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Introduction

The second issue of the report on the “State Of The Union” on the use of Information and Communication Technologies in the field of Cultural Heritage adopts a different approach from the first one. Apart from completing the information on the European countries provided in the first issue of the Report with the two reports from Sweden (by Halina Gottlieb) and Bulgaria (by Hristina Staneva) included here in the appendix, the papers of this volume deal with general issues.

The two main contributions by David Arnold and Neil Silberman approach the core of the problem from opposite – and complementary – perspectives.

David deals with the technological challenges arising when applying IT to heritage content. However, his approach is not positivistic. He is aware that the many peculiarities of heritage challenge the ability of technology to cope with the needs of users and applications. The statement appearing early in his paper that “there may be as many digital representations of a single artefact as there are purposes for their creation” pairs with the statement that in archaeology “theory creates objects”¹. In another passage, a similar concept appears: tangible heritage, the primary target of digitization activities, incorporates intangible features and interpretation. David’s consciousness of the blurred border between intangible and tangible, data and interpretation, objects and context, theory and facts, may be the better warranty that the answers he gives here to a number of very practical questions aren’t just a cookbook of easy recipes. Nonetheless, the result is not discouraging. Heritage professionals are invited to take part, as essential protagonists, in the search for better tools, as described, for example, in EPOCH’s Research Agenda.

Silberman regards the problems standing in the middle of the cultural debate. He identifies four main issues, i.e. heritage conservation, common understanding among scholars, marketisation of culture and the social function of heritage. In examining these areas in detail, Neil clarifies some technological problems with great precision. Firstly, he points out that information management problems are not a mere question of agreeing on common data structure, but they derive from different approaches, histories, habits, methodologies and research focus: in a word, from the diversity of the ontologies different specialists use. Exploring how this diversity can be managed may turn IT from a mere facility into a substantial pillar for “innovative, multidisciplinary forms of historiography”. The same concept is expressed as a must on the IT side by Martin Doerr, when he states, as quoted in EPOCH’s Research Agenda², that without ‘fundamental’ investigation on research processes, question and discourse, “research on other topic would continue to be ‘blind’ what the real issues are.” In Silberman’s description, conservation, marketisation and identity problems share the common issue of sustainability. It is generally accepted that heritage must be preserved, that it has to achieve some degree of self-sustainability and that it has a social value going well beyond “study, education and enjoyment” insofar as it provides a sense of collective, although diverse, identity. Much debate has recently taken place on the common roots of Europe and if these should be explicitly quoted in the European Constitution; however, they are crystallized in the archaeological sites, the historic buildings – including churches and synagogues – and the monuments that populate the European landscape, and they are under the eyes of every citizen and of every visitor. Exploiting this commonality together with individual contributions to collective social memory indeed creates new challenges to technologists and to the capacity of culture

¹ I. Hodder (1999) *The Archaeological Process* London. Blackwell, p. 84

² D. Arnold and G. Geser (2007) *Research Agenda for the Applications of ICT to Cultural Heritage*. Budapest, *Archaeolingua*, p. 59

professionals to cope with a tumultuous growth of user-created content, needing systematization, verification and supervision. Neil advocates that “ICT can take the lead in monitoring the long-term economic dimension” for the “effective shaping of future policies and development designs”.

The economic issues underlying sustainability as outlined by Neil Silberman are dealt in the next two papers, a survey by Kaminski, McLoughlin and Sodagar of the methods used for valuating heritage in Europe and an economic analysis by Pignataro and Rizzo of how preservation should be undertaken.

This economic perspective completes the picture of this report, which is the natural complement of EPOCH’s Research Agenda. On the one hand, it aims at providing the policy framework in which research priorities are placed. On the other, it gives an approach to these issues that may be of some interest also for who is not professionally involved, or personally interested, in detailing future avenues for technological CH development, but simply believes that heritage keeps an important place in the post-modern 21st century society, although incorporating the technologies which already play such a relevant role in everyday life.

Digital Artefacts: Possibilities and Purpose

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Abstract

Developments in 3D scanning and recording technologies now mean that almost any level of accuracy is achievable in digitisation of historic artefacts. This capability poses challenges to cultural heritage professionals (archaeologist, historian, curator, etc.) who are now confronted with previously unimaginable opportunities and therefore must ask and answer questions of the underlying purpose of collecting digitized models of artefacts, archaeological contexts, historic monuments, buildings or ruins. As with many engineering challenges, there are significant issues of price/performance in undertaking data capture and the range of solutions may lend themselves to addressing different heritage applications.

In this discussion I will address some of the potential purposes for creating and using digital artefacts, ranging from analysis to public dissemination and pose more questions than answers in considering the fitness for purpose of data being collected and the challenges of re-purposing data collected for one purpose for use in a different context.

1 Introduction

There are many potential purposes for creating and using digital representations of cultural artefacts and indeed there are many forms that such digital artefacts can take. It is important to recognise that a digital representation of an artefact is a representation of certain relevant characteristics of the artefact – it is not the complete artefact, nor even a representation of the complete artefact. It is only a representation of “relevant characteristics”. The definition of what is relevant will depend upon the purposes of creating the artefact.

In principle there may be as many digital representations of a single artefact as there are purposes for their creation, each targeted at a different purpose or combination of purposes.

In practice there are usually reasons for wanting to capture characteristics required for many purposes simultaneously, only some of them known before the exercise of capturing the data is undertaken. The reasons may vary from aspects like the cost of undertaking data capture, to intrinsic characteristics of the actual recording process being undertaken. At one extreme, for archaeologists, data capture is typically a unique opportunity because the act of investigating a site actually destroys much of the evidence. Hopefully this is not true of individual objects, but in many fields the act of digitisation may well involve some risk of wear and tear, ranging from handling fragile artefacts to digitising material that would be sensitive to extended exposure to stronger light than desirable.

For these reasons we should first consider a typical range of purposes and what the relevant characteristics for those purposes might be. Two broad ranges of purposes are:

- applications concerned with documentation and analysis for use by cultural heritage professionals and
- applications with a component of dissemination to the “general public” or at least that fraction of the public who have a potential interest in the artefacts.

We will now briefly consider these relevant characteristics

Relevant Characteristics for Applications of Digital Artefacts

There are, of course, many aspects of cultural artefacts that can be documented depending upon the analysis to be undertaken. Addison, for example [Addison, 2006] characterizes digital capture technologies in four groups:

- Visual: still/video cameras, colour scanners
- Dimensional: 3D scanning, photogrammetry, surveying (EDM/Total station), GPR)

Locational: GPS sensors. ...
Environmental: thermal, acoustic, C14, ...

For the purposes of this paper we will consider the categories of data that might be required to support applications in each of the two broad categories in the previous section –

Documentation and analysis and; Dissemination to the public

a. Documentation and analysis

Documentation might be as part of cataloguing and recording the contents of a collection, but there are many potential analyses to assist in:

- dating and classification by comparison with other artefacts;
- interpreting the authorship and cultural origins of a digitised illuminated manuscript;
- monitoring deterioration by comparison with the earlier state of the real artefact;
- revealing and image processing the substrata hidden by the final layers of paint in an old master;
- analysing a statue's composition and structure and the processes used in creating it;
- understanding the use of colour in the context of historic lighting conditions.

All of these applications have been attempted using digital representations of artefacts and the relevant characteristics will be different in each case. Some of the “applications” are still speculative or only implemented in demonstrations. These applications, and others, suggest where considerations of data usability may lead to rather different conclusions about the set of characteristics which need to be included in the digital artefact.

The first consideration is obvious, but all too often naively overlooked. Any analysis is supported by the data that is recorded – if the data hasn't been recorded then the analysis cannot be performed. Either different approaches must be adopted to analyse the data that is held or additional data must be gathered. Although this is an obvious statement it may be easily overlooked if the person requiring the analysis does not understand the computational processes involved.

Rather than analyse each of these applications for its individual data requirements, the following is presented as a characterisation of the essential sub-areas about which decisions are required

- i. Shape, size and position. In these accuracy of recording is the most obvious are in which decisions need to be taken. Although interpolation can be used to enhance apparent accuracy later, because artefacts may have worn or been damaged over time and interpolation makes assumptions about the continuity of data, interpolation techniques are potentially suspect as a way of enhancing data sets if accuracy is the objective.

A less obvious consideration is the dimensionality of the data recorded (do you record the 3D surface of an oil-painting, for example, including thickness of paint?).

How are surfaces recorded or derived? There are many mathematical techniques used for defining surfaces and fitting them to a set of points. Devices have been proposed which combine point sampling with surface estimation in real-time, and then check the surface estimates in critical areas by taking additional samples. If there is a high degree of confidence

in the mathematical accuracy of the surface definitions then we can have more confidence when intermediate data points are calculated.

Wherever position is being recorded, and by any method, including manual methods, the issue of accuracy will be important. There are many ways of expressing accuracy and many factors that influence the data's accuracy. Some factors are characteristics of the recording equipment and the equipment's performance may be influenced by the circumstances of data recording (extremes of temperature, light levels, etc).

