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# Assessing the Role of Cultural Resources as a Key Product for Socio-Economic Development

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# ASSESSING THE ROLE OF CULTURAL RESOURCES AS A KEY PRODUCT FOR SOCIO-ECONOMIC DEVELOPMENT.

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## Abstract

*Post-industrial, knowledge societies need Culture! The various types of culture represent a multidimensional asset largely underestimated, with an extremely powerful potential for socio-economic growth which is unfortunately still very far from being fully expressed.*

*In this paper, organizational models and technological solutions are proposed as key factors for enabling full expression of an asset that could positively affect several aspects of our life. In fact, if intelligently managed, Culture can provide:*

- *High quality content: the proliferation of new media, like 3g mobile phones or pay TVs, is generating digital spaces that need to be filled with useful and appealing contents.*
- *Socio-economic development: many of the poorest countries host amazing heritage resources that could attract tourists. Cultural tourism is a segment that shows signs of growth all over the world.*
- *Cross-cultural integration: culture is extremely effective for helping people from different areas of this planet in better understanding each other.*
- *Identity building: with the emerging working model based on “boundaryless careers”, it is vital to invest on Culture for building one’s own existential, social, and professional identity.*

*Among the different branches that compose the Culture, it has been chosen to concentrate on the cultural heritage for its intrinsic multidimensional value and its tight connections with one of the leading world industries: the tourism.*

*However, a careful management and wide dissemination of Culture would enhance the fundamental resources of nations. These resources can be organised in two categories of capital:*

- *Human Capital. That is: promoting the creativity of individuals. We define as “creative” sectors like arts, fashion, design, architecture, but also the research of innovation, be it scientific, economic, or technological.*
- *Territorial Capital. That is the territory, its history, landscape, traditions, craftsmanship, and typical products. The Cultural Heritage obviously belongs to this category.*

*The implementation of carefully designed organisational configurations and wisely customised technological solutions can provide the foundations required for allowing the heritage sector in obtaining its right place in the socio-economic scenario.*

*The core issue of this framework is to identify the source of value, that will soon be the main, for cultural heritage institutions that interact with the public, directly or indirectly: the final user.*

*Keywords: Cultural Heritage, Tourism, Storytelling, Ontologies.*

# 1 INTRODUCTION

Western, industrialized countries are facing what is probably the greatest challenge of their economic history: being competitive against emerging Asian countries, which are showing capacity to provide products and services at a fraction of the costs needed in Europe or America. Furthermore, recently, together with the already harsh competition over goods production, outsourcing of services and human labour is becoming the next threat. Just to have an idea of the dimension of this phenomenon, defined as “job-offshoring”, let’s analyse recent data referring to some of the major corporations operating in the ICT area:

- Hewlett-Packard: 8.000 hired in India, 20.000 fired in America.
- Oracle: 4.200 hired in India.
- Intel: 1.400 hired in Asian Countries.
- People-Soft: 1.000 hired in Asian Countries.
- Cisco: 600 hired in Asian Countries.

Solutions to this issue are to be found investing in resources which are more difficult to be replicated or outsourced. These resources can be organised in two categories of capital, highly interconnected and mutually beneficial:

- **Human Capital.** In the post-industrial economy, the competitiveness of a country is connected to its capacity of creating a habitat that attracts (and retains) creative talents: researchers, designers, high level problem solvers like top managers and analysts, represent a work force able to create new needs, new products, new processes, and therefore become a key resource for economic development.
- **Territorial Capital.** With this definition we mean all the resources that are linked with the territory, its history, landscape, traditions, craftsmanship, and typical products. The Cultural Heritage obviously belongs to this category.

While industrial factories tend to have a very disharmonic and aggressive impact on the territory, creative activities on the contrary tend to establish positive feedbacks with the neighbourhood, significantly contributing to its sustainable development. We consider as creative activities such as art, fashion, design, architecture, but also innovation, be it cultural, scientific, economic, or technological (Fig. 1).

