SMART CULTURE

DELIVERABLE 3.3

SmartCulture Research Agenda

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The SMART CULTURE consortium:

- EuraTechnologies (EUP) (project coordinator)
- Asociación Madrid Plataforma Audiovisual (MAC)
- Asociación Cluster del Sector Audiovisual de Euskadi – Euskadiko Ikustentzunezko Klusterra (EIKEN)
- The University of Birmingham (UoB)
- Comune di Siena (SIENA)
- Sofia Development Association (SDA)
- Geemeente Eindhoven (Eindhoven)
- Region Midtjylland (MIDT)
- Libera Universitá di Lingue e Comunicazione IULM (IULM)
- Sofiiski Universitet Sveti Kliment Ohridski (SU-NIS)
- Design Cooperatie Brainport UA (DCB)
- Aarhus Universitet (UoA)
- Randers Kommune (MMEx)

For more information on this document or SMART CULTURE, please contact:

Camille Rouzé – Smart Culture Project Manager

EuraTechnologies
165 Avenue de Bretagne
59000 Lille, FRANCE
crouze@euratechnologies.com
Tel: 0033 359 08 32 35

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PROJECT FACT SHEET

Over the past few years, there has been an increase in global demand from Cultural Heritage organizations worldwide for innovative digital applications based on Information and Communication Technologies (ICT). This demand has and will generate unique opportunities for cultural and creative companies to enter into global market value chains.

Overall objectives

The SMART CULTURE project aims at:

• Fostering relationships between Cultural Heritage organizations, regional cultural and creative clusters to create partnerships to enlarge the visibility and accessibility of Heritage collections and sites. These relationships will not only provide an opportunity to open up the hidden social and economic potential of heritage and cultural collections through these digital technologies, but also impact on the quality life of culturally diverse citizens.

• Promote the creation of engaging digital experiences for access to cultural resources by the cross fertilization between ICT enterprises, Creative and Cultural Industries (especially SMEs) and research stakeholders across Europe. This cross fertilization will lead to new opportunities and good practices for innovative digital access to cultural resources and digital cultural mediation.

Duration

Three years: 36 months

Project start up: 1st December 2012

Project exit: 30th November 2015

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FOREWORD

New digital technologies hold promises for — but also raise issues about — the cultural heritage of Europe. While it is more and more recognized that interactive technologies can bring cultural heritages alive in new and engaging ways to a broader range of persons; it simultaneously raises numerous questions, for instance of selection and types of material suitable for such presentations; and questions about approaches to the securing of heritages of digital artefacts and practices.

This growing importance of specific technologies for both presenting and storing necessitates closer relations between the cultural institutions and companies with the appropriate knowledge about digital possibilities. The SmartCulture European project indeed has the double aim of developing the person's access to experiences regarding cultural heritage and developing synergies between the range of institutions active on such issues.

The European context as much as the international scene, confirm the legitimacy and necessity that the Smartculture project to be based on an enlarged vision of culture, but centered on the persons'capacity and development. Indeed both "culture" and above all "cultural heritage" can be seen as ressources for personal and collective freedooms and capacity-raising which induces even more public and private responsibilities.

The most recent conventions, such as the Faro Convention published in 2005 by the Council of Europe remind this idea, defining cultural heritage as '*a group of resources inherited from the past which people identify, independently of ownership, as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions*'. Complemented by the Fribourg Declaration (2007), the term culture is described as covering those "*values, beliefs, convictions, languages, knowledge and the arts, traditions, institutions and ways of life through which a person or a group* ***expresses their humanity and the meanings that they give to their existence and to their development***".

Through this cultural approach considering the human person (alone or with others) as the **center value** of development, one can see how "into practice", actors are confronted to the necessity of encompassing complexity in their paradigms and to involve themselves through systemic dynamics, far from being easy to apply in reality. If recipients of the responsibility and effectiveness evaluation related to cultural heritage domains are the States (at first and last expense), the government action with regards to the civil society would remain incomplete if all stakeholders would not agree and participate in a logic of democratic governance. The approach adopted through a triple-helix : public actors at infra -, inter - and supranational levels ; Private actors such as companies whose responsibilities towards society are significant and varied , interfering with cultural life ; Civic actors refering to non -governmental organizations (NGOs) and other non-profit organizations.

