of persons or agencies likely perform these services, it is hoped that industry will develop and support tools for the digital archiving market."	0 - The paper does not seem to be relevant to 4CH project
DHUR-32	Charbonneau N., Burgess J., Robichaud L.,"Using 4D modelling in a university-museum research partnership: The CASE of the ALPHONSE RAYMOND HISTORIC FACTORY COMPLEX",2015,"2015 Digital Heritage International Congress, Digital Heritage 2015",,, 7419579,"603","610",,"10.1109/DigitalHeritage.2015.7419579","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84965176741&doi=10.1109%2fDigitalHeritage.2015.7419579&partnerID=40&md5=306df72d7a3aead2cc009e6637129f24","In the field of virtual heritage, scientific 4D modelling brings together interdisciplinary expertise in an iterative process to create and revise digital models that also reflect the passage of time. Our work focusses on making this type of model serve the needs of museologists by linking various documentary sources (both text-based and iconographic) and testimonials to the 4D model. Our case study involves a former industrial site. Over the decades, various buildings in this old factory complex have been the subject of construction, demolition and redevelopment. Under a university-museum research partnership, our 4D model will be part of an interactive digital environment designed for a museum exhibit. Our goal is to maximize the flexibility of the model, which was based on i) research to find new documentary sources, ii) oral testimonies to complete the documentary record and iii) testing to make the user experience more cognitively enriching. This approach has strengthened the partnership between the museum and the university, made university research available to a wider audience and provided a modest museum with a new tool. © 2015 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-33	Chen T., Makara D., Sean C., McGinleya S., Cheng J.,"Analysis of cultural ecosystem services and heritage tourism based on social media: Virtual learning on tourism information management",2020,"African Journal of Hospitality, Tourism and Leisure","9","1",,"1","10",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85078291262&partnerID=40&md5=c329643b270a61987a516a302c7d2b45","Due to the far-reaching nature of the Internet and the rapid development of global information. Tourists and learners of different time and space can participate in sightseeing activities through the Internet, resulting in changes in sightseeing styles, which not only change the presentation of knowledge, but also change the way of learning information exchange, and the sightseeing environment also. Therefore, the real environment of the traditional classroom is extended to the networked virtual world of learning. As far as users are concerned, the biggest difference in sightseeing websites lies in the learning mode provided by the entire network sightseeing. However, it can be roughly divided into two different types: (1) established by the enterprise organization and (2) required to be charged. Courses and websites can be established by school units. Online tourism is a new type of education derived from the digital revolution and 4IR. The vigorous development in the country is also an important way for the government to achieve the goals of ""lifelo learning"" and its ""knowledge economy"" policy. The industry believes that the most important projects it must be involved in are: (a) establishing its own leading position in online tourism expertise (b) using learner feedback as a basis for improving network tourism (c) continuing research and development to expand the capabilities of the network sightseeing platform scholars believe that the most Important projects are: (a) the establishment of a school network sightseeing unit (b) to improve the interaction between the tourism network and the visitors (c) to provide a variety of course contents. However, in all the problems and difficulties faced, the industry believes that the most important difficulty is to make the public see the digital changes as popular events and accept the way to identify online tourism scholars believe that the related technology of network tourism needs to be strengthened. © 2020 AJHTL /Author/s."	0 - The paper does not seem to be relevant to 4CH project
DHUR-34	Ching S.H.,"Turning a Service Learning Experience into a Model of Student Engagement: The Lighthouse Heritage Research Connections (LHRC) Project in Hong Kong",2018,"Journal of Academic Librarianship","44","2",,"196","206",,"10.1016/j.acalib.2018.02.007","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85042516677&doi=10.1016%2fj.acalib.2018.02.007&partnerID=40&md5=5425a10e92dd697fa483f786eb843676","The digital shift has provided easy access to academic library users, and yet, the usage of archival collections continues to be low. At the same time, the need for innovation in library services for cultural heritage scholarship and its advancement is emerging. This paper outlines a library-led service-learning program that connects students with lighthouse artifacts, archival collections, scholars in global academia, and wider communities. Student engagement cases are provided to illustrate the way in which the librarian utilizes the Framework of Information Literacy for Higher Education by ACRL to work closely with students. These cases also demonstrate how students can contribute to knowledge creation and preservation efforts for a specific cultural heritage topic that is not static, but which keeps receiving new contributions or additions to the depository. Thus, this paper is an answer to the ACRL's call for pilot projects to be assessed and shared with the wider community of academic librarians and support staff. It also builds on emerging roles for academic libraries like engaged learning. Librarians must move beyond simply seeing themselves as partners. Instead, librarians should see themselves as prime facilitators that co-create and co-develop cultural heritage research and historical projects by connecting actors and resources more effectively than any single actor can do alone. © 2018 Elsevier Inc."	0 - The paper does not seem to be relevant to 4CH project
DHUR-35	Chudy M., Lukasik E., Parkola T., Kusmierek E., Jackowski J., Dahlig-Turek E.,"Digital library adaptation for traditional music and content-based research polish sound archives and dlibra",2020,"Proceedings of the ACM/IEEE Joint Conference on Digital Libraries",,, 3398544,"289","298",,"10.1145/3383583.3398544","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85095119972&doi=10.1145%2f3383583.3398544&partnerID=40&md5=e2160a99aaf702b3b72e0f85793f435d","The existence of numerous and rich traditional music collections, their importance for preserving cultural heritage and an increasing interest in this type of music were the key factors leading to the concept of a music research support environment for ethnomusicologists. Our experience with Polish traditional music collections and archives shows that their existence is not equivalent to their availability for search, retrieval, processing and analysis. The idea behind the environment is to provide stable infrastructure and software solutions necessary to enable musicological research and, in a wider perspective, to open traditional music resources for a larger group of users. The paper describes our motivation for building such music research support environment and a number of issues and challenges we have encountered in the process. We present the environment concept, building stages already completed and plans for its further development. The environment is founded on the dLibra digital library adapted to the requirements of traditional music content and collections and with consideration for the current needs of ethnomusicologists. It combines the advantages of a user-centric layered digital library and Linked Open Data enrichment with system-centric music processing tools. A few of such tools have already been developed, for example, to support automatic music transcription of a large number of recordings in order to make them available for research and analysis. Future development plans include content aggregation and content-based indexing and search. © 2020. ACM ISBN."	0 - The paper does not seem to be relevant to 4CH project

DHUR-36	Clarizia F., Colace F., Lombardi M., Pascale F.,"A context aware recommender system for digital storytelling",2018,"Proceedings - International Conference on Advanced Information Networking and Applications, AINA","2018-May",, 8432287,"542","549",,"10.1109/AINA.2018.00085","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85052315378&doi=10.1109%2fAINA.2018.00085&partnerID=40&md5=6d1f924c79bb11d15385d8307390e439","Finding the information and making it available today is a very complex challenge. On the one hand, the large amount of available data requires a great ability to manage information on the other hand, understanding the real needs of users requires complex systems that can provide contextual information. Italy's economy is based on tourism, thanks to its cultural heritage visited by millions of people every day. The goal of this paper is to create a recommender system to furnish a tailor-made story for the user based on the context in which it is located, thanks to a smart app that can provide contextual information. Using a Chatbot, this system also provides a context awareness data in order to enhance the tourist experience. © 2018 IEEE."	0 - The paper does not seem to be relevant to 4CH project
DHUR-37	Clark K.P., Van Amringe K.E.,"Flight hardware delivery breakthroughs via engineering/business best-practices synthesis",2002,"IEEE Aerospace Conference Proceedings","7",, 1035318,"3409","3428",,"10.1109/AERO.2002.1035318","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84879356587&doi=10.1109%2fAERO.2002.1035318&partnerID=40&md5=79a43220b0101fc13c6e1bd7dfb1f0fc","Development and use of leading-edge engineering and business practices provides firm footing for tremendous advances in the aerospace community. When applied together and systemically across multiple missions, these practices can yield tremendous reduction of technical, schedule and cost risks for project development. An example of this synthesis can be found in the Jet Propulsion Laboratory's (JPL's) Flight Hardware Logistics Program (FHLP), which uses space systems engineering expertise and supply-chain business acumen to achieve breakthroughs in the delivery of space flight hardware. To support the evolution from a few large projects to many smaller projects developed in shorter time, flight hardware delivery must evolve from serial, independent and resource-intensive processes to those characterized by commonality, multi-project support, anticipation, industry-partnering, reuse and easy access to information. These processes are fundamental to the communication, coordination and collaboration that FHLP provides to enhance JPL project success. The heart of FHLP centers on the commonality of flight hardware across multiple projects. As an example, FHLP has demonstrated significant schedule, cost and technical risk reduction using a common buy of 31 flight computers for 9 different projects. Understanding and coordinating similar product requirements for multiple subsystems, instruments, projects and companies can yield even greater savings. Knowledge of upcoming missions, their right product needs, hardware capabilities and supply sources allow anticipatory procurements of flight hardware to reduce or eliminate lead-time. This is being done for flight electronic parts, connectors and fasteners with replenishment funded by compensation from users for supplied hardware. Partnering with industry is achieved with suppliers and users of hardware. Open contracts and supplier early parts buys are examples of supplier agreements while synchronized procurement and inventory exchange are examples of user agreements between JPL and its contractors. Improved tracking, coordination, record keeping and storage of residual flight hardware can provide crucial cost and schedule benefits to future projects. FHLP has developed a low-cost, JPL-wide system and facilities to significantly increase the capability for current project use of residual material from past projects. Having the right hardware information at the engineer's fingertips saves considerable time and reduces the risk of missing important knowledge. FHLP provides limited hardware information today tomorrow it will provide much more comprehensive one-stop shopping. The FHLP information tools include an on-line JPL-wide hardware catalog of available inventory (with reports, shopping carts and digital pictures), on-line product documentation and database of hardware usage by projects. The many simultaneous smaller projects implemented today do not enjoy the substantial infrastructure and stable expertise more prevalent in the past on fewer large projects. FHLP fills these gaps with services of hardware information, availability, investigation, delivery and storage. Likewise, proposed projects hungry for higher fidelity information, increased heritage and lower costs welcome a menu of support from FHLP that includes information about available hardware, costs, lead-times and suppliers. FHLP's early focus on hardware delivery and inventory will be augmented by enhanced hardware information and expand to include other NASA Centers and industry partners. Breakthroughs will be limited only by imagination, innovation, commitment and energy. © 2002 IEEE."	0 - The paper does not seem to be relevant to 4CH project
DHUR-38	Claudio G., Luca G., Luce L.M.,"Interaction design for cultural heritage. A robotic cultural game for visiting the museum’s inaccessible areas.",2017,"Design Journal","20","sup1",,"S3925","S3934",,"10.1080/14606925.2017.1352895","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85070552315&doi=10.1080%2f14606925.2017.1352895&partnerID=40&md5=63fc9375e5313ee5debc892e5c193a54","Nowadays many museum areas are not accessible to visitors because of issues related to security or architectural barriers. Make explorable these areas is one of the sensible topics in the cultural debate about the enhancing of the visiting experience. The paper describes the design of a roboethics activity conceived in codesign with museum stakeholders (Museum Guides, Museum Curators, Telecommunication Experts, Designers and Final Users) with the purpose to face this problem. After a first stage, in which a telepresence robot piloted by the Museum Guide it has been used a to show the inaccessible areas of the museum it is going to be performed a second stage of the project with the scope of building a more interactive visiting experience. To satisfy this need an interactive game, it has been developed. The game is based both on the robot ability to be driven by the visitors and also on the capacity of the robot to been used as a platform for the digital storytelling. The whole experience it has been designed and tested with the support of high school students. © 2017 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-39	Clini P., Nespeca R., Ruggeri L.,"Virtual in real. Interactive solutions for learning and communication in the national archaeological museum of Marche",2017,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","42","5W1",,"647","654",,"10.5194/isprs-Archives-XLII-5-W1-647-2017","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85020724278&doi=10.5194%2fisprs-Archives-XLII-5-W1-647-2017&partnerID=40&md5=c5efe21f609166c7e5aef90199a490bc","Today the ICTs are favourable additions to museum exhibitions. This work aims to realize an innovative system of digital exploitation of artefacts in the National Archaeological Museum of Marche (MANaM), in order to create a shared museum that will improve the knowledge of cultural contents through the paradigm ""learning by interacting"" and ""edutainment"". The main novelty is the implementation of stand-Alone multimedia installations for digital artefacts that combine real and virtual scenarios in order to enrich the experience, the knowledge and the multi-sensory perception. A Digital Library (DL) is created using Close Range Photogrammetry (CRP) techniques applied to 21 archaeological artefacts belonging to different categories. Enriched with other data (texts, images, multimedia), all 3D models flow into the cloud data server from which are recalled in the individual exhibitions. In particular, we have chosen three types of technological solutions: VISUAL, TACTILE, SPATIAL. All the solutions take into account the possibility of group interaction, allowing the participation of the interaction to an appropriate number of users. Sharing the experience enables greater involvement, generating communicative effectiveness much higher than it would get from a lonely visit. From the ""Museum Visitors Behaviour Analysis"" we obtain a survey about users' needs and efficiency of the interactive solutions. The main result of this work is the educational impact in terms of increase in visitors, specially students, learning increase of historical and cultural content, greater user involvement during the visit to the museum."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-40	Clough P.,"Evaluation: Thinking outside the (Search) box",2014,"ACM International Conference Proceeding Series","05-07-Dec-2014",,,"1","9",,"10.1145/2824864.2824890","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84959906480&doi=10.1145%2f2824864.2824890&partnerID=40&md5=f49720cf1f20047dbaf25ac9b59b3fb6","Evaluation of IR systems has typically focused on the system and specifically assessing the quality of a ranked list of results with respect to a query. However, IR functionality is typically just one component amongst many that are used to help support users' wider information seeking activities. Many systems that include a search box also provide features, such as faceted lists, subject hierarchies, visualizations and recommendations to help users find information. In this paper I discuss experiences gained from developing a system to support exploration and discovery in digital cultural heritage. In particular I focus on the development of system components to support search and navigation and how the different components were evaluated within the development life-cycle of the project. The importance of taking a holistic approach to evaluation, as well as utilising evaluation approaches from domains other than IR, is emphasized. In short, we need to be thinking outside the (search) box when it comes to evaluation in IR. © 2015 ACM."	0 - The paper does not seem to be relevant to 4CH project

DHUR-41	Clough P.D., Goodale P., Agosti M., Lawless S.,"ACHS'16: First international workshop on accessing cultural heritage at scale",2016,"Proceedings of the ACM/IEEE Joint Conference on Digital Libraries","2016-September",, 7559628,"289","290",,"10.1145/2910896.2926733","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989905686&doi=10.1145%2f2910896.2926733&partnerID=40&md5=0d769dfea2470319621eeedbc2f55c88","The workshop aims to bring together researchers and practitioners to review and discuss ways of providing effective access to large-scale collections of cultural heritage content. The scale, variety and availability of cultural heritage content, combined with the variety of user groups with respect to background knowledge, specialist experience and needs is challenging in the context of existing access methods. In particular, we consider going beyond keyword search in large-scale cultural heritage digital libraries, in support of exploration and discovery. Our purpose for the workshop is to consider the opportunities and challenges presented by new and existing technologies, as well as the needs and experiences of diverse user communities. Our goal is to assess the current state-of the-art, to identify opportunities and establish future research priorities, informed by the combined knowledge and experience of academics and practitioners. © 2016 ACM."	1 - The paper could be interesting but it is neccessary to read more
DHUR-42	Cousins J., Chambers S., Van Der Meulen E.,"Uncovering cultural heritage through collaboration",2008,"International Journal on Digital Libraries","9","2",,"125","138",,"10.1007/s00799-008-0041-1","https://www.scopus.com/inward/record.uri?eid=2-s2.0-56049116653&doi=10.1007%2fs00799-008-0041-1&partnerID=40&md5=a0d0c530b9e94a72203af0799c64e079","The article describes the history of The European Library from project to operational service. It concentrates on the collaborative organizational model that has contributed to its success to date. This success has led to the European Union making available funds and backing The European Library as the horse to lead the European Digital Library Initiative, called Europeana. The paper describes how the lessons learnt in The European Library during the past 2 years of operational service will be applied to create a new cross domain portal covering museums, archives, libraries and audio visual archives. The paper will also touch on the need to collaborate at technical and semantic levels as well as human and political ones. Within libraries, efforts have been made to standardize data and formats to make item level searching across National Libraries feasible. This has made web searching feasible, via The European Library, for many records and items that cannot be retrieved by the big search engines, but has left the user with essentially a library system. The National Libraries are therefore finding ways to make this data more accessible and more open. OAI-PMH harvesting and a wiki approach to the building and sharing of collection descriptions are contributing to this accessibility. The paper does not cover the technical developments in any great detail, but will mention where the use of certain technologies have helped or hindered the development of the site. In the future, The European Library will also make use of research and developments for Europeana, such as object reuse exchange, interoperability, multilingual search and retrieval, and the ranking of search results, but these will not be covered here. The national libraries have learnt a great deal by sharing and collaborating in the construction and maintenance of The European Library. To date this has been a greater return on the national libraries' investment than the additional visitors or users of their data. This peer group collaboration is being further attempted in the creation of a crosscultural sector portal, Europeana, into which The European Library will feed. © 2008 Springer-Verlag."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-43	Cramer H., Evers V., Ramlal S., Van Someren M., Rutledge L., Stash N., Aroyo L., Wielinga B.,"The effects of transparency on trust in and acceptance of a content-based art recommender",2008,"User Modeling and User-Adapted Interaction","18","5",,"455","496",,"10.1007/s11257-008-9051-3","https://www.scopus.com/inward/record.uri?eid=2-s2.0-54949121314&doi=10.1007%2fs11257-008-9051-3&partnerID=40&md5=0d675d66e9cde9d973dd25bb4deb5e60","The increasing availability of (digital) cultural heritage artefacts offers great potential for increased access to art content, but also necessitates tools to help users deal with such abundance of information. User-adaptive art recommender systems aim to present their users with art content tailored to their interests. These systems try to adapt to the user based on feedback from the user on which artworks he or she finds interesting. Users need to be able to depend on the system to competently adapt to their feedback and find the artworks that are most interesting to them. This paper investigates the influence of transparency on user trust in and acceptance of content-based recommender systems. A between-subject experiment (N = 60) evaluated interaction with three versions of a content-based art recommender in the cultural heritage domain. This recommender system provides users with artworks that are of interest to them, based on their ratings of other artworks. Version 1 was not transparent, version 2 explained to the user why a recommendation had been made and version 3 showed a rating of how certain the system was that a recommendation would be of interest to the user. Results show that explaining to the user why a recommendation was made increased acceptance of the recommendations. Trust in the system itself was not improved by transparency. Showing how certain the system was of a recommendation did not influence trust and acceptance. A number of guidelines for design of recommender systems in the cultural heritage domain have been derived from the study's results."	0 - The paper does not seem to be relevant to 4CH project
DHUR-44	Cuca B., Hadjimitsis D.G.,"Space technology meets policy: An overview of Earth Observation sensors for monitoring of cultural landscapes within policy framework for Cultural Heritage",2017,"Journal of Archaeological Science: Reports","14",,,"727","733",,"10.1016/j.jasrep.2017.05.001","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85019842454&doi=10.1016%2fj.jasrep.2017.05.001&partnerID=40&md5=ddd800fdd51eae1e9148005ccf96df91","A wide range of satellite sensors that provide potentially useful imagery for digital documentation, mapping and monitoring of archaeological sites and cultural landscapes. Although some satellites have stopped acquiring new data, their archived satellite imagery can still be accessed, downloaded and exploited for monitoring of changes and therefore useful for research domain of archaeology and cultural landscapes. The aim of this paper is 1) to make an overview of past and current satellite earth observation optical sensors useful for land monitoring, with focus on cultural landscapes and 2) to illustrate a policy framework that goes beyond recommendations, suggesting the need of valuable information possibly provided by the in satellite imagery. Paper will put focus on Copernicus programme as the most recent mission that provides imagery on the global scale and free of charge. Paper, furthermore, highlights the need for a more structured consideration of the contribution that space technologies services and products can offer to the non-space sectors. The actions for implementation of strategies regarding the currently renewed attention towards cultural heritage protection and management, could soon benefit from the technological achievements of satellite technologies in terms of dedicated operational services and applications, tailored to the needs of end-users such as archaeologists, landscape professionals, public administration, researchers and students. © 2017"	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-45	Cunningham S.J., Mahoui M.,"Interacting with and through a digital library collection: Commenting Behavior in flickr's the commons",2013,"Proceedings of the ACM/IEEE Joint Conference on Digital Libraries",,,,"21","24",,"10.1145/2467696.2467745","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84882273493&doi=10.1145%2f2467696.2467745&partnerID=40&md5=27720917ae902563f8094ae902ce341c","There is growing interest by digital collection providers to engage collection users in interacting with the collection (e.g. by tagging or annotating collection contents) and with the collection organizers and other users (e.g. to form loose 'communities' associated with the collection). At present, little has been documented as to the uptake of these mechanisms in specific collections, or the range of behaviors that emerge as users bend existing facilities to their own needs. This paper is one step in that direction: it describes the social information behaviors exhibited in a cultural heritage photography collection in The Commons on Flickr, and suggests implications for digital library design in response to these behaviors. Copyright © 2013 by the Association for Computing Machinery, Inc. (ACM)."	0 - The paper does not seem to be relevant to 4CH project

DHUR-46	Dallas C.,"Digital curation beyond the “wild frontier”: a pragmatic approach",2016,"Archival Science","16","4",,"421","457",,"10.1007/s10502-015-9252-6","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84940702204&doi=10.1007%2fs10502-015-9252-6&partnerID=40&md5=3ac0c0c9947a6fae217598591b2be38c","This paper advocates the necessity of developing a pragmatic alternative to the dominant custodial theorization of digital curation as an “umbrella concept for digital preservation, data curation, electronic records, and digital asset management”. Starting from a historical account and an examination of prevalent definitions, it points to the current dependence of digital curation on a prescriptive approach rooted in its cognate field of digital preservation, aiming to serve the needs of professional stewardship. It demonstrates the disconnect of this theorization with the rich historical traditions of museum curatorship where the notion of curation originated, its inability to act as a framework for understanding the diversity and pervasiveness of contemporary digital curation practices “in the wild” (such as content curation, personal archiving, and pro-am digitization), and its dependence on a “wild frontier” ideology dissonant with contemporary critical cultural heritage scholarship. The alternative, pragmatic approach views digital curation as a “contact zone” practice, routinely performed by a broad range of actors including researchers, artists, users, and communities, on dynamically evolving objects, domain knowledge representations, and interactions, beyond the curation life cycle prescribed for custodial environments. On this basis, this study calls for a formal reconceptualization of digital curation, adequate knowledge representation of its objects, evidence-based research on curation practices, and establishment of curation-enabled digital infrastructures suitable for curation in the continuum. Reaching beyond a custodial view, this approach aims to establish digital curation as a field of intellectual inquiry relevant to emerging pervasive curation practices in the digital environment. © 2015, Springer Science+Business Media Dordrecht."	0 - The paper does not seem to be relevant to 4CH project
DHUR-47	Darling J.M., Vanoni D.J., Levy T.E., Kuester F.,"Enhancing the digital heritage experience from field to museum: User-centered system design of an augmented reality tablet application for cultural heritage",2013,"Proceedings of the DigitalHeritage 2013 - Federating the 19th Int'l VSMM, 10th Eurographics GCH, and 2nd UNESCO Memory of the World Conferences, Plus Special Sessions fromCAA, Arqueologica 2.0 et al.","1",,6743782,"453","",,"10.1109/DigitalHeritage.2013.6743782","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84896777527&doi=10.1109%2fDigitalHeritage.2013.6743782&partnerID=40&md5=140e3c4b8b84cf07553ce54408c872c7","As smartphones and tablets continue to pervade our daily lives, museums have turned to these devices as a new platform for engaging visitors with cultural heritage. However, the needs of the museum visitor are often overlooked when designing these applications. Researchers from CISA3 are beginning to address this problem by performing studies to gage users' wants in both engaging with the interfaces of mobile applications and the affordances associated with their environment of use. © 2013 IEEE."	0 - The paper does not seem to be relevant to 4CH project
DHUR-48	Deuschel T., Heuss T., Humm B.,"The digital online museum: A new approach to experience virtual heritage",2014,"CEUR Workshop Proceedings","1306",,,"38","48",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84919807912&partnerID=40&md5=07020659acf91c338a1494dc9242dca9","This paper describes a novel approach to satisfy the needs of museum's website visitors with a unique experience that cannot be reproduced in the museum itself. We aim at providing a continuous and lasting experience, without the emphasis of a single, final result-a process we call digital strolling. The view supports this process by displaying results as a path on which the user strolls. To enable the user to find new and unexpected inspiration, recommendations to related exhibits are proposed in different dimensions to vary the user's path. The common approach of image retrieval as the sole method to generate recommendations of related exhibits is not sufficient. Authored tagging is still the better but more costly solution. The proposed approach claims to fill the gap between current digital museums and the needs of the digital museums' visitors."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-49	Di Stefano C., Battisti F.,"Caravaggio in Rome: A QoE-based proposal for a virtual gallery",2018,"3DTV-Conference","2017-June",,,"1","4",,"10.1109/3DTV.2017.8280423","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85046336753&doi=10.1109%2f3DTV.2017.8280423&partnerID=40&md5=e303db6a776872690431c3a5d2bfb76c","The spreading of low-cost and easy-to-implement systems for Virtual Reality, make it possible for a large number of consumers to experience this technology. The application fields span a wide range and recently the educational aspect started having a significant impact. In this paper we design a framework that allows the user to visit a virtual museum in which all canvases painted by Caravaggio and conserved in Rome are displayed. The aim of this project is two-fold: on one hand we provide the user with the possibility of having a personalized and educative exploration of an artistic content, while on the other hand we assess the acceptability of this virtual reality-based application by the final user. The system has been implemented in three different versions, one based on a standard interaction between subject and PC, while the other two rely on the use of Google Cardboard, a low-cost framework for virtual reality rendering. In order to assess the Quality of Experience of the users of the system, we performed subjective experiments that showed pros and cons of the proposed system and highlighted some guidelines towards the use of VR for serious gaming. The synergic cooperation between Art History and ICT gave to this project a peculiar aim in which both disciplines' interests and needs are profitably combined to build a Digital Humanities project. The result is a product, which is philologically accurate and at the same time innovative in terms of technologies used. © 2017 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-50	Doerr M., Tzompanaki K., Theodoridou M., Georgis Ch., Axaridou A., Havemann S.,"A repository for 3D model production and interpretation in culture and beyond",2010,"VAST 2010 - 11th International Symposium on Virtual Reality, Archaeology and Intelligent Cultural Heritage",,,,"97","104",,"10.2312/VAST/VAST10/097-104","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84868010581&doi=10.2312%2fVAST%2fVAST10%2f097-104&partnerID=40&md5=b1a2ea31ad81e384cef74a410d43dc05","In order to support the work of researchers in the production, processing and interpretation of complex digital objects and the dissemination of valuable and diverse information to a broad spectrum of audience there is need for an integrated high performance environment that will combine knowledge base features with content management and information retrieval (IR) technologies. In this paper we describe the design and implementation of an integrated repository to ingest, store, manipulate, and export 3D Models, their related digital objects and metadata and to enable efficient access, use, reuse and preservation of the information, ensuring referential and semantic integrity. The repository design is based on an integrated coherent conceptual schema that models complex metadata regarding provenance information, structured models, formats, compatibility of 3D models, historical events and real world objects. This repository is not implemented just to be a storage location for digital objects it is meant to be a working integrated platform for distant users who participate in a process chain consisting of several steps. A first prototype, in the field of Cultural Heritage, has already been implemented in the context of 3D-COFORM project, an integrated research project funded by the European Community's Seventh Framework Programme (FP7/2007-2013, no 231809) and the results are satisfactory, proving the feasibility of the design decisions which are absolutely new, ambitious, and extraordinarily generic for e-science. © The Eurographics Association 2010."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-51	Donato V., Biagini C., Bertini G., Marsugli F.,"Challenges and opportunities for the implementation of h-bim with regards to historical infrastructures: A case study of the ponte giorgini in castiglione della pescaia (grosseto - Italy)",2017,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","42","5W1",,"253","260",,"10.5194/isprs-Archives-XLII-5-W1-253-2017","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85020712126&doi=10.5194%2fisprs-Archives-XLII-5-W1-253-2017&partnerID=40&md5=1bda12b7ee9fbb7711d323d9f1074a11","Historical Building Information Modeling (H-BIM) has been widely documented in literature and is becoming more popular with government bodies, who are increasingly choosing to make its use mandatory in public procurements and contracts. Although the system seems to be one of the best approaches for managing data and driving the decision-making process, several difficulties arise due to the amount of effort required in the initial phases, when the data derived from a geometrical survey must be converted into parametric elements. Moreover, users must decide on a ""level of geometrical simplification"" a long time in advance, and this inevitably leads to a loss of geometrical data. From this perspective, our research describes a procedure to optimize the workflow of information for existing artefacts, in order to achieve a ""lean"" H-BIM. In this article, we will analyse two aspects: The first relates to the level of accuracy in a digital model created from the two different point clouds achieved from laser scanner and form images, while the second concerns the conversion of this information into parametric elements (Building Object Models- BOMs) that need to have specific characteristics. The case study we are presenting is the ""Ponte Giorgini"" (""Giorgini Bridge"") in Castiglione della Pescaia (Grosseto - Italy)."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements

DHUR-52	Dorey J.,"Preserving and disseminating cartographic knowledge: The role of archives in the digital age",2014,"Association of Canadian Map Libraries and Archives Bulletin",,"147",,"42","46",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84906748706&partnerID=40&md5=9aa01a32fdf1e7061d983534345c30e0","The goal of the Summit was to provide 'the Canadian archival community an opportunity to consider its future and envision how Canada's documentary heritage remains a valued part of Canada's knowledge infrastructure. While the outcomes of the Summit addressed specifically archival challenges, these challenges are not only of concern to the archival community: libraries, museums, documentation centers, and information services all deal with digital material, using practices suited to their specific needs. Cartographic knowledge, including paper maps, digital maps and geomatics data, shares many of the features of archival records. It is no longer enough to provide services to our various user groups without knowing more about them. Archivists are experts at preserving historical records through a number of activities entrenched in a set of practices: appraisal, arrangement, description, preservation management and access."	0 - The paper does not seem to be relevant to 4CH project
DHUR-53	Dorner D.G., Liew C.L., Yeo Y.P.,"A textured sculpture: The information needs of users of digitised New Zealand cultural heritage resources",2007,"Online Information Review","31","2",,"166","184",,"10.1108/14684520710747211","https://www.scopus.com/inward/record.uri?eid=2-s2.0-34047263613&doi=10.1108%2f14684520710747211&partnerID=40&md5=3d9474d09cf05d70ba26592f14b1cf02","Purpose - The purpose of this study is to gather some empirical, baseline information on the perceived needs of end-users of digital cultural heritage resources. The study was funded by the National Library of New Zealand in order to take end-user needs into consideration more fully in its development and presentation of digital cultural heritage resources. Design/methodology/approach - The study's research design involved a mixed quantitative and qualitative approach a user survey comprising self-administered, semi-structured questionnaires, seven face-to-face semi-structured interviews and one focus group. Findings - The findings outline the barriers users face in using New Zealand digital cultural heritage resources. They also highlight the user needs and features and characteristics they most desire in digital cultural heritage resources. Originality/value - Only a handful of studies exist about end-user needs with respect to the digitisation of cultural heritage materials and very few are research-based articles. This research is the first of its kind to describe information needs of users of digital cultural heritage resources in New Zealand, and pays particular attention to the needs of historical researchers. © Emerald Group Publishing Limited."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-54	Doumat R., Egyed-Zsigmond E., Pinon J.-M.,"Digitized ancient documents·· What's next?",2009,"Document Numerique","12","1",,"31","51",,"10.3166/dn.12.1.31-51","https://www.scopus.com/inward/record.uri?eid=2-s2.0-77950847451&doi=10.3166%2fdn.12.1.31-51&partnerID=40&md5=319120a8068cc5159bd33209ac17c5e6","Collections of cultural heritage documents are most of the time digitized images. These precious documents are now availab hence the use of a collaborative annotation space and the reuse of users' experiences, by tracing their actions -during the annotation process- in order to offer an assistance based on these traces is necessary. In this article we present our digital archive model and a prototype of the collaborative application to annotate online ancient manuscripts. The application offers an assistant for semi-automatic annotation, and a tracing system that saves traces of important actions in order to reuse them in a recommender system afterwards. © 2009 Lavoisier, Paris."le on the internet and need manual annotations to make their content accessible and exploitable. Manual annotations are expensive and tedious	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-55	Doumat R., Egyed-Zsigmond E., Pinon J.-M.,"Digitized ancient documents·· What's next?",2009,"XXVIIeme Congres INFORSID 2009",,,,"195","210",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84884634746&partnerID=40&md5=bdfea8f6102962dbe95b2b8708fa05af","Collections of cultural heritage documents are most of the time digitized images. These precious documents are now available on the internet and need manual annotations to make their content accessible and exploitable. Manual annotations are expensive and tedious hence the use of a collaborative annotation space and the reuse of users' experiences, by tracing their actions -during the annotation process- in order to offer an assistance based on these traces is necessary. In this article we present a digital archive model and prototype of a collaborative system to annotate online ancient manuscripts. The application offers an assistant for semi-automatic annotation, and a tracing system that saves traces of important actions in order to reuse them in a recommender system afterwards."	0 - The paper does not seem to be relevant to 4CH project
DHUR-56	Dragoni M., Tonelli S., Moretti G.,"A knowledge management architecture for digital cultural heritage",2017,"Journal on Computing and Cultural Heritage","10","3", 15,"","",,"10.1145/3012289","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85026845459&doi=10.1145%2f3012289&partnerID=40&md5=c23b2ccada391125e2cd334ce3e012fe","The increasing demand of technological facilities for galleries, museums, and archives has led to the need for designing practical and effective solutions for managing the digital life cycle of cultural heritage collections. These facilities have to support users in addressing several challenges directly related to the creation, management, preservation, and visualization of digital collections. Such challenges include, for example, the support for a collaborative management of the produced information, their curation from a multilingual perspective to break the language barriers and make collections available to different stakeholders, and the development of services for exposing structured version of data both to users and machines. Platforms satisfying all of these requirements have to support curators activities and, at the same time, provide facilities for engaging the virtual consumers of the produced data. In this article, we propose a description of an abstract architecture for managing digital collections built on a set of components, services, and APIs able to address the challenges mentioned previously. An instantiation of this architecture is discussed, and we present a use case concerning the management of a digital archive of verbo-visual art. Lessons learned from this experience are reported to outline future activities. © 2017 ACM."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-57	Drap P., Seinturier J., Chambelland J.-C., Gaillard G., Pires H., Vannini G., Mucciotti M., Pruno E.,"Going to Shawbak (Jordan) and getting the data back: Toward a 3D GIS dedicated to medieval archaeology",2009,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","38","5W1",,"","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84961313065&partnerID=40&md5=4c86c649d7dcaab2adc5ad9669ad33a7","The paper presents an interdisciplinary project which is a work in progress towards a 3D Geographical Information System (GIS) dedicated to Cultural Heritage with a specific focus application on the Castle of Shawbak, also known as the ""Crac de Montréal"", one of the best preserved rural medieval settlements in the entire Middle East. We develop a set of tools for medieval archaeological analysis ranging from the production of traditional graphical documentation like orthophotos and low-resolution 3D models (VRML) to the use of 3D/2D GIS through the creation of centralized and exhaustive object storage tool both for archaeological and photogrammetric data. Using these tools archaeologists will be able to produce, store, visualize and manage both archaeological and 3D data, according to their needs. The Shawbak archaeological project is a specific and integrated project between medieval archaeological research, conservative restoration and site's valorization. Focusing mainly on stratigraphical analysis of upstanding structures provides archaeologists with a huge amount of data to collect on site and useful records that will be used to understand the structures from stratigraphical and technological point of views. The foundation stone for this project is the analysis of documents produced and used by archaeologists in order to identify specific archaeological requirements The first phase is to give archaeologists traditional photogrammetric tools so that they can be autonomous in producing graphical documents (taking photographs, photo orientation and traditional orthophoto generation). The second step is to develop a common model structure for both photogrammetric and archaeological data storage using a unique database and allowing to link archaeological data with 3D measurements. Specific photogrammetry tools dedicated to stone by stone measurement have been under development since 2000 to help archaeologists to easily produce photogrammetric surveys. These tools are now integrated in a more complex system which allows automatic production of 2D or 3D representations from archaeological database queries. The graphical 2D documents produced through this process look like the handmade drawings done by archaeologists using orthophotos. The 3D GIS is the last step of this chain and aims the automatic production of 3D models through archaeological database queries: these 3D models are in fact a graphical image of the database and at the same time the interface through which the user is able to modify it. This approach enables automatic 3D thematic representation and new archaeological analysis through bidirectional-links between 3D representation and archaeological data. All these developments are written in Java within Arpenteur framework. (Arpenteur, 2008)."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements

DHUR-58	Dunne S., Lerkenfeld M.,"Digital archiving: A call for user inspired digital archiving of cultural heritage",2010,"EuroITV'10 - Proceedings of the 8th International Interactive TV and Video Conference",,,,"27","29",,"10.1145/1809777.1809784","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84889234900&doi=10.1145%2f1809777.1809784&partnerID=40&md5=7a318ae2d9a84e579497462a357736ff","Recently, there has been an increasing amount of digital archiving projects. Among these, national broadcasting organisations have begun offering digital content free to the public. The amount of digitalised information is increasing, though no one seems to be able to answer the question of how the information should be archived in order to be beneficial in the future? Given the financial cost and legal practices such as copyright, digitalisation has been discussed and addressed from various angles however, organisations still don't appear to focus on the end users, the distribution or how the public can benefit from a new type of archive. This paper explores different problems and ideas when developing new digital archive platforms with the purpose of making national broadcasting organisations' cultural content available to the public. Furthermore, we discuss methods of making information accessible and useful in terms of the characteristics digital media possesses. Finally, we call for new methods and approaches to the creation of user inspired digital archives, and the need for innovation in the standards of digital archiving related to public service."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-59	El-Behaedi R., Ghoneim E.,"Flood risk assessment of the Abu Simbel temple complex (Egypt) based on high-resolution spaceborne stereo imagery",2018,"Journal of Archaeological Science: Reports","20",,,"458","467",,"10.1016/j.jasrep.2018.05.019","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85047869952&doi=10.1016%2fj.jasrep.2018.05.019&partnerID=40&md5=f48435b8d21fdc431f17eaf6d900e907","The ancient Egyptian Abu Simbel temple complex, located on the western bank of the Lake Nasser reservoir behind the Aswan High Dam, is increasingly vulnerable to natural and anthropogenic processes. Flooding by the rising waters of the reservoir is among the main factors that threaten this ancient structure. With the present construction of a series of large dams from the 2nd through 5th Nile River cataracts in Sudan as well as the building of Africa's largest hydroelectric dam, the Grand Ethiopian Renaissance Dam, there is growing concern about the safety of the structure. Accordingly, there is a dire need for the development of a novel tool to enable detailed and systematic monitoring of potential hazards that the ancient temple complex may face in the future. Therefore, in order to quantify the possible inundation of the temple complex and to locate potential segments at risk of flooding, stereo pair imagery from the Pleiades-1A satellite sensor were used to build a very high-resolution 2-meter digital elevation model (DEM). Using the derived DEM, a number of reservoir water level rise scenarios were simulated using GIS. The results showed that with a slight increase of the reservoir's water level from 175 m to 177 m ASL, only 4.9% of Abu Simbel peninsula would be inundated. Such flooded area would increase to more than 13% with a water rise of 181 m ASL. A hypothetical high water rise event of 185 m and 189 m ASL, as a result of potential catastrophic damage to the upstream neighboring dams, would submerge nearly one third (30.3%) and half (~53.7%) of the peninsula, respectively. In particular, the eastern portions of the Smaller Temple and the causeway of the Great Temple would be most severely impacted by the flooding. A new user-friendly Google Earth Engine tool, “Satellite Observations for Archaeological Preservation” (SOAP), was also developed to easily and dynamically display the flooding simulation results to in-country stakeholders and policy makers. The innovative approach used for this study is highly adaptable and with only a few minor modifications can be used for assessing vulnerability of similar archaeological sites to reservoir flooding worldwide. © 2018 Elsevier Ltd"	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-60	Esmaeili H., Thwaites H., Woods P.C.,"A Conceptual Human-Centered Approach to Immersive Digital Heritage Site/Museum Experiences: The Hidden Waterfall City",2018,"Proceedings of the 2018 3rd Digital Heritage International Congress, Digital Heritage 2018 - Held jointly with the 2018 24th International Conference on Virtual Systems and Multimedia, VSMM 2018",,, 8810110,"","",,"10.1109/DigitalHeritage.2018.8810110","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85072166722&doi=10.1109%2fDigitalHeritage.2018.8810110&partnerID=40&md5=f1c4280e8e5ccc8674c365c7a6ced4b3","In this paper we present a conceptual Digital Heritage (DH) site in two different forms. The work includes several Unity Scenes built into one package with interactions between a virtual museum and the conceptual DH site. The main objective here is to create a large and realistic user experience using the latest Immersive Virtual Reality (IVR) technologies available to public. This enables us to study the future users' behavioral patterns in such environments in the next step. The findings can be contributed to the field, mainly for the future technical development. However, the pilot user study undertaken step by step during the development process of this conceptual DH package is not included in this paper as we mainly look at the technical aspects and the overall concept at this stage. The major effort in this study is to employ the available IVR resources to create such environments as proof of concept in large scale. Although (affordable and available to public) IVR technologies have been significantly improved in the recent years, still there are many areas that need to be empowered. DH has long been one of the main targets in cultural studies. In this paper we examine the major interactions in IVR, applicable to DH, using a practical Human-Centered approach as a pilot test for the future behavioral patterns study related to this conceptual work. Therefore, as explained, this study does not represent a real case of DH or a historical review as the focus is mainly on the technical/design aspects, involving the currently available human interaction elements in IVR. © 2018 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology

DHUR-61	Esposito F.,"Symbolic machine learning methods for historical document processing",2013,"DocEng 2013 - Proceedings of the 2013 ACM Symposium on Document Engineering",,,,"1","2",,"10.1145/2494266.2494291","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84887324559&doi=10.1145%2f2494266.2494291&partnerID=40&md5=098fb41e6a356c74bf9ae9c378d227db","Numerous valuable histor and cultural sources - a major part of our cultural heritage - are currently imperilled and scattered in various national archives. Arts and Humanities are sciences that are mainly based on the interpretation of cultural objects such as texts, paintings and works of arts, or historical/ethnological remains and monuments. Such objects are often unique, very valuable, fragile, irreplaceable and locally preserved in scientific collections at museums, in archives, or in urban and historic areas. Archives, museums and other cultural institutions do not simply conserve these objects. They also manage a large of documentation on them in the form of photo collections, expertise, records, scientific studies and analyses. Both the objects themselves as well as the supplementary documentation are often accessible only through physical contact with users. Duplicates such as text documents (e.g., critical editions), or image documents (facsimiles, photographs) on paper are extremely expensive in terms of manpower, know-how and printing costs, and often these expenses cannot be justified for a small scientific audience. Electronic formats for object documentation might alleviate this access problem. Numerous initiatives have been started and supported to highlight and investigate a variety of challenges that museums and other culture-historical institutions are facing in an increasingly digital, media saturated landscape. However, full knowledge and usage of this material are severely impeded by access problems, due to the lack of appropriate content-based search and retrieval aids that help users to find what they really need even when electronically and digitized copies are available. Preserving contents does not consist in simply storing them, but in actively transforming them to adapt them technically and keep them intelligible. Moreover, many informal and non-institutional contacts between cultural archives constitute specific professional communities which today, however, still lack effective and efficient technological support for cooperative and collaborative knowledge working. The creation of digital libraries, enhanced by annotation collaboratory facilities, is the technological response to bundle documents, interpretation knowledge, work processes and an expert network in a very flexible working environment. Object and document collections in the Arts and Humanities always represent work in progress. The inventory at cultural institutions is growing steadily due to donations, acquisitions, and by virtue of their own daily scientific and conservation services. These additions must be incorporated into the existing collections but often space difficulties, problems of scientific know-how and lack of personnel have to be dealt with. Professionals and experts classify, analyze, assess and expose or edit these objects and documents. Highly qualified external specialists are frequently difficult to locate, if they are not part of a scholarly network. Internal experts are often overburdened with routine work in times of small cultural budgets and can only invest time sporadically and intermittently in integrating new inventories. Many scientific members of cultural institutions have temporary contracts and leave after a few years, taking with them a great part of the accumulated know-how. The intrinsic nature of the document processing procedures supporting the progressive work on historic material, as outlined in this introduction, poses several constraints that require solutions specifically tailored to the tasks mentioned above. Over the years, Intelligent Systems are becoming valuable working instruments for researchers involved in humanistic sciences. The new challenge is now to provide these people with tools that are able to facilitate the fruition and investigation of the cultural heritage, so that even non-experts or communities of researchers may use up-to-date tools for both their personal work and for collaborative purposes. Technologically, the World Wide Web can serve both as a standard communication platform for such communities and as a gateway for document-centered digital library applications. Yet, while the Web may solve the problem of the diffusion and access of this material in its digital form, new automated tools are needed to allow a more intelligent processing and a personalized utilization of this knowledge. According to the situation previously described, besides the effectiveness and the efficiency of such solutions, such automatic tools must be able to cope with situations in which the continuous growth of the available material and knowledge is a fundamental and unavoidable issue. Hence, there is the need for a system component that is able to build incrementally upon previously acquired knowledge through diverse reasoning mechanisms. Specifically, the availability of systems that can automatically identify and separate document classes and meaningful parts inside them would alleviate experts from the need to accomplish low-level tasks, thus allowing them to focus on more intellectual interpretation-intensive tasks. For such systems to be successful in a real operating environment, however, their behavior and results must be comprehensible to human experts, which can happen only when symbolic representations are used. The choice of these symbolic mechanisms, which resemble closely the human way of reasoning, also allows a more direct comprehension and control of the knowledge synthesized at every step of the process. In the talk, different experiences and projects in the cultural heritage application domain are briefly presented and the symbolic Machine Learning approaches, developed by the LACAM Lab. of the Department of Computer Science of the University of Bari, are presented. Since the 90's Document Engineering has been one of the elective application domains for the research group working in the field of Conceptual Learning, Inductive Logic Programming and Statistical Relational Learning. The research projects ([1], [2], [3], [4]) financed by the UE and by the Italian Ministry of Research have allowed the development and the vast experimentation in the domain of Cultural Heritage preservation with different general purpose ML methods and tools. The proprietary systems WISDOM++ [5], ATRE [6], INTHELEX [7], DOMINUS [8] are characterized by the intensive exploitation of intelligent techniques in each step of the document processing, from the acquisition to the layout analysis, from classification to interpretation, from text categorization to semantic indexing for information retrieval purposes. For example, in the project Collate (Collaboratory for Annotation, Indexing and Retrieval of Digitized Historical Archive Material), which aimed to provide a support for archives, researchers and endusers, worked with digitized historic/cultural material. A large corpus of multi-format documents concerning rare historic film censorship forms from the 20's and 30's, fig.1 (a), but also including newspaper articles, photos, stills, posters and film fragments, provided by three major European Film archives, had to be processed. The application of different symbolic learning methods in the diverse phases of the automatic document processing, from the image document acquisition to the layout correction and analysis, from document classification to understanding, allowed to keep contents accessible in their integrity and intelligible according to their meaning. The possibility of understanding the content of a part of a document, basing on the layout, is reported In fig. 1, where an example of a censorship card is shown, with the automatically acquired rule for the recognition of the logic block of the film title, expressed in terms of position and relationships with other logical layout blocks. The application of symbolic ML methods allows to organize and classify documents, to cope with the incrementality and the need for continuous updating and refining classification theories and concepts, in order to improve accuracy according to new available documents. Techniques for te	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-62	Estermann B.,"Are memory institutions ready for open data and crowdsourcing? Results of a pilot survey from switzerland",2013,"Proceedings of the 9th International Symposium on Open Collaboration, WikiSym + OpenSym 2013",,, 29,"","","",,"10.1145/2491055.2491075","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84888161407&doi=10.1145%2f2491055.2491075&partnerID=40&md5=2f5146ac9f2dd2ff179a966575a1d654","Since the advent of the World Wide Web, the cultural heritage sector has undergone a series of changes. In a pilot survey among memory institutions (galleries, libraries, archives, museums) in Switzerland we have focused on two recent trends - open data and crowdsourcing - Asking to what extent heritage institutions are ready to adopt open data policies and to embrace crowdsourcing strategies. The results suggest that so far, only very few institutions have adopted an open data policy. There are however signs that this may soon change: A majority of the surveyed institutions considers open data as important and believes that the opportunities prevail over the risks. Some obstacles however still need to be overcome, in particular the institutions' reservations with regard to ""free"" licensing and their fear of losing control. With regard to crowdsourcing the data suggest that the adoption process will be slower than for open data. Although approxi-mately 10% of the responding institutions seem already to experiment with crowdsourcing, there is no general breakthrough in sight, as a majority of respondents remain skeptical with regard to the benefits. Categories and Subject Descriptors K4.3 [computers and society]: organizational impacts - computer supported collaborative work K4.4 [computers and society]: electronic commerce - electronic data interchange (EDI) intellectual property K6.0 [management of computing and information systems]: general - economics. Copyright 2010 ACM."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology