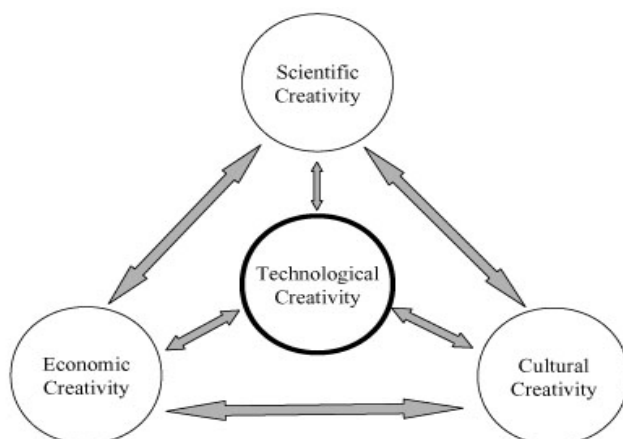


Fig.1: Domains of creative activity (from Mitchell et al Eds. 2003)

In his seminal work Richard Florida (2002) has demonstrated how much the presence of a creative labour force depends upon environmental conditions. After having defined a set of indexes for

assessing the predisposition for creativity of territorial entities, Florida has tested those indexes on a series of American cities and European countries and found a positive correlation between the increase of investments in human capital, technological innovation, R&D, and GDP growth (Fig. 2).

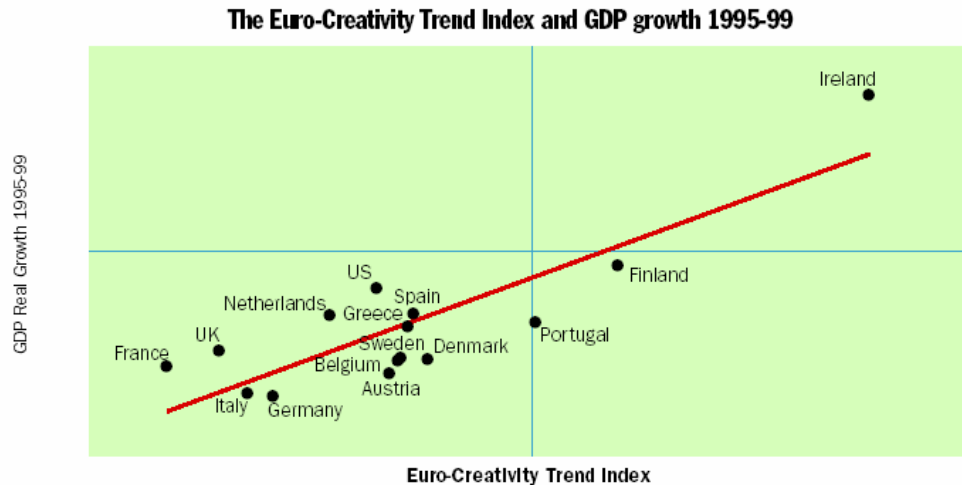


Fig. 2: From Florida and Tinagli (2004)

The results of the investigation have brought Florida to create a new approach to economic productivity: according to the author, the critical factors for the successful development of a city or a region are represented by 3Ts: Talent, Technology and Tolerance. In TABLE 1 are indicated the sub-indexes composing each of the three Ts as described in the extension of the analysis to the European context (Florida and Tinagli 2004).

<b>Euro-Talent</b>	The Euro-Talent Index is composed of three sub-indexes: the Euro-Creative Class Index which is based on creative occupations as a percent of total employment; the Human Capital Index which is based on the percentage of population age 25-64 with a bachelor degree or above (degrees of at least four years); and the Scientific Talent Index, which is based on the number of research scientists and engineers per thousand workers.
<b>Euro-Technology</b>	The Euro-Technology Index is based on three separate measures: an R&D Index based on research and development expenditures as a percent of Gross Domestic Product, an Innovation Index based on the number of patent applications per million population, and a High-Tech Innovation Index based on the number of high technology patents in fields such as biotechnology, information technology, pharmaceuticals and aerospace per million population.
<b>Euro-Tolerance</b>	The Attitudes Index is an indicator of attitudes toward minorities based into four categories: intolerant, ambivalent, passively tolerant and actively tolerant. The Attitudes Index is the percentage of the respondents that have been classified as actively and passively tolerant; the Values Index measures to what degree a country reflects traditional vs modern or secular values. the Self-Expression Index captures the degree to which a nation values individual rights and self-expression.
<b>Euro-Creativity</b>	The Euro-Creativity Index, or ECI, represents a new composite measure that provides a fuller assessment of national competitiveness in the Creative Age. The ECI is a composite based on the Euro-Talent, Technology and Tolerance Indexes discussed above. The ECI compares well to other leading competitiveness indicators, but we believe it is a considerable improvement over them. The conventional measures emphasize technology and in some cases include some indicators of talent. None include any measures of tolerance that is a clear source of competitive advantage. The ECI measures beyond them all by factoring all three Ts into account.

