H2020-Adhoc-2014-20-RTD-G.A. No. 699523 – JHEP2

Support to the implementation of the Strategic Research Agenda (SRA) of the Joint Programming Initiative on Cultural Heritage and Global Change (JPI CH)

Instrument: Coordination and Support Action

Deliverable D 2.11

Growing the Heritage Portal into a Knowledge Hub
Scoping study

Due date of deliverable: *December, 2017*

Actual submission date: *May, 2018*

Lead beneficiary for this Deliverable: MCI (Ministry of Research and Innovation, Romania)

Start date of project: 1st January 2016 Duration: 4 years

Ministry of Cultural Heritage and Activities (Italy)

Project Coordinator: Antonia Pasqua RECCHIA

Coordination and Support Action within Horizon 2020 (2014-2020)		
Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

CONTENTS

INTRODUCTION

The Joint Programming Initiative in "Cultural Heritage and Global Change: a new Challenge for Europe" (JPI CH) was approved by the Council as one of the three short-listed JPI proposals on December 2009, and was launched in January 2010. Its implementation and grow up through a joint commitment of 19 Participating Countries and 7 Observers is currently carried out according to its „bible" documents, namely: *Vision Document, the Strategic Research Agenda (SRA), the Action Programme* and in course to be adopted, *Future Strategy-Vision, main achievements and future goals.*

A scoping study about the transition of the Heritage Portal to a Knowledge Hub system will be delivered in respect of JHEP2 Deliverable 2.11 ("Growing the Heritage Portal into a Knowledge Hub") by Ministry of Research and Innovation (former ANCSI)- RO as task leader of Task 2.5 "Knowledge Hub".

As stated in the Description of Work (Grant Agreement No. 699523, JHEP2, Annex 1): "*The potential of the Heritage Portal to be transformed into a Knowledge Hub will be explored at the level of available knowledge and its rate of enrichment and refresh as well at technical dimension, in its capacity to store data and providing customized information in real-time to a large number of users. The identified "best practices" in terms of preservation and re-use of declared heritage cultural sites and assets, innovative ICT-based conservation techniques will be particularly investigated in making the transition from a portal dimension and functionality to a knowledge hub (i.e. a cloud repository system) in the service of public, aware scientific communities, practitioners and indirectly users the for long term".* Therefore, deliverable 2.11 appears as a scoping study on challenging the potential of the current Heritage Portal to turn into a Knowledge Hub, referring in the following as Heritage Knowledge Hub (HKH). The aim of intended study is to demonstrate that HKH could provide a platform for knowledge exchange and learning on effective CH cooperation at all levels since the critical mass of the prosumers of cultural goods are increasing irrespectively of their membership to public sector or to private markets.

General and indispensable requirements is proposed regarding the IT architecture (modular system) and content (data and meta-data) for the extended capacity and new services that HKH is expected to provide. We are less suggestive about the particular adequate technical IT solution as there are many available tools and software packages that can be suitably chosen at the time of implementation by the respective developer team.

The ultimate end of the HKH is to "improve the supply and accessibility of content that supports evidence-informed policy making and practice in Cultural Heritage area." The identified "best practices" in terms of preservation, re-use of and marketing declared heritage cultural sites and assets, innovative ICT-based conservation techniques will be particularly investigated in making the transition from the Heritage Portal to an upgraded configuration that may embody a cloud repository system. These services mainly respond to the needs of aware scientific communities, policy makers, economic players, market niche innovators, practitioners and other users from large public. The analysis is performed in terms of functionality, accessibility and data visibility on friendly user interface.

The report methodology is based on desk research. The **General Context** section does explain the present conditions and how the CH consideration of cultural heritage is gaining a higher interest within research and cultural European landscape, the policy science framework that is favourable to setting up a knowledge hub. The operability and performance dimensions of HKH are sketched in **Vision** section. A technical backbone architecture is proposed in relation to the high requested performance within the **System Architecture** section. The **Data Content, its Accessibility and Security** section develops the content and information type that will be in demand for the targeted audiences. The users categories, their instruments of involvement in generating knowledge and how the HKH answers their needs in terms of information, are depicted in **Customers** section. The **Global Visibility and Sustainability** section stresses the international position of Cultural Heritage and its reinforcement in relation to major worldwide organizational players on research arena. **Cost Analysis**

in Creation and Maintenance section focuses on cost-benefit analysis for both setting up and maintenance phases. The report is concluded by **Recommendations and Conclusions** section.

GENERAL CONTEXT

Since the adoption of the European Agenda for Culture in 2007, cultural heritage has been a priority for the European cooperation on culture policy. Cultural heritage is a "strategic resource for a sustainable Europe, a major asset and an important component of the European project", as the Council Conclusions of May 2014 stated. The Commission, in its Communication of July 2014 and Council in its Conclusions of November 2014 reminded the importance of boosting efforts and synergies across different stakeholders to safeguard develop and transmit cultural heritage to future generations.

Thus, the **sustainable development** is a driver to the future strategy for cultural heritage. Adopting innovative strategies which may include inter-alia the use of technology and ICTs as well as the creation of partnerships and alliances could further strengthen the sustainability of the business models of CH management and reuse. European cultural heritage is of exceptional economic importance, generating an estimated annual revenue of € 335 billion and 9 million jobs through developing innovative conservation strategies and through the integration of the most advanced technologies in cultural assets and related industries (i.e. circular economy).

Historic cities, towns and villages face the most complex problems in terms of preserving the European identity while generating sustainable growth and employment. With this challenge, wise heritage management can be successful through the energy-efficient re-use of historic buildings, and the promotion of greener transport and cultural tourism. Cultural and creative industries are gaining more impact on urban and natural environments, rural areas and remote regions and they are strongly connected with the natural environment as well as with the community-oriented management. The HKH would like to capture these different lines of management of innovative forms initiated both within industrial sector and within communities' self-organization.

In terms of policies, CH is addressed both at EU, regional and national levels. The maintenance, restoration, accessibility and exploitation of cultural heritage are primarily national responsibilities. The interaction between the CH and environment, research and innovation, education, is shaped by several EU policies as it is underlined in the key EC and Council Communication papers.

In terms of "engaging communities" and digital tools, according to [2], "*participatory governance of cultural heritage**:***

- *seeks the active involvement of relevant stakeholders in the framework of public action - i.e. public authorities and bodies, private actors, civil society organisations, NGOs, the volunteering sector and interested people - in decision-making, planning, implementation, monitoring and evaluation of cultural heritage policies and programmes to increase accountability and transparency of public resource investments as well as to build public trust in policy decisions;*
- *helps triggering new opportunities brought by globalisation, digitisation and new technologies which are changing the way cultural heritage is created, accessed and used;"*

According to [2], the Council *"invites the member states to:*

- *make use of digital means in order to increase access to and participation in the governance of cultural heritage for all social groups**;***
- *explore the role of virtual communities in the development and implementation of cultural heritage policies....";*

"…*development and heritage preservation, research into the specificities of the relationship between urban 'smartness' and cultural heritage remains limited*" according to [5].

"*The citizens of a smart city are potential participants in its governance and in the evolving development of smarter services, including those related to accessing and preserving cultural heritage and the arts. Now, however, there are few visible examples of smart cultural initiatives integrated with smart city developments at a pilot or a conceptual level*" according to [6].

"....although potential applications and approaches abound, cultural heritage currently stands for a mostly unexploited asset, presenting multiple integration opportunities within smart city contexts." according to [5].

In 2011, the European Commission initiated the European Innovation Partnership on Smart Cities and Communities.

The JPI should have a word to say in this respect and the HKH should keep track of new developments triggered by these recommendations across EU.

VISION

The adopted definition for the meaning of Knowledge Hub Portal (HKH) is the one expressed in [10]: **"***Knowledge hubs are local innovation systems that are nodes in networks of knowledge production and knowledge sharing. They are characterized by high connectedness and high internal and external networking and knowledge sharing capabilities. As meeting points of communities of knowledge and interest, knowledge hubs fulfil three major functions: to generate knowledge, to transfer knowledge to sites of application; and to transmit knowledge to other people through education and training".*

Objective: Create a Cultural Heritage platform to establish and disseminate best practices and shape the research agenda in embracing an inclusive approach by listening to all potential stakeholders via the portal. It will provide input to EU, national and local policymakers, and screening research and innovative initiatives from the community of practice inside and outside the EU.

"*The potential of the Heritage Portal to be transformed into a Knowledge Hub will be explored at the level of available knowledge and its rate of enrichment and refresh as well at technical dimension, in its capacity to store data and providing customized information in real-time to a large number of users*" (JHEP2-DoW).

The data flow circulating on the site is mainly supporting the research and innovation in cultural heritage sectors, mostly in line with the Strategic Research Agenda defined priorities; HKH promotes and encourages the re-use of published data in terms of research results, innovative actions, supporting policies and data as research work. The HKH aims to map new developments and indicate the road in CH innovation, science, management development, and business models.

Offer a support for knowledge exchange to increase the capabilities of institutions and organizations in the capacity building. Information and expertise models are spreading out to provide multiplier effects over similar organizations and initiatives. Through knowledge retention and transparency of information, sustainable cross-sector research and academic cooperation and continuous active involvement of communities of practice and services in CH protective exploitation are expected to increase.

To achieve all these, the website will encompass three main pillars, namely **Research** (including education and training), **Policies** and **Business and Entrepreneurship**. Although it will be necessary for research to be undertaken in partnership with heritage agencies, the private sector and practitioners, consideration is given to support for research underpinning the development of policies, charters and guidelines as well as business development strategies within institutions.

As it is stated in the JHEP2-DoW "*The Heritage Portal as major dissemination instrument towards stakeholders and society will promote and will be promoted where appropriate (by) other websites where the European heritage is clearly referenced by worldwide recognized values*." Moreover, according to [12], the "International research leadership" indicator shows that, in overall, the JPIs registered a score of almost 3 on a range of 0-5, which means that considerable efforts should be streamed by MS in strengthening the collaboration links under various umbrella activities with the international partners within the specific areas of JPI. The cooperation dimension is of the same importance as the policy formulations and their adoption. Keeping this reason, the HKH should be a lighthouse at global arena by fostering the cultural/research heritage international cooperation.

The central objectives of HKH are:

1. To analyse the economic and social potential of community practices; JPI CH will demonstrate that the ***heritage economy*** (based on research and development services) is underpinned by a ***heritage industry*** (consisting of physical, digital and intangible assets) that together add to Europe's future worth;
2. To formulate evidence –based policy recommendations;
3. To consolidate a critical mass for participatory governance among public and private actors;
4. To map existing funding opportunities for CH research/innovation over the EU programmes;

5. To transmit the knowledge of cultural heritage and skills to the younger generations;
6. To provide training for the capacity building of cultural heritage research.

A large amount of data will be streamed and a wide range of produced knowledge will be managed through four main stages detailed in the following.

Knowledge generation: The performed analytical work reflecting on results and lessons from implementation of various policy initiatives at national and local level (e.g. produced by governments and/or universities and research institutions, JHEP and JHEP2 deliverables, etc.) will release sound knowledge. The medium term objective is to improve the understanding of the role of policy coordination and governance in relation to education, research, digitalization, socio-cultural development and cultural innovation.

