INVESTING IN KNOWLEDGE FOR HERITAGE MANAGEMENT: DIHÈLIA e-Portal Project

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Abstract. The main aim of this project is to investigate and identify the pillars of Knowledge Architecture in the field of Cultural Heritage. This will be carried out through the construction of a specialised Portal and a multilingual thesaurus for the social and educational dissemination of cultural, historic and natural heritage. We study cultural heritage and how it's managed from a multidisciplinary point of view, employing the methods and procedures used in the human and social sciences, information technology and library science together with documentation. The research team will design the Dihèlia portal and the thesaurus through the use of a wide range of procedural activities. To achieve this, the information shall be organised on the basis of a multilingual taxonomy, involving an analysis of scientific production, the primary sources and information resources of the team's researchers, the scientific community and any available resources that can be found on the Internet. In this way, we will design 5 databases (projects, resources and the culture of information, researchers, scientific production and cultural industries). We will work on the thematic areas of the realms of heritage through the use of 40 concept maps so as to construct the hierarchical thesaurus and the alphabetical thesaurus for information retrieval, which will be multilingual (Catalan, Spanish, English and French). The information system, which will be located on the website of the Scientific Park of Barcelona (URL: http://www.dihelia.org) , shall be verified through a questionnaire carried out on a selection of potential users and clients of the portal (basically teachers, researchers, companies involved in cultural industries, students and archive and library users). The design of the browsing and information recovery interface, as well as the services of personalisation will require the evaluation, selection and installation of cutting-edge technologies. The technological platform needed to implement the portal will require a report on the issue of the information architecture and the development of the on-line services. The planned services are: distance learning, virtual community, weblog, distribution list, agenda, MyPortal and archives containing digital information on projects. The aims of this work are: a) To make users visible in the field of cultural heritage; b) To make the information visible to researchers; c) To promote and simplify public access to the large heritage databases.The final aim of the research will be to confirm whether indeed digital and virtual

environments, such as the portal, allow for the informative dissemination and scientific understanding of all aspects of heritage in the information society.

INTRODUCTION

Our current involvement in cultural heritage and its management centres around a wide range of complex areas in which to act and numerous study subjects: archaeological, anthropological, architectural, artistic, scientific, communicative, cultural, documentary, historical, linguistic and natural. It is interesting to see how the changes in the paradigm regarding access to knowledge, with the application of the specific and technological didactics, become visible through the creation of digital information systems, as is the case with specialised portals.

The success of the design and creation of a specialised portal is based on both the coming together of different disciplines as well as the interaction in the same virtual space of: access to and educational use of digital archives and libraries, virtual exhibitions and museums, both natural parks and theme parks, cultural tourism, archaeological finds and preservation of heritage in museums, cultural industries and any culture of information of the scientific community that is relevant to the field of heritage. The creation of the portal also requires theoretical and practical knowledge of how to apply the procedures relating to the architecture of information and knowledge, being a cross-discipline involved in the creation of systematically organised digital content.

The current tendency in the information society is both to communicate knowledge and create spaces that promote the idea of *learn to learn*, *learn to understand*, as well as to become familiar with the sources of information and information resources that make up the culture of information of a specific field. All this is achieved by initiating projects to build digital libraries, specialised portals and thematic gateways. Regrettably, there are few researchers or investigations nowadays that deal with specialised portals in the field of heritage and the only available option, faced with this lack of resources, is to search the directories of virtual museums, archives and libraries, and make opportune searches on various search engines. What this project proposes is to create an indispensable virtual space that brings together heritage, knowledge architecture and information technology.

AIM OF THE PROJECT

The aim of the project is to investigate how information architecture proposes a range of procedures to design a specialised portal in the field of cultural heritage. The portal will be defined as an educational and transactional environment of specialised information on all aspects of heritage, offering the user the chance to personalise both the content and the consultations in accordance with his or her personal preferences. The emphasis on the preferences of the user entails the creation of a portal that acts as a bi-directional environment: 1. Organisation of the contents in a multi-disciplinary domain: heritage. 2. Transfer of information by means of personalising the on-line services.