TABLE 1: The components of Florida's "3Ts" model

The Cultural Heritage holds a great potential for nourishing socio-economic development, but it is a very conservative environment. It is therefore necessary to attract (and/or produce) creative talents in order to introduce in the sector fresh energies, bring along new ideas, and open up new perspectives on the management of an extremely powerful assets, the value of which is quite far from being fully extracted.

Implementation of innovative promotion strategies, enabled by carefully designed organisational configurations and wisely customised technological solutions, are the prerequisites for allowing the heritage sector obtaining its right place in the socio-economic scenario.

In fact, besides its widely recognised potential as cross-cultural integrator (Veltman 2002), Cultural Heritage is proving to be a catalyst for the economic development of territories, and represents a resource impossible to re-create artificially.

Unfortunately, due to causes that will be analysed in closer detail further in this paper, Cultural Institutions are generally characterised by a very poor level of management and promotion. Among these causes it is significant to mention that cultural resources are obviously directed, at both local and national level, by professionals with a historic/artistic/archaeological background, lacking by definition the managerial and technological skills required to design and implement state-of-art, cutting-edge economic strategies and technological tools.

Therefore, in order to have a chance of seeing these strategies and tools concretely adopted, it is necessary to intervene at two levels, by:

- defining evolutionary roadmaps for introducing advanced management strategies and technological tools with the aim of progressively increase cultural institutions' performances, but at the same time,
- supporting decision makers (i.e. cultural resources managers) in acquiring the competences required for dealing with advanced economic/technological models.

Among the specific objectives to be achieved in this framework, the following should be considered as priorities:

- increase the capacity of cultural institutions to raise financial resources autonomously,
- spread the notion of fruition of culture and heritage as a leisure activity, triggering a process of democratisation of culture,
- boost the employment rate: according to a EU research, for every 100 positions created in the cultural sector, 60 more open in infrastructural activities<sup>1</sup>,
- fulfil the mission of CH institution to preserve artefacts and communicate the knowledge embedded in them.

Last but not least, it is vital to follow a pragmatic approach, promoting the implementation of pilot projects and spin offs for confronting methodological issues with practical implementations.

## **2 WHY CULTURAL TOURISM**

Tourism has become one of the leading world industries: according to the World Tourism Organisation, between 7 and 8% of total worldwide export of services and goods is generated by the tourism sector, which ranks fourth after chemicals, automotive products, and fuels. It is interesting to note that tourism holds a greater market share than computer and office equipment, food, textiles and clothing, and telecommunications equipment (Fig. 3).