As technology improves there are increasingly conscious decisions to be made about the degree of accuracy at which it is useful to record the artefact. For example, the digital Michelangelo project [Levoy et al, 2000] reported an exercise in detailed digitisation of Michelangelo's David. The data for such exercises is measured in Terabytes and even to process and archive such datasets for any volume of artefacts would represent a significant challenge to many computer services, let alone any prospect of interactive examination of the full dataset. These challenges have led to the development of new computational techniques (e.g. see [Borgo et al, 2001] for an example applied to the digital David). When such applications are designed for web use then a version of the data at reduced accuracy is inevitably a pre-requisite using current technologies.

Sample spacing is another aspect of accuracy – accurately recorded point samples across a surface will only generate an accurate surface if the density of sampling is sufficiently high.

For many artefacts the accuracy at which the context of the object is recorded is also an important factor – for example including the relationship to other artefacts in the same original context. Recording the context brings another set of potential technologies into play, particularly if context on a geographic scale is needed (e.g. GPS and its variants).

Considering the recording of shape, size and position is probably the most obvious of the various data types to discuss. This has been discussed in some depth both because of its central importance and because it is easy to overlook the potential complexity of the decisions that may need consideration.

ii. Colour and light properties.

Colour and colour perception is a science in its own right. Many factors influence the perception of colour and recording base colours has been a challenge underestimated by virtually every amateur photographer since colour film was invented.

Distinctions in the usefulness of colour information relate to the way data is collected – primarily the degree of care taken to relate colour to base colours by taking into account lighting conditions. This may involve recording colour under controlled conditions (e.g. using a light stage to record light properties of an artefact), but this is only possible where either the artefact can be moved or the normal position is in an internal space where light can be controlled. See Hawkins et al [Hawkins, 2001] figures 2, 4, 9 and 11 for images of the operations of a light stage and a description of the data capture process. See also [Muller et al, 2005]

The other approach normally adopted is to record reference colour information under the same lighting conditions. This would also be part of calibrating a light stage of course.

Other factors which may influence the recording of colour include:

- natural light behaviour; such as shadows and reflection;
- materials, such as translucency and colour bleeding
- environmental, such as bright sunshine or wet materials
- artificial light sources – recording under different illumination spectra (or even multiple spectra)

The careful use of reference colour charts in the recording process can alleviate some of these issues, but others still remain – the extreme example is probably the difficulty of modelling jewellery!

Colour information is of course difficult to use without a proper recording of the relationship between colour information and positional data.

iii. Internal structure of an object.

Applications such as monitoring conditions of an artefact require some recording of the appropriate physical characteristics and comparison over time. Positional and colour information will inform some analyses, but in other circumstances data on internal structure may be required (e.g. flaws in a jewel or; structural cracks will be required).

In other circumstances, different internal structural information may be required, for example, X-ray information on the sub-structure of paintings used to understand the artist's creative process or detect earlier, now covered, works. In other cases, X-rays may be used for analysis of the materials e.g.[Staalduinen et al, 2006]

iv. Other material properties

The list of other properties that might need recording is long but some examples would be: density and weight; chemical composition; moisture content and; and structural characteristics (e.g. strength under load etc.). Some of these will be collected from samples of similar materials since the process of determining their characteristics may be destructive.

v. Informational content of the artefact.

The physical characteristics of a digital artefact are important but only a small part of the significance of an object. The first additional information to be considered is the informational content of the artefact itself. The most obvious example of this might be an illustrated manuscript – both work of art and explicitly containing information. Other examples might be the component images in a picture or scenes in a film (ignoring for a moment the audio component of the film).

A classic example of this is the film shot in Norwich by planners seeking to identify areas for development of traffic systems in the 1950's – the film's content shows most of the streets of central Norwich, illustrating snippets of everyday life in the city and a fascinatingly, rich source of information on the architectural state and physical condition of the city, frozen at a known "point" in time. Although transferred to video by the East Anglian Film Archive, this film has not, to the author's knowledge, ever been digitized, indexed or analysed.

Depending on the applications of the digital artefact this informational content may be more important than the digitised physical representation.

At one end of the spectrum, a printed book is a cultural artefact but an individual copy of a version of the printed book in digital form (e.g. of the first edition) may have fewer applications than a representation of the linguistic content, independent of its appearance in print.

b. Dissemination to the Public

Public dissemination needs to be based on the appropriate underlying historic information, so the considerations identified in the previous section on the nature of informational content remain relevant. The issues here are more to do with the delivery mechanisms and the implications for the version of an artefact to be delivered.

Here the decisions on data collection may be driven by different considerations. Some of these decisions may be taken (and often regretted) at data collection time; others will be taken about how to derive suitable internet objects from data collected for more scholastic and curatorial purposes.

For example a museum could decide to digitise artefacts for use as part of a web-presence and increasingly there are systems showing 3D artefacts on the web. The complexities of delivering these objects to the client's browser have evolved enormously over the last few years and it remains the case that technology is moving fast in this area. Issues such as the size of data files, model representation and associated software for displaying the models; bandwidth assumed in delivery; watermarking and copyright protection technologies, etc will influence the content of the on-line collection.

However for the purposes of this paper we will assume that these decisions can be subsumed as subsets of the variations in the previous section, coupled with a different set of decisions about how to abstract suitable representations for use in public communication from the data sets generated as part of the assembly of a digital collection. However it may actually be that different data needs to be collected – for example if the publicly viewed models are required to be very real in appearance but undertaking measurements from them is less important then image-based rendering might be adopted.

c. Tangible v intangible heritage

Artefacts of historic or cultural significance have knowledge and information associated with them that complete the picture of their significance. Of themselves, they may be impoverished without the additional context of the knowledge of their production, use, history, ownership, etc. Some of this will be known fact, some deduction, and some will be cultural interpretation. Many culturally significant artefacts have religious or nationalistic contexts – each of which may produce valid culturally-based interpretations. All of these may be correct and significant but they may be conflicting. The contextual information can be regarded as an inextricable part of the artefact and as such the artefact itself becomes uncertain. The cultural components of the information are one example of “intangible heritage”.

In addition, there are cultural artefacts which are intrinsically intangible heritage – stories, music, performance, dance are all examples. In some cases there will be physical artefacts associated with the intangible heritage – manuscripts, etc. In other cases, associated with myths for example, there may be tangible heritage which is, in fact, interpretation of the intangible. The line between tangible and intangible is inexorably blurred and inevitably, even where artefacts are considered purely tangible, linkage to other, non-tangible, information will be a requirement. However the essential characteristic of intangible heritage is that

there is a degree of uncertainty because interpretation has been used which will be to greater or lesser extent subjective.

The linkage to the other data is one example of metadata, which is required for many aspects of digital artefacts.

d. Metadata

Metadata can be defined as data about data. There have been significant efforts to define metadata formats for cultural heritage. Some of these are formal standards (e.g. CIDOC-CRM [ISO, 2006]). In the present context metadata exists at a number of levels:

- i. Data concerned with the provenance of an individual artefact. This would include the producer; the methods of capture; the conditions at the time of capture; information on the settings used for equipment; perhaps on the algorithms used (e.g. for stitching partial scans), etc. There may also be items connected to the artefact of legal interest (owner, copyright status, fee for re-use etc.). (See, for example, [Addison, 2006] for the proposed metadata fields to be associated with Virtual Heritage. The table in Addison's paper is reproduced in the attachment to this document, for reference)

There are other approaches – for example the Visual Resources Association has produced a guide entitled “Cataloguing Cultural Objects” with important qualifier “A Guide to Describing Cultural Works and Their Images” [CCO, 2003]. This guide addresses the normal information one might see in a museum index, but does not for example, acknowledge the difficulties in recording 3D shape on a card index.

- ii. External links may be needed to data which is part of the same collection (e.g. data about a collection, linking data recorded at the same time, in the same season, by the same collector).
- iii. In principle we need to think about the metadata and provenance of hierarchical artefacts. For example a city reconstruction may use information on fragments of masonry collected at one time; on the archaeological records; on materials properties; on artefacts collected from this and other sites; on typical design styles from the period, etc. Each subsection of the reconstruction may have different creators and these may be different from the authors of the stories about the environment, or the modellers assembling the complete environment, etc
- iv. Relationship to data collected elsewhere (Previously recorded data about the same item; structural properties recorded in analysis of comparable material samples; analysis of historic lighting materials, flame properties, etc.)

Questions/Considerations for those thinking of creating/using digital artefacts

a. Which underlying format of 3D models is best suited to the application?

A 3D model will be a collection of all the geometric and visual data listed above (in principle shape/geometry and colour/light behaviour, possibly including material properties). The issue of model representation is particularly significant because a model in one representation will not necessarily be simple to convert to a different format. The most obvious example is the contrast between image-

based rendering and models represented by their geometric boundary mapped with colour textures.

Boundary representations of artefacts have been used extensively to describe a 3D object as the collection of surfaces and their properties. Such models have origins in other fields – notably Computer Aided Design, where they are used to describe an object in terms suitable for manufacturing it. Two classes of approach are now used to create such models – modelling using some sort of modelling package and capture from range scans. Range scans create “point clouds” and conversion of these clouds to efficient boundary representations is an on-going topic of research. Between these two approaches lie systems which seek to generate models from 2D images (photogrammetry etc). These may or may not seek to create models of the surface geometry [Debevec, 1999].

Generating realistic images of objects represented in these sorts of formats has been a challenge for at least the last 40 years. Methods which take into account (progressively) hidden surfaces, diffuse colour, shadows, specular reflection, participating media (smoke etc), radiosity, etc have gradually improved the images of artificial objects, but as yet have not quite captured a truly life-like feel of the actual appearance.