In this context and more specifically to Smartculture project, both triple actors from the transversal domains of culture, cultural heritage, ICTs are involved. But above all related to the knowledge and development areas tackled by the project, are considered the link embodied by the Research domain.

The SmartCulture Research Agenda (SRA) has been developed in this purpose, and more specificaly to draw together a range of initiatives that push the development of both access and

experiences to Digital Cultural Heritage (DCH) through collaboration between research, heritage curation, and SMEs within digital media.

These initiatives, their research, their commercial and policy contexts and their potentials are drawn from the Regional Research Agendas (RRAs, D3.2) that had been produced by each of the regional clusters. Based on this information, the SRA will identify research priorities aimed at collaborative initiatives that can develop productive integrations of complementarities between the regions. This is linked to the identified disparities between regions and the various recommendations for further action in the RRAs.

Based on the Regional Research Agendas (D3.2), the following three thematic research priorities have been identified:

- New heritages, new knowledge and new questions
- Cultural research and innovation
- The relevance and meaning of cultural heritage to contemporary audiences

In order to have any effect, these three priorities must be implemented through a variety of measures that include specific research actions, common research infrastructures, collaborative projects and expanded possibilities of knowledge sharing. This, along with other developments and challenges, will point at a range of possible future scenarios.

Developing the potential of the European cultural heritage within a digital media landscape is dependent on the ability of a range of actors to work across boundaries of disciplines, methodologies, modes of knowledge production and application as well as regional and national.

I – INTRODUCTION

The SmartCulture Research Agenda has been developed out of the 8 Regional Research Agendas[1] provided by the SmartCulture consortium. As a reminder, the participating regions of this document are the following:

- NORD PAS DE CALAIS, FRANCE
- SIENA, ITALY
- MIDTJYLLAND, DENMARK
- EINDHOVEN, THE NETHERLANDS
- MADRID, SPAIN
- WEST MIDLANDS, UNITED KINGDOM
- BASQUE COUNTRY, SPAIN
- SOFIA, BULGARIA

The SmartCulture Research Agenda aims at producing detailed and interdisciplinary knowledge of various types of processes and experiences of cooperating with regard to retrieving, contextualising, producing locally related cultural content.

Through a common template, each of the regions have outlined national and regional policies on research and innovation as well as Smart Specialization, current research projects and infrastructures, state-of-the-art applications and collaborative projects in addition to recommendations for how to further the overall goals outlined above.

Although not every region have been able to supply all the data specified by the template, the material gathered constitutes a solid and detailed base for defining a list of priorities, which have been identified from a list made up of each region's projects and recommendations.

First, we detailed the European strategies in terms of research and innovation to contextualise the Research Agenda and the local policies in each of the eight regions. Then, we defined the rechearch topics and innovation lines that have been drawn through the analysis of the Regional Research Agendas. A forecast of the existing technologies and services implemented in the regional projects helped us to get an overview of the current market before mentorionning the main research and innovation interests of the research and SME community; and underlined projects focusing on relations between Research Institutions and SMEs. Finally, we presented the future regional scenarios and the challenges that will face the stakeholders in the development of the Digital Cultural Heritage field in Europe.

[1] Regional Research Agendas - Deliverable 3.2.

II – RESEARCH AND INNOVATION STRATEGIES AND POLICIES

In terms of research and innovation, the European Union is *responsible for 24% of world expenditure on research, 32% of high impact publications and 32% of patent applications, while representing only 7% of the population*[2].

Setting out from this premise, the European Union developed a set of research and innovation strategic guidelines to remain a major global player. **Europe 2020** is the EU's growth strategy for a smart, sustainable, inclusive economy which includes seven flagship initiatives, including the **Innovation Union** implemented through the financial instrument **Horizon 2020**; with which nearly 80 billion euros will be dedicated to create worldclass science performer, to remove obstacles to innovation, and to revolutionise the way public and private sectors work together. The main objectives are to move on from the lab to the market and to strengthen the Union's excellence and attractiveness in research and innovation as well as its economic and industrial competitiveness.