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<sup>1</sup> Censis

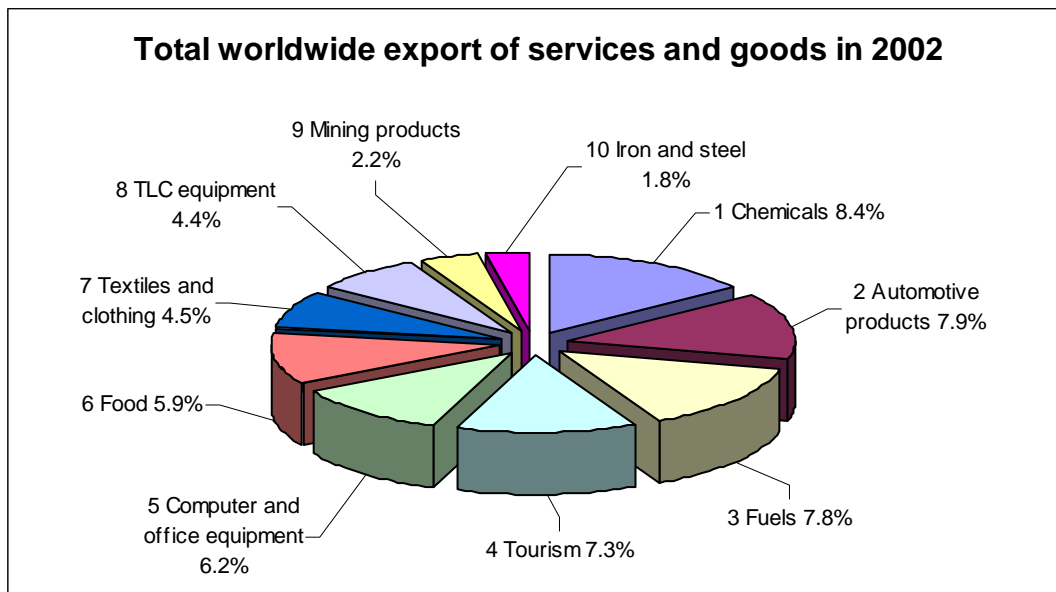


Fig. 3: Worldwide export earnings

Moreover, the growth of international tourism arrivals significantly outpaces growth of economic output as measured in Gross Domestic Product (GDP). In years when world economic growth exceeds 4 per cent, the growth of tourism volume tends to be higher. When GDP growth falls below 2 per cent, tourism growth tends to be even lower. In the period 1975-2000 tourism increased at an average rate of 4.7 per cent a year and GDP at 3.5 per cent, i.e. tourism grew on average 1.3 times faster than GDP (Fig. 4).<sup>2</sup>

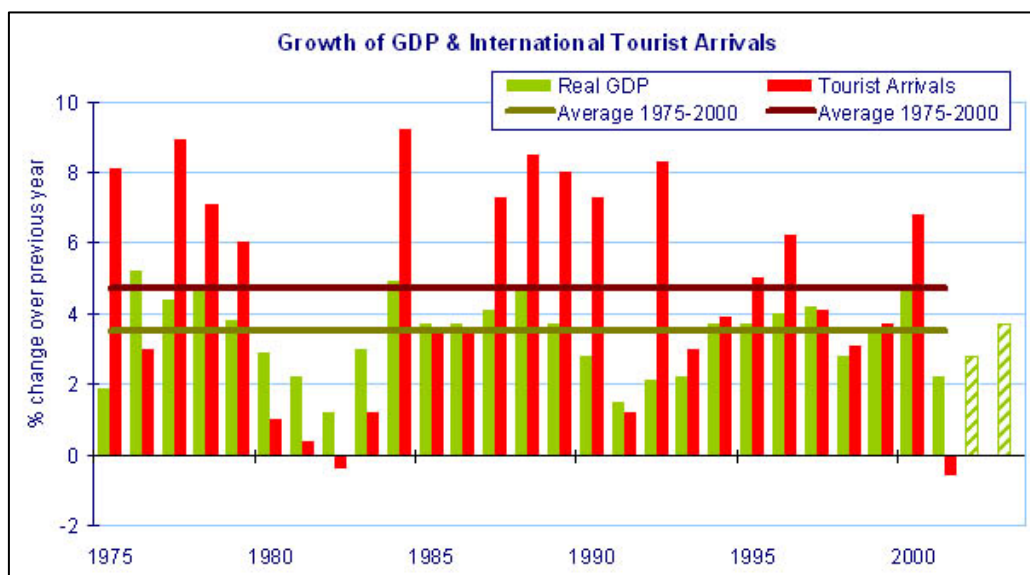


Fig. 4: GDP vs International Tourist Arrivals

<sup>2</sup> <http://www.world-tourism.org/facts/tmt.html>

However, even in the tourism sector, the competition of emerging countries is becoming increasingly tougher, concentrating again in those segments where the offer is more generic (e.g. in beach tourism). Emerging countries are, in fact, able to run resorts with very low management costs. Data from the just closed summer season show a substantial flexion of arrivals in European beach tourism destination displaying, on the contrary, a clear gain in the “Cities of Art”: cultural resources are unique.

Having considered facts and figures indicated so far, the objective of the research described in this paper is to enable the CH sector expressing its full potential and, as a consequence, positively affect connected activities (positive externalities).

To this end it is necessary, for cultural institutions, to carefully plan evolutionary roadmaps leading towards innovation; i.e. to develop innovative ways of supporting visitors, be they foreign tourists or local citizens, in achieving a fully satisfactory cultural experience. The main prerequisite for reaching this goal is to support cultural resources managers in becoming aware of the urgent need for a revision of their mission: in the emerging scenario, not only their main objective but also the main “client” is changing. In fact, as we will see in closer detail further in the paper, the main purpose of a cultural resource manager is changing from preservation to communication/education and the main source of economic income from public (Governments) to private (final users, sponsors, enterprises and corporations) (Missikoff 2004). Please note that these elements have always co-existed and will probably do so in the future: it is the proportion of their respective contribution that is going to change considerably.

### 3 UNLOCKING THE VALUE OF CULTURAL HERITAGE

The first milestone of the roadmap proposed in this paper is to identify the source of value, that will soon be the main, for cultural heritage institutions interacting with the public directly (e.g. museums, archaeological sites, but also web portals or thematic broadcasting channels) or indirectly (e.g. cultural heritage departments in public administrations at local, national and international level, private companies providing management consultancy or technological solutions): the final user.