More recently the technique of image-based rendering has been developed and used with cultural artefacts in some live applications. For example at the National Palace Museum, Taiwan, [Palace] high quality digital artefacts have been in use alongside their physical counterparts in order show details that cannot otherwise be viewed by the museum visitor. Examples include a carved olive stone where the carving details can only be shown in the museum by placing a large magnifying glass next to the artefact in the museum case. A second example is a fine example of carved ivory where a piece with 21 concentric spheres carved from a single piece is available as an image-based model in which each layer of the carving can be peeled away to show the underlying layers. Unfortunately these examples are not available on the museum’s website which nevertheless shows some excellent examples of documenting cultural objects on-line.

Image-based modelling is undertaken very differently. The models are captured by photographing the object from “all” directions, lit by known source or sources from “all” directions. This generates a potential large number of images from marginally different directions and intermediate views are then generated by interpolating between the images. In the basic method the boundary representation of an object is not derived (although for some objects (and only some objects) image processing techniques could be used to generate a model).

Philosophically the starting point for the modelling using boundary representations is different from that on which image-based modelling is based. For boundary models the initial target was structural and geometrical accuracy “decorated” with colour information – and then attempting to compute a life-like image by understanding how light would behave in the modelled environment. In contrast for image-based modelling the original objective was to be able to produce images that were truly life-like. The starting point is therefore to record the actual images and then try and compute more information about the underlying geometry that must have been present for the images to have been generated.

Determining the type of 3D object to be captured also involves making decisions about the needs (or not) of capturing the object’s internal structure. This might require additional consideration of:

- v. Whether surface textures were sufficiently good to represent the object visually or whether volumetric information was needed to be able to show characteristics such as translucency.
- vi. Similarly other information which could be held as surfaces but were connected with internal structure rather than surface geometry might need to be captured (e.g. the underlying structure of cracks).

b. What metadata format(s) and encodings should be adopted?

Given the costs of developing collections of digital artefacts and the need for the results to remain usable over the long term, it is really important to consider both the logical and physical format in which the artefacts will be documented and stored.

Much of the work of planning long-term archive of digital objects has been undertaken from a base in the digital libraries community. The management of collections of 3D cultural heritage objects is at an earlier stage and there remains significant debate about whether the approaches adopted for digital libraries are in fact suitable for related, but different, domain of cultural artefacts.

In the digital libraries area, the Dublin Core Metadata Initiative has been strongly influential. “The Dublin Core Metadata Initiative is an open forum engaged in the development of interoperable online metadata standards that support a broad range of purposes and business models.” [DCMI, 2006]. Projects such as the Metadata Encoding and Transmission Standard or METS are strongly linked to the Dublin Core work. “The METS schema is a standard for encoding descriptive, administrative, and structural metadata regarding objects within a digital library, expressed using the XML schema language of the World Wide Web Consortium. The standard is maintained in the Network Development and MARC Standards Office of the Library of Congress, and is being developed as an initiative of the Digital Library Federation.” [METS].

The Digital Library Federation [DLF] is an international association of libraries and allied institutions, which was founded in 1995. It includes the British Library, Library of Congress and many American Ivy League University Libraries amongst its membership and provides a searchable web-based database of standards information. Although billed as international and including the British Library the federation appears strongly US-based.

The Dublin Core approaches are increasingly appearing to move towards the museums area and are the adopted basis for the work of the MICHAEL project. This project began in 2004 involving development of a multi-lingual portal for sharing information on museum collections in the UK, France and Italy. It has recently been extended to incorporate another 9 European countries. [Caffo, 2006], [MICHAEL]

In parallel to these developments and starting from the perspective of documenting of historic, cultural heritage artefacts in museums the CIDOC-CRM initiative has recently reached ISO standard [ISO, 2006]. ISO 21127:2006 establishes guidelines for the exchange of information between cultural heritage institutions. In simple terms this can be defined as the curated knowledge of museums. The work is based on the work of ICOM – the International Council of Museums [CIDOC-CRM]. This approach has been adopted by a number of other projects and is the basis of the ontological work included in the EPOCH Common Infrastructure [EPOCH].

Fellner [Fellner, 2005] argues that the intrinsic problem is that we have yet to define the appropriate metadata vocabulary for use with the richer multi-

dimensional data that is becoming the norm for digital artefacts, in comparison to the more conventional world of metadata applied to the artefacts of the digital library. It is to be hoped that the evolution of these initiatives will seek to harmonise the approaches at least to the extent of ensuring inter-operability, but there are significant differences of approach. It is perhaps worth noting that it is expected to be possible to map the concepts included in the UNESCO virtual heritage proposed provenance into the other formats.

Multilingual ontologies further complicate interoperability not least because the terms used in one natural language may have no direct equivalent in another and indeed apparently similar words may have conflicting meanings in two different natural languages.

e. How do we ensure long term archive, preservation and access to digital objects?

Concerns here cover the ability to guarantee:

- long term archive
- physical security
- access in the long term

Part of the answer to long-term preservation issues will be the developments of standardised metadata. However there are two other aspects worth noting. Firstly, that the storage media of the computer age have a tendency to become obsolete in very short time frames. The issue is both the durability of physical material and the obsolescence of the equipment for manipulating them. CD materials are widely quoted as having a reliable shelf-life of around 15 years – somewhat less than the lifetime of most of the artefacts we are trying to record digitally! A sound policy of moving onto new storage media is an essential part of the process of using digital artefacts and it must be said that computer scientists are notoriously bad at this. Computing services are rather better at recognising the issue.

Secondly, that long term access will also rely on being able to identify the digital artefact within the collection. This identification could also be linked to the copyright, IPR and licensing processes. There are also two initiatives that have been started in the area of long-term identification of digital objects – the Digital Object Identifier (ISO) and the Persistent Identifier (DCMI working group). Both initiatives are designed to provide long-term availability of unique identification similar to the system of ISBN's but for digital objects.

“The Digital Object Identifier (DOI) is a system for identifying content objects in the digital environment. The DOI system is managed by the International DOI Foundation, an open membership consortium including both commercial and non-commercial partners, and has recently been accepted for standardisation within ISO” [DOI, 2006].

The Dublin Core Persistent Identifier Working Group was declared inactive and deactivated by the DCMI in September 2005, although some of that work continues under different guises.

Re-purposing data

Having built a digital object there is an obvious and appropriate desire to re-use the effort invested in any appropriate context. This will inevitably mean that the use will extend to applications that were not envisaged at the time the data was collected. Two challenges are commonly faced.

The easier of these challenges is faced when the application you are seeking to create cannot cope with the detail and volume of data that has been digitised. This is the common situation when artefacts digitised for scholastic documentation are to be used in web applications, including on-line publication. Here there are many methods that have been worked on by computer scientists for years. For example, almost every year there will be new papers on improved mesh simplification at the annual ACM SIGGRAPH conference (see www.siggraph.org).

It would not usually be necessary or desirable for a cultural heritage professional to be working on these aspects, but it is necessary that they understand the nature of the data manipulations being undertaken. Some methods are irreversible so that the data once simplified will remain in that form in the new environment or reconstitution may distort the original. Although it may appear that this would only be the case if the original artefact has not been properly archived or is not available for other (e.g. legal) reasons, the original model may not be available *where it is needed* because of the difficulty of shipping large volumes of data (e.g. to a client over the internet). This has the effect that making a simplified model available could potentially both misrepresent the original and protect it against unscrupulous exploitation (cf the much reported theft of copyright by hand held video cameras in the cinema).

There are rather different processes that are designed to compress data in various formats for transmission over networks. These methods would typically be used where the internet bandwidth is not fast enough to send the full dataset in its original format, but the target is to compress and convey the original digital artefact across the network, rather than to simplify it for transmission. Methods may be “loss-less” or “lossy” meaning that after compression at one end of the transmission the re-constitution either reinstates exactly the original in the first case or something “good enough” for the application in the second.

The second case of re-purposing data is where the initial dataset is required with more information added. For example this might occur because the accuracy of digitisation was unsuitable for the higher performance printers and displays that have since become available. In this case smoother images may be produced by interpolation of the original data, but this data is almost inevitable an invention that cannot be more accurate than the original data, whilst giving the impression of higher quality images. Alternatively the new application may require additional data fields that were not originally collected – a far more challenging situation.

Reconstructions or visualisations

A related issue is where the original digital artefacts are to be used in an application which attempts to reconstruct an “original” state of the artefacts. Examples would be reconstituting a pot from shards of pottery [Kampel and Melero, 2003] or rebuilding a castle digitally from the records of the ruins. In these applications we are somewhat away from having the intelligent tools to assist the cultural heritage professional with the reconstruction. Most commonly these applications are undertaken using general purposes modellers (e.g. Maya or 3D-Studiomax) and the reconstructions are effectively created by hand.

In the longer term we need modelling tools that use the evidence of the recorded artefacts and act as intelligent assistants. For example in the case of the pottery an assistant that understood the likely styles and the generic properties of pots of a similar age might be able to guide the modeller with suggestions of which piece organisations would give the appropriate continuity of curvature etc. There have been experiments with this sort of tool, but few have yet attempted the equivalent for architectural styles for example. In addition the potential of coupling multiple sources (e.g. archaeological evidence, historic maps and photographs or paintings) has yet to be tapped.