The DIHÈLIA portal, being the proposal of the research, involves organising the contents and the access to the information through the creation of both a taxonomy and a thesaurus for information retrieval. The taxonomy

will represent the categories of heritage, which will be the result of the process of associating documents, materials, objects and projects to the thematic categories of the information system. The process of categorising the heritage, using the scientific method of documentation, will take the form of the construction of 40 concept maps, which will include all the specific categories in the field of heritage. Likewise, a thesaurus specialising in heritage will be built as the documentary language for retrieval and will hold the description of the information contained within the portal. The thesaurus, which will act as a way of controlling the vocabulary, will include the controlled descriptors, the synonyms and all the complexities of the relationship between the concepts. It will be managed and kept up to date by means of a specific package of programmes able to automatically manage the thesaurus. This therefore involves: defining the domain of heritage, selecting the organisational characteristics of the thesaurus, publicising the creation of a new thesaurus in a forum or other professional body, applying the deductive + inductive hybrid method (previous control of the categories + creation of the descriptors by indexing the primary sources of information and the resources), selecting the descriptors, recording in a computer system, structuring, verification and on-line access procedures. Likewise, the project aims to create a multilingual thesaurus. The portal will therefore offer versions in Catalan, Spanish, English, and French.

The project will construct an integrated information system to give the specialised field a double objective: to resolve problems of accessing information and to provide visibility for the specific producers and users of the heritage. In this respect, the web environment has been chosen as the setting for the creation of an information system due to the important status it enjoys in the world, its accessibility and also because it allows for the integration of heterogeneous information on materials, objects and projects. The portal, through methodical work, will identify, select and analyse the primary sources and any resources of information available on the Internet. Five portal databases will be created: 1. Projects. 2. Information resources and culture. 3. Researchers and research groups. 4. Scientific production. 5. Cultural industries. To achieve this, use will be made of all kinds of primary sources taken from the research group itself and from the archives and libraries, as well as identifying and selecting specific information resources found on the net.

The construction of the heritage-based portal will be completed with the study and design of the personalisation of the needs of potential users and clients of the system (information audience). The services that are planned for the portal are: 1. Distance learning (master's degrees in heritage and management). 2. Virtual community specialising in the field of heritage with member identification (login + keyword). 3. Public weblog on any subjects proposed by the users. 4. Distribution list on museology and museography. 5. Agenda of events and news. 6. "My…" services with: My heritage, My museum, My project, My exhibition, My resource directory, My library, My archive, My course. 7. Electronic archives containing digital information on projects.
To achieve all this, the research proposal also involves a study of the report on information technologies that can help in the design of portals: content management, automated management of taxonomies and thesauri and the personalisation of "push" services and technology. The construction of the portal will involve the use of a technological platform to allow for CMS content management (Content Management Systems). A package of programmes to automatically manage the virtual maps, taxonomies and thesauri will also be implemented. In addition, a licensed web version database manager will be used, a recovery interface designed and the on-line services implemented. So as to ensure the quality of the project, the W3 technology standards will be used as a reference mark, as well as the guidelines and regulations from the field of library sciences and documentation

(ASIS, ASIST, IFLA, ISO + ANSI and Unesco). The portal corporate taxonomy will therefore offer versions in Catalan, Spanish, Basque, Galician, English, German, French, and Italian.
The results of the research and the construction of the portal will increase society's awareness of heritage. They will ensure innovation through the creation of a new system of organisation, with a new and original thesaurus that will take in the whole area of heritage. They will also provide support to research in the area. As well as encouraging researchers and research groups to exchange their experiences, distance learning and training will also be made easier. All in all, the specialised portal will incorporate heritage into the information society.

BACKGROUND

The creation of portals specialising in the subdomains of cultural heritage started with a number of projects in the US, Canada and Europe during the 1990's. The main initiatives developed along two paths: heritage (specific aspects) and knowledge architecture.
Using the new paradigm of heritage and with reference to the management of historical and anthropological memory, studies and projects are designed particularly in the Anglo-Saxon realm. These projects back the educational value of digitalising collections of cultural heritage, creating archive research centres to reorientate the teaching-learning concept of anthropology and history. Consequently, the first studies and projects tackled the domain of heritage only in terms of subdomains: documentation and history, archaeology and documentation, anthropology and documentation, ecology (natural parks) and documentation.