DHUR-63	Fadli F., AlSaeed M.,"Digitizing vanishing architectural heritage The design and development of Qatar historic buildings information modeling [Q-HBIM] platform",2019,"Sustainability (Switzerland)","11","9", 2501,"","",,"10.3390/su11092501","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85066923237&doi=10.3390%2fsu11092501&partnerID=40&md5=b406246468d8e99640377ecf17123980","The documentation of vanishing architectural heritage includes intensive information and data gathering, filtering, classification and digitization. Enabling such an endeavor necessitates the act of documentation, which requires the cooperation of several professionals from different fields, extensive resources, precise organization, and robust structuring. Therefore, the design and development of an innovative digital platform to facilitate the interaction between users from different specialties is highly desirable to enable dynamic real-time preservation and protection of such invaluable heritage. The aim of this study is to investigate the existing Qatari built heritage, urban conservation methods and the principles of modern digitizing and archiving techniques to create a sustainable and interactive archiving platform-Qatar Historic Buildings Information Modeling (Q-HBIM) platform. This unique digital platform aims to respond to the needs of the society as well as the experts in the fields of urban heritage conservation and buildings restoration. A literature review was conducted on topics relating to Qatar urban heritage and the principles of three-dimensional digitization technology including an exploration of the aspects of sustainable urban preservation. Accordingly, site analysis (physical, photogrammetric and 3D scanning techniques were used), and in-depth interviews were adopted as the main data collection techniques. The findings of this study elucidate the principles of innovative architectural heritage digitization tools involving Building Information Modeling (BIM) technology and processes. It is anticipated that the present work will formulate an advanced and unique interactive archiving tool in the context of Qatar and GCC/MENA regions in the shape of the: Qatar Historic Building Information Modeling (Q-HBIM) platform. © 2019 by the authors."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-64	Farnand S., Jiang J., Frey F.,"Current practices in fine art reproduction: Project summary",2013,"Archiving 2013 - Final Program and Proceedings",,,,"48","53",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84883185713&partnerID=40&md5=da8cafb1dbe0dc76cccb61cd4ae7aead","Many cultural heritage institutions are currently spending significant resources photographing their works of art for a variety of applications with distinctly different requirements. To create reproductions of their artwork, cultural heritage institutions employ a range of technology and a variety of workflows. A similar variety is used to publish these images in a number of output media. This project was undertaken to explore these workflows and the image quality of the reproductions they generate. The objectives of this project were to: (1) determine the optimal reproduction processes in use in cultural heritage institutions today, (2) document the image quality inherent in current workflows in print and online, (3) define key quality criteria based on objective and subjective metrics, and (4) use this information to develop a framework to serve as a guideline for museums to follow when reproducing fine art. To work towards these objectives, a series of experiments were developed to evaluate the image quality attainable with the current reproduction workflows. Key findings of the project included that (1) achieving accurate tone reproduction at capture is crucial, (2) acceptable reproductions are achievable using a digital press, (3) following standardized workflows, ISO printing standards, and viewing standards substantially reduces the need for manual post-processing, (4) camera make, lighting, a file format had little impact on the ranking results, (5) internet-based experiments may be successfully used when evaluating image preference and, (6) while workflows still vary considerably, some commonalities were found for workflows producing images that were generally ranked highly across the experiments. These workflows were used as a basis for the development of the recommended guidelines, which included the following recommendations and considerations: • Workflows covering the whole image interchange cycle should be documented in detail. No undocumented processing should be performed along the image interchange cycle. • ICC profile-based color management should be used to achieve best results. • The use of targets to ensure a proper capture setup is recommended. • Defining imaging goals and talking to users is indispensable to help set expectations. • Guide prints did not prove useful in these experiments and are not recommended as proofs (though more testing may be needed). They could, however, be used for a visual 'reality check' on press • Closing the communication loop in the image interchange cycle is of the utmost importance. © Copyright 2013 Society for Imaging Science and Technology."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-65	Ferrara V., Macchia A., Sapia S., Lella F.,"Cultural heritage open data to develop an educational framework",2014,"IISA 2014 - 5th International Conference on Information, Intelligence, Systems and Applications",,, 6878775,"166","170",,"10.1109/IISA.2014.6878775","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84906730099&doi=10.1109%2fIISA.2014.6878775&partnerID=40&md5=0118ee0aefd9a75237f7bd74e6c36a5a","In recent years many projects have applied multimedia technology to support dissemination and new modality of digital museum resources access to meet the knowledge and interests of different users needs. Linked open data technology suggest to rethink access to digital cultural heritage resources and their dissemination in different contexts. This paper presents the results of project to develop learning Repository and annotation tool to increase the content of cultural heritage according to needs of teachers. The Educational Platform was developed to disseminate multimedia cultural content inside of classroom through Open access data modality to sharing museum resources and to making multimedia lessons. The tools developed provide museum information to share with teachers who can reuse and re-contextualize them in their multimedia lessons and create educational environments to improve engagement and student learning. This approach may be very interesting to adopt new strate of promoting cultural heritage in other contexts such as lifelong learning and tourism. In this way the museum object becomes a tool for teaching, new learning environments will be created and relationship between museum staff and education context will be improved. © 2014 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-66	Ferrara V., Macchia A., Sapia S.,"Reusing cultural heritage digital resources in teaching",2013,"Proceedings of the DigitalHeritage 2013 - Federating the 19th Int'l VSMM, 10th Eurographics GCH, and 2nd UNESCO Memory of the World Conferences, Plus Special Sessions fromCAA, Arqueologica 2.0 et al.","2",, 6744792,"409","412",,"10.1109/DigitalHeritage.2013.6744792","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84896749479&doi=10.1109%2fDigitalHeritage.2013.6744792&partnerID=40&md5=ba550b9e9a4e7bcdd078d5b2f7c72070","In recent years many projects have applied technology, as Linked Data, and new modality of digital museum resources access as a personalized way to meet the knowledge and interests needs of different users. Furthermore, current studies engage users in a new way of taking part in cultural heritage. This paper presents a framework to search, download and re-use digital resource of cultural heritage by teachers for developing their multimedia lessons. Open access data modality, tools for sharing museum resource and to make multimedia lesson are developed. In this way the museum object becomes a tool for teaching and educational environments will be created to improve engagement and student learning. Designing a learning repository that manages and shares various information of different museum catalogues and an annotation tool to museum objects are ongoing to allow teachers and students to increase cultural heritage contents and to improve relationship between museum staff and education context. © 2013 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology

DHUR-67	Ferreira-Lopes P.,"A Data-driven Approach for Architectural History Knowledge. Capturing Buildings Construction Events for Historical Research Collaboration",2020,"Journal on Computing and Cultural Heritage","13","2",15,"","","","10.1145/3376925","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85089495792&doi=10.1145%2f3376925&partnerID=40&md5=9e8fea4faf05f4ad5fd7e57db4c5be11","The increase of multidisciplinary research in the field of architectural history has led to the need to set up new experiences and solutions for the handling and integration of the information extracted from historical documents. These solutions seek to support diverse users of the research community with the aim of solving challenges directly related with the digitalisation, structuring, standardisation, and management of historical information. These challenges include, for example, the creation of a digital support that enables a collaborative growth and management of information, the normalisation of terms and vocabularies to make its analysis efficient, the elaborating of a conceptual model, and the development of a metadata support that allows its more expanded dissemination and reuse. This article describes a case study project in which the documents of archives, of research, and of projects previously carried out by the Late Gothic Network (Red Tardogótica) are the raw material for the proposal of an event-oriented historical database (e-database). This e-database means to record and systematise the information about the artistic transfers related with the architectural production in the transition of the Modern Age, a period also known as the Late Gothic. The e-database's design has considered the possibility of its use for the analysis of social networks (abstract-relational model, a Graph model) and the spatiotemporal analysis of the events (geo-temporal model, GIS). The main section of this article describes the architecture of the database, with a view to addressing the questions of the relations between the datasets and the matter of implementing the thesauri and controlled vocabularies that must be respected for the standardisation, recording, and later analysis of the data. Next, we contribute quantitative and qualitative analyses to evaluate the database's important gaps of information. This proposal initially covers the geographical framework of the western Andalusian territory, but it can be expanded to other areas and adapted to other case studies. Finally, the article summarises the learning achieved in this first phase of the case study project and describes the perspectives to broaden its use in the community of	1 - The paper could be interesting but it is neccessary to read more
DHUR-68	Ferro N., Silvello G.,"From users to systems: Identifying and overcoming barriers to efficiently access archival data",2016,"CEUR Workshop Proceedings","1611","","","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84977589704&partnerID=40&md5=9089d5518d912662b3858d81635ae27d","Digital archives are one of the pillars of our cultural heritage and they are increasingly opening up to end-users by focusing on accessibility of their resources. Moreover, digital archives are complex and distributed systems where interoperability plays a central role and efficient access and exchange of resources is a challenge. In this paper, we investigate user and interoperability requirements in the archival realm and we discuss how next generation archival systems should operate a paradigm shift bringing a new model of access to archival resources which allows to better address these needs. To this end, we employ the data structures and query primitiv based on the NEsted SeTs for Object hieRarchies (NESTOR) model to efficiently access archival data overcoming the identified barriers and limitations."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-69	Flynn B.,"Augmented visualisation Designing experience for an interpretative cultural heritage",2008,"Proceedings of the International Conference on Information Visualisation",,,4577986,"447","452",,"10.1109/IV.2008.103","https://www.scopus.com/inward/record.uri?eid=2-s2.0-51749087247&doi=10.1109%2fIV.2008.103&partnerID=40&md5=fa07fe79a9384f7229f246739e6057fd","The use of visualisation technologies is well established in digital cultural heritage. The earlier IT challenge of presenting material culture has largely been addressed with the production of high quality digital artefacts. A number of projects have drawn on the potential for augmented visualisation offered by mobile technologies, game engines and responsive environments. Alongside these advances is a recognition that a relevant digital cultural heritage needs to reflect contemporary interpretative practices rather than relying on outmoded systems of material science. While leading research in interpretative heritage has incorporated the hermeneutic aspects of previously lived cultures there have been less recognition of the importance of the users' role in the formation of cultural knowledge. The paper proposes that we take a step back to investigate the processes of knowledge formation. It provokes a series of new research questions on visualizing cultural heritage knowledge in light of theoretical readings on perception and knowledge formation. It points to the need to devise alternative methods for the design and production of an interpretative digital cultural heritage. Such methods detail the generative potential of a complex process rather than the replication of a complex structure. © 2008 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-70	Frangakis N., Lim V., Tanco L.M., Smatana P., Hreno J., Picinali L., Simeone L., Amditis A.,"PLUGGY: A pluggable social platform for cultural heritage awareness and participation",2018,"CEUR Workshop Proceedings","2235",,,"21","30",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85062416694&partnerID=40&md5=2eceb325653f6cd1b1b5eb868af58064","One of the preconditions for genuine sustainability is a heritage that is present anywhere and anytime in everyday life. We present PLUGGY, a Pluggable Social Platform for Heritage Awareness and Participation. PLUGGY will address the need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator and a major influencing factor. With PLUGGY, we aim to bridge this gap by providing the tools needed to allow users to share their local knowledge and everyday experience with others, together with the contribution cultural institutions. Users will be able to build extensive networks around a common area of interest, connecting the past, the present and the future. It will be powered by its users and puts people's values, aspirations and needs first. Users of PLUGGY will be the providers of information about cultural heritage in the everyday and ordinary, real life. Through its social platform and by using its innovative curation tools, designed to solely focus on a niche area in social media, citizens will be able to act as skilled storytellers by creating fascinating personalised stories and share them through social networking with friends, associates and professionals. In this paper, we describe a structured formative and summative evaluative approach of PLUGGY's core concepts and the results will be used to inform and improve its design. Copyright held by the author(s)."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-71	Fryer J.G., Chandler J.H., El-Hakim S.F.,"Recording and modelling an aboriginal cave painting: With or without laser scanning?",2005,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","36","5/W17",,"","","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85049525377&partnerID=40&md5=7826ca66a48fa288274ec6e8d51f2001","There are many compelling arguments, worldwide, for the recording of indigenous art sites which are endangered by ""people pressures"". The Baiame cave painting in the Hunter Valley of Australia (lat. 33 S, Long 151 E) is one such site. Traditional methods for recording rock art sites are reviewed from the perspective of archaeologists, indigenous peoples, the general public and surveyors/photogrammetrists. Needs and expectations of these diverse groups can range from approximate sketches to 3-D computer models and animations. Previously a laser scanner was used in conjunction with digital photography to produce a realistic 3-D model of the Baiame cave (El-Hakim et. al., 2004). Some simple surveying measurements were needed to 'tie' the spectral information on the cave wall to the digital elevation model (DEM) defined by the laser scanning. A second attempt at modelling the same cave has recently been undertaken using surveyed control points, digital photography and automated image correlation software commercially available with the Leica Photogrammetric System to produce a DEM and orthophotography. The relative merits of both approaches are discussed and the implications arising from their adoption outlined. The output of such a 3-D processes are reviewed with respect to the present and possible future expectations of users. © 2005 International Society for Photogrammetry and Remote Sensing. All rights reserved."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-72	Ganguli K.K., Gomez O., Kuzmenko L., Guedes C.,"Developinimmersive VR experience for visualizing cross-cultural relationships in music",2020,"Proceedings - 2020 IEEE Conference on Virtual Reality and 3D User Interfaces, VRW 2020",,,9090640,"401","406",,"10.1109/VRW50115.2020.00086","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85085359061&doi=10.1109%2fVRW50115.2020.00086&partnerID=40&md5=caf1e8e924c09ca15bec1a0f4a5d0e30","With the advent in advanced computing methodologies and forward-thinking data storage needs over the last decade, there has been a major drive for reformatting archival collections to enable advanced computational analysis. In this paper, we present our digital compendium of music from the Arab Mashriq and Western Indian Ocean comprising two music collections drawn from Library materials and field recordings at the New York University Abu Dhabi. This is at once the product and object of our ongoir research at the intersection of cultural heritage preservation and computational analysis. Through computational-ethnomusicological research, we explore the cross-cultural similarities, interactions, and patterns from the music excerpts in order to understand their similarity space by employing audio analysis, machine learning, and visualization techniques. Besides the digital artifactual value, pedagogical/educational and scholarly outcomes, we focus on attracting user-friendly and community engagement into appreciating the music from this region. This is done by providing interactive visualizations of the musical features on a dashboard application and 3-D rendering of the mappings in a VR environment. The VR experience is not only immersive but also provides a scope for appreciation, learning, and dissemination of the music from the region. © 2020 IEEE."	0 - The paper does not seem to be relevant to 4CH project

DHUR-73	Gardiner K., Carswell J.D.,"Viewer-based directional querying for mobile applications",2004,"Proceedings - 4th International Conference on Web Information Systems Engineering Workshops, WISEW 2003: 3rd International Workshop on Web and Wireless Geographical Information Systems, W2GIS 2003, 1st Web Services Quality Workshop, WQW 2003 and 1st Workshop on Multichannel and Mobile Information Systems, MMIS 2003",,,1286789,"83","91",,"10.1109/WISEW.2003.1286789","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84947929382&doi=10.1109%2fWISEW.2003.1286789&partnerID=40&md5=47342046f3bbb3617f6be5dcf371f1fc","With the steady and fast advancements in the integration of geographic information systems and mobile location-based services, interest in exploiting this technology for cultural heritage (CH) data sharing has become apparent. In this area there has been an increasing need to integrate positional information with non-positional data and add a spatial dimension to the definition of a users ""context"". In this paper, we describe an implementation of a viewer-based directional query processor that operates on an Oracle spatial database. The spatial position and orientation are taken from the viewer's perspective. Using this frame of reference a view-port is defined in real time as the viewer progresses through the space and used as the primary filter to query an R-tree spatial index. Finally, an experimental implementation shows how the query processor performs within a VRML model of Dublin linked to a spatially enabled CH dataset. © 2004 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-74	Gentili G., Micarelli A., Sciarrone F.,"Infoweb: an adaptive information filtering system for the cultural heritage domain",2003,"Applied Artificial Intelligence","17","8-9",,"715","744",,"10.1080/713827256","https://www.scopus.com/inward/record.uri?eid=2-s2.0-0242498540&doi=10.1080%2f713827256&partnerID=40&md5=c5422271b25906f8f3e74a992e1d164f","This paper presents a system developed for adaptive retrieval and the filtering of documents belonging to digital libraries available on the Web. This system, called InfoWeb, is currently in operation on the ENEA (National Entity for Alternative Energy) digital library Web site reserved to the cultural heritage and environment domain. InfoWeb records the user information needs in a user model, created through a representation, which extends the traditional vector space model and takes the form of a semantic network consisting of co-occurrences between index terms. The initial user model is built on the basis of stereotypes, developed through a clustering of the collection by using specific documents as a starting point. The user's query can be expanded in an adaptive way, using the user model formulated by the user himself. The system has been tested on the entire collection comprising about 14,000 documents in HTML/text format. The results of the experiments are satisfactory both in terms of performance and in terms of the system's ability to adapt itself to the user's shifting interests. © 2003 Taylor and Francis Group, LLC."	1 - The paper could be interesting but it is neccessary to read more
DHUR-75	Gilbert T., Baxter T., Spence A.,"The Australian oil spill response atlas project",2005,"2005 International Oil Spill Conference, IOSC 2005",,,,"9408","9416",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-33646075099&partnerID=40&md5=57ce17b9bf8befd92fa21d1f7a179969","Australia is among the top five shipping nations of the world based upon cargo and kilometres travelled. Australia also has vast, remote and environmentally sensitive coastlines ranging from tropical to subantarctic. Unfortunately shipping accidents and illegal discharges of oil and chemical pollutants into our marine environment do occur. To support spill response management in Australia, over the past four years the Australian Maritime Safety Authority (AMSA) has coordinated the development of a uniform and integrated national Oil Spill Response Atlas (OSRA) based upon an Arc View® geographic information system (GIS). The main aims of the OSRA project were to:1. Develop a mutually agreed national GIS specification for the development of the digital atlas to assure consistency and compatibility Australia wide 2. Fast track the collation, capture and conversion of all relevant geographical and textual data into a standard digital GIS format for the majority of Australia's marine and coastal environments (particularly for highly sensitive environments such as, world heritage areas, and marine parks and reserves) and 3. Create a user-friendly series of GIS system tools specially designed for the particular needs of spill response managers, operational staff and environmental agencies. This paper highlights some of the advantages of GIS based systems for spill response management, the OSRA system development and features, as well as the GIS automation tools that assist spill response managers and operational personnel."	0 - The paper does not seem to be relevant to 4CH project
DHUR-76	Gil-Fuentetaja I., Economou M.,"Communicating museum collections information online: Analysis of the philosophy of communication extending the constructivist approach",2019,"Journal on Computing and Cultural Heritage","12","1",3,"","","",,"10.1145/3283253","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85062242782&doi=10.1145%2f3283253&partnerID=40&md5=fa6307eadc4f22a29435d33fb82b7727","Cultural heritage institutions are spending considerable effort and resources to provide online access to their collection catalogues and collection management systems, usually through their institutional websites. This improves accessibility and supports research and engagement by diverse user groups, as well as meeting the increasing expectation by audiences that this type of information will be freely and easily available online. However, cultural organisations have not responded to these needs in the same way and have been employing different web tools and features to present their collections online. In this article, we argue that the technological implementation choices and the type of content provided reflect also the philosophy of communication of the institution itself. We used the constructivist approach's learning theory and theory of knowledge and combined these interrelated epistemological and cognitive perspectives to analyse the communication philosophy of a large number of museum online catalogues. The article presents the research carried out initially in 2007 through 2009 and then again in 2017, studying the provision of collections information online by different types of museums across Europe and in the United States. This enabled us to establish categories of presentation types and study the changes over time. The results highlighted the major shift towards participatory practices which have been transforming the cultural heritage world over the past years. © 2019 Association for Computi Machinery."	1 - The paper could be interesting but it is neccessary to read more
DHUR-77	Gillespie D., La Pensée A., Cooper M.,"USER-appropriate viewer for high resolution interactive engagement with 3D digital cultural artefacts",2013,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","40","5W2",,"271","276",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84924286351&partnerID=40&md5=c7d8ba055d35536d6ca3449fa638756f","Three dimensional (3D) laser scanning is an important documentation technique for cultural heritage. This technology has been adopted from the engineering and aeronautical industry and is an invaluable tool for the documentation of objects within museum collections (La Pensée, 2008). The datasets created via close range laser scanning are extremely accurate and the created 3D dataset allows for a more detailed analysis in comparison to other documentation technologies such as photography. The dataset can be used for a range of different applications including: documentation archiving, surface monitoring, replication, educational sessions conservation and visualization. However, the novel nature of a 3D dataset is presenting a rather unique challenge with respect to its sharing and dissemination. This is in part due to the need for specialised 3D software and a supported graphics card to display high resolution 3D models. This can be detrimental to one of the main goals of cultural institutions, which is to share knowledge and enable activities such as research, education and entertainment. This has limited the presentation of 3D models of cultural heritage objects to mainly either images or videos. Yet with recent developments in computer graphics, increased internet speed and emerging technologies such as Adobe's Stage 3D (Adobe, 2013) and WebGL (Khronos, 2013), it is now possible to share a dataset directly within a webpage. This allows website visitors to interact with the 3D dataset allowing them to explore every angle of the object, gaining an insight into its shape and nature. This can be very important considering that it is difficult to offer the same level of understanding of the object through the use of traditional mediums such as photographs and videos. Yet this presents a range of problems: this is a very novel experience and very few people have engaged with 3D objects outside of 3D software packages or games. This paper presents results of research that aims to provide a methodology for museums and cultural institutions for prototyping a 3D viewer within a webpage, thereby not only allowing institutions to promote their collections via the internet but also providing a tool for users to engage in a meaningful way with cultural heritage datasets. The design process encompasses evaluation as the central part of the design methodology focusing on how slight changes to navigation, object engagement and aesthetic appearance can influence the user's experience. The prototype used in this paper, was created using WebGL with the Three. Js (Three. JS, 2013) library and datasets were loaded as the OpenCTM (Geelnard, 2010) file format. The overall design is centred on creating an easy-to-learn interface allowing non-skilled users to interact with the datasets, and also providing tools allowing skilled users to discover more about the cultural heritage object. User testing was carried out, allowing users to interact with 3D datasets within the interactive viewer. The results are analysed and the insights learned are discussed in relation to an interface designed to interact with 3D content. The results will lead to the design of interfaces for interacting with 3D objects, which allow for both skilled and non skilled users to engage with 3D cultural heritage objects in a meaningful way."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements

DHUR-78	Gitto S., Geri F.,"The versatility of augmented reality for the enhancement of cultural heritage.",2020,"IOP Conference Series: Materials Science and Engineering","949","1", 012077,"","",,,"10.1088/1757-899X/949/1/012077","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85096859677&doi=10.1088%2f1757-899X%2f949%2f1%2f012077&partnerID=40&md5=fd5ea558edb69215f86642531eab1bcc","All Virtual reality, augmented reality, mixed reality or straight-up video games can now be found in growing numbers within spaces dedicated to culture and the arts. The choice of such tools is trans-forming the traditional museum tour into a multifaceted and interactive experience to t point, in some cases, of flirting with entertainment. From our experience, the role of augmented reality hasn't been to substitute itself to the « real» tour. On the contrary, AR invites the user to immerse themselves in an animated personal experience enriched with supplementary information. Elaborated with goals and features different from those of virtual reality, AR aims at strengthening direct contact with works of art as much as possible, inciting an active « live» use and a presence "on-site" more than "on-line". The diversity of three logistical contexts in which we have worked — a large-scale monument, a historical palace and its heterogenous art collection, and finally an archeological complex encompassing a traditional museum and the remains of a Roman amphitheatre — has brought us to reflect upon the functional aspects that come to determine a personalized digital product, as tailored as possible to specific needs. Each of the three apps has permitted a deepening of ea of their features in order to meet specific goals targeted by various museum institutions. In this paper we describe these features in more specific terms. © 2020 Institute of Physics Publishing. All rights reserved."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-79	Goh D.H., Chan R.L.,"The national archives of Singapore reference enquiry database",2003,"Electronic Library","21","4",,"316","321",,"10.1108/02640470310491540","https://www.scopus.com/inward/record.uri?eid=2-s2.0-0042863394&doi=10.1108%2f02640470310491540&partnerID=40&md5=481a61a44ad8de806216a3bfb19651ef","The National Archives of Singapore offers reference services to members of the public on questions related to Singapore's history and heritage. However, with only two reference officers stationed at the reference helpdesk at any one time, users may often have to queue to await servicing while the officers are busy attending to queries, telephone calls or retrieving physical documents. The Reference Enquiry Database was thus conceived to provide Web-based access to ready reference information on frequently asked subjects by members of the public, thereby reducing waiting times for users, easing the workload of reference officers and allowing them more time to attend to more complex information needs. This paper provides the background and rationale for the system as well as discusses design and implementation issues."	0 - The paper does not seem to be relevant to 4CH project
DHUR-80	Goldstein H., Hendriks R.,"Unplugging the DAM: Making digital asset management business process based by deconstructing it",2010,"Archiving 2010 - Preservation Strategies and Imaging Technologies for Cultural Heritage Institutions and Memory Organizations, Final Program and Proceedings",,,,"28","32",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-79956104487&partnerID=40&md5=7b143c09ea9225786edf36baeb8ee710","Instituting digital asset management (DAM) in cultural heritage institutions tends to be a major IT initiative. What is often overlooked is that DAM in isolation merely provides a resource intensive organizational tool for digital assets within the institution. The more important aspects of a DAM implementation are the workflow processes and procedures that are integrated into the application, the links the application makes internally and externally to other institutional systems, and ultimately how the implementation changes and enhances the institution's business processes surrounding the use of digital assets. When the Rijksmuseum in Amsterdam, The Netherlands, decided to undertake a DAM implementation as part of their revamped digital imaging program, their final solution combined MediaBin, an enterprise-level DAM product from Autonomy, with data links to their collection management system, AdLib, and Microsoft SharePoint, a collaboration and business process portal toolkit, with an eye toward further integration in the future. I was commissioned as an outside consultant to help the Rijksmuseum Archive conceptualize their internal business workflows and processes involving digital assets as they existed and how they might change and be enhanced. Working with the ICT Director, Rob Hendriks, we evaluated systems to layer the actual tasks of these workflows and processes on top of the chosen DAM software. The choice of the DAM application was influenced by its ability to connect to possible front ends, SharePoint being only one of the choices evaluated. The museum had prior experience working with SharePoint making its choice a logical decision. The integration that resulted has been in use for about two years, with additional functionality added in subsequent versions. It has allowed the museum to be more efficient and consider new opportunities. Training of users was fast-tracked most users never see the MediaBin interface which can be confusing for non-imaging personnel. Users interact with a simplified SharePoint interface, trimmed down to basic functionality. SharePoint also serves as the enabler for request forms, project tracking, and order fulfillment. The model we will describe in our presentation is in many ways an evolution of DAM ahead of the actual maturation of DAM applications, especially for the cultural heritage sector. In the future, a traditional DAM application could be best of breed components rather than an integrat system a file system or repository like Fedora, a metadata container or wrapper within a database, and a digital asset transformation engine like ImageMagick. Interfaces and workflows to suit the audience would be layered on top via products like SharePoint or open source wiki or CMS systems. The key differentiator for each institution would be the business processes and workflows that make the integration truly functional for the organization, and the flexibility to plug in other systems	0 - The paper does not seem to be relevant to 4CH project
DHUR-81	Gomez-Oliva A., Alvarado-Uribe J., Parra-Meroño M.C., Jara A.J.,"Transforming communication channels to the co-creation and diffusion of intangible heritage in smart tourism destination: Creation and testing in Ceutí (Spain)",2019,"Sustainability (Switzerland)","11","14", 3848,"","",,,"10.3390/su11143848","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85073903280&doi=10.3390%2fsu11143848&partnerID=40&md5=47d9ccfae699b1a20ec56fc9ed4c7e55","Creating smart tourism destinations requires innovative solutions which cover the main pillars of sustainability as sociocultural, environmental, and economic aspects, in order to spread the cultural heritage of these tourist destinations to their visitors. One of the most demanded approaches by the new hyper-connected visitors is the expectation of plunging and becoming a short-term resident to receive a real experience during their visit. Therefore, the scope of this research covers the objective of designing an innovative communication channel between a visitor and a point of interest (POI), which in turn allows agile experiences to be built and provided and increases the dissemination of cultural heritage through new technologies, considering the real needs of the territories and the new digital visitors. In order to address these topics, this paper proposes an innovative and co-created progressiveWeb-App for visitors called Be Memories in order to spread the intangible heritage of a tourist destination, where the content is co-created by residents of the destination. The tool has been tested in Ceutí, a Spanish village with a high cultural value, which needs to be disseminated through new innovative tools. The trial was launched during local festivities of the village using an Internet of Things device, called a Smart Spot, to establish a communication channel between the visitor and POI. The results of the test were measured using Google Analytics, the reactions of Be Memories in social networks, and the acceptance of other cities and European committees. The results have concluded that Be Memories is able to enable a local experience via agile, fresh, and crowd-sourced content that people enjoy. This channel presents a complementary level of information with respect to official sources, documentaries, and local guide tours, at the same time enabling a mechanism to promote physical visits, walking tours, and cultural heritage via low-cost and sustainable infrastructure. © 2019 by the authors."	0 - The paper does not seem to be relevant to 4CH project

DHUR-82	Gualandi M.L., Scopigno R., Wolf L., Richards J., Buxeda i Garrigos J., Heinzelmann M., Hervas M.A., Vila L., Zallocco M.,"ArchAIDE - archaeological automatic interpretation and documentation of cEramics",2016,"2016 Eurographics Workshop on Graphics and Cultural Heritage, GCH 2016",,,,"203","206",,"10.2312/gch.20161408","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85054137065&doi=10.2312%2fgch.20161408&partnerID=40&md5=0ed99bb70f5b39267b1c1c427efa6a3d","The goals of H2020 project ""ArchAIDE: are to support the classification and interpretation work of archaeologists with innovative computer based tools, able to provide the user with features for the semi-automatic description and matching of potsherds over the huge existing ceramic catalogues. Pottery classification is of fundamental importance for the comprehension and dating of the archaeological contexts, and for understanding production, trade flows and social interactions, but it requires complex skills and it is a very time consuming activity, both for researchers and professionals. The aim of ArchAIDE is to support the work of archaeologists, in order to meet real user needs and generate economic benefits, reducing time and costs. This would create societal benefits from cultural heritage, improving access, re-use and exploitation of the digital cultural heritage in a sustainable way. These objectives will be achieved through the development of: • an as-automatic-as-possible procedure to transform the paper catalogues in a digital description, to be used as a data pool for search and retrieval process • a tool (mainly designed for mobile devices) that will support archaeologists in recognizing and classifying potsherds during excavation and post-excavation analysis, through an easy-to-use interface and efficient algorithms for characterisation, search and retrieval of the visual/geometrical correspondences • an automatic procedure to derive a complete potsherds identity card by transforming the data collected into a formatted electronic document, printable or visual • a web-based real-time data visualisation to improve access to archaeological heritage and generate new understanding • an open archive to allow the archival and re-use of archaeological data, transforming them into common heritage and permitting economic sustainability. Those tools will be tested and assessed on real-cases scenarios, paving the way to future exploitation. © 2016 The Author(s) Eurographics Proceedings © 2016 The Eurographics Association."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-83	Güleç Özer D., Nagakura T., Vlavianos N.,"Augmented reality (AR) of historic environments: Representation of parion theater, Biga, Turkey",2016,"A/Z ITU Journal of the Faculty of Architecture","13","2",,"185","193",,"10.5505/itujfa.2016.66376","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984985757&doi=10.5505%2fitujfa.2016.66376&partnerID=40&md5=427e42d17c1c789e17e9dbe8aea8538f","Similar to other fields in architecture, architectural representation involves adopting digital methods and digital data at a fast pace as in the case of cultural heritage preservation often referred to as digital heritage. Among these digital technologies, augmented reality (AR) techniques are well-known since they contribute a lot to the representation process. In addition to various sectoral uses, the use of AR tools and methods is important to study and research with regards to their integration in historical representation. This study aims to represent historical heritage in terms of photogrammetry and AR methods for the Parion Theater, Biga, Turkey, dates back to 1st-2nd century A.D. and has been under excavation since 2005. There is a need for a high-tech visualization of cultural heritage because it is important to share and visualize data for such users as historians, archaeologists, architects, tourists and so on. The paper uses MULTIRAMA, a method previously developed by ARC Team (MIT) in 2013, which aims to represent the “unseen” to such users by documenting and visualising the site for use in this user-friendly app. The method will support cultural heritage representation in the following stages: i) documentation (use of photogrammetric methods), ii) data process and modeling, (correcting 3D photogrammetric images using AR) and iii) presentation (3D reconstruction of the cultural heritage via an AR application). This holistic and low cost approach will focus on the problem of accurate reconstruction and representation in cultural heritage of Parion. © 2016, Istanbul Teknik Universitesi, Faculty of Architecture. All rights reserved."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-84	Haddad N.A.,"From hand survey to 3D laser scanning: A discussion for non-technical users of heritage documentation",2013,"Conservation and Management of Archaeological Sites","15","2",,"213","226",,"10.1179/1350503313Z.00000000056","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84893842111&doi=10.1179%2f1350503313Z.00000000056&partnerID=40&md5=4f23705e1bfa94a9a49945d0d742f11a","Digital technology has changed our approaches to cultural heritage documentation radically and promises to continue to bring rapid changes. Photographic and non-photographic (graphic) documentation tools are merging in one process, in which digital photographic technology is the main base. Due to digital technology, there is an increasing gap between specialist technicians and non-technical users involved in heritage documentation. 3D approaches are still not popular among users in cultural heritage. However, in order to build a bridge between the specialist and non-technical users, a dialogue between them needs to be developed, not only to discuss issues of data precision and 3D accuracy, but also visualization production systems, which can now easily be achieved by modern digital photographic technology. This paper presents a comparative evaluation and synthesis of cultural heritage documentation methods and survey techniques currently available, focusing on the needs and requirements of non-technical users of heritage documentation. It attempts to clarify some new aspects in cultural heritage documentation and to assess the impact of current technology. The paper undertakes a comparative evaluation of the potential application of digital methods in documentation - and examines issues such as quality, accuracy, time, costs and specific skills required - from pre-electronic techniques (hand measurement) to 3D laser scanning, which today represents the most advanced technology available for measuring and documenting objects, structures and landscapes."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-85	Hall M.M., Fernando S., Clough P.D., Soroa A., Agirre E., Stevenson M.,"Evaluating hierarchical organisation structures for exploring digital libraries",2014,"Information Retrieval","17","4",,"351","379",,"10.1007/s10791-014-9242-y","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84904969709&doi=10.1007%2fs10791-014-9242-y&partnerID=40&md5=3729a782b31f991ac2561c465088f940","Search boxes providing simple keyword-based search are insufficient when users have complex information needs or are unfamiliar with a collection, for example in large digital libraries. Browsing hierarchies can support these richer interactions, but many collections do not have a suitable hierarchy available. In this paper we present a number of approaches for automatically creating hierarchies and mapping items into them, including a novel technique which automatically adapts a Wikipedia-based taxonomy to the target collection. These approaches are applied to a large collection of cultural heritage items which is formed through the aggregation of other collections and for which no unified hierarchy is available. We investigate a number of novel user-evaluated metrics to quantify the hierarchies' quality and performance, showing that the proposed technique is preferred by users. From this we draw a number of conclusions as to what makes a hierarchy useful to the user. © 2014 Springer Science+Business Media New York."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-86	Hassani F.,"Documentation of cultural heritage techniques, potentials and constraints",2015,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","40","5W7",,"207","214",,"10.5194/isprsarchives-XL-5-W7-207-2015","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84974574132&doi=10.5194%2fisprsarchives-XL-5-W7-207-2015&partnerID=40&md5=476d14ebde77e8f4749b13f602c08dac","Cultural Heritage is known as an invaluable asset of human being, which portrays his achievements over centuries. The need for identification and preservation of cultural heritage is well understood and experts attempt is to exploit any possible method to fulfill this aim. There are several published literatures and documents, which emphasize on the importance of the documentation of the cultural heritage such as Burra Charter. However, with the development of human and invention of new tools and technologies, the concept of the conservation of cultural heritage has changed considerably. The new technologies such as computers and digital tools have opened new windows and bestowed new opportunities in the process of conservation of cultural heritage. In this regard, it is important to review different technologies in order to make the best advantage of these tools in the cultural heritage field. The focus of this paper would be on the non-Technical users who need to gain an overall comprehension of these new emerging tools. The foundation of this paper will be on the existing literatures published by various experts in addition to the authors experience and research in the conservation field."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements

DHUR-87	Hauswedell T., Nyhan J., Beals M.H., Terras M., Bell E.,"Of global reach yet of situated contexts: an examination of the implicit and explicit selection criteria that shape digital archives of historical newspapers",2020,"Archival Science","20","2",,"139","165",,"10.1007/s10502-020-09332-1","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85084717967&doi=10.1007%2fs10502-020-09332-1&partnerID=40&md5=640f9619b69e3c53f15f0ce671539ba7","A large literature addresses the processes, circumstances and motivations that have given rise to archives. These questions are increasingly being asked of digital archives, too. Here, we examine the complex interplay of institutional, intellectual, economic, technical, practical and social factors that have shaped decisions about the inclusion and exclusion of digitised newspapers in and from online archives. We do so by undertaking and analysing a series of semi-structured interviews conducted with public and private providers of major newspaper digitisation programmes. Our findings contribute to emerging understandings of factors that are rarely foregrounded or highlighted, yet fundamentally shape the depth and scope of digital cultural heritage archives and thus the questions that can be asked of them, now and in the future. Moreover, we draw attention to providers' emphasis on meeting the needs of their end-users and how this is shaping the form and function of digital archives. The end user is not often emphasised in the wider literature on archival studies and we thus draw attention to the potential merit of this vector in future studies of digital archives. © 2020, The Author(s)."	1 - The paper could be interesting but it is neccessary to read more
DHUR-88	Heidorn P.B.,"Biodiversity and biocomplexity informatics: Policy and implementation science versus citizen science",2002,"Proceedings of the ACM International Conference on Digital Libraries",,,,"362","364",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-0036996094&partnerID=40&md5=74b7df465cf44d94538f1d1edfcdebbd","Biological science is one of the top ten social trends and the twenty-first Century has been defined as ""The Age of Biology"". One of the central themes of this age is biodiversity. Biodiversity is the richness of life. Biodiversity includes the variety of genes within one species through the complex interconnection of all life within an environment. One of the grand challenges of the twenty-first century is to document and understand the world's natural heritage. The management of the many kinds of information associated with this endeavor is ""Biodiversity Informatics"". There are many efforts developing worldwide to collect and distribute this information in digital collections. Some of these efforts are complementary some efforts are in conflict and are just independent. There is a great need to integrate this information to increase its usefulness and value. Unfortunately, this integration is extremely difficult because of the diversity of the use and users of the information and the diversity of the information itself. The panelists will discuss different perspectives on the construction of global biodiversity digital libraries from the perspective of different goals and uses."	0 - The paper does not seem to be relevant to 4CH project
DHUR-89	Huang Y.,"Public Digital Libraries: Observations and Prospects from the Chinese Experience",2018,"Journal of Arts Management Law and Society","48","2",,"122","132",,"10.1080/10632921.2017.1377662","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85031414127&doi=10.1080%2f10632921.2017.1377662&partnerID=40&md5=6617c41e99556cc640fc4145f19c92f6","In recent years, the digital revolution has created both challenges and opportunities for cultural industries. The ever-increasing production and diffusion of culture through new media via the Internet have profoundly challenged the basic infrastructure and modes of operation in many sectors of the cultural industries. This has been most evident in the case of heritage organizations—including public libraries—where the digital revolution has brought with it a number of significant challenges with respect to courting visitors/users and remaining relevant in the context of evolving digital technologies. This article discusses the rise and evolution of public digital libraries in the 1990s as a response to these new challenges. After formulating some observations about this global trend, which is now more than two decades old, this article discusses the case of public digital libraries in China. In particular, this article points to the importance of cultural policy for the development of this new form of cultural institution. Finally, after reviewing some of the challenges faced by most of these new digital libraries, this article discusses the importance of professional culture in addressing the changing needs of users. © 2018 Taylor & Francis."	0 - The paper does not seem to be relevant to 4CH project
DHUR-90	Huvila I.,"Awkwardness of becoming a boundary object: Mangle and materialities of reports, documentation data, and the archaeological work",2016,"Information Society","32","4",,"280","297",,"10.1080/01972243.2016.1177763","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84976416491&doi=10.1080%2f01972243.2016.1177763&partnerID=40&md5=cb65d094fc1a4f4164d37765a88e4959","Information about an archaeological investigation is documented in an archaeological report, which makes it the boundary object par excellence for archaeological information work across stakeholder communities such as field archaeologists, heritage managers, and land developers. The quality of reports has been a subject of debate, and recently it has been argued that more emphasis should be placed on making primary research data at least similarly available. This study explores the changing materialities and reciprocal formation of documents and their users with the advent of digitization, and how documents form and lose their status as boundary objects in these processes. The study posits that in order to be functional, a boundary object needs to provide a disclosure that makes it accessible to cognate communities. Further, it shows how assumptions about the functioning of the human and nonhuman (material artifacts) influence the ways in which archaeologists conceptualize the preservation and archiving of archaeological information and the role and potential of different types of digital and paper-based documents. This article is based on an interview study of Swedish archaeology professionals (N = 16) with theoretical underpinnings in the notions of boundary objects, mangle of practice, and disclosure. © 2016, Published with license by Taylor & Francis. © Isto Huvila."	1 - The paper could be interesting but it is neccessary to read more
DHUR-91	Innocenti P., Konstantelos L., Ross S., Maceviciute E., Wilson T., Ludwig J., Pempe W.,"Assessing digital preservation infrastructures: Implementing a framework for library, engineering and eScience organisations",2010,"Archiving 2010 - Preservation Strategies and Imaging Technologies for Cultural Heritage Institutions and Memory Organizations, Final Program and Proceedings",,,,"18","23",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-79956116358&partnerID=40&md5=194b333a94a4430e5393f2b72e8b48c2","Sustaining Heritage Access through Multivalent ArchiviNg (SHAMAN) is an EU-funded project focusing on the development of an integrated preservation framework. Through grid technologies, the SHAMAN framework promotes a distributed approach in preservation systems, whereby ingest, persistent storage, access, presentation and manipulation of digital information is managed for long-term consumption. order to understand the ever-evolving requirements for functionality in information systems, the SHAMAN team, led by HATII at the University of Glasgow, conducted an in-depth investigation of user needs for preservation solutions. The results we used to inform the development of a corresponding Assessment Framework. The purpose of the Assessment Framework is to evaluate the degree that the SHAMAN outputs are consistent with the identified user requirements and to measure the overall success of the project. The SHAMAN outputs are instantiated as functional prototypes that reflect preservation requirements in three distinct domains: memory institutions, industrial design & engineering and e-Science. Following the specifications of the assessment framework, the software artefacts produced by SHAMAN for each prototype must be assessed to validate their conformance with user and system requirements. To this end, a software validation methodology has been devised, which builds on the SHAMAN Assessment Framework to verify that the SHAMAN software satisfies the reasons for its development. This paper documents the SHAMAN Assessment Framework and explicates the relationship between assessment and software validation in the SHAMAN project."	1 - The paper could be interesting but it is neccessary to read more

DHUR-92	Jäger-Klein C., Kryeziu A., Ymeri Hoxha V., Rant M.,"A digital pre-inventory of architectural heritage in kosovo using Docu-Tools®",2017,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","42","2W5",,"383","388",,"10.5194/isprs-archives-XLII-2-W5-383-2017","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85030254520&doi=10.5194%2fisprs-archives-XLII-2-W5-383-2017&partnerID=40&md5=5d0dbc504c30863daaa00150b6019e8d","Kosovo is one of the new states in transition in the Western Balkans and its state institutions are not yet fully functional. Although the territory has a rich architectural heritage, the documentation and inventory of this cultural legacy by the national monument protection institutions is insufficiently-structured and incomplete. Civil society has collected far more material than the state, but people are largely untrained in the terminology and categories of professional cultural inventories and in database systems and their international standards. What is missing is an efficient, user-friendly, low-Threshold tool to gather together and integrate the various materials, archive them appropriately and make all the information suitably accessible to the public. Multiple groups of information-holders should be able to feed this open-Access platform in an easy and self-explanatory way. In this case, existing systems such as the Arches Heritage Inventory and Management System would seem to be too complex, as it pre-supposes a certain understanding of the standard terminology and internationally used categories. Also, the platform as archive must be able to guarantee the integrity and authenticity of the inputted material to avoid abuse through unauthorized users with nationalistic views. Such an open-Access lay-inventory would enable Kosovo to meet the urgent need for a national heritage inventory, which the state institutions have thus far been able to establish. The situation is time-sensitive, as Kosovo will soon repeat its attempt to join UNESCO, having failed to do so in 2015, receiving only a minimum number of votes in favour. In Austria, a program called docu-Tools® was recently developed to tackle a similar problem. It can be used by non-professionals to document complicated and multi-structured cases within the building process. Its cloud and app-design structure allows archiving enormous numbers of images and documents in whatever format. Additionally, it allows parallel access by authorized users and avoids any hierarchy of structure or prerequisites for its users. The archived documents cannot be changed after input, which gave this documentation tool acclaimed court relevance. The following article is an attempt to explore the potential for this tool to prepare Kosovo for a comprehensive heritage inventory. © Authors 2017. CC BY 4.0 License."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-93	Jailani A.K., Kusakabe S., Araki K.,"Adaptive Context-Awareness Model for Cultural Heritage Information Based on User Needs",2016,"Proceedings - 2015 IIAI 4th International Congress on Advanced Applied Informatics, IIAI-AAI 2015",,,7373927,"339","342",,"10.1109/IIAI-AAI.2015.287","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84964334186&doi=10.1109%2fIIAI-AAI.2015.287&partnerID=40&md5=bdca021f5f1a0d93f559b234b03aa3ed","Due to the rapid growth of digital information of cultural heritage, users can access and exploit cultural heritage information in its full richness. However, current tools do not fully support searching information based on user needs. This paper describes a conceptual model and its prototype of cultural heritage. We propose a model for providing adaptive context-awareness to cultural heritage content based on user's profile and current location in Global Positioning System (GPS). We introduce our model with Unified Modeling Language (UML) based approach. © 2015 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-94	Jett J., Senseney M., Palmer C.L.,"A model for providing web 2.0 services to cultural heritage institutions: The imls dcc flickr feasibility study",2013,"D-Lib Magazine","19","5-6",,"","",,"10.1045/may2013-jett","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84878934596&doi=10.1045%2fmay2013-jett&partnerID=40&md5=415e40747278d61e5ebd5ba77941140c","The Flickr Feasibility Study, which was launched by the Institute of Museum and Library Services (IMLS) Digital Collections and Content (DCC) project in 2009 to determine how aggregators might provide intermediary services for cultural heritage institutions wishing to engage in Web 2.0 initiatives, shed light on both needs and models for aggregation services. This article provides an overview of the study's findings, including the efficiencies that aggregation services such as the DCC can afford cultural heritage institutions when they act as intermediaries to facilitate Web 2.0 participation. Also discussed are the outcomes of the study's conversations with Yahoo, Inc. representatives regarding aggregators as members of the Commons on Flickr and the complimentary cultural heritage spaces that aggregation services can help their member institutions to create outside of the Commons. Finally, the ample rewards in long-tail community engagement and user-generated metadata that cultural heritage institutions can reap when they expose their collections to Web 2.0 communities, are highlighted. © 2013 Jacob Jett, Megan Senseney and Carole L. Palmer."	1 - The paper could be interesting but it is neccessary to read more
DHUR-95	Johnson E., Liew C.L.,"Engagement-oriented design: a study of New Zealand public cultural heritage institutions crowdsourcing platforms",2020,"Online Information Review","44","4",,"887","912",,"10.1108/OIR-10-2019-0329","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85084993895&doi=10.1108%2fOIR-10-2019-0329&partnerID=40&md5=231b687885756a6ed40b8a2053c6e4ce","Purpose: The purpose of this study is to propose a set of design recommendations for crowdsourcing platforms with a focus on user engagement. A sample of New Zealand (NZ) cultural heritage institutions (CHIs) crowdsourcing platforms were assessed, with the aim of offering insights into how they have been designed to encourage dialogue and engagement and to sustain participation. Design/methodology/approach: The design recommendations were derived from a review of related works. Following this, 12 crowdsourcing projects overseen by libraries, museums and an archive in NZ were assessed against the recommendations through content analysis. Findings: The recommendations were classified into four main categories. These were promote ease of use, attract and sustain user interest, foster a community of users and show users that their work is contributing to the institution and society. The findings indicated that the sample of crowdsourcing projects assessed were generally successful at displaying the credibility and significance of their projects, and promoting their crowdsourced collections. Many of the projects could nevertheless benefit from providing further support to promoting dialogues and engagement with their users and contributors and sustaining offline community interaction. Research limitations/implications: The content analysis conducted was focused on the functionality of design elements of the crowdsourcing platforms. The design recommendations derived from the analysis were intended as a starting point for discussion and they would need to be validated in further studies. Other relevant project information such as funding and staffing, promotion and outreach efforts were not solicited in this study. Such information could provide important contextualisation. Future research could take the form of in-depth case studies, including surveying those involved in the projects and stakeholders to investigate such contextual aspects of crowdsourcing projects. Originality/value: Previous research on crowdsourcing in NZ CHIs consisted of single case studies. This study provides a wider snapshot and insights into digital crowdsourcing platforms from public NZ CHIs. The study findings have practical implications for project managers and Web designers involved in crowdsourcing projects, particularly those in the cultural heritage sector. © 2020, Emerald Publishing Limited."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-96	Jolly M., deCourcy E.,"Heritage in the limelight, a collection in progress: Uncovering, connecting, researching and animating Australia's Magic Lantern past",2018,"Open Library of Humanities","4","1",,"","",25,"10.16995/olh.275","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85049807154&doi=10.16995%2folh.275&partnerID=40&md5=3acaaf2058197fbed1f6a529d0b03f63","Once they are formed, the digital collections of cultural and collecting institutions do not exist in splendid isolation. As well as being aggregated data sets, digital heritage collections are also links to tangible objects and specific historical experiences. Digital collections may allow users to find the actual analogue objects from which they were derived, they may allow users to understand a particular historical experience (or a simulation of it), they may connect them to a particular place, or they may lead them to other digital collections. Digital heritage collections need to develop generous interfaces in order to maximise their unity across these different demands and to appeal to a variety of users. This article takes as its case study the digital database and interface made by the Australian-based research team, 'Heritage in the Limelight: The Magic Lantern in Australia and the World'. It examines how the culture, ephemera and documentation around the magic lantern's use in Australia across the nineteenth a twentieth century calls for its digital presentation in a dynamic, operational archive. The following piece surveys scholarly debates around digital collections that have informed the construction of the Heritage in the Limelight database and prototype Collection Explorer as well placing the creation of this Australian initiative in the context of work being done on lantern slide digital resources globally. © 2018 The Author(s)."	1 - The paper could be interesting but it is neccessary to read more