When multiple original artefacts are contributing towards a reconstruction the challenges of hierarchical provenance is likely to be faced. Each component contributing to an assembly

will have its own provenance and the assembly will have a different one. Where multiple reconstructions contribute to a larger environment several levels of hierarchy may be needed to fully document the artefact. The use of such provenance will not only be scholastic, but potentially used for controlling royalties and other legal protection. Built in digital watermarking or copyrighting may also be “hidden” in a digital object’s encoding.

Conclusions

We have seen many different aspects of the creation and use of digital artefacts. It is inevitable that such artefacts will find their place in the range of techniques for historical documentation and analysis over time. We are in a potentially dangerous situation at present where the tools are immature but there are many potential benefits in the short term of taking up the challenge. These benefits address both scholarly research and dissemination to the public, capitalising on the public’s undoubted interest in the past.

During this phase it is very important for cultural heritage professionals to continue the long traditions of curatorship and caution, but their participation in the search for appropriate tools and processes is also essential if the technologies are to evolve to achieve their potential. In the meantime the pioneers in the use of digital artefacts in historic research need to remain aware of the limitations of current technologies and the restrictions on their applicability.

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Appendix 1: Proposed Virtual Heritage Metadata (“World Heritage metadata structure” from [Addison, 2006])

Type	o.	Data Encoding/Format
What	i.	Heritage ID (a superset of existing WorldHeritage ID)
	ii.	Title/Brief Description
	iii.	Heritage Type/Classification (e.g. Cultural: archaeological, ...)
	iv.	Heritage Time Period (e.g. geologic or historic time)
Why	v.	Purpose (why recorded/produced)
How	vi.	Recording Device Parameters (type, sample rate, precision,...)
	vii.	Secondary device(s) (data manipulation)
Whom	viii.	Submitter and date of submission
	ix.	Environmental Conditions
	x.	Rights given/withheld
	xi.	Author/Copyright holder
	xii.	Sponsor/Funder/Client
	Date	xiii.
Where	xiv.	Location (Latitude/Longitude and compass direction if applicable)

Cultural Heritage and the Information Technologies: Facing the Grand Challenges and Structural Transformations of the 21st Century

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The Epoch Network of Excellence in Processing Open Cultural Heritage has set for itself a grand challenge, in its primary objective of providing “a clear organisational and disciplinary framework for increasing the effectiveness of work at the interface between technology and the cultural heritage of human experience represented in monuments, sites and museums.” (EPOCH 2007) More specifically, this framework is intended to “encompass all the various work processes and flows of information from archaeological discovery to education and dissemination” seeking to identify obstacles to smooth integration and flow of information and thereby to establish overall research priorities.

The natural focus of EPOCH’s evolving Joint Programme of Activities is thus the design of a wide range of practical applications and actions to address the existing challenges to effective and efficient integration of cultural heritage and information technology. Yet these are not engineering challenges alone. In accordance with the larger social and economic objectives of IST in FP6, EPOCH must also help to “increase innovation and competitiveness in European businesses and industry” connected with the heritage sector and to “contribute to greater benefits for all European citizens.” (CORDIS 2007)

Indeed, over the last few decades, the potential of CH ICT for providing such economic and social benefits has already been demonstrated, particularly in the fields of data collection and analysis; in management and monitoring of cultural heritage resources; and in public presentation activities at museums and sites. The development of a wide variety of networked digital field recording techniques and databases has added efficiency, cost-effectiveness, and power to the task of accurately documenting and analyzing monitoring the physical state of sites and standing historical monuments. Management and spatial planning of heritage resources by local authorities and heritage administrations have been made more effective and flexible through the use of Geographical Information Systems, database design, and new networking technologies.

Digital visualisations have now begun to rival linear narrative as a main method of historical documentation and interpretation for both scholarly and educational audiences. Public presentation and educational programmes have now come to include immersive environments, multimodal interfaces and haptic applications for the study of sites and objects. The use of virtual human figures as avatars and dynamic elements in virtual historical environments have offered unprecedented opportunities to link the visitor experience with vast amounts of well-researched information about past societies.

These developments in data processing, visualisation, and methods of public presentation are important foci for EPOCH’s research agenda, but the longer-term relevance of that agenda—and above all, the long-term usefulness of its research results—must also take into account the current transformations and emerging structural trends in the field of Cultural Heritage itself. For the interface of culture and technology on which EPOCH focuses its efforts is not a static boundary but a hazy border area, where institutions in *both* the ICT and CH sectors face challenges from shifting economic conditions and changing government policies. Integration must be an ongoing process, not a one-time accomplishment.

This paper will therefore concentrate on the following four main areas of special concern in the CH sector that will likely exert a significant structural impact on working practices (and the potential for ICT integration) over the coming 10-15 years:

- ***Intensifying Physical Threats*** to heritage of all types from natural deterioration, urban and industrial development, deliberate destruction, and climate change, all on an unprecedented scale.
- ***Competing CH Research Paradigms***, making the sharing of information across and within the present disciplinary boundaries increasingly difficult.
- ***Marketisation of Culture***, forcing cultural heritage organizations and institutions to become increasingly dependent for their very survival on independent sources and methods of income generation.
- ***Questions of Heritage and Identity in an age of increasing ethnic and*** cultural diversity, posing challenges traditional definitions of “national patrimony” and transforming the role of heritage in contemporary society.

EPOCH’s success or failure in recognizing and facing these challenges may well determine the future of its ICT integration efforts and may arguably influence the evolution of heritage itself in the coming decades.

1 Conservation Challenges: Material Heritage in Danger

The physical conservation of material heritage resources is perhaps the central task of the CH sector. It represents the material basis on which all scholarly and public understandings of heritage lie. Ever since the adoption of the Venice Charter (ICOMOS 2001), the overriding concern for the conservation of authentic physical fabric has been the foundation of all accepted international heritage standards and policies. And in the past two decades enormous strides have been made within the CH sector by such international institutions as the Getty Conservation Institute, the Institute for Conservation, and ICCROM to address specific problems in the physical conservation of various types of ancient materials, monuments, and artefacts. (GCI 2007, ICON 2007, ICCROM 2007)

In this challenge as in the others that will be mentioned in the following pages, some important achievements have already been made through the use of information technology. Indeed, the initial surveys of EPOCH’s Sector Watch have highlighted CH stakeholders’ concern with more effective ICT tools for 1.) detailed, and in some cases, three-dimensional documentation of the physical state of objects and structures, 2.) accurate monitoring of progressive change or deterioration, 3.) visualisation and modelling of original, anticipated, or desired future states. The EPOCH Research Agenda has, in turn, underlined the importance of this realm of activity and has identified a wide range of applications with direct relevance for physical conservation activities (Arnold and Geser 2007: 32).

Yet even the briefest glance at the World Monument Fund’s “Watch List” (WMF 2007) or the ICOMOS “Heritage @ Risk” reports (ICOMOS 2005) indicates the enormous scale of conservation threats to all types of material heritage. In growing, already congested urban areas, the physical deterioration of standing historic structures and archaeological sites is due not only to the natural processes of exposure and physical deterioration, but is exacerbated in many cases by their vulnerability to pollution, vibration, and vandalism. Social and economic developments, rather than purely chemical and mechanical processes are now primary factors in the increasing scale of conservation work. Rapid industrial development in formerly rural areas and regions endangers sites and monuments whose remoteness from population centres once protected them.

Widespread looting of tombs and sites in developing areas feeds the thriving antiquities market in the more developed ones. In regions where cultures and religions are in conflict, the conscious destruction of archaeological sites has become a part of contemporary inter-communal warfare. Most ominous of all, global warming is also taking its toll with the rise of

sea and ground water levels in some places and increasing aridification in others. Unique frozen deposits (for example, the frozen mummies of the Mongolian steppe (Gheyle 2006) and the delicate heritage of polar areas (Chaplin and Barr 2007) are thawing, with the consequent destruction of their uniquely preserved remains.

The scale of each of these threats is unprecedented and growing. Taken together, they represent a level of antiquities destruction that is itself of historic proportions, from which no region of the world is immune. Both in the cases of protected antiquities in developed countries and uninvestigated remains in developing regions, this limited and non-renewable resource is rapidly shrinking, offering a grim prospect of a future with a badly depleted communal resource of cultural heritage and the vanishing possibility of documentation of the architectural and archaeological record. An increasing number of international appeals and statements of scholarly concern have been distributed to highlight particular cases of dramatic conservation emergencies. Likewise, some innovative fund-raising methods have been attempted in the US through the use of private philanthropy and in the UK, through the Heritage Lottery Fund. Televised contests to select heritage sites for thorough conservation and publicity campaigns to “save” endangered universal heritage (as in the notable cases of Machu Picchu in Peru, the Mostar Bridge in Sarajevo, the Buddhas of Bamiyan in Afghanistan, and the looted sites and museums of Iraq). But beyond such high-visibility projects, chosen on a case-by-case basis, the wider problem of global heritage ecology has yet to be addressed in an adequately systematic or uniform way.

It is increasingly obvious that a new, regional and worldwide approach to heritage conservation is needed that can grasp the true dimensions of the problem we now face (Lozny 2006). At a time when the budgets of antiquities and monuments services are already stretched to the limit, and with an ever-widening definition of cultural heritage coming to include vernacular architecture, industrial installations, cultural landscapes, battlefield remains and the countless forms and expressions of popular and folk culture (textiles, photographs, posters, and personal memorabilia), the challenge of heritage conservation requires the adoption of an environmental sensibility—rather than a selective connoisseur approach. The more effective use of limited conservation funds will depend on a clearer empirical understanding of the scale and nature of conservation threats.