The Innovation Union will complete the **European Research Area** which aims at developing more effective national research systems, an optimal transnational cooperation and competition, an open labour market for researchers, gender equality and gender mainstreaming in research, an optimal circulation, access to and transfer of scientific knowledge.

In addition to these guidelines, each Member State has been asked to design **Research and Innovation Strategies for Smart Specialisation** (RIS3) in order to make innovation a priority for all regions. The SmartCulture partners have detailed in the Regional Research Agendas (D3.2) their regional and national strategies in terms of research and innovation, in general and in the field of Digital Cultural Heritage. Even if not all of the regions defined a Smart Specialisations Strategy (as the Midtjylland region in Denmark for example), they defined a large set of local strategies that follow the EU guidelines mentioned above, taking into account the local specificities and reflecting its regional strengths. Let's take the examples of the **Spanish strategy of science, technology and innovation 2013-2020**; the Dutch **Brainport 2020 Top Economy, Smart Solutions**; the Basque **Science, Technology and Innovation Plan (PCTi2015)**; the British **Technology Strategy Board**; the Danish **More Creative;** the Bulgarian **Strategy for Scientific Research 2020**; the Italian **Program of Research (HIT 2020)** or the **France Europe 2020**.

If the research and innovation strategies are pretty clear in all these regions, the strategic research guidelines in the field of Digital Cultural Heritage are not that obvious. As the SmartCulture scope of actions is at the crossroads of technologies and culture and concern at the same time Information and Communication Technologies and Cultural and Creative Industries, policy makers didn't always consider this sector as a smart specialisation and we observe a great disparity between the regions in terms of specific policies. If the Smart Regions Midtjylland and Eindhoven are well equipped in this area with the **CLICK programme** aiming to boost innovation in the Cultural Heritage sector or the **LAM.FM** including a digital archiving project among the regional museums, other regions produced either digital strategies with particular attention to Culture, or Plans for Culture with a special focus on the digital as the **Strategic Cultural Plan of Madrid**, the **Basque Plan for Culture** or **Valore Cultura** in Italy. The digitization of Cultural Heritage is also the focus of specific programmes as the French **National**

[2] *Enhancing and focusing EU international cooperation in research and innovation: A strategic approach*, 14.9.2012. European Commission.

Digitisation Plan or the Bulgarian **National Strategy for the Development of Creatives Industries**.

Digital Cultural Heritage needs transversality and transdisciplinarity, which make the policies complex to design and regulate in the less developed regions. To compensate for this lack, the local stakeholders and researchers often develop their own programmes with the help of clusters and universities through calls for papers as the projects **Masaccio** or **Nuemuc** in Nord Pas de Calais region. Knowledge and Technology Transfer seems to be an absolute neccessity for the research in the field in order to better organise and transfer the resources, as underlined by the French **law ESR** and the British **Creative Industries Knowledge Transfer Network**. The share of labs, platforms, studies, protocols would enhance crossfertilization and develop productive integrations of complementarities between the regions

This state of play is well aligned with the **Regions of Knowledge** programme which main objective is "*to intensify the role of research and technological development (RTD) in economic development and to invest better and more in RTD through cultivating innovative 'research-driven clusters' at a local and regional level*"[3]. The goal is to maximise the region's potential and to create a dynamic environment that can attract or retain the best researchers, as "*Europe would require at least one million more researchers in the next decade to reach the target of investing 3% of EU GDP in R&D by 2020"*[4].

[3] http://cordis.europa.eu/fp7/capacities/regions-knowledge_en.html

[4] http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=key

III – RESEARCH TOPICS AND INNOVATION LINES

Most of the recommendations from the Regional Research Agendas (D3.3) underlined issues and possible avenues for new knowledge to be explored in relation to digital cultural heritage. The following topics and priorities have been constructed on these issues and possibilities as well as on the premise that collaborative research across disciplines and sectors have the best possibilities of succeeding if based on questions of mutual interest. These topics and priorities are:

- New heritages, new knowledge and new questions
- Cultural research and innovation
- The relevance and meaning of cultural heritage to contemporary audiences