Knowledge utilization and production: The stakeholders should be encouraged to use the knowledge available. Help create a trusted learning and sharing environment for engaged community and dedicated governance, where everyone can benefit from a shared understanding of CH assets and values; create a culture of collaborative practice development, sharing and problem solving.

Knowledge management: A knowledge management interface through an adequate architecture will facilitate the translation and distilling of specific knowledge addressing various stakeholders (i.e. curators at regional and national level, staff with specific responsibilities). Creating a database-management system to organise knowledge generated from JPI CH participatory stakeholders (formally organized or informally) so that they can be easily retrieved;

Knowledge sharing: Creating knowledge sharing tools and mechanisms: (i) specific work spaces split in thematic topics addressing stakeholders from research, industry, business and society at large; (ii) creating a dedicated social media spaces that shows the work of JPI's that is innovative, generate new knowledge and whose lessons can be showcased during events (e.g. Twitter).

The HKH aims to become the Europe's observatory on Cultural Heritage research and innovation. HKH gathers all the information, knowledge and experiences in the field of CH in Europe, in order to represent a one-stop-shop for all sustainable CH related issues. The HKH will join forces with other existing websites in related sectors, i.e. with European Research Infrastructure on Heritage Science- E-RIHS website that is going to become a pan-European infrastructure.

A website (www.jpi-culturalheritage.eu) has been set up for JPI CH consortium members supporting the management, communication and dissemination of information on the joint programming process and cultural heritage research activities.

Independently of the JPI CH website, the Heritage Portal as a dissemination platform towards research community has been set up (www.heritageportal.eu). It is an interactive online resource for the broad cultural heritage community, where research findings, funding opportunities, stories, discussions and events are shared. The assessment of the existing site proves that, currently, the Heritage Portal is a dynamic online community for both researchers and practitioners operating in the multi-disciplinary field of cultural heritage. It aims to address the very real problem of fragmentation within a research area where the topics covered can range from art history to nanotechnology, through sociology and anthropology, to structural engineering. The current online site has dedicated sections of **Funding, Vacancies, Training, JPI CH presentation** which will be developed and make themselves more distinctive in the future framework of the HKH. The developments in terms of regulation and best practices across **EU countries** will be kept. The issue **EU institutions** will be enlarged with international one. The invitation addressed to visitors „**How to contribute**" – will be kept as interaction mechanism as it is well defined from security and data safe point of view, just it will be extended over much more topics for citizens engagement.

Also, data flow from JPI CH site will regularly feed HKH content. The research/joint activities outcomes as well as regular CH news, as well as events calendar and the most up-to-date relevant EU legislation and support programmes will be copied from JPI CH website to HKH, gaining a wider

visibility. The KHK will be built on a gradual upgrading of the present website of Heritage portal. The Figure 1 presents the data transfer from JPICH site towards step by step upgraded Heritage portal.

The core target group of HKH are professionals working in the field of CH and related disciplines with a particular added value for public managers working at policy or technical level. Other users include services providers, NGO's, interest groups and professional associations active in the field. The tracking system in place for Heritage Portal shows at the mid 2016 that there are currently 2114 registered users, there are currently 804 subscribers to the monthly newsletter, 3.007 likes and 2,980 people follow this on Facebook, 861 Twitter followers. The aim is to further develop the Heritage Portal functionality and increase the traffic to the website. The HKH will continue to be a major dissemination instrument towards stakeholders and society. Results of research and joint activities as well as best practice in terms of preservation, re-use and relevant new ICT techniques will get a wide visibility via the HKH. News items should cover initiatives both around Europe coming from public governmental institutions, private creative industry communities, cultural organizations and no less civil organizations and similar

Figure 1. Data transfer from JPICH site towards upgraded Heritage portal

SYSTEM ARCHITECTURE

The aim is to propose a knowledge architecture design for cooperation with external users and deep fusion of gathered data. What we intend by "system architecture" is:

> "*In ICT research the term architecture typically describes how the system or program is constructed, how it fits together, and the protocols and interfaces used for communication and cooperation among modules or components of the system*"[1]

OR,

> "*IT architecture is a design for the arrangement and interoperation of technical components that together provide an organization of its information and communication infrastructure*"[2]

The HKH gateway aims to establish a continuous exchange of knowledge with national, EU-level and global knowledge providers such as member states, EU and international organizations, data services, research bodies and industry associations. It is a virtual space for these providers to consolidate, expand and increase the visibility of their CH knowledge.

The HKH offers a "one-stop-shop" for existing information and good practices. The HKH gathers information from various stakeholders, such as EU institutions, national administrations, regional and local authorities, civil society, social partners, private enterprises, academia, international organizations, etc.. Also, the HKH offers an up-to-date visual tool recording the implementation progress of the objectives established in [3] and [4].

The HKH is a platform for re-organizing, re-purposing and re-using cultural heritage science information by moving away from the notion of item repositories towards a network of connected resources. The scattered information across several sources, such as ministries, agencies, research institutes, cultural organization, enterprises and universities are valuable resources targeted by the platform. The need to consume information from various data sources in the cultural domain is more than never online demanding and the proliferation of repositories hosting important information in the form of metadata records, authority files, linked data resources makes possible the creation of a system as a "cross-route" node of this flow of big data. In other words, the proposed platform should aggregate content from credible sources, following activity streams and verified links, but not in the concept of how a digital library like **Europeana** repository is built.

The milestone steps in building up the HKH are described in the following:

1. **Hand-over from the current Heritage Portal**
   A mechanism for transferring the Heritage Portal functionalities and content onto the new developed architectural system on the server and adoption of a Content Management System that ensures a smooth and quick integration of all functionalities of the portal.
2. **Actions for HKH development backbone architecture**
   Upgrade or change of the *IT system architecture*;
   Identification of *possible structure and accessible models* to incorporate and extend the current Heritage Portal storage capacity (repository).
   Identify, review, select, prepare and upload adequate *data content* for the various sections of the new portal, including case studies, facts & figures, digitization tools resources, training material, funding opportunities, business models for CH management, etc..
   The HKH services will be designed to attract new users and maintain high interest from existing specialised audience; analyse users' behaviour on website and assess their needs; intensively *use the social media networks*, (LinkedIn, Facebook and Twitter); develop a

1 www.courts.state.ny.us/ad4/LIB/gloss.html

2 http://www.ichnet.org/glossary.htm

strategy to encourage interaction and engagement with the CH community members. Appropriate links to relevant DGs' websites (DG EAC, DG RTD, DG Connect, etc.), to the audiovisual services portal of the Commission and their associated social media pages.

Suitable management tools for *expanding remotely the access of users*: use of Web 2.0 technologies and Social Media applications to support the knowledge sharing. In the social media space, web APIs have allowed web communities to facilitate sharing content and data between communities and applications. In this way, content that is created in one place can be dynamically posted and updated in multiple locations on the web.

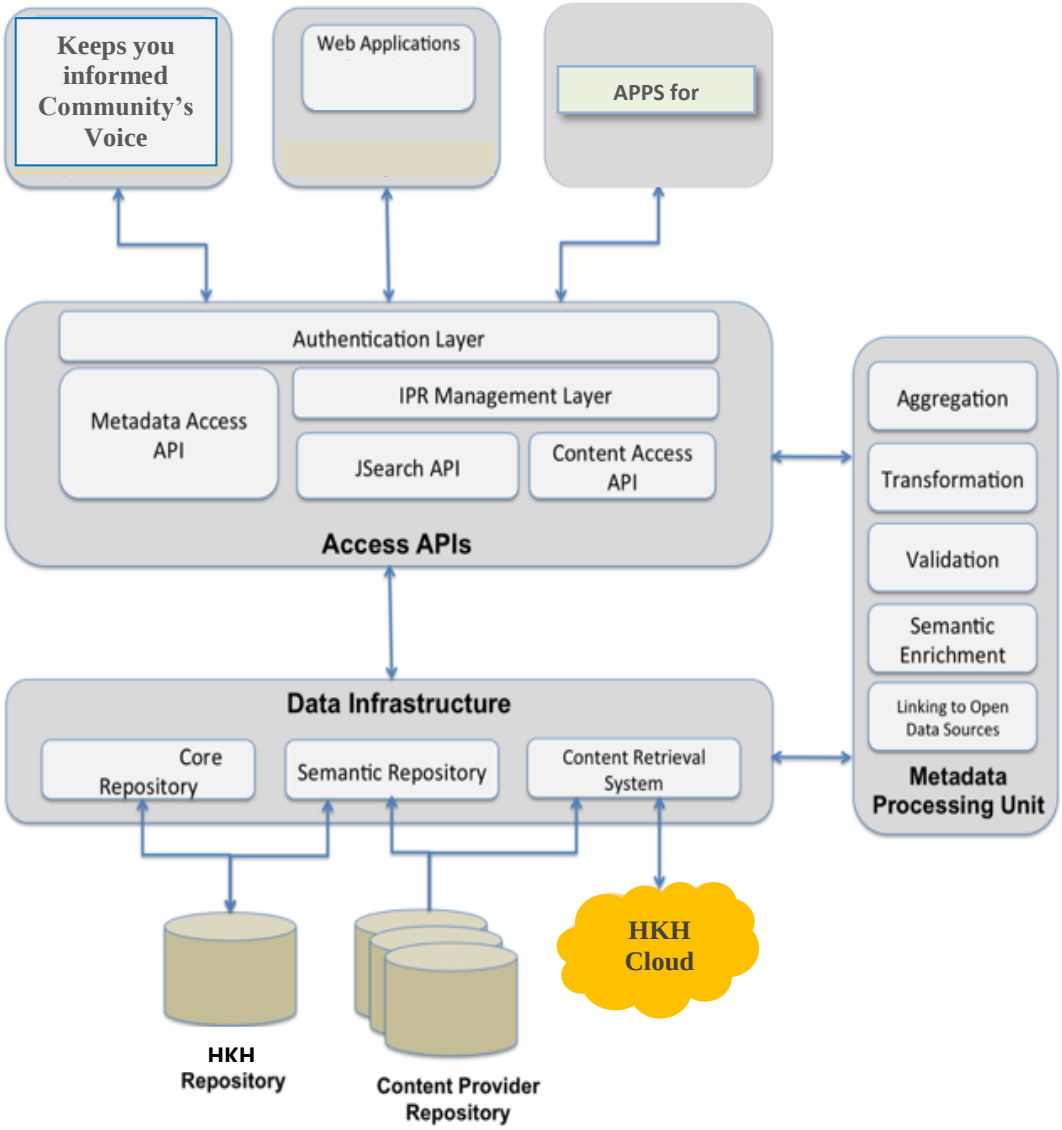
The system will be equipped with a leading-edge semantic search engine able to deliver real-time customized information. Optimal search capabilities are crucial to the development of an active user community for the site.

3. **Maintenance periodic operations**

   Maintain *and update all content,* including the databases, documents, links etc. Verify that information is still relevant and properly inter-linked, proceeding with the direct update to ensure constant relevance and quality of the HKH. Ensure that data uploads, subscriptions, access rights, etc. are properly managed and the new content is properly filtered being subject to internal quality control. IT features of the portal perform properly and that all IT security risks are adequately applied.