ICT can play a crucial role in analysing particular types of conservation problems, prioritising their importance, and providing networked data that can assist in the formulation of overall policies in the CH sector. In addition to monitoring specific processes of decay and deterioration, interlinked ICT networks can offer detailed and regularly updated “snapshots” and trend forecasts about the physical state of the entire range of material remains in a particular state, region or locality. As in the case of environmental planning, the goal can not only be to preserve a particular kind of monument or object as an “endangered species” without taking into consideration the changes occurring in the wider “eco-system” to which it belongs. For heritage, in its physical aspects, must be considered to be more than our society’s attic of antiques. The material remains of the past of the past are a part of our living present; in their omnipresence and visibility they offer individuals and communities alike a sense of who they are and where they are in the history of humanity (Lowenthal 1985). Heritage conservation should thus not be just a matter of spot restoration and consolidation of particular buildings and objects. As a kind of cultural “biosphere,” conserved cultural heritage offers society a sense of time and historical orientation (Zerubavel 2004). Its loss or significant degradation will have far-reaching socio-cultural, as well as scientific, consequences.

Thus, in the coming years, CH conservators (working on specific problems at specific sites) and planners (focusing on regional issues of urban and infrastructure threats to material heritage) will need to work ever more closely together within the information networks that can be provided by ICT. More than merely developing tools for specific conservation projects, ICT must help create a new information structure for new multidisciplinary teams of heritage ecologists, simultaneously addressing the challenges of conservation on local and

regional scales. Just as the environmental movement merged the formerly fragmented scholarly focus on biology, botany, geology, and zoology toward a more practical ecological collaboration, a new concept of the ecology of material heritage will require the same kind of institutional and conceptual shift. The failure to make such a structural transformation—leaving the process of conservation to arbitrary (if high-tech) “triage” operations at specific sites—will almost certainly fail to halt or even lessen the intensifying deterioration, degradation, and destruction of cultural heritage resources all over the world.

Intellectual Challenges: Fragmentation of Historical Scholarship

The assumption that “the cultural heritage of human experience represented in monuments, sites and museums” is a single, coherent undertaking is badly mistaken. Except for a common concern with the material remains of past societies, the differences of approach and intention are in many cases far more important than the commonalities. First of all the functional goals of various CH institutions differ. The approach of academic institutions is primarily *analytical*, seeking to stimulate and produce original research and formulate taxonomies, chronological sequences, and scholarly hypotheses about material remains. Although museums too may sponsor scholarly research and publish monographs and scholarly journals, their public function is primarily *communicative*: collecting, exhibiting, and conveying heritage significance to their visitors. And regarding monuments and sites services, their task is primarily *administrative*: documentation, conservation, and enforcement of laws that regulate the protection and conservation of moveable and immovable heritage resources.

This functional differentiation is further complicated by a wide variety of theoretical orientations within the entire range of historiographical and heritage disciplines (e.g. Trigger 2006, Wallerstein 2001, Johnson 1999). Alongside the traditional art-historical and culture-historical approaches to material culture (i.e. identifying and dating sequences of styles, artefacts, architecture, and larger arrangements of specific past cultures), are the anthropological approaches that seek cross-cultural typologies of the behaviour represented in the material remains. At the same time, processualists create dynamic models of ancient systems to test hypotheses about the mechanics of ancient societies. Structuralist and post-processual scholars, for their part, collect evidence to decode and deconstruct the unspoken “texts” that the material culture of every period is believed to express. Each of these main intellectual streams represents a distinctive methodology of study, with particular preferences for certain kinds of data and distinctive and differing criteria for documenting and analyzing the evidence.

In addressing this issue of functional and intellectual fragmentation of CH data, ICT professionals—and in particular the EPOCH Network—have focused on the challenge of standardizing processes for data capture, networking, and interoperability as primary strategies for linking information throughout the entire CH sector (Arnold and Geser 2007). Through the development and use of CIDOC-CRM for encoding both newly captured and legacy data, the goal is to devise metadata standards “suitable to encode information about cultural artefacts and their history” (Arnold and Geser 2007: 74) and thus provide access to by all researchers in an ever-growing repository of CH information in digital form.

Yet the present fragmentation of data sources and collections is not merely a matter of inefficient or non-existent communication networks; it’s also a product of distinct and long-established disciplinary epistemologies. For example, the data systematically collected and used in art- or culture-historical research, is quite different from that collected and used by anthropologists, processualists, or post-processualists. Each CH research project can therefore be seen from an intellectual standpoint as the expression of a particular historiographical orientation, not merely the collection of objective material facts. And although there are many variants and combinations of the various CH research approaches, any attempt to provide a free information flow about the whole set of data about the past must directly and consciously contend with the fact that scholars dealing with material heritage in the range of specialized

sub-fields see different types of data as significant. In a word, they are not all talking about the same thing.

Here too, the contribution of ICT can be something more than bridging a static interface between technology and culture. The effort to establish interoperable digital tools for Data Collection, Structure, and Analysis can be the first step in creating innovative, new multidisciplinary forms of historiography. Widening access to new classes of networked data will encourage a deeper consideration of their commonalities and contrasts. No less important is the growing recognition of the importance of “Intangible Heritage.” By the terms of the UNESCO Convention on the Safeguarding of the Intangible Cultural Heritage, “Intangible Heritage” is defined as “the practices, representations, expressions, knowledge, skills—as well as the instruments, objects, artefacts and cultural spaces associated therewith—that communities, groups and, in some cases, individuals recognize as part of their cultural heritage.” (UNESCO 2005)

Although the accepted methods of collecting about Intangible Heritage are still in the process of discussion and crystallization (Munjeri 2004), their relevance to the wider objectives of ICT-CH integration are clear. The explicit mention of the relationship of intangible ideas and traditions to material objects, artefacts, and cultural spaces suggests that it is not a separate category of cultural heritage knowledge, but part of an evolving concept in which the ideational and physical are becoming more closely intertwined. Thus traditional notions of data collection, structure, and analysis and metadata standards must also take account of non-physical as well as physical evidence.

Effective ICT research tools have the potential of not only producing meaningful bodies of interlinked data that has been collected within existing disciplinary frameworks, but can also help to reshape the wider intellectual strategies for the study of CH information and production of knowledge in the years to come. The goal is certainly not to create a single, dominating heritage discourse that is simply the sum of all its presently fragmented parts. Through the serious collaboration of ICT and CH professionals it can be the first step in creating innovative, multidisciplinary forms of historiography.

Socio-economic Challenges: The Marketisation of Culture

From the very inception of national European Heritage institutions in the 19th century, the stewardship and presentation of CH monuments and sites has been widely recognised as an official, public responsibility. But that responsibility is now undergoing a dramatic change. As with many other government functions throughout the European Union, the administration of CH resources is being gradually outsourced to private firms and private non-profit associations, in the belief that they can be more efficient and economical than centralized bureaucracies in the performance of certain well-defined tasks (Myerscough 2001). Thus in recent years, official CH heritage institutions have increasingly relied on outside contractors for management and personnel services, ICT training, salvage excavations and surveys, and conservation expertise—to the decidedly mixed reaction of CH professionals (for a basic discussion, see Canadian Heritage 2007).

Yet marketisation of culture has had another, even more sweeping effect on the practices of the CH sector: namely, the packaging, design and promotion of monuments, sites, and museums as income-generating “attractions,” structured and marketed with the same modes of tour booking, entrance fees, visitor services, restaurants, and gift shops, as other packaged visits of the modern mass tourist industry (Hewison 1987). In an era of steadily shrinking operating budgets, CH institutions such as sites and museums have in many cases had to rely for their independent existence and in some cases for their very survival, on visitor revenues, either generated directly or through franchise arrangements (Hall and McArthur 1998). With CH coming to be seen as a valuable and insufficiently developed asset in the context of Europe’s flourishing tourist industry, there is also a wider economic incentive for this trend. Governments at all levels have in recent years invested significant amounts to convert modest archaeological and historical sites into “heritage attractions,” with the hope not only of

supporting existing CH facilities, but in stimulating the local economy with subsidiary services such as hotels, shops, and restaurants that can offer local employment opportunities. Public funding programs like those of the European Commission's Interreg, EUROMED Heritage, Culture 2007 programmes, and the World Bank's "Framework for Action in Cultural Heritage and Development" (Cernea 2001) have set standards—and offer substantial economic incentives—for public and private investment in ambitious heritage development projects.

ICT has played a key role in this process, providing powerful new digital tools for conveying heritage content to visitors and also in promoting more effective marketing of heritage sites (Owen et. al. 2004). The tools and approaches for public interpretation outlined in the EPOCH Research Agenda (Arnold and Geser 2007) include a wide range of visualization technologies, multi-modal interfaces, wireless PDA visitor guides, and augmented reality applications, designed to energise visitor interest and provide vivid heritage experiences. As such, the role of ICT in this new form of heritage presentation is prominent and visible, but it remains to be seen, from a strictly economic standpoint, whether it is a sustainable strategy for the integration of CH and ICT. The substantial costs of hardware purchase, installation, maintenance, and updating make it unlikely to be a dominant form of public interpretation—at least in the short- and medium-term in any but the most developed countries and in any but already well-visited sites. A general lack of detailed statistical data on investment-return rates and accurate estimations of hidden costs borne by the public in completed projects (such as road building and adjacent infrastructural improvements, traffic control, and waste disposal) makes useful generalisations about the specific economic contribution of CH to local economies impossible to rely on.