4.1 New heritages, new knowledge and new questions

This priority is based on the recognition that the advent of new technologies, changing demographics are not only affecting the ways in which cultural heritage material is collected, stored, presented, but also what cultural heritage is and how it should be interpreted. This research priority aims at formulating new research questions and/or methodologies in relation to various types of changes. This can be broken down into the following research areas:

- **Identities**
  - How does mobility affect the understanding of the European cultural heritage?
  - How do digital artefacts affect citizens' understanding of cultural heritage?
  - What does it mean to be 'connected' to a cultural heritage?
  - What is the significance of the relationship between tangible and intangible cultural heritage?

- **Methodologies**
  - How existing and future cultural heritage can/should be archived?
  - What are the links between research questions and methodologies?
  - How do we develop strategies that allow for new areas of research as they react to developments in technology, digital cultural heritage and shifts in audience expectations?

- **Institutions**
  - How does the digitalization of cultural heritages relate to questions of intellectual rights and ownership?
  - How does digitalization affect the range of institutional actors with a stake in cultural heritage preservation and/or commercialisation?
  - How can new institutions/research fields be brought into research about cultural heritage?

4.2 Cultural research and innovation

This priority grows out of the institutional gaps identified within many of the Regional Research Agendas. What is identified is, broadly speaking, a gap between research on culture, which is (or has been) largely focused on preservation, and the entrepreneurial and innovation sector, which is largely based on visions of change and transformation. A collaborative venue for discussing more central questions with regard to culture, heritage and change will produce productive re-interpretations. Central topics for such a venture are:

- **Cultural heritage research as preservation and/or development**
  - What political/institutional interests are at stake in researching the preservation of cultural entities or the development of new identities and entities? And how does migration, internationalisation and globalisation relate to and inform this?
  - What characterizes the different institutional discourses on cultural heritage and how can these be brought into productive dialogues?

- **Culture as Innovation**
  - How can Cultural Heritage function as an axis of innovation?
  - How does cultural heritage function within contexts of entrepreneurship and innovation?
  - How can different types/aspects of cultural heritage be brought together to create something new?

- **Culture as events**
  - What role do cultural events play in the public perception of cultural heritage?
  - How can specific events bring together cultural heritage as both stable and dynamic?
  - In what way can specific events bring together stakeholders with differing aims, objectives or remit in the area of culture and heritage?

4.3 The experiences and expectations of contemporary audiences

The priority is linked to the argument that the development of sustainable models developed for access and usage of cultural heritage should be based on a more thorough understanding of what cultural heritage experiences actually mean for the end users. The expansion of users of cultural heritage is therefore largely dependent on more empirical research about the meaning and relevance of cultural heritage to contemporary users. Important research priorities and topics within this area are:

- The experience of cultural heritage
  - How are the traditional institutions of cultural heritage perceived?
  - How are existing and new modes of presenting cultural heritages perceived?
  - What role does interactivity play in such processes?

- Cultural heritage as consumer commodity
  - What can we learn from (successful) commercial products and services related to cultural heritage (computer games, personal digital archives)?
  - What cultural trends/consumer demands are visible in digital products linked to consumer perceptions of time and how can these relate to cultural heritage?

- Smart Technologies
    - What can the use of smart technologies (e.g. in the home) tell us about consumer behaviour that could be relevant for cultural heritage?
    - What can Smart Culture learn from the more established models of audience experience in other sectors?. Eg. Retail, Music, Broadcast

Collaborative research within these three areas holds the promise of producing detailed and interdisciplinary knowledge of various types of processes relevant for the further development of cultural digital heritage.

4.4 Implementation

The Regional Research Agendas clearly reflect a deep commitment within each region to the community **value of cultural heritage**. And within each region there is a range of interesting projects in progress. These state-of-the art projects can form the base for the development of research in-depth on some of the topics identified above. As this would happen within the existing consortium this would be within or immediately after the completion of the SmartCulture project.