The web platform with user-oriented front and back-end operability will provide great opportunities to develop further innovative applications that can draw upon the wide range of source content and metadata available. The HKH architecture framework is depicted in Figure 2.

Figure 2. HKH system architecture



Technology infrastructure

General and indispensable requirements are proposed regarding the IT architecture (modular system) and content (data and meta-data) for the extended capacity and new services that Heritage Portal (HP) is expected to provide as HKH. We are less suggestive on the particular adequate technical IT solution as there are many available tools and software packages that could be suitably chosen at the time of implementation by the respective developer.
In overall, a performing HKH hardware/software architecture should include the following components:

1 Platform architecture

1.1. Dedicated server infrastructure

1.1.1. Staging environment
1.1.2. Failover system
1.1.3. Production environment

1.2. Infrastructure Failover

The platform architecture uses a failover mechanism to insure continuous availability of the website. The monitoring system will be responsible for triggering the failover of the system in case of issues within the availability of the website or the underlying infrastructure, a notification is automatically sent to the system administrator.

2 System services

The following systems should be available and used to ensure availability, standardization and recovery:

1.1 Monitoring services

- system to monitor the health and availability of the server and the website (IT infrastructure monitoring).
- open source Host-based Intrusion Detection System. The system monitors the logs, root-check and the processes running on the server → notifications are sent to the system administrator in case of any suspect service or activity is detected.

The monitoring services are designed and configured to check the status and availability of the system and the website, in case of failover is triggered and a clone of the actual site hosted in a different data centre will take the relay of the live site, a notification is instantly sent to the system administrator to start the recovery process of the live site.

1.2. System in use to insure a proper backup strategy

- Backup to disk: insures that backups are being taken within the following approach.
- Mirror of the website: A fully updated copy of the website is kept as a mirror of the live site, and will take the relay in case of interruption of service of the actual live site.

1.3. System for deployment and standardization of the infrastructure.

Automated deployment and standardization insures that all the servers are setup in an identical manner, and insures that all the servers have the same software version with the latest applied security patches.

Content Storage and accessibility

The technology infrastructure should provide storage and access to medium and high quality content for use by web-based applications. The application programming interface (API)[3] approach

3 An API approach is an architectural approach that revolves around providing programmable interfaces to a set of services to different applications serving different types of consumers (Wikipedia)

(for knowledge sharing) a web-based system and a database system should use best practice examples that not cause a lot of load. The access mechanism must be able to filter according to assigned rights statements. It is envisioned that access for project partner and developers may be different to a wider audience. In technical terms, the technology infrastructure must be able to implement access to content based on rights specifically stated for the purposes of the data use.
The Technical Space provides storage and HTTP access to medium and high quality content uploaded by users. Types of content include image, video, audio and text files in various formats.
The Metadata Processing Unit

The interoperability among various formats for metadata and the semantic enrichment of knowledge in the scientific cultural heritage field will be ensured by Metadata Processing Unit (MPU). The repository of metadata will be accessible via metadata delivery protocols (such as OAI-PMH), programmatic interfaces and semantic web technologies (such as SPARQL). The MPU should be based on the developers platform that supports different protocols for importing metadata and a user-friendly interface. The developer's platform should re-use other open source development frameworks and libraries according to specific deployments and customizations[4].
The existing tracking system on Heritage Portal should be upgraded. The suitable performance monitoring modules should collect data about server usage, availability and responsiveness and other added resources.

Web portal

The HKH web will be a dynamic platform in achieving a twofold mission, namely: **communicating policies** development and other high level information and **gathering** useful data from external contributors and aggregating it on storage space of the platform. From this perspective, the HKH should be positioned both as an editorially-led information space (but not replicating the content of the JPI CH site) and a user-led conversation platform (where the vast majority of content generation comes from the users themselves, engaged actively with the site). Subsequently, two important sections will be developed, starting from the current structure of the Heritage Portal:

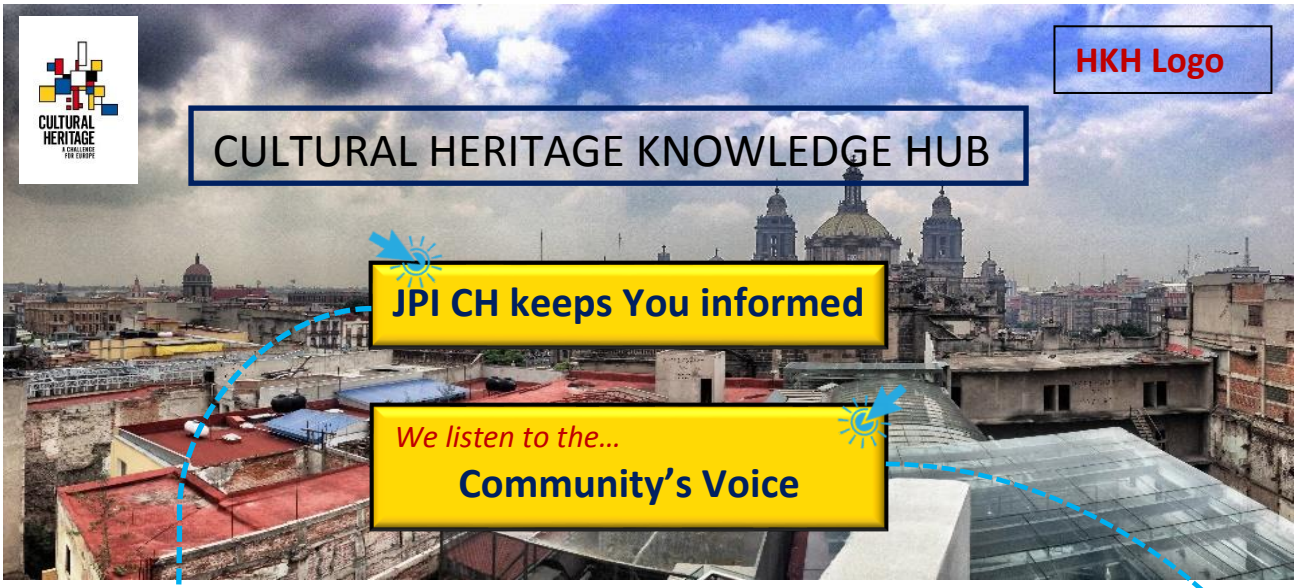
"**JPI CH keeps You informed**"

and

"**We listen to Community's Voice**".

Both sections will dispose of two sides, namely the *Front office*, in the editorial service of the public users and *Back office* restricted to manage/edit website's content, content editor roles.
The Figure 3 bellow depicts the HKH land page together with the entry pages of the two main sections.

4 Full description of such platform at http://mint-wordpress.image.ntua.gr/mint-end-user-documentation/).



a) The home page of Heritage Knowledge Hub

b) The entry page of *JPI Keeps You informed*

c) The entry page of *Voice of Community*

Section 1 "JPI CH keeps you informed"

The current Heritage portal will be upgraded and the input from JPI CH will regularly feed the HKH first section. The HKH should provide information with a key focus on EC policy support over the thematic areas. Such that the HKH includes a section on ***R&I policies***, which allows users to access quantitative and qualitative knowledge relative to EC policy, national and regional related policies.

Moreover, Section 1 is intended to provide information about JPI CH structure, its activities and its outcomes (i.e. the JPI CH planned instruments to foster joint research activities based on the Action Programme 2016-2018, actions related to the four main themes of the Strategic Research Agenda related to the organizations', networking, international expert meetings, workshops and conferences). Dedicated subpages are intended to widely disseminate information of a more general interest (news and press releases), outstanding results from the joint research calls (***Platform of projects*** hosting information about the projects completed or still running under the launched joint calls will project's activities, progress and achievements), international JPICH visibility and actions (***International cooperation***), etc.. Here the "**Networking"** menu item opens a page with a range of worldwide JPICH partners.

The "***Home****"* menu item opens a page explaining the JPI CH initiative along with the programme of past and future consortium activities.

The **"*News & Events*"** informs the readers about important events and their follow-up, such as event recording sessions, documents, guidelines or any other outcome. Here events of public interest where JPI is a speaking voice will be posted, like:

-The own JPI meetings under Alignment, Monitoring, Joint activities (JHEP2), i.e. Project Parade on yearly basis aiming to up light JPI CH activities and presenting recent research results.

-EU actions dedicated to cultural heritage, such as the European Heritage Days, EU Prize for Cultural Heritage/Europa Nostra Award, European Heritage Label, the 2018 European Year of Cultural Heritage; i.e. High-level Innovation and Cultural Heritage Conference, Brussels, 20 March 2018 (https://ec.europa.eu/digital-single-market/en/news/high-level-innovation-and-cultural-heritage-conference)

-Key international conferences.

This way, the HKH will address a more general audience, potential followers who are not reached through the project's "direct" dissemination activities. The Figure 4 shows the menu of this section.