It is clear, however, that some sites, no matter how meticulously researched and elaborately developed, will never attract large numbers of visitors, for the routes of tourism are exceptionally inflexible, based less on content than the convenience of nearby highways and airports, the pressures of itinerary planning, and the most comfortable facilities (Hamza 2004). Despite the attractive offers and funding, the likelihood of energizing local economies through heritage presentation must take into account the harsh calculus of investment costs vs. logically expected return (Briedenham and Wickens 2004). Although the academic tourism literature is filled with conceptual studies of new formulations like "co-opetition" among regional attractions (Buhalis 2003), the hard fact of the matter is that, in the absence of detailed market studies before initiating expensive heritage presentation projects, the decision of many local communities to embark on heritage presentation and valorisation projects may be risky from a strictly economic point of view (Rizzo and Throsby 2006).

New economic assessment methods are needed; the range of currently utilized valuation studies (detailed in Mason 2005) are currently the subject of discussion and development by both economists and CH professionals (Mourato and Mazzanti 2002). In addition the wisdom of the general movement toward the marketisation of CH properties and tasks has been questioned for its short-term economic orientation focussing on revenue-generation and cost effectiveness—and its relative neglect of such relatively longer-term CH priorities as sound conservation, preservation of site authenticity, and calculation of the hidden costs still borne by the government (Palumbo 2006).

As in the case of physical conservation, a long-term view needs to be taken and the role of ICT can be central. More than merely developing tools for specific presentation applications within marketed heritage attractions, ICT must help create a new information structures for collecting, analyzing, and updating data about their performance for the effective shaping of future policies and development designs. Instead of taking the current economic trends for granted, ICT can take the lead in monitoring the long-term economic dimensions of the cultural heritage field.

Cultural Challenges: The Function of Heritage in 21st Century Society

Beyond its conservation values, specific research interests, and economic dimensions, CH in Europe has always had the important social function of fostering a sense of collective identity. Recent work in sociology has focused precisely on this value of CH for maintaining and enhancing a shared historical consciousness that encompasses all members of society and strengthens their sense of social cohesion (e.g. Zerubbavel 2004, Misztal 2003, Connerton 1989). The issue has also been addressed in relation to EU expansion and the promotion of an evolving concept of pan-European identity (Eder and Spohn 2005).

Yet when we refer to the identity-value of European material heritage, where should the boundaries be drawn? The nation-state has until recently been the main point of reference; antiquities services and preservation agencies have been largely focused on presenting a recognised and formalized “national patrimony.” Yet today, the multiplicity of ethnic and socio-economical identities and cultures in Europe, offer a more complex and less homogeneous reality. The historical mainstream must be widened to take into account and include the diversity of European identities and cultures in the field of cultural heritage. Consequently, awareness has risen on the importance of protecting the rights of ethnic minorities, immigrant communities, and regional cultures to be represented as part of a diverse European heritage (Pendlebury et. al. 2004, Hall 1999).

While social inclusion has often been seen primarily in terms of providing enhanced access to existing cultural heritage institutions and activities, it is crucial that the integration of ICT into CH not be restricted to “official” sites and institutions, but also create structures for individuals and groups within society express their own interest and pride in the traditions, monuments, landscapes and memories of particular significance to them. Some innovative experiments in the construction of web-based “memory communities” have been attempted and they represent a promising new arena for the creation of new forms of CH participation that acknowledges the importance of a bottom-up, rather than solely top-down approach to the presentation of heritage material (e.g. Giaccardi 2006). In this respect, one of the most pressing questions ICT integration faces is whether it will merely improve the efficiency of current heritage institutions, or to help to build an evolving, more inclusive collective memory, combining the efforts both of official heritage administrations and the independent initiatives of a wide variety of individuals and community groups.

The integration of digital technologies into CH offer a unique opportunity for increasing the flexibility of interpretation activities—in their capacity both to collect and to structure large quantities of divergent data for selective retrieval both within and outside the formalized heritage institutions of museums and sites. They offer an independent channel—not only of one-way heritage communication—but also a forum for wide public discussion, reflection, and creativity. Within the CH sector, the communication of CH information is no longer seen solely as a process of distilling scientific results and presenting them to a largely passive public but encouraging their active participation in the documentation and discussion of the sites, objects, landscapes, and traditions in a variety of social contexts (Silberman 2006).

The EPOCH Research Agenda has already predicted that CH institutions, particularly local museums and site museums, “are going to move away from the static displays of artefacts and concentrate on establishing the structures for the creation of long-term, sustainable local memory institutions, in which the input of the public is central” (Arnold and Geser 2007: 49). Accordingly, ICT integration must also develop new applications for “user-generated content” and create innovative web-based communication structures that will provide additional benefits to the general public in the preservation and inter-generational transmission of meaningful collective memories.

Conclusions and Prospect

The success and lasting impact of the EPOCH network lies on two foundations: technological excellence and attention to the greatest needs and challenges of contemporary heritage. Without attention to both, the impact of the technology to solve heritage's most pressing problems will remain in question. For as repeatedly noted, the CH sector is in the midst of far-reaching conceptual and structural changes that must be taken into account. The challenge of ICT integration should not be restricted to the improvement of digital recording, data processing, and communication technologies, but of helping to shape the meaning and direction of the entire enterprise. In concrete terms, that means encouraging a transition toward a more inclusive, supportable, meaningful activity of preserving and reflecting on the past that fits not only the information technologies but no less important, meshes well with the requirements and need of the Information Age.

Constant assessment and re-evaluation is essential and, to that end, the overall goal of ICT integration in CH should be the gradual dissolving of an interdisciplinary "interface." With the passage of time and the close cooperation of the two sectors, new and sustainable organisational structures for CH can be created that will allow constant feedback between culture and technology, between past and present, and between the CH sector and wider society. Thus the task of the EPOCH network is indeed far more than an engineering challenge. Its goal should be to study the evolving technologies and techniques of heritage conservation, research, economics, and community participation and evaluate the potential of ICT to enrich scholarship and expertise in dealing with material culture and to heighten public sensitivity to the universal values and particular modes of human expression embodied in our shared inheritance of cultural heritage objects, traditions, and sites.

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Valuing European cultural heritage sites

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Abstract

The following review looks at non-market valuation studies of cultural heritage sites that have been conducted in Europe. The most widely used non-market valuation technique in the cultural heritage sector is contingent valuation. This ‘stated preference’ methodology has been widely used in the field of environmental economics since the 1960s, but the adoption of the technique in the cultural heritage field has been much more recent. Revealed preference techniques have been used far less as a means to value heritage sites but there is evidence that this is beginning to change with increased use of the Travel Cost Method at heritage sites.

1 Introduction

When assessing the heritage sector, it is clear that a wide range of values can be attributed to cultural heritage sites. These can be precise values, such as the cost of admission to a site, or the cost of a book in the gift shop. These sorts of values are easily accessible to traditional economic modelling techniques. There is also a class of more amorphous values (non-market or non-monetary values), such as the ‘satisfaction’ derived from visiting a cultural heritage site, or the aesthetic value of a cultural heritage site to a local community.

It is therefore possible to apply two types of economic valuation analysis to cultural heritage sites – market and non-market. Market analyses are the traditional analyses carried out by economists which identify direct and indirect expenditure effects. While these techniques can determine the more easily measurable economic impacts of a cultural heritage site, they do not reveal the full range of values produced by a site. Non-market analyses try to capture the values and benefits that are not picked up by the market valuations.

Because cultural heritage goods and services are not usually traded in conventional markets, the benefits derived from these goods and services are ‘external’ to the market. The economic valuation of non-market cultural heritage goods and services attempts to ‘measure’ individual’s preferences for non-market goods and services. If monetary estimates are made of an individual’s preferences for such goods and services, these can be integrated into an economic format comparable to conventional economic costs and benefits. This will enable impacts generated in the sector to be accounted for in policy and decision making processes.

Non-market valuations can be separated into two techniques: revealed and stated preference.

- Revealed preference techniques are based on an individual’s actual purchasing decisions.
- Stated preference techniques are based on how people say they would react to changes in the market.

2 Revealed preference methods

The revealed preference methods of non-market valuation comprise two principal techniques. Travel cost analysis and the hedonic price analysis. These non-market valuation techniques, have seen fewer applications in the field of cultural heritage compared to stated preference methodologies, despite having much more widely-accepted economic principles.

2.1 Travel Cost Analysis

The underlying assumption of the travel cost methodology is that the amount individuals are prepared to pay to travel to a cultural heritage site is a reflection of the value of the goods and services provided by that heritage site. Using this framework, the expenses that individuals incur in order to visit a site, in terms of time and travel costs, are a proxy for the 'price' of access to the site. This data can be used to estimate willingness to pay.

Because travel costs increase with distance, the further away people live from a site, the less often they will visit. The number of visits to a site can be affected by other factors. The greater the choice of alternative sites, the fewer visits will be made to a site. Higher income earners will on average make more trips. Personal interest will also impact on the number of visitors. Statistical modelling should try to take these factors into account.