A first step towards producing research within the topics outlined above could be a series of comparative audience/user studies of a selected state-of-the-art project within each region. These projects should be chosen to reflect different but comparable technological experiences in order to draw out salient features of the experiences of digital cultural heritage. Based on the descriptions in the Regional Research Agendas the following projects/actors (and others) can form the base of comparative data on the consumer experiences of cultural heritage through **3D technology**:

- Immersive bubble (Nord Pas de Calais, France)
- DiT-BecS / SienaBiografix / Parasite SI2019 (Siena, Italy)
- “Holger the Dane” (Midtjylland, Denmark)
- Eindhoven, city of “Makers” (Eindhoven, The Netherlands)
- Digital Prototyping Hall (West Midlands, UK)
- Museo de America (Madrid, Spain)
- Mediascape (Basque Country, Spain)
- 3D Laser Preservation — Four Temples of Different Religions (Sofia, Bulgaria)

Bringing together the actors involved in these projects as well as entities directly involved with 3D technology applications to focus on user experiences and research will produce valuable knowledge that will enable more sustainable solutions as well as methodologies that can bring future initiatives closer to contemporary and emerging consumer experiences and expectations.

This focus on **consumer experiences and expectations** is proposed as first step based on the recognition that further developments in the digital cultural heritage field are dependent of user or consumer relevance. A related argument comes out of some of the Regional Research Agendas in the sense that they propose to study similar experiences and/or content in other

areas in order to gain insight into consumer relevance. This could be the use of smart technologies in other fields (e.g. health) or the different ways in which consumers accumulate their own digital culture heritage through photos, music etc.

A more focused collaboration on consumer experiences and expectations of digital cultural heritage through a specific technology, e.g. 3D visualisation as the example above, points towards the call many of the Regional Research Agendas for closer cooperation around experimentations with the same technology. This is linked to the calls for common and open platforms that will allow a more sustained and long-term collaboration.

A third area that needs initial focus is the ways in which **knowledge is produced and transferred in networks of different types of institutions**. This is something that is brought up in almost all the Regional Research Agendas and needs to be addressed as a related research topic in its own right. A more sustained focus on and understanding of the different types of knowledge regimes involved — different research disciplines, museum management and curation, software development, commercial applications as well as innovation and entrepreneurship — will help further successful knowledge brokering.

The example above about a collaborative focus on consumer experiences and expectations could include a parallel track in which the production of knowledge was in focus with the aim of raising awareness and reflexivity among the participating partners. The ultimate aim of this would be to make the possible levels of collaboration more explicit and productive.

These avenues of implementation— collaboration on consumer experiences and expectations and knowledge brokering — are feasible within the SmartCulture timeframe — or immediately after. Some of the other aspects within the three priorities would need more time. This is for instance the case with a more sustained research effort focused on understanding the larger implications of how cultural heritages are transformed through new technologies. This would entail more theoretical groundwork from a number of disciplines.

The further implementation of the proposed research priorities rests on the enactment of a relevant enabling framework. Following the Regional Research Agendas this would have to include:

- The expansion and consolidation of relevant research infrastructures at the regional level (centres, labs, incubation networks etc.) that can instigate and frame collaboration between divergent actors.

- An increased focus on the implications of cultural heritage within different disciplines.

- An increased focus on how cultural events can be used to experiment with and further digital cultural heritage.

- The development and enactment of specific policies and funding opportunities for digital cultural heritages at the national and regional level.

IV – FORECAST ON TECHNOLOGIES AND SERVICES

The projects detailed in the Regional Research Agendas (D3.2) have highlighted the most applied technologies currently used in the Digital Cultural Heritage field.

As the sector is focused on **knowledge**[5], the use of the **data** had broadened and strengthened the past few years. Metadata, open data, big data, linked data, data mining, indexing solutions, reasoning, cloud computing or QR codes have been the subjects of many studies. These technologies can have several uses: creation of digital fresco (e.g. **Signature**, Nord Pas de Calais), creation of visitor's paths in museums (e.g. **Tech a way**, Nord Pas de Calais), provision of added value services (e.g. **IPRs**, Basque Country), analysis of market and customers behaviours (e.g. **Viditrusts**, Siena), unlocking all heritage information (e.g. **Brabant Cloud**, Eindhoven), or enhancement of advance researches (e.g. **Multisensor**, Sofia).