DHUR-97	Jones C.E., Liapis A., Lykourentzou I., Guido D.,"Board game prototyping to co-design a better location-based digital game",2017,"Conference on Human Factors in Computing Systems - Proceedings","Part F127655",,,"1055","1064",,"10.1145/3027063.3053348","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85019620273&doi=10.1145%2f3027063.3053348&partnerID=40&md5=aa5e951d672a52b9a873e23c0531d052","In this case study we describe the iterative process of paper prototyping, using a board game, to co-design a location-based mobile application. The end goal of the application is to motivate reflection on historical topics about migration. The board game serves to capture the core concerns of this application by simulating movement through the city. Three play tests highlighted the users' interest and issues with the historical content, the way this content is represented, and the players' responses to the interactions and motivating mechanisms of the application. Results show that the board game helped capture important design preferences and problems, ensuring the improvement of our scenario. This feedback can help reduce development effort and implement a future technology prototype closer to the needs of our end users. Copyright © 2017 by the Association for Computing Machinery, Inc. (ACM)."	0 - The paper does not seem to be relevant to 4CH project
DHUR-98	Jones J.,"Creative research & development collaborations",2005,"Conferences in Research and Practice in Information Technology Series","40",,,"","",1,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85072046804&partnerID=40&md5=7d642a3057f3c6acbff981138539a506","Around the world there are many examples of how universities and industry work together to create new knowledge and new economic value. Motivating creative, smart people to work together can be one of the hardest aspects of such endeavours, especially where various arrangements and agreements need to take the commercial interests of industry into account as well as the highly aspirational interests of individual researchers. Professor Jeff Jones, CEO and Research Director of ACID - the Australasian CRC for Interaction Design - will discuss some of the key challenges to establishing robust collaborative arrangements, the difficulties that arise where geographic distance is an issue, and the fantastic project teams and outcomes that are possible. Jones will also showcase some of the interaction design projects already underway. Interaction design is about finding better ways for people to interact with each other through communication technologies. Interaction design involves understanding how people, learn, work and play so that we can engineer - better, more valuable and more appropriate technologies to the contexts of their lives. As an academic discipline, interaction design is about the people-research that underpins the development of these technologies. For ACID, interaction design is commercially focused to help people participate in the digital world. ACID is uniquely situated in the world to help Australasia take advantage of the hybrid Indigenous- Asian-European-North American design and creative industries. ACID has a defined capacity to integrate the hard-edged commercial focus of its Smart Livi projects with the distinctive and responsible activities in the Virtual Heritage projects. But to make ACID truly distinctive we've combined these with technologies in Digital Media projects and the mass-distribution and social capacity development expertise emerging in the Multi-user Environments projects. This multifaceted integration of technology, methods, domain knowledge and culture provides ACID and the Australasian economy with an ultimate value differentiator and some truly sustainable advantages. © 2005, Australian Computer Society, Inc."	0 - The paper does not seem to be relevant to 4CH project
DHUR-99	Jordan J., Angelopoulou E., Maier A.,"A Novel Framework for Interactive Visualization and Analysis of Hyperspectral Image Data",2016,"Journal of Electrical and Computer Engineering","2016",,2635124,"","",,"10.1155/2016/2635124","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84994037066&doi=10.1155%2f2016%2f2635124&partnerID=40&md5=cc457eff631ad4908913a3bad018c68f","Multispectral and hyperspectral images are well established in various fields of application like remote sensing, astronomy, and microscopic spectroscopy. In recent years, the availability of new sensor designs, more powerful processors, and high-capacity storage further opened this imaging modality to a wider array of applications like medical diagnosis, agriculture, and cultural heritage. This necessitates new tools that allow general analysis of the image data and are intuitive to users who are new to hyperspectral imaging. We introduce a novel framework that bundles new interactive visualization techniques with powerful algorithms and is accessible through an efficient and intuitive graphical user interface. We visualize the spectral distribution of an image via parallel coordinates with a strong link to traditional visualization techniques, enabling new paradigms in hyperspectral image analysis that focus on interactive raw data exploration. We combine novel methods for supervised segmentation, global clustering, and nonlinear false-color coding to assist in the visual inspection. Our framework coined Gerbil is open source and highly modular, building on established methods and being easily extensible for application-specific needs. It satisfies the need for a general, consistent software framework that tightly integrates analysis algorithms with an intuitive, modern interface to the raw image data and algorithmic results. Gerbil finds its worldwide use in academia and industry alike with several thousand downloads originating from 45 countries. © 2016 Johannes Jordan et al."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-100	Josse I.,"Crowdsourcing facing Cultural heritage of printed texts: The platform Correct (Co-operative text correction and enrichment)",2014,"Archiving 2014 - Final Program and Proceedings",,,,"169","173",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84905675493&partnerID=40&md5=63bf3da11ed1b1bd59be08a874dc5c05","The platform CORRECT was created within the frame of a research and developmer program which gathers 9 partners coming from institutional, industrial and educational background. In such a context, this program focuses on a wide range of technical challenges from the correction of OCR outputs to their improvements through a crowdsourcing approach. The project follows 3 main targets: first to promote a crowdsourcing approach, to fulfill the need for e-accessibility / digital access (for all users and for all access devices), lastly to develop innovative tools and approaches based on man-machine relationship. One of the main technical challenges was to develop tools dedicated to the production of digital transcription consistent with the original documents. The next issue at stake was the possibility led to the improvement of the digital transcriptions in order to produce new versions of these transcriptions under several formats (such as e-books format or disabled people editions dedicated to disabled people). One of the main challenges was also to recruit, mobilize and manage a great number of contributors. Reflections on such issues and challenges had been undertaken at different levels: up to what extent and how users should be involved within the project and through what kind of collaborative mechanisms the technical requirements of platform tools (IHM and assistance/help features) and, lastly, thoughts about contents made available. © 2014 Society for Imaging Science and Technology."	0 - The paper does not seem to be relevant to 4CH project
DHUR-101	Jusof M.J., Rahim H.R.A.,"Revealing visual details via high dynamic range gigapixels spherical panorama photography: The Tempurung Cave natural heritage site",2014,"Proceedings of the 2014 International Conference on Virtual Systems and Multimedia, VSMM 2014",,, 7136690,"193","200",,"10.1109/VSMM.2014.7136690","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988230815&doi=10.1109%2fVSMM.2014.7136690&partnerID=40&md5=907a419da095452f26473d5ca4e6d020","This paper is focused on creating an efficient workflow process for high dynamic range spherical panoramas for preserving heritage sites taking the Tempurung Cave as a working model. Although there are several methods for producing HDR spherical panorama, higher-resolution images impose new problems in handling and creating such large size detailed output. Furthermore, high-resolution detail photographic documentation is essential for preservation purposes, as it will serve as a reference for interested parties. With today's technology, achieving higher resolution images is not entirely impossible however, an efficient workflow process is needed to ensure quality output especially when involve combination of multiple techniques. The hundred million years old cave is one of the largest limestone caves in Peninsular Malaysia. The tunnel cave runs down through two hills, covering a distance of two kilometers deep made up of five large domes previewing a magnificent display of stalagmites and stalactites. While the naturally form heritage was kept safe before, the increasing number of tourists and visitors today saw constructions built within the caverns such as the walkway and electric lighting for viewer's better sightings. The heritage is very well known and protected the digitization of the cave is an effort to keep a digital copy of such natural heritage not only for visitors to experience but also for interested parties to study the formations and habitat within through detailed documentation of the site. High Dynamic Range (HDR) photography is adapted into a user-navigable spherical virtual environment as a method to reveal details hidden within dark areas while the interactive panorama is a way to let the viewer be immersed into the environment seeing as if on site. Exploration in this technique will show the possibilities of HDR to display beyond what can actually be seen with human eyes. The immersive visual experience is enhanced with detailed luminance between the lightest and darkest areas. Todays capture devices, which can capture in high number of pixels while enhancing details and quality of images does impose some issues in the workflow of HDR spherical panorama. The very large file size of each image that needs more computing resources lead to a search for a more efficient workflow process. This paper outlines an efficient workable process method of creating a HDR gigapixels spherical panorama using the Tempurung Cave in Ipoh, Malaysia as a case study. © 2014 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology

DHUR-102	Kaldeli E., Menis-Mastromichalakis O., Bekiaris S., Ralli M., Tzouvaras V., Stamou G.,"Crowdheritage: Crowdsourcing for improving the quality of cultural heritage metadata",2021,"Information (Switzerland)","12","2", 64,"1","18",,"10.3390/info12020064","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85100753879&doi=10.3390%2finfo12020064&partnerID=40&md5=381ce94c2ed217b5fc4fcce294839f83","The lack of granular and rich descriptive metadata highly affects the discoverability and usability of cultural heritage collections aggregated and served through digital platforms, such as Europeana, thus compromising the user experience. In this context, metadata enrichment services through automated analysis and feature extraction along with crowdsourcing annotation services can offer a great opportunity for improving the metadata quality of digital cultural content in a scalable way, while at the same time engaging different user communities and raising awareness about cultural heritage assets. To address this need, we propose the CrowdHeritage open end-to-end enrichment and crowdsourcing ecosystem, which supports an end-to-end workflow for the improvement of cultural heritage metadata by employing crowdsourcing and by combining machine and human intelligence to serve the particular requirements of the cultural heritage domain. The proposed solution repurposes, extends, and combines in an innovative way general-purpose state-of-the-art AI tools, semantic technologies, and aggregation mechanisms with a novel crowdsourcing platform, so as to support seamless enrichment workflows for improving the quality of CH metadata in a scalable, cost-effective, and amusing way. © 2021 by the authors. Licensee MDPI, Basel, Switzerland."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-103	Kalita D., Deka D.,"Ontology for preserving the knowledge base of traditional dances (OTD)",2020,"Electronic Library","38","4",,"785","803",,"10.1108/EL-11-2019-0258","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85092613087&doi=10.1108%2fEL-11-2019-0258&partnerID=40&md5=3c196198ddc6b0c16a61f74f71cf23bc","Purpose: Systematic organization of domain knowledge has many advantages in archiving, sharing and retrieval of information. Ontologies provide a cushion for such practices in the semantic Web environment. This study aims to develop an ontology that can preserve the knowledge base of traditional dance practices. Design/methodology/approach: It is hypothesized that ontology-based approach for the chosen domain might boost collaborative research prospects in the domain. A systematic methodology was developed for modeling the ontology based on the analytico-synthetic rule of library classification. Protégé 5.2 was used as an editor for the ontology using the Web ontology language combined with description logic axioms. Ontology was later implemented in a local GraphDB repository to run queries over it. Findings: The developed ontology on traditional dances (OTD) was tested using the dances of the Rabha tribes of North East India. Rabha tribes are from an indigenous mongoloid community and have a robust presence in Southeast Asian countries, such as Myanmar, Thailand, Bangladesh, Bhutan and Nepal. The result from HermiT reasoner found the presence of no logical inconsistency in the ontology, while the OOPS! pitfall checker tool reported no major internal inconsistency. The induced knowledge base of traditional dances of the Rabha's in the developed OTD was further validated based on some competency questions. Research limitations/implications: In the growing trend of globalization, preservation of the cultural knowledge base of human societies is an important issue. Traditional dances reflect a strong base of the cultural heritage of human societies as they are closely related to the lifestyle, habitat, religious practices and festivals of a specific community. Originality/value: The current study is exclusively designed, keeping in mind the variables of traditional dance domain based on a survey of the user- and domain-specific needs. The ontology finds probable uses in traditional knowledge information systems, lifestyle-based e-commerce sites and e-learning platforms. © 2020, Emerald Publishing Limited."	0 - The paper does not seem to be relevant to 4CH project
DHUR-104	Katifori A., Perry S., Vayanou M., Antoniou A., Ioannidis I.-P., McKinney S., Chrysanthi A., Ioannidis Y.,"""Let Them Talk!"": Exploring guided group interaction in digital storytelling experiences",2020,"Journal on Computing and Cultural Heritage","13","3", 21,"","",,"10.1145/3382773","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85092735568&doi=10.1145%2f3382773&partnerID=40&md5=8233bc73ed430aec24d7f6e1bc23f79e","Visits to cultural heritage sites are generally social in nature, yet resources to support these sociable experiences are often individualized, catering to the solitary visitor. Digital technologies offer means to disrupt this predicament, encouraging social engagements in cultural contexts. Here we present the results of a user study that systematically investigates the effects of face-to-face group conversation and physical interactions within a digital cultural storytelling experience at the Neolithic site of Çatalhöyük, with the objective of promoting engagement, learning, and perspective taking. Seeking to articulate the benefits and weaknesses of promoting social interactions in digital storytelling settings, we start with a story-based experience that was designed for individual use, we extend it with novel system-driven interaction prompts, and then we evaluate the two versions with 102 participants. Our findings provide statistically significant evidence that conversation is related to longer and more absorbed participation in the experience and greater learning regardless of personality traits. Where social interaction is purposefully integrated into the story, more conversation is generated, and these interactive prompts do not disrupt the story flow even though participants report awareness of them. Finally, certain tendencies among users affect their talkativeness and enjoyment, providing future designers of digital stories with guidance to better address audience needs. © 2020 ACM."	1 - The paper could be interesting but it is neccessary to read more
DHUR-105	Kelly E.,"Reuse of wikimedia commons cultural heritage images on the wider web",2019,"Evidence Based Library and Information Practice","14","3",,"28","51",,"10.18438/eblip29575","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85073674214&doi=10.18438%2feblip29575&partnerID=40&md5=1cb81f110004f305785b753a9396297f","Objective - Cultural heritage institutions with digital images on Wikimedia Commons want to know if and how those images are being reused. This study attempts to gauge the impact of digital cultural heritage images from Wikimedia Commons by using Reverse Image Lookup (RIL) to determine the quantity and content of different types of reuse, barriers to using RIL to assess reuse, and whether reused digital cultural heritage images from Wikimedia Commons include licensing information. Methods - 171 digital cultural heritage Wikimedia Commons images from 51 cultural heritage institutions were searched using the Google images ""Search by image"" tool to find instances of reuse. Content analysis of the digital cultural heritage images and the context in which they were reused was conducted to apply broad content categories. Reuse within Wikimedia Foundation projects was also recorded. Results - A total of 1,533 reuse instances found via Google images and Wikimedia Commons' file usage reports were analyzed. Over half of reuse occurred within Wikimedia projects or wiki aggregator and mirror sites. Notable People, people, historic events, and buildings and locations were the most widely reused topics of digital cultural heritage both within Wikimedia projects and beyond, while social, media gallery, news, and education websites were the most likely places to find reuse outside of wiki projects. However, the content of reused images varied slightly depending on the website type on which they were found. Very few instances of reuse included licensing information, and those that did often were incorrect. Reuse of cultural heritage images from Wikimedia Commons was either done without added context or content, as in the case of media galleries, or was done in ways that did not distort or mischaracterize the images being reused. Conclusion - Cultural heritage institutions can use this research to focus digitization and digital content marketing efforts in order to optimize reuse by the types of websites and users that best meet their institution's mission. Institutions that fear reu without attribution have reason for concern as the practice of reusing both Creative Commons and public domain media without rights statements is widespread. More research needs to be conducted to determine if notability of institution or collection affects likelihood of reuse, as preliminary results show a weak correlation between number of images searched and number of images reused per institution. RIL technology is a reliable method of finding image reuse but is a labour-intensive process that may best be conducted for selected images and specific assessment campaigns. Finally, the reused content and context categories developed here may contribute to a standardized set of codes for assessing digital cultural heritage reuse. © 2019 Kelly."	0 - The paper does not seem to be relevant to 4CH project
DHUR-106	Kelly E.J.,"Use of Louisiana's Digital Cultural Heritage by Wikipedians",2018,"Journal of Web Librarianship","12","2",,"85","106",,"10.1080/19322909.2017.1391733","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85035129866&doi=10.1080%2f19322909.2017.1391733&partnerID=40&md5=6d459ff8b38cd29ec31db7e4feb8956a","Analysis of how cultural heritage institutions' (CHI) digital assets are being cited on Wikipedia can be beneficial to understanding user needs and interests as well as priorities for collection development and digitization. This case study details an analysis of Wikipedia links to online resources from Louisiana cultural heritage institutions in order to determine what types of cultural heritage resources users are citing on Wikipedia, what is the content of the Wikipedia articles with Louisiana CHI citations, and how this can influence the work of CHI. The results of the study include findings that digital library items and archival finding aids are the most cited sources from cultural heritage institutions on Wikipedia and are particularly popular for Louisiana-specific Wikipedia articles on society and the social sciences and culture and the arts. Some possible strategies for determining digitization and collection development priorities based on these findings are also detailed. © 2018 Elizabeth Joan Kelly."	0 - The paper does not seem to be relevant to 4CH project

DHUR-107	Khan S., Rosa S., Germak C.,"Exploring new functionalities in cultural heritage spaces - Designing different museum trails with low cost technologies",2018,"Proceedings of International Design Conference, DESIGN","5",,,"2251","2262",,"10.21278/idc.2018.0357","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85054958583&doi=10.21278%2fidc.2018.0357&partnerID=40&md5=fefa2b142690650a0a5d8ed8af257e42","Different museums and cultural heritage institutions are seeking new ways to improve access to their artefacts and collections. The huge impact of the digital revolution shed some light on diverse approaches to minimize the visitor's museum experience disruption and enhance the accessibility to the exhibits. This paper describes the design of a sensor system by improving the access to the cultural resources adopting a non invasive and low cost technology. The study will provide new suggestions to analyze visitors' behaviour and their needs and design new visiting trails for the museum. © ResearchGate 2018. All rights reserved."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-108	Kim M.H., Rushmeier H., Ffrench J., Passeri I., Tidmarsh D.,"Hyper3D: 3D graphics software for examining cultural artifacts",2014,"Journal on Computing and Cultural Heritage","7","3", 14,"","" ,"10.1145/2567652","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84979835776&doi=10.1145%2f2567652&partnerID=40&md5=c6b11afd8a5f6736eb1dc09a79d17800","Art conservators now have access to a wide variety of digital imaging techniques to assist in examining and documenting physical works of art. Commonly used techniques include hyperspectral imaging, 3D scanning, and medical computed tomography imaging. However, viewing most of this digital image data frequently requires both specialized software, which is often associated with a particular type of acquisition device, and professional knowledge of and experience with each type of data. In addition, many of these software packages are focus on particular applications (such as medicine or remote sensing) and do not permit users to access and fully exploit all the information contained in the data. In this paper, we address two practical barriers to using high-tech digital data in art conservation. First, users must deal with a wide variety of interfaces specialized for applications besides conservation. We provide an open-source software tool with a single intuitive interface consistent with conservators' needs that handles various types of 2D and 3D image data and preserves user-generated metadata and annotations. Second, previous software has largely allowed visualizing a single type or only a few types of data. The software we present is designed and structured to accommodate multiple types of digital imaging data, including as yet unspecified or unimplemented formats, in an integrated environment. This allows conservators to access different forms of information and to view a variety of image types simultaneously. © 2014 ACM."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-109	Klavans J.L., LaPlante R., Golbeck J.,"Subject matter categorization of tags applied to digital images from art Museums",2014,"Journal of the American Society for Information Science and Technology","65","1",,"3","12",,"10.1002/asi.22950","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84895060936&doi=10.1002%2fasi.22950&partnerID=40&md5=ab16ff0b0e611b529beb6a1a0bc97794","In recent years, cultural heritage institutions have increasingly used social tagging. To better understand the nature of these tags, we analyzed tags assigned to a collection of 100 images of art (provided by the steve.museum project) using subject matter categorization. Our results show that the majority of tags describe the people and objects in the image and are generic in nature. This contradicts prior subject matter analyses of queries, tags, and index terms of other image collections, suggesting that the nature of social ta largely depends on the type of collection and on user needs. This insight may help cultural heritage institutions improve their management and use of tags. © 2013 ASIS&T."	0 - The paper does not seem to be relevant to 4CH project
DHUR-110	Konstantakis M., Aliprantis J., Teneketzis A., Caridakis G.,"Understanding user eXperience aspects in cultural heritage interaction",2018,"ACM International Conference Proceeding Series",,,,"267","271",,"10.1145/3291533.3291580","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85060865172&doi=10.1145%2f3291533.3291580&partnerID=40&md5=56f8b2c129becd94a80adf5c9a1f6089","In recent years, User eXperience has became a rather popular research field for services or products development. To meet the high user expectations, designers tend towards bringing users into the design process on creating a new product or service, in an attempt to understand and then satisfy efficiently users' needs. This paper analyzes users' requirements, proposes methods to enhance user modeling and describe the interaction process between users and Cultural Heritage applications and products. Particularly, our research focuses on giving users the opportunity to develop a strategic and imaginative roadmap that can help them define their experience, in order to achieve exploitation and sustainability. To achieve this, we analyze the integration of new technologies to the whole lifecycle of cultural data in order to elucidate how important is the use and re-use of content destined to be ""seen"" to existing and new physical and digital audiences, hence open to all possible platforms. © 2018 Association for Computing Machinery."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-111	Kontiza K., Bikakis A., Miller R.,"Cognitive-based visualization of semantically structured cultural heritage data",2015,"CEUR Workshop Proceedings","1456",,,"61","68",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84944313213&partnerID=40&md5=ecf9d48c44bcf302736304d0155602a6","We present preliminary findings regarding the increasing use of Info-Vis tools and semantically structured data by cultural heritage institutions. This sector faces a number of challenges in developing best practices for publishing Linked Data, including the presentation of their digital cultural heritage collections and the visualization of their multidimensional hidden histories. We suggest that, as these institutions' interest in Semantic Web technologies grows and associated applications are more widely adopted, the need to provide InfoVis tools for efficient overview and exploration of cultural data increases. We postulate that changes in the paradigms for interaction with cultural datasets are also needed, with more focus on users' needs and cognitive processes. We suggest that by taking into account human information processes, better cognitive support can be introduced via InfoVis tools for Linked Data, th reducing the cognitive load experienced by users."	0 - The paper does not seem to be relevant to 4CH project
DHUR-112	Koutsabasis P., Vosinakis S.,"Kinesthetic interactions in museums: conveying cultural heritage by making use of ancient tools and (re-) constructing artworks",2018,"Virtual Reality","22","2",,"103","118",,"10.1007/s10055-017-0325-0","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85029744387&doi=10.1007%2fs10055-017-0325-0&partnerID=40&md5=b04b47f6caf2a2fd684630aaa892c6f8","Kinesthetic interactions allow users to interact with 3D applications through their body movements and hand gestures. When kinesthetic applications are introduced in museums and heritage institutions, they add embodiment to visitor experience. An appropriate fit for kinesthetic technology in museums rests on visitors engaging in purposeful body movements and hand gestures that convey meanings about both intangible and tangible heritage. This paper presents the design, development and evaluation of a kinesthetic application of sculpturing Cycladic figurines, which places the user at the role of an ancient craftsman who creates a figurine with bare-hand movements (translated by Leap Motion to respective sculpting actions) in a simplified virtual environment. The Cycladic sculpture application has been evaluated in laboratory and field testing (as part of a wider educational activity in the museum) with positive results on usability, fun and learning. We identify several benefits as well as challenges of designing kinesthetic interactions in museums and we report on design issues that need to be taken into account in similar applications. © 2017, Springer-Verlag London Ltd."	1 - The paper could be interesting but it is neccessary to read more
DHUR-113	Kovachev D., Klamma R.,"Context-aware mobile multimedia services in the cloud",2009,"CEUR Workshop Proceedings","539",,,"101","107",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84888396575&partnerID=40&md5=3fe5667de408b2f7d360421c8361d8ee","Mobile devices become widely accepted computing paradigms but the mobile services need to be aware of the dynamical user environment and adapt accordingly to the context. With the increasing amount of multimedia, ontologies can add value to the new semantic multimedia services, by considering the contextual information. Our goal is to provide new concepts for mobile multimedia computing in certain domains like cultural heritage data management. We propose to model the mobile, user and multimedia context with the use of ontologies. We take cloud computing as service infrastructure for supporting complex semantic multimedia tasks for the mobile clients."	0 - The paper does not seem to be relevant to 4CH project

DHUR-114	Koya K., Chowdhury G.,"Cultural Heritage Information Practices and iSchools Education for Achieving Sustainable Development",2020,"Journal of the Association for Information Science and Technology","71","6",,"696","710",,"10.1002/asi.24283","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85070310751&doi=10.1002%2fasi.24283&partnerID=40&md5=3882337c06800071cd3dd70672a7c0a4","Since 2015, the United Nation Educational, Scientific and Cultural Organization (UNESCO) began the process of inculcating culture as part of the United Nations' (UN) post-2015 Sustainable (former Millennium) Development Goals, which member countries agreed to achieve by 2030. By conducting a thematic analysis of the 25 UN commissioned reports and policy documents, this research identifies 14 broad cultural heritage information themes that need to be practiced in order to achieve cultural sustainability, of which information platforms, information sharing, information broadcast, information quality, information usage training, information access, information collection, and contribution appear to be the significant themes. An investigation of education on cultu heritage informatics and digital humanities at iSchools (www.ischools.org) using a gap analysis framework demonstrates the core information science skills required for cultural heritage education. The research demonstrates that: (i) a thematic analysis of cultural heritage policy documents can be used to explore the key themes for cultural informatics education and research that can lead to sustainable development and (ii) cultural heritage information education should cover a series of skills that can be categorized in five key areas, viz., information, technology, leadership, application, and people and user skills. © 2019 ASIS&T"	0 - The paper does not seem to be relevant to 4CH project
DHUR-115	Kulakov K.A., Petrina O.B., Korzun D.G., Varfolomeyev A.G.,"Towards an understanding of smart service: The case study for cultural heritage e-Tourism",2016,"Conference of Open Innovation Association, FRUCT","2016-September",, 7561520,"145","152",,"10.1109/FRUCT-ISPIT.2016.7561520","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989181214&doi=10.1109%2fFRUCT-ISPIT.2016.7561520&partnerID=40&md5=6e349ad71966f509df0986f063a9158e","e-Tourism covers a wide niche of the digital services market. The existing services, although being presented in the large amount in today's Internet, do not achieve high intelligence level. The user still needs to perform a lot of operations manually: to solve a given problem she/he finds and accesses appropriate Internet services or uses mobile applications. A lot of information fragments are linked by the user her/himself, in the mind. In this paper, we discuss the problem of smart service development for the e-Tourism domain. The considered use-case scenario comes from cultural heritage tourism, which is an area of growing application interest We identify smart service attributes that allow a service to achieve a new level of the intelligence. The user becomes more focused on the substantial aspects of solving the problem. We contribute architectural solutions to service design. For the given use-case we show how the service-oriented system can be implemented in the form of a smart space deployed on user-surrounding devices based on the usage of external Internet services and multiple data sources. © 2016 FRUCT."	0 - The paper does not seem to be relevant to 4CH project
DHUR-116	Larue F., di Benedetto M., Dellepiane M., Scopigno R.,"From the digitization of cultural artifacts to the web publishing of digital 3D collections: An automatic pipeline for knowledge sharing",2012,"Journal of Multimedia","7","2",,"132","144",,"10.4304/jmm.7.2.132-144","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84861876160&doi=10.4304%2fjmm.7.2.132-144&partnerID=40&md5=b41ac45dcddef9717325e4b42e9cfe38","In this paper, we introduce a novel approach intended to simplify the production of multimedia content from real objects for the purpose of knowledge sharing, which is particularly appropriate to the cultural heritage field. It consists in a pipeline that covers all steps from the digitization of the objects up to the Web publishing of the resulting digital copies. During a first stage, the digitization is performed by a high speed 3D scanner that recovers the object's geometry. A second stage then extracts from the recovered data a color texture as well as a texture of details, in order to enrich the acquired geometry in a more realistic way. Finally, a third stage converts these data so that they are compatible with the recent WebGL paradigm, then providing 3D multimedia content directly exploitable by end-users by means of standard Internet browsers. The pipeline design is centered on automation and speed, so that it can be used by non expert users to produce multimedia content from potentially large object's collections, like it may be the case in cultural heritage. The choice of a high speed scanner is particularly adapted for such a design, since this kind of devices has the advantage of being fast and intuitive. Processing stages that follow the digitization are both completely automatic and ""seamless"", in the sense that it is not incumbent upon the user to perform tasks manually, nor to use external softwares that generally need additional operations to solve compatibility issues. © 2012 ACADEMY PUBLISHER."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-117	Lawton A.,"Digital libraries that demonstrate high levels of mutual complementarity in collectionlevel metadata give a richer representation of their content and improve subject access for users",2014,"Evidence Based Library and Information Practice","9","4",,"73","75",,"10.18438/b8ns43","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84920281177&doi=10.18438%2fb8ns43&partnerID=40&md5=7c9c76b733b35f1ba565c41058873a01","Objective - To determine how well digital library content is represented through free-text and subject headings. Specifically to examine whether a combination of free-text description data and controlled vocabulary is more comprehensive than free-text description data alone in describing digital collections. Design - Qualitative content analysis and complementarity comparison. Setting - Three large scale cultural heritage digital libraries: one in Europe and two in the United States of America. Methods - The researcher retrieved XML files of complete metadata records for two of the digital libraries, while the third library openly exposed its full metadata. The systematic samples obtained for all three libraries enabled qualitative content analysis to uncover how metadata values relate to each other at the collection level. The researcher retrieved 99 collection-level metadata records in total for analysis. The breakdown was 39, 33, and 27 records per digital library. When comparing metadata in the free-text Description metadata element with data in four controlled vocabulary elements, Subject, Geographic Coverage, Temporal Coverage and Object Type, the researcher observed three types of complementarity: one-way, two-way and multiple-complementarity. The author refers to complementarity as ""describing a collection's subject matter with mutually complementary data values in controlled vocabulary and free-text subject metadata elements"" (Zavalina, 2013, p. 77). For example, within a Temporal Coverage metadata element the term ""19th century"" would complement a Description metadata element ""1850-1899"" in the same record. Main Results - The researcher found a high level of one-way complementarity in the metadata of all three digital libraries. This was mostly demonstrated by free-text data in the Description element complemented by data in the controlled vocabulary elements of Subject, Geographic Coverage, Temporal Coverage, and Object Type. Only one library demonstrated a significant proportion (19%) of redundancy between free-text and controlled vocabulary metadata. An example of redundancy found included a repetition of geographic information in both a Description and Geographic Coverage metadata elements. Conclusion - The author reports high levels of mutual complementarity in the three cultural heritage digital libraries studied. The findings demonstrate that collection-level metadata which includes both free-text and controlled vocabulary is more representative of the intellectual content of the collections and improves subject access for users. The author maintains that there is no standard for collection-level metadata descriptions, and that this research may contribute to best practice guidelines in this area. It is unclear whether the digital libraries studied had written policies in place on how to describe collections and if those policies were adhered to in practice. The author expresses a need for further research to be conducted on collection-level metadata in other domains, such as science and interdisciplinary digital libraries, and on other scales (e.g., regional or state collections) and geographic regions beyond Europe and the United States. © 2014 Lawton."	0 - The paper does not seem to be relevant to 4CH project
DHUR-118	Lemon B., Blinco K., Somes B.,"Building NED: Open access to australia's digital documentary heritage",2020,"Publications","8","2", 19,"","",,"10.3390/PUBLICATIONS8020019","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85086929246&doi=10.3390%2fPUBLICATIONS8020019&partnerID=40&md5=c5f134b77e8179b9eb4c03ab06ba3de5","This article charts the development of Australia's national edeposit service (NED), from concept to reality. A world-first collaboration between the national, state and territory libraries of Australia, NED was launched in 2019 and transformed our approach to legal deposits in Australia. NED is more than a repository, operating as a national online service for depositing, preserving and accessing Australian electronic publications, with benefits to publishers, libraries and the public alike. This article explains what makes NED unique in the context of global research repository infrastructure, outlining the ways in which NED member libraries worked to balance user needs with technological capacity and the variations within nine sets of legal deposit legislation. © 2020 by the authors."	0 - The paper does not seem to be relevant to 4CH project

DHUR-119	Lercari N., Shiferaw E., Forte M., Kopper R.,"Immersive Visualization and Curation of Archaeological Heritage Data: Çatalhöyük and the Dig@IT App",2018,"Journal of Archaeological Method and Theory","25","2",,"368","392",,"10.1007/s10816-017-9340-4","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85021286452&doi=10.1007%2fs10816-017-9340-4&partnerID=40&md5=1afd00b370bd9bd9c8f2d76af665ad0c","Advanced data capture techniques, cost-effective data processing, and visualization technologies provide viable solutions for the documentation of archaeological heritage and material culture. Work at the UNESCO World Heritage site of Çatalhöyük has demonstrated that new digital approaches for capturing, processing, analyzing, and curating stratigraphic data in 3D are now feasible. Real-time visualization engines allow us to simulate the stratigraphy of a site, the three-dimensional surfaces of ancient buildings, as well as the ever-changing morpholo of cultural landscapes. Nonetheless, more work needs to be done to address methodological questions such as follows: can three-dimensional models and stratigraphic relationships, based on 3D surfaces and volumes, be used to perform archaeological interpretation? How can a 3D virtual scenario become the interface to cultural data and metadata stored in external online databases? How can we foster a sense of presence and user embodiment in the simulation of ancient cities and archaeological sites? This article aims to provide viable solutions to the methodological challenge of designing a comprehensive digital archaeological workflow from the data acquisition and interpretation in the field to a three-dimensional digital data curation based on interactive visualization, searchable 3D data, and virtual environments. This work describes the results we achieved developing the application Dig@IT, a multi-platform, scalable virtual reality tool able to foster archaeological data analysis, interpretation, and curation in a realistic and highly interactive virtual environment. © 2017, Springer Science+Business Media, LLC."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-120	Li J., Yu N.,"Key Technology of Virtual Roaming System in the Museum of Ancient High-Imitative Calligraphy and Paintings",2020,"IEEE Access","8",,9163107,"151072","151086",,"10.1109/ACCESS.2020.3015318","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85090794183&doi=10.1109%2fACCESS.2020.3015318&partnerID=40&md5=cd8fe4bd7fe78af8af0ee952b6f7e08e","To show the traditional Chinese painting and the spiritual culture of universities, highlight the artistic accumulation and cultural heritage, analyze the value and significance of digitalizing the Museum of Ancient High-Imitative Calligraphy and Painting, Qingdao Agricultural University (QAU) is regarded as the research object. The design principles of the digital museum are clarified by understanding the specific user needs, and the 3DS Max is utilized to develop a roaming system for the Museum of Ancient High-Imitative Calligraphy and Painting of QAU through Unity3d, a Virtual Reality (VR) software platform. Besides, the perspective control, collision detection of virtual characters and scenes, and control of pop-up information display windows are realized to achieve the interactive design of users and the QAU digital museum system. Finally, from the four aspects of resource content, information presentation, resource presentation, and learning effect, a comprehensive evaluation is conducted. The research results show that more than 80% of people think that the content satisfaction of virtual system resources is high, which is more scientific and accurate more than 65% think that the information is presented better, and 87% think that the system is open enough in addition, nearly one-third of the visitors believe that using the system can initiate their interest and motivation in learning. This shows that the learning and cultural communication effects of the virtual system are more obvious. This system realizes the objective of disseminating traditional classic art culture and values by new technical means, which has reference significance for research in other fields. © 2013 IEEE."	1 - The paper could be interesting but it is neccessary to read more
DHUR-121	Lo Presti O.,"Church institution and digital world: New opportunities to profess the word of God",2011,"International Journal of Business and Globalisation","7","1",,"116","130",,"10.1504/IJBG.2011.040850","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84875906540&doi=10.1504%2fIJBG.2011.040850&partnerID=40&md5=2a87529ae6dc1c7af5e95079c1eff2c5","The purpose of this paper is to investigate the relationship between church institution and new technology in the field of communication and management of the religious tourism experience. A critical study of the institutional church use of new technology applications for the communication, management and promotion of ecclesiastic heritage is developed an empirical phase is implemented by conducting research and analysis of technology applied to ecclesiastic heritage, and all of this in while developing a case study of the Catholic Church institution of Naples. This paper shows the high degree of technology utilisation by church institutions in order to communicate and educate people to evangelisation. The results of this study will be useful to understand the adaptability of these technologies to the needs of users, recipients and territories their degree of enhancement and promotion and the measures that can be implemented for an efficient and effective governance of heritage and territory. Copyright © 2011 Inderscience Enterprises Ltd."	0 - The paper does not seem to be relevant to 4CH project
DHUR-122	Lo Turco M., Giovannini E.C.,"**Towards a phygital heritage approach for museum collection**",2020,"Journal of Archaeological Science: Reports","34",,102639,"","",,"10.1016/j.jasrep.2020.102639","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85095790456&doi=10.1016%2fj.jasrep.2020.102639&partnerID=40&md5=f753aaeb2e9842fe332bfb2446578d58","The paper presents different experiences developed at the Department of Architecture and Design of Politecnico di Torino in collaboration with Fondazione Museo delle Antichità Egizie in Turin, Italy. These research offered interesting suggestions for working on the crucial relationship between content (collection) and container (museum) through shared and interoperable digital workflows. In the B.A.C.K. TO T.H.E. F.U.T.U.RE. project the research emphatise the role of artworks, that are characterized by intangible and historical values. Artworks are also connected with eterogeneous documentary heritage that enlighted the need of creating new narratives avoiding the descriptive and analytical ones. The project offers a workflow that using different vocabularies (database and open data) is able to structure data and use visual media (3d web publishing) to create different degree of accessibility to cultural heritage content. The recently launched SMART MUSEUM research, works on automated procedures to show, through graphics, the complex phenomena triggered by the attractive weight of the collections. In this case, the artwork assumes artistic, social and media values that contribute to create novel attributes able to identify an attractive weight of the artwork. These value affects the attractiveness of an artwork within the exhibition project and can be an interesting subject for a correct foreshadowing of visitor flows. The involved elements are the exhibition area (the graphic field), the collection (the attractive elements) and the users. The conceived procedure, once automated, becomes a prototype to support the curators to control and improve the efficiency of the exhibition layout. © 2020 Elsevier Ltd"	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-123	Lorenzini C., Carrozzino M., Tecchia F., Bergamasco M.,"Automatic creation of bas-relieves from single images",2013,"Proceedings of the DigitalHeritage 2013 - Federating the 19th Int'l VSMM, 10th Eurographics GCH, and 2nd UNESCO Memory of the World Conferences, Plus Special Sessions fromCAA, Arqueologica 2.0 et al.","1",,6743771,"417","420",,"10.1109/DigitalHeritage.2013.6743771","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84896797741&doi=10.1109%2fDigitalHeritage.2013.6743771&partnerID=40&md5=dc5e573e8d044834cb8b2162f4080905","When we think to bas-relieves it is natural to compare them with sculptures, because they share some common properties such as techniques, materials and shapes. However, from a different perspective, bas-relieves have even deeper connections with other bi-dimensional forms of art, such as the frescoes both have been used to decorate walls surfaces, although bi reliefs enabled different perspective of interpretation. Bas-relieves, in fact, extend themselves in the three-dimensional space and are therefore able to provide more information compared to an image representing the same scene moreover, and not less interestingly, they are also enjoyable by users with special needs, such as blind people, that are able to explore their surfaces by means of their sense of touch. For this reason, many attempts have been made in the past to realize bas-relieves representing transpositions of bi-dimensional artworks such as images in order to improve their accessibility. Commonly these transpositions are manually made since manual procedures allow to retain the full control of the final result. The introduction of ICT tools such as 3D modeling and printing has allowed to simplify this process which however still results long and time-consuming, often aimed to one single specific case. In this paper we present an automatic system to enable a fast and massive production of 2.5D models, suitable to be transformed into simplified bas-relieves, starting from a single image, and providing an interactive editor in order to refine the results of the automatic reconstruction, designed for users having no special technical skills. The resulting digital models can be (optionally) refined with 3D modeling tools and directly used in Virtual Reality applications, for instance for educational purposes, or physically reconstructed as actual bas-reliefs to enable access to blind people. The paper details the methodology, the algorithm and presents the results obtained. © 2013 IEEE."	0 - The paper does not seem to be relevant to 4CH project

DHUR-124	Lossau N., Rahmsdorf S., Altenhöner R.,"Data for the future: The German project “Co-operative development of a long-term digital information archive” kopal",2006,"Library Hi Tech","24","4",,"574","582",,"10.1108/07378830610715437","https://www.scopus.com/inward/record.uri?eid=2-s2.0-33751414796&doi=10.1108%2f07378830610715437&partnerID=40&md5=4ee6390669ffa5bf88198a35abae459e","Purpose One of the unresolved problems of the global information society is ensuring the long-term accessibility of digital documents. The project kopal tackles this problem head-on: in a three-year project kopal's objective is the practical testing and implementation of a cooperatively created and operated long-term archival system for digital resources. Design-methodology-approach The system will be implemented in accordance with international standards for long-term archiving and metadata within the Op Archival Information System OAIS framework. The project partners, Die Deutsche Bibliothek DDB, Göttingen State and University Library SUB Göttingen, IBM Deutschland GmbH and the Gesellschaft für wissenschaftliche Datenverarbeitung mbH Göttingen GWDG, will establish a cooperatively transferable solution for cultural heritage institutions, as well as for business and industry. Findings Within the project, the project partners DDB and SUB Göttingen are developing software for the inp and access of data, which will be released under an open-source license. Research limitations-implications Long-term preservation methods and strategies will be discussed in general in the paper. Practical implications The project will present a stable and reusable platform for additional partners and users, especially for cultural heritage organisations. Originality-value The solution is based on Digital Information and Archiving System DIAS, jointly devised by IBM and the National Library of The Netherlands in The Hague, and it will be adapted to the needs of the project with several extensions. Establishing a collaborative solution for long-term preservation is a milestone in the development of systems for the long-term availability of	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-125	Lowe D.B., Bennett M.J.,"A status report on JPEG 2000 implementation for still images: The UConn survey",2009,"Archiving 2009 - Preservation Strategies and Imaging Technologies for Cultural Heritage Institutions and Memory Organizations - Final Program and Proceedings","1509 STP",,,"209","212",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-77952379703&partnerID=40&md5=fbac3394db5d56523935dd44735ff8bc","JPEG 2000 is the product of thorough efforts toward an open standard by experts in the imaging field. With its key components for still images published officially by the ISO/IEC by 2002, it has been solidly stable for several years now, yet its adoption has been considered tenuous enough to cause imaging software developers to question the need for continued support. Digital archiving and preservation professionals must rely on solid standards, so in the fall of 2008 the authors undertook a survey among implementers (and potential implementers) to capture a snapshot of JPEG 2000's status, with an eye toward gauging its perception within this community. The survey results revealed several key areas that JPEG 2000's user community will need to have addressed in order to further enhance adoption of the standard, including perspectives from cultural institutions that have adopted it already, as well as insights from institutions that do not have it in their workflows to date. Current users were concerned about limited compatible software capabilities with an eye toward needed enhancements. They realized also that there in much room for improvement in the area of educating and informing the cultural heritage community about the advantages of JPEG 2000. A small set of users, in addition, perceived problems of cross-codec consistency and future file migration issues. Responses from non-users disclosed that there were lingering questions surrounding the format and its stability and permanence. This was stoked largely by a dearth of currently available software functionality, from the point of initial capture and manipulation on through to delivery to online users	0 - The paper does not seem to be relevant to 4CH project
DHUR-126	Lu Z.,"Improving viewer engagement and communication efficiency within non-entertainment live streaming",2019,"UIST 2019 Adjunct - Adjunct Publication of the 32nd Annual ACM Symposium on User Interface Software and Technology",,,,"162","165",,"10.1145/3332167.3356879","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85074858311&doi=10.1145%2f3332167.3356879&partnerID=40&md5=2a1d781ffa113adce84f889a33c1706d","Live streaming has recently gained worldwide popularity, due to the affordable digital video devices, high-speed Internet access, and social media. While video games and other entertainment content attract a broad audience to live streaming, it has become an important channel for sharing a variety of non-entertainment content, such as civil content, knowledge sharing, and even promoting traditional cultural practices. However, little research has explored the practices and challenges of the vibrant communities of these streamers who share knowledge or showcase cultural practices through live streams, and few tools have been designed and developed to support their needs for engaging viewers and communicate with viewers more efficiently. The goal of my research is to better understand the practices of these streamers and their communities, and to design tools to better support knowledge sharing and cultural heritage preservation through live streaming. © 2019 Copyright is held by the owner/author(s)."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-127	Lunn B.K.,"User needs in television archive access: Acquiring knowledge necessary for system design",2009,"Journal of Digital Information","10","6",,"1","15",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-76649129358&partnerID=40&md5=e7f3ca312fb96115083fcb8b44f0c980","This paper presents a methodical approach for generating deep knowledge about users, as a prerequisite for design and construction of digital information access to cultural heritage information objects. We exemplify this methodical approach by reporting on an explorative study of information need characteristics in a television broadcast context. The methodical approach is inspired by naturalistic research, and our ma data is nine in-depth interviews conducted with scholars and students within the academic field of Media Studies. The analysis identifies four characteristics. Firstly, broadcasts are needed as objects of analysis in empirical research. Secondly, the needs are related to three broadcast dimensions: 1) Transmission 2) Archive and 3) Reception. Thirdly, four fundamental types of information needs are verified in a television broadcast context: 1) Known item 2) Factual data 3) Known topic or content and 4) Muddled topic or content. Fourthly, the interviewees' needs consist of four phases: 1) Getting an overview of transmitted broadcasts 2) Identification of borderline exemplars 3) Selection of specific programmes and 4) Verification of facts. The present paper presents novel research on characteristics of information needs in a television broadcast context. We demonstrate how one may go about generating knowledge which is imperative for the design and construction of future broadcast retrieval systems."	0 - The paper does not seem to be relevant to 4CH project
DHUR-128	Lurie J.,"Geospatial digital asset management⇓ a solution integrating imagery and gis where will all the pixels go?(and how will we ever find them?)",2004,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","35",,,"","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85044465978&partnerID=40&md5=f91bf9c5d75e22bad1a10331f501dcae","The era of widely available high resolution remotely sensed data has arrived. With the advent of numerous commercial satellite systems, data sets of a quality and size previously restricted to government use are now readily available to a broad range of customers. But the data is only the beginning the continued growth and health of the remote sensing industry depend on broad adoption of this technology. To achieve success, systems to derive information from imagery are essential. Utility of the high resolution data must be apparent to a broad community ranging from map makers to agricultural analysts to intelligence staff. Data utility depends critically on intelligent, useable systems for data storage, management, and exploitation. Digital asset management systems for storing and maintaining high resolution imagery data must be capable of integration with GIS layers and other metadata in order to move beyond GIS to spatial decision support systems. In this paper we describe an image-based geospatial data management system which meets these requirements and addresses issues crucial to the user including efficient data ingest and retrieval, cataloging, data security, data integrity, intellectual property and others. The system incorporates extensive retrieval strategies including geographic search techniques. The open architecture of the system ensures easy integration of multifunctional software to meet the needs of the individual user. For example, the system as currently configured integrates third party viewing and imagery manipulation software. The technical specifications and heritage of the system will be described as well as typical applications. Copyright 2004, International Society for Photogrammetry and Remote Sensing. All rights reserved."	1 - The paper could be interesting but it is neccessary to read more