In parallel, the cultural heritage digitalisation projects in Europe increase ideas on and contributions to the creation of information systems, identifying and analysing the patterns and the problems that the documentation was detecting in relation to the sources and their management in the design process. Of the most significant problems, we would highlight: a) The complexity of the collections of sources and resources for their management and treatment; b) The changing patterns of conduct as regards heritage and its management by the professionals, the different disciplines involved, companies and administration; c) The new learning models for heritage, with the support of the sources, materials and objects; d) The creation of the value of heritage in digital format due to its quality, usability and accessibility; e) The growing interest in the management of the memory and the identity of the communities with the creation of digital archives and project design; f) The absence of any systems to organise or represent contents in the global domain of heritage, the only exception being the subdomain of fine arts, which has indeed created taxonomies and thesauri; g) Little synergy between heritage and information architecture, which is highlighted by limited scientific production, publications and development in general.

The first authors that forwarded a theory on the construction of integrated information systems in the field of heritage were: J. Blackaby and B. Sandore (1997). These were followed by the thoughts and reflections of Dempsey, Marty, Rayward, Twidale, Tariffi, Morganti and Segbert. In Europe, the *European Heritage Network* was created in 1999, arising from the protection agreements of architectural, archaeological, cultural and scenic heritage. The European Heritage Network suggested, for the first time, the need to build some organisational system for the domains of heritage and opted for a thesaurus, the first version of which was,

regrettably, rather limited: controlled vocabulary of key words and available in all the official languages of the European Union (before the recent entry of new states).
As regards Spain, the line of work has centred solely on two subdomains of heritage: architectural heritage and museum heritage. From amongst the information system projects and portals, we would highlight: the resource directory entitled *Patrimonio de la Humanidad en España (2003) (Heritage of Humanity in Spain)* from the Comisión Española de Cooperación with UNESCO; the website of J. García Vicente entitled 'el Patrimonio de la Humanidad en España'; the Monumentalia.net portal (2000); the Musealia.com portal (2004) of the museums of Catalonia on the Internet; the Ibero-American Portal of Cultural Management (2000) at Gestioncultural.org. As for portals of heritage as a global domain, there are no studies or developments. In spite of this, the information society favours bi-directionality in studies and some initiatives indicate that within the next two years, the trend will be projects that combine knowledge architecture with heritage.

CURRENT STATE OF INVESTIGATION IN THE FIELD

Over the last four years, the investigations and projects in the bi-directional field of heritage + knowledge architecture in Europe have diversified along distinct lines, according to Tariffi & Morganti & Segbert (2004):

a. Development of investigations and projects in the cultural heritage subdomain, tackling the problem of the formats of materials and multimedia objects: TRIS. URL:http://www.trisweb.org
b. Research and development of new cultural services and products that are supported through the design of new specific technologies for this domain: KIST (Knowledge and Information stimulating technology). URL: http://www.scran.ac.uk/kist/ ; MATAHARI (Mobile access to artefacts and heritage at remote installations). URL: http://www.isy.liu.se/~klas/matahari/presentation.html; TREBIS (Trial and evaluation of biodiversity information system for public use in a natural history museum). URL: http://www.trebis.org
c. Management of collections and interface design for the full use of portals and gateways: CTIC (Common threads: collections and connections in cyberspace) URL: http://www.commonthreads.org.uk ; Hyperguide (Customizable hyperguide to cultural and scientific Webs) URL: http://www.eidosis.com/hyperguide/; POUCE (Portails culturels collectifs) URL: http://www.spacespa.it/tris/trisportalpro/cluster/default_blue4bf.html?PRID=14; VRCHIP (Virtual reality cultural and heritage information portal) URL: http://www.nnc.co.uk/VRCHIP.asp
d. Digitalization of collections of heritage with special emphasis on archives, libraries and above all on museums and cultural tourism: Activate (New access and services for cultural content) URL: http://www.activate.ie ; BEASTS (Boosting the economy by assisting SMEs in the tourism sector) URL: http://www.project.cd/beasts/
e. Investigations related to educational projects and electronic editing of texts that support teaching-learning: TPHS (The People's Heritage Showcase) URL: http://dbs.cordis.lu/fep-cgi/; UHI-NMS (Multimedia Learning Initiative) URL: http://www.friends.uhi.ac.uk/nms.html