Travel cost methodology determines the number of visits from different distances from the site, and the travel cost from each zone. This is used to create an aggregate demand curve for visits to the site. The demand curve is used to determine how many visits individuals would make at various travel cost prices. This can then be used to provide an estimate of willingness to pay for site visitors. This applies if they are charged an admission fee or not. The most controversial aspects of the travel cost method include accounting for the opportunity cost of travel time, how to handle multi-purpose and multi-destination trips.

As with the hedonic price methodology, travel cost has not been widely applied to the valuation of cultural heritage sites. European studies using travel cost methods are rare. The only exception is the work of Bedate *et al.* (2004), which uses the travel cost method to estimate the demand curve for a historic village, a museum in the provincial capital, and a historic cathedral in the Castilla y León region of Spain. Travel cost is more widely used in North America (i.e. Martin 1994, Poor and Smith 2004), where the technique originated, although a recent study from Armenia (Alberini and Longo 2006) suggests the application of the method is becoming more widespread.

Castilla y León

The study by Bedate *et al.* (2004), uses a zonal travel cost model to estimate the demand curve for a historic village (Uruena), a museum in the provincial capital (Museum of Burgos), and a historic cathedral (Cathedral of Palencia) in the Castilla y León region in northern Spain³.

A zonal travel cost model was constructed, with zones based upon bordering regions, regions not bordering in central Spain, peripheral regions in Spain, and regions

³ A cultural music festival was also valued.

outside of the Iberian peninsular. Surveys conducted mainly in the summer of 1998 were face-to-face interviews with tourists.

The research attempted to provide an estimate of the consumer surplus (use value) obtained from visits to the heritage sites. The study used transport costs (entry charges were considered to be zero), but not other expenses incurred during the journey. Using this data visits per capita were extrapolated for each zone, allowing the creation of a demand curve.

The walled town of Uruena revealed a total consumer surplus of €272.26 based on 130 valid responses, the Cathedral of Palencia had a total consumer surplus of €712.20 (based on 190 valid responses) and the total consumer surplus for the Museum of Burgos was €1171.97 (based on 294 responses). The researchers note that the longer the distance traveled the lower the number of visits. In the cases where this was not true the state of the road and transport network provides a credible explanation for the results.

Application to valuing ICT at cultural heritage sites

The travel cost methodology has not yet been widely applied to cultural heritage sites, although there does appear to be a recent renewed interest in its use. As with the hedonic pricing method, it seems unlikely that the technique has the flexibility to determine the impact of ICT at cultural heritage sites. However, it is conceivable that in some cases travel cost could be used to determine the value of a specific IT-oriented exhibition or event.

2.2 Hedonic Price Method

The hedonic price method continues to be the most underused of the non-market valuation methodologies in the European context. As with the Travel Cost Method this is a revealed preference methodology, but this technique uses the increase, or decrease, in property values of buildings around a heritage site as the surrogate value. Hedonic pricing has been used even less frequently as an evaluation technique (Clark and Herrin 1997, Deodhar 2004).

The hedonic pricing method has been used in the field of environmental economics to provide an estimate of the value of environmental amenities and urban goods that affect prices of marketed goods. Hedonic price analysis was first used by Andrew Court in 1939, although the technique gained widespread popularity with the work of Zvi Griliches in the early 1960s (Goodman 1998). Although the technique is not widely used to determine values for cultural heritage sites, it has been applied to cultural heritage in both the United States and Australia.

House prices are the most common vehicle for estimating the value of environmental amenities, although other vehicles such as wages can be used (e.g. Smith 1983). Hedonic valuations assume that individuals place a value on the characteristics of a good, rather than the good itself. In this way the price will be a surrogate for the value of a set of characteristics, including cultural heritage characteristics that people consider important when purchasing the good.

The rationale of hedonic property price analysis is that property prices are determined not only by the characteristics of the property, but by the environmental attributes of the locality such as the neighbourhood and community, and other local environmental characteristics. In this scenario, if the factors not related to cultural heritage are controlled for, then the remaining price differences can be ascribed to differences in

the quality and value cultural heritage. The higher price will be a reflection of the perceived value of cultural heritage to people who buy houses in the area.

Application to valuing ICT at cultural heritage sites

Although the hedonic pricing method has been applied to a limited number of cultural heritage sites, it seems unlikely that the technique could be used to determine the impact of ICT at such sites. The method is limited by its relationship to the property, or similar markets.

3 Stated preference methods

There are a number of issues with the application of revealed preference methodologies to cultural heritage assets (Bennett 2000):

- Revealed preference techniques are retrospective. They rely on future changes being extensions of the past and therefore do not work well if the future scenarios are significantly different to the past.
- Marketed goods may not always neatly relate to cultural heritage (i.e. existence benefits). It is unlikely that these benefits will be adequately determined using revealed preference techniques.

These kinds of limitations have led to the development of stated preference techniques. These methodologies can be applied to a wide range of circumstances where no marketed goods exist. However, the techniques and methodologies for measurement are not equally well developed in the different areas. Traditional economic analysis has a long history, but the measurement of indirect user benefits and societal benefits are less well developed.

Stated preference methodologies comprise two principal types of technique. Contingent valuation and the contingent choice family of techniques. Contingent valuation is by far the most commonly used method for site evaluation.

3.1 Contingent valuation

The contingent valuation method (CVM) is a non-market valuation technique based on stated preference, which tries to extract an estimation of the 'willingness to pay' for a good or service from users and non-users. Contingent valuation is the only accepted way of determining a financial value for non-use values in cultural heritage. These 'passive use' values that do not involve a market and may not even involve direct participation are extremely difficult to quantify otherwise. They include amongst others option, existence, and bequest benefits. In the current climate of diminishing funds for the cultural heritage sector, there is increasing urgency in assigning a financial value to non-use and passive use at cultural heritage sites. Individuals are obviously willing to pay for non-use, or passive use, but traditional economic analyses tend to treat these benefits as zero. Since people do not reveal their willingness to pay for them through their purchases or by their behaviour, the only option for estimating a value is by asking them questions.

The contingent valuation method was first proposed in 1947 and applied in a Harvard Ph.D. dissertation on the economic value of recreation in woodlands in Maine. Numerous applications of the method to various public goods and studies of its methodological properties were conducted in the 1970s and 1980s. These studies are mainly from the environmental arena but also cover the fields of transport, health, education, and the arts, and have been conducted across the globe.

The contingent valuation method requires respondents to provide values based on hypothetical scenarios. Contingent valuations' reliance on what respondents say they will do, rather than their actions, is paradoxically one of the method's greatest attributes, and its most controversial feature.

As Noonan (2003: 172) states the non-market nature of many cultural resources makes the use of methods like contingent valuation a "regrettable necessity". Although the method has many advantages and disadvantages it does hold "the promise of improving our knowledge of cultural resources' role in society"

The earliest application of non-market analysis in the 'cultural' field was the contingent valuation study undertaken in Australia to determine the value of support for the Australian arts, using increased taxes as a payment vehicle. The success of this early study was an impetus to the use of contingent valuation techniques in the cultural arena. The technique was used increasingly for other cultural valuation studies throughout the 1980s, including a referendum on a Swiss municipal theatre, the value of performing arts and culture in Ontario, cultural attractions in Britain, and the purchase of two Picasso paintings by a Swiss city (Noonan 2002).

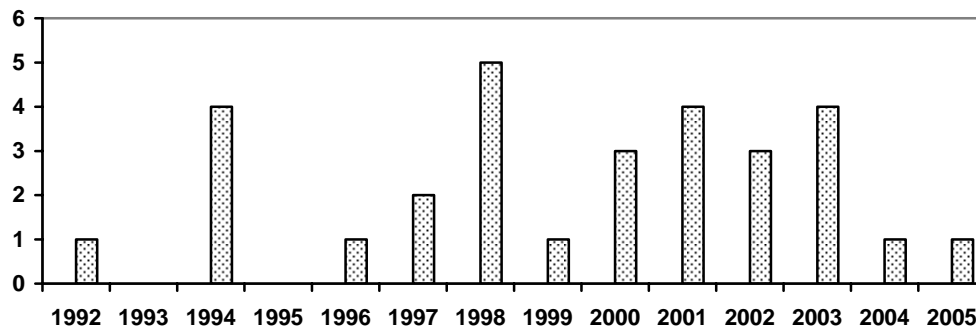


Figure 1: The publication of stated preference surveys conducted on cultural heritage sites in Europe

However, it was not until the early 1990s that non-market analyses began to be applied to cultural heritage sites⁴. The earliest published study was a contingent valuation survey undertaken at Nidaros Cathedral, Norway (Navrud 1992, and Navrud and Strand 2002). This was followed by a blossoming of site valuations in 1994, including a valuation of the damage caused by air pollution at Durham Cathedral, UK (Willis 1994), the value of maintaining 16 historic buildings in Neuchatel, Switzerland (Grosclaude and Soguel 1994), and a valuation of three historic sites in Italy.

1996 saw studies of the renovation of buildings in Grainger Town, Newcastle, UK (Garrod *et al.* 1996), and the WTP to gain entry to Warkworth Castle, UK (Powe and Willis 1996). It also saw the first publication of what was to become an extensive and sophisticated series of reports on the Royal Theatre in Copenhagen (1996).