As Sigrun Eckelmann, German Research Council, Bonn, summarises: “Where the pressure comes from for change in the future, I think first comes from the user. The users (...) search for information based on their specific needs, using the most convenient, reliable and complete source, ...” (Digicult 2002)

The Digicult IST Support Measure has provided, since its start in March 2002, an enormous quantity of high-quality material in pursuing its mission of “monitoring and assessing existing and emerging technologies that provide opportunities to optimise the development, access to, and preservation of Europe’s rich cultural and scientific heritage, within the emerging digital cultural economy.”<sup>3</sup>

Particularly meaningful, among this material, is a list of users’ expectations (TABLE 2) extracted by an online Delphi to point out the considerable gap separating these expectations from what most institutions would be able to provide online.

<ul style="list-style-type: none"> <li>• immediate access to everything</li> <li>• provision of integrated services</li> <li>• applications to be user friendly, multilingual, providing full cultural information about the stored objects</li> <li>• increased interactivity</li> <li>• acceptance as an equal partner; have a “voice” that is heard</li> </ul>	<ul style="list-style-type: none"> <li>• quality and pertinence of the content</li> <li>• “processes” rather than static artefacts</li> <li>• core information written simply and accessibly, without using jargons or making assumptions about prior knowledge</li> <li>• richer imaginative experiences</li> <li>• fully documented collections presented in engaging ways</li> </ul>
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<sup>3</sup> <http://www.digicult.info/pages/info.php>

<ul style="list-style-type: none"> <li>• ability to create personal collections and to surface resources in own working or</li> <li>• learning environments</li> </ul>	<ul style="list-style-type: none"> <li>• opportunity to criticise and debate issues, resources and services provided by cultural</li> <li>• institutions</li> </ul>
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TABLE 2: What users expect (Accumulated from the DigiCULT online Delphi)

From an analysis of the users' expectations listed in the previous table, it clearly appears that an extensive use of technologies represents a basic element for any innovation plan in the CH sector. Technology can provide a platform of launch for transforming cultural institutions in state-of-art, networked organisations, here defined as *Cultural Service Providers* (Forte and Missikoff 2003). More specifically, it is necessary to transform the mission of archives from "storing objects" to the life cycle management of digital/digitised objects, libraries from "reading rooms" to digital information service centres, and museums from displaying collections to proposing narrative connections and new experiences (Digicult 2002).

Unfortunately, according to the results of the 5th Framework Program IST Project *eCulture Net*: "an estimated 95% of all cultural heritage institutions in Europe are not in the position to participate in any kind of digital cultural heritage venture. They not only lack the financial resources to participate, but also have other problems like shortage of staff, essential skills, and the necessary technologies."<sup>4</sup>

For disclosing the value of a cultural resource, it is necessary to identify the core products of cultural institutions. When a visitor purchases the admission ticket to a museum, an exhibition, or an archaeological site, what is he/she getting in return for the fee paid? Knowledge and emotions: these can be considered as the core products of a cultural institution (Missikoff 2004).

Emotional aspects of a cultural experience can certainly benefit from an appropriate use of choreographic installations, but recent studies are showing extremely positive effects, especially for non experts visitors, deriving from the use of narrative metaphors as a catalyst for attracting the attention and creating a connection between the visitor and the knowledge embedded in the cultural resource. Particularly interesting, in this area, defined as "Storytelling", is the work done by the Gesture and Narrative Language (GNL), a research group at the MIT Media Lab led by Prof. Justine Cassell (Liu 2002). This field of research is expanding at a dazzling rate and the amount of valuable resources constantly growing, but the killer application will be the design of "Storytelling Engines" able to automatically produce narrative metaphors, according to contextual parameters like the user's profile and position in the space, time available for the visit, and so forth (Cavazza et al 2002).

However, in this paper we will concentrate on the representation and communication of the multiple layers of knowledge hidden in any cultural object, from a pin to a temple. Here the need to take the user profile into consideration is stronger and this issue constitutes one of the major weaknesses of the present cultural institutions' communication strategy. The rigidity of the sadly typical panel written in maximum two languages and providing visitors with the same (generally boring) content regardless of their profile category, is simply unacceptable in 2005.

A solution for this issue can be found in theories and techniques borrowed from Artificial Intelligence which are recently gaining wide international recognition: Ontologies and the Semantic Web. Before analysing this technology in closer detail, let's briefly observe how the life-cycle of a digital cultural resource unfolds (Fig. 5).