In all the fields mentioned above, the investigations that involve a significant increase of projects have grown rapidly. For exemple:

1. **DIGICULT** (Digital Culture): URL: http://www.digicult.info/pages/index.php

2. **MICHAEL** (Multilingual Inventory of Cultural heritage Europe). URL: http://www.michael-culture.org

3. **MINERVA** (Ministerial Network for valorising Activities in Digitisation). URL: http://www.minercaeurope.org

We should also point out that the very limited bibliography has until now answered the interests of the researchers in the area in giving priority to processes of development. Nevertheless, the information and knowledge society is setting a rapid pace in the production of integrated information systems specialising in the subdomains of heritage and this trend is growing. Social science teaching departments, library science and documentation departments and art departments of Spanish universities are showing signs of change and reflecting the increase in demand for products and systems related to heritage; useful for the market and society in general. In addition, we are witnessing a rapid and spectacular diversification in Europe, both in research material as well as innovation. Nevertheless, there is still no global reflection on the heritage and knowledge architecture pairing and all its possible potentialities have yet to be explored using knowledge management, with the help of information and communication technologies, so as to bring the prospective audience closer to education, leisure and speculation-orientated use of heritage.

PROJECT GOALS

The proposal for the project concerning the portal specialising in the entire domain of cultural heritage arose as the result of the non-existence of bi-directional research embracing cultural heritage + knowledge architecture. The starting point of the project is therefore the interdisciplinary and methodological challenge of firstly investigating and then developing a digital and virtual space dealing with scientific communication, the dissemination and exchange of ideas and personalised services relating to cultural heritage.

The DIHÈLIA portal answers the social, educational and disciplinary demand for greater visibility as regards cultural heritage content in the information society. This social demand has been reflected in a number of initiatives from the European Union, all contained within the Herein programme (URL: http://www.european-heritage.net/sdx/herein/index.xsp), which promotes the need to identify the contents and offers access to archaeological, artistic, cultural, documentary, historic and scenic heritage as well as that relating to biodiversity. The realisation of a portal, as an integrated information system that organises and allows greater access to heritage, will serve to provide a new space for research and knowledge. Likewise, it aims to explore the specialised contents and language of heritage by means of the procedures and standards of information architecture and the semantic web. In this regard, the project has two advantages in that it investigates the organisation and accessibility of heritage through the creation of a taxonomy and a multilingual thesaurus for retrieving information in this field.

The background to this project centres primarily on the first conclusions and prototypes made in Europe, all of which are mentioned in this paper (**Current State of investigation in the field**): KIST, MATAHARI, TREBIS, POUCE, CTIC, Hyperguide, VRCHIP, BEASTS, TPHC and UHI-NMS.
The first results investigated by the research team of this project point to the following as pending aspects:

- Lack of procedures and methodology for tackling projects dealing with the complex heritage + information architecture pairing.
- Lack of systems for organising knowledge in the entire domain of heritage. There are only systems within subdomains, particularly in artistic heritage (Getty Thesaurus and the ICONCLASS Thesaurus).
- Lack of on-line services that cater to the needs of society and heritage researchers.
- Limited experience in information technologies for the implementation of content management systems in the domain being studied.
- Non-existence of exchange forums on the subject of heritage.

The general goal of this project is to investigate how to make cultural heritage visible to society and the scientific community, by means of studying and developing the procedures of knowledge architecture. The final product of this project will be the creation of a portal specialising in cultural heritage: DIHÈLIA.

Specific goal 1 : Information ressources and services.

To make information visible to researchers in cultural heritage. To be aware of, to analyse and to evaluate the primary sources of information and the information resources pertaining to the domain of heritage's culture of information. To create, test and produce the databases for the domain:

- Research projects on cultural heritage
- Researchers and research groups
- Scientific production
- Cultural industries
- Information resources onthe Web, and the information literacy for the heritage management.