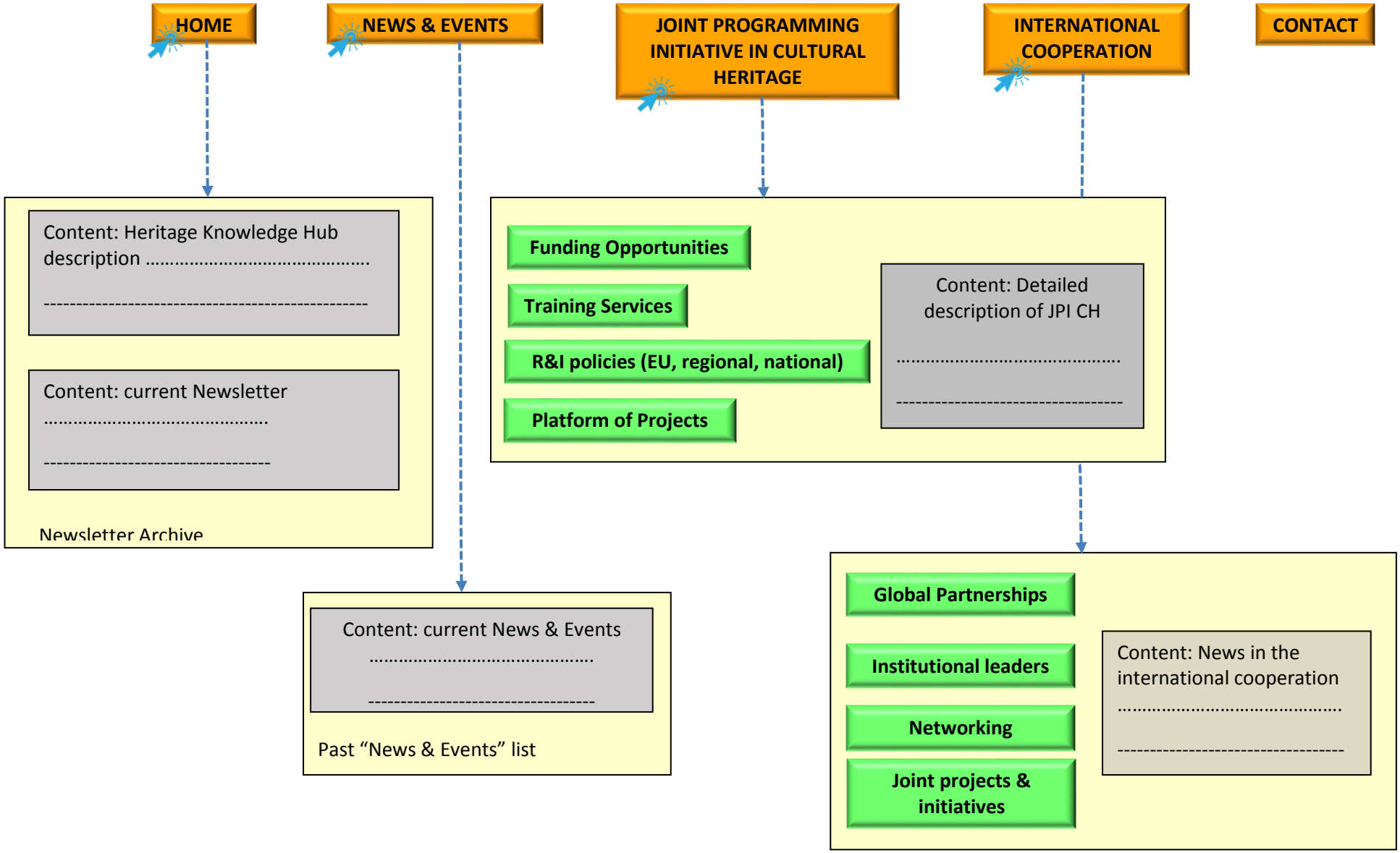


Figure 4. The **JPI CH keeps You informed** page menu

Section 2 "We listen to Community's Voice" implements a participative-oriented approach with interactive subsections, a platform where users can easily exchange ideas and collaborate. This allows sharing and replicating best practice, facilitating the dissemination of good sustainable CH concepts. Its scope is mainly to publicize announcements of upcoming conferences and events, call for papers, information about the initiatives projects' activities, etc.. Each menu item will open a **workspace** with tools and features tailored to targeted audiences.

The Figure 5 shows the menu of this section. Such that, by clicking on ***Cultural and creative Ecosystems*** menu item, a new page opens as Interactive Workspace with a series of topics of interest like ***Digitization*** or ***Integration of CH in smart cities***. The interested visitor could become contributor on the posted topics by following the instructions on „*How to contribute*". The workspace pages are not designed as discussion forums, but rather as spaces with management data mechanisms where the external readers/users post and retrieve information. In addition, section 2 hosts a space of ***Projects Inventory*** allowing the storage of "know-how" in circulating the aggregated knowledge from registered contributors (advanced technologies, with relevant guidelines, important tools and resources that Communities of practice are encouraged to share as "success stories").

The ***Integration of CH in Smart cities development*** addresses the integrated approach to heritage conservation and integration of CH value into the contemporary urban landscapes; promotion and valorisation are needed in order to take into account its manifold contribution to societal and economic objectives, as well as its impact on other public policies. **Conservation** is increasingly geared towards preserving and enhancing a whole cultural landscape rather than an isolated site, and also becoming more people-centred. Old approaches sought to protect heritage by isolating it from daily life. New approaches focus on making it fully part of the local community. Sites are given a second life and meaning that speak to contemporary needs and concerns.

The main provided services within section 2 are the following:

- Visualize data and allow interaction within the dedicated workspaces split on thematic areas in (e.g. smart cities/urban socio-cultural development, entrepreneurial and innovation, projects)
- Exchange of data, information and knowledge
- Regular informative service update
- Cross-sector cooperation: innovative solutions for creative industries (links+ best stories)

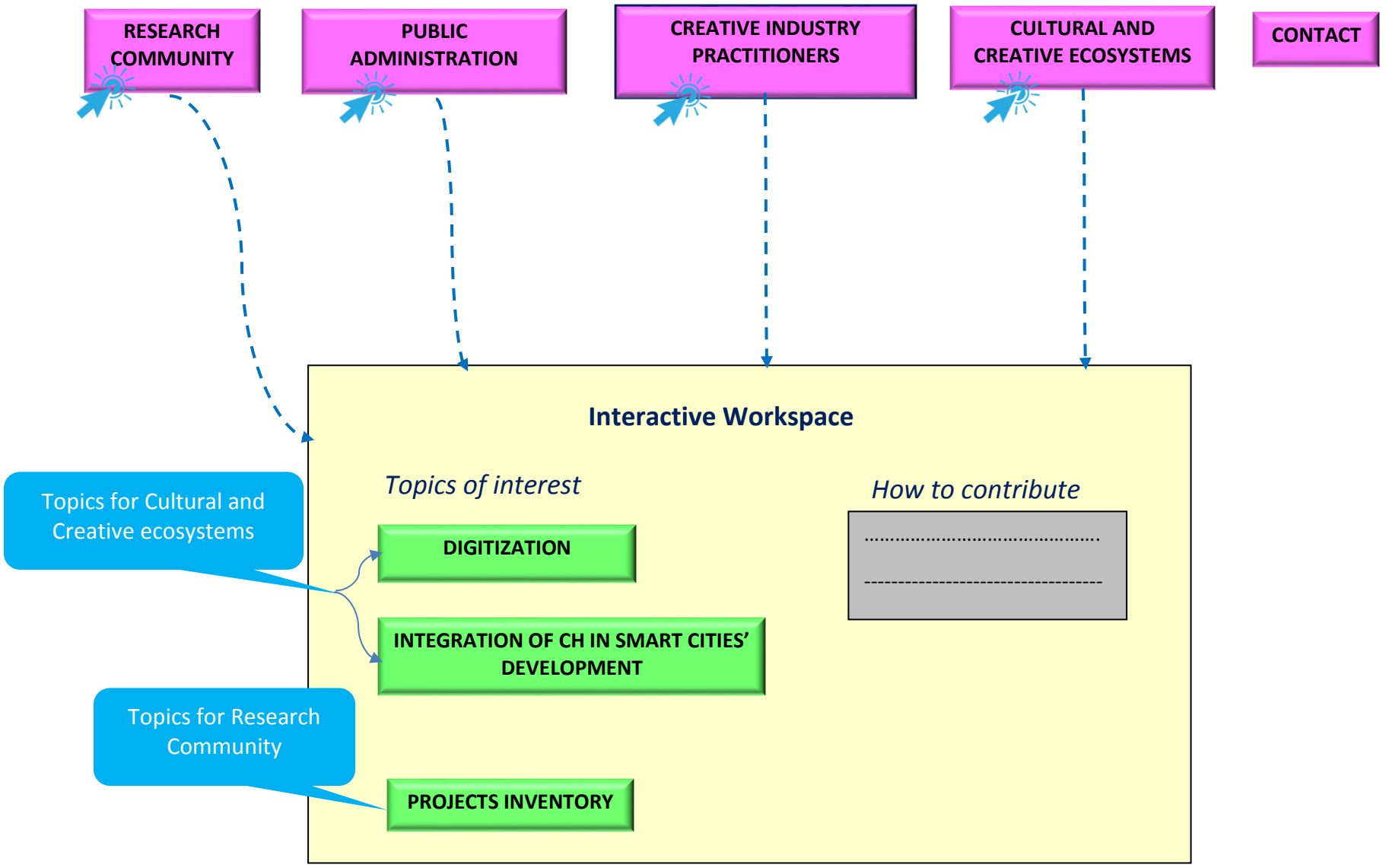


Figure 5. The **Community's Voice** page menu

The HKH functions and its structure should be constantly and timely updated according to the growing needs of the JPI CH and to new policy and market requirements in the field.

The Content Management System (CMS) should be partitioned to manage various classes of user's responsive data. The HKH CMS could be provided by WordPress. WordPress is an open source blog tool and publishing platform licensed under the GNU General Public License (GPL). The template system of the WordPress makes it easy to re-arrange widgets and install and switch between themes that could be edited for more advanced customizations. It provides standardized formatting and styling of text within articles. Multimedia files such as images, videos, flash movies, image galleries, slideshows etc. can be uploaded and linked to (or displayed in) pages and articles, or embedded directly from other places (e.g. Youtube). Since WordPress generates pages dynamically, all these archive pages come at no additional space-cost to the server. New archives can be created and easily linked. Wordpress built-in search functionality allows visitors to the portal to search for terms they are interested in; the search terms are highlighted, making it is even easier for them to find what they were looking for. WordPress supports the standards for displaying links to other sites that have themselves been linked to a post or article.

Open access

In the light of the "3Os- Open Innovation, Open Science and Open to the world"– a vision for Europe in 2030" the HKH aims to become an open knowledge platform for open content sharing and exchange on a broad range of R&I issues on CH. Such that, in line with the "small 3Os: open access, open source, or open data" the HKH should incorporate open standard for sharing content, such as Dublin Core, OData, compact SDMX 2.0 protocols, and Open Graph fitting into their overall strategic objectives to make their knowledge more accessible.

On one way, the visitors, potential contributors, interested in posting on HKH site will be registered on the basis of personal interest for the thematic categories where they intend to contribute (post an announcement on an achievement, referral to articles, events of public interest, etc.). With an adequate policy ensuring the data integrity, the data should be filtered and the content optimally categorized as part of quality control mechanism.

On the other way, in offering customized information relevant to visitors' demand, the HKH will aggregate content and match this with user profiles through the use of clever' technology (semantic markup, automatic entity extraction and a 'matching engine') able to detect the visitors preferences.

Such that the HKH "smartness" is due in putting data in work and circulation for citizens and for the stimulation of communities in getting actively involved in achieving smarter cultural heritage. The Open approaches track knowledge use, check if the knowledge is reaching the right audiences, and how knowledge is being received.

Identification, authentication, rights management

A user management system will authenticate access by identifying a user according to details of his account. Currently the Heritage portal asks potential contributors to register for awarding the access to writing/posting articles. Both for *section 1* and *section 2* access rights to control access to specific subareas of interaction with external contributors should be enabled, allowing or denying access to a resource (dataset, content or service). Access rights will be awarded based on IPR restrictions according to rights statements for resources.

The RSS and ATOM11 specifications are fully supported by WordPress and any page on the HKH has an associated feed that a reader can subscribe to. This way the interested users are automatically informed about developing news and new data.

Measuring the visibility degree, improving the services

The analysis of statistics of the HKH is useful for project dissemination and the assessment of its impact. It is possible keeping going this analysis with Google Analytics (largest used web analytics solution) that give insights into one's website traffic and marketing effectiveness. Statistics should be analysed on a tri-monthly basis in order to verify trends and variations. Also, there are several features that introduce and reinforce the social dimension of the platform. A basic rating mechanism in the form of favourites/likes for platform resources (items, collections and user groups etc.) is also being

tested to provide the basis for a ranking engine that will improve search results and allow the search engine to adapt to user preferences. Finally, a user can join or follow user group or project spaces and other users, with a notification mechanism that informs him/her of updates, pending requests or invitations.