DHUR-129	Maietti F., Di Giulio R., Piaia E., Medici M., Ferrari F.,"Enhancing Heritage fruition through 3D semantic modelling and digital tools: The INCEPTION project",2018,"IOP Conference Series: Materials Science and Engineering","364","1", 012089,"","",,"10.1088/1757-899X/364/1/012089","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85049373201&doi=10.1088%2f1757-899X%2f364%2f1%2f012089&partnerID=40&md5=56f55d80075a8a8bc9b966352ec46390","The INCEPTION project, ""Inclusive Cultural Heritage in Europe through 3D Semantic Modelling"", started in June 2015 and lasting four years, aims at developing advanced 3D modelling for accessing and understanding European cultural assets. One of the main challenges of the project is to close the gap between effective user experiences of Cultural Heritage via digital tools and representations, and the enrichment of the scientific knowledge. Within this framework, the INCEPTION project goals are consistently aligned while accomplishing the main objectives of accessing, understanding and strengthening European cultural heritage by means of enriched 3D models. At the end of the third year of activity, the project is now facing different challenging actions starting from already developed advancement in 3D data capturing and holistic digital documentation, under interdisciplinary and cross-cutting fields of knowledge. In this direction, the approach and the methodology for semantic organization and data management toward H-BIM modelling will be presented, as well as a preliminary nomenclature for semantic enrichment of heritage 3D models. According to the overall INCEPTION workflow, the H-BIM modelling procedure starts with documenting user needs, including experts and non-experts. The identification of the Cultural Heritage buildings semantic ontology and data structure for information catalogue will allow the integration of semantic attributes with hierarchically and mutually aggregated 3D digital geometric models for management of heritage information. © Published under licence by IOP Publishing Ltd."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-130	Maietti F., Medici M., Piaia E.,"An inclusive approach to Digital Heritage: Preliminary achievements within the INCEPTION project",2017,"GCH 2017 - Eurographics Workshop on Graphics and Cultural Heritage",,,,"145","150",,"10.2312/gch.20171306","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85087333453&doi=10.2312%2fgch.20171306&partnerID=40&md5=d7f6a6016a0dc556e59f7879913f9fa2","At the end of the second year of activity and after having completed the first steps in the development of its main goals, the project INCEPTION - Inclusive Cultural Heritage in Europe through 3D Semantic Modelling is now facing different challenging actions starting from already developed advancement in 3D data capturing. Semantic modelling for Cultural Heritage buildings in H-BIM environment and the development of the INCEPTION platform for deployment and valorisation of enriched 3D models will allow accomplishing the main objectives of accessing, understanding and strengthening European cultural heritage. In this direction, the approach and the methodology for semantic organization and data management toward H-BIM modelling will be presented, as well as a preliminary nomenclature for semantic enrichment of heritage 3D models. According to the overall INCEPTION workflow, the H-BIM modelling procedure starts with documenting user needs, including experts and non-experts. The identification of the Cultural Heritage buildings semantic ontology and data structure for information catalogue will allow the integration of semantic attributes with hierarchically and mutually aggregated 3D digital geometric models for management of heritage information. © 2017 GCH 2017 - Eurographics Workshop on Graphics and Cultural Heritage. All rights reserved."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-131	Marasco A., Balbi B.,"Designing accessible experiences for heritage visitors through virtual reality",2019,"e-Review of Tourism Research","17","3",,"426","443",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85078103933&partnerID=40&md5=e00953fbcba25254968a1064ec0c81e1","Virtual reality offers significant opportunities for inclusive tourism, especially at heritage destinations where full accessibility is often limited by site characteristics or conservation issues. This study applies a user-centric methodology for the design of accessible heritage tourism experiences through virtual reality, with a focus on visitors with mobility impairments. It addresses the early-stage design research aimed to understand the needs and expected core elements of digital accessible experiences from visitors' perspective. Through a multimethod explorative research, personas and scenarios are developed to inform the subsequent co-design of virtual reality solutions along the visitors' journey. Methodological and practical implications are discussed. © 2019 Texas A and M University."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-132	Martínez-Graña A.M., Goy J.L., Cimarra C.A.,"A virtual tour of geological heritage: Valourising geodiversity using google earth and QR code",2013,"Computers and Geosciences","61",,,"83","93",,"10.1016/j.cageo.2013.07.020","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84883438227&doi=10.1016%2fj.cageo.2013.07.020&partnerID=40&md5=a55622312bc7380bc4c1faf53e22f957","When making land-use plans, it is necessary to inventory and catalogue the geological heritage and geodiversity of a site to establish an apolitical conservation protection plan to meet the educational and social needs of society. New technologies make it possible to create virtual databases using virtual globes - e.g., Google Earth - and other personal-use geomatics applications (smartphones, tablets, PDAs) for accessing geological heritage information in ""real time"" for scientific, educational, and cultural purposes via a virtual geological itinerary. Seventeen mapped and georeferenced geosites have been created in Keyhole Markup Language for use in map layers used in geological itinerary stops for different applications.A virtual tour has been developed for Las Quilamas Natural Park, which is located in the Spanish Central System, using geological layers and topographic and digital terrain models that can be overlaid in a 3D model. The Google Earth application was used to import the geosite placemarks. For each geosite, a tab has been developed that shows a description of the geology with photographs and diagrams and that evaluates the scientific, educational, and tourism quality.Augmented reality allows the user to access these georeferenced thematic layers and overlay data, images, and graphics in real time on their mobile devices. These virtual tours can be incorporated into subject guides designed by public. Seven educational and interpretive panels describing some of the geosites were designed and tagged with a QR code that could be printed at each stop or in the printed itinerary. These QR codes can be scanned with the camera found on most mobile devices, and video virtual tours can be viewed on these devices. The virtual tour of the geological heritage can be used to show tourists the geological history of the Las Quilamas Natural Park using new geomatics technologies (virtual globes, augmented reality, and QR codes). © 2013 Elsevier Ltd."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-133	Marty P.F.,"Digital convergence and the information profession in cultural heritage organizations: Reconciling internal and external demands",2014,"Library Trends","62","3",,"613","627",,"10.1353/lib.2014.0007","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84898870298&doi=10.1353%2flib.2014.0007&partnerID=40&md5=b0fb7ea2b986871b297f70e06088d965","Nearly twenty years ago, W. Boyd Rayward became one of the first academics to examine how electronic information and the functional integration of libraries, archives, and museums has affected, and will affect, the information profession. In doing so, he laid the groundwork for an entire research agenda on the topic of digital convergence, where the increased use of, and reliance on, digital resources in libraries, archives, and museums has increasingly blurred the traditional distinctions between these institutions. This paper explores how Rayward's early work in this area influenced the development of this topic over time, focusing on how information professionals in cultural heritage organizations can and should reconcile their internal perceptions of identity with the external expectations of their users, particularly those who do not or cannot clearly distinguish between different institutions or the information resources they manage. In a world where the traditional assumptions we take for granted about information organization and access in libraries, archives, and museums are simply not shared by our users, the future of the information profession depends on the ability of cultural heritage information professionals to transcend the traditional boundaries between libraries, archives, and museums to meet information needs in the digital age. © 2014 The Board of Trustees, University of Illinois."	0 - The paper does not seem to be relevant to 4CH project

DHUR-134	Mazurek C., Parkola T., Werla M.,"Storage, management and on-line presentation of multi-domain cultural heritage- dLibra software case study",2010,"Proceedings of the 2010 2nd International Conference on Information Technology, ICIT 2010",,,1 5553342,"249","252",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-77957878821&partnerID=40&md5=c2a62f99de0c13ecdec440a856e5335c","dLibra is a software package for building complex and highly interoperable digital libraries, which is developed by Poznan Supercomputing and Networking Center since 1999. The increasing number of dLibra end-users and increasing variety of institutions exploiting dLibra is a source of new needs and challenges. One of such challenges comes from the differences in type and complexity of digital heritage objects published on-line by institutions coming from different domains. In the ideal situation each of the types of objects should have dedicated user interface, but on the other hand, as far as digital objects are concerned, the issues related with storage and management can be performed by one adequately unified system. In this paper we present the issues related with the development of digital libraries containing digital heritage objects coming from different domains and the solutions that we propose in the context of the dLibra software."	1 - The paper could be interesting but it is neccessary to read more
DHUR-135	McGookin D., Tahiroğlu K., Vaittinen T., Kytö M., Monastero B., Vasquez J.C.,"Cultural heritage 'in-The-wild': Considering digital access to cultural heritage in everyday life",2018,"CEUR Workshop Proceedings","2084",,,"63","75",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85045316812&partnerID=40&md5=e3fa84a7ff2d48b57fa735f8995a542a","As digital cultural heritage applications begin to be deployed out with 'traditional' heritage sites (such as museums, open-Air museums or galleries), there is an increased need to consider their use amongst individuals who are open to learning about the heritage of a site, but where that is a clearly secondary purpose of their visit. Parks, recreational areas and the everyday built environment represent places that although often rich in heritage, are often not visited primarily to access that heritage. We present the results of a study of a mobile application, called Explore, that supports accessing heritage on a Finnish recreational island. Evaluation with 45 participants, who were not visiting primarily to access the heritage, provided insight into how digital heritage applications can be developed for this user group. Our results showed how low immersion and lightweight interaction support individuals to integrate cultural heritage around their primary visit purpose. Although participants were willing to include heritage as part of their visit, they were not willing to be directed by Explore. Our work outlines future directions that should be considered when expanding the reach of heritage access beyond 'traditional' sites. © 2018 CEUR-WS. All rights reserved."	1 - The paper could be interesting but it is neccessary to read more
DHUR-136	Meiling P., Esser G., Pfeifer N., Rosvall J.,"Optical documentation techniques for condition assessment of facades: A tentative evaluation of three case studies executed in Göteborg and Vienna",2011,"International Journal of Architectural Heritage","5","2",,"123","139",,"10.1080/15583050903272019","https://www.scopus.com/inward/record.uri?eid=2-s2.0-79952031831&doi=10.1080%2f15583050903272019&partnerID=40&md5=bf3ae4bb1be6255268078c100e953655","A growing need for relevant information for long-term planning is a vital issue for the actors involved in management and maintenance of built heritage, as well as of built environments at large. Through its subsidiary companies, the publicly owned real estate and housing corporation Forvaltnings AB Framtiden, Inc., in Goteborg, Sweden, is administering 70,000 apartments. In Vienna, the Wiener Wohnen is an Austrian municipal housing corporation, administering 220,000 apartments. The dimensions of such building stocks indicate the relevance of user-friendly yet stringent methods for acquisition of valid information about types of construction, materials, and related issues of deterioration. A combination of existing and new methods for documentation and condition assessment of building facades, primarily based on optical techniques, has been designed and tested in accordance to the needed information indicated. This article reports on the outcome of three case studies comparing three methods for developing digital image, textured three-dimensional-models of existing buildings. Copyright © Taylor & Francis Group, LLC."	0 - The paper does not seem to be relevant to 4CH project
DHUR-137	Missikoff O.,"Assessing the role of cultural resources as a key product for socio-economic development.",2005,"Proceedings of the 13th European Conference on Information Systems, Information Systems in a Rapidly Changing Economy, ECIS 2005",,,,"","",12,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84870981069&partnerID=40&md5=4f67f4bc354229be58cc5941f30098d6","Post-industrial, knowledge societies need Culture! The various types of culture represent a multidimensional asset largely underestimated, with an extremely powerful potential for socioeconomic growth which is unfortunately still very far from being fully expressed. In this paper, organizational models and technological solutions are proposed as key factors for enabling full expression of an asset that could positively affect several aspects of our life. In fact, if intelligently managed, Culture can provide: High quality content: the proliferation of new media, like 3g mobile phones or pay TVs, is generating digital spaces that need to be filled with useful and appealing contents. Socio-economic development: many of the poorest countries host amazing heritage resources that could attract tourists. Cultural tourism is a segment that shows signs of growth all over the world. Cross-cultural integration: culture is extremely effective for helping people from different areas of this planet in better understanding each other. Identity building: with the emerging working model based on boundaryless careers"", it is vital to invest on Culture for building one's own existential, social, and professional identity. Among the different branches that compose the Culture, it has been chosen to concentrate on the cultural heritage for its intrinsic multidimensional value and its tight connections with one of the leading world industries: the tourism. However, a careful management and wide dissemination of Culture would enhance the fundamental resources of nations. These resourc can be organised in two categories of capital: Human Capital. That is: promoting the creativity of individuals. We define as creative"" sectors like arts, fashion, design, architecture, but also the research of innovation, be it scientific, economic, or technological. Territorial Capital. That is the territory, its history, landscape, traditions, craftsmanship, and typical products. The Cultural Heritage obviously belongs to this category. The implementation of carefully designed organisational configurations and wisely customised technological solutions can provide the foundations required for allowing the heritage sector in obtaining its right place in the socio-economic scenario. The core issue of this framework is to identify the source of value, that will soon be the main, for cultural heritage institutions that interact with the public, directly or indirectly: the final user."	0 - The paper does not seem to be relevant to 4CH project
DHUR-138	M'kadem A.B., Nieuwenhuysen P.,"Digital access to cultural heritage material: Case of the Moroccan manuscripts",2010,"Collection Building","29","4",,"137","141",,"10.1108/01604951011088862","https://www.scopus.com/inward/record.uri?eid=2-s2.0-78049490434&doi=10.1108%2f01604951011088862&partnerID=40&md5=374cbfaaddcef3fdcfb1eea301c1da95","Purpose: The purpose of this paper is to study the readiness of academic researchers in history in Moroccan universities to change their habits and ways of accessing old manuscript collections from direct access to on/offline access to digitized versions of the same documents. Design/methodology/approach: A survey was conducted with a sample population of about 30 researchers, both students and teachers. This survey used a questionnaire distributed directly. Findings: This user study came to the conclusion that though people appreciate the possible existence of a digital library for manuscripts (on- or offline), they have some hesitation to use it solely because they are afraid of losing a precious and fruitful human interaction with the private holders of manuscript collections. Research limitations/implications: The study is considered as a basis for future studies that could enhance the concepts and the methods. The limitations in this research are mainly due to the local scope of the survey. Originality/value: The survey is unique in the sense that it is the first one. The manuscripts have been studied previously at several levels except a user needs perspective. © Emerald Group Publishing Limited."	0 - The paper does not seem to be relevant to 4CH project
DHUR-139	Muglia C., Kelly E.J., O'gara G., Stein A., Thompson S., Wolcott L.,"How we talk about assessment: A new framework for digital libraries",2019,"Serials Librarian","76","1-4",,"208","212",,"10.1080/0361526X.2019.1586050","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85066152279&doi=10.1080%2f0361526X.2019.1586050&partnerID=40&md5=477eff804234be71b0cefff4e5f763e4","In 2017, six institutions received an Institute of Museum and Library Services National Forum Grant to conduct a year-long comprehensive needs assessment. Through various survey instruments and outreach methods, the digital library community's input revealed the need for reuse assessment practices and requirements of digital assets held by cultural heritage and research organizations. While the current literature outlines traditional library metrics and assessment, the authors focused on the ways in which users utilize and transform unique assets from digital collections. The needs assessment found that the digital library community wants to more deeply understand how digital assets are reused and repurposed. This article examines the initial qualitative and quantitative analysis of a community needs assessment that showcases the current and anticipated landscape of digital library reuse assessment. © 2019 Caroline Muglia, Genya O'Gara, Santi Thompson, Elizabeth J. Kelly, Ayla Stein and Liz Wolcott."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology

DHUR-140	Muir A.,"Legal deposit and preservation of digital publications: A review of research and development activity",2001,"Journal of Documentation","57","5",,"652","682",,"10.1108/EUM0000000007097","https://www.scopus.com/inward/record.uri?eid=2-s2.0-0035634361&doi=10.1108%2fEUM0000000007097&partnerID=40&md5=5476fb1d4cfc703988aa8e43deaa2232","The aim of legal deposit is to ensure the preservation of and access to a nation's intellectual and cultural heritage over time. There is a global trend towards extending legal deposit to cover digital publications in order to maintain comprehensive national archives. However, including digital publications in legal deposit regulations is not enough to ensure the long-term preservation of these publications. Indeed, there are many practical difficulties associated with the entire deposit process. Concepts, principles and practices that are accepted and understood in the print environment, such as publication, publisher, place of publication and edition, may have new meanings or no longer be appropriate in a networked environment. Mechanisms for identifying, selecting and depositing digital material either do not exist or are inappropriate for some kinds of digital publication. There is a great deal of work on developing digital preservation strategies: this is at an early stage. National and other deposit libraries are at the forefront of research and development in this area, often in partnership with other libraries, publishers and technology vendors. Most of this activity is of a technical nature. There is some work on developing policies and strategies for managing digital resources. However, not all management issues or users' needs are being addressed."	0 - The paper does not seem to be relevant to 4CH project
DHUR-141	Murray K., Beiden D.,"Applying user-centered design principles to redesign the interface to the portal to Texas history: The IOGENE project",2010,"Archiving 2010 - Preservation Strategies and Imaging Technologies for Cultural Heritage Institutions and Memory Organizations, Final Program and Proceedings",,,,"163","168",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-79956111731&partnerID=40&md5=3be6e52bc95d1be0ae2abd1e6b951081","The IOGENE project at the University of North Texas Libraries applied user-centered design principles to redesign the interface to a unique digital library of cultural heritage materials, the Portal to Texas History SM. Since its launch in 2004, the interface had become dated and implementation of new functionality was constrained by the underlying technical infrastructure. Genealogists, a significant and under-studied class of digital library users, participated in the redesign of the Portal's interface. At the outset of the project, focus group discussions provided insights regarding genealogists' information needs as well as their research practices in relation to online information systems. In large part, these insights informed the functional requirements for the redesign of the Portal's user interface. Subsequent to each of two public releases of the redesigned interface, genealogists were engaged in usability testing. An online survey measured user satisfaction prior to and after the new interface was released. Results determined that satisfaction with the Portal significantly improved after the final release of the redesigned interface. The project's process and findings will be of interest to archives and digital libraries facing similar challenges in regard to redesigning their user interface and involving users in the design process."	1 - The paper could be interesting but it is neccessary to read more
DHUR-142	Niebling F., Bruschke J., Latoschik M.E.,"Browsing spatial photography for dissemination of cultural heritage research results using augmented models",2018,"GCH 2018 - Eurographics Workshop on Graphics and Cultural Heritage",,,,"185","188",,"10.2312/gch.20181358","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85071321776&doi=10.2312%2fgch.20181358&partnerID=40&md5=380e001f2d012f0c66f78abbe53bbbac","Both digital and physical 3D models of buildings as well as historical photographs of architecture are used for a wide range of needs, from research in humanities and information technologies, museum contexts and library studies, to touristic applications. Spatially oriented photographs play an important role in visualizing and browsing contemporary as well as historical architecture, starting with the ground-breaking Photo Tourism project [SSS06]. We present a technique to combine physical, 3D-printed models of buildings with spatially registered historical photographic documents in a hand-held Augmented Reality (AR) environment. Users are enabled to spatially explore historical views of architecture by selecting photos from a collection of images, which are then utilized as textures for the physical model rendered on their respective mobile device. We compare different methods to spatially select photos registered to a physical model in hand-held AR. © 2018 GCH 2018 - Eurographics Workshop on Graphics and Cultural Heritage. All rights reserved."	0 - The paper does not seem to be relevant to 4CH project
DHUR-143	Nikolov I., Madsen C.,"Interactive environment for testing SFM image capture configurations",2019,"VISIGRAPP 2019 - Proceedings of the 14th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications","1",,,"317","322",,"10.5220/0007566703170322","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85068214320&doi=10.5220%2f0007566703170322&partnerID=40&md5=bab21d297f02c1725fd4ab3cdc7ce197","In recent years 3D reconstruction has become an important part of the manufacturing industry, product design, digital cultural heritage preservation, etc. Structure from Motion (SfM) is widely adopted, since it does not require specialized hardware and easily scales with the size of the scanned object. However, one of the drawbacks of SfM is the initial time and resource investment required for setting up a proper scanning environment and equipment, such as proper lighting and camera, number of images, the need of green screen, etc, as well as to determine if an object can be scanned successfully. This is why we propose a simple solution for approximating the whole capturing process. This way users can test fast and effortlessly different capturing setups. We introduce a visual indicator on how much of the scanned object is captured with each image in our environment, giving users a better idea of how many images would be needed. We compare the 3D reconstruction created from images from our solution, with ones created from rendered images using Autodesk Maya and V-Ray. We demonstrate that we provide comparable reconstruction accuracy at a fraction of the time. Copyright © 2019 by SCITEPRESS – Science and Technology Publications, Lda. All rights reserved"	0 - The paper does not seem to be relevant to 4CH project
DHUR-144	Nöll T., Köhler J., Reis G., Stricker D.,"Faithful, compact and complete digitization of cultural heritage using a full-spherical scanner",2013,"Proceedings of the DigitalHeritage 2013 - Federating the 19th Int'l VSMM, 10th Eurographics GCH, and 2nd UNESCO Memory of the World Conferences, Plus Special Sessions fromCAA, Arqueologica 2.0 et al.","1",,6743708,"15","22",,"10.1109/DigitalHeritage.2013.6743708","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84896776773&doi=10.1109%2fDigitalHeritage.2013.6743708&partnerID=40&md5=230b6ebfabdd360579a2239ad2eb1ed3","Effective documentation and display of ancient objects is an essential task in the field of cultural heritage conservation. Digitization plays an important role for the process of creating, preserving and accessing objects in digital space. Up to the present day, industrial scanners are used for this task that focus mainly on the detailed reconstruction of the object's geometry only. However, important for a faithful digital presentation of the object is in particular the appearance information, i.e. a description of the used materials and how they interact with incident light. Using the worlds first full-spherical scanner, we propose a user friendly reconstruction process that is specifically tailored to the needs for digitizing and representing cultural heritage artifacts. More precisely, our hardware specifically addresses the problem that invaluable or fragile artifacts m not be turned over during acquisition. Nevertheless, we can digitize the object completely including its bottom. Further, by integrating appearance information into our digitization we achieve a far more faithful digital replica with a quality comparable to a real picture of the object. But in contrast to a static picture, our representation allows to interactively change the viewing and lighting directions freely. In addition, the results are very memory efficient, consuming only several MB per scanned object and hence are suited to be accessed and visualized interactively in a web browser. In cooperation with museums and a private collector, we digitized several cultural heritage artifacts in order to demonstrate the feasibility of the proposed process. © 2013 IEEE."	0 - The paper does not seem to be relevant to 4CH project

DHUR-145	Nöll T., Köhler J., Reis G., Stricker D.,"Fully automatic, omnidirectional acquisition of geometry and appearance in the context of cultural heritage preservation",2015,"Journal on Computing and Cultural Heritage","8","1",,"2","",,"10.1145/2629693","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84923864158&doi=10.1145%2f2629693&partnerID=40&md5=190aa83f3db9327b3cd7dfa6e67c8edd","Effective documentation and display of ancient objects is an essential task in the field of cultural heritage conservation. Digitization plays an important role in the process of creating, preserving, and accessing objects in digital space. Up to the present day, industrial scanners are used for this task, which focus mainly on the detailed reconstruction of the object's geometry only. However, particularly important for a faithful digital presentation of the object is the appearance information - that is, a description of the used materials and how they interact with incident light. Using the world's first full-spherical scanner, we propose a user-friendly reconstruction process that is specifically tailored to the needs of digitizing and representing cultural heritage artifacts. More precisely, our hardware specifically addresses the problem that invaluable or fragile artifacts may not be turned over during acquisition. Nevertheless, we can digitize the object completely, including its bottom. Further, by integrating appearance information into our digitization, we achieve a far more faithful digital replica with a quality comparable to a real picture of the object. But in contrast to a static picture, our representation allows one to interactively change the viewing and lighting directions freely. In addition, the results are very memory efficient, consuming only several megabytes per scanned object. In cooperation with museums and a private collector, we digitized several cultural heritage artifacts to demonstrate the feasibility of the proposed process. © 2015 ACM."	0 - The paper does not seem to be relevant to 4CH project
DHUR-146	Norberg L.R., Vassiliadis K., Ferguson J., Smith N.,"Sustainable design for multiple audiences: The usability study and iterative redesign of the Documenting the American South digital library",2005,"OCLC Systems and Services","21","4",,"285","299",,"10.1108/10650750510629625","https://www.scopus.com/inward/record.uri?eid=2-s2.0-31044438215&doi=10.1108%2f10650750510629625&partnerID=40&md5=eab0c6b596a2c99e95d1a575c354b36c","Purpose - To demonstrate the value in conducting a usability study and following an iterative design process to create a more user-centered and sustainable digital library. Design/methodology/approach - After identifying three key user groups, a series of usability tests and focus groups were conducted to assess how users interact with the site's interface. An iterative design process followed involving the development and testing of prototypes by representative users and stakeholders. Findings - Users' interaction with a digital library is task-oriented and context dependent. Serving the needs of multiple audiences is an iterative process and requires an ongoing dialog with users. Research limitations/implications - Like most usability studies, the results are not generalizable. Practical implications - It offers an example of how an informal usability study and iterative design process can be conducted to create a more user-centered digital library. Originality/value - This paper provides new insights into the information needs and behaviors of users of cultural heritage digital libraries and builds on the literature on usability and iterative design. © Emerald Group Publishing Limited."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-147	O'Gara G.M., Woolcott L., Joan Kelly E., Muglia C., Stein A., Thompson S.,"Barriers and solutions to assessing digital library reuse: preliminary findings",2018,"Performance Measurement and Metrics","19","3",,"130","141",,"10.1108/PMM-03-2018-0012","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85054562348&doi=10.1108%2fPMM-03-2018-0012&partnerID=40&md5=b3bf59d02d6230af1baeb23b547642a2","Purpose: The purpose of this paper is to highlight the initial top-level findings of a year-long comprehensive needs assessment, conducted with the digital library community, to reveal reuse assessment practices and requirements for digital assets held by cultural heritage and research organizations. The type of assessment examined is in contrast to traditional library analytics, and does not focus on access statistics, but rather on how users utilize and transform unique materials from digital collections. Design/methodology/approach: This paper takes a variety of investigative approaches to explore the current landscape, and future needs, of digital library reuse assessment. This includes the development and analysis of pre- and post-study surveys, in-person and virtual focus group sessions, a literature review, and the incorporation of community and advisory board feedback. Findings: The digital library community is searching for ways to better understand how materials are reused and repurposed. This paper shares the initial quantitati and qualitative analysis and results of a community needs assessment conducted in 2017 and 2018 that illuminates the current and hoped for landscape of digital library reuse assessment, its strengths, weaknesses and community applications. Originality/value: In so far as the authors are aware, this is the first paper to examine with a broad lens the reuse assessment needs of the digital library community. The preliminary analysis and initial findings have not been previously published. © 2018, Genya Morgan O'Gara, Liz Woolcott, Elizabeth Joan Kelly, Caroline Muglia, Ayla Stein and Santi Thompson."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-148	Ongena G., Huizer E., Van De Wijngaert L.,"Threats and opportunities for new audiovisual cultural heritage archive services: The Dutch case",2012,"Telematics and Informatics","29","2",,"156","165",,"10.1016/j.tele.2011.05.005","https://www.scopus.com/inward/record.uri?eid=2-s2.0-81955161195&doi=10.1016%2fj.tele.2011.05.005&partnerID=40&md5=3456a86a6842e73dc8e0e40ce907a901","Purpose: The purpose of this paper is to analyze the business-to-consumer market for digital audiovisual archiving services. In doing so we identify drivers, threats, and opportunities for new services based on audiovisual archives in the cultural heritage domain. By analyzing the market we provide insights into the preconditions for provision of fruitful and viable services that can be build upon these archives. Design/methodology/approach: The research method takes the form of a case study, including literature search and interviews. For this research we adopt the STOF-framework for analyzing purposes. This framework consists of four components: a service component, a technological component, an organizational component, and a financial component (STOF). Findings: The authors argue an imbalance between the different factors of the STOF-model in the Netherlands. First, the service domain in the Dutch audiovisual archive domain shows little knowledge about (potential) users ar their needs regarding the archive. The service domain is therefore probably the biggest question mark in this market. Second, the technical component presents few impedances and is therefore least of an issue. Third, the organization component terms of value network presents issues revolving around the nature of the cultural institution. Non-profit cultural organizations like Sound & Vision in the Netherlands are not naturally inclined towards business modeling around development of services. Fourth and last, the financial domain shows severe bottlenecks for unlocking the content regarding intellectual property. The clearing of copyrights is one of the main tasks of Images for the Future, but engulfs much time in the primary process. In sum, the study shows promising and problematic issues that arise in the field of developing audiovisual archive services. Research limitations/implications: This is a one-case study, so no cross analysis with other cases was possible. Future work includes the investigation of user needs regarding audiovisual cultural heritage and possible services upon the archives. Originality/value: This is one of the first studies that look into the factors in a particular domain that influence the viability of services by using a business model framework. This paper, therefore, extends the utilization of this framework (STOF-model) as it used as a method for the evaluation of a market and provides market insights. Also, the application on the audiovisual cultural heritage domain is quite novel. For practitioners regarding the development of audiovisual archive services the paper presents fresh insights in the configuration of the different business components of the services. © 2011 Elsevier Ltd. All rights reserved."	1 - The paper could be interesting but it is neccessary to read more
DHUR-149	Pääkkönen T., Rautiainen J., Ryynänen T., Uusitalo E.,"Open, extended, closed or hidden data of cultural heritage",2018,"CEUR Workshop Proceedings","2084",,,"403","411",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85045351005&partnerID=40&md5=592c36982917840812a982348beacde6","The National Library of Finland (NLF) agreed on an ""Open National Library"" policy in 2016[1]. In the policy there are eight principles, which are divided into accessibility openness in actions and collaboration. Accessibility in the NLF means that access to the material needs to exist both for the metadata and the content, while respecting the rights of the rights holders. Openness in operations means that our actions and decision models are transparent and clear, and that the materials are accessible to the researchers and other users. These are one way in which the NLF can implement the findable, accessible, interoperable, re-usable (FAIR) data principles [themes in practise. The purpose of this paper is to view the way in which the policy has impacted our work and how findability and accessibility have been implemented in particular from the aspects of open, extended, closed and hidden data themes. In addition, our aim is to specify the characteristics of existing and potential forms of data produced by the NLF from the research and development perspectives. A continuous challenge is the availability of the digital resources - gaining access to the digitised material for both researchers and the general public, since there are also constant requests for access to newer materials outside the legal deposit libraries' work stations. © 2018 CEUR-WS. All rights reserved."	0 - The paper does not seem to be relevant to 4CH project

DHUR-150	Palmer C.L., Knutson E.M.,"Metadata practices and implications for federated collections",2004,"Proceedings of the ASIST Annual Meeting","41",,,"456","462",,"10.1002/meet.1450410153","https://www.scopus.com/inward/record.uri?eid=2-s2.0-34247379041&doi=10.1002%2fmeet.1450410153&partnerID=40&md5=40bc75c083e148265849f4bca489d119","As digital library development begins to focus on interoperability and collection federation, resource developers need to be concerned with contributing to national and international collections, while not losing sight of the needs of institutions and user communities. The Digital Collections and Content (DCC) project aims to provide integrated access to IMLS National Leadership Grant (NLG) digital collections through a centralized collection registry and metadata repository. While technical development proceeds on the repository, our research team is investigating how collections and items can best be represented to meet the needs of both service providers and diverse user communities. This paper presents results on metadata and collection representation practices based on survey data, interviews, and content analysis. Despite Dublin Core's prevalence and perceived ease of use, problems with field richness and consistency of application persist, in part because of the distinct cultures of description that have evolved in different kinds of cultural heritage institutions. Moreover, the concept of a digital collection is widely unsettled among resource developers. This has important implications for central repositories, if, as we hypothesize, the strategic foregrounding and backgrounding of collection-level metadata proves critical for navigation and interpretation of information in large-scale federated collections."	0 - The paper does not seem to be relevant to 4CH project
DHUR-151	Paneva-Marinova D.,"Personal work space and content analysis functionality in a cultural heritage digital library",2017,"Digital Presentation and Preservation of Cultural and Scientific Heritage","2",,,"78","84",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84893910427&partnerID=40&md5=26302df1d983589b19deca1d3ed751dc","The paper presents a different vision for personalization of the user's stay in a cultural heritage digital library that models services for personalized content marking, commenting and analyzing that doesn't require strict user profile, but aims at adjusting the user's individual needs. The solution is borrowed from real work and studying of traditional written content sources (incl. books, manuals), where the user mainly performs activities such as underlining the important parts of the content, writing notes and inferences, selecting and marking zones of their interest in pictures, etc. In the paper a special attention is paid to the ability to execute learning analysis allowing different ways for the user to experience the digital library content with more creative settings. © 2017 Bulgarian Academy of Sciences, Institute of Mathematics and Informatics. All rights reserved."	1 - The paper could be interesting but it is neccessary to read more
DHUR-152	Pattuelli M.C.,"Modeling a domain ontology for cultural heritage resources: A user-centered approach",2011,"Journal of the American Society for Information Science and Technology","62","2",,"314","342",,"10.1002/asi.21453","https://www.scopus.com/inward/record.uri?eid=2-s2.0-78951493272&doi=10.1002%2fasi.21453&partnerID=40&md5=b4d48adedeb0532660440795e2717f69","The use of primary source materials is recognized as key to supporting history and social studies education. The extensive digitization of library, museum, and other cultural heritage collections represents an important teaching resource. Yet, searching and selecting digital primary sources appropriate for classroom use can be difficult and time-consuming. This study investigates the design requirements and the potential usefulness of a domain-specific ontology to facilitate access to, and use of, a collection of digital primary source materials developed by the Library of the University of North Carolina at Chapel Hill. During a three-phase study, an ontology model was designed and evaluated with the involvement of social studies teachers. The findings revealed that the design of the ontology was appropriate to support the information needs of the teachers and was perceived as a potentially useful tool to enhance collection access. The primary contribution of this study is the introduction of an approach to ontology development that is user-centered and designed to facilitate access to digital cultural heritage materials. Such an approach should be considered on a case-by-case basis in relation to the size of the ontology being built, the nature of the knowledge domain, and the type of end users targeted. © 2010 ASIS&T."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-153	Pattuelli M.C.,"Teachers' perspectives and contextual dimensions to guide the design of N.C. history learning objects and ontology",2008,"Information Processing and Management","44","2",,"635","646",,"10.1016/j.ipm.2007.05.008","https://www.scopus.com/inward/record.uri?eid=2-s2.0-39649085349&doi=10.1016%2fj.ipm.2007.05.008&partnerID=40&md5=b3c26b9e95188e8ea02ec256792e0abb","This paper describes an ongoing research project that involves the study of teachers' information seeking behaviors, needs and practices in relation to a collection of primary source materials available through the University of North Carolina at Chapel Hill (UNC) Library's digital library Documenting the American South (DocSouth). By gaining an in-depth understanding of the needs and wants of teachers in the context of their work, we hope to build a collection of learning objects and a domain ontology applied to the collection to improve teachers' access to the cultural heritage materials and to facilitate their actual use in the classroom. © 2007 Elsevier Ltd. All rights reserved."	1 - The paper could be interesting but it is neccessary to read more
DHUR-154	Peters D., Brenzinger M., Meyer R., Noble A., Zimmer N.,"The digital library in the re-inscription of African cultural heritage",2015,"IFLA Journal","41","3",,"204","210",,"10.1177/0340035215603990","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84942895373&doi=10.1177%2f0340035215603990&partnerID=40&md5=091c0b986c8762f6b46ec819dd765feb","African digital libraries have evolved beyond the 'preservation or access' debate of the 1990s, and the concomitant compulsion to (un-)systematically convert cultural heritage collections from analogue to digital formats. The challenge now lies in the agility to respond to user needs, to match the selection for digitisation with a more strategic approach towards research relevance and potential research outputs. This paper will examine the symbiotic relationship between preservation, cultural heritage and scholarship in a case study on the description and documentation of extinct African languages. It proposes that the new point of focus lies in digital scholarship, enabling both technical innovation and more intellectual engagement in revisiting the digital library to review, correct and augment transitory records through a new scholarly interpretation of African cultural heritage. © 2015, © The Author(s) 2015."	0 - The paper does not seem to be relevant to 4CH project
DHUR-155	Piaia E., Maietti F., Di Giulio R., Schippers-Trifan O., Van Delft A., Bruinenberg S., Olivadese R.,"BIM-based Cultural Heritage Asset Management Tool. Innovative Solution to Orient the Preservation and Valorization of Historic Buildings",2020,"International Journal of Architectural Heritage",,,"","",,"10.1080/15583058.2020.1734686","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85081354986&doi=10.1080%2f15583058.2020.1734686&partnerID=40&md5=9ee93b43d2625864ab5c7e29074880cc","Digital technologies are more and more needed to give access to Cultural Heritage (CH) and to allow for their curation and re-use. For this reason, it is necessary to increase the knowledge on the CH building stock to support sustainable maintenance, preservation and revitalization strategies through the development of user-friendly asset management tools to support the decision-making process towards an affordable and feasible conservation strategy. The Asset Management tool described in this paper is a software solution used for condition assessment on–site and management of assets with embedded Buildi Information Model (BIM) software. The main aim of the tool is to leverage the existing data in BIM to expedite and enhance the quality of building inspections. The solution provides the possibility to not only asses the condition in a professional way, but also to optimize the conservation maintenance planning according to different ambition levels and needs. A well elaborated and used standard for Condition Assessment is integrated and tailored on Cultural Heritage within the framework of H2020-INCEPTION project. In this context, the CH Asset Management (CH AM tool) is regarded mainly within the framework of decision-making for restoration, conservation and maintenance of historic buildings. © 2020, © 2020 Taylor & Francis."	0 - The paper does not seem to be relevant to 4CH project

DHUR-156	Pierdicca R., Paolanti M., Frontoni E.,"eTourism: ICT and its role for tourism management",2019,"Journal of Hospitality and Tourism Technology","10","1",,"90","106",,"10.1108/JHTT-07-2017-0043","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85061356943&doi=10.1108%2fJHTT-07-2017-0043&partnerID=40&md5=0ddc352a688daeb8182108775e215305","Purpose: This paper aims to present innovative information and communication technology (ICT) infrastructure specifically designed and optimized for the tourism sector. The case presented, “La Valle del Pensare lungo il corso del Potenza”, has been conceived with the aim of providing a digital infrastructure to ten municipalities in the Marche Region (Italy), nestled among the valley of the Potenza River. This research project is aimed at developing an important communication system that facilitates the tourist routes of mining attractions and specific thematic routes across the territory, promoting historical centers, cultural heritage, green areas and interesting places. Design/methodology/approach: “La Valle del Pensare” information system has the main feature of being scalable and multi-purpose, as the contents can be managed and conveyed through the website, app mobile, totem touch screen and standard tourist signage. It is integrated and modular and allows to manage multiple information, ensuring an interoperable and multi-channel approach. It is designed for small municipalities in the province of Macerata to connect the territory’s resources and activities through a network. Findings: This work represents an important communication system, i.e. innovative ICT infrastructure that facilitates the tourist routes of mining attractions and specific thematic routes across the territory. Thanks to the collection of user-generated data, the platform allows monitoring of usage statistics and performances. In this way, the municipalities can infer useful information about user’s preferences and needs. The paper also discusses how “La Valle del Pensare” gives identity to the territory, which is not identified as a simple summation of the Common, but as a recognizable system that intends to implement the level of competitiveness through the creation of a real territorial logo able to identify vocations and specificity of the Valley of the Potenza. Originality/value: The value of the project lies in the ICT system, able to convey information at different scales, providing the users with updated contents at the same time, administrations can constantly monitor its performances, being able to infer useful information about tourists’ needs, habits and preferences. The main contributions are the creation of a single cloud-based architecture for the management of multiple multi- media contents, to be exploited in various platforms, the design of a unique content management system used by several small municipalities of a same territory, the monitoring user’s preferences and needs by collecting users’ generated data and the analysis of meaningful statistics about the tourists, tested and verified in real scenario with real users. © 2019, Emerald Publishing Limited."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-157	Pietroni E., Adami A.,"Interacting with virtual reconstructions in museums: The etruscanning project",2014,"Journal on Computing and Cultural Heritage","7","2", 9,"","",,"10.1145/2611375","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84979823981&doi=10.1145%2f2611375&partnerID=40&md5=9b853364b69de03b5bcf9e91645d25cc","Starting from our experience in this domain, we discuss some fundamental concepts about the potentialities of the virtual reconstructions of cultural sites inside museums, with a specific focus on the communication needs, the design, the combination of media, the interaction interfaces, and the embodiment. We conceive a virtual reconstruction as a digital ecosystem, whose main peculiarities are (1) 3D reconstruction, (2) inclusivity, and (3) interactivity. A virtual reconstruction, in a wide sense, should integrate different levels of visualization, both realistic and symbolic 3D models, metadata, storytelling, behaviors and tools of visualization and interaction, in order to ""reconstruct"" and communicate a cultural context, an ecosystem where all the information is integrated. Despite the great advancements of the last years in the digitization process, computer graphics techniques, and archiving strategies, a basic limit of most of virtual museums is that they do not fire up the attention and the involvement of the public: they lack stimulating activities for visitors, narratives metaphors, and emotional impact. The interaction interfaces are not always simple to understand and to control in a few minutes, and they can generate a sense of frustration that causes users to abandon the application after a short and superficial approach. No gap should exist betwe knowledge and communication. But how can we translate the complexity of the knowledge in appealing to users and into simple applications that fit with the public's need? This article focuses on some communication rules and criteria that are often considered of minor importance by the researchers working in the field of digital cultural heritage but that are really essential to cultural transmission, especially inside museums. We believe that a stronger collaboration between research institutions and museums and among different disciplines would be recommended. Given this premise, we present the Etruscanning EU project, developed in 2011- 2013, focused on the virtual reconstruction of two important Etruscan tombs of the Orientalizi period: the Regolini-Galassi tomb in Cerveteri and the tomb n.5 of Monte Michele in Veii. © 2014 ACM."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-158	Pilsk S.C., Person M.A., Deveer J.M., Furfey J.F., Kalfatovic M.R.,"The biodiversity heritage library: Advancing metadata practices in a collaborative digital library",2010,"Journal of Library Metadata","10","2-3",,"136","155",,"10.1080/19386389.2010.506400","https://www.scopus.com/inward/record.uri?eid=2-s2.0-79951825429&doi=10.1080%2f19386389.2010.506400&partnerID=40&md5=c2df53577e80e32be6eeaf7445c8d5de","The Biodiversity Heritage Library is an open access digital library of taxonomic literature, forming a single point of access to this collection for use by a worldwide audience of professional taxonomists, as well as ""citizen scientists."" A successful mass-scanning digitization program, one that creates functional and findable digital objects, requires thoughtful metadata work flow that parallels the work flow of the physical items from shelf to scanner. This article examines the needs of users of taxonomic literature, specifically in relation to the transformation of traditional library material to digital form. It details the issues that arise in determining scanning priorities, avoiding duplication of scanning across the founding 12 natural history and botanical garden library collections, and the problems related to the complexity of serials, monographs, and series. Highlighted are the tools, procedures, and methodology for addressing the details of a mass-scanning operation. Specifically, keeping a steady flow of material, creation of page level metadata, and building services on top of data and metadata that meet the needs of the targeted communities. The replication of the BHL model across a number of related projects in China, Brazil, and Australia are documented as evidence of the success of the BHL mass-scanning project plan. © Taylor & Francis Group, LLC."	0 - The paper does not seem to be relevant to 4CH project
DHUR-159	Pintus R., Yang Y., Rushmeier H.,"ATHENA: Automatic text height extraction for the analysis of old handwritten manuscripts",2013,"Proceedings of the DigitalHeritage 2013 - Federating the 19th Int'l VSMM, 10th Eurographics GCH, and 2nd UNESCO Memory of the World Conferences, Plus Special Sessions fromCAA, Arqueologica 2.0 et al.","1",, 6743802,"605","612",,"10.1109/DigitalHeritage.2013.6743802","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84896789371&doi=10.1109%2fDigitalHeritage.2013.6743802&partnerID=40&md5=6048647473b0ab7a6d5db94898a77cf7","A massive digital acquisition of huge sets of deteriorating historical documents is mandatory due to their value and delicacy. The study and the browsing of such digital libraries is becoming crucial for scholars in the Cultural Heritage field, but it requires automatic tools for analyzing and indexing those dataset items. We present here a layout analysis method to perform automatic text height estimation, without the need of any kind of manual intervention and user defined parameters. It proves to be a robust technique in the case of very noisy and damaged handwritten manuscripts. The effectiveness of the method is demonstrated on a huge heterogeneous corpus of medieval manuscripts, with different writing styles, and affected by other uncontrollable factors, such as ink bleed-through, background noise, and overtyping text lines. © 2013 IEEE."	0 - The paper does not seem to be relevant to 4CH project
DHUR-160	Poux F., Valembois Q., Mattes C., Kobbelt L., Billen R.,"Initial user-centered design of a virtual reality heritage system: Applications for digital tourism",2020,"Remote Sensing","12","16", 2583,"","",,"10.3390/RS12162583","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85090081466&doi=10.3390%2fRS12162583&partnerID=40&md5=f32347fa216462434a541dcbb820a9b4","Reality capture allows for the reconstruction, wit a high accuracy, of the physical reality of cultural heritage sites. Obtained 3D models are often used for various applications such as promotional content creation, virtual tours, and immersive experiences. In this paper, we study new ways to interac with these high-quality 3D reconstructions in a real-world scenario. We propose a user-centric product design to create a virtual reality (VR) application specifically intended for multi-modal purposes. It is applied to the castle of Jehay (Belgium), which is under renovation, to permit multi-user digital immersive experiences. The article proposes a high-level view of multi-disciplinary processes, from a needs analysis to the 3D reality capture workflow and the creation of a VR environment incorporated into an immersive application. We provide several relevant VR parameters for the scene optimization, the locomotion system, and the multi-user environment definition that were tested in a heritage tourism context. © 2020 by the authors."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements

DHUR-161	Praticò S., Solano F., Di Fazio S., Modica G.,"Machine learning classification of mediterranean forest habitats in google earth engine based on seasonal sentinel-2 time-series and input image composition optimisation",2021,"Remote Sensing","13","4", 586,"1","28",,"10.3390/rs13040586","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85100818706&doi=10.3390%2frs13040586&partnerID=40&md5=c4b82480321384b2b73d6b9dd1d0388d","The sustainable management of natural heritage is presently considered a global strategic is-sue. Owing to the ever-growing availability of free data and software, remote sensing (RS) techniques have been primarily used to map, analyse, and monitor natural resources for conservation purposes. The need to adopt multi-scale and multi-temporal approaches to detect different phenological as-pects of different vegetation types and species has also emerged. The time-series composite image approach allows for capturing much of the spectral variability, but presents some criticalities (e.g., time-consuming research, downloading data, and the required storage space). To overcome these issues, the Google Earth engine (GEE) has been proposed, free cloud-based computational platform that allows users to access and process remotely sensed data at petabyte scales. The application was tested in a natural protected area in Calabria (South Italy), which is particularly representative of the Mediterranean mountain forest environment. In the research, random forest (RF), support vector machine (SVM), and classification and regression tree (CART) algorithms were used to perform supervised pixel-based classification based on the use of Sentinel-2 images. A process to select the best input image (seasonal composition strategies, statistical operators, band composition, and derived vegetation indices (VIs) information) for classification was implemented. A set of accuracy indicators, including overall accuracy (OA) and multi-class F-score (Fm), were computed to assess the results of the different classifications. GEE proved to be a reliable and powerful tool for the classification process. The best results (OA = 0.88 and Fm = 0.88) were achieved using RF with the summer image composite, adding three VIs (NDVI, EVI, and NBR) to the Sentinel-2 bands. SVM and RF produced OAs of 0.83 and 0.80, respectively. © 2021 by the authors. Licensee MDPI, Basel, Switzerland."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-162	Pretto N., Micheloni E., Gasparotto S., Fantozzi C., Poli G.D., Canazza S.,"Technology-Enhanced Interaction with Cultural Heritage: An Antique Pan Flute from Egypt",2020,"Journal on Computing and Cultural Heritage","13","2", 8,"","",,"10.1145/3355395","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85089161333&doi=10.1145%2f3355395&partnerID=40&md5=336f4cf9e04b2134f76b52bc727a0e67","Digital technology in museum practice provides new means of interaction with artifacts and collections. In particular, we need interactive installations in order to encourage and stimulate visitors to learn and understand archaeological musical instruments through engagement and active participation: these instruments (i.e., interactive artifacts per se) are de facto unplayable and inaccessible to visitors, as a consequence of their preservation issues. However, presenting artifacts to the general public is a complex task for their multifaceted nature, and digital technology must not sacrifice accuracy or depth of information for the sake of entertainment. Moreover, deploying digital technology is a multidisciplinary effort that requires an interplay among different fields, from history and archaeology to information engineering and craftsmanship. In this article, we present a methodology to relate such disciplines in order to design a digital multimedia installation that promotes archaeological musical instruments in a museum. In defining the problem, we identify four different aspects to consider: the museum collection, the museum environment, the manufacturing opportunities for the installation, and the user experience. Such aspects are integrated in a design approach that is centered on Design Thinking. The proposed methodology is exemplified in the designing and manufacturing of an installation for a Pan flute from Egypt dated back to 700 A.D., a case in which multisensory interaction is particularly important to convey the lost sound of the instrument. We describe in detail an installation (exhibited at the Museum of Archaeological Science and Art at the University of Padova), which virtually recreates the Pan flute and communicates information related to its history, iconography, acoustics, and musicology. Just after the deployment of the installation, we also carried out an assessment with a group of experts in the fields of information engineering, music, musicology, and archaeology. The good results obtained demonstrate that the installation is a convenient way of interaction, simple to use and aesthetically integrated in the museum context. © 2020 ACM."	0 - The paper does not seem to be relevant to 4CH project
DHUR-163	Rajan S.S., Esmail S.M., Dr.,"Manuscripts: Preservation in the Digital Age",2021,"Library Philosophy and Practice","2021",,,"1","11",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85103086849&partnerID=40&md5=d5a068c8e667dcb838e88bd2267f1964","Library is the indispensable part of educational institution designed to serve educational, cultural, research, recreational information to the users.. Libraries are the places wherever the complete information gathering takes place together with intellectual and our cultural heritage. The collections possessed by the library are affected by numerous environmental factors that ultimately results in irreparable harm to numerous collections. The information embodied in manuscripts is effective however materials used for this purpose cause a true challenge. These manuscripts have proof of facts, their accomplishments, thoughts, work they need done, theories then on, that are essential for human development. These guide the younger generations for ages and should be saved for each coming generations. This article provides a short define of preservation strategies adopted to protect the manuscripts. Preventive measures should be applied with caution and value effective manner. © 2021"	0 - The paper does not seem to be relevant to 4CH project
DHUR-164	Reid G.,"The digitisation of heritage material: Arguing for an interpretative approach based on the experience of the powys digital history project",2000,"Program","34","2",,"143","158",,"10.1108/EUM0000000006930","https://www.scopus.com/inward/record.uri?eid=2-s2.0-0034165333&doi=10.1108%2fEUM0000000006930&partnerID=40&md5=40354039e69f18d8286d831447ccd967","In the past, librarians, museum curators and archivists have responded to ICT developments by adapting them to traditional working practices such as cataloguing. Recent developments are creating new pressures, however, and the expectations on information professionals are changing. The most radical innovation is that of the Internet, and it may no longer be appropriate to think in traditional terms to exploit this new medium to the full. The Internet offers remote access and digitisation programmes are being designed to make use of that. So far, these programmes have concentrated on the digitisation of finding aids or of selected primary source materials, but there is also a need for other programmes ('digital exhibitions') to be developed with a greater emphasis on collaboration and interpretation, aimed at the non-academic, or casual user. In this way librarians, museum curators and archivists can demonstrate their readiness to embrace the visions of such programmes as the People's Network and the National Grid for Learning and at the same time reach a whole new audience."	0 - The paper does not seem to be relevant to 4CH project
DHUR-165	Richard H.,"Training librarians in the latest developments in heritage issues [La formation aux questions patrimoniales dans les bibliothèques]",2013,"Bulletin des Bibliotheques de France","58","5",,"","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84886652443&partnerID=40&md5=2d3dee74cf9d81e026ae4cbe7a783402","Heritage collections in libraries have undergone considerable changes in recent years, with new formats for description, a considerable rise in digital material (native or otherwise), legal constraints, new online frameworks, and increasing interest from a broader cross-section of library users. At the same time, the decision to classify a given set of material as a heritage collection is increasingly falling to library professionals, who are expected to evaluate the significance of the material in their holdings rather than simply limiting heritage collections to old, rare, or precious items. Library staff therefore need to be aware of the new stakes at issue in managing heritage collections. This means devising and adapting specific training courses for staff in charge of such collections, looking at issues such as specialisation, starting a new job, and ongoing training to keep up to date with scientific and technological developments."	0 - The paper does not seem to be relevant to 4CH project

DHUR-166	Richard Valpy D.,"Counterpoint: From missionaries to managers: Making the case for a canadian documentary heritage commission",2016,"Archivaria","2016","82",,"137","163",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85026831303&partnerID=40&md5=978cefc5151dc36dd896491fae24c759","Recent events in the Canadian archival landscape suggest that the archival community is struggling to remain relevant in the digital age. While efforts have been made to articulate a new vision for the Canadian archival system, a fundamental weakness in the system is that it remains “closed,” without active participation from key stakeholders, particularly records creators and users. The Canadian Council of Archives and the very notion of the archival community are both premised on the assumption that the documentary heritage of Canada is a collective archival responsibility and therefore archivists can fulfill that responsibility through collaborative action. The digital revolution has demonstrated the weaknesses in this assumption. The strategic goal of the collective archival community now should be to foster a societal environment in which good records are created and valued. In order to achieve the ultimate goal of the Canadian archival system - to support the preservation of Canada’s documentary heritage - a new stakeholder-driven organization needs to be established, independent of archival institutions or the profession. Its purpose would be to promote, sustain, and expand Canada’s documentary heritage by emphasizing the importance of complete, authentic, and reliable records as tools to support the efficient functioning of contemporary society as well as central components of our documentary heritage. Driven by records creators and records users, this organization would fill a critical gap, opening up the Canadian archival system so that it includes inputs - both intellectual and financial - not only from archival institutions and archival professionals but also from the public, whose records we strive to preserve. © 2016, Association of Canadian Archivists. All rights reserved."	0 - The paper does not seem to be relevant to 4CH project
DHUR-167	Rico M., Vila-Suero D., Botezan I., Gómez-Pérez A.,"Evaluating the impact of semantic technologies on bibliographic systems: A user-centred and comparative approach",2019,"Journal of Web Semantics","59",,100500,"","",,"10.1016/j.websem.2019.03.001","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85063761037&doi=10.1016%2fj.websem.2019.03.001&partnerID=40&md5=0bc2b6d82be4d1df1198d4e5d367a9f2","Semantic and linked-data technologies are currently used by several cultural heritage institutions to make their content available through the Web. Although these technologies are heavily oriented towards data reuse and integration, one clear benefit highlighted by recent literature is the enhancement of human cultural consumption and user experience through the development of novel cultural end-user applications like Online Public Access Catalogues (OPACs). However, to the best of our knowledge, studies into the impact of these technologies on end-user applications are scarce. In order to address this lack, we report the results of two within-group user-centred studies of two online bibliographic systems in a realistic setting — using a widely deployed OPAC and its counterpart linked-data based system, datos.bne.es. The results of our first within-group study show that users of the system based on linked data required significantly less time and visited fewer pages to complete a typical search and retrieval activity. Additionally, the results of our user satisfaction tests also provided significantly better results for this new system. These results are consistent with the hypothesis that semantic technologies applied to library catalogues provide an enhancement that helps satisfy users’ information needs. © 2019 Elsevier B.V."	0 - The paper does not seem to be relevant to 4CH project
DHUR-168	Ruggieri F., Peresan A., Vaccari F., Magrin A., Romanelli F., Panza G.F., Cozzini S., Fresa A., Sipos G., Scardaci D., Reale M., Krenek A., Matyska L.,"VRCs on EGI and regional infrastructures",2012,"Proceedings of Science","2012-March",,,"","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84910139611&partnerID=40&md5=2bb72c95ccfe594ca0b9ee7026bb99fb","The CHAIN project has organised a workshop at the EGI Community Forum 2012 event in March 2012. The event aimed at reviewing the current status of Virtual Research Communities (VRCs) and their needs in terms of e-Infrastructures. The workshop has been focusing mainly on two topics: 1. An update on the Digital Cultural Heritage and Seismic VRCs status and requirements – including the current VRC vision of the CHAIN, EGI-InSPIRE, EUMEDGRID-Support, INDICATE and GISELA projects. 2. The CHAIN roadmap towards interoperability among e-Infrastructures. The workshop included presentations about CHAIN, its user communities, its partner projects and of the expected structure and content of the CHAIN roadmap that will be delivered by the end of 2012. Within this roadmap Science Gateways are proposed as sustainable interoperability solution for applications. © Copyright owned by the author(s) under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike Licence."	0 - The paper does not seem to be relevant to 4CH project
DHUR-169	Sánchez-Belenguer C., Vendrell-Vidal E., Sanchez-Lopez M., Díaz-Marín C., Aura-Castro E.,"Automatic production of tailored packaging for fragile archaeological artifacts",2015,"Journal on Computing and Cultural Heritage","8","3",17,"","",,"10.1145/2716324","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84930194983&doi=10.1145%2f2716324&partnerID=40&md5=83be4e1250e2444ce64765ff1ad978f3"," © 2015 ACM."	0 - The paper does not seem to be relevant to 4CH project
DHUR-170	Schlötterer J., Seifert C., Wagner L., Granitzer M.,"A game with a purpose to access Europe's cultural treasure",2015,"CEUR Workshop Proceedings","1345",,,"13","18",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84926011587&partnerID=40&md5=ff8255489655af1e3c49cb1bb7f2f95f","Europeana, the European aggregator for digital cultural heritage objects spends huge effort on providing access to the vast collection of Europe's Culture. While the content has been made available online, it still needs to be disseminated. We propose a ""games with a purpose"" approach to engage people with this tremendous collection and make them discover European culture. This approach is implemented by a question and answering system, in which players create questions that are answered by specific Europeana resources. Other players can then use a search interface to Europeana to find the particular resource that is needed to answer the questic This concept provides a low level entrance to cultural heritage for end users. Moreover it reveals human search strategies on Europeana that can be exploited to support and improve the search experience of other users on Europeana and helps to identify objects of interest by analyzing usage data. Copyright © 2015 for the individual papers by the paper's au- thors. Copying permitted for private and academic purposes. This volume is published and copyrighted by its editors."	0 - The paper does not seem to be relevant to 4CH project
DHUR-171	Seifert C., Bailer W., Orgel T., Gantner L., Kern R., Ziak H., Petit A., Schlötterer J., Zwicklbauer S., Granitzer M.,"Ubiquitous access to digital cultural heritage",2017,"Journal on Computing and Cultural Heritage","10","1",4,"","",,"10.1145/3012284","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85018192900&doi=10.1145%2f3012284&partnerID=40&md5=3c06998477f23998c77e9ff7f426c58f","The digitization initiatives in the past decades have led to a tremendous increase in digitized objects in the cultural heritage domain. Although digitally available, these objects are often not easily accessible for interested users because of the distributed allocation of the content in different repositories and the variety in data structure and standards. When users search for cultural content, they first need to identify the specific repository and then need to know how to search within this platform (e.g., usage of specific vocabulary). The goal of the EEXCESS project is to design and implement an infrastructure that enables ubiquitous access to digital cultural heritage content. Cultural content should be made available in the channels that users habitually visit and be tailored to their current context without the need to manually search multiple portals or content repositories. To realize this goal, open-source software components and services have been developed that can either be used as an integrated infrastructure or as modular components suitable to be integrated in other products and services. The EEXCESS modules and components comprise (i) Web-based context detection, (ii) information retrieval-based, federated content aggregation, (iii) metadata definition and mapping, and (iv) a component responsible for privacy preservation. Various applications have been realized based on these components that bring cultural content to the user in content consumption and content creation scenarios. For example, content consumption is realized by a browser extension generating automatic search queries from the current page context and the focus paragraph and presenting related results aggregated from different data providers. A Google Docs add-on allows retrieval of relevant content aggregated from multiple data providers while collaboratively writing a document. These relevant resources then can be included in the current document either as citation, an image, or a link (with preview) without having to leave disrupt the current writing task for an explicit search in various content providers' portals. © 2017 ACM."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements

DHUR-172	Semeraro G., Lops P., De Gemmis M., Musto C., Narducci F.,"A Folksonomy-based recommender system for personalized access to digital artworks",2012,"Journal on Computing and Cultural Heritage","5","3",11,"","",,"10.1145/2362402.2362405","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84979834448&doi=10.1145%2f2362402.2362405&partnerID=40&md5=3e6e4f4132d46e42f3e22f94ba2bea83","Museums have recognized the need for supporting visitors in fulfilling a personalized experience when visiting artwork collections, and they have started to adopt recommender systems as a way to meet this requirement. Content-based recommender systems analyze features of artworks previously rated by a visitor and build a visitor model or profile, in which preferences and interests are stored, based on those features. For example, the profile of a visitor might store the names of his or her favorite painters or painting techniques, extracted from short textual descriptions associated with artworks. The user profile is then matched against the attributes of new items in order to provide personalized suggestions. The Web 2.0 (r)evolution has changed the game for personalization from ""elitist"" Web 1.0, written by few and read by many, to Web content potentially generated by everyone (user-generated content - UGC). One of the forms of UGC that has drawn most attention from the research community is folksonomy, a taxonomy generated by users who collaboratively annotate and categorize resources of interests with freely chosen keywords called tags. In this work, we investigate the problem of deciding whether folksonomies might be a valuable source of information about user interests in the context of recommending digital artworks. We present FIRSt (Folksonomy-based Item Recommender syStem), a content-based recommender system which integrates UGC through social tagging in a classic content-based model, letting users express their preferences for items by entering a numerical rating as well as by annotating items with free tags. Experiments show that the accuracy of recommendations increases when tags are exploited in the recommendation process to enrich user profiles, provided that tags are not used as a surrogate for the item descriptions, but in conjunction with them. FIRSt has been developed within the CHAT project ""Cultural Heritage fruition & e-learning applications of new Advanced (multimodal) Technologies"", and it is the core of a bouquet of Web services designed for personalized museum tours. © 2012 ACM."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-173	Sharma S., Bawa S., Lomash H.,"Web Presence of Indian Digital Culture",2015,"Preservation, Digital Technology and Culture","44","2",,"62","68",,"10.1515/pdtc-2014-0021","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84935440085&doi=10.1515%2fpdtc-2014-0021&partnerID=40&md5=13b1b211accc20ed45c9379cfff20232","Our day-to-day needs are greatly dependent on information and communications technology (ICT)-as represented by the Internet. Knowledge about culture is no exception. This paper focuses on the availability of digital cultural information about India on the Web. We aim to answer three questions: How is Indian culture represented on the Web? How are Indian cultural herita sites being used? Who is using the sites? The study also examines the usability of these sites, and whether they are maintained. Content, ranking, and users' age groups are the three criteria on which this analysis has been based. © 2015 Walter Gruyter GmbH, Berlin/Boston."	0 - The paper does not seem to be relevant to 4CH project
DHUR-174	Shin J.-E., Woo W.,"Design guidelines for a location-based digital heritage storytelling tool to support author intent",2018,"Proceedings of the 2018 3rd Digital Heritage International Congress, Digital Heritage 2018 - Held jointly with the 2018 24th International Conference on Virtual Systems and Multimedia, VSMM 2018",,, 8810102,"","",,"10.1109/DigitalHeritage.2018.8810102","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85072405344&doi=10.1109%2fDigitalHeritage.2018.8810102&partnerID=40&md5=2eec814dc8b16252d04ca3ead1add880","This paper proposes guidelines for the design of a Mixed Reality(MR) storytelling tool for cultural heritage sites that utiliz geotagged content and detailed location-specific narrative principles while prioritizing the intent of the author. Continuous efforts have been made to apply storytelling techniques in producing location-based digital heritage content over MR platforms However, consideration for fine-Tuned input parameters required at the authoring level has been consistently lacking. This has resulted in content that fails to identify, understand, and reflect the goals and needs of the author in maximizing the benefits of the narrative form for MR heritage experiences. To address this problem, we combine an analysis of existing location-based digital authoring tools with qualitative user studies conducted in a digital storytelling workshop. With the implications derived from our findings, we establish detailed design guidelines to provide a systematic narrative structure in the arrangement of geotagged content over various Points of Interest within the MR heritage space. Our study identifies two major authoring motivations for location-based MR storytelling: space-driven and story-driven. We thereby assert the need to bifurcate the design of the tool to support both these purposes and propose guidelines that differentiate the functions and task flow of each authoring mode. © 2018 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-175	Silvester C.,"Giving the public what they want: Personalised heritage interaction producing dynamic and extensible learning which is thematically appropriate",2010,"International Journal of the Inclusive Museum","3","2",,"65","72",,"10.18848/1835-2014/CGP/v03i02/44327","https://www.scopus.com/inward/record.uri?eid=2-s2.0-80052513821&doi=10.18848%2f1835-2014%2fCGP%2fv03i02%2f44327&partnerID=40&md5=d889461955a3d0ddd121833585c3809c","Currently visitors to galleries and museums have a fairly standardised experience of any exhibition and existing auditory devices allow only limited interaction. The heritage exhibit experience does not cater for the specific needs and requirements of the individual user and there is little ""follow on activity"" post exhibition visit. Given the low cost of current digital multimedia devices, we argue that a more satisfying and meaningful experience of exhibitions could be gleaned from using: usercentric information as they enter the exhibition space to identify specific individual needs suitable personal multimedia systems to convey information (e.g. electronic interactive signage, ipods), postvisit information. Such changes would significantly enhance their experience. The Applied Vision Research Centre and the DDesign Ideas Research Group of the School of Art and DDesign at Loughborough University are comparing ways in which curators plan and dDesign exhibitions with users' requirements across a wide range of museums, galleries and heritage centres. Individual user needs vary, depending on a range of factors including: initial interest in the exhibition itself, general level of knowledge of art and heritage, ease of mobility in traversing an exhibition, etc. Tailoring the experience of exhibitions to each individual's needs will result in greater population knowledge and appreciation of heritage. We plan to use survey and eye-tracking methods to quantitatively determine which items attracted their attention and cognitive task analysis and verbal protocol analysis to examine which exhibits attract substantial attention. Eliciting this knowledge will enable the development of new interactive techniques based on visual and cognitive science coupled with the development of the user plan, woven into the development of dDesign (scenario building) to personalise a user's visit to a museum or gallery. © Common Ground, Carl Silvester, All Rights Reserved."	1 - The paper could be interesting but it is neccessary to read more
DHUR-176	Sitokdana M.N.N., Tanone R., Tanaem P.F.,"Digitalization of the local language dictionary of Pegunungan Bintang",2019,"Procedia Computer Science","161",,,"49","56",,"10.1016/j.procs.2019.11.098","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85078910297&doi=10.1016%2fj.procs.2019.11.098&partnerID=40&md5=0057bfbfc2d9bcabff92457636747c40","The increasingly rapid development of globalization and modernization in Indonesia has changed the order of life of its people. The positive change is that people's lives are increasingly modern, but on the other hand it is disastrous for them, namely the degradation of cultural heritage which should be used as the main foundation of the nation's civilization. As happened in Papua, some local languages have become extinct and some are threatened of extinction. Some local languages that are under threat of extinction are found in the Pegunungan Bintang regency, namely the languages of the Ngalum, Ketengban, Murop, Lepki and Arimtap tribes. Speakers of the local languages of these tribes are increasingly diminishing due to social, political and economic globalization. While on the other hand globalization brings opportunities for us to develop and preserve local languages by utilizing the sophistication and availability of information technology. As in this study, the digital dictionary application for Pegunungan Bintang local language is made using those development opportunities. This study uses qualitative method to investigate, find and manage language data of Ngalum, Ketengban, Murop, Lepki and Arimtap tribes. The collected vocabulary data turn into an android application with a prototyping approach, which is an approach that develops a device that will be developed or repaired according to user' needs. This application has been tested and it can be run on an android smartphone by being able to translate vocabulary from Indonesian to all local languages of Pegunungan Bintang and vice versa. Blackbox testing was also done to observe the functionality of the application when users use the application. 2019 The Authors."	0 - The paper does not seem to be relevant to 4CH project

DHUR-177	Skov M., Ingwersen P.,"Exploring information seeking behaviour in a digital museum context",2008,"IIiX'08: Proceedings of the 2nd International Symposium on Information Interaction in Context",,,,"110","115",,"10.1145/1414694.1414719","https://www.scopus.com/inward/record.uri?eid=2-s2.0-62949230087&doi=10.1145%2f1414694.1414719&partnerID=40&md5=f59440261e0ee0792566fbf28f2f1006","This paper describes the preliminary results of a case study of task-based interactive information seeking and retrieval behaviour of virtual museum visitors in context. The research described here is part of a larger study: this paper specifically looks at 1) leisure tasks/interests and derived information needs, and 2) main characteristics of virtual museum visitors' information seeking behaviour. Both quantitative and qualitative data were gathered from written enquiries to the museum, an online questionnaire and a user study of simulated interest tasks combined with retrospective think-aloud sessions. The data collected did not show exploratory behaviour to be predominant as expected. Rather analysis of data indicates a broad coverage of different types of needs. Finally, four main characteristics of virtual museum guests' information seeking behaviour were identified. Copyright 2008 ACM."	1 - The paper could be interesting but it is neccessary to read more
DHUR-178	Smiraglia R., Park H.,"Presentation: Using Korean open government data for data curation and data integration",2016,"Proceedings of the International Conference on Dublin Core and Metadata Applications","2016-October",,,"88","89",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85038807442&partnerID=40&md5=5242b40559b58ec86deafe6fce5df332","This presentation addresses cultural heritage data-sharing practices through the use of Republic of Korea open government data for data-curation and data integration. Data curation enables datasharing throughout the data management life cycle to create new value for new user needs. Previous studies for cultural heritage data integration have been conducted with the mediation between metadata and ontology. Examples are ontology-based metadata integration in the cultural heritage domain with mediation between Dublin Core (DC) and the meta-level ontology known as the CIDOC CRM (International Committee for Documentation - Conceptual Reference Model) (Stasinopoulou et al. 2007), DCMI type vocabulary and the CIDOC CRM (Kakali et al. 2007), DC metadata and the CIDOC CRM in cultural heritage digital object collections (Koutsomitropoulos, Solomou and Papatheodorou 2009), and between archival metadata such as Encoded Archival Description (EAD) and the CIDOC CRM (Bountouri and Gergatsoulis 2011). A gap remaining from prior studies is that cultural heritage data integration has not been actively studied with an emphasis on knowledge organization and data curation using open government data. Our research employed a visualization phase, in which we used domain analytical techniques to better understand the contents of the population of 375 library-related open government cultural heritage data available at the Korean Open Government Website (http://data.go.kr/). Researchers translated all records from Korean to English. Data were in unstructured and in heterogeneous formats such as file formats, data formats and or web addresses. For data curation and integration, we employed the meta-level ontology known as the CIDOCCRM, which we applied qualitatively to small sets of carefully selected records. This phase was based on an earlier project using a different data-set (Park and Smiraglia 2014), in which cultural disparities between Korean data and the CRM were detected and resolved. Visual mappings are conducted by using the mapped Korean open government data which were in unstructured and heterogeneous formats by using CIDOC CRM version 6.2. The mappings were simple and straight-forward. To map instantiation of records, which is required for data integration, we used FRBRoo (Functional Requirements for Bibliographic Records - object oriented), an extension of the CIDOC CRM, to map the instantiation of data records in a typical data-sharing scenario. Then, equivalent mapping processes were comparatively tested with visualizations to demonstrate the effective harmonization between the CIDOC CRM and FRBRoo, which enables the integration of metadata and data curation from unstructured and heterogeneous formats. This presentation may contribute to the cross- or meta-institutional integration of curation across institutional boundaries in cultural heritages as an imperative for cultural synergy and the role of information institutions (Smiraglia 2014) with metadata integration."	0 - The paper does not seem to be relevant to 4CH project
DHUR-179	Soares R., Pereira M., Martins J.A.,"Collection, preservation and contextualization of digital objects for Android mobile devices [Recolha, preservação e contextualização de objectos digitais para dispositivos móveis com Android]",2012,"RISTI - Revista Iberica de Sistemas e Tecnologias de Informacao",,"9",,"75","89",,"10.4304/risti.9.75-89","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85035122219&doi=10.4304%2fristi.9.75-89&partnerID=40&md5=5034c67813705d1085e64d9df533404a","Motivation: The increasing use and growth of mobile devices, spurred the need to collect and preserve digital objects. More and more, it is important ensure that our information becomes persistent and accessible anytime and anywhere. What if, besides access, there was the possibility of contextualize each digital object? If so, the user could recall how, what and why it stored that data, throughout their lives. Results: The CoBy application was created in order to allow the user collect, preserve and contextualize all digital objects that will appear in mobile devices with Android as operating system. Each of them will be associated with place where they occurred (geo-location). The application includes other features, such as backup and restore from the mobile device or from the Cloud. This application provides a strong contribute to the preservation and contextualization of a person's digital heritage."	1 - The paper could be interesting but it is neccessary to read more
DHUR-180	Song M., Elias T., Martinovic I., Mueller-Wittig W., Chan T.K.Y.,"Digital heritage application as an edutalnment tool",2004,"Proceedings VRCAI 2004 - ACM SIGGRAPH International Conference on Virtual Reality Continuum and its Applications in Industry",,,,"163","167",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-10044290743&partnerID=40&md5=8c722bf748f7745a082dedd75a1b9c8c","With the fast-growing technological advancements in Virtual Reality (VR) technology and easier access to more affordable computer graphics hardware, it has become possible to create a diverse range of VR applications that are not only geared towards scientific research and medical training applications but also for ""edutainment"" purposes for the general public. ""Edutainment"" is an upcoming field that combines education with entertainment aspects thus enhancing the learning environment to be much more engaging and fun-filled. In this paper, we describe a project on a Digital Heritage application aimed to serve as an edutainment tool. The visitors are able to virtually ""enter and explore"" the reconstructed heritage environment and learn more on the presented content through virtual experiences. We have incorporated a Virtual Tour Guide that presents the cultural and historical content through non-linear digital storytelling techniques for the dynamic content creation to fit the changing profiles and needs of the visiting audience."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-181	Song M., Elias T., Müller-Wittig W., Chan T.K.Y.,"Interacting with the virtually recreated Peranakans",2003,"Proceedings of the 1st International Conference on Computer Graphics and Interactive Techniques in Australasia and South East Asia, GRAPHITE '03",,,,"223","228+302",,"10.1145/604471.604515","https://www.scopus.com/inward/record.uri?eid=2-s2.0-32244442492&doi=10.1145%2f604471.604515&partnerID=40&md5=ab2a4931dea4b77bc793df57f4a367ce","Virtual Reality (VR) technology opens up many new possibilities. One of the new and upcoming areas this VR technology is rapidly being used for is in the Digital Heritage domain. With the abundant content and the need for preservation and conservation for cultural heritage, there has been an explosion of Digital Heritage projects worldwide. VR technology provides an important educational tool to recreate the cultural heritage content in an immersive high-quality 3D environment for the users to enter and experience the culture in real-time. Intuitive interaction techniques providing users other tools as an alternative to the conventional mouse and keyboard input also add to enhanced educational value. Here, we present a Digital Heritage project focusing on the Singapore region. We have selected the Peranakans and their Culture as the main topic for reconstruction using the VR technology. Innovative interaction techniques specific to the selected Digital Heritage content is also under development. This paper outlines the motivation, early developments, and implementation currently in progress. Copyright © 2003 by the Association for Computing Machinery, Inc."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology

DHUR-182	Srinivasan R., Boast R., Becvar K.M., Furner J.,"Blobgects: Digital museum catalogs and diverse user communities",2009,"Journal of the American Society for Information Science and Technology","60","4",,"666","678",,"10.1002/asi.21027","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85042593186&doi=10.1002%2fasi.21027&partnerID=40&md5=f1406747ef0ec6315cb171e8f75f3d93","This article presents an exploratory study of ""Blobgects,"" an experimental interface for an online museum catalog that enables social tagging and blogging activity around a set of cultural heritage objects held by a preeminent museum of anthropology and archaeology. This study attempts to understand not just whether social tagging and commenting about these objects is useful but rather whose tags and voices matter in presenting different ""expert"" perspectives around digital museum objects. Based on an empirical comparison between two different user groups (Canadian Inuit highschool students and museum studies students in the United States), we found that merely adding the ability to tag and comment to the museum's catalog does not sufficiently allow users to learn about or engage with the objects represented by catalog entries. Rather, the specialist language of the catalog provides too little contextualization for users to enter into the sort of dialog that proponents of Web 2.0 technologies promise. Overall, we propose a more nuanced application of Web 2.0 technologies within museums-one which provides a contextual basis that gives users a starting point for engagement and permits users to make sense of objects in relation to their own needs, uses, and understandings."	0 - The paper does not seem to be relevant to 4CH project
DHUR-183	Stewart R., Simeonov S., Pavlov R.,"Development of base ontology for a digital library of the Bulgarian museums' collections",2019,"ACM International Conference Proceeding Series",,,a5,"","",,"10.1145/3351556.3351581","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85073374025&doi=10.1145%2f3351556.3351581&partnerID=40&md5=c7cc9d183101ed82bf6774b1188135b1","This paper gives a further look into the process of ontology engineering for the needs of the Bulgarian museums' digital collections. The representation of the data model and a skeleton for a digital library offers a universal solution that can be used for the digitalization of movable cultural heritage ensuring its compatibility with the existing legislation in the domain. The main purpose of the base ontology is to unify and extend the usability of accumulated knowledge stored in the museum collection as well as information retrieval and query processing. The development of its structure has been proceeded following the bottom-up model due to the requirements of the front and backend users forming an important step for the standardization of I.T. solutions in the work of Bulgaria museums. © 2019 Association for Computing Machinery."	1 - The paper could be interesting but it is neccessary to read more
DHUR-184	Strodl S., Motlik F., Stadler K., Rauber A.,"Personal & SOHO archiving",2008,"Proceedings of the ACM International Conference on Digital Libraries",,,,"115","123",,"10.1145/1378889.1378910","https://www.scopus.com/inward/record.uri?eid=2-s2.57649155222&doi=10.1145%2f1378889.1378910&partnerID=40&md5=aa1deb1860314b836cde8671fb689d6b","Digital objects require appropriate measures for digital preservation to ensure that they can be accessed and used in the near and far future. While heritage institutions have been addressing the challenges posed by digital preservation needs for some time, private users and SOHOs (Small Office/Home Office) are less prepared to handle these challenges. Yet, both have increasing amounts of data that represent considerable value, be it office documents or family photographs. Backup, common practice of home users, avoids the physical loss of data, but it does not prevent the loss of the ability to render and use t data in the long term. Research and development in the area of digital preservation is driven by memory institutions and large businesses. The available tools, services and models are developed to meet the demands of these professional settings. This paper analyses the requirements and challenges of preservation solutions for private users and SOHOs. Based on the requirements and supported by available tools and services, we are designing and implementing a home archiving system provide digital preservation solutions specifically for digital holdings in the small office and home environment. It hides the technical complexity of digital preservation challenges and provides simple and automated services based on established best practice examples. The system combines bitstream preservation and logical preservation strategies to avoid loss of data and the ability to access and use them. A first software prototype, called Hoppla, is presented in this paper. Copyright 2008 ACM."	1 - The paper could be interesting but it is neccessary to read more
DHUR-185	Tan K.L., Al Masri M., Chevallet J.-P., Mulhem P., Berrut C.,"Multimedia information modeling and retrieval (MRIM)/Laboratoire d'Informatique de Grenoble (LIG) at CHiC2013",2013,"CEUR Workshop Proceedings","1179",,,"","",,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84922023903&partnerID=40&md5=55d868ef19636fa676b8df82a08c67be","Numerous cultural heritage materials are accessible through online digital library portals. However, this conversion resulted in the issues of inconsistency and incompleteness. The Cultural Heritage in CLEF 2013 (CHiC) takes the initiative to organize an evaluation cam paign which involve several tasks such as 1) multilingual task, 2) polish task and 3) interactive task. We present the results of the MRIM/LIG team for the Ad-Hoc task and for the Semantic Enrichment task. For the Ad-Hoc task, we incorporate Term Links based on Wikipedia into the Language Model. Our approach has the following advantages: 1) it is easy and simple to generate the Term Similarity Matrix based on statistical information 2) a light weight integration in the Language Model. For the semantic query enrichment task, we deal with short queries found in this collection. These short queries can not describe a specific information need. Hence, the goal of this task is to find best ten terms for a query to semantically enrich the topic and guess the user's information need or original query intent. We use the Wikipedia as a semantic resource in order to find these related terms."	1 - The paper could be interesting but it is neccessary to read more
DHUR-186	Tarumova N.,"Digital Libraries in Russian segment of Internet: The Analysis of Open Access to Cultural Heritage Objects",2017,"ACM International Conference Proceeding Series",,,,"1","3",,"10.1145/3143699.3143701","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85040744733&doi=10.1145%2f3143699.3143701&partnerID=40&md5=e039331ccc70fd980d830ea5fceb0bda","The purpose of this article is to analyze the modern state of electronic libraries at Russian Internet segment of and compare the search and access systems to the cultural heritage objects stored in library funds for different reader/user categories. Author tested more then 150 site including resources of most significant Russian libraries and archives as well as small text repositories of different museums. Created to integrate all library funds the project of National Electronic Library of Russian Federation is now in a process of developing. Audience expanding and involving new ordinary readers/users to Russian cultural heritage objects need a special approach to their presentation at library sites. © 2017 Association for Computing Machinery."	0 - The paper does not seem to be relevant to 4CH project
DHUR-187	Tibbo H.R., Lee C.A.,"c",2010,"Archiving 2010 - Preservation Strategies and Imaging Technologies for Cultural Heritage Institutions and Memory Organizations, Final Program and Proceedings",,,,"53","57",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-79956133666&partnerID=40&md5=d1e22756a745151c7edfc3f04559a00a","During the past decade a growing number of practitioners, educators, and cultural heritage funders have explored the idea of a convergence of library, archives, and museum functions. The rise of digital collections and services has served as an impetus for much of this thinking along with a search for economic efficiencies and enhanced and integrated user access to materials. With the growing interest in, and actuality of, LAM convergence, there is a pressing need for educators of LAM professionals to consider how this new reality changes educational requirements and programs. This paper discusses digital curation as a promising area of convergence in both professional practice and professional education and provides a model that seeks to identify both common requirements and institutional differences. We have developed a Matrix of Digital Curation Knowledge and Competencies for identifying and organizing the material to be covered in a digital curation curriculum. The Matrix is organized along six dimensions: mandates, values and principles, functions and skills, professional, disciplinary or institutional / organizational context, type of resource, prerequisite knowledge and transition point in the information continuum. Within the context of potential LAM education convergence, one of the fundamental questions is the extent to which offerings must vary based on the professional, disciplinary, institutional, organizational, or cultural context in which students plan to work. LAM convergence is not likely to result in complete unification, but the growing importance of digital curation activities in supporting the missions of all three types of institutions poses exciting new opportunities for collaboration in professional education."	1 - The paper could be interesting but it is neccessary to read more

DHUR-188	Timms K.,"New partnerships for old sibling rivals: The development of integrated access systems for the holdings of archives, libraries, and museums",2009,"Archivaria","68",,,"67","95",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84880111813&partnerID=40&md5=111be1a9d4e091de08a9ff7e28a76a60","This paper describes one avenue for beneficial and effective collaboration between the cultural heritage siblings of archives, libraries, and museums: creating integrated access systems. In the digital era, it is easier and more sensible to pool resources to provide streamlined and richer service to the clients of these institutions. Researchers are more likely to care about having access to a resource than knowing who owns it. After discussing the perceptions, similarities, and existing points of convergence between these types of institutions, this paper discusses various options for creating integrated access systems. These include: federated searching, metadata aggregation systems, the collection-level description method, and various hybrid systems. Although some issues and complications may need further resolution, the conclusion of the paper is that this type of partnership between sibling institutions is desirable and should be pursued for the benefit of the users."	1 - The paper could be interesting but it is neccessary to read more
DHUR-189	Toms E.G., Dufour C., Hesemeier S.,"Measuring the user's experience with digital libraries",2004,"Proceedings of the ACM IEEE International Conference on Digital Libraries, JCDL 2004",,,,"51","52",,"10.1145/996350.996364","https://www.scopus.com/inward/record.uri?eid=2-s2.0-4944251777&doi=10.1145%2f996350.996364&partnerID=40&md5=17c76be96c86ab0dc8203a2fc97813bc","In this paper, we propose a method for assessing user experience. Normally evaluation is based on usability or on the efficiency of or effectiveness of focused information search tasks. Yet all experiences with libraries (whether physical or virtual) need not be for the explicit purpose of finding, acquiring and using information. The experience and its playfulness and pleasure have equal value. To assess this experience, we modified a experiential value scale developed for online shopping and have tested it in the context of culture and heritage websites."	0 - The paper does not seem to be relevant to 4CH project
DHUR-190	Tong Y., Cui B., Chen Y.,"Research on UI visual design of intangible cultural heritage digital museum based on user experience",2018,"13th International Conference on Computer Science and Education, ICCSE 2018",,,8468809,"428","431",,"10.1109/ICCSE.2018.8468809","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85055482264&doi=10.1109%2fICCSE.2018.8468809&partnerID=40&md5=67c859967738a0014d7946767da0b51e","With the development of multi-sensory design and digital technology, intangible cultural heritage can be disseminating through the virtual exhibition of digital museum. The establishment of a digital museum system for intangible cultural heritage will help to realize the sharing of intangible cultural resources and promote the full spread of the functions of intangible cultural heritage. Starting with the user's psychological needs and users' characteristics of the non-legacy digital museum, the UI visual level design of the non-legacy digital museum based on user experience is to discuss the cultural psychology, visual perception, and comfort of the user in the process of using the non-legacy digital platform, and discuss the interface layer of the non-legacy digital museum. It mainly focuses on three aspects of visual hierarchy design: color, text, and layout. At the same time, we can use the grid system to create a good visual atmosphere, enabling users to experience better in the visual sense. It makes the design leads to a beautiful user experience through the cultural element display and aesthetic sense of the interface, and guides the user to complete the interaction process. By keeping the usability of the interface, effectively controlling the text, color and image of the interface to ensure it can be used easily. This study tries to create an immersive process for users to get an unforgettable experience. © 2018 IEEE."	0 - The paper does not seem to be relevant to 4CH project
DHUR-191	Toth M.B., Christens-Barry W.A., Easton Jr. R.L.,"Eureka! dublin core based metadata supports the archimedes palimpsest manuscript imaging program",2006,"Proceedings of the International Conference on Dublin Core and Metadata Applications",,,,"","",10,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84871347896&partnerID=40&md5=77f74465e9aac77ff3ac3135bca209d6","Digital imaging of the Archimedes Palimpsest offers a complex set of metadata challenges. The thousand-year-old manuscript contains the earliest known copies of some of Archimedes unique mathematical works, overwritten with a book of prayer. Digital imaging of this manuscript is yielding a large and rich volume of data. The Archimedes Palimpsest team has developed the Archimedes Palimpsest Metadata Standard using the Dublin Core Metadata Element Set as the core metadata for this effort. The need for spatial metadata to support a complex range of image data has required the integration of metadata standards based on those originally developed for geospatial imaging from space. The result is a unique manuscript imaging standard to support digital scriptospatial data accessible by a range of users on t Internet as part of this dynamic, ongoing program."	0 - The paper does not seem to be relevant to 4CH project
DHUR-192	Trichopoulos G., Aliprantis J., Konstantakis M., Caridakis G.,"Artists: A virtual reality cultural experience personalized artworks system: The “children concert” painting case study",2018,"CEUR Workshop Proceedings","2811",,,"146","152",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85101190953&partnerID=40&md5=9ddba200f5b491f8e865dcb38e05a600","In recent years, there is a constant tendency in integrating modern technologies into mobile guides and applications in Cultural Heritage (CH) domain, aiming in enriching cultural user experience. Amongst them, Virtual Reality (VR) has widely been used in digital reconstruction or restoration of damaged cultural artifacts and monuments, allowing a deeper perception in their characteristics and unique history. This work presents a VR environment that takes into account the diverse needs and characteristics of visitors and digitally immerses them into paintings, giving them the ability to directly interact with their characteristics with the Leap Motion controller.To test our proposed system, a mobile prototype application has been designed, focused on the famous painting “Children Concert” created by Georgios Iakovidis, which also integrates the User Personas and the different scenarios depending on users’ profile. Copyright © 2018 for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0) DCAC 2018."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-193	Tsai C.,"A review of image retrieval methods for digital cultural heritage resources",2007,"Online Information Review","31","2",,"185","198",,"10.1108/14684520710747220","https://www.scopus.com/inward/record.uri?eid=2-s2.0-34047261637&doi=10.1108%2f14684520710747220&partnerID=40&md5=c5667dd92588b13932b1978a5a6654f2","Purpose - The aim of this paper is to examine related studies to identify which retrieval methods are supported by current digital cultural heritage libraries. In this way it is hoped to provide a direction for future cultural heritage applications to provide more complete and/or improved retrieval functionality. Design/methodology/approach - The methodology of this paper is based on introducing the general concept of image-based retrieval systems as well as their retrieval methods. Then, users' needs are discussed to illustrate the demands of semantic-based retrieval. After the retrieval methods have been presented, current digital cultural heritage libraries are examined in terms of their supported retrieval methods that allow users to query images. Findings - Current digital cultural heritage libraries mostly provide only general retrieval methods based on image-based lo level features, i.e. query by image contents. Very few consider other retrieval methods such as browsing and semantic-based retrieval. In addition, none of the current systems provide all possible retrieval methods for users. Originality/value - This study is the first one to examine image-based retrieval methods in digital cultural heritage libraries. This study supports the improvement of retrieval functionality for digital cultural heritage libraries in the future. © Emerald Group Publishing Limited."	1 - The paper could be interesting but it is neccessary to read more
DHUR-194	Tsai T.-H., Lee L.-C.,"A study of using contactless gesture recognition on shadow puppet manipulation",2016,"ICIC Express Letters, Part B: Applications","7","11",,"2317","2322",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84992732415&partnerID=40&md5=7d72bf32185bdbdc619a2948d4b2eedf","Gesture recognition using depth and infrared image data has seen the greatest development and is the most acknowledged technological advancement in recent years. It has given rise to contactless scenarios, where the device and system capture changes in user movements and allow more intuitive input gestures. As a result, users need not learn specific knowledge beforehand, and can input commands using natural interaction. Shadow puppetry is an important art form in traditional Chinese arts and cultures, and is a key representation of intangible culture heritage as recognized by the UNESCO. Traditionally, the puppeteers use wooden rods to articulate the puppets’ joints and produce a very stylized form of animation. However, with ever advancing media trend and technologies, the mastery of this art form is in danger of extinction and its popularity is in decline. The goal of this study is to utilize gesture recognition to develop a system to improve upon traditional puppetry manipulation and therefore encourage complete beginners to learn to use it, and lower the barrier to digital medium adoption. In this study both qualitative and quantitative analysis were conducted and yielded positive results. © 2016 ICIC International."	0 - The paper does not seem to be relevant to 4CH project