Specific goal 2: Use, Users and Information Consumer, and Training

To make users visible in the field of cultural heritage. To investigate the possibilities of the services along two lines: distance learning (virtual courses and master's degrees), and added value services (agenda, distribution list, news, questions and answers and weblog).

Specific goal 3: Customisation and Personalisation Services.

To promote and allow easier public access to the large heritage databases. To define possible models for personalised services based on a dual methodology: services relating to scientific communication (virtual community) and individualised services (MyPortal, MyLibrary, MyMuseum, MyResources, MyCourse).

Specific goal 4: Multilingual Taxonomy.

To create, test and evaluate an accurate system for organising the thematic categories of the cultural heritage domain, namely, a specialised taxonomy.

Specific goal 5: Multilingual Thesaurus.

To be aware of, to analyse and to evaluate the categories of cultural heritage in order to build a multilingual thesaurus for information retrieval. As regards methodology, the thesaurus will be the end result of the research team creating 40 concept maps.

Specific goal 6: Digital Platform for Heritage Knowledge Transfer.

To be aware of, to analyse and to contrast the development models for creating the DIHÈLIA portal. To define the development and implementation model of the portal by means of selecting the technological platform, the content management system (CMS Plumbtree), the database manager (File Maker Server and MySQL), the thesaurus manager and the concept map manager (Multites Thesaurus Software).

The aims set forth above are all relevant for a variety of reasons. In the first place, they answer the social demand to improve awareness of cultural heritage. This demand has been reflected in a number of European initiatives that are aiding programmes and projects in the field of cultural heritage.This research project will be most useful in taking a first step closer to the sources that make up the bases of knowledge on heritage. Likewise, all the possible alternatives of specialised language will be studied to ensure access to the sources through controlled multilingual vocabulary.

METHODOLOGY AND WORK PLAN

In order to achieve the aforementioned goals, we will carry out a series of activities/tasks, which will represent the basic investigative process. The work plan for the next three years of research will be adapted in accordance with the desired aims.

We will use a methodology based on the two paradigms of research used by the scientific community of cultural heritage and the researchers of knowledge architecture: qualitative paradigm and systemic paradigm respectively. Using combined procedures from both paradigms (always in light of the aim to be achieved and the task to carry out), the research team will carry out the following:

- In order to identify, select and analyse the primary sources of the information resources of the heritage domain, a protocol will be configured to classify the sources and establish the optimal indicators of quality to subsequently design the databases (design based on current experimental trends in usability and accessibility).
- In addition, a semi-structured questionnaire will be designed to analyse the preferences of the portal's prospective information audience (design based on the theory and methods of the user studies).
- Lastly, as regards the construction of the taxonomy and the thesaurus for information retrieval, an experiment will be carried out by designing the taxonomy from the process of categorising, which allows for the concept maps. In addition, the thesaurus will be designed using a hybrid of the two methods of construction: inductive and deductive (given that the team researchers have been compiling primary sources and information resources over their entire professional life).

These research methods and techniques will be employed to carry out a set of tasks, which will be described below:

Task 1

Identification, selection and evaluation of the typology of sources and information resources that represent scientific production and the culture of information of cultural heritage. The idea is to carry out an exhaustive search for information on the domain, detecting and analysing the existing sources and resources.

Task 2

Collection, analysis and processing of the existing sources and resources to design and create the databases. The plan is to construct 5 databases:

- Research projects on cultural heritage
- Researchers and research groups
- Scientific production
- Cultural industries
- Information resources and the culture of information.

These databases provide the documentary dimension of the entire domain of cultural heritage. They will be built through the creation of a list of documentary and technological requirements, which will ensure the design of the information fields and their consequent retrieval.

Task 3

Evaluation of the prototypes for the 5 databases. Analysis of any problems that the design of the fields may entail and the presentation of the interaction between the various databases. Elaboration of the test and implementation.

Task 4

Design of the system for organising knowledge (**part one**). Preparation of the concept maps by all members of the research team. Evaluation of the problems of the overlapping of the categories. Automatic processing of the concept maps. Design and extraction of the thematic taxonomy on cultural heritage. Analysis and evaluation of the results.