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<sup>4</sup> <http://www.mmi.unimaas.nl/eculturenet/>



## Life-cycle of a digital/virtual cultural resource

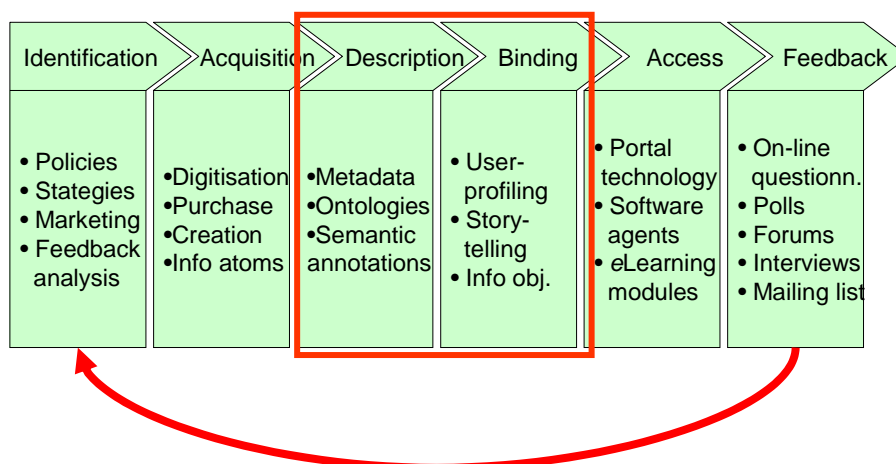


Fig. 5

In this work we are considering only digital cultural assets because potentially accessible through digital media like the internet or mobile devices. The importance of producing digital contents has been strongly fostered by the European Commission that has promoted researches in this area by launching, on the 8<sup>th</sup> of December 1999, the *eEurope* initiative “An information society for all”, to ensure that EU citizens fully benefit from the changes the Information Society is bringing. *eEurope*'s key objectives are to bringing every citizen, home and school, every business and administration, into the digital age and online. It plans to create a digitally literate Europe, supported by an entrepreneurial culture ready to finance and develop new ideas. *eEurope* also wants to ensure the whole process is socially inclusive, builds consumer trust and contributes to social cohesion.<sup>5</sup> Within that objective there is a specific action for Member States and the Commission jointly to create a coordination mechanism for digitisation programmes across Member states.

On 4 April 2001, representatives and experts from Member States met at Lund in Sweden to discuss the issues involved and to make recommendations for actions that support coordination and add value to digitisation activities in ways that would be sustainable over time.

The experts endorsed the findings of a preparatory meeting held in Luxembourg on 15/16 November 2000. They highlighted the value and importance of Europe's digitised cultural and scientific content which provides:

- **An accessible and sustainable heritage.** Europe has unique and significant wealth in its cultural and scientific heritage. Digitisation of its resources is a vital activity for providing improved access for the citizen and for preserving Europe's collective cultural heritage (both past and future).
- **Support for cultural diversity, education and content industries.** Digitised cultural assets are crucial in sustaining and promoting cultural diversity in a global environment. They are also a key resource for education and for the tourism and media industries.
- **Digitised resources of great variety and richness.** Member States have invested significantly in programs and projects for digitising cultural and scientific content. Such digitisation activities

<sup>5</sup> [http://europa.eu.int/information\\_society/eeurope/2002/action\\_plan/pdf/actionplan\\_en.pdf](http://europa.eu.int/information_society/eeurope/2002/action_plan/pdf/actionplan_en.pdf)

cover a diversity of domains and content types, such as museum artifacts, public records, archaeological sites, audio-visual archives, maps, historical documents and manuscripts.

The Lund Meeting produced the Lund Principles:

*Europe's cultural and scientific knowledge resources are a unique public asset forming the collective and evolving memory of our diverse societies and providing a solid basis for the development of our digital content industries in a sustainable knowledge society.*<sup>6</sup>

As stated above, the first milestone of the roadmap proposed in this paper is to identify the source of value, i.e. the final user. If this point is not recognised, we will just see the strong limitations that characterise the heritage sector in the analogous dimension, transferred in the digital dimension. So, as cultural institutions were traditionally devoting their energies primarily on preservation, similarly much of the resources allocated to projects in the digital heritage, seem to be limited to the production of digitised content, with very little attention to usability and/or accessibility.