DATA CONTENT, ITS ACCESSIBILITY AND SECURITY

The HKH should have a high capacity of absorption and processing to be a credible source in spreading out knowledge on various directions:

- Innovative solutions for creative industry and not only,
- Cultural Heritage landscape and organizational structures (sharing knowledge with engaged community and dedicated governance),
- Strategic policy development and its implementation process in the sector (provide input to EU, national and local policymakers),
- Evidence of cultural heritage as an economic production factor
- Cultural heritage role in for inclusiveness, cohesion, and participation
- Use of cultural heritage as important of sustainable European landscapes development.

The data will be driven by SRA research priorities in connection with H2020 related priorities (e.g. H2020 SC5). According to the SRA, JPI CH should encourage innovative approaches, applications and tools that will create added value for society. The migration of public knowledge produced internally within JPEH and JPEH2 projects and by other JPI CH activities will be channeled towards the HKH specific sections for a certain number of thematic topics. The dissemination data and the knowledge produced should be within the limit of research; we promote data as research outcomes, not as tools or practices already in use in the respective market sectors.

Providing customized information in real-time to a large number of users: Using 'clever' technology (semantic mark-up, automatic entity extraction and a 'matching engine'), the HKH will aggregate content from different sources and match these with user profiles, so that users get information pushed to them that is relevant to their job, their expertise or their location. The database should have a structured architecture for materials able to be intelligently interrogated through *a search engine*. The aim of the HKH is to "improve the supply and accessibility of content that supports evidence-informed policy making and practice in international development."

Database materials could be generally classified into:

- ✓ Academic/scientific works (discussion papers, articles, evidence papers)
- ✓ Research (research report, evidence report, journal articles, conference papers, theses)
- ✓ Knowledge communication (guides, policy brief, policy notes, policy documents, practice papers, case studies, good practice guides)
- ✓ Capacity building (manuals, toolkits, training/educational material)
- ✓ Programme and project materials (reports, evaluations, newsletters, communications)
- ✓ Video/ Images/Infographics
- ✓ Other (statistics, maps, blogs…)

The HKH will allow the visualization, access and interaction within the workspaces with tools and features tailored to thematic topic (i.e. smart cities/urban socio-cultural development, entrepreneurial and innovation or projects). Via these tools, the visitors and allowed contributors may exchange data –post and receive information (links+ best stories).

The managed knowledge will follow the first level at metadata classification: Capacity Building, Management Strategies, Knowledge Sharing and Research Infrastructure, Strategic documents and Communities of practices.

Strategic documents

Among others purposes, JPI CH working aims to deliver research-based evidence policies that integrate more strongly all aspects of cultural heritage – tangible, intangible and digital. In this

respect, various activities are envisaged to bring the produced knowledge to the political level. We may remind few significant involvements of JPICH in EU policy like providing inputs to consultation for Strategic Foresight H2020 and H2020 intermediary evaluation, contributions to Evaluation Report on JPIs or JPI Chairs Statement. On a strategic direction, JPI CH aims also to streamline national programmes to reduce duplication, to exploit synergies and to coordinate research in the cultural heritage arena.

Pertinent outcomes of this portfolio of activities, such as the results of the fact-finding mission of the JPI CH and relevant strategy documents, such as [3], [4] are to be purposefully incorporated in a specific HKH database of relevant strategy documents. As JPI-CH should become the European leader player on Cultural Heritage, EU relevant policy documents should be catalogues and stored as items or link addressing active source.

Some example of relevant policy documents:

- *Mapping of Cultural Heritage actions in European Union policies, programmes and activities*[5]
- *Council conclusions on participatory governance of cultural heritage, December 2014)*[6]
- *Getting cultural heritage to work for Europe- Horizon 2020 Expert Group for the Societal Challenge 'Climate action, environment, resource efficiency and raw materials*, *April 2015*[7]
- *Evaluation of joint programming to address grand societal challenges, March 2016*[8]
- *Towards an integrated approach to cultural heritage for Europe, July 2014*[9]
- *Council of Europe- Culture and Cultural Heritage*[10]

or EU policy related papers:

--**"***From Valletta to Faro with a stopover in Brussels. International legal and policy background for archaeology or simply the understanding of heritage at the European level"*- Paulina Florjanowicz, Proceedings of the International Conference, Lisbon, Portugal, 19–21 March 2015

--*JPI Chairs' Statement on Joint Research addressing grand challenges*, Brussels, nov. 2017

Knowledge sharing

In [2] the Council invites the member states to „*develop multilevel and multi-stakeholder governance frameworks which recognise cultural heritage as a shared resource by strengthening the links between the local, regional, national and European levels of governance of cultural heritage...*";

Following the research priority "Connecting people with heritage", HKH will increase the access to cultural heritage information through open share of produced knowledge. Since the innovation, services and business models which helping Europe's future economic growth and jobs are driven by the research progress through projects' accomplishment a **Platform of Projects** will be set up, as we mentioned in previous section. This platform will upfront advanced technology for cultural heritage conservation and re-use, management of CH resources and other similar topics will be posted as "best practices". These examples will be selected only from the projects completed within the framework of the past research Joint calls (i.e. the pool of 26 ended projects) having in mind also the next coming joint calls (2018 &2019 as well as joint call Heritage +).

The projects funded through the research calls are encouraged to publish open access. This is according to principles under Horizon 2020 - and supposedly also under its successor FP 9 - through which open access to scientific publications is ensured and open access to research data is promoted in publicly funded research at EU level. The HKH will leverage the visibility of research results

5 http://ec.europa.eu/culture/library/reports/2014-heritage-mapping_en.pdf

6 http://data.consilium.europa.eu/doc/document/ST-15320-2014-INIT/en/pd

7 http://resources.riches-project.eu/getting-cultural-heritage-to-work-for-europe/

8 https://publications.europa.eu/en/publication-detail/-/publication/d4a8f349-e68c-11e5-8a50-01aa75ed71a1/language-en

9 http://ec.europa.eu/culture/library/publications/2014-heritage-communication_en.pdf

10 https://www.coe.int/en/web/culture-and-heritage

funded through the joint calls and the replicability of these results. The proposed projects to be uploaded on the Platform of Projects are the following:
--The 10 projects awarded within the JPI pilot joint call
--The 16 projects awarded within the second call launched under the EC Horizon 2020.
--The awarded projects within the recent calls "Changing environments" and "Digital heritage" (2017) as well those that will come out from the upcoming calls in the roadmap, namely "Conservation and protection (2018) and Identity and perception (2019).
Within the **Platform** the coordinators of projects may act as content contributors once they are awarding the writing access rights.
Other projects as sources of "best practices" could be posted as link or/and resumes by visitors/accredited contributors on section **Project Inventory**. The video materials from projects, underlining the cooperation among EU partners could be multi-linguistic. Attention is payed to international cooperation, particularly with Mediterranean area, as about 140 projects have been supported linking more than 500 organisations across the EU and the Mediterranean area - from universities, research centres and heritage institutions to private companies - to develop and apply "state of the art" methodologies, technologies, new products and tools. This underlines the extremely high interest that exists in undertaking transnational activities in the CH area. Once the pool of projects added by contributors or by KHK owner from external sources is reaching a critical dimension, an inventory of international projects could be created into the **Joint projects and initiatives.**

Research infrastructures

As it is stated in [3], JPIs act as strategic hubs by coordinating major RDI activities, investments and programmes in their respective domains and „by further optimizing the use of national investments and (RDI) capacities through the sharing of infrastructures at the level of member countries".
The pan-European research infrastructures with potential interest for JPI CH are:

- ACTRIS: Aerosols, Clouds and Trace gases
- E-RIHS: European Research Infrastructure for Heritage Science[11] has entered the ESFRI Roadmap in 2016 and currently is in Preparation phase (2016-2019)
- Copernicus programme[12].
- IPERION CH: Integrated Platform for the European Research Infrastructure on Cultural Heritage[13]
- ARIADNE: Advanced Research Infrastructure for Archaeological Dataset Networking in Europe[14]
- CERIC-ERI: Central European Research Infrastructure Consortium[15]
- DARIAH-ERIC: Digital Research Infrastructure for the Arts and Humanities[16]

11 http://www.e-rihs.eu/

12 http://www.copernicus.eu/

13 http://www.iperionch.eu

14 http://www.ariadne-infrastructure.eu

15 http://www.ceric-eric.eu

16 http://www.dariah.eu

- PARTHENOS: Pooling Activities, Resources and Tools for Heritage E-research Networking, Optimization and Synergies[17]

More complete information on pan-European infrastructures is accessible at http://www.e-rihs.eu/about/international-collaborations/.

Cultural and creative ecosystems

Technology adds economic value in the heritage sector, since nowadays digitised cultural material can be used to enhance the visitor experience, develop educational content [1]. The Strategic Research Agenda encourages partnerships with the private sector in the creative, digital and other industries. In one way or another, JPI should deliver also innovative solutions for industry, as Leonidas Antoniou, the chairman of the "Groupe de Programmation Conjointe" -GPC has stated in many occasions by making clear reference to the interaction of cultural assets and values and their potential for innovation at economic and entrepreneurial level.
The HKH should clearly capture this potential for innovative industrial solutions and promote favourable opportunities within the local communities and the cultural and creative ecosystems (i.e. the SMEs linked to services and cultural events).

In this respect, some thematic areas of interest for catalysing good examples could be:

- **Sustainable innovative** technologies and procedures for CH valorisation and management.
- **Regeneration of artefacts, buildings and landscape** integrated into the society and smart cities contexts.
- **Non-invasive and non-destructive measurement and testing methods**, techniques and instruments, for advanced diagnostics and interpretation of historical and technological contexts of art and heritage.
- **New business models in finance and investment** for the effectiveness of cultural heritage as an economic production factor.
- **Innovative Business Models** for cultural heritage management

Like the ones above, the **advanced technologies for restoration** are receiving a large interest from public and private practitioners. The most advanced diagnostic technologies are increasingly applied to the restoration of Cultural heritage leading industries and investments in the sector. Restoration of cultural heritage is a source of industrial innovation, growth and jobs representing a very difficult environment where the best technological products and methodologies can be tested.

Digitisation

"…cultural and creative industries are confronted with the challenges of moving into the digital age. Culture and heritage in the digital era represent a set of opportunities for European economies and societies." (Androulla Vassiliou, Commissioner responsible for Education and Culture in 2011).

The traditional approaches to cultural and artistic heritage are transformed by digitisation and online accessibility of cultural content enabling new forms of societal engagement and new models of revenue over the value chains. At present the digital technologies and global communications are opening the path for new business models in the creative industry (indirectly into cultural heritage). This challenge should be embraced by researchers, innovators and decision-makers in order to preserve and promote the European cultural values, resources and wealth for next generations.