The **connected objects** have also become increasingly significant in the field with the use of the Internet of things, Near Field Communication (NFC), Sensor Networks, Geolocation, Wifi or Bluetooth. Researchers, entrepreneurs or municipalities have designed new services in order to enhance the experience of the public. Let's take the examples of NFC cards allowing the audience to access at the same time to public transportation and the museums of a city (e.g. **Pass Musée C'art**, Nord Pas de Calais), NFC phones or geolocation mobile application presenting enriched cultural or touristic content (e.g. **MONGRANVILLE exhibition** or **Walls have voices** in Nord Pas de Calais, Application **Comune di Siena** in Siena) or proximity based targeting through locations and mobile phones (e.g. **Apple iBeacon**, West Midlands).

As one of the Digital Cultural Heritage's aims is to unlock the access to cultural resources, the notions of pleasure and of user experiences are fundamental in the field. Thus, the research community has been working around **human machine interaction** by making use of touch interaction, motion interaction, biometric and brain sensors, robotics, notably through the following projects: the Emotional cinema **Mademoiselle Paradis** or the **Objects touch table** in the Natural History Museum in Nord Pas de Calais; or the game developed by the **Museum of Human Evolution** which uses 3D virtual recreations and Kinect technology in the region of Madrid for the younger visitors.

In addition to these new services, the use of **realities and dimensions** also increases the experience of the public through virtual and augmented realities, 2D/3D/4D images, 3D prints, or immersive interfaces. The museum Louvre Lens in the region Nord Pas de Calais developed an **immersive bubble** allowing the audience to manipulate pieces of art in 3 dimensions, whereas the **Museo de América** in Madrid displays 3D virtual recreations of war armors allowing the visitors to dress for war in a virtual way. The example of the **Digital Innovation Hub** in West Midlands is particularly accurate in this matter as it tests hardware and software solutions while modelling audience interaction across real and virtual environments.

We shall also underline the fact that these technologies present a high scientific interest which could extend the research opportunities, as the 3D reconstruction and relief of archaeological and historical sites by the **ATS** (Archaeolandscapes Tech&Survey) in Siena or the 3D laser scanning for Digital preservation and dissemination of the **Four temples**'s objects in Sofia.

[5] The data is extracted from an information and the knowledge is derived from data.

V – MAIN RESEARCH AND INNOVATION INTERESTS OF THE RESEARCH AND SME COMMUNITY

One of the main concerns of the research and SME community and especially of the Human sciences community, is the **innovation through uses and services**. Indeed, the technologies mentioned above imply to innovate the production, the product itself, the consumption of the public and finally the market. The multiplicity of mediums allow to broadcast information on mobile phones, websites, ebooks, video walls, touch screens, tablets, social networks… and pushes the research community to develop **transmedia** and **serious games**.

The content created for these innovations shall consider its linguistic and discursive dimensions as human beings will handle and interact with it. To enhance the experience, we shall first understand the behavior of the users, their emotions, their understanding. The laboratories **Geriico** and **Ureca** at the University of Lille in the region Nord Pas de Calais are especially focusing on these studies and contribute to the design of new services with cultural institutions and SMEs.

The **language** is also very much questioned by the Digital Cultural Heritage stakeholders. We can mention the work of the **Language Observatory** in Siena that acquires and processes data for linguistic analysis and the production of real cards geolinguistic. On a different note, the **Project WHIM – What if machine** in Madrid is a natural interaction based on language research group which collects crowd-source data about how people value and expand creative ideas. The region of Sofia presents also promising projects based on the semantic as the **Ontotext,** which focus on a number of interconnected areas involving formal semantics; or the **Multisensor** (Mining and Understanding of multilinguaL contenT for Intelligent Sentiment Enriched coNtext and Social Oriented interpretation), advancing the research and development of multilingual media analysis technologies.

It also questions the **standardization**, especially in a global context. What standards and vocabulary shall we use to collaborate with and to be understood by everyone? As an example, the Spanish ministry of Education, Culture and Sports is developing a **thesaurus of Cultural Heritage** including a standard vocabulary to catalogue the collections and code linked open data, allowing all museums in Spain to speak the same "language".