DHUR-195	Tucci G., Bonora V.,"From real to·· ""real"". A review of geomatic and rapid prototyping techniques for solid modelling in Cultural Heritage field",2011,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Science ISPRS Archives","38","5W16",,"575","582",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84924653506&partnerID=40&md5=a5e0428abac94ad3533ee2b62ef486e9","The documentation and 3D modelling of Cultural Heritage are now mainly based on digital techniques to produce complete, detailed and photorealistic three-dimensional surveys. The integration of various technologies and sensors is the best solution to obtain results with these characteristics. According to the reproduction scale, you need to change the characteristics of the instruments used during acquisition. Reduced or real scale solid models are an effective support for projects involving communication and divulgation: they can be understood without the intermediation of data processing systems, therefore increasing the potential users. Additive Manufacturing (AM) is an expression indicative of technologies used to fabricate physical objects directly from CAD data sources they are also called three-dimensional printing, solid freeform fabrication or layered manufacturing. The paper analyzes only factors related to the processing that involves the superficial aspect of the solid model some important aspects useful in other applications, e.g. mechanical behaviour of the used matenal or the method to realize the internal structure or possible supports of the model, are neglected."	0 - The paper does not seem to be relevant to 4CH project
DHUR-196	Valdelomar J.T., Brandtner J., Kucera M., Wallner M., Sandici V., Neubauer W.,"4D investigation of Digital Heritage: An interactive application for the auxiliary fortress of Carnuntum",2015,"2015 Digital Heritage International Congress, Digital Heritage 2015",,, 7419457,"81","84",,"10.1109/DigitalHeritage.2015.7419457","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84965118615&doi=10.1109%2fDigitalHeritage.2015.7419457&partnerID=40&md5=0b6b76287e3d714234fae9e06e7db85a","Innovative methods (e.g. geophysical prospection, remote sensing prospections, 3D modeling and visualization) adapted to Cultural Heritage and Archaeology open a wide field of research which needs appropriate techniques, skills and workflows. However, Virtual Archaeology (VA) must be understood not only as a passive instrument for visualizing the data and results but rather as a digital tool that provides an interactive four dimensional framework where the user is able to visualize, explore, analyze and evaluate both raw-data and 3D reconstructions. In this paper we would like to present a new developed interactive application called Arch4DInspector developed by the Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology (LBI ArchPro). © 2015 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-197	Valtolina S., Mazzoleni P., Franzoni S., Bertino E.,"A semantic approach to build personalized interfaces in the cultural heritage domain",2006,"Proceedings of the Workshop on Advanced Visual Interfaces","2006",,,"306","309",,"10.1145/1133265.1133328","https://www.scopus.com/inward/record.uri?eid=2-s2.0-34247156527&doi=10.1145%2f1133265.1133328&partnerID=40&md5=9fe02547a874db8a3af71d4634eea169","In this paper we present a system we have built to disseminate cultural heritage distributed across multiple museums. Our system addresses the requirements of two categories of users: the end users that need to access information according to their interests and interaction preferences, and the domain experts and museum curators that need to develop thematic tours providing end users with a better understanding of the single artefact or collection. In our approach we make use of a semantic representation of the given heritage domain in order to build multiple visual interfaces, called ""Virtual Wings"" (VWs). Such interfaces allow users to navigate through data available from digital archives and thematic tours and to create their own personalized virtual visits. An interactive application integrating personalized digital guides (using PDAs) and 360 panoramic images is the example of VW presented. Copyright 2006 ACM."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-198	Van Daele K., Meganck L., Mortier S.,"On data-driven systems and system-driven data: Twenty years of the Flanders heritage inventory",2016,"Journal of Cultural Heritage Management and Sustainable Development","6","2",,"153","165",,"10.1108/JCHMSD-01-2016-0004","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84981716503&doi=10.1108%2fJCHMSD-01-2016-0004&partnerID=40&md5=f9b0e06ed766cb1c0bdc2dbb5fd9935c","Purpose – Over the past 20 years, heritage inventories in Flanders (Belgium) have evolved from printed books to digital inventories. The purpose of this paper is to look at this evolution and highlight the interaction between the system and its users. Design/methodology/approach – After a short introduction about the history of inventories in Flanders, this paper mainly concerns itself with the last decade. Discrete topics will be highlighted to show the effects of the interaction that has taken place. Findings – It is obvious that a system that publishes a digital inventory needs to adapt to the user requirements. But, after years of working with a digital inventory system, it h become apparent that not only has the system been developed to the users' needs, but also that user practice and the resulting data have been shaped by the system. Seeing data projected on a common basemap has led researchers to realise how intertwined and interdependent different types of heritage can be and how much their respective methodologies can benefit from more interaction. It has become apparent that data quality is of the utmost importance, something that can only be guaranteed by data entry standards, validation tools, and a strict editing workflow. The systems that are being developed are not expected to live on forever, but the data in them is. Originality/value – This paper presents real-life use cases and practical applications of building and maintaining a large digital inventory system over the years and through changes in organisational structure and focus. It provides insights that are hard to ascertain from smaller projects due to the volumes of da that are handled. © 2016, © Emerald Group Publishing Limited."	1 - The paper could be interesting but it is neccessary to read more
DHUR-199	Van Den Akker C., Van Erp M., Aroyo L., Van Nuland A., Van Der Meij L., Legêne S., Schreiber G.,"From information delivery to interpretation support: Evaluating cultural heritage access on the Web",2013,"Proceedings of the 5th Annual ACM Web Science Conference, WebSci'13","volume",,,"431","440",,"10.1145/2464464.2464491","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84883080513&doi=10.1145%2f2464464.2464491&partnerID=40&md5=f70ab4926a4da79904f2e92a1f2f767d","In this paper, we present an evaluation framework for online access to cultural heritage. The framework enables the assessment of online cultural heritage applications in terms of their provision and support of information and interpretation. It is anchored in digital hermeneu-tics: the study and theory of the Web as a vehicle of (self)-interpretation. Digital hermeneutics considers the limits of automation and modelling on the one hand, and the interaction of people and technology on the other. In this paper, this philosophical issue will linger in the background, while we focus on the more practical issues of (1) explaining the evaluation framework and (2) describing our work in Agora in the context of that framework. We analyze twelve Web applications, representing the range of current state of the art in this field. This provides valuable insights into what cultural heritage applications on the Web do, can do, and how distinctive goals are to be achieved. Then we report on three user studies with the Agora demonstrator which made us reconsider a number of assumptions we made about the user's needs for information and interpretation. Copyright 2013 ACM."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-200	van Dijck J.,"Digital photography: Communication, identity, memory",2008,"Visual Communication","7","1",,"57","76",,"10.1177/1470357207084865","https://www.scopus.com/inward/record.uri?eid=2-s2.0-51249133616&doi=10.1177%2f1470357207084865&partnerID=40&md5=89d20b697b74cf903160c803eeb2e1c2","Taking photographs seems no longer primarily an act of memory intended to safeguard a family's pictorial heritage, but is increasingly becoming a tool for an individual's identity formation and communication. Digital cameras, cameraphones, photoblogs and other multipurpose devices are used to promote the use of images as the preferred idiom of a new generation of users. The aim of this article is to explore how technical changes (digitization) combined with growing insights in cognitive science and socio-cultural transformations have affected personal photography. The increased manipulation of photographic images may suit the individual's need for continuous self-remodelling and instant communication and bonding. However, that same manipulability may also lessen our grip on our images' future repurposing and reframing. Memory is not eradicated from digital multipurpose tools. Instead, the function of memory reappears in the networked, distributed nature of digital photographs, as most images are sent over the internet and stored in virtual space. © 2008 SAGE Publications."	0 - The paper does not seem to be relevant to 4CH project

DHUR-201	Varniene-Janssen R., Šermokas A.,"Ontologies and technologies for integrating and accessing digital cultural heritage: Lithuanian approach",2020,"Informacijos Mokslai","88",,,"66","82",,"10.15388/IM.2020.88.32","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85086923353&doi=10.15388%2fIM.2020.88.32&partnerID=40&md5=a01693755f2659706359c672bf528248","Web technologies are the ke for the implementing and ensuring the full range of user needs in the digital age. On the other hand, the issue of unified representation of digital content from diverse memory institutions in order to ensure semantic integrity still remains a matter of urgency. Semantic interoperability of information and data is essential in an integrated system. In this paper, we analyze and describe an ontology-based metadata interoperability approach and how this approach could be applied for memory institution data from diverse sources which do not support ontologies. In particular, we describe the use of the CIDOC CRM ontology as a mediating schema within Lithuania's Information System of the Virtual Electronic Heritage (hereinafter ""VEPIS"") The paper introduces the role of the CIDOC CRM based Thesaurus of Personal Names, Geographical Names and Historical Chronology (hereinafter ""BAVIC""), which operates as a core ontology within VEPIS by allowing to understand things and relationships between things as well as identify the time and space of things. The paper also focuses on trust of the cultural information on the Web. Users make trust judgments based on provenance that may or may not be explicitly offered to them. In particular, we describe how provenance is managed within digital preservation and access processes within VEPIS and define whether this management meets the W3C Provenance Incubator Group's Requirements for Provenance on the Web. The paper is based on the results of the research initiated in 2018-2019 at the Faculty of Communication and the Faculty of Mathematics and Informatics of Vilnius University by authors of this paper. © 2019 Regina Varniene-Janssen, Albertas Sermokas."	0 - The paper does not seem to be relevant to 4CH project
DHUR-202	Vats N.K.,"Electronic library of spiritual heritage: Copyright limitations and exceptions",2018,"Journal of Intellectual Property Rights","23","4-5",,"194","197",,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85064511555&partnerID=40&md5=64bd13790e24756e890ca8451052a9a2","Today, we are in the race of virtual world but due to inadequacy and costly affair for managing physical infrastructure, huge demand of labour needs big budget to maintain. However, short life of physical material as well as literature comparatively to digital world and time consuming affair to serve the users is a usual practice. With evolution of digitization, the information technology has opened the doors for the open access and the e-library has broken the boundary which has become accessible to users. On the one hand the students, scholars, knowledge seekers and learners will be able to get benefits of open access except the restricted contents in languages they desire and on the other hand the authors of the books and other literatures should not be deprived to their exclusive rights of reproduction, economic and dissemination. There may be accessibility to the data bank, in electronic form as literature, dramatic, scientific, an artistic works subject to the registration on particular domain as visitor/regular member or on payment as casual visitor whatever the conditions applied. The researchers aimed to analyse the limitation on rights of copyright owners on sharing of digitized information, understand the durability of electronic data on cultural, spiritual heritage and promotion of tourism. © 2018, National Institute of Science Communication and Information Resources (NISCAIR). All rights reserved."	0 - The paper does not seem to be relevant to 4CH project
DHUR-203	Vinella F.L., Lykourentzou I., Papangelis K.,"Motivational Principles and Personalisation Needs for Geo-Crowdsourced Intangible Cultural Heritage Mobile Applications",2020,"UMAP 2020 Adjunct - Adjunct Publication of the 28th ACM Conference on User Modeling, Adaptation and Personalization",,,"362","369",,"10.1145/3386392.3399284","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85089262282&doi=10.1145%2f3386392.3399284&partnerID=40&md5=c3d764f84b5715c1b687a6dd1ce35691","Whether it's for altruistic reasons, personal gains or third party's interests, users are influenced by different kinds of motivations when making use of mobile geo-crowdsourcing applications (geoCAs). These reasons, extrinsic and/or intrinsic, must be factored in when evaluating the use intention of these applications and how effective they are. A functional geoCA, particularly if designed for Volunteered Geographic Information (VGI), is the one that persuades and engages its users, by accounting for their diversity of needs across a period of time. This paper explores a number of proven and novel motivational factors destined for the preservation and collection of Intangible Cultural Heritage (ICH) through geoCAs. By providing an overview of personalisation research and digital behaviour interventions for geo-crowdsoured ICH, the paper examines the most relevant usability and trigger factors for different crowd users, supported by a range of technology-based principles. In addition, we present the case of StoryBee, a mobile geoCA designed for ""crafting stories" by collecting and sharing users' generated content based on their location and favourite places. We conclude with an open-ended discussion about the ongoing challenges and opportunities arising from the deployment of geoCAs for ICH. © 2020 ACM."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-204	Vlăsceanu G.V., Boiangiu C.-A., Deaconescu R.-A., Prodan M., Avatavului C., Rughinis R., Mocanu I.,"Designing a document image analysis system on 3 axis: Education, research and performance",2019,"eLearning and Software for Education Conference",,,"202","208",,"10.12753/2066-026X-19-027","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85085181883&doi=10.12753%2f2066-026X-19-027&partnerID=40&md5=576213fdea7f31c843df30b37896d036","Technology advances to make life easier for people. We tend to surround us with devices as small as possible and with the highest computing power. The need for data access from everywhere is an important detail. As a consequence, digital documents have been gaining ground on printed ones and for some sectors, the latter were even replaced. The need and the obligation to preserve the written cultural heritage, represented by books and valuable documents, some of them rare and even unique, forced us to imagine a system that protects the patrimony but makes it also accessible. In order to make books easily available to the public and at the lowest possible risk for the protection of the originals, we came to the idea of designing and creating an efficient digitization system of these records. The current article presents the proposed architecture of a Document Image Analysis System that will process the information with individual modules for each type of operation. The main scope for such tool is to recognize information from the documents and extract them for electronic use. The flow of operations are indicated by user, some steps can be eliminated depending on the user's desire and needs. In order to design an efficient Document Image Analysis System, we need a 3 axis approach: Education - involving students that can receive tasks for replacing modules and validating their homework, Research - performing various tests and Performance - testing the module interconnection and enabling the system to be extremely configurable. No matter what axis is considered, the main scope is the flexibility of the system - performed by individual modules as physical binaries or collection of binaries that are linked via scripts. Each module is designed to accomplish a certain major task by executing several sub-tasks whose results, in most cases, are subject to an intelligent voting process that produces the module's output data. © 2019, National Defence University - Carol I Printing House. All rights reserved."	1 - The paper could be interesting but it is neccessary to read more
DHUR-205	Vosinakis S., Avradinis N.,"Virtual agora: Representation of an ancient greek agora in virtual worlds using biologically-inspired motivational agents",2016,"Mediterranean Archaeology and Archaeometry","16","5 Special Issue",,"29","41",,"10.5281/zenodo.204964","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85034625037&doi=10.5281%2fzenodo.204964&partnerID=40&md5=a5fa21dbe9736a37dd0f8a9c51462d78","Populating virtual worlds with computer controlled characters is a key issue in virtual heritage applications, an argument that can also be held as valid for the majority of virtual world applications. Virtual heritage worlds usually tend to be either devoid of people, or include computer-controlled characters that function as animated props, demonstrating pre-scripted and repetitive behaviour. In more advanced approaches, digital characters in special roles, such as virtual guides, may also be situated in the virtual world. Recent virtual heritage reconstruction works seem to acknowledge the necessity of incorporating non-human controlled characters that include intelligence in order to enhance presence and provide the user with an engaging experience. This paper presents the design and development of Virtual Agora, a virtual heritage application in the Open Simulator environment aiming to replicate daily life in an ancient Greek agora using biologically-inspired motivational agents. The application follows a multi-layered motivational model for agents that includes biological, as well as psychosocial needs. Every agent possesses a set of basic attributes that relate to its biological and physical characteristics, as well as its personality. Furthermore, ager are endowed with a set of behaviours that satisfy particular goals and consist of a sequence of actions towards achieving this goal. In addition to this generic action set, every agent possesses an extra set of actions, based on its assignment of a role or profession. The roles and the respective behaviours have been designed and selected based on available resources regarding life in the ancient agora of classical Athens. In the current implementation visitors can walk around the environment observing daily activities performed by the digital characters and interact with them by asking questions about aspects of their profession. © 2016 MAA."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology

DHUR-206	Wall G.,"Business model issues in the development of digital cultural content",2003,"First Monday","8","5",,,"",",,"10.5210/fm.v8i5.1056","https://www.scopus.com/inward/record.uri?eid=2-s2.0-78651434831&doi=10.5210%2ffm.v8i5.1056&partnerID=40&md5=3f7150afabe41d3416d994fed9f8db34","Business model issues in the development of digital cultural content by Gerry Wall This paper examines business model aspects of digitizing cultural content. It is based in large part on a Study conducted by the author and his colleagues for the Department of Canadian Heritage. Based on data collected from several cultural institutions regarding their efforts to digitize content, the study found that implications for the cost side have been significant, leading to explorations of facilities and content sharing programs, formalized budgeting, the need for better copyright expertise and improved mid to long term planning. On the revenue (funding) side, a clear need for more rigorous assessments of user demand emerged. In addition, the possibility of revisiting organizational mandates was identified, as well as various revenue-generating opportunities including sponsorship, user-fees and private/public sector partnerships. © 2003, First Monday."	0 - The paper does not seem to be relevant to 4CH project
DHUR-207	Walsh D., Clough P., Foster J.,"User categories for digital cultural heritage",2016,"CEUR Workshop Proceedings","1611",,,"","","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84977499179&partnerID=40&md5=f0ac2ca74d26932039f03c1d736a9676","Increasingly information systems and services are being tailored to the needs of individuals and groups through the use of user-centred design techniques. In this paper we consider the ways in which the users of digital cultural heritage have been previously characterised and grouped. Despite recognising the importance of adopting user-centred techniques, there appears to be little prior work that has compared user groupings across user studies. Through a preliminary review of previous literature we compare ways in which users have been categorised and provide points for open discussion. The dimensions of domain knowledge, technical experience and motivation provide a way of distinguishing previously identified groups. We believe discussions about user categories and models is warranted and will help in the future design of digital cultural heritage services."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-208	Webmoor T.,"From silicon valley to the valley of teotihuacan: The ""Yahoo!s"" of new media and digital heritage",2008,"Visual Anthropology Review","24","2",,"183","200",,"10.1111/j.1548-7458.2008.00012.x","https://www.scopus.com/inward/record.uri?eid=2-s2.0-61049210768&doi=10.1111%2fj.1548-7458.2008.00012.x&partnerID=40&md5=820ccc72188ef66869fcd09041dc7a9d","This article examines the convergence of new media and archaeology, specifically cultural heritage management. I examine the events involving Yahool's creation of a global, ""electric anthropology archive."" This archive was part of the company's ""mixed reality"" time capsule project to transmit user-generated digital contributions from the UNESCO World Heritage Site of Teotihuacan, Mexico. Working through the specifics of how this new media mogul operationalized the functionality of Web 2.0 at a cultural heritage site, I identify the salient components of what is new about this emerging technology (a ""platform shift"") and how it parallels ethical and legal demands to open archaeology to greater public involvement (a ""paradigm shift""). Considering the emerging centrality of users in new media, I examine the potential of new media for academic projects by discussing the integration of a wiki, a particular and defining type of new media, into the investigation of what constitutes heritage for locals at Teotihuaean. Current concerns in archaeology, such as the need to create and maintain digital databases as well as the granting of restrictive Intellectual Property Rights (IPRs) over the material of the discipline, may be creatively and productively worked throu by using such new media. © 2008 by the American Anthropological Association	0 - The paper does not seem to be relevant to 4CH project
DHUR-209	Webster P., Clough P., Demartini G., Storrar T., Ranade S., Seaman G.,"Exploring entity-centric methods in the UK Government Web Archive",2016,"CEUR Workshop Proceedings","1611",,,"","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84977498015&partnerID=40&md5=b4a6a97a24bcbe2dc1033c2d778dbeb4","Being able to explore large digital collections effectively is of interest to both academics and practitioners alike. The need to go beyond the provision of keyword-driven functionality to features that support exploration and discovery is widely recognised. In addition, providers are seeking to support more diverse groups of users with varying information needs and tasks. Increasing amounts of cultural heritage are being stored in web archives that present unique challenges as a form of digital cultural heritage. This paper describes a collaboration between the University of Sheffield and the UK National Archives to investigate entity-based methods for exploring the UK Government Web Archive."	1 - The paper could be interesting but it is neccessary to read more
DHUR-210	Weir E.T.,"Exploring the digital information needs of diaspora communities: A user study of the lithuanian diaspora",2019,"Slavic and East European Information Resources","20","1-2",,"39","49",,"10.1080/15228886.2019.1628501","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85068255812&doi=10.1080%2f15228886.2019.1628501&partnerID=40&md5=a3ec3b82d2ae74677c916c356ad41d0f","Collecting and representing the cultural heritage of diaspora communities have historically posed a challenge to cultural heritage institutions like libraries and archives. In the advent of Web 2.0 technologies, digital collections and platforms have often been offered as the latest panacea to the multitude of issues relating to these collections. Using results from a survey conducted on the topic of Lithuanian-American cultural heritage, this article explores the information needs and interests of the broader Lithuanian diaspora community. The results reveal a broad interest in digital resources related to this subject across a spectrum of both generational status and Lithuanian language skills. Furthermore, survey results also provide insight on which resources users are currently using to find information on this subject and potential areas of improvement. © Erika T. Weir."	0 - The paper does not seem to be relevant to 4CH project
DHUR-211	Wessman A., Thomas S., Rohiola V., Kuitunen J., Ikkala E., Tuominen J., Koho M., Hyvönen E.,"A citizen science approach to archaeology: Finnish archaeological finds recording linked open database (SUALT)",2019,"CEUR Workshop Proceedings","2364",,,"469","478",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85066025998&partnerID=40&md5=4ce1108a576659de57d582d7f4767e55","In this paper, we present an ongoing project called Finnish Archaeological Finds Recording Linked Open Database (Suomen arkeologisten löytöjen linkitetty avoin tietokanta – SuALT), including the reasons why this citizen science project is underway. SuALT will be a digital web service catering for discoveries of archaeological material made by the public especially, but not exclusively, metal-detectorists. SuALT engages the citizens by providing them access to contextualized data about other related finds by linking data from different data sources in Finla and beyond. SuALT is a collaborative consortium project. The project team members work in three sub-projects, each led by a different organization and thus represents a broad interdisciplinary group, that combines specialisms from archaeology, semantic computing, cultural heritage studies, and archaeological heritage management. Subproject 1, which is based at the Department of Cultures at the University of Helsinki, focuses on user needs research and on the public Cultural Heritage interactions. Subproject 2, based in both Aalto University and in Helsinki Centre for Digital Humanities at the University of Helsinki, is specializing on the technology and implementation of the SuALT prototype. Subproject 3 works with ensuring the sustainability of SuALT at the Finnish Heritage Agency, the organization that will manage the database after the end of this project in 2021. © 2019 CEUR-WS. All rights reserved."	0 - The paper does not seem to be relevant to 4CH project

DHUR-212 Wheeler F.B., Bennett M.J.,"Accurate color? A preliminary investigation into the color gamut of selected special collection library objects",2011,"Archiving 2011 - Preservation Strategies and Imaging Technologies for Cultural Heritage Institutions and Memory Organizations - Final Program and Proceedings",,,,"87","91",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84860623365&partnerID=40&md5=ad0aeb14be869ec0973d27e9a48562c1","As cultural institutions continue to digitize their collections' objects, millions of images now exist in TIFF, JPEG, and JPEG 2000 color still image formats. Commonly, however, the colors of the original objects are not accurately reproduced when such digital image files are rendered on a computer monitor or on a print [1]. Such renderings are acceptable to a degree based upon user intent, but a direct comparison of the original and the image rendering will show easily visible differences upon closer inspection. The chain from the object itself, to the digital imaging device through color encoding, storage, color decoding, and finally to presentation is good but clearly needs improvement if archival storage of color, critical materials is desired. This paper presents an examination of the first step in this chain and provides a more precise indication of what colors may be present in documents held by cultural institutions. A number of initiatives are currently underway to improved color accuracy of scanned images. Best practic workflows now are guided by physical color targets so that captured image files can be evaluated against known color standards. In addition, multispectral techniques are being studied. A CIE/ISO Standards Archival Color Committee is currently investigating ways of encoding and storing color data in image archives [2], However, to date there have been few investigations that provide measurements of colors taken directly from original objects in cultural heritage collections. This study provides such measurements of sample colors taken directly from the surface of a wide selection of objects from the Library of Congress' collections - maps, prints, photographs, books, rare books, sheet music, and manuscripts. The Library's collections are so vast and complex that no attempt was made to select a statistically valid representative document set - but the selection was sufficiently large and varied to give an indication of the range of colors. Following a procedure used by Williams and Burns [3], direct spectrodensitometer measurements were made of a set of colors from each selected object. Per object these sets of colors were imported into CHROMiX ColorThink Pro software through which specific colors can be displayed in graphical form. This allowed for the comparative overlay of the color gamut for a variety of device specific color spaces - such as the sRGB gamut commonly available on computer monitors - to provide information about the ambiguities involved in capturing, storing, and rendering the color values accurately. Colorimetric measurements are the focus - a given object's colors were characterized using the device independent CIELAB color space. Analysis was then done to characterize the colors currently being stored in common RGB TIFF files and to provide guidelines for selecting appropriate color spaces when digitizing different kinds of objects. Comparisons of the document colors and the colors commonly used to build ICC color profiles are shown. These comparisons indicate that using a broader set of profiling colors - particularly colors similar to those in the original documents - may provide more accurate color in digital images." 0 - The paper does not seem to be relevant to 4CH project

DHUR-213 Wickett K.M., Doerr M., Meghini C., Isaac A., Fenlon K., Palmer C.,"Representing cultural collections in digital aggregation and exchange environments",2014,"D-Lib Magazine","20","5-6",,,"","",,"10.1045/may2014-wickett","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84904662536&doi=10.1045%2fmay2014-wickett&partnerID=40&md5=2ca3a27ae221f07d9d2ca41a59cbc0f3","The representation of collections in digital library systems that aggregat or exchange cultural heritage data can serve a number of useful functions. In this article, we present specific roles that collections can play in digital aggregations, representational requirements that arise from those roles, and modeling strategies for meeting the requirements. The functional roles of collections and collection descriptions speak to the needs of individual users accessing or contributing content, system developers seeking to improve search experiences, and institutions providing data to federated aggregations. However, the current data models that support cultural heritage aggregations are not designed to fully accommodate and integrate collection-level data. Therefore we have developed a set of general requirements for the representation of collections in digital aggregation systems. In order to demonstrate how these requirements can be addressed in a current operational context, we present specific strategies for collection representation in systems that use the Europeana Data Model. © 2014 Reinaldo A. Bergamaschi, Henrique P. de Oliveira, Akihito Kumon Jr. and Rodrigo C. Rezende." 0 - The paper does not seem to be relevant to 4CH project

DHUR-214 Wickham M.S.,"Heritage Quay: What Will You Discover? Transforming the Archives of the University of Huddersfield, Yorkshire, UK",2015,"New Review of Academic Librarianship","21","2",,"195","205",,"10.1080/13614533.2015.1042116","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84932153721&doi=10.1080%2f13614533.2015.1042116&partnerID=40&md5=df10596425ab940ab2d61604bd16ba48","The University of Huddersfield presents a key case study of the transformation of its Archives Service, using the newly-developed Staff/Space/Collections dependency model for archives and the lessons of the UK's Customer Service Excellence (CSE) scheme in order to examine and illustrate service development. Heritage Lottery Fund (HLF) and University funding has created new spaces for the audiences and collections of the future, including innovative technology on site to showcase and to explore digitized and digital material. Changes in collecting and collections management and new staff skillsets are developing to meet the needs of the audiences identified through extensive collections-based consultation. © 2015, Published with license by Taylor & Francis." 0 - The paper does not seem to be relevant to 4CH project

DHUR-215 Wu D., Xu S., Xu X., Chen X.,"Users' visual attention flow on the search result page of digital cultural heritage collection",2019,"Proceedings of the Association for Information Science and Technology","56","1",,"816","818",,"10.1002/pra2.188","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85075928902&doi=10.1002%2fpra2.188&partnerID=40&md5=11ec6c1a0806ccd4896c7d5165d3b1aa","Cultural heritage breathes a new life with digital technologies and the internet. Digitization of cultural heritage artifacts do represent new materials and new contexts for research and practice. It is important to know how the public access and browse online collections of digital cultural heritage. This paper presents an eye-tracking experiment on Digital Dunhuang, which is the most famous digital cultural heritage project in China, and identifies users' visual attention in search engine results pages (SERP). The results show how visual attention allocates in each area of interest (AOI), and the AOIs are browsed back and forth until the information needs are satisfied. Author(s) retain copyright, but ASIS&T receives an exclusive publication license" 0 - The paper does not seem to be relevant to 4CH project

DHUR-216 Wuttke U.,"The “PARTHENOS training webinar series”: Webinars as a means of delivering successful research infrastructure training in ehumanities and eHeritage",2019,"LIBER Quarterly","29","1",,"1","35",,"10.18352/lq.10257","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85064977440&doi=10.18352%2flq.10257&partnerID=40&md5=955f1ddb038f5d746a86b9b094d1bc90","Research infrastructures have an ever greater presence in both the Humanities and Cultural Heritage Studies. Scholars and information professionals working in the fields of research libraries, archives, and information play a crucial role as users and providers in cultivating the kind of world-class research that today increasingly relies on the use of these digital research infrastructures. Therefore, their continuous professional development is essential for them to be able to reap the benefits available from the ever-changing field of eHumanities and eHeritage research infrastructures, a mission that is at the heart of the Training team of the Horizon 2020 funded project PARTHENOS (“Pooling Activities, Resources and Tools for Heritage e-Research, Optimization and Synergies”). This paper describes the “PARTHENOS eHumanities and eHeritage Webinar Series.” These five live and interactive seminars delivered via the internet represent an introductory training programme that focuses on the professional development and capacity building needs and requirements of (digital) humanities and cultural heritage scholars, as well as of information specialists who work for digital humanities and digital heritage infrastructures. Using the PARTHENOS Webinar Series as a case study of the development and delivery of research infrastructure-focussed professional development, the paper outlines the intellectual, educational, and practical context in which the PARTHE-NOS Webinar Series was conceived, the syllabus used for the initial run of the series, and the analysis of the data collection exercises conducted after the first five webinars, especially the feedback collected from both the trainees and the trainers (online survey and open questions study), and it discusses possibilities for improvement. In the conclusion, the paper places the insights from the PARTHENOS webinars in the context of the potential of webinars for research infrastructure training. It argues that in order to reap their full potential for research infrastructures as training instruments as well as instruments to gain insights in user requirements, new developments, and for community building, further theoretical grounding, professionalization, and on-going analysis of their effectiveness is needed. 0 - The paper does not seem to be relevant to 4CH project

DHUR-217	Zahidi Z., Lim Y.P., Woods P.C.,"Understanding the user experience (UX) factors that influence user satisfaction in digital culture heritage online collections for non-expert users",2014,"Proceedings of 2014 Science and Information Conference, SAI 2014",,, 6918172,"57","63",,"10.1109/SAI.2014.6918172","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84909645283&doi=10.1109%2fSAI.2014.6918172&partnerID=40&md5=43407ffbe5f7854ac12fef1e4a8dbb57","The purpose of this paper is to explore how user experience (UX) influences user satisfaction when interacting with digital culture heritage online collections from non-expert perspective. Non-experts are categorised as apprentice investigator and general public. UX factors and website features that influence user satisfaction were identified and investigated. The relevancy is to examine whether existing digital cultural heritage online collections are able to satisfy general type users. Two existing digital culture heritage online collections were used as the vehicle to get the findings. A qualitative approach was adopted in this pilot study. Think-Aloud-Protocol was conducted to understand the users' cognitive and affective feelings when interacting with the chosen online collections. Results indicated that UX factors are seen as the enabler to trigger user satisfaction and dissatisfaction. User satisfaction is subjective and dependent on user's needs, expectations and existing experiences. This study revealed that non-experts valued direct and brief content that is displayed through attractive layout, familiar subject matter and dynamic way of presenting the content. Users expect the usability is there but that will not guarantee an overall user satisfaction. Apart from that, they appreciated website features of digital culture heritage collections that would give the users a sense of immersion when interacting with the content and effective content searching. These features appeared to be one of the contributors to influence user satisfaction when interacting with digital cultural heritage online collections. © 2014 The Science and Information (SAI) Organization."	1 - The paper could be interesting but it is neccessary to read more
DHUR-218	Zhou X., Sun B.,"Research on Inheritance and Protection of Intangible Cultural Heritage Based on Digital Cloud Computing Algorithm",2020,"ACM International Conference Proceeding Series",,,,"529","532",,"10.1145/3434581.3434673","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85099342440&doi=10.1145%2f3434581.3434673&partnerID=40&md5=2aa7640c13da098c17c03a24ea71fdc2","As an important strategic resource for enhancing intellectual property rights, intangible cultural heritage plays an important role in the development of national economy, culture, and politics. As a major country of intangible cultural heritage, my country has some problems in its protection and inheritance, which affects the exertion of resource advantages to some extent. Paper-cutting is an intangible cultural heritage. For this reason, this thesis takes the application of image retrieval in the protection of intangible cultural heritage as the research object, and explores the retrieval methods suitable for paper-cutting images to meet the increasing fashion needs of users. The paper proposes a paper-cut image retrieval algorithm based on improved AKAZE and FED to realize the protection of intangible cultural heritage inheritance under the digital cloud computing algorithm. © 2020 ACM."	0 - The paper does not seem to be relevant to 4CH project
DHUR-219	Zhuang Y., Lu W., Wu J.,"Latent Style Model: Discovering writing styles for calligraphy works",2009,"Journal of Visual Communication and Image Representation","20","2",,"84","96",,"10.1016/j.jvcir.2008.11.007","https://www.scopus.com/inward/record.uri?eid=2-s2.0-60649092514&doi=10.1016%2fj.jvcir.2008.11.007&partnerID=40&md5=7c6e7e47e16c816ef19e16e2a522c956","Chinese calligraphy works is a valuable part of the Chinese culture heritage. More and more calligraphy works images are digitized, preserved and exhibited in digital library. Users always want to appreciate the style-similar works simultaneously. To satisfy their need, calligraphic style representation and browsing calligraphy works by its style are the most important problems to be addressed. This paper proposes calligraphic style representation which is a multinomial probability distribution over visual words, and Latent Style Model to discover the style of calligraphy works and organize the works by style. In our experiments, we evaluated various factors that influence the model, and proved the effectiveness of the style representation and the model. At last, we illustrate the Calligraphic Style Browser to organize and exhibit the resource according to the styles. © 2008 Elsevier Inc. All rights reserved."	0 - The paper does not seem to be relevant to 4CH project
DHUR-220	Zoifaghari M., Malian A.,"Non metric: Cameras in architectural photogrammetry",2000,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","33",,,"501","508",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-27744524775&partnerID=40&md5=017e42ce78f2467a722a5743d744d3a5","Historical buildings and ancient monuments are valuable cultural heritage of nations, that are unfortunately being damaged due to human interference, weather conditions and environmental pollution. So, it is necessary to record all of them in a rapid and easy manner, in order that archaeological studies and establishment of a National Heritage Archive becomes possible. Close Range Photogrammetry(CRP) with interesting and unique capabilities is the most useful tool for this purpose. The difBculty in traditional photogrammetry is the necessity of metric camera that is expensive, hard to access(especially in countries such as Iran that are rich in cultural heritage), far from user-friendliness and needs special processing instruments. Such factors reduce the degree ofusefulness and easiness of CRP technology. There are a lot of historical monuments in Iran(which many ofthem are in the level of the most important cultural heritage of the world) and in the present project one of them i.e. the reliefofDriushI, the Great(500 B.C.) on the rocks of Bisotun was choosen as the test ûeld. This splendid monument is, nationally and internationally, highly discussed and there is an emergent programme in hand for its conservation and restoration. The present project is concentrated on the application of professional and amateur non metric cameras. These cameras have unknown calibration parameters that are usually photo variant. The kernel of this research is firstly to have a survey on the calibration elements of non metric cameras(that are easily available) ai:d secondly to show the photogrammetric capabilities of a precise non metric(Hasselblad), an amateur(Yashica), and a digital(Minolta) camera from the stereoplotting and rectification point of view. © 2000 International Society for Photogrammetry and Remote Sensing. All rights reserved."	0 - The paper does not seem to be relevant to 4CH project
DHUR-221	Zolfaghari M., Malian A.,"Non metric camera in architectural photogrammetry",2002,"Amirkabir (Journal of Science and Technology)","13","50",,"77","85",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-0036492813&partnerID=40&md5=5aca48aa5efbeb6640df975f284ca43e","Historical buildings and ancient monuments are valuable cultural heritage of nations, that are unfortunately being damaged due to human interference, weather conditions and environmental pollution. So, it is necessary to record all of them in a rapid and easy manner, in order that archaeological studies and establishment of a National Heritage Archive becomes possible. Close Range Photogrammetry (CRP) with interesting and unique capabilities is the most useful tool for this purpose. The difficulty in traditional photogrammetry is the necessity of metric camera that is expensive, hard to access (especially in countries such as Iran that are rich in cultural heritage), far from user - friendliness and needs special processing instruments. Such factors reduce the degree of usefulness and easiness of CRP technology. There are a lot of historical monuments in Iran (which many of them are in the level of the most important cultural heritage of the world) and in the present project one of them i.e. the relief of Driush I, the Great (500 B. C.) on the rocks of Bisotun was choosen as the test field. This splendid monument is, nationally and internationally, highly discussed and there is an emergent propgramme in hand for its conservation and restoration. The present project is concentrated on the application of professional and amateur non metric cameras. These cameras have unknown calibration parameters that are usually photo variant. The kernel of this research is firstly to have a survey on the calibration elements of non metric cameras (that are easily available) and secondly to show the photogrammetric capabilities of a precise non metric (Hasselblad), an amateur (Yashica), and a digital (Minolta) camera from the stereoplotting and rectification point of view."	0 - The paper does not seem to be relevant to 4CH project

DHUR-222	Abu Bakar N.A., ChePa N.,"Towards game engagement: Usability evaluation of digital Malaysian traditional games",2016,"Journal of Telecommunication, Electronic and Computer Engineering","8","8",,"77","81",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85011371381&partnerID=40&md5=abfd62fa1bb3c82e6bcbd13021aad219","Sustainable engagement in digital traditional games can preserve country's cultural heritage. However, despite such importance, digital traditional games are far less popular than the digital contemporary games. This study investigates one dimension of user engagement by empirically evaluate their usability aspects. Three digital versions of Malaysian traditional games namely Dam Haji, Congkak and Gasing-X were chosen. Literature suggested that usability problems may affect user engagement in the game. In contemporary games, usability is one of the attributes that promotes attractiveness which later leads to engagement. To date, little is known whether usability is also deemed critical for users to become engaged to traditional games. Usability helps in verifying the requirements, successes and functionality of the games which are missing. Evaluation involved 50 respondents who are IT and domain experts, using the instrument that was adopted from Jakob Nielsen's usability evaluation principles. The instrument consists of 17 heuristic component protocols based on interface design. The results revealed several usability issues with current digital Malaysian traditional games including aesthetic and minimalist design, error prevention, help and documentation and assessment, which should be given serious attention in the development of future digital Malaysian traditional games."	0 - The paper does not seem to be relevant to 4CH project
DHUR-223	Adam K., Kalisperakis I., Grammatikopoulos L., Karras G., Petsa E.,"Automatic camera calibration for cultural heritage applications using unstructured planar objects",2013,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS we have focused on the example of urban walls covered with graffiti. Images are connected pair-wise with inter-image homographies, which are estimated automatically through a RANSAC-based approach after extracting and matching interest points with the SIFT operator. All valid points are identified on all images on which they appear. Provided that the image set includes a 'fronto-parallel' view, inter-image homographies with this image are regarded as emulations of image-to-world homographies and allow computing initial estimates for the interior and exterior orientation elements. Following this initialization step, the estimates are introduced into a final self-calibrating bundle adjustment. Measures are taken to discard unsuitable images and verify object planarity. Results from practical experimentation indicate that this method may produce satisfactory results. The authors intend to incorporate the described approach into their freely available user-friendly software tool, which relies on chess-boards, to assist non-experts in their projects with image-based approaches." Archives","40","5W2",,"1","6",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84924289993&partnerID=40&md5=715efcacc5137e0c2154d8b54257008d","As a rule, image-based documentation of cultural heritage relies today on ordinary digital cameras and commercial software. As such projects often involve researchers n familiar with photogrammetry, the question of camera calibration is important. Freely available open-source user-friendly software for automatic camera calibration, often based on simple 2D chess-board patterns, are an answer to the demand for simplicity and automation. However, such tools cannot respond to all requirements met in cultural heritage conservation regarding possible imaging distances and focal lengths. Here we investigate the practical possibility of camera calibration from unknown planar objects, i.e. any planar surface with adequate texture	0 - The paper does not seem to be relevant to 4CH project
DHUR-224	Al-Ajlouni S.S., Fraser C.S.,"Zoom-dependent calibration for consumer grade-cameras",2006,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","36",,,"20","25",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-79251503644&partnerID=40&md5=01eaf7f6c76648fa5a26575969b7684d","A significant practical constraint currently applying to the adoption of consumer-grade digital cameras for photogrammetric measurement is the requirement to record images at fixed zoom and focus settings. This is a consequence of the variation of camera calibration parameters, especially principal distance and lens distortion, with changing zoom and focus. This paper describes a zoom-dependent calibration model, in which the image coordinate correction equations for departures from collinearity are expressed as a function of the nominal focal length written to the EXIF header of the images. Such a calibration approach frees the user from the constraint of recording images with both fixed focus and zoom. The newly developed zoom-dependent calibration approach is reviewed and the results of its application to tl calibration of a number of off-the-shelf cameras are presented. The benefits of the approach for medium-accuracy close-range photogrammetry applications across fields as diverse as traffic accident reconstruction and heritage recording are then highlighted. © 2018 International Society for Photogrammetry and Remote Sensing. All rights reserved."	0 - The paper does not seem to be relevant to 4CH project
DHUR-225	Algee L., Bailey J., Owens T.,"Viewshare and the kress collection: Creating, sharing, and rapidly prototyping visual interfaces to cultural heritage collection data",2012,"D-Lib Magazine","18","11-12",,,"","",,"10.1045/november2012-algee","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84872141159&doi=10.1045%2fnovember2012-algee&partnerID=40&md5=32cc6c5134fa67e5bccf9c7c87c3ea86","Visualization tools for digital cultural heritage collections allow users discover connections between artifacts over time and across space. Created using curators' and collection stewards' unique knowledge of their collections, visualizations empower users to discover meaning and patterns within digital collections using dynamic, interactive displays. Viewshare, a free, open-source visualization platform developed by the National Digital Information Infrastructure and Preservation Program at the Library of Congress and its partners, is such a tool. Viewshare's primary function is as a platform for generating and customizing views that enable users to creatively experience digital cultural heritage collections. But Viewshare can also be used by institutions as a testbed for development of web requirements and as a step in the larger workflow of managing collection data and testing its potential augmentation and exhibition. This article explains the conceptual framework behind Viewshare's development and its specific functions and affordances. The article then explicates a specific, detailed use case of Viewshare by the National Gallery of Art, Gallery Archives, demonstrating both how Viewshare offers a new way for collection managers and users to understand collections and also how Viewshare can serve as a rapid prototyping tool by which content managers can refine their existing practices around digital collection management, description, and display. © 2012 Lauren Algee, Jefferson Bailey and Trevor Owens."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-226	Aloia N., Binding C., Cuy S., Doerr M., Fanini B., Felicetti A., Fihn J., Gavrilis D., Geser G., Hollander H., Meghini C., Niccolucci F., Nurra F., Papatheodorou C., Richards J., Ronzino P., Scopigno R., Theodoridou M., Tudhope D., Vlachidis A., Wright H.,"Enabling European archaeological research: The ARIADNE E-infrastructure",2017,"Internet Archaeology",,"43",,"","",,"10.11141/ia.43.11","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85018426356&doi=10.11141%2fia.43.11&partnerID=40&md5=11275072cb25f4025cf9d6e8cd8f2127","Research e-infrastructures, digital archives and data services have become important pillars of scientific enterprise that in recent decades has become ever more collaborative, distributed and data-intensive. The archaeological research community has been an early adopter of digital tools for data acquisition, organisation, analysis and presentation of research results of individual projects. However, the provision of einfrastructure and services for data sharing, discovery, access and re-use has lagged behind. This situation is being addressed by ARIADNE: the Advanced Research Infrastructure for Archaeological Dataset Networking in Europe. This EUfunded network has developed an einfrastructure that enables data providers to register and provide access to their resources (datasets, collections) through the ARIADNE data portal, facilitating discovery, access and other services across the integrated resources. This article describes the current landscape of data repositories and services for archaeologists in Europe, and the issues that make interoperability between them difficult to realise. The results of the ARIADNE surveys on users' expectations and requirements are also presented. The main section of the article describes the architecture of the einfrastructure, core services (data registration, discovery and access) and various other extant or experimental services. The ongoing evaluation of the data integration and services is also discussed. Finally, the article summarises lessons learned, and outlines the prospects for the wider engagement of the archaeological research community in sharing data through ARIADNE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology

DHUR-227	Amato A., Venticinque S., Di Martino B.,"A distributed and scalable solution for applying semantic techniques to big data",2014,"International Journal of Mobile Computing and Multimedia Communications","6","2",,"50","67",,"10.4018/ijmcmc.2014040105","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84930458298&doi=10.4018%2fijmcmc.2014040105&partnerID=40&md5=c1fdfdcd06ea0bb6d12bd8742524834a","The digital revolution changes the way culture and places could be lived. It allows users to interact with the environment creating an immense availability of data, which can be used to better understand the behavior of visitors, as well as to learn about their thoughts on what the visit creates excitement or disappointment. In this context, Big Data becomes immensely important, making possible to turn this amount of data in information, knowledge, and, ultimately, wisdom. This paper aims at modeling and designing a scalable solution that integrates semantic techniques with Cloud and Big Data technologies to deliver context aware services in the application domain of the cultural heritage. The authors started from a baseline framework that originally was not conceived to scale when huge workloads, related to big data, must be processed. They provide an original formulation of the problem and an original software architecture that fulfills both functional and not-functional requirements. The authors present the technological stack and the implementation of a proof of concept. Copyright © 2014, IGI Global."	0 - The paper does not seem to be relevant to 4CH project
DHUR-228	Amirah Sarif Abdullah S.N., Mansor Y.,"Metadata interoperability requirements for aggregating Islamic manuscript bibliographic records",2014,"2014 the 5th International Conference on Information and Communication Technology for the Muslim World, ICT4M 2014",,, 7020651,"","",,"10.1109/ICT4M.2014.7020651","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84946690172&doi=10.1109%2fICT4M.2014.7020651&partnerID=40&md5=19636cad508a44d2fab96f4f93e76f2a","The advancement in ICT has facilitated the access to rare, valuable, Islamic heritage resources such as manuscripts. Efforts to preserve and disseminate information about precious Islamic manuscripts have been evidenced through initiatives such as digital library projects and online catalogs. Accessibility to Islamic manuscripts housed in various repositories in institutions around the world can be enhanced through the creation of a central gateway interface. This requires the aggregation of bibliographic records surrogating the manuscripts. However, metadata interoperability has been found to be an important determinant in successful records aggregation. This paper discusses factors affecting metadata interoperability among various repositories housing Islamic manuscript from around the world. It also proposes to investigate how library professionals and users view metadata standards, and the issues associated with metadata interoperability in order to establish a shareable metadata for Islamic manuscripts. © 2014 IEEE."	0 - The paper does not seem to be relevant to 4CH project
DHUR-229	Bathow C., Breuckmann B., Scopigno R.,"Verification and acceptance tests for high definition 3D surface scanners",2010,"VAST 2010 - 11th International Symposium on Virtual Reality, Archaeology and Intelligent Cultural Heritage",,,,"9","16",,"10.2312/VAST/VAST10/009-016","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84991914207&doi=10.2312%2fVAST%2fVAST10%2f009-016&partnerID=40&md5=c27a7a9a5c0cfd808ad5208293288301","High definition three-dimensional (3D) surface scanners, based on structured light or laser light section techniques, have found a wide range of applications, especially for technical and industrial applications (mostly for measuring and inspection tasks). Since about 10 years, systems adapted for the requirements of arts and Cultural Heritage (CH) support 3D digitization of art objects. Although the use of digital 3D models in CH is rapidly growing, many of the users are not yet completely familiar with terminology and all details of technical specifications. As most of the users are practitioners there is sometimes only little experience with terms as data quality, accuracy, resolution, measurement uncertainty, especially because these terms are used in very different ways, in manuals and brochures of scanner manufacturers as well as by authors of scientific papers. Moreover, the objective of many applications is digitization instead of measurement therefore, many users are not even aware, that they nevertheless have to care about metrology issues such as verification and acceptance tests of the used equipment to get a reliable scanning result. In its first part, the paper will give an overview the fundamentals of data acquisition and data processing, presenting also advantages and benefits, limitations and drawbacks as well as correlations between different performance parameters of high definition 3D surface scanners. Our goal is also to rectify a number of typical misunderstandings and to clarify related terms and definitions. In its second part, the paper will concentrate on verification and acceptance tests of high definition 3D scanners, reviewing the German guidelines VDI/VDE 2634/2 and proposing some preliminary extensions required to cope better with the CH domain. © The Eurographics Association 2010."	0 - The paper does not seem to be relevant to 4CH project
DHUR-230	Bertoncini M., Masci M.E., Ronca A.,"Paving the way for the next generation of cultural digital library services: The case study of 'fortuna visiva of Pompeii' within the BRICKS project",2006,"Digital Spectrum: Integrating Technology and Culture - Proceedings of the 10th International Conference on Electronic Publishing, ELPUB 2006",,,,"5","16",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84869047102&partnerID=40&md5=01e05f33aede9ba7eb1e34a65b151def","The BRICKS EU Project (http://www.brickscommunity.org) is constructing a distributed, scalable, and safe infrastructure that will provide open-source technology for the European Digital Memory. This infrastructure, known as the ""Foundation"", has been implemented through the integration of independent software units called ""Bricks"", which are developed on the architecture nodes. A Brick is an independent building block whose functionality is made available through a formally defined interface. Bricks can be put together to provide richer functionality, and may encapsulate Content. In order to test and validate the Foundation infrastructure and demonstrate how to build value-added services overlapping such infrastructure, some significant added-value ""Pillar"" applications have been developed and made available, addressing the ""Greek temple metaphor"". The intention is to use such applications for validating the Foundation services and, at the same time, those applications will constitute the basis of the future advancement of the BRICKS sustainability concept and be an attractive feature for the creation of a future Cultural Heritage Community. The ""Fortuna Visiva of Pompeii"" Pillar application has been developed as a case study within the ""Archaeological site"" Pillar. By using most of the Bricks created within the overall framework, demonstrates how the final users will be provided with services designed to enable them to use Pompeii's Archaeological Digital Library and Geographic Information System for learning, research and cultural tourism. Final users have been largely involved from the very beginning in the design phase of the case study applications, ensuring that such application matched the initial requirements (""vertical integration""), thus contributing to bridge the gap between users' community and advanced ICTs in the Cultural Heritage domain."	0 - The paper does not seem to be relevant to 4CH project
DHUR-231	Bettivia R.S.,"Mapping significance properties in OAIS: A case study with video games extended poster abstract",2015,"Proceedings of the Association for Information Science and Technology","52","1",,"1","4",,"10.1002/pra2.2015.1450520100136","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987746793&doi=10.1002%2fpra2.2015.1450520100136&partnerID=40&md5=7656030f7f5d0bd486a61155b014d59f","The term “Significant Properties” is commonly used in the fields of digital preservation and curation. It is variously defined, which puts it in tension with more precisely delineated standards for preservation, such as the broadly used Open Archival Information System reference model (CCSDS, 2012). This poster proposes mapping properties identified by both creators of video games as significant into the OAIS reference model. This research uses the framework provided by Giaretta et al. (2009), outlined as a clarification about the relationship between OAIS and significant properties, as a starting point. Utilizing data from the Preserving Virtual Worlds II grant and data from interviews with digital preservationists working in libraries and the cultural heritage sectors as case studies, this project aims to provide a real world example of how well user-defined significance maps onto commonly employed preservation models. Data from PVWII suggest that social, surface, and affective attributes of games are considered significant by designers and players. These properties encompass the totality of what really makes a game beyond the code and computing environment, even while they do not appear to fit within the precisely defined categories existent in OAIS. This poster argues that OAIS can be made to accommodate such properties because its requirement to update archival packages as the base knowledge of the designated community changes over time. Copyright © 2015 by Association for Information Science and Technology"	0 - The paper does not seem to be relevant to 4CH project