Eelco Bruinsma, Dutch partner of the MINERVA project,<sup>7</sup> in his position paper fosters the creation of a "Digital Cultural Area". For a European Cultural Area to be enhanced, augmented, and supplemented virtually, by the digital exchange of knowledge, of ideas and of manifestations, or surrogates of cultural and scientific works, the right of free and unimpeded access to distributed cultural resources and sources of knowledge, irrespective of the physical location, specific characteristics and abilities of the user, or the physical location of the resources, must be ensured. Digitisation of cultural resources and sources of knowledge may lower the threshold of access by bridging physical distances and by removing the barriers of time, but digital insularity is as great a risk as is insularity in the analogous world (Bruinsma 2003).

<b>Accessible (re)sources</b>
Easy and unimpeded access to cultural heritage resources is necessary to attain a desired level of knowledge, or familiarity with cultural heritage for education, for appreciation, for the acquisition of skills, or modes of expression and creativity, the creation or dissemination of knowledge, or for leisure, irrespective of time, location, nationality, and abilities of the user.
<b>Networked (re)sources</b>
For producing value added and reusable content, heritage institutions should cooperate with knowledge institutions. The final goal is a meta-network for semantic interoperability whose nodes are aggregates of cultural sources and portals. To this end, research in the field of ontologies and the semantic web is a prerequisite.
<b>Transparent (re)sources</b>
A collective vision on the value of digital cultural heritage should be paired with the collective support of transparency. Details of where content comes from are only important if the user chooses to extend his inquiry to the original, or to other sources, or objects close to the original. Presentation and marketing should be channelled through regular "folder" sites. The separation of networked content from PR strategies is a deliberate and conscious decision to be made by the management of institutions. Presentation of, and access to, networked (re)sources should be the main concern of quality assurance.
<b>Persistent (re)sources</b>
Stable, consistent and persistent access to cultural sources and resources must be ensured to secure investments in digitization and the necessary public and political support. Issues of Long Term preservation are high on the agenda's of the European Commission (Firenze Agenda) and UNESCO (Draft Charter on the preservation of the digital heritage). <sup>8</sup> Access not only depends on "being there", but also on "being visible" (i.e. "discoverable").
<b>Rights Management</b>
Effective rights management should safeguard creative originality and original productivity that adds value by editing or contextualising. It also creates a lasting commitment and is an incentive for creative individuals and

<sup>6</sup> [http://www.cordis.lu/ist/directorate\\_e/digicult/lund\\_p\\_browse.htm](http://www.cordis.lu/ist/directorate_e/digicult/lund_p_browse.htm)

<sup>7</sup> <http://www.minervaeurope.org>

<sup>8</sup> UNESCO document 32 C/28, 19 August 2003

organizations to produce new works, or adapt material for specific use, or users. Acceptable use and reuse of original creations, knowledge, or value added materials should, however, not be stifled by excessive protection of rights of exploitation.

**Quality**

To ensure the integrity, completeness, discoverability and usability of digital cultural (re)sources a quality framework should be in place. A possible Post-Lund approach could be the elaboration of a quality framework that carefully maps the quality aspects that surround the creation of a European Area of digitised cultural heritage. Presentation of, and access to networked (re)sources should be the main concern of quality assurance.

TABLE 3: Key elements of the European Area of digitised cultural (re)sources

## 4 ONTOLOGIES AND THE SEMANTIC WEB

A key issue is therefore to be able to provide information according to the individual user's characteristics and expectations, initially based on some predefined categories to be further refined analysing feedbacks and fruition behaviours (Solima 2002).

In fact, besides infrastructural matters, the most relevant problem in the cultural heritage promotion and valorisation is represented by the lack of consideration of final users' characteristics and needs, reflected in the incapacity to compose contents basing on those characteristics and needs. The proposed solution for addressing this aspect is instantiated by the utilization of tools and methodologies for ontological analysis with the purpose of producing contents organised for allowing a diversified provision, based on user requirements formulated starting from users profiles segmentation and spatial positioning.

The first step to be taken, in order to produce a usable and interoperable output, shall be represented by the construction of a Domain Ontology. Ontologies are defined as "a shared understanding of some domain of interest which may be used as a unifying framework" for "facilitating knowledge sharing and interoperability between independently developed subsystems" (Uschold and Gruninger, 1996).

The proliferation of contents and resources available on the internet has posed the problem of extracting meaningful information from an almost infinite repository: the world wide web. Meanwhile, in the Cultural Heritage domain, digitisation projects and consequently digital cultural contents are proliferating, multiplying the amount of resources available.