Task 5

Design of the system for organising knowledge (**part two**). Construction of the thesaurus using the deductive and inductive methods. Design of first vocabulary with controlled keywords. Implementation in the thesaurus manager. Detection of terminology problems. Application of the keywords to a significant sample of primary sources and information resources, being no less than 3000 documents. Creation of the hierarchical thesaurus. Creation of the multilingual version of the thesaurus. Analysis and evaluation of the results.

Task 6

Design of the assortment of services available on the portal based on a double strategy: services for the scientific community and individualised services. Evaluation and analysis of the information system created: Definition and management of the "Life Cycle of the Contents", Modelling of the architecture of the categories, Web Services for the Portal, Technological Standards, Levels of security and mechanisms. Analysis and evaluation of the results.

Task 7

Definition of the parameters and the basic structure of the virtual environment. This environment will have accessibility that enables information in the specialised portal to be consulted and retrieved from the databases and the services. Design of parameters for the Web based information architecture that take into account: human interaction factors, interaction procedures, technological design objectives, diverse information retrieval methods, use of virtual spaces, accessibility of various sources, cross-navigation and the

setting up of technological tools (technological CMS platform for content management). Evaluation and analysis of accessibility, usability and navigation.

Task 8

Design of the recovery interface using the parameters defined in the previous task (task 7). Analysis of the characteristics, selection of the standards, design and implementation. Web-based interface that will encompass: customisable access, unique identification of every user, presentation styles, information visualisation and selection of the technological tools.

Task 9

Preparation of a pilot test for the DIHÈLIA portal by means of a restricted communication plan intended for a sample group of users selected to evaluate the portal: teachers, researchers, companies involved in cultural industries, students and archive and library users. Analysis and evaluation of the results.

Task 10

Communication plan for starting up the portal. Registration campaign for the DIHÈLIA portal in the main information systems, databases, thematic guides, search engines, research groups, specialised university departments and institutes, thematic gateways and portals with related specialisations. Analysis and evaluation of the results.

WELCOME DIHÈLIA PROJECT

Enjoy exploring the new site DIHÈLIA portal and exploring his taxonomy!

Fig. 1. Logo: DIHÈLIA E-Portal.