17 http://www.parthenos-project.eu

Visualisation is an important component in shaping smart cultural heritage developments and in providing a tangible interface between the user and the enabling and often invisible technologies lying beneath (Li et al. 2016). The visualisation technologies presently identified with smart cultural developments, according to [6], are:

- *3D visualization:* The three-dimensional (3D) visualization of data as represented *i*n multi-dimensional planes, usually as a 3D model frame or object (i.e. eHERITAGE H2020 project)
- *Geovisualisation*
- *Augmented Reality:* AR is the interaction of superimposed data, graphics, audio and other sensory enhancements over a real-world environment that is displayed in real time. AR is among the technologies that enhance the architectural and photographic representations with animation, 3-D modelling, pictorial re-colouring, digital enlargement and sound design (i.e. eHERITAGE H2020 project)

Also, significant advances towards developing platforms for smart cultural heritage utilising enabling technologies are among others, the following:

- Effective IC-Technologies for the creation, management and reuse of content and knowledge
- Standards, Metadata, Ontologies and Semantic Processing in Cultural Heritage and Digital Libraries

The public-private partnerships for digitisation must be encouraged and the releases of digitisation standards could be an appropriate instrument to proliferate this form of cooperation. This is a priority within digitisation issues since there are still unanswered questions like:

> *Who owns the digital forms of cultural heritage and who decides who can create it, access and use it, how can it be protected from copyright infringement and how is Intellectual Property assigned in a digital world?*

However, according to [6], nowadays there are no published standards specific to smart cultural heritage projects as there is available for smart cities, such as those developed by ISO/IEC or the IEEE Smart Cities Initiative (IEEE 2014)[18]

The path towards a full deployment of digitisation standards is paved by open licences, like, the creative commons licenses of PD, CC0, CC-BY and CC-BY-SA applied to digitised cultural heritage material allowing its reuse in new applications and environments. Under the use of them the European culture becomes digitally available.

The HKH will definitely highlight the issue of standards in digitization and related ones inviting the visitor to check the following links:

- Culture and Cultural Heritage Standards-https://www.coe.int/en/web/culture-and-heritage/standards
- http://withculture.eu/#/sources
- EU initiatives on digitisation-https://ec.europa.eu/digital-single-market/en/news/developing-europes-digital-platform-cultural-heritage-public-consultation-opens
- e-Infrastructures and Digital Libraries…the Future http://www.digitalmeetsculture.net/article/einfrastructures-and-digital-libraries-the-future/

One of the outstanding accomplishments at EU level, following the launch of the **digital libraries initiative** in 2005, is Europeana- Europe's portal of digital libraries, archives and museums[19]

While *the report of the Comité des Sages (high-level reflection group) on" Digitisation of Europe's cultural heritage"*[20] makes reference that "The **Europeana** portal should become the central reference

18 https://smartcities.ieee.org/index.php.

https://smartcities.ieee.org/home/ieee-smart-cities-initiative.html

19 www.europeana.eu

20 http://europa.eu/rapid/press-release_IP-11-17_en.htm

point for Europe's online cultural heritage" our ambitious goal would be the **HKH** becomes a standard hub for science supporting CH development and preservation.

We will briefly described **Europeana** portal to highlight that our HKH has a completely different objective, not to build up another repository for digitized cultural goods, but an warehouse of tools, technologies and transferable business models for CH management, research and innovation. **Europeana** gives access to over 53 million items including image, text, sound, video and 3D material from the collections of over 3,700 libraries, archives, museums, galleries and audio-visual collections across Europe. The platform is used by teachers, artists, data professionals in cultural institutions and creative fields but also by everyone looking for information on culture.

The two platforms should answer complementary questions; while **Europeana** answers the question "What is worth to preserve?" **HKH** offers solutions to "How to optimally preserve it for as long as possible?"

The answers to these questions may come from various external sources, but firstly, the HKH will search on insight sources as projects implemented under the JPI CH Joint Calls.

Bearing in mind that "*…to strengthen Europe's position in the field of cultural heritage preservation, restoration and valorisation, there is a need to: seize the opportunities offered by digitisation; to reach out to new audiences and engage young people in particular"* [1], the HKH will consider:

--the selection of the best practices over digitization tools from the completed projects of the past joint calls and the next ones

--the screening of relevant legislative initiatives and funding instruments by public authorities for boosting the digitization at Member States' level. It should draw upon analytical work done at the national level and identify best practice examples in the Member States.

--the exploration of the best technical models to maximise access and use of digitised material like IPR regulation in public-private partnerships for digitisation of works that are in the public domain.

Periodic update on major initiatives and policy developments in CH digitization sector (i.e. new elaborated standards for digitization) will be done and subsequently HKH will reflect this in its content enrichment.

Integration of cultural heritage into smart cities development

The concept of "smart cultural heritage," according to researchers of the EU funded DATABENC (Distretto ad Alta Tecnologia per i Beni Culturali) initiative, is about digitally connecting institutions, visitors, and objects in dialogue. Smart heritage focuses on adopting more participatory and collaborative approaches, making cultural data freely available (open), and consequently increasing the opportunities for interpretation, digital curation, and innovation. This is the case of Europeana, E-RHIS, etc. Since [1] states that "*heritage is a source of social innovation for smart, sustainable and inclusive growth*", the HKH will promote stories and practices of the innovative use of cultural heritage to encourage integration, inclusiveness, cohesion, and participation.

Some spot areas of potential topics of interest for discussion to be included on HKH are: *heritage led urban regeneration, sustaining cultural landscapes, CH-based inclusive governance.*

Specific benefits of including cultural heritage in a smart city initiative derive from big data management and augmented reality, as we mentioned previously. The "digital shift" process of creative industries entails the use of various digital technologies and instruments. A one gaining more expansion is the *big data management* allowing the storage and administration of great amounts of data, beneficial for the preservation of cultural heritage, and the sustainable monitoring of its life cycle conservation. This contributes to the "smart city" concept from cultural point of view allowing both citizens and visitors to access their historical value. Smart cultural heritage is strongly associated with the identity of place and communities through smart technologies, knowledge and participation.

A contemporary debate issue is how the historical and cultural heritage of cities is and can be underpinned by means of smart city tools, solutions and applications[21].

In a global movement of the implementation of smart cities, according to the scientific literature in the sector, the urban cultural heritage within smart city strategies is still fragmentary approached. The question is to what extent cultural heritage is and can be more incorporated in smart city strategies or smart city applications related to cultural heritage management. In particular, the HKH should be an integration gap between overarching smart city solutions and site-based cultural heritage preservation and promotion applications, pointing out this issue. This topic could be forwarded for discussions or documented in a HKH cross-section of *international developments in smart cities and their implications for the cultural heritage sector.* Similar topics: *the use of smart platforms and visualisation technologies; developing smart cultural heritage services.*

As it is stated in [2], the Council "*invites the member states to promote civic participation in the framework of a smart development model for European cities which actively integrates cultural heritage in order to contribute to the innovation and revitalisation of European towns, connecting them to related sites and territories, promoting their attractiveness as well as attracting investments, new economic activities and enterprises…"*

More recommendations on the best use of Cultural Heritage in Smart Cities are under the following link of the Maltese Presidency in 2017. https://jamdots.nl/view/190/Europeana---Smart-Cities?divFallback

Periodic update about progress at regional and European level, on the integration of CH into the sustainable urban development (i.e. integration of migrants and preservation of cultural identity, issue not still appropriately considered so far) will be done and subsequently HKH will reflect this in its content enrichment.

21 http://eu-smartcities.eu/

CUSTOMERS

This section is about "Connecting people with heritage", as SRA states **"**…. by addressing themes and issues that enable people and communities to connect with heritage….". The main objective is to provide a platform for knowledge exchange and learning on effective CH cooperation at all levels and the target audiences approaching consist of:

- sharing knowledge with engaged community and dedicated governance on strategic policy development and transformation process in science and research organisations;
- create a culture of collaborative practice on sharing and problem solving on CH areas
  - interactivity with government/administration in CH sectors
  - place to deal with local community of practitioners
- enable users to access multiple and adequate data sources

The progress of JPI CH open possibilities to attract new partners to the JPI, in Europe and globally, and to enhance cooperation with NGOs and IGOs. Within European communities, people are continually creating all kinds of heritage, including cultural, social, economic and environmental heritage. HKH could be an appropriate instrument in exploring new approaches of engaging diverse communities acting on various heritage sectors. The visitors expressing an interest in sharing information on popular themes may do this in the section **Community's Voice**. This knowledge traffic should to be filtered, coordinated and maintained.

The overall target group that the HKH aims at reaching includes:

- ✓ Researchers, institutions, associations
- ✓ Cultural organisations: museums, galleries and other cultural institutions
- ✓ Industry representatives: professional organisations, SMEs in creative industries
- ✓ Government representatives at European and international level
- ✓ Community groups and heritage interest groups, NGOs
- ✓ International organisations
- ✓ European Initiatives, networks, technology platforms and online communities

For these different groups, the HKH is a structured reference website:

- explaining the EU action in the field of CH preservation and re-use, which is particularly relevant for national, regional and local authorities, rearch communities and civil society organisations,
- collecting the CH integration policies in Europe, in particular the legislation in MS,
- putting at the disposal of community practitioners practical tools for preservation and re-use, **particularly relevant** for scientific community and local authorities,
- announcing events, conferences relating to integration, particularly relevant to all groups but **in particular** for the media,
- advertising funding opportunities at national and EU level, particularly relevant for potential applicants such as universities, research, SMEs and civil society organisations.
- promoting technological research and innovation for the sustainable use of sites, buildings and landscapes and related business services.

HKH will launch several topics of discussions to succinct the interest of customers like:

- Role of cultural heritage in the reconstruction of national identity'
- Analysis of CH value for social, political and economic perspectives'
- Support for local communities acting in heritage management,
- Sharing knowledge of conservation measures for historical.
- Artificial intelligence-based decision-making mechanism in preserving tangible cultural heritage
- Programmes and instruments fostering the public-private partnerships and local incentives for SMEs in developing their activities in CH local area.

The heritage sector should be also a target market for the private stakeholders whose interventions should accelerate in this field within the expansion on circular economy and the development of the new professional skills. As is stated in [1], to strengthen Europe's position in the field of cultural heritage preservation, restoration and valorisation, there is a need to identify skills needs and improve the training of heritage professionals. To transform Europe's citizens into agents of change able to cope with cultural material change in the 21st century, the KHK will create a platform with e-learning resources, like **digital training material and webinars.** E-learning tools promote wider access to cultural content in schools and universities, and allow people to generate, reuse and add value to content, enhancing the value of cultural collections.

Along the tuning process of HKH, to better respond to customers' information needs, the customers themselves could be involved into by intelligently gathering evidence and feedback from their operations on site. All of these components above will be retained and used in building up the web portal interface elements.

The KHK provides a rich set of features for encouraging collaboration and information sharing. All of this is tied together using leading-edge semantic search capabilities (see Figure 6).