DHUR-232	Blanke T., Bryant M., Frankl M., Kristel C., Speck R., Vanden Daelen V., Van Horik R.,"The European holocaust research infrastructure portal",2017,"Journal on Computing and Cultural Heritage","10","1", 1,"","",,"10.1145/3004457","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85008937006&doi=10.1145%2f3004457&partnerID=40&md5=dbaea0fa4ef75884eab8f5ea5a571e68","Over the course of the past century, there have been significant changes in the practices of archives driven by the massive increase in the volume of records for archiving, a larger and more diverse user base, and the digital turn. This paper analyses work undertaken by the European Holocaust Research Infrastructure project (EHRI) to develop heritage archives into research infrastructures by connecting their knowledge and making it relevant for research. In the article, we focus on EHRI's work on an integrated collection portal, acting as central gateway to the rich information on Holocaust-related sources. At the time of writing, the portal contains over 150,000 descriptions of over 1,850 institutions that hold Holocaust-related archival material in 51 countries. In addition, it hosts concise reports that provide in-depth per-country information about the Holocaust history and archival situation in 47 countries, topic-focused research guides, and a range of other services. The article presents how the EHRI portal work connects to the state of the art of heritage portals and the novel solutions we had to develop to align the portal with the requirements of a research infrastructure. © 2017 ACM."	0 - The paper does not seem to be relevant to 4CH project
DHUR-233	Brunet P., Andújar C.,"Immersive data comprehension: Visualizing uncertainty in measurable models",2015,"Frontiers Robotics AI","2","SEP", 22,"","",,"10.3389/frobt.2015.00022","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85061996310&doi=10.3389%2ffrobt.2015.00022&partnerID=40&md5=206547faf5ad3d2e31cb85d274649df8","Recent advances in 3D scanning technologies have opened new possibilities in a broad range of applications including cultural heritage, medicine, civil engineering, and urban planning. Virtual Reality systems can provide new tools to professionals that want to understand acquired 3D models. In this review paper, we analyze the concept of data comprehension with an emphasis on visualization and inspection tools on immersive setups. We claim that in most application fields, data comprehension requires model measurements, which in turn should be based on the explicit visualization of uncertainty. As 3D digital representations are not faithful, information on their fidelity at local level should be included in the model itself as uncertainty bounds. We propose the concept of Measurable 3D Models as digital models that explicitly encode such local uncertainty bounds. We claim that professionals and experts can strongly benefit from immersive interaction through new specific, fidelity-aware measurement tools, which can facilitate 3D data comprehension. Since noise and processing errors are ubiquitous in acquired datasets, we discuss the estimation, representation, and visualization of data uncertainty. We show that, based on typical user requirements in Cultural Heritage and other domains, application-oriented measuring tools in 3D models must consider uncertainty and local error bounds. We also discuss the requirements of immersive interaction tools for the comprehension of huge 3D and nD datasets acquired from real objects. © 2015 Brunet and Andújar."	1 - The paper could be interesting but it is neccessary to read more
DHUR-234	Bruno N., Roncella R.,"HBIM for conservation: A new proposal for information modeling",2019,"Remote +B209:B239Sensing","11","15", 1751,"","",,"10.3390/rs11151751","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85070444006&doi=10.3390%2frs11151751&partnerID=40&md5=3a81d1e86d968c3f38efedd5a1d7feb4","Thanks to its capability of archiving and organizing all the information about a building, HBIM (Historical Building Information Modeling) is considered a promising resource for planned conservation of historical assets. However, its usage remains limited and scarcely adopted by the subjects in charge of conservation, mainly because of its rather complex 3D modeling requirements and a lack of shared regulatory references and guidelines as far as semantic data are concerned. In this study, we developed an HBIM methodology to support documentation, management, and planned conservation of historic buildings, with particular focus on non-geometric information: organized and coordinated storage and management of historical data, easy analysis and query, time management, flexibility, user-friendliness, and information sharing. The system is based on a standalone specific-designed database linked to the 3D model of the asset, built with BIM software, and it is highly adaptable to different assets. The database is accessible both with a developed desktop application, which acts as a plug-in for the BIM softwar and through a web interface, implemented to ensure data sharing and easy usability by skilled and unskilled users. The paper describes in detail the implemented system, passing by semantic breaking down of the building, database design, as well as system architecture and capabilities. Two case studies, the Cathedral of Parma and Ducal Palace of Mantua (Italy), are then presented to show the results of the system's application. © 2019 by the authors."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-235	Cai S., Jin P., Qi Y., Shen X.,"Protected-3DMPS: Remote-rendering based 3D model publishing system in digital museum",2006,"Journal of Computational Information Systems","2","1",,"277","283",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-33746512207&partnerID=40&md5=cc5dccd19c49a409383b7ce98c5a5c5c","A new 3D model publishing system, called Protected-3DMPS, is proposed. It is implemented to prevent the piracy or misuse of 3D digital heritage models by combining the geometry loss compression and remote rendering technology. Protected-3DMPS adopts the remote rendering structure. The client is a 3D interactive viewer. It contains a point-rendering geometry-compressed model. On the server side, the rendering module renders the original high-resolution model. Then it returns images to the client according to requests. This system can effectively protect 3D models from attacks of malicious users. This guarantees the security of 3D data. Meanwhile it significantly lowers the requirements of the client machine's graphics hardware and network bandwidth."	0 - The paper does not seem to be relevant to 4CH project
DHUR-236	Chamnongsri N., Manmart L., Wuwongse V.,"Implementation and evaluation of palm leaf manuscript metadata schema (PLMM)",2009,"Proceedings of the ACM/IEEE Joint Conference on Digital Libraries",,,,"367","",,"10.1145/1555400.1555466","https://www.scopus.com/inward/record.uri?eid=2-s2.0-70450260488&doi=10.1145%2f1555400.1555466&partnerID=40&md5=b6a6ccda04dd8df44dde08b6e9c08669","The evaluation of Palm Leaf Manuscripts Metadata Schema PLMM) aims to examine whether the PLMM satisfactorily meets the user requirements in searching for the PLMs and managing the PLMs collection. (1) An examination of the PLMM's capability in describing the particular characteristics of Northeastern Thai Palm Leaf Manuscripts, and its usefulness in the palm leave manuscripts preservation and rights control management (2) an investigation of users' satisfaction when using PLMM to search for the PLMs and managing the PLMs collection. The evaluation process began with the development of the prototype of PLMs management system to implement the PLMM. Then, more than 200 metadata records describing all types of sample PLMs (with variations in sizes, scripts, languages, titles, and number of content subjects contained in a fascicle) were provided in Extensible Markup Language (XML) format, while system interfaces and queries were developed with Hypertext Preprocessor (PHP). This was followed by the trials with end users and staff in their workplace in order to evaluate the usefulness of PLMM in user tasks according to the FRBR tasks: Find, identify, select, and obtain and collection development tasks. The research found that 'somewhat high' efficiency of the PLMM was perceived among the participants in the two tasks. The finding also suggests that perceived efficiency of the PLMM was significantly higher with more years of users' experience with the PLMs. The status of users is another factor which positively affected the perceived efficiency of the PLMM."	0 - The paper does not seem to be relevant to 4CH project

DHUR-237	Dimitriou N., Drosou A., Tzovaras D.,"Scan4Reco: Towards the digitized conservation of cultural heritage assets via spatiotemporal (4D) reconstruction and 3D printing",2016,"2016 Eurographics Workshop on Graphics and Cultural Heritage, GCH 2016",,,,"53","56",,"10.2312/gch.20161382","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85021716557&doi=10.2312%2fgch.20161382&partnerID=40&md5=738d93b6a521509c3137be403cb15a26","The European Cultural Heritage includes a rich variety of cultural items and a significant amount of resources is devoted to their conservation and dissemination to the public. Living in the era of digitization, these efforts have been significantly facilitated by advances not only in traditional domains (e.g. material science, etc.), but also from more modern ones (i.e. 3D computer graphics & VR simulations). Within this context, the EU funded project Scan4Reco aims to offer low-cost and feasible solutions in the field, as well as to improve existing practices via the automatic digitization and documentation of a wide variety of cultural items. In particular, material identification and visualization will be addressed via multi-sensorial and multi-resolutional material segmentation and data-fusion algorithms, while the problem of the parallel deterioration of the composing materials, given certain environmental conditions will be dealt with via the introduction and fusion of statistical, material-specific ageing models. The conservation dedicated Decision Support System (DSS) of Scan4Reco will be built upon a simulation engine and will suggest optimal conservation methodologies according to different criteria. Last but not least, the Scan4Reco outcomes will be demonstrated through tactile multilayered 3D printed surrogates, while digital surrogates of the cultural items along with their travel in time will be exhibited in a dedicated VR museum. In order to familiarize the reader with Sca4Reco's research novelties and breakthrough innovations, the current paper describes its modules, elaborating on their connection to the project's objectives and to identified user requirements. In addition, we present the overall architecture of the platform commenting on the interdependencies between components and their functionality. © 2016 The Author(s) Eurographics Proceedings © 2016 The Eurographics Association."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-238	Fernie K., Griffiths J., Stevenson M., Clough P., Goodale P., Hall M., Archer P., Chandrinos K., Agirre E., De Lacalle O.L., De Polo A., Bergheim R.,"PATHS: Personalising access to cultural heritage spaces",2012,"Proceedings of the 2012 18th International Conference on Virtual Systems and Multimedia, VSMM 2012: Virtual Systems in the Information Society",,, 6365960,"469","474",,"10.1109/VSMM.2012.6365960","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84872008736&doi=10.1109%2fVSMM.2012.6365960&partnerID=40&md5=f3ef11eb83c22b1e42ecc758e7450b0f","Digitisation of the cultural heritage means that a significant amount of material is now available through online digital library portals. However, the vast quantity of cultural heritage material can also be overwhelming for many users who lack knowledge of the collections, subject knowledge and the specialist language used to describe this content. Search portals often provide little or no guidance on how to find and interpret this information. The situation is very different in museums and galleries where collections are organized in exhibitions which offer themes and stories that visitors can explore. The PATHS project, which is funded under the European Commission's FP7 programme, is developing a system that explores the familiar metaphor of a trail (pathway) to enhance the discovery and use of the content made available in digital libraries. This paper will report on the findings of the user requirements analysis and the specifications for the first prototype of the PATHS system which is based on contents from Europeana and the Alinari Archives. © 2012 IEEE."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-239	Floch J., Jiang S.,"One place, many stories: Digital storytelling for cultural heritage discovery in the landscape",2015,"2015 Digital Heritage International Congress, Digital Heritage 2015",,, 7419566,"503","510",,"10.1109/DigitalHeritage.2015.7419566","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84965142722&doi=10.1109%2fDigitalHeritage.2015.7419566&partnerID=40&md5=a3fec0b948607f4cc336370db63dc5cb","Places we walk through every day often have cultural heritage stories connected to them, but many stories remain unknow and many get lost. Storytelling for cultural heritage discovery has long been used, mostly in cultural institutions. The documentation and dissemination of cultural heritage stories related to the landscape is challenging. There are countless places, and many of them lie outside the responsibility of cultural institutions. Associations and enthusiasts contribute to gather memories and tell about places, but the information is often fragmented and not always available in a digital form. Thus stories are difficult to retrieve. Can we exploit the popularity of a mobile participatory culture in order to engage people to tell about the places around them and to boost the exploration of cultural heritage in the landscape? This paper presents the design and evaluation of the mobile and social storytelling application 'stedr'. As young people are under-represented among users of traditional culture, we have chosen them as a target group in our study. Young people have contributed to elicitation of requirements, to the development of the application, and finally to its evaluation. Our contribution is a revisited digital storytelling approach for engaging in the discovery of cultural heritage in the landscape and the evaluation of the approach. © 2015 IEEE."	0 - The paper does not seem to be relevant to 4CH project
DHUR-240	Freire N., Isaac A., Robson G., Howard J.B., Manguinhas H.,"A survey of Web technology for metadata aggregation in cultural heritage",2018,"Information Services and Use","37","4",,"425","436",,"10.3233/ISU-170859","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85040344933&doi=10.3233%2fISU-170859&partnerID=40&md5=87e13e9c063f80278250ce65d02b6feb","In the World Wide Web, a very large number of resources are made available through digital libraries. The existence of many individual digital libraries, maintained by different organizations, brings challenges to the discoverability and usage of these resources by potential users. A widely-used approach is metadata aggregation, where a central organization takes the role of facilitating the discoverability and use of the resources, by collecting their associated metadata. The central organization has the possibility to further promote the usage of the resources by means that cannot be efficiently undertaken by each digital library in isolation. This paper focuses in the domain of cultural heritage, where OAI-PMH has been the embraced solution, since discovery of resources was only feasible if based on metadata instead of full-text. However, the technological landscape has changed. Nowadays, with the technological improvements accomplished by network communications, computational capacity, and Internet search engines, the motivation for adopting OAI-PMH is not as clear as it used to be. In this paper, we present the results of our analysis of available potential technologies, using as application context the Europeana Network and its requirements for metadata aggregation. We cover the following technologies: IIIF (International Image Interoperability Framework) Webmention; Linked Data Notifications; WebSub; Sitemaps; ResourceSync; Open Publication Distribution System (OPDS); Linked Data Platform; and Schema.org. © 2017-IOS Press and the authors."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-241	Fu X., Zhu Y., Xiao Z., Xu Y., Ma X.,"RestoreVR: Generating Embodied Knowledge and Situated Experience of Dunhuang Mural Conservation via Interactive Virtual Reality",2020,"Conference on Human Factors in Computing Systems - Proceedings",,, 3376673,"","",,"10.1145/3313831.3376673","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85091267432&doi=10.1145%2f3313831.3376673&partnerID=40&md5=5f5c1fa6fd3f7ed9f670c8fe4e5a9726","In Dunhuang Mogao Grottoes, unique Buddhist murals of ancient China are preserved. Unfortunately, the exquisite murals are suffering from degradation. Experts have been trying to enhance public's awareness of mural protection, but there's no efficacious means to attract interest and popularize knowledge yet. In this paper, we propose RestoreVR, an interactive virtual reality (VR) system engaging users to experience Dunhuang mural restoration in a digital tour in the cave. Based on an online survey with the public and in-depth interviews with five Dunhuang experts, we derive a set of design requirements for generating embodied knowledge and situated experience in VR to bridge the gap between highly specialized experts and general audiences. Accordingly, we design RestoreVR and conduct a between-subjects user study to compare our system with traditional methods. The results suggest that RestoreVR significantly improves user experience and awareness of CH protection over existing methods. © 2020 ACM."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology

DHUR-242	Goud S., Lombardo V.,"Assessment of digital environments for cultural heritage communication",2020,"CEUR Workshop Proceedings","2687",,,"","",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-85093667910&partnerID=40&md5=2d07f848eb0b5444e04d716cb66b4d42","Preservation of cultural heritage requires the effective communication of values associated with its tangible and intangible elements from one generation to the next. The process of transfer of values may be termed as Cultural Heritage Communication (CHComm). This paper analyses different approaches to Cultural Heritage Communication by identifying the dimensions of interface options through which a communication metaphor is deployed. The goal of this survey is to understand the ways in which digital environments and interfaces proposed in the literature can achieve effective Cultural Heritage Communication. The analysis is based on how th literature responds to the unique requirements of implementing effective CHComm within digital environments. Inferences arising out of the survey are classified through categories that provide insights on the communication metaphor, contextual implementation, user engagement, interface optimization and targeted evaluation. Finally, we propose three suggestions with the goal of facilitating the effectiveness of CHComm with respect to interfaces of digital environments. © Copyright 2020 for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0)."	0 - The paper does not seem to be relevant to 4CH project
DHUR-243	Hannewijk B., Vinella F.L., Khan V.-J., Lykourentzou I., Papangelis K., Masthoff J.,"Capturing the city's heritage on-the-go: Design requirements for mobile crowdsourced cultural heritage",2020,"Sustainability (Switzerland)","12","6",2429,"","",,"10.3390/su12062429","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85082803503&doi=10.3390%2fsu12062429&partnerID=40&md5=bb66d2e274d978abf52b083e542a2db1","Intangible Cultural Heritage is at a continuous risk of extinction. Where historical artefacts engine the machinery of intercontinental mass-tourism, socio-technical changes are reshaping the anthropomorphic landscapes everywhere on the globe, at an unprecedented rate. There is an increasing urge to tap into the hidden semantics and the anecdotes surrounding people, memories and places. The vast cultural knowledge made of testimony, oral history and traditions constitutes a rich cultural ontology tying together human beings, times, and situations. Altogether, these complex, multidimensional features make the task of data-mapping of intangible cultural heritage a problem of sustainability and preservation. This paper addresses a suggested route for conceiving, designing and appraising a digital framework intended to support the conservation of the intangible experience, from a user and a collective-centred perspective. The framework is designed to help capture the intangible cultural value of all places exhibiting cultural-historical significance, supported by an extensive analysis of the literature. We present a set of design recommendations for designing mobile apps that are intended to converge crowdsourcing to Intangible Cultural Heritage. © 2020 by the authors."	0 - The paper does not seem to be relevant to 4CH project
DHUR-244	Hasbi W., Suhermanto,"Development of LAPAN-A3/IPB satellite an experimental remote sensing microsatellite",2013,"34th Asian Conference on Remote Sensing 2013, ACRS 2013","2",,,"1508","1515",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84903460452&partnerID=40&md5=59d6ff69f646eb124003626306070ce9","Remote sensing data from satellite is needed for development in Indonesia. Besides getting data from foreign satellite agencies, LAPAN also develops LAPAN-A3/IPB microsatellite. This satellite development continues from the heritage of LAPAN-A1/TUBSAT and LAPAN-A2/ORARI bus while improving the payload of the satellite. To achieve user requirement, this satellite will carry several payloads such as an experimental line scan imager payload, high resolution digital space camera with 4 megapixel images, automatic identification systems (AIS), earth magnetic field sensor and automatic packet relay system (APRS) for digital amateur communication. Since line scan imager payload is not easy to implement in microsatellite due to its small inertia in nature, several aspect carefully implemented to achieve as high as possible remote sensing data quality. This paper shows that development of LAPAN-A3/IPB satellite has considered several importance aspects to achieve remote sensing satellite requirement as well as for its global maritime monitoring and al for the scientific applications.'	0 - The paper does not seem to be relevant to 4CH project
DHUR-245	Hess M., Robson S.,"3D imaging for museum artefacts: A portable test object for heritage and museum documentation of small objects",2012,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","39",,,"103","108",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84924269781&partnerID=40&md5=4500c77e1057e84912885e7cd34fd3cc","3D colour image data generated for the recording of small museum objects and archaeological finds are highly variable in quality and fitness for purpose. Whilst current technology is capable of extremely high quality outputs, there are currently no common standards or applicable guidelines in either the museum or engineering domain suited to scientific evaluation, understanding and tendering for 3D colour digital data. This paper firstly explains the rationale towards and requirements for 3D digital documentation in museums. Secondly it describes the design process, development and use of a new portable test object suited to sensor evaluation and the provision of user acceptance metrics. The test object is specifically designed for museums and heritage institutions and includes known surface and geometric properties which support quantitative and comparative imaging on different systems. The development for a supporting protocol will allow object reference data to be included in the data processing workflow with specific reference to conservation and curation."	0 - The paper does not seem to be relevant to 4CH project
DHUR-246	Hess M.,"Online survey about current use of 3D imaging and its user requirements in cultural heritage institutions",2015,"2015 Digital Heritage International Congress, Digital Heritage 2015",,,7419517,"333","338",,"10.1109/DigitalHeritage.2015.7419517","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84965146918&doi=10.1109%2fDigitalHeritage.2015.7419517&partnerID=40&md5=b707aba0cb8b390e765ecb58422d2455","The potential of 3D images is increasingly recognized by heritage professionals for opening up new technological possibilities for digital documentation, analysis and research, exhibition display and education. Yet, currently there is no comprehensive understanding of what constitute 3D image qualities for a digital artefact, from the point of view of a heritage professional. An online survey addressed to the international heritage community gauged information about current adoption of 3D imaging technologies, priorities for 3D image quality and visions of future use. Despite a number of barriers, there is high interest in 3D imaging technologies across heritage institutions and the museum sector. © 2015 IEEE.	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-247	Jett J., Palmer C.L., Fenlon K., Chao Z.,"Extending the reach of our collective cultural heritage: The IMLS DCC Flickr Feasibility Study",2010,"Proceedings of the ASIST Annual Meeting","47",,,"","",,"10.1002/meet.14504701420","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84861432143&doi=10.1002%2fmeet.14504701420&partnerID=40&md5=1366e7cc582ce27b6a0a752d281113d0","The Flickr Feasibility Study investigated the roles and processes required for a digital collection aggregator to facilitate participation of cultural heritage institutions in Web 2.0 communities. The results demonstrate that providing this service for museums, libraries, and archives can be a natural extension of aggregation activities. While the role is complicated by the varying requirements of different kinds of institutions, analysis of user interactions can guide both collection development and building of communities of interest around cultural heritage collections."	1 - The paper could be interesting but it is neccessary to read more
DHUR-248	Lourdi I., Papatheodorou C.,"A metadata application profile for collection-level description of digital folklore resources",2004,"International Conference on Database and Expert Systems Applications - DEXA","15",,,"90","94",,"10.1109/dexa.2004.1333455","https://www.scopus.com/inward/record.uri?eid=2-s2.0-10044249078&doi=10.1109%2fdexa.2004.1333455&partnerID=40&md5=f8449ce1ecdca6598b4300987f55e48b","The preservation and representation of folklore collections is a basic priority for every country because they are valuable for studying the customs and the tradition of specific groups of people and places. However, for the heterogeneity and diversity of folklore resources (text, images, photographs, 3D objects, sound recordings, maps or even digital material), it is difficult to create a unified and semantically rich description concerning both the collections and their objects. In this paper we introduce an integrated metadata model by mixing elements of different metadata standards in order to make the navigation to the digital collection efficient and to provide the users with rich meaningful information retrieval to collection objects. The model fits with the requirements and the unique characteristics of the folklore collections and is focused on facilitating the retrieval of information to all the structural levels."	0 - The paper does not seem to be relevant to 4CH project

DHUR-249	Luzzi C.,"ManUScript Italian poEtry in muSic (1500-1700) interoperable model: Towards an application of frbroo, Linked Open Data and semantic web technology",2014,"ACM International Conference Proceeding Series","12-September-2014",,6,"","",,"10.1145/2660168.2660189","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984941781&doi=10.1145%2f2660168.2660189&partnerID=40&md5=2f13adf4c73f378aba9e5ced696c8fbc","The most urgent challenge in the field of digital libraries is the demand for powerful and efficient systems which allow for integrated access to huge amounts of digital content. Recent initiatives have demonstrated how cultural heritage and digital libraries benefit from the use of semantic technologies which enable users to share content beyond the boundaries of individual applications and Web sites, as well as from Linked Open Data (LOD) projects which expands the way that we access cultural heritage. The FRBRoo (Functional Requirements for Bibliographic Records object-oriented) initiative offers a universally shared model for cultural heritage and performing arts and allows an exhaustive description of the intellectual content of the poetry and music repertoires. In this position paper we discuss matters about developing MUSES (ManUScript Italian poEtry in muSic) model. MUSES intends to use FRBRoo as the point of departure for defining specialised ontologies for the domain of poetry in music and developing access to optimally retrieve resources from libraries and archives made accessible on the Web."	1 - The paper could be interesting but it is neccessary to read more
DHUR-250	Lykke M., Lund H., Skov M.,"User-driven CHAOS: Tags and annotations in radio broadcast research",2016,"Knowledge Organization","43","2",,"73","85",,"10.5771/0943-7444-2016-2-73","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84964720995&doi=10.5771%2f0943-7444-2016-2-73&partnerID=40&md5=692bd215ddb50ec6dfe3b7e79de7d14d","CHAOS (Cultural Heritage Archive Open System) provides streaming access to more than 500,000 broadcasts by the Danish Broadcast Corporation from 1931 and onwards. The archive is part of the LARM project with the purpose of enabling researchers to search, annotate, and interact with recordings. To support the researchers the optimal way, a user-centred approach was taken to develop the platform and related metadata scheme. Based on the requirements, a three level metadata scheme was developed: 1) core archival metadata, 2) LARM metadata, and 3) project-specific metadata. The paper analyses how researchers apply the metadata scheme in their research work. The purpose is to gain insight into broadcast researchers' tagging practice and motivation for tagging to inform future design of digital cultural heritage systems. The study consists of two studies, a) a qualitative study of subjects and vocabulary of the applied metadata and annotations, and b) five semi-structured interviews about goals for tagging. The findings clearly show that the primary role of LARM.fm is to provic access to broadcasts and provide tools to segment and manage concrete segments of radio broadcasts. Although the assigned metadata are project-specific, they have been applied to serve as invaluable access points for fellow researchers due to their factual and neutral nature. The researchers particularly stress LARM.fm's strength in providing streaming access to a large, shared corpus of broadcasts."	0 - The paper does not seem to be relevant to 4CH project
DHUR-251	Meghini C., Scopigno R., Richards J., Wright H., Geser G., Cuy S., Fihn J., Fanini B., Hollander H., Niccolucci F., Felicetti A., Ronzino P., Nurra F., Papatheodorou C., Gavrilis D., Theodoridou M., Doerr M., Tudhope D., Binding C., Vlachidis A.,"ARIADNE: A research infrastructure for archaeology",2017,"Journal on Computing and Cultural Heritage","10","3", 3064527,"","",,"10.1145/3064527","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85027490568&doi=10.1145%2f3064527&partnerID=40&md5=62723b5979a49bdb672d6597ed2ef437","Research e-infrastructures, digital archives, and data services have become important pillars of scientific enterprise that in recent decades ha become ever more collaborative, distributed, and data intensive. The archaeological research community has been an early adopter of digital tools for data acquisition, organization, analysis, and presentation of research results of individual projects However, the provision of e-infrastructure and services for data sharing, discovery, access, and (re)use have lagged behind. This situation is being addressed by ARIADNE, the Advanced Research Infrastructure for Archaeological Dataset Networking in Europe. This EU-funded network has developed an e-infrastructure that enables data providers to register and provide access to their resources (datasets, collections) through the ARIADNE data portal, facilitating discovery, access, and other services across the integrated resources. This article describes the current landscape of data repositories and services for archaeologists in Europe, and the issues that make interoperability between them difficult to realize. The results of the ARIADNE surveys on users' expectations and requirements are also presented. The main section of the article describes the architecture of the e-infrastructure, core services (data registration, discovery, and access), and various other extant or experimental services. The ongoing evaluation of the data integration and services is also discussed. Finally, the article summarizes lessons learned and outlines the prospects for the wider engagement of the archaeological research community in the sharing of data through ARIADNE. © 2017 ACM."	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements
DHUR-252	Monod E., Klein H.K.,"From e-heritage to interpretive archaeology systems (IAS): A research framework for evaluating cultural heritage communication in the digital age",2005,"Proceedings of the 13th European Conference on Information Systems Information Systems in a Rapidly Changing Economy, ECIS 2005",,,,"","",10,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84871030682&partnerID=40&md5=1c17b382c9644fadc5917d769643f4a6","The principal purpose of this paper is to examine which research approaches are best suited for determining the requirements of the next generation of interactive interpretation support systems for cultural heritage site. We are optimistic that such systems if properly designed to exploit the potential of advanced information and communication technologies (ICTs), can not only meet, but even exceed visitor-user expectations. The research framework proposed to achieve this ideal integrates insights from both Interpretive Archaeology and interpretive IS research. We call the application of ICT's in systems for communicating cultural heritage information e-Heritage Systems or e-HS. We define Interpretive Archaeology Systems""(IAS) as a subclass of e-HS, the desig of which is informed by hermeneutics and phenomenology, Therefore, the principal purpose of the paper is to promote a shift from e-HS to IAS. To illustrate the fruitfulness of our preferred approach for IAS requirements identification, we derive a s of criteria from our research philosophy and apply them to the evaluation of an existing e-HS: the ARCHEOGUIDE in Olympia."	0 - The paper does not seem to be relevant to 4CH project
DHUR-253	Not E., Petrelli D.,"Blending customisation, context-awareness and adaptivity for personalised tangible interaction in cultural heritage",2018,"International Journal of Human Computer Studies","114",,,"3","19",,"10.1016/j.ijhcs.2018.01.001","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85040639031&doi=10.1016%2fj.ijhcs.2018.01.001&partnerID=40&md5=a57c041874e54ff023577eaf710ffc5a","Shaping personalisation in a scenario of tangible, embedded and embodied interaction for cultural heritage involves challenges that go well beyond the requirements of implementing content personalisation for portable mobile guides. Content is coupled with the physical experience of the objects, the space, and the facets of the context—being those personal or social—acquire a more prominent role. This paper presents a personalisation framework to support complex scenarios that combine the physical, the digit and the social dimensions of a visit. It is based on our experience of collaborating with curators and museum experts to understand and shape personalisation in a way that is meaningful to them and to visitors alike, that is sustainable to implement, and effective in managing the complexity of context-awareness. The proposed approach features a decomposition of personalisation into multiple layers of complexity that involve a blend of customisation on the visitor's initiative or according to the visitor's profile, system context-awareness, and automatic adaptivity computed by the system based on the visitor's behaviour model. We use a number of case studies of implemented exhibitions where this approach was used to illustrate its many facets and how adaptive techniques can be effectively complemented with interaction design, rich narratives and visitors' choice to create deeply personal experiences. Overarching reflections spanning case studies and prototypes provide evidence of the viability of the proposed framework, and illustrate the final effect of the user experience. © 2018 The Authors"	0 - The paper does not seem to be relevant to 4CH project

DHUR-254	Pádua L., Adão T., Narciso D., Cunha A., Magalhães L., Peres E.,"Towards modern costeffective and lightweight augmented reality setups",2015,"International Journal of Web Portals","7","2",,"33","59",,"10.4018/IJWP.2015040103","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984670510&doi=10.4018%2fIJWP.2015040103&partnerID=40&md5=1d7cbdabd1a054a130ae43963b3d28bb","Augmented Reality (AR) has been widely used in areas such as medicine, education, entertainment and cultural heritage to enhance activities that include (but are not limited to) teaching, training and amusement, through the completion of the real world with viewable and usually interactive virtual data (e.g. 3D models, geo-markers and labels). Despite the already confrmed AR benefts in the referred areas, many of the existing AR systems rely on heavy and obsolete hardware bundles composed of several devices and numerous cables that usually culminate in considerably expensive solutions. This issue is about to be tackled through the recent technological developments which currently enable the production of small-sized boards with remarkable capabilities - such as processing, visualization and storage - at relatively low prices. Following this line of reasoning, this paper proposes and compares fve different multi-purpose AR mobile units, running Windows or Android operating systems, having in mind low-cost and lightweight requirements and different levels of immersion: a laptop computer, two tablets, a smartphone and smartglasses. A set of tests was carried out to evaluate the proposed unit performance. Moreover, a set of users' assessments was also conducted, highlighting an overall acceptance regarding the use of the proposed units in AR applications. This paper is an extension of a previous work (Pádua et al., 2015) in which a conceptual architecture for mobile units - complying with AR requirements (including visualization, processing, location and communication) for indoor or outdoor utilization - was presented, along with a shorter set of lightweight and cost-effective AR mobile units and respective performance tests. Copyright © 2015,."	0 - The paper does not seem to be relevant to 4CH project
DHUR-255	Partarakis N., Antona M., Zidianakis E., Stephanidis C.,"Adaptation and content personalization in the context of multi user museum exhibits",2016,"CEUR Workshop Proceedings","1621",,,"5","10",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984819373&partnerID=40&md5=128b6677b6a063cfe47adcb9cd7a13af","Two dimensional paintings are exhibited in museums and art galleries in the same manner since at least three centuries. However, the emergence of novel interaction techniques and metaphors provides the opportunity to change this status quo, by supporting mixing physical and digital Cultural Heritage experiences. This paper presents the design and implementation of a technological framework based on Ambient Intelligence to enhance visitor experiences within Cultural Heritage Institutions (CHIs) by augmenting two dimensional paintings. Among the major contributions of this research work is the support of personalized multi user access to exhibits, facilitating also adaptation mechanisms for altering the interaction style and content to the requirements of each CHI visitor. A standards compliant knowledge representation and the appropriate authoring tools guarantee the effective integration of this approach in the CHI context. © 2016 for this paper by its authors. Copying permitted for private and academic purposes."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-256	Pereira Z., Morgado A., Gomes Pereira L.,"Comparison of different approaches to create architectural archives",2004,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","35",,,"552","557",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-41549160685&partnerID=40&md5=1acb73783826f474e0ce4ed0fcb02056","The architectural heritage is continuously at risk due to the threat of multiple catastrophes caused by human and/or natural interference. The importance of architectural archives to help preserving the historical monuments is thus obvious and urgent. Architectural archives can be created by means of terrestrial photogrammetry, using distinct approaches. These approaches relate mainly to the selection of the data acquisition equipment - analogue versus digital cameras and among these, metric versus non-metric cameras - and the data processing and information extraction techniques - stereoscopic versus monoscopic convergent multi-image techniques. The selected technique has implications on the instrument used to process the data, i.e., dedicated (photogrammetric workstation) versus standard computer, which influences accuracy and greatly the costs. In this study we create architectural archives of one Portuguese church with the referred techniques, by using the Photogrammetric Image Station SSK Pro from Intergraph and th software PhotoModeler. The data to create the archives are collected with analogue and digital cameras as well as metric and non-metric cameras. The archives are made up of the photographs/images acquired, the control points, and 3D models in the vector form as well as rendered with rectified images. The church is inserted in its surroundings with the help of 3D urban models. These are created with aerial images and aerial photogrammetry. Multi-media techniques are used to promote the divulgation of the church archives through the Web. The archives are also compared in terms of accuracy. The main conclusion is that architectural archives, of moderate detail, created with the Photomodeler and digital non-metric cameras fulfil the user requirements. © 2014 ISPRS. All Rights Reserved."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-257	Perles A., Pérez-Marín E., Mercado R., Segrelles J.D., Blanquer I., Zarzo M., Garcia-Diego F.J.,"An energy-efficient internet of things (IoT) architecture for preventive conservation of cultural heritage",2018,"Future Generation Computer Systems","81",,,"566","581",,,"10.1016/j.future.2017.06.030","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85026728227&doi=10.1016%2fj.future.2017.06.030&partnerID=40&md5=c83df7044106a93f8fa03b8076d9926a","Internet of Things (IoT) technologies can facilitate the preventive conservation of cultural heritage (CH) by enabling the management of data collected from electronic sensors. This work presents an IoT architecture for this purpose. Firstly, we discuss the requirement from the artwork standpoint, data acquisition, cloud processing and data visualization to the end user. The results presented in this work focuses on the most critical aspect of the architecture, which are the sensor nodes. We designed a solution based on LoRa and Sigfox technologies to produce the minimum impact in the artwork, achieving a lifespan of more than 10 years. The solution will be capable of scaling the processing and storage resources, deployed either in a public or on-premise cloud, embedding complex predictive models. This combination of technologies can cope with different types of cultural heritage environments. © 2017 The Author(s)"	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-258	Pitocco M.,"Information technology and management of diagnostics for analysis of seismic vulnerability in buildings",2011,"Procedia Computer Science","3",,,"352","360",,,"10.1016/j.procs.2010.12.059","https://www.scopus.com/inward/record.uri?eid=2-s2.0-79952513911&doi=10.1016%2fj.procs.2010.12.059&partnerID=40&md5=0341617c6805367d60051217fd7e122b","Ensuring the safe of a building in the event of an earthquake requires analysis of its vulnerability. The analysis is undertaken to evaluate the damage expected in the building for a possible earthquake of pre-established energy. To achieve this, a calculation model has to be prepared, referred to structural and typological characteristics in order to define a cause and effect relationship. This is possible either with in-depth design details or by undertaking diagnostic investigation of existing constructs. At the moment, state-of-the-art technology offers detectors, instruments and diagnosis methods, above all for non-destructive testing, which is user-friendly and will produce extensive information and large amounts of data in a short time. The risk is that excessive amounts of data produced by cutting-edge technology are not followed up with a useful and adequate interpretation of the actual data. It is clear that digital support for optimizing the diagnostic process and, simultaneously, meeting the three fundamental requirements of a diagnostic campaign for the assessment of seismic vulnerability in buildings must: • ather and systemize a large number of data • put together a reasoned collection of recorded data and decisions applied that will be useful in the future • guide diagnostics towards the most appropriate investigation method for the specific case. In short, the use of a digital platform for managing and interpreting recorded data appears applicable to the quality system for a diagnostic campaign, above all if considering the non-destructive type that allows for methodical, systematic knowledge of building heritage so as to obtain the model's timely correspondence with the real world. A digital platform will be useful in the management of a quality system when applied to action planning (that is to say a set of methods and instruments) within the system, aimed at its definition, achievement, substantiation, demonstration and maintenance. © 2010 Published by Elsevier Ltd."	0 - The paper does not seem to be relevant to 4CH project

DHUR-259	Pozzi F., Antonaci A., Dagnino F.M., Ott M., Tavella M.,"A participatory approach to define user requirements of a platform for intangible cultural heritage education",2014,"VISAPP 2014 - Proceedings of the 9th International Conference on Computer Vision Theory and Applications","2",,,"782","788",,"10.5220/0004873507820788","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84903481289&doi=10.5220%2f0004873507820788&partnerID=40&md5=2726060a53f3be21faf95c875f19af36","In the last years the protection and safeguarding of cultural heritage has become a key issue of European cultural policy and this applies not only to tangible artefacts (monuments, sites, etc.), but also to intangible cultural expressions (singing, dancing, etc.). The i-Treasures project focuses on some Intangible Cultural Heritages (ICH) and investigates whether and to what extent new technology can play a role in the preservation and dissemination of these expressions. To this aim, the project will develop a system, based on cutting edge technology and sensors, that digitally captures the performances of living human treasures, analyses the digital information to semantically index the performances and their constituting elements, and builds an educational platform on top of the semantically indexed content. The main purpose of this paper is to describe how the user requirements of this system were defined. The requirements definition process was based on a participatory approach, where ICH experts, performers and users were actively involved through surveys and interviews, and extensively collaborated in the complex tasks of identifying specificities of rare traditional know-how, discovering existing teaching and learning practices and finally identifying the most cutting edge technologies able to support innovative teaching and learning approaches to ICH. Copyright © 2014 SCITEPRESS - Science and Technology Publications. All rights reserved."	0 - The paper does not seem to be relevant to 4CH project
DHUR-260	Schmidt R., Lindley A., King R., Jackson A., Wilson C., Steeg F.,"The planets IF - A framework for integrated access to preservation tools",2010,"ACM International Conference Proceeding Series",,,,"","","",,"10.1145/2039263.2039273","https://www.scopus.com/inward/record.uri?eid=2-s2.0-80054779665&doi=10.1145%2f2039263.2039273&partnerID=40&md5=fa67f91daa608313db63596a915f0715","The Planets project is driven by requirements for the long-term preservation faced by institutional libraries and archives. The project develops an integrated environment that allows archivists to seamlessly utilize and evaluate tools and strategies for the preservation of cultural heritage data. The Planets Interoperability Framework (IF) supports this vision by providing the technical backbone for integrating existing content repositories, preservation tools, and services into a service-oriented research infrastructure. It implements a number of common software components for user authentication, data access, or service orchestration. Moreover, it defines the interfaces and communication protocols for preservation services like identification, characterization, migration or rendering. It thereby assures the interoperability of the various heterogeneous preservation tools and applications in order to establish a coherent and extensible preservation system. In this paper, we present the service architecture as well as the runtime environment and its application. © 2010 ACM."	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology
DHUR-261	Tapete D., Cigna F.,"InSAR data for geohazard assessment in UNESCO World Heritage sites: state-of-the-art and perspectives in the Copernicus era",2017,"International Journal of Applied Earth Observation and Geoinformation","63",,,"24","32",,"10.1016/j.jag.2017.07.007","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85032471921&doi=10.1016%2fj.jag.2017.07.007&partnerID=40&md5=ceb8a56f025bcb20a55d2dbb3a25a879","Protection of natural and cultural heritage is encompassed by the United Nations' 2030 Agenda for Sustainable Development and is among the innovative applications and services of the European Union's Earth Observation programme Copernicus. We are currently witnessing an increasing exploitation of Interferometric Synthetic Aperture Radar (InSAR) methods to assess geohazards affecting cultural heritage. This paper offers the first data mining exercise to identify InSAR geoinformation that is digitally available and/or published and that spatially includes one or more cultural, natural and mixed UNESCO World Heritage Site (WHS). The exercise focused on the 45 countries of geographical Europe, Turkey, Israel and the Russian Federation, and their 445 WHS of Outstanding Universal Value. We built a database of academic and grey literature collated via a Boolean search of the ISI Web of Science catalogue and systematic skim-reading to a total number of 280 publications as of the end of 2016. Over 460 InSAR open access digital datasets were also analysed. We found clusters of WHS covered by InSAR data in Italy, the Netherlands, western Germany, eastern Spain, Greece and the UK that match with the geographic distribution of InSAR expertise and geohazard hotspots. The existing stock of InSAR geoinformation already provides an overall WHS coverage of 36%, with similar proportion of available data for 'urban' (40%) and 'rural' (34%) WHS. The sites with the highest number of publications are historic city centres (e.g. Amsterdam, Athens, Barcelona, Lisbon, Paris, Rome), as well as Permanent Geohazard Supersites (e.g. Mt. Etna, Naples, Istanbul), where the impact of natural and/or anthropogenic processes is well known. First generation SAR data (mainly ERS-1/2) predominate in the literature with over 15 new publications/year since 2002, whilst second and third generation data show less pronounced rates since 200 and 2014, respectively. The current engagement level of end-users appears still limited (less than 1% of publications involve heritage stakeholders), and a shared guidance on the use of InSAR for heritage practitioners does not exist yet. Towards the development of Copernicus' services and applications in support of cultural heritage preservation and management, our analysis contributes to: outline the existing capabilities focus on requirements for bespoke InSAR-derived products and	0 - The paper does not seem to be relevant to 4CH project
DHUR-262	Tsai C.,"A review of image retrieval methods for digital cultural heritage resources",2007,"Online Information Review","31","2",,"185","198",,"10.1108/14684520710747220","https://www.scopus.com/inward/record.uri?eid=2-s2.0-34047261637&doi=10.1108%2f14684520710747220&partnerID=40&md5=c5667dd92588b13932b1978a5a6654f2","Purpose - The aim of this paper is to examine related studies to identify which retrieval methods are supported by current digital cultural heritage libraries. In this way it is hoped to provide a direction for future cultural heritage applications to provide more complete and/or improved retrieval functionality. Design/methodology/approach - The methodology of this paper is based on introducing the general concept of image-based retrieval systems as well as their retrieval methods. Then, users' needs are discussed to illustrate the demands of semantic-based retrieval. After the retrieval methods have been presented, current digital cultural heritage libraries are examined in terms of their supported retrieval methods that allow users to query images. Findings - Current digital cultural heritage libraries mostly provide only general retrieval methods based on image-based lo level features, i.e. query by image contents. Very few consider other retrieval methods such as browsing and semantic-based retrieval. In addition, none of the current systems provide all possible retrieval methods for users. Originality/value - This study is the first one to examine image-based retrieval methods in digital cultural heritage libraries. This study supports the improvement of retrieval functionality for digital cultural heritage libraries in the future. © Emerald Group Publishing Limited."	0 - The paper does not seem to be relevant to 4CH project
DHUR-263	Tsai F., Chang H., Lin Y.-W.,"Combining 3D volume and mesh models for representing complicated heritage buildings",2017,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","42","2W5",,"673","677",,"10.5194/isprs-archives-XLII-2-W5-673-2017","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85030248477&doi=10.5194%2fisprs-archives-XLII-2-W5-673-2017&partnerID=40&md5=ede12adfa9e11bd12fd5a8e14ef5bb91","This study developed a simple but effective strategy to combine 3D volume and mesh models for representing complicated heritage buildings and structures. The idea is to seamlessly integrate 3D parametric or polyhedral models and mesh-based digital surfaces to generate a hybrid 3D model that can take advantages of both modeling methods. The proposed hybrid model generation framework is separated into thre phases. Firstly, after acquiring or generating 3D point clouds of the target, these 3D points are partitioned into different groups. Secondly, a parametric or polyhedral model of each group is generated based on plane and surface fitting algorithms to represent the basic structure of that region. A ""bare-bones"" model of the target can subsequently be constructed by connecting all 3D volume element models. In the third phase, the constructed bare-bones model is used as a mask to remove points enclosed by the bare-bones model from the original point clouds. The remaining points are then connected to form 3D surface mesh patches. The boundary points of each surface patch are identified and these boundary points are projected onto the surfaces of the bare-bones model. Finally, new meshes are created to connect the projected points and original mesh boundaries to integrate the mesh surfaces with the 3D volume model. The proposed method was applied to an open-source point cloud data set and point clouds of a local historical structure. Preliminary results indicated that the reconstructed hybrid models using the proposed method can retain both fundamental 3D volume characteristics and accurate geometric appearance with fine details. The reconstructed hybrid models can also be used to represent targets in different levels of detail according to user and system requirements in different applications. © Authors 2017."	0 - The paper does not seem to be relevant to 4CH project

DHUR-264	Tsai T.-H., Lee L.-C.,"A study of using contactless gesture recognition on shadow puppet manipulation",2016,"ICIC Express Letters, Part B: Applications","7","11",,"2317","2322",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84992732415&partnerID=40&md5=7d72bf32185bdbdc619a2948d4b2eedf","Gesture recognition using depth and infrared image data has seen the greatest development and is the most acknowledged technological advancement in recent years. It has given rise to contactless scenarios, where the device and system capture changes in user movements and allow more intuitive input gestures. As a result, users need not learn specific knowledge beforehand, and can input commands using natural interaction. Shadow puppetry is an important art form in traditional Chinese arts and cultures, and is a key representation of intangible culture heritage as recognized by the UNESCO. Traditionally, the puppeteers use wooden rods to articulate the puppets' joints and produce a very stylized form of animation. However, with ever advancing media trend and technologies, the mastery of this art form is in danger of extinction and its popularity is in decline. The goal of this study is to utilize gesture recognition to develop a system to improve upon traditional puppetry manipulation and therefore encourage complete beginners to learn to use it, and lower the barrier to digital medium adoption. In this study both qualitative and quantitative analysis were conducted and yielded positive results. © 2016 ICIC International."	0 - The paper does not seem to be relevant to 4CH project
DHUR-265	Tucci G., Bonora V.,"From real to··· ""real"". A review of geomatic and rapid prototyping techniques for solid modelling in Cultural Heritage field",2011,"International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives","38","5W16",,"575","582",,,"https://www.scopus.com/inward/record.uri?eid=2-s2.0-84924653506&partnerID=40&md5=a5e0428abac94ad3533ee2b62ef486e9","The documentation and 3D modelling of Cultural Heritage are now mainly based on digital techniques to produce complete, detailed and photorealistic three-dimensional surveys. The integration of various technologies and sensors is the best solution to obtain results with these characteristics. According to the reproduction scale, you need to change the characteristics of the instruments used during acquisition. Reduced or real scale solid models are an effective support for projects involving communication and divulgation: they can be understood without the intermediation of data processing systems, therefore increasing the potential users. Additive Manufacturing (AM) is an expression indicative of technologies used to fabricate physical objects directly from CAD data sources they are also called three-dimensional printing, solid freeform fabrication or layered manufacturing. The paper analyzes only factors related to the processing that involves the superficial aspect of the solid model some important aspects useful in other applications, e.g. mechanical behaviour of the used matenal or the method to realize the internal structure or possible supports of the model, are neglected."	0 - The paper does not seem to be relevant to 4CH project
DHUR-266	van Bergen S.,"Connecting systems for better services around special collections",2014,"D-Lib Magazine","20","9-10",,"","","",,"10.1045/september2014-vanbergen","https://www.scopus.com/inward/record.uri?eid=2-s2.0-84908565081&doi=10.1045%2fseptember2014-vanbergen&partnerID=40&md5=a2d3347ccd77a208088f3b55ecceb728","Over the last few years, several projects to improve physical and digital access to special collections have been undertaken by Leiden University Libraries in the Netherlands. These heritage collections include manuscripts, printed books, archives, maps, atlases, prints, drawings and photographs, from the Western and non-Western worlds. They are of both national and international importance. The projects were undertaken to meet two key requirements: providing better and faster service for customers when using the collections, and creating a more efficient workflow for the library staff. Their interdependencies, with regard to creating new formats for the description of graphic materials and providing digital access, led to a merger of the projects with a combined set of goals for conversion, cataloging and digitization-on-demand. This article describes the infrastructure behind these projects, and the impact of the projects on users and staffto date. © 2014 Saskia van Bergen."	1 - The paper could be interesting but it is neccessary to read more
DHUR-267	Vayanou M., Ioannidis Y., Loumos G., Kargas A.,"How to play storytelling games with masterpieces: from art galleries to hybrid board games",2019,"Journal of Computers in Education","6","1",,"79","116",,"10.1007/s40692-018-0124-y","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85067299766&doi=10.1007%2fs40692-018-0124-y&partnerID=40&md5=f33bea36135fb3313fbca29602ee3422","In this article we explore how to play storytelling games with collections of artworks. First we propose a generic storytelling game, titled "Find the artwork behind the story!", and we present the results of a user study that investigates the game's affordances in different environments and setups, ranging from large exhibitio at a cultural center, to a casual home setting. We report a series of game-testing sessions, highlighting the differences between on-site and remote experiences and we reflect upon critical aspects of the game design, identifying key opportunities and requirements in each case. Then we focus on the "home game scenario" and we describe how we re-designed the game experience so as to address the increased interactivity and learning requirements revealed in this setting. We propose a hybrid board game experience that combines analogue and digital media, orchestrating the use of physical "Artwork Cards" along with digital narratives displayed on the players' personal mobile or tablet devices. We present the game-authoring platform and the mobile client application that we have developed to support the creation and provision of the proposed game experiences. Finally, following a user-centered design approach, we report preliminary evaluation results of the game prototype using the focus group methodology. © 2018, Beijing Normal University."	0 - The paper does not seem to be relevant to 4CH project
DHUR-268	Zhang C., Zhang W., Zheng Y.,"Multimedia-based computer-aided ceramic design",2021,"Computer-Aided Design and Applications","18","s4",,"49","60",,"10.14733/CADAPS.2021.S4.49-60","https://www.scopus.com/inward/record.uri?eid=2-s2.0-85100502221&doi=10.14733%2fCADAPS.2021.S4.49-60&partnerID=40&md5=e2d9ea76823f0766217dfd28ec20b9fe","This paper conducts an in-depth study on the design of ceramics based on the principles of multimedia computer-aided design, defines the concepts of computer-aided design and ceramic art design in the research process, and explains the connotation and requirements of information technology to promote the design ability of ceramic art professionals. Through the overview and analysis of ceramic traditional craft, the design methods and principles applicable to the digital experience of the traditional craft situation under the ceramics are found, and attempts are made to transform the advantages of digital technology into new potential energy for the protection and inheritance of traditional craft. Starting from the theory of non-heritage information and virtual visualization art performance, the information content, basic process, and development context of ceramic craft are organized, the ceramic craft content and its matching information visualization display methods are compared, and it is proposed to present and disseminate the information of kiln porcelain assembly and firing craft through the construction of a three-dimensional model of ceramic furnace and virtual visualization display. The virtual visualization art aesthetics is divided into three aspects: content aesthetics, visual aesthetics, and interactive aesthetics, and the art performance in the virtual visualization system of the kiln is studied from three aspects: art aesthetics, visual performance, and interactive display. The study utilizes modern tools such as augmented reality and virtual reality technologies for the innovative transmission, research, sharing, and dissemination of cultural heritage digital content, enabling users to interact with digital content simply and naturally. © 2021 CAD Solutions, LLC."	0 - The paper does not seem to be relevant to 4CH project