In addition, a common and central feature of the future scenarios emerging from the experiences in each region relates precisely to the **data**. The **open data** promises new developments across sectorial and institutional boundaries whereas the application of **big and user data** promises to deliver more integrated and contextual experiences.

Furthermore, the researchers and SMEs plan to further work on the following technologies: **robotics, human machine interaction and collaboration, connected objects, gestures and emotion combined interaction, mixed display system, mobile applications with augmented reality and sensor technology, holography, facial recognition, printed intelligence, RFID ink, artificial intelligence, stereoscopic technics**…

The regions of Madrid and Eindhoven also underlined the increasing trends of **minimization, surroundable and wearable** technologies with a strong focus on mobile technological applications, like the glasses or the watches.

VI – RANGE OF CASE-BASED PROJECTS FOCUSING ON RELATIONS BETWEEN RESEARCH INSTITUTIONS AND SMES

Based on the analysis produced by the SmartCulture consortium, there is — throughout most of the regions — evidence that both public and private research institutions have been successful in producing relevant knowledge in cooperation with institutions across the digital cultural heritage sector. Such cross-sectorial and –institutional knowledge is produced within various networks as the **Basque Innovation Agency**, the **DIGHUMLAB** in Midtjylland or the **Inria Innovation lab** in Nord Pas de Calais.

One of the common areas of research and development initiatives is the development of digital applications and collections of cultural heritage. The regions focused on relations between research institutions and SMEs with regards to the digital availability of and access to the cultural heritage. A prominent example of a successful innovation process is **larm.fm** from Denmark. This project has resulted in the establishment of a digital research infrastructure and the development of an open source digital platform that enables researchers from all Danish Universities to access a collection of 700.000 radio programmes. The larm.fm platform was developed on a prototype platform (CHAOS) by Geckon, a private software development company and the Danish Broadcasting Company (DR) and is a successful example of cooperation between private and public companies and institutions within the cultural sector. The larm.fm has so far been the main empirical database of three collaborative research projects, two of them based in Denmark, and one as a European comparative project about Transnational Radio Encounters, funded by HERA. Furthermore the larm.fm platform will be used in a digital archiving project among the regional museums in Region Midt in 2014-2017, coordinated by Digital Humanities Lab (DigHumLab) at Aarhus University.

Similar projects are to be found in the creation of an **integrated digital archive** in Siena, **European Digital Museum for Science and Technology** in Eindhoven**, Digital Arts projects** in West Midlands and other digitized collections – some of them specific for research purposed (copyright issues), some opening up for public access to the regional as well as national cultural heritage. All of these projects have been developed in close cooperation between university-based research, public institutions and private companies. Following this, it is also clear that such corporative ventures across various boundaries are challenging and these challenges will be discussed in more detail below.

VII - FUTURE SCENARIOS

Apart from the technologies and main research interests mentioned above, the field of Digital Cultural Heritage can explore other areas of smart specializations.

Indeed, some projects presented by the eight regions tend to foster the citizen's **mobility**, for example thanks to geolocation or visitor's paths created online or through mobile applications. The field of Digital Cultural Heritage can also enhance the experience inside the public transportation, like the videowalls in the central station in Amsterdam (The Netherlands) which broadcast digitized paintings; or the project of the CITC in Nord Pas de Calais (France) broadcasting books extracts on walls, windows or screens in the subway.

S**ustainable development** also needs to be considered from all kinds of angles: sustainability of standards (how long can a standard last?) which is a major concern regarding to the digitization of Cultural Heritage, sustainability of the materials (how could we re-use technologies and supports? How can we recycle the materials?), sustainability of networks, collaborations and infrastructures.

Research in the field of Digital Cultural Heritage can also impact **land-use planning** and **social cohesion**, as underlined by several regional projects: the conversion of a Tram depot into a Digital Art Center in Sofia or the use of empty patrimonial buildings to create fablabs and testlabs in Eindhoven.