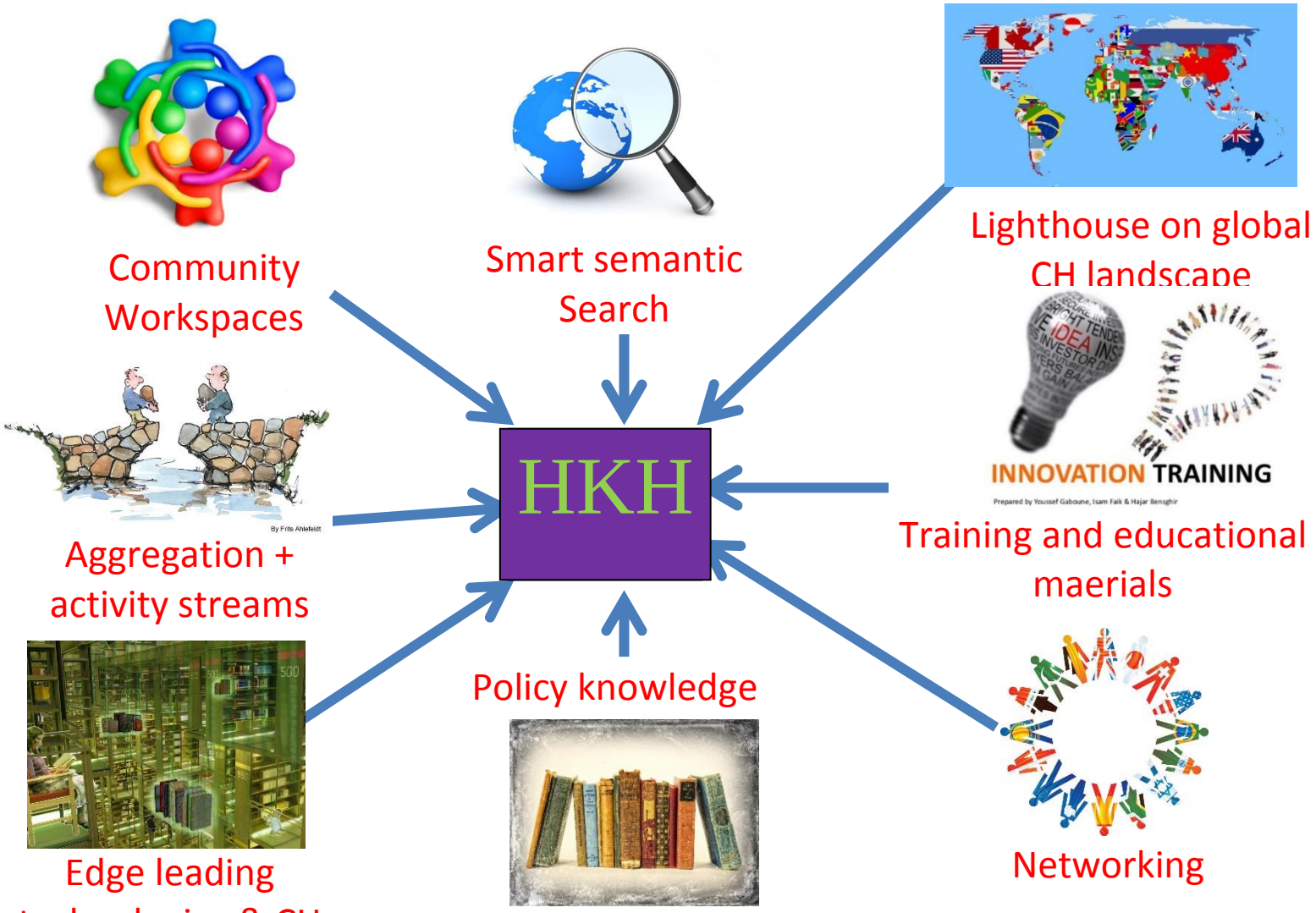


Figure 6. The main features of the HKH

GLOBAL VISIBILITY AND SUSTAINABILITY

According to [12], the "International research leadership" indicator shows that, in overall, the JPIs registered a score of almost 3 on a range of 0-5, which means that considerable efforts should be streamed by MS in strengthening the collaboration links under various umbrella activities with the international partners within the specific areas of JPI. Our objective on international dimension is the integration of the HKH in a global network representative for Cultural World Heritage nearby outstanding knowledge portals hosted in Europe (Global Online Knowledge Hubs for CH).

Cultural diplomacy is seen as „an instrument of EU Neighborhood Policy" by the EC Foreign Affairs and Security Policy. PI-CH should embrace the opportunity of this vision and should become the European leader player on Cultural Heritage on a potential role of the most effective ambassador of peace. It is acknowledge that countries outside of Europe have rich and diverse cultural heritage, with different structures and related policies to govern it. However, looking to the SRA priorities, there were two high level areas on everyone's agenda - connecting people with heritage and the protection of heritage.

Creating synergies with Global Cultural Heritage JPI Partnership and advanced economies like USA, Canada, Japan, together with Brazil, Russia, India, China, South Korea, South Africa and neighboring Mediterranean countries may bring concrete results in the coming years. As example, some global leader countries have set as priority the CH from different perspectives:

- **China:** cultural heritage is one of the three priority areas of cooperation in the 2012 EU-China Joint Declaration on cultural cooperation.
- **India:** the preservation (and digitization) of cultural heritage is a priority of the policy dialogue agenda.
- **Brazil:** cultural heritage is a priority area of the Joint Programme on Culture with European Commission.

Uncontestable evidence is that the international cooperation is extremely important and translated to HKH, this mainly means, the expansion of range of referrals with other sites outside Europe. The set of links to the most relevant organizations to be firstly uploaded on HKH are listed in the Annex 1. One of the area which has a huge potential to take advantage from the implementation of JPIs is the **Mediterranean Area (MED)**, where Cultural Heritage, urbanization, environment (costal/marine management) are connected to most of the human activities. MED is one of the top world destinations for tourism due to its cultural heritage, climate, landscape and ambience.

According to [2], the Council invites the member states to „enhance cooperation with international organizations such as the Council of Europe and UNESCO to promote a participatory approach to cultural heritage governance…". The successes of JPI CH open possibilities to enhance cooperation with NGOs and IGOs, such as: HEREIN--part of the Council of Europe[22], Europa Nostra[23], European Construction Technology Platform[24], Europeana[25], International Centre for the Study of the Preservation and Restoration of Cultural Property[26], International Federation of Library Associations and Institutions[27], United Nations Educational, Scientific, Cultural Organization / World Heritage[28].

22 www.coe.int/herein

23 www.europanostra.org

24 http://www.ectp.org

25 www.pro.europeana.eu

26 http://www.iccrom.org

27 www.ifla.org

28 http://www.unesco.org/culture

More complete information to be associated to its organization description is accessible through D4.3 (JHEP): *Creating synergies through collaboration with NGOs and IGOs: a concept paper on the results achieved so far*.

According to [1], to strengthen Europe's position in the field of cultural heritage preservation, restoration and valorization, there is a need to apply a strategic approach to research and innovation, knowledge sharing and smart specialization[29]. Collaboration with other initiatives, such as other JPIs (e.g. JPI Climate or JPI Urban Europe), infrastructures such as European Research Infrastructure on Heritage Science (E-RIHS) or programmes such as Copernicus, should help foster synergies and concerted actions to make optimum use of limited resources.

CH strongly links with environmental and climate issues, developing strong synergies with natural landscapes and indirectly addressing key global challenges such as climate change impacts and adaptation. Similarly, JPI CH is growing in relative synchronization with other relative JPIs, where common areas are present.

- **JPI FACCE**-„Agriculture, Food Security and Climate Change[30]: traditional food (Mediterranean diet-UNESCO Heritage)
- **JPI CLIMATE**-„Connecting Climate Knowledge for Europe"[31]: climate services, resilience to CC, EO Copernicus
- **JPI URBAN EUROPE**-„Global Urban Challenges, Joint European Solutions"[32]: urban cultural heritage & urban regeneration, smart cities, tourism (valorization, sustainability, management), as tourism/transport/urban planning/smart cities
- **JPI OCEANS-„**Healthy and Productive Seas and Oceans**"**[33] : underwater CH (preservation, valorisation, tourism), coastal planning & management
- **BiodivERsA[34]**: safeguard cultural/rural landscape
- **Global EO:** for cultural and natural heritage scouting (Copernicus for global heritage map).

HKH is an instrument leveraging the JPI mission, namely "position cultural heritage research at an international level" as it is mentioned in [3]. A series of actions through which this could be achieved:

- To promote its funding actions with open participation, especially the future joint calls open for participation to emerging and most 3rd countries advanced economies.
- To facilitate citizen's cooperation through joint on-line seminars EU-Third countries, for capacity building. Specifically from Asia, South America and Africa that may point to new examples and perspectives on smart cultural heritage as well as the identification of new and smart service priorities (specific contribution on urban sustainable development).
- To provide a platform for knowledge exchange and learning, efficiently supporting the international strategic cooperation on cultural/research heritage.
- To address joint research in MED area which is a priority and a challenge for Europe within a globalized world; launching common calls on topics of common interest.

29 http://s3platform.jrc.ec.europa.eu/

30 https://www.faccejpi.com/

31 http://www.jpi-climate.eu/home

32 https://jpi-urbaneurope.eu/

33 http://www.jpi-oceans.eu/

34 http://www.biodiversa.org/

COST ANALYSIS IN CREATION AND MAINTENANCE OF HKH

In this section we are going to estimate the cost of human resources for the HKH creation and maintenance over an indicative period, regardless the final technology that would be adopted by the developer as optimal solution.

In order to get a realistic estimation of costs, we remind, in principal, **the professional profiles** that a future developer should engage in the creation/ considerable upgrading of existing HEPO and, on second stage, maintenance of the HKH.

A. The architecture system developer: building up technological infrastructure

B. The database/ cloud or local repository developer

C. The web designer: experience in web design, interface web, visualization features, friendly interactivity mechanisms for users; it should include a scheme for the improvement of the lay-out of the website, of its content and user-friendliness.

D. The content provider (project coordinator, project manager, partners on volunteer basis) will cooperate with the **editorial staff** for producing materials, seek out and inform about interesting events, conferences, articles, calls for papers, videos that would be of interest to the project, which be published in on HKH. The content to be published on the website is also provided and/or suggested by all partners; direct contributions (articles, events, suggestions and proposals) can be sent to the partners and by the associate partners, stakeholders, project's followers, etc.

E. The website manager: experience in website management (editing, news items, management of the subscriber's database etc.) and website development; editing all dissemination materials including the online content; it should include a quality assurance scheme to ensure the quality of the uploaded items. In addition, the website manager should continuously **promote** the HKH.

The main tasks of website manager and of the content provider consist of:

- Collecting information on the categories mentioned in *Data content and its accessibility* chapter,
- Keeping this information up-to-date and relevant, including development of new content if required; this content should be regularly updated following a methodology for content collection approved by the GB. The material collected should be of relevance for the JPI-CH, be it from a national or regional source.

Expertise in CH: At least one member of the team should have professional experience in CH issues (researcher or research administrator).

In providing overall approach and organizational structure, in continuously update and enrichment of the content of the HKH, we estimated the following costs:

HKH built up: full development timeline 6 months full time equivalent

a) Actions for HKH upgrading backbone architecture: 3 months full time equivalent
   Personnel cost: aprox. 5.000 Eur / month (FTE)
   Personnel effort:
   0.5 PM data base/ cloud or local repository set-up
   1.0 PM architecture system developer
   0.5 PM interface web, visualization features, friendly intercativity mechanisms for users
   1.0 PM data selection and uploading

b) Hand-over from the current Heritage Portal: 2 months full time equivalent
   Personnel cost: approx. 4.000 Eur/month (FTE)
   Personnel effort:
   1.0 PM undertaking over architecture system elements
   1.0 PM data selection and uploading

Maintenance periodic operations:
Personnel cost: approx. 3.000 Eur / month (FTE)

--Data posting and management including content-generation and editorial services on a one-day-per-week basis: 0.2 PM

-- Infrastructure periodical check: 0.2 PM

While the actions to be undertaken and the detailed time-plan for HKH creation will be established by the designated service provider, we present in the table below an estimation of timeline development and of the effort/cost per activity.