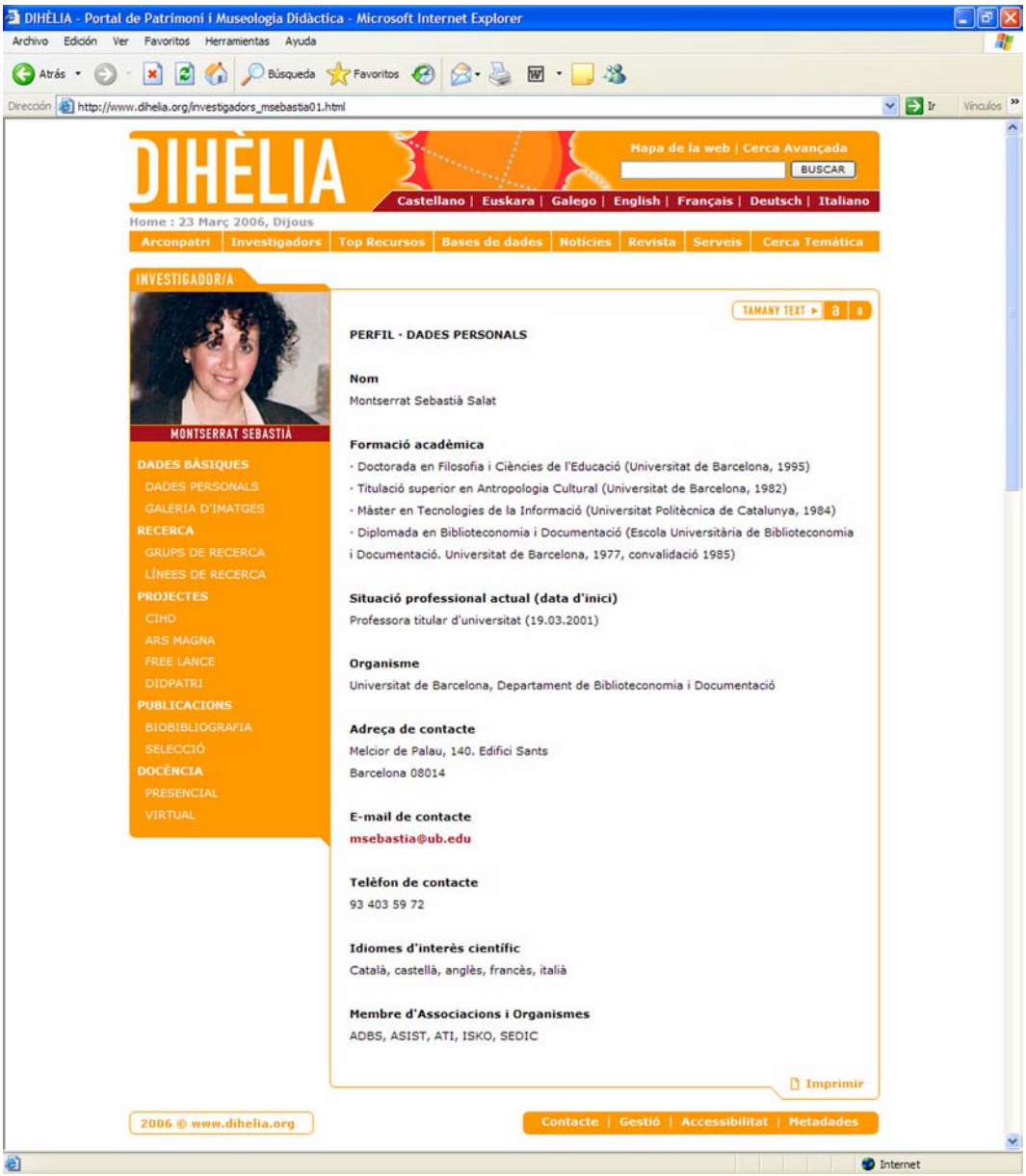

Fig. 2. DIHÈLIA Investigator Page. URL: http://www.dihelia.org/investigadors_msebastia01.html

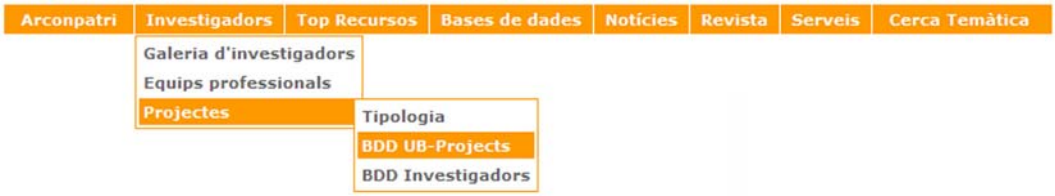

Fig. 3. DIHÈLIA E-Portal. Hierarchical Menu.

Fig. 4. DIHÈLIA E-Portal. Multilingual Menu

CONCLUSIONS

The main benefits that can be derived from this research proposal are in several different areas:

1. To contribute to the dissemination of Cultural Heritage by creating an open space which will contribute to society's well-being and to the exchange of information and experiences between different agents specialised in the subject examined by the project in Spain and Europe.
2. To offer a new space with global visibility of the contents of the cultural heritage field; thus generating a permanent state of questioning about scientific output and providing information.
3. To qualitatively improve cultural heritage knowledge among the scientific and academic communities, the cultural industries and society.
4. To contribute to the creation of integrated systems and services to manage specialised contents using a combination of the two methodological approaches used in the project: Information architecture (knowledge) and Cultural Heritage.
5. To generate new knowledge with respect to the use of digital environments for working methodologically with primary sources and information resources, with the aim of learning at different educational levels of both formal and informal training.
6. To strengthen the social and educational aspect of on-line services based on an interface that will assure the Portal's usability.
7. To guide the actions of the community specialised in cultural heritage and in knowledge architecture. By the same token, to define a reconsideration of digital content management within the framework of categorisation (specialised Taxonomy); experimenting in cross-navigation and retrieval in a virtual environment such as that of specialised portals (multilingual thesaurus and interface).

8. To design techniques and plan new procedures in the field of portal creation as a strategy for disseminating cultural heritage in the information society.
9. Medium-term participation in the European Heritage Network once the research has finished.

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