A viable solution was spotted through the implementation of techniques and methods derived from the evolution of Artificial Intelligence studies on knowledge. The proposed solution was called "The Semantic Web" and the proponent's name needs little presentation: Tim Berners-Lee (Berners-Lee et al 2001). The most remarkable advantages the Semantic Web should provide, consist in the possibility to perform searches based on concepts instead of terms, therefore reducing the chances of confusion and allowing software agents to carry out complex tasks for humans. The Semantic Web, according to Berners-Lee, should substantially rely on well formed, interoperable and sharable contents. These conditions can be guaranteed by a recently developed knowledge organisation framework whose interest is rapidly growing in the scientific research community: Ontologies (Uschold and Gruninger, 1996).

The aim of this section is to provide the reader with a practical understanding of the basic principles of ontologies, and of the possible advantages deriving from their application in the CH domain. A more extensive description depicts ontologies as "*an explicit, agreed and shared definition of a portion of reality by means of a conceptual model. This model may exist in someone's head or be embedded in a software or information system, in an object or in a process. The task of an ontology builder is to identify the model and make it explicit. This allows the model to be accessed by, or communicated to, a wider range of potential users, be they people, organisations or software agents*" (Missikoff 2003). With respect to a *thesaurus*, an ontology aims at describing concepts, whereas a thesaurus aims at

describing terms. An ontology can be seen as an enriched thesaurus where, besides the definitions of, and relationships among, terms of a given domain, more conceptual knowledge is represented. With respect to a *Knowledge Base (KB)*, an ontology can be seen as a KB whose goal is limited to the description of the concepts necessary for modeling domains. A KB, in addition, includes the knowledge needed to model and elaborate a problem, or to answer to queries about a domain.

An ontology is composed of:

- a set of concepts (e.g., entities, attributes, processes) regarding a given domain
- the definitions (*conceptualization*) of these concepts
- the relationships interconnecting entities within a given domain

Constructing an ontology implies a series of basic steps to be carried out, these are:

- *examining the vocabulary* that is used to describe the characteristic objects and processes of the domain
- *developing rigorous definitions* about the basic terms in that vocabulary
- characterizing the logical connections among those terms

For what concerns a practical use, at a higher level we can subdivide the space of uses for ontologies in the following four categories:

- communication and cooperation among people
- better institutions organization
- interoperability among systems
- system engineering benefits (reusability, reliability, specification)

For a more effective content wrapping, it will be referred to studies on Reusable Information Objects (RIO) that, after the creation of the domain ontology, will allow the decomposition of knowledge in “atomic” units.

A RIO can be defined as a digital resource of knowledge that can be reused to support knowledge acquisition. RIOs are aimed to deliver a complete experience on one topic or aspect and include anything that can be delivered across a network on demand.

Examples of RIOs can be the following:

- textual information,
- images
- prerecorded video and audio fragments,
- animation,
- software systems and applications,
- web pages,
- etc.

Following this approach insures a wide range of advantages, the first of which is surely a user centred approach, but includes also a great flexibility in information objects utilization, ease of content updates and searches, adaptation and customization of a knowledge acquisition process to needs of particular user(s), and facilitations of various types of learning. In this new scenario, the learning process would be: (i) competency-based, (ii) customized, (iii) individualized/personalized, (iiii) context sensitive.

This characteristics will increase continuously, and considerably, the value of content available for the final users.

## 5 CONCLUSION

In the industrial age, human creativity was divided in three well distinct types of activity: science, economics and humanities. This division is reflected in all aspects of our lives, from education to public administration to, obviously, the productive system. In spite of the fact that we now consider

this division as the only possible way of organising the world, it is typical of the industrial age: it did not exist before, and will not exist after. In fact we are already witnessing its decline. In the “Age of Creativity”<sup>9</sup> there is no difference between the creativity of an entrepreneur, a scientist or an artist.

What people look for is lifestyles: companies like Nike or Coca Cola don't make shoes or drinks any more, manufacturing processes are now outsourced. They manage narratives, they provide consumers with ways of expressing themselves, they propose lifestyles.

With the end of the industrial age, creative individuals are reuniting all aspects of creativity, breaking the categories that strongly characterised the last couple of centuries, but would have been meaningless to Leonardo Da Vinci, Michelangelo, Galileo or Shakespeare.

And this is just what the Cultural Heritage needs now: a creative model that combines cultural contents with technology and management. When this will be achieved, the heritage sector will express its potential and unlock its real value.

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<sup>9</sup> <http://www.creativeclusters.co.uk>