Milestone operations	M1	M2	M3	M4	M5	M6	COST (Euro)	Effort Personnel
Actions for HKH development backbone architecture	X	X			X		15.000	3.0 PMs
Hand-over from the current Heritage Portal			X	X			8.000	3.0 PMs
Maintenance periodic operations						X	1.200	0.4 PMs

The overall estimative cost is up to 25.000 Eur. The building action will run during 2018 European Year of Cultural Heritage, making it an opportunity to raise wider awareness on the protection of cultural heritage and its sustainable management.

RECOMMENDATIONS FOR THE DEVELOPMENT AND MAINTENANCE OF THE HKH

This section will advance some key recommendations for the service provider in charge to develop and maintain the HKH. The HKH will adapt to the growing needs and requirements of the project during its lifetime.

For the dynamic content submitted by registered contributors, the *language* in which the content is uploaded, is English.

The *internal quality control* procedures for validation of content and knowledge production in order to have good and regular content output should be operational. The methods to ensure quality need qualified and well-trained staff and these will iterate a number of checks, including that one regarding the credibility of information sources.

The Monitoring and periodic assessment of the web usage could be supported by tools such as Google Analytics, Awstats, Webalizer and Mailchimp that return information about understand user behaviour and preferences, that will be use afterwards to respond to demand.

A *marketing strategy* to promote the HKH off- and online to ensure that the HKH is generally known by the stakeholders and each of the target groups, as well as the European institutions and the media should be thought. The promotion strategy should be adequate per type of thematic activities (legislation, practices, etc.) and it should be a dynamic document regularly updated (on yearly bases preferable).

The HKH further expansion may include new services. The *mobile apps* become important tools in making accessible more readily digital content and allowing users further flexibility in *how, when and where* they may want to access the content, and share it (iPhone or iPad). Suitable management tools for the users, Apps stores; use of Web 2.0 technologies and Social Media applications should be re-design to new appealing framework look. The *Cloud computing* (important overall IT trend) services may be taken into consideration for the expansion of HKH operational capacity virtualization (Infrastructure as a Service), and independent access with adequate security rules and appropriate rights.

CONCLUSIONS

As it is anticipated in [15] „The Heritage Portal has significant potential to become a single-point of information exchange and retrieval for heritage stakeholders across Europe, and as such a long-term marketing strategy for the site is essential.” The portal is the essential tool for the external communication of the project; it is the keystone for dissemination actions towards stakeholders and followers. It is:

-linking the existing web sites created under the various projects and actions and other related portals.

-screening in real time other related initiatives in this area, in order to avoid duplication of information.

-easily accessible, user friendly, informative, well organised, up to date, attractive and reliable.

-significantly improved in terms of traffic and visibility.

In addition, some improvements that makes difference between the current Heritage Portal and the HKH are:

- The Platform of Projects;
- The much bigger storage capacity of various data format both on local server and cloud platform
- Intelligent search engine based on semantic ontology
- More active integration of social media like Twitter, LinkedIn

- Faster and reliable respond to user demand for customized data

Such that, the HKH provides a central platform in user-friendly format, with key information, among others on infrastructures, EU and global policies related to CH, on others active cultural organization from authorized sources. It is rather about collecting resources as links to their repositories instead of what is traditionally termed as 'items'. More than being a simple website for information and management JPI, the HKH extend its functionality by presenting a user-friendly interface with much more interactivity, especially on "education and training, capacity building", hosting webinars. The software platform on which the HKH web is based is WordPress, which is an open source software, with high possibility for customization. The integration with social media sites increases interactivity and traffic.

Sustainability: It is characteristic of knowledge hubs that the knowledge is shared throughout a knowledge network. In fact the resilience and strength of a knowledge hub seems to rest in its connectivity, based on strong internal and external ties. By this, an important principle of knowledge management is applied, namely that knowledge is needed to use and create more knowledge.

Finally, HKH helps European cities and regions address and improve their CH assets and values with a sustainable approach. HKH should gather all the information, knowledge and experiences, in order to represent a one-stop-shop for all sustainable CH related issues. It presents detailed and expertly projects of CH initiatives and provides for a platform where users can easily exchange ideas and collaborate. This allows sharing and replicating best practice, facilitating the dissemination of good sustainable CH concepts.

SOURCE INDEX

[1] Towards an integrated approach to cultural heritage for Europe, COM(2014), July 2014
http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2014:477:FIN

[2] Draft Council conclusions on participatory governance of cultural heritage, November 2014
http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014XG1223%2801%29

[3] JPI Cultural Heritage and Global Change -Future Strategy-Vision, main achievements and future goals

[4] JPI Cultural Heritage and Global Change -Strategic Research Agenda
http://www.jpi-culturalheritage.eu/wp-content/uploads/SRA-def.pdf

[5] Cultural Heritage in Smart City Environments,
https://www.researchgate.net/publication/319273270_CULTURAL_HERITAGE_IN_SMART_CITY_ENVIRONMENTS

[6] Smart Cities and Cultural Heritage – A Review of Developments and Future Opportunities,
https://www.researchgate.net/publication/318820332_Smart_Cities_and_Cultural_Heritage_-_A_Review_of_Developments_and_Future_Opportunities

[7] ELTIS-The urban mobility observatory
www.eltis.org

[8] A central knowledge hub for the secure, sustainable supply of raw materials
https://ec.europa.eu/jrc/en/news/central-knowledge-hub-secure-sustainable-supply-raw-materials

[9] European Web Site on Integration (EWSI),
https://ec.europa.eu/migrant-integration/index.cfm?action=furl.go&go=/home?lang=en

[10] Knowledge hubs and knowledge clusters: Designing a knowledge architecture forDevelopment, MRPA paper, Hans-Dieter Evers, 2008
https://mpra.ub.uni-muenchen.de/8778/

[11] GPEDC Working Group on Knowledge Hub on Effective Development Co-operation
http://effectivecooperation.org/wordpress/wp-content/uploads/2015/10/TOR-WG-Knowledge- Hub.pdf

[12] Evaluation of joint programming to address grand societal challenges, March 2016
https://publications.europa.eu/en/publication-detail/-/publication/d4a8f349-e68c-11e5-8a50-01aa75ed71a1/language-en

[13] Smart Cities And Communities - European Innovation Partnership, COM(2012), July 2012,
http://ec.europa.eu/eip/smartcities/files/ec_communication_scc.pdf

[14] Concept Paper Cultural Heritage JPI Partnership and advanced economies, D4.2. (JHEP)

[15] Set up external web-based communication and information portal for public information, D6.2. JHEP, April 2012

Annex 1

Brazil Web links:

- Historic and Artistic National Heritage Institute (IPHAN) http://portal.iphan.gov.br/portal/montarPaginaInicial.do;jsessionid=02D3219AC3E25C54CAA4E55700E5C038
- Cultura Viva: Program of the Ministry of Culture. http://www.cultura.gov.br/culturaviva
- Ministry of Culture: http://www2.cultura.gov.br/site/

China Web links:

- Ministry of Culture: http://english.moc.gov.tw/
- Chinese World Cultural Heritage Foundation: http://www.cwchf.com/
- Saving Antiquities for Everyone (SAFE): http://www.savingantiquities.org/about/
- Beijing Cultural Heritage Protection Centre: http://www.bjchp.org/ (open in Google Chrome, and translate into English)

Egypt Web links:

- Ministry of State for Antiquities http://www.sca-egypt.org/eng/main.htm
- Centre for Conservation and Preservation of Islamic Architectural Heritage http://www.ciah.biz/
- The Centre for Documentation of Cultural and Natural Heritage http://www.bibalex.org/researchcenters/cultnat_en.aspx
- The Egyptian Antiquities Information Service http://www.eais.org.eg/
- International Council of Museums – Committee for Conservation http://www.icom-cc.org/
- German Archaeological Institute, Caro Department http://www.dainst.org/en/department/kairo?ft=all
- French Institute for Oriental Archaeology http://www.ifao.egnet.net/
- American Research Centre in Egypt http://www.arce.org/
- Egypt Exploration Society http://www.ees.ac.uk/
- Egyptian Cultural Heritage Organisation http://www.e-c-h-o.org/

India Web links:

- Archaeological Survey of India http://asi.nic.in/asi_aboutus.asp
- National Conversation Policy http://asi.nic.in/pdf_data/draft_national_conservation_policy_monuments.pdf
- JNNURM http://jnnurm.nic.in/
- Ministry of Urban Development http://moud.gov.in/
- Ministry of Culture http://www.indiaculture.nic.in/
- Indian Heritage Cities Network http://www.ihcn.in/

Israel Web links:

- Ministry of Environmental Protection http://www.gov.il/FirstGov/TopNavEng/Engoffices/EngMinistries/Engsviva/
- Ministry of Education http://www.education.gov.il/moe/english/ind.htm
- Ministry of Culture and Sport http://mcs.gov.il/English/Pages/About-the-Ministry-of-Culture-and-Sport.aspx

Japan Web links:

- Agency of Cultural Affairs http://www.bunka.go.jp/english/
- Japanese Ministry of Education, Culture, Sports, Science and Technology http://www.mext.go.jp/english/
- Japanese Funds-in-Trusts http://www.unesco.emb-japan.go.jp/htm/jpfundsintrust.htm

Russia Web links:

- Compendium: Cultural Policies and Trends in Europe; Country Profile; Russian Federation; 2013: http://www.culturalpolicies.net/down/russia_022013.pdf
- Ministry of Culture (Coordinating Council for Culture)- http://government.ru/en/department/27/

- -The Federal Archival Agency- http://archives.ru/
- -The Federal Agency for Tourism http://www.russiatourism.ru/
- The UNESCO site www.unesco.ru provides a useful overview of Cultural Heritage in Russia.
- Russian Foundation for Basic Research (Research Funding) (http://www.rfbr.ru/rffi/ru/info).
- Russian Humanitarian Foundation
- Scientific projects listed under the Ministry of Culture http://www.mkrf.ru/deyatelnost/scientific-work/index2013.php
- Bilateral research cooperation between Russia and Norway on the Research Council of Norway website. http://www.forskningsradet.no/en/Russia/1253956512669

South Africa Web links:

- The Department of Arts and Culture https://www.dac.gov.za/
- South African Heritage Resources Agency http://www.sahra.org.za/
- The National Heritage Council http://www.heritageportal.co.za/organisation/national-heritage-council-nhc
- Department of Environmental Affairs https://www.environment.gov.za/

National Research Foundation http://www.nrf.ac.za/

USA Web links:

- Heritage Strategies International http://www.hs-intl.com/about-us
- International Council on Monuments and Sites http://icip.icomos.org/ENG/agenda.html
- National Park Service http://www.nps.gov/index.htm
- National Trust for Heritage Preservation http://www.preservationnation.org/
- Smithsonian http://www.si.edu/
- Getty Conservation Institute http://www.si.edu/
- Library of Congress http://www.loc.gov/
- State Historic Preservation Office http://www.ncshpo.org/