Appendix 5 – Projects results

SCOPUS DATABSE (TITLE-ABS-KEY (digital AND heritage AND users Accessed 12/04/2021	**Step 2: First scanning**			**Step 3: Categorisation**									
CODE	**User needs analysed in the project**	**Paper available?**	**If no, info in abstract?**	**Field**	**CH type**	**Structure/scale**	**User Category**	**Purpose macrocategory**	**Purpose of digitalisation**	**Users jobs**	**Users pains**	**Users gains**	**NEED01**	**NEED02**
	Does the project provide a deliverable/information addressing users needs?						*Please, select the main user category. If it is a multiple choice, please include a new row per category*		*Please, select the main purpose of digitalisation among the proposed categories*	*Please list main problems users are trying to solve; Task users are trying to perform in their work; Objectives they try to achieve*	*Please describe the obstacles that could affect users while they are performing the actions listed in the "users jobs" (main difficulties and challenges; negative social consequences; risks)*	*Describe benefits users expect/desire/would be surprised to obtain while performing the activities listed in the "users jobs" (savings, quality, easiness of procedure, what are they looking for?)*		
DHUR-02	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	Professional researchers	Conservation	Studies on CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Digital collections, however, are dependent upon the interfaces through which they are explored and those interfaces do not necessarily encourage the modes of discovery that can provide new insights	The views created in Viewshare give external users an interactive interface that can be employed for generative interpretation and investigation of online digital collections. It provides the collection managers building those views a free, easy-to-use to	UN20 - Generating and customizing visualization that allow users to dynamically and creatively experience digital contents.	
DHUR-03	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		ICT IN MUSEUMS	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN03 - Creating interactive museum experiences to better connect visitors	
DHUR-04	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	Professional researchers	Preservation	Preventive conservation	Access Digital archives	Approaches to digital preservation are often still ad hoc and based on a single institution focus and frequently do not take into consideration the needs of the variety of actors who will come into contact with a system throughout the preservation lifecycle.	Integrated point of access	UN21 - Long-term preservation framework for large volumes of digital data	
DHUR-05	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	General and educational users and visitors, tourists	Conservation	Documentation of CH	The metadata currently in use in most institutions tends to be objectivist, top-down and experi-created. Instead, users should be considered as proactive metadata creators rather than passive consumers and participatory and collaborative Web 2.0 approaches would help to enrich digital heritage collections.	This shift requires social and political organisational changes and re-conceptualisation of existing models, tools and practices	Users as proactive metadata co-creators Metadata diversity Metadata scalability Variable metadata participation Metadata aggregation	UN12 - Facilitate digital models sharing and information exchange	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator
DHUR-06	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Professional researchers	Conservation	Documentation of CH	Methodology for affordable but of high quality and precision modeling of cultural heritage data and its exploitation towards the delivery of personalized content.	more researchers with various backgrounds (e.g. material scientists), aspire to integrate the aspect of 3D virtualization within their work but there are limitations concerning the amount of the data that have to be managed	Multi-resolution model management on an interactive web platform	UN12 - Facilitate digital models sharing and information exchange	
DHUR-07	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Collection	Professional researchers	Conservation	Documentation of CH	Accessing metadata and archival resources	Main problems with metadata: lack of quality in metadata contents in most of the cases; difficulty in accessing metadata contents due largely to limited user's knowledge on the content of the metadata; heterogeneity of the data at the level of schemas which makes the access even more difficult.	Information accessible and useful	UN12 - Facilitate digital models sharing and information exchange	UN22 - Availability of digital archiving standards
DHUR-19	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Professionals and SMEs providing services or products for preservation, conservation and restoration	Preservation	Diagnostic activities	Survey and advanced multimedia representations for the selection of restoration interventions	Management of multiple data sources and type of information; imperfect synchronization and a lack of understanding between those collecting the information and the researchers	Use of systems of representation and data management allowing the transmission and analysis of data collected and also creating access to users not experts in the field of 3D graphics	UN18 - Provision of infrastructure and services for data sharing, access and re-use	
DHUR-20	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	group	Professionals and SMEs providing services or products for preservation, conservation and restoration	Conservation	Documentation of CH	3D models, particularly BIM and GIS, are often used as separated tools.	Low-cost software on the commercial market that do not match the rigorousness of classical photogrammetric methods. Recent technological progress has led to a reduction of the gap between the professionals and the amateurs.	BIM-GIS integration is not only expected, but mandatory to ensure a convergence of multidisciplinary interests	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	
DHUR-21	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	group	Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization	Conservation	Documentation of CH	The GIS and BIM systems, by their nature, manage information of different types and with different levels of detail.	Data interoperability	Integration between BIM (Building Information Modeling) and GIS (Geographic Information System). + "The system can manage, from a spatial point of view, different scales of detail, allowing the connection between data from the architectural scale to the territorial one and, from a temporal point of view, data belonging to different periods. "	UN17 - Visually organize 3D digital archives by the display of different level of information	
DHUR-22	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Public and/ or private heritage institutions responsible for managing monuments and sites	Conservation	Documentation of CH	Cultural Heritage documentation collection and analysis for maintenance, conservation and restoration	Lack of tools required by Cultural Heritage documentation: organized and coordinated storage and management of historical data, easy analysis and query, time management, 3D modelling of irregular shapes, etc. and constant updating of information and continuous collection and processing of different data	More coordinated and efficient management and preservation of heritage assets. All the metadata related to the survey and modelling are included to certify the process and the final product	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	
DHUR-23	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	NO	YES	TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Professionals and SMEs providing services or products for preservation, conservation and restoration	Preservation	Diagnostic activities	Develop **virtual inspection systems** that help experience and disseminate cultural heritage.	For such systems to be truly ubiquitous, they need to expose a user-friendly interface that an untrained population can find intuitive and engaging.	The paper shows a system that allows users tp interact with it by simply w **aving a laser pointer to select structures or to define a path.**	UN11 - Smart monitoring systems with minimally invasive installation and analysis systems to identify deterioration processes	
DHUR-24	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		DIGITAL ARCHIVES	Monuments / groups of buildings / sites (and landscape)	settlement	Professional researchers	Conservation	Documentation of CH	Digitalized acquisition of the architectural heritage	Multiple levels of representation of architectural heritage	Architectural elements must be preserved and accessable for stimulating fruition for those users interested in historical and cognitive research. It may be the case of a tourist or a citizen who is eager to deepen his awareness of a building or of a neighbourhood together with its layering of history and architectural value.	UN17 - Visually organize 3D digital archives by the display of different level of information	UN16 - Time upgradable 3D modelling
DHUR-25	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		ICT IN MUSEUMS	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN03 - Creating interactive museum experiences to better connect visitors	
DHUR-28	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	landscape	Others	Conservation	Studies on CH	Management of Geoheritage (basic needs covered by these are actually quite limited: to find, see and understand geoheritage before, during or after a visit to a geosite).	New digital tools, which are very efficient with many ways to manipulate geodata are only available on workstations equipped with the necessary software. Data interoperability. The cost of proprietary software may be prohibitive for some promoters. Compatibility problems may arise since the standards are not the same for different	To offer various technical solutions that allow users to view, search and also analyse, modify or acquire geographical data from the web. The use of digital imaging in real time and 3D modelling has made possible the study of inaccessible natural sites and the non-destructive observation of rocks and fossils.	UN09 - Creating immersive, populated, interactive reconstructions of archaeological sites to enhance users experiences	
DHUR-32	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	NO	YES	TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Professional researchers	Valorisation	Communication of CH	To offer a 4D model to be integrated into an interactive digital environment designed for a museum exhibit	Flexibility of models	The needs of museologists by linking various documentary sources (both text-based and iconographic) and testimonials to the 4D model.	UN10 - The need of high resolution interactive 3D visualization tools	UN12 - Facilitate digital models sharing and information exchange
DHUR-38	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Artifact	Collection	Museum curators	Valorisation	Gamings with CH	Creating a robotic cultural game for visiting the museum's inaccessible areas	Enjoying in a virtual and diversified way, through the use of digital technology, some objects that are not visible to the public.	Experiment innovative and empathetic categories of visiting, especially for the areas not accessible to visitors because of issues related to security or architectural barriers; growing museum competitivity; discovering new potentiality for the museum guide, which nowadays is living a severe crisis, with new skills, such as digital storytelling.	UN03 - Creating interactive museum experiences to better connect visitors	UN05 - Enhancing and making accessible underwater or inaccessible heritage
DHUR-39	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		ICT IN MUSEUMS	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN03 - Creating interactive museum experiences to better connect visitors	
DHUR-42	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization	Valorisation	Creation of partnership and networking	Creating a new cross domain portal covering museums, archives, libraries and audio visual archives	Management of multiple data sources and type of information	Increase the collaboration at technical and semantic levels as well as human and political (peer group collaboration).	UN18 - Provision of infrastructure and services for data sharing, access and re-use	
DHUR-44	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	landscape	Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization	Preservation	Monitoring	Mapping and monitoring of archaeological sites and cultural landscapes by the in satellite imagery	Data availability and accessibility. Lack of "intellectual accessibility". High professional skills in domain of satellite remote sensing analysis and interpretation.	Important contribution of satellite remote sensing to heritage monitoring, protection and management. To detect and monitor destruction and looting of heritage in areas affected by armed conflicts with no or low possibility for site control on the ground. Risk assessment and mitigation of effects of climate change.	UN07 - Spreading knowledge on remote sensing applications for cultural heritage sites	UN06 - The need of comprehensive risk assessment methods for cultural heritage affected by climate change and natural hazards
DHUR-48	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		ICT IN MUSEUMS	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN03 - Creating interactive museum experiences to better connect visitors	
DHUR-49	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		ICT IN MUSEUMS	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN03 - Creating interactive museum experiences to better connect visitors	

DHUR-50	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	NO	YES	TECHNOLOGIES/ MODELS	Artifact	Collection	Professional researchers	Conservation	Documentation of CH	Production, processing and interpretation of complex digital objects and the dissemination of valuable and diverse information to a broad spectrum of audience	combine knowledge base features with content management and information retrieval (IR) technologies	3D documentation as an affordable, practical and effective mechanism for long term documentation of tangible cultural heritage	UN12 - Facilitate digital models sharing and information exchange		
DHUR-51	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Artifact	Open air/ landscape	Professionals and SMEs providing services or products for preservation, conservation and restoration	Preservation	Maintenance practices	Several difficulties arise due to the amount of effort required in the initial phases, when the data derived from a geometrical survey must be converted into parametric elements	The process is highly time-consuming and it is based on the operator's knowledge and manual modeling work. Creation of digital libraries of parametric objects	New approaches for managing data and driving the decision-making process. Procedure to optimize the workflow of information for existing artefacts. Integrative procedure for obtaining an H- BIM by integrating several survey techniques to achieve the best result in terms of precision of parametric elements.	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing		
DHUR-53	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	Professional researchers	Conservation	Documentation of CH	Access to digital archives for CH research	Lack of integration and incomplete access to digital resources	Integrated point of access to cultural heritage resources	UN18 - Provision of infrastructure and services for data sharing, access and re-use	UN21 - Long-term preservation framework for large volumes of digital data	
DHUR-54	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	General and educational users and visitors, tourists	Valorisation	Communication of CH	Creating a new cross domain portal covering museums, archives, libraries and audio visual archives	Management of multiple data sources and type of information	Increase the collaboration at technical and semantic levels as well as human and political (peer group collaboration).	UN18 - Provision of infrastructure and services for data sharing, access and re-use	UN12 - Facilitate digital models sharing and information exchange	
DHUR-56	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Collection	Museum curators	Conservation	Documentation of CH	How online collections could support the information need of their users and the process of interpreting digital object	The issues that make interoperability	Such methods detail the generative potential of a complex process rather than the replication of a complex structure	UN20 - Generating and customizing visualization that allow users to dynamically and creatively experience digital contents.		
DHUR-57	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	complex	Professionals and SMEs providing services or products for preservation, conservation and restoration	Conservation	Studies on CH	Improve the capacity to produce, store, visualize and manage both archaeological and 3D data.	The system must be tested with all the buildings already studied in order to compare the results of this method in different examples of structures.	3D measurements are done by using only one photograph through the user interface and automatically computing reprojection and correlation. Survey directly on the 3D model in laboratory and insert in it a lot of different kinds of data.	UN09 - Creating immersive, populated, interactive reconstructions of archaeological sites to enhance users experiences		
DHUR-58	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization	Valorisation	Communication of CH	Innovation in the standards of digital archiving related to public service	Financial cost and legal practices such as copyright	To make information accessible and useful in terms of the characteristics digital media possesses and to create user inspired digital archives	UN22 - Availability of digital archiving standards		
DHUR-59	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	complex	Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization	Preservation	Identification of the risks and deterioration patterns	Quantify the possible inundation of the temple complex according to different scenarios	Evaluate effectiveness of implemanted solutions	reliable tool for forecasting environmental change and future change scenarios on cultural heritage through non-invasive and non-destructive tools	UN11 - Smart monitoring systems with minimally invasive installation and analysis systems to identify deterioration processes		
DHUR-60	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		ICT IN MUSEUMS	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN03 - Creating interactive museum experiences to better connect visitors		
DHUR-61	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	Professional researchers	Valorisation	Communication of CH	Exploitation of intelligent techniques in each step of the document processing, from the acquisition to the layout analysis, from classification to interpretation, from text categorization to semantic indexing for information retrieval purposes.	Lack of integration and incomplete access to digital resources	To keep contents accessible in their integrity and intelligible according to their meaning; to cope with the incrementality and the need for continuous updating and refining classification theories and concepts, in order to improve accuracy according to new available documents; to facilitate the fruition and investigation of the cultural heritage	UN18 - Provision of infrastructure and services for data sharing, access and re-use		
DHUR-62	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	Associations, NGOs, local communities and citizens aiming at maintaining and communicating cultural heritage	Valorisation	Communication of CH	Exploitation of intelligent techniques in each step of the document processing, from the acquisition to the layout analysis, from classification to interpretation, from text categorization to semantic indexing for information retrieval purposes.	Lack of integration and incomplete access to digital resources	To keep contents accessible in their integrity and intelligible according to their meaning; to cope with the incrementality and the need for continuous updating and refining classification theories and concepts, in order to improve accuracy according to new available documents; to facilitate the fruition and investigation of the cultural heritage	UN18 - Provision of infrastructure and services for data sharing, access and re-use		
DHUR-63	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	complex	Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digitization	Preservation	Maintenance practices	The process of cultural (including built) heritage preservation is an unceasing practice that requires relevant data to be captured, analyzed, filtered, recorded, monitored and regularly updated. The process is complex and includes a series of operations that start with physical surveying, data analysis, drafting, modeling and monitoring the post- construction	Integrating technology. Intensive cooperation between several fields. The availability of digitalization tools is limited to experts and highly costly.	Interaction between users from different specialties.	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	UN19 - Availability of tools to gather and integrate diverse digital materials, archive them appropriately and make the information accessible	
DHUR-64	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	NO	YES	TECHNOLOGIES/ MODELS	Artifact	Collection	Museum curators	Valorisation	Dissemination through publications	To create reproductions of their artwork, cultural heritage institutions employ a range of technology and a variety of workflows. A similar variety is used to publish these images in a number of output media.	the image quality attainable with the current reproduction workflows	while workflows still vary considerably, some commonalities were found for workflows producing images that were generally ranked highly across the experiments	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing		
DHUR-65	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		EDUCATION	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	How online collections could support the information need of their users and the process of interpreting digital object	Because an accurate representation of a user's interests, generally stored in some form of user profile, is crucial to the performance of personalized search or browsing agents	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN12 - Facilitate digital models sharing and information exchange	UN18 - Provision of infrastructure and services for data sharing, access and re-use	
DHUR-66	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		EDUCATION	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	How online collections could support the information need of their users and the process of interpreting digital object	Because an accurate representation of a user's interests, generally stored in some form of user profile, is crucial to the performance of personalized search or browsing agents	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN12 - Facilitate digital models sharing and information exchange	UN18 - Provision of infrastructure and services for data sharing, access and re-use	
DHUR-68	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	Professional researchers	Conservation	Documentation of CH	Investigation of a new model of access to archival resources that responds to user and interoperability requirements	Efficient access and exchange of resources is a challenge	User orientation of archives, where usability and findability of resources are number one priorities	UN22 - Availability of digital archiving standards	UN12 - Facilitate digital models sharing and information exchange	
DHUR-69	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	NO	NO	KNOWLEDGE SHARING AND VISUALISATION						(users' role in) the formation of cultural knowledge.	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Such methods detail the generative potential of a complex process rather than the replication of a complex structure			
DHUR-70	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		KNOWLEDGE SHARING AND VISUALISATION	Monuments / groups of buildings / sites (and landscape)	landscape	Associations, NGOs, local communities and citizens aiming at maintaining and communicating cultural heritage	Valorisation	Encounters with communities	They want to share their local knowledge and everyday experience with others, together with the contribution of cultural institutions	Society to be actively involved in cultural heritage activities (as observer & creator)	* Users **will be able to build extensive networks** around a common area of interest, connecting the past, the present and the future * Users **will be the providers of information** about cultural heritage in the everyday and ordinary, real life	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator		
DHUR-71	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Artifact	Open air/ landscape	Others	Conservation	Documentation of CH	3D recording of indigenous art sites.	Photogrammetrists seem to be poorly aware of what the owners of the site really require. Operational problems associated with bulkiness and portability of the laser scanner.	The creation of a DEM, generation of orthoimages, draping of those images over the DEM and production of fly-throughs, animations, etc. provides the basis for subsequent and non- intrusive scientific investigation.	UN09 - Creating immersive, populated, interactive reconstructions of archaeological sites to enhance users experiences		
DHUR-73	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		KNOWLEDGE SHARING AND VISUALISATION	Monuments / groups of buildings / sites (and landscape)	Open air/ landscape	General and educational users and visitors, tourists	Conservation	Documentation of CH	Use of geographic information systems and mobile location-based services in CH data.	The approach of utilising a scan line intersection algorithm delivers the desired results needed to determine the line of sight but a limitation is that it is specific to 2 dimensional data.	Introduction of a directional method of querying a realistic spatial database system that considers the user's line-of-sight in the context of cultural heritage information retrieval.	UN07 - Spreading knowledge on remote sensing applications for cultural heritage sites		
DHUR-77	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	To display high resolution 3D models.	It is a very novel experience and very few people have engaged with 3D objects outside of 3D software packages or games. 3D datasets is presenting problems affecting their storage and dissemination (size of the datasets).	To provide a methodology for museums and cultural institutions for prototyping a 3D viewer within a webpage. To promote their collections via the internet.	UN10 - The need of high resolution interactive 3D visualization tools		
DHUR-78	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		ICT IN MUSEUMS	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN03 - Creating interactive museum experiences to better connect visitors		
DHUR-82	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Artifact	Collection	Professional researchers	Conservation	Documentation of CH	How online collections could support the information need of their users and the process of interpreting digital object	The lack of tools tailored for CH requirements: organized and coordinated storage and management of historical data, easy analysis and query, time management, flexibility, user-friendliness, etc.	To create a single information space, where the data and the services owned by European archaeological institutions can be discovered and accessed through a single search facility. To address the item-level integration of archaeological data.	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator		
DHUR-83	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Artifact	Open air/ landscape	Professional researchers	Conservation	Documentation of CH	Documentation and representation of heritage.	Need of low-cost, holistic method utilizing AR (Augmented Reality) technologies to represent digital heritage.	There is a need for a high-tech visualization of cultural heritage because it is important to share and visualize data for such users as historians, archaeologists, architects, tourists and so on.	UN10 - The need of high resolution interactive 3D visualization tools		

DHUR-84	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Public and/ or private heritage institutions responsible for managing monuments and sites	Conservation	Documentation of CH	Documentation as methods to give meaning, understanding, definition, and recognition of the values of cultural heritage.	Documentation tools have undergone a major transformation and changing digital technology is increasing the gap between specialist and non-technical users in heritage documentation	The effectiveness of these new approaches, in comparison to traditional techniques, revolves around factors such as cost, time, accuracy and monitoring	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	
DHUR-85	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	Professional researchers	Conservation	Documentation of CH	Automatic creation of a hierarchy and the mapping between the items and the hierarchy.	Accurate representation of user's interests to perform personalized search or browsing agents.	Organising collections of documents and contributing to create a set of user-focused evaluation metrics that can be used to determine hierarchy and mapping quality; a novel data-driven hierarchy creation algorithm that uses data derived from Wikipedia as an intermediary between the user and the data; and the identification of attributes that suggest how hierarchies should be formed.	UN12 - Facilitate digital models sharing and information exchange	UN19 - Availability of tools to gather and integrate diverse digital materials, archive them appropriately and make the information accessible
DHUR-86	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Others	Conservation	Documentation of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-92	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digilization	Conservation	Documentation of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Because an accurate representation of a user's interests, generally stored in some form of user profile, is crucial to the performance of personalized search or browsing agents	To create a single information space, where the data and the services owned by European archaeological institutions can be discovered and accessed through a single search facility. To address the item-level integration of archaeological data.	UN19 - Availability of tools to gather and integrate diverse digital materials, archive them appropriately and make the information accessible	
DHUR-93	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	NO	NO	DIGITAL ARCHIVES										
DHUR-95	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		KNOWLEDGE SHARING AND VISUALISATION	Artifact	Archive/ library	Professionals and SMEs providing services or products for preservation, conservation and restoration	Valorisation	Creation of partnership and networking	Manage crowdsourcing projects	1)Promote ease of use, 2)attract and sustain user interest, 3)foster a community of users and 4)show users that their work is contributing to the institution and society		UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-99	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Artifact	Archive/ library	Others	Preservation	Materials conservation tests	Interactive visual analysis of multispectral and hyperspectral image data.	Existing research and commercial software are often comprised of a rich toolbox of useful algorithms for specific applications	To allow the user to explore the data in a novel way. To provide intuitive access to the raw image data.	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-101	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	landscape	Professional researchers	Preservation	Preventive conservation	Creating an efficient workflow process for High Dynamic Range (HDR) spherical panoramas for preserving heritage sites	The very large file size of each image that needs more computing resources lead to a search for a more efficient workflow process.	The digitization of CH is an effort to keep a digital copy of natural heritage not only for visitors to experience but also for interested parties to study the formations and habitat within through detailed documentation of the site.	UN20 - Generating and customizing visualization that allow users to dynamically and creatively experience digital contents.	
DHUR-102	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Collection	Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digilization	Conservation	Documentation of CH	Combination of general-purpose state-of-the-art AI tools, semantic technologies, and aggregation mechanisms with a novel crowdsourcing platform, so as to support seamless enrichment workflows for improving the quality of CH metadata in a scalable, cost-effective, and amusing way.	CH Institutions have put significant efforts in improving the quality of their collections' metadata, however, the efficiency of such efforts is compromised by a problem of scale: improving or even adding new metadata to hundreds of thousands or even millions of records coming from different sources requires significant investment in time, effort, and resources which organizations cannot	Metadata quality improvement and enrichment and engagement adn awareness on cultural heritage assets among users	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	UN12 - Facilitate digital models sharing and information exchange
DHUR-107	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		ICT IN MUSEUMS	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN03 - Creating interactive museum experiences to better connect visitors	
DHUR-108	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Artifact	Collection	Professionals and SMEs providing services or products for preservation, conservation and restoration	Preservation	Maintenance practices	To provide an open-source software tool with a single intuitive interface consistent with conservators' needs that handles various types of 2D and 3D image data and preserves user-generated metadata and annotations. To accommodate multiple types of digital imaging data.	Digital image data frequently requires both specialized software, which is often associated with a particular type of acquisition device, and professional knowledge of and experience with each type of data. Many of these software packages are focused on particular applications (such as medicine or remote sensing) and do not permit users to access and fully exploit all	To allow conservators to access different forms of information and to view a variety of image types simultaneously.	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	
DHUR-110	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		KNOWLEDGE SHARING AND VISUALISATION	Artifact	Collection	Professionals and SMEs providing services or products for preservation, conservation and restoration	Conservation	Documentation of CH	Cultural User eXperience: they aim to bring the user into the design process on creating a new product or service. [...] Each user has its own cultural characteristics, learns and interacts differently with a certain artifact and finally obtains a unique cultural experience. The interaction between different cultural objects and user's cultural backgrounds	Because, an accurate representation of a user's interests, generally stored in some form of user profile, is crucial to the performance of personalized search or browsing agents	A semantic representation of user's profile and needs could lead to **more efficient and accurate user modeling methods, which then combined with the structured data of the CH institutions**, would result to more complete and substantive personalized user experience	UN03 - Creating interactive museum experiences to better connect visitors	UN20 - Generating and customizing visualization that allow users to dynamically and creatively experience digital contents.
DHUR-116	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Artifact	Collection	Associations, NGOs, local communities and citizens aiming at maintaining and communicating cultural heritage	Valorisation	Communication of CH	Introduction of a pipeline that covers all steps from the digitization of the objects up to the Web publishing of the resulting digital copies: ease of use, high automation and quickness	In CH field, there is still a lack of global and automatic solutions enabling to cover the whole process-ing chain that ranges from content creation and digital archiving to content publishing and sharing	To simplify the production of multimedia content from real arti-facts, producing faithful digital imprints and avoiding thetedious and time consuming task of a manual modelingthrough CAD softwares; to improve knowledge sharing among public and museal institutions	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	
DHUR-119	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	landscape	Others	Conservation	Studies on CH	To foster archaeological data analysis, interpretation, and curation in a realistic and highly interactive virtual environment. To define new interactive ways to document, visualize, and curate searchable archaeological data using immersive virtual environments connected to a remote Structured Query Language (SQL) database server.	Ontologies for cultural objects. The online curation and dissemination of 3D and geospatial archaeological data is still all but mainstream.	To make our data more widely accessible to the public. To generate new interpretative questions. To create new inferential models for archaeological interpretation, but further investigation is needed to refine their usage and comprehension. Novel interactive and analytical tools that are not available in existing software.	UN09 - Creating immersive, populated, interactive reconstructions of archaeological sites to enhance users experiences	
DHUR-122	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		KNOWLEDGE SHARING AND VISUALISATION	Artifact	Collection	Museum curators	Valorisation	Communication of CH	Making heritage information more accessible to an ever-widening public audience	"enjoying in a virtual and diversified way, through the use of digital technology, some objects that are not visible to the public.	"enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor" "transforming the visitor experience into an active experience, through the most recent forms of edutainment"	UN03 - Creating interactive museum experiences to better connect visitors	UN05 - Enhancing and making accessible underwater or inaccessible heritage
DHUR-124	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	NO	NO	DIGITAL ARCHIVES										
DHUR-126	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		KNOWLEDGE SHARING AND VISUALISATION	Artifact	intangible	Professionals and SMEs providing services or products for preservation, conservation and restoration	Valorisation	Communication of CH	Some streamers **leverage live streams to showcase traditional cultural art forms and artifacts**, i.e., intangible cultural heritage (ICH). These ICH practices are endangered and not widely known, however, through live streaming, a broader viewer get to know them and begin to appreciate these cultural practices inherited from our ancestors.	Although these streamers may have large and devoted fan bases, t **hey have no effective tools to support learning or knowledge sharing, because most streaming platform features, e.g., gifting and leaderboards, are designed for entertainment**	To enable these streamers to better engage and communicate with viewers, tools need to be designed and developed to support these streamers in preparation of content, creating novel forms of streams, engaging viewers, and maintaining their communities	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	UN12 - Facilitate digital models sharing and information exchange
DHUR-129	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	complex	Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digilization	Conservation	Documentation of CH	Developing advanced 3D modelling for accessing and understanding European cultural assets and to close the gap between effective user experiences of Cultural Heritage via digital tools and representations, and the enrichment of the scientific knowledge.	Integration of semantic attributes. Cultural, environmental and management barriers. Semantic enrichment of heritage 3D models. Shared library for historical elements does not exist.	Accessing, understanding and strengthening European cultural heritage by means of enriched 3D models. To enhance the dialogue between ICT technologies, different Cultural Heritage experts, users and different disciplines, both social and technical. To achieve interoperable models able to enrich the interdisciplinary knowledge of	UN12 - Facilitate digital models sharing and information exchange	UN17 - Visually organize 3D digital archives by the display of different level of information
DHUR-130	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	complex	Decision-makers and national public bodies (i.e. ministries) promoting policies and strategies for conservation, preservation and digilization	Conservation	Documentation of CH	Accessing, understanding and strengthening European cultural heritage by means of enriched 3D models.access- ing, understanding and strengthening European cultural heritage by means of enriched 3D models.	Semantic enrichment. Large amount of data to capture. Issues to naming each architectural element that composes a building.	To achieve interoperable models able to enrich the interdisciplinary knowledge of European cultural identity by different users. Development of an open standard platform to "contain", implement and share the digital models. To innovative technologies for creating 3D models with an inclusive approach.	UN12 - Facilitate digital models sharing and information exchange	
DHUR-131	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	settlement	General and educational users and visitors, tourists	Valorisation	Accessibility	To offer inclusive tourism, especially at heritage destinations where full accessibility is often limited.	The accessibility of some Heritage destinations are often limited by site characteristics or conservation issues.	accessible heritage tourism experiences through virtual reality, with a focus on visitors with mobility impairments.	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-132	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	landscape	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create virtual databases using virtual globes - e.g., Google Earth - and other personal-use geomatics applications (smartphones, tablets, PDAs) for accessing geological heritage information in "real time" for scientific, educational, and cultural purposes via a virtual geological itinerary.	Accurate representation of a user's interests to perform personalized search or browsing agents.	To show tourists geological history of sites and to evaluate the scientific, educational, and tourism quality; to allow users to access to the georeferenced thematic layers and overlay data, images, and graphics in real time on their mobile devices.	UN20 - Generating and customizing visualization that allow users to dynamically and creatively experience digital contents.	
DHUR-139	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	Others	Conservation	Documentation of CH	The majority of librarians and information specialists in cultural heritage organizations (CHOs) collect use statistics. However, not as many community practitioners actively and consistently collect reuse statistics.	Lack of: standardized assessment approaches, time, assessment tools to support collection and analysis, appropriate software and/or system constraints, training and expertise in interpreting collected data.	Assessing digital repository content reuse,	UN23 - Reuse and recontextualization assessment standards	
DHUR-146	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	NO	NO	DIGITAL ARCHIVES										
DHUR-147	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES		DIGITAL ARCHIVES	Artifact	Archive/ library	Museum curators	Conservation	Documentation of CH	assessing the impact of data reuse in order to better understand, and tell the story of, what has been learned or gained by a user when they repurpose a digital object.	understand the users and uses of digital collections by applying a new type of assessment lens	Have a vehicle to consistently track usage of their images in any forum	UN23 - Reuse and recontextualization assessment standards	

DHUR-152	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	DIGITAL ARCHIVES	Artifact	Collection	General and educational users and visitors, tourists	Conservation	Studies on CH	To modernize the provision of infrastructure and services for data sharing, discovery, access and re-use.	The lack of tools tailored for CH requirements: organized and coordinated storage and management of historical data, easy analysis and query, time management, flexibility, user-friendliness, etc.	To enable these streamers to better engage and communicate with viewers, tools need to be designed and developed to support these streamers in preparation of content, creating novel forms of streams, engaging viewers, and maintaining their communities	UN12 - Facilitate digital models sharing and information exchange	UN18 - Provision of infrastructure and services for data sharing, access and re-use
DHUR-156	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	KNOWLEDGE SHARING AND VISUALISATION	Monuments / groups of buildings / sites (and landscape)	route	Associations, NGOs, local communities and citizens aiming at maintaining and communicating cultural heritage	Valorisation	Communication of CH	To present innovative ICT infrastructure specifically designed and optimized for the tourism sector: modular and scalable, represents an important communication system that facilitates the tourists' routes, as well as mining attractions and specific thematic routes across the territory. The proposed system allows managing multiple information with an Interoperable and multi- channel approach. Given its flexibility,	Managing multiple information with interoperable and multi-channel approach. Replicability of systems to different cultural and natural sites	Creation of the single cloud-based architecture that allows the management of multiple multimedia contents, to be exploited in various platforms; development of the unique content management system for several small municipalities of a same territory to share cultural and touristic information; monitoring user's preferences and needs by collecting users' generated data; providing local administration with	UN24 - Facitate networking and share resources in the touristic sector through common communication system based on digital information	
DHUR-157	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Artifact	Open air/ landscape	Museum curators	Valorisation	Communication of CH	To translate the complexity of the knowledge in appealing to users and into simple applications that fit with the public's need (The interaction interfaces are not always simple to understand and to control in a few minutes, and they can generate a sense of frustration that causes users to abandon the application after a short and superficial approach)	"a basic limit of most of virtual museums is that they do not fire up the attention and the involvement of the public: they lack stimulating activities for visitors, narratives metaphors, and emotional impact"	The potentiality of virtual ecosystems and new natural interaction interfaces in VR environments based on body movements.	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-160	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES	TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-161	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES	TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	landscape	Public and/ or private heritage institutions responsible for managing monuments and sites	Preservation	Monitoring	Owing to the ever-growing availability of free data and software, remote sensing (RS) techniques have been primarily used to map, analyse, and monitor natural resources for conservation purposes. The need to **adopt multi-scale and multi-temporal approaches to detect different phenological aspects of different vegetation types and species has**	The time-series composite image approach allows for capturing much of the spectral variability, but presents some criticalities (e.g., time-consuming research, downloading data, and the required storage space). *"The analysis of phenological differences during a selected time period (e.g., one*	the Google Earth engine (GEE) has been proposed, a free cloud-based computational platform that allows users to access and process remotely sensed data at petabyte scales. The paper addresses: *"To test how different variables and their combinations, all*	UN05 - Enhancing and making accessible underwater or inaccessible heritage	
DHUR-171	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES	DIGITAL ARCHIVES	Artifact	Collection	General and educational users and visitors, tourists	Conservation	Documentation of CH	Interested users, students, librarians, or researchers who want to access, search, and discover content	objects are often not easily accessible for interested users because of the distributed allocation of the content in different repositories and the variety in data structure and standards.	single point of discovery is necessary that searches all related data silos, which in turn requires an intelligent aggregation of results and a harmonization of metadata	UN18 - Provision of infrastructure and services for data sharing, access and re-use	
DHUR-172	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Artifact	Collection	General and educational users and visitors, tourists	Conservation	Documentation of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Digital collections, however, are dependent upon the interfaces through which they are explored and those interfaces do not necessarily encourage the modes of discovery that can provide new insights	The views created in Viewshare give external users an interactive interface that can be employed for generative interpretation and investigation of online digital collections. It provides the collection managers building those views a free, easy-to-use to	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-174	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	General and educational users and visitors, tourists	Valorisation	Communication of CH	Making heritage information more accessible to an ever-widening public audience	Because an accurate representation of a user's interests, generally stored in some form of user profile, is crucial to the performance of personalized search or browsing agents	Geo-crowdsourcing (GeoCS) has demonstrated itself to be a potential problem-solving tool for public management: -Gaining new geo-spatial knowledge; -Strengthening of social relationships; Personal satisfaction; -Learning; Self-expression; Self-image;	UN12 - Facilitate digital models sharing and information exchange	
DHUR-180	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-181	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	stand-alone / individual	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-192	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-196	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	landscape	General and educational users and visitors, tourists	Valorisation	Communication of CH	Providing raw-data and 3D reconstructions in CH and Archaeology	Interactive four dimensional framework where the user is able to visualize, explore, analyze	To generate a digital environment in which results can be analyzed in detail both in space and time whereas new hypothesis and interpretations are offered and can be scientifically discussed.	UN09 - Creating immersive, populated, interactive reconstructions of archaeological sites to enhance users experiences	
DHUR-197	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES	ICT IN MUSEUMS	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN03 - Creating interactive museum experiences to better connect visitors	
DHUR-199	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	KNOWLEDGE SHARING AND VISUALISATION	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	how online collections could support the information need of their users and the process of interpreting digital object	Users (often without much background knowledge) **are left on their own to browse and search through massive online portals without the typical guidance of the carefully curated museum exhibitions**. Millions of objects are only supported by brief (manually added) historical context, short descriptions or some limited metadata information	The ultimate hypothesis of our research is that cultural heritage institutions need to find the right balance be tween (1) providing information and supporting access to this information, and (2) providing and supporting its interpretation in ways suitable for a diverse range of online visitors.	UN18 - Provision of infrastructure and services for data sharing, access and re-use	UN03 - Creating interactive museum experiences to better connect visitors
DHUR-203	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES	KNOWLEDGE SHARING AND VISUALISATION	Monuments / groups of buildings / sites (and landscape)	intangible	General and educational users and visitors, tourists	Valorisation	Creation of partnership and networking	-Placing the user at the center of the preservation process. -Create a safe zone from where the act of understanding cultural diversity on the one hand, and the growth of personal sensitivity towards the heterogeneity of ICH on the other. -The broad participation and sharing of information between all actors and creates a	feeling understood regarding their motivations when making use of mobile geo-crowdsourcing applications	Geo-crowdsourcing (GeoCS) has demonstrated itself to be a potential problem-solving tool for public management: -Gaining new geo-spatial knowledge; -Strengthening of social relationships; Personal satisfaction; -Learning; Self-expression; Self-image; Instrumentality;	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-205	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	settlement	General and educational users and visitors, tourists	Valorisation	Communication of CH	The necessity of incorporating non-human controlled characters that include intelligence in order to enhance presence and provide the user with an engaging experience.	-While high-quality 3D visualization of spaces and artifacts is a desired element in virtual heritage applications, it is not alone adequate to ensure that the user experience will be as engaging and fruitful as expected. -The problem with such approaches is that they lack any additional interactive and social features that would further engage and motivate users.	-Interactive 3D environments to represent existing or reconstructed cultural artifacts and places in high detail. -Added interactivity allows users to freely navigate and explore the content, as well as provide engaging features such as interactive digital	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator	
DHUR-207	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES	USER GROUPS			Non specific							
DHUR-225	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	KNOWLEDGE SHARING AND VISUALISATION	Artifact	Collection	Others	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Digital collections, however, are dependent upon the interfaces through which they are explored and **those interfaces do not necessarily encourage the modes of discovery that can provide new insights**. --> digital collection managers will need to ask **whether traditional interfaces truly support the increasingly novel and exploratory ways that users engage with online collections**	The views created in Viewshare give external users an interactive interface that can be employed for generative interpretation and investigation of online digital collections. It provides the collection managers building those views a free, easy-to-use tool to probe the strengths and limitations of collection metadata	UN20 - Generating and customizing visualization that allow users to dynamically and creatively experience digital contents.	
DHUR-226	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	DIGITAL ARCHIVES	Monuments / groups of buildings / sites (and landscape)	landscape	Professional researchers	Conservation	Historic and bibliographic research	To modernize the provision of infrastructure and services for data sharing, discovery, access and re-use.	One of the major limitations perceived was the lack of knowledge and tools for easy sharing of these visual resources and to support remote visual analysis	To create a single information space, where the data and the services owned by European archaeological institutions can be discovered and accessed through a single search facility. To address the item-level integration of archaeological data.	UN18 - Provision of infrastructure and services for data sharing, access and re-use	
DHUR-234	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	complex	Public and/ or private heritage institutions responsible for managing monuments and sites	Preservation	Preventive conservation	HBIM methodology to support documentation, management, and planned conservation of historic buildings	Rather complex 3D modeling requirements. Lack of shared regulatory references and guidelines as far as semantic data are concerned. Lack of knowledge and training in information technology of most CH professionals.	Flexibility, easy usability, and information sharing. To support documentation, ordinary management, and planned conservation of historic buildings. To give a concrete answer to the lack of tools tailored for CH requirements.	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	
DHUR-237	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES	TECHNOLOGIES/ MODELS	Artifact	Collection	Professionals and SMEs providing services or products for preservation, conservation and restoration	Preservation	Diagnostic activities	To provide a portable solutions To produce a hierarchical 3D reconstruction of the object via successive utilization of multi-sensorial dara To apply material analysis techniques. To spatio-temporally (4D) simulate uni-material models taking into account	Reduce risks associated to objects manipulation and increase safety of operation Understand effectivly of restoration and maintenance treatments according to their evolution over time and their applicability under particular environment conditions	Automatic digitization and documentation of a wide variety of cultural items	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing	
DHUR-238	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	DIGITAL ARCHIVES	Artifact	Archive/ library	General and educational users and visitors, tourists	Valorisation	Communication of CH	To enhance the discovery and use of the content made available in digital libraries	Subject knowledge and specialist language	Enhance the discovery and use of the content made available in digital libraries.	UN12 - Facilitate digital models sharing and information exchange	UN19 - Availability of tools to gather and integrate diverse digital materials, archive them appropriately and make the information accessible
DHUR-240	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	DIGITAL ARCHIVES	Artifact	Archive/ library	Professional researchers	Conservation	Documentation of CH	Present the results in surveying available web technology for applicability in metadata aggregation in cultural heritage.	Existence of many individual digital libraries, maintained by different organizations, brings challenges to the discoverability and usage of these resources by potential users.	Several technological solutions from the Web are available and look promising for simplifying the implementation of the metadata aggregation scenario in cultural heritage. Future work, on the technical software side, will address how these technologies may be used for designing crawling robots that aggregate the metadata. We expect that with crawling algorithms, which make use of Web	UN19 - Availability of tools to gather and integrate diverse digital materials, archive them appropriately and make the information accessible	UN12 - Facilitate digital models sharing and information exchange
DHUR-241	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Artifact	Open air/ landscape	Professional researchers	Conservation	Documentation of CH	To educate the general public about the current situation of murals and conservation effort by experts for better appreciation and preservation of this national treasure	Because of historical, natural, and manmade reasons, Mogao Grottoes is under mural degradation, including mildew, discoloration, smoking, blister, fake, and disruption. It is difficult to allow the general public to conduct active learning by simulating the real prac tice on the cultural heritage site	There has been a rising trend of carrying out digital mural restoration in the CH conservation feld. With potential advantages, digital restoration is efficient, repeatable, and convenient for popularization	UN12 - Facilitate digital models sharing and information exchange	

DHUR-246	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES	TECHNOLOGIES/ MODELS	Artifact	Collection	Others	Valorisation	Communication of CH	New technological possibilities for digital documentation, analysis and research, exhibition display and education.	New technological possibilities for digital documentation, analysis and research, exhibition display and education.	Benefits and provide opportunities for scientific research but also to enable the 'public to explore collections for inspiration, learning and enjoyment' and 'to research, share and interpret information related to collections, reflecting diverse views'.	UN25 - Benefits and provide opportunities for scientific research but also to enable the 'public to explore collections for inspiration, learning and enjoyment' and 'to research, share and interpret information related to collections, reflecting
DHUR-251	3 - The paperis focused in digitalisation of monuments and sites and clearly addresses users requirements	YES	DIGITAL ARCHIVES	Monuments / groups of buildings / sites (and landscape)	landscape	Professional researchers	Conservation	Historic and bibliographic research	Data acquisition, organization, analysis, and presentation of research results of individual projects	The issues that make interoperability	Enables data providers to register and provide access to their resources	UN18 - Provision of infrastructure and services for data sharing, access and re-use
DHUR-255	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Artifact	Collection	General and educational users and visitors, tourists	Valorisation	Communication of CH	To create new ways of seeing and navigating digital collections. generating and customizing views that enable users to creatively experience digital cultural heritage collections	Devise alternative methods for the design and production of an interpretative digital cultural heritage	Enhance the vision of the real object enriched by digital content, implementing the educational content offered to the visitor. Transforming the visitor experience into an active experience, through the most recent forms of edutainment	UN04 - The need of society to be actively involved in cultural heritage activities, not only as an observer but also as a creator
DHUR-256	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Artifact	Archive/ library	Public and/ or private heritage institutions responsible for managing monuments and sites	Conservation	Documentation of CH	To help preserving the historical monuments creating a digital architectural archives	Final survey accuracy. Time-consuming process concern information extraction.	Architectural archives of monuments and historic buildings, complemented with geographical information of the surroundings, are a valuable source of information to preserve, reconstruct and rehabilitate the architectural patrimony.	UN01 - Optimized, cost-efficient and time-saving procedures for data capturing and processing
DHUR-257	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	TECHNOLOGIES/ MODELS	Monuments / groups of buildings / sites (and landscape)	landscape	Public and/ or private heritage institutions responsible for managing monuments and sites	Preservation	Preventive conservation	Applying IoT technologies to CH for remote monitoring of factors affecting the conservation state of artworks in order to improve their long-term preservation and to promote the value of CH for future generations.	Data availability and accessibility	To optimize resources and avoid expensive in-situ installations, allowing massive supervision of artefacts contained in museums, historical buildings, open-air archaeologicalsites, etc; and to have a precise diagnosis of the key factors affecting art displays	UN07 - Spreading knowledge on remote sensing applications for cultural heritage sites
DHUR-260	2 - The paper refers to general requirements (not specific to users categories) or to a specific technology	YES	DIGITAL ARCHIVES	Artifact	Archive/ library	Professional researchers	Conservation	Documentation of CH	Applying IoT technologies to CH for remote monitoring of factors affecting the conservation state of artworks in order to improve their long-term preservation and to promote the value of CH for future generations.	Data availability and accessibility	To optimize resources and avoid expensive in-situ installations, allowing massive supervision of artefacts contained in museums, historical buildings, open-air archaeologicalsites, etc; and to have a precise diagnosis of the key factors affecting art displays	UN07 - Spreading knowledge on remote sensing applications for cultural heritage sites