Sustainability and future developments of the European digital cultural heritage depend on the successful combination of specific infrastructures or enabling frameworks and thematically relevant research topics. If this combination is successful, **a future scenario** for the development of the sector could include:

- Closer cooperation between a wider range of academic disciplines;
- Closer cooperation between publicly funded research and commercial actors;
- More international, collaborative research and development projects;
- A better understanding of the meanings and implications of cultural heritage within digital media ecologies both locally at the level of the European community;
- Applications of technology that are well aligned with consumer expectations;
- Consumer products incorporating cultural heritage;
- A greater involvement of citizens in the innovative developments of cultural heritage and its usages;
- An increased citizen ownership of cultural heritages.

VIII – CHALLENGES

There are a number of challenges in relation to realising the potentials outlined above. Many of these are described in the Regional Research Agendas. Some of the most important of these challenges are:

- Disciplinary insularity;
- Lack of recognition of interdisciplinary and cross-sectorial research;
- Discursive barriers (e.g. between different types of institutions);
- Too much administration in terms of applying for and running research programmes;
- Processes of digitalisation of cultural heritage materials;
- Divergent timeframes within the different institutional settings;
- Available resources in relevant SMEs;
- Unstable and underdeveloped markets;
- Lack of regional political and commercial emphasis;
- Lack of focused funding possibilities.

These challenges will have to be addressed within different institutions, i.e. research institutions, local and national governments, funding bodies, cultural heritage institutions and commercial enterprises. The overall challenge lies with the possibility of coordinating the measures in order to assure that they serve the double aim of developing access to and experiences of the European cultural heritage and developing the range of institutions providing such experiences and access.

The SmartCulture project aims at expanding the demand for digital cultural heritages by developing innovative and participatory ways of getting citizens to engange with cultural heritage. Such an enterprise could, however, be assisted by the production of more detailed knowledge about the role of cultural heritages in everyday life and identity formation. This is addressed by the research priority: *The relevance and meaning of cultural heritage to contemporary audiences*. Such knowledge is important for the further development of the digital cultural heritage.

IX – CONCLUSION

The SRA has been built upon the data assembled through the Regional Research Agendas in the eight regions. The insights and examples in these documents testify for a great variety of and ingenuity in the ways that cultural heritage materials — pre-digital or digital — are put to use to enliven communities while stimulating research and innovation. This is very encouraging and constitutes a solid base for further developments and for bringing more regions into collaborative projects.

The processes forming the materials through which citizens get acquainted and engaged with their cultural heritage are transforming through the application of new media and technologies. What this means for the cultural identities and continuities is far from fully understood. What the assembled Regional Research Agendas show, however, is that there is a widespread willingness throughout the regions to experiment with the new technological possibilities. This experimentation sometimes springs from innovative initiatives within cultural and creative industries and related SMEs. At other times, new applications spring from new research questions. This traffic does not follow a specific road map. Infrastructures and other ways of supporting this traffic must thus be flexible and adaptable. They must, in other words, be innovative.

The descriptions and evaluations of the projects and their contexts within each region formed the backdrop of the formulation of a range of specific **recommendations** to, respectively, policy makers, future research and to the Strategic Research Agenda. A central theme across the regions is the call for a more elaborate integration across national states, regions in terms of **policies, funding schemes and selected technology applications**. The aim of these recommendations is to encourage a range of commonly focused initiatives that cut across disciplinary and institutional boundaries. The major themes of the recommendations are the following:

- Cross-disciplinary, cross-sectional and cross-national infrastructures (labs, centres, projects, networks etc.);
- Coordinated policies/strategies on cultural heritage research;
- Common and open platforms for access to and experiences of cultural heritage;
- Funding opportunities tailored to digital cultural heritage projects;
- The use of European Capitals of Culture (or other cultural events) as levers in the development of digital cultural heritage.

The processes leading up to the SRA are therefore hopeful signs of the possibility of implemented the many elements of this agenda, and with that enliven the European cultural heritage as an interactive part of the everyday life of citizens, broader research communities and innovative and entrepreneurial industries of culture and services. In order to do that, the research topics and scenarios outlined in this agenda is to be transformed into concrete plans for execution, which will be detailed in the following deliverables (Joint Action Plan – D4.1; Business Plan – D4.2).