The first valuation of an archaeological site was conducted in 1997, with the study of the archaeological complex at Campi Flegrei in Naples, Italy (Riganti 1997). The

⁴ This review refers to published studies only. A number of additional studies are contained in unpublished papers and Ph.D. dissertations.

nineties closed with an evaluation of alternative road options for Stonehenge, UK (Mourato and Maddison 1999, Maddison and Mourato 2002).

Recently, contingent valuation has been used to determine WTP values for cleaning Lincoln Cathedral, UK (Pollicino and Maddison 2001), and retaining cultural services at various Italian museums (Bravi *et al.* 2002). The value of Italian heritage assets was assessed at Napoli Musei Aperti, Naples, Italy (Santagata and Signorello 2000, 2002), the baroque city of Noto, the Bosco di Capodimonte, and museum services in the Galleria Borghese museum, in Rome. Museums and archives have also been intensively studied, including the Surrey History Centre, UK (Özdemiroğlu and Mourato 2002), congestion at the British Museum (Maddison and Foster 2001), and the National Museum of sculpture in Valladolid, Spain (Sanz *et al.* 2003).

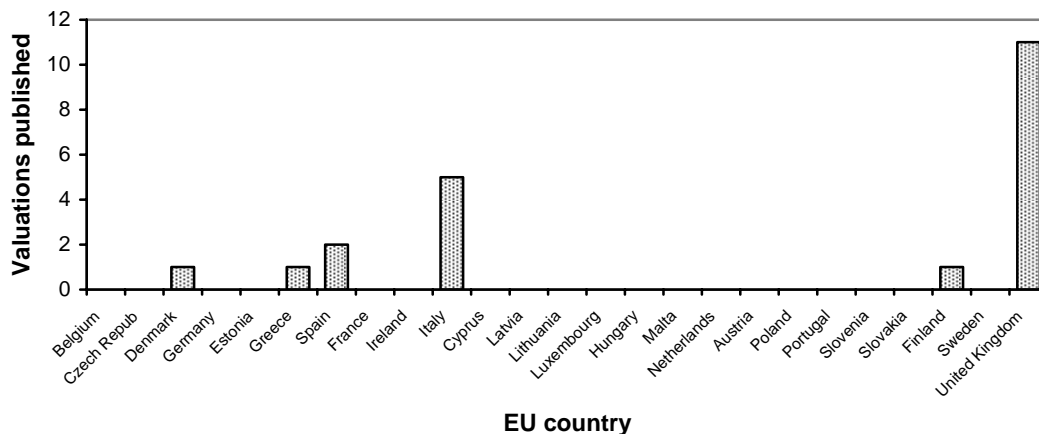


Figure 2: The distribution of non-market valuation studies that have been conducted across the EU⁵

It is apparent that the application of non-market valuation studies of heritage sites is not evenly distributed across Europe. By far the greatest proportion of such studies has been conducted in the UK where the methods are officially recognised by the government, followed closely by Italy. With the exception of Denmark, Greece, and Finland, in the EU and Switzerland and Norway most European countries have not published non-market valuations for their heritage assets.

It is apparent that most types of cultural heritage asset have been valued using stated preference non-market valuation methods. These include:

Cathedrals

Some of the earliest applications of contingent valuation in the cultural heritage sector were carried out at cathedrals.

Nidaros Cathedral (Norway)

The first evaluation of a cultural heritage site using the contingent valuation method took place at Nidaros Cathedral, Trondheim, Norway (Navrud 1992, and Navrud and Strand 2002). Nidaros Cathedral is the oldest surviving medieval building in

⁵ The number of valuations in the graph relates to the number of published articles rather than the number of actual valuations of individual heritage sites.

Scandinavia, which is built over the grave of St. Olav, the patron saint of Norway, and holds the Norwegian crown jewels. Navrud (1992) used contingent valuation to estimate visitor's WTP values for reducing the deterioration of the building caused by air pollution. This was achieved using two different lines of questioning:

Individuals were asked exactly how much they would be willing to pay to reduce air pollution. As this was the cause of the degradation of the cathedral this method would solve the issue at its root. Individuals were also asked how much they would be willing to pay to restore the damage caused by air pollution to the cathedral.

Face-to-face interviews were conducted with individuals outside the cathedral between June and August 1991. An open-ended question format was used, and the payment vehicle was a one-off payment.

It was found that respondent's willingness to pay for the reduction of air pollution required to preserve the cathedral was 318 NOK, but the WTP for the repair of pollution damage to the cathedral was 278 NOK. It was noted that 65% of the respondents felt that the original structure of the cathedral had a greater meaning to them than a restored structure.

In order to test for whole-part bias, the study compared the WTP for reducing damage to all Norwegian cultural heritage sites with the willingness to pay for reduced damages to Nidaros Cathedral.

Using the cathedral's 165,000 visitors in 1991 as a base, the aggregated benefits of these results were calculated. Applying the mean WTP values provided estimations for visitors of 52.5 million NOK for preservation and 48.9 million NOK for restoration and repair. Approximately, 41,000 foreigners visited the cathedral in 1991, providing an average WTP attributed to foreigners of 238 NOK and 174 NOK respectively. The value of preserving and restoring the cathedral was 10 million and 7 million NOK (Navrud and Strand 2002: 38-9).

It has been suggested by Pollicino and Maddison (1999: 4) that because the study samples only the views of the cathedral's visitors rather than all Norwegians, it represents an underestimate of the willingness to pay. They also note it is unclear if the respondents were valuing other benefits deriving from the reduction of air pollution in addition to the decrease in damage to the Cathedral.

Durham Cathedral (UK)

This study by Willis (1994) was used to determine WTP for access to Durham Cathedral in the UK. The survey was undertaken ascertain if visitors could be charged an entrance fee in order to obtain revenue for building restoration. The analysis was used to determine what the change in visitor numbers would be at different price levels. The survey was also used to find out about visitor motivations (for example, 71% of those surveyed were engaged in sightseeing). At the time of the survey, Durham Cathedral had free access, although donation boxes with a picture of a one pound coin were located near all entrances and exits. Ninety-two visitors were questioned when leaving the cathedral. The individuals were asked if they had already given a donation voluntarily. It was found that 51% of respondents had made no contribution, and only 12% had contributed more than the suggested amount of a pound.

A payment-card format was used to determine the WTP for access to the cathedral. When asked for a maximum WTP, 31% suggested that they would give more than the

suggested donation. Furthermore, 49% said that they were willing to pay over £0.76. The optimum access fee calculated by Willis was £0.875. It was therefore evident that the maximum annual revenue that could be achieved from entrance fees was slightly lower than the revenue then obtained from annual donations. The reason that an entry charge would not raise significantly more than the donations was because many of the visitors who contributed less than the entrance charge would either cease to visit or visit less frequently. It should be noted that in this context, the benefit most visitors to the cathedral gain exceeds the revenue from donations. Therefore, a consumer surplus accrues to most visitors.

Lincoln Cathedral (UK)

This contingent valuation study by Pollicino and Maddison (2001, 2002) was used to determine a WTP valuation for a masonry cleaning program at Lincoln Cathedral. Air pollution had caused much soiling on the cathedral's stonework. The mechanism used was a hypothetical increase in the cleaning cycle from 40 years to 10 years, and the payment vehicle was a rise in annual household tax. Face-to-face interviews were conducted with 328 Lincolnshire residents. The survey instrument was designed to comply with the NOAA recommendations for contingent valuation design and use.

Photographs were presented to respondents to show the cathedral as it could look with 15 years of accumulated grime and pollution on the façade and after the stonework had been cleaned. Respondents were therefore valuing the change of appearance that followed the cleaning cycle.

A double-bounded dichotomous-choice method was used and found evidence of a starting point bias. The research concluded that respondents living in the region of Lincoln did place a high value on the preservation of the cathedral's appearance and supported a higher WTP for the increased cleaning cycle. Households in Lincoln had a mean WTP of £49.77 and an aggregate WTP of £1.8 million. Households outside of the city had a mean WTP of £26.77 and an aggregate of £5.5 million. The geographical extent of the WTP was estimated to extend to 40-53 miles from the cathedral.

Historic areas and buildings

Historic buildings, groups of buildings and localities have been widely studied using the contingent valuation technique.

Historic buildings in Neuchatel (Switzerland)

This research by Grosclaude and Soguel (1994) attempts to determine the WTP for restoration of damage, caused by traffic pollution, to historic buildings in Neuchatel, Switzerland. Sixteen buildings were included in the survey. Two hundred residents were surveyed. Those interviewed were told that the local authority could no longer afford to undertake all the restoration and maintenance required and so the residents would be required to contribute to a fund for the maintenance work. Each was shown photographs of the 16 buildings in order to ascertain which buildings respondents wanted restored. The survey used an open-ended question format to determine residents' WTP as an annual sum to maintain the buildings. A number of individuals could not provide a precise WTP and so iterative bidding was instigated by the interviewer. A multiple regression analysis using a Box-Cox transformation was used to identify the variables that affected individuals' willingness to pay. The mean WTP for the sample was 14.3 Swiss Francs and the median WTP was 5.0 Swiss Francs. Twenty-two individuals were unconcerned about the protection of the buildings. If

these individuals were removed from the analysis the values for mean and median WTP increase to 16.0 and 7.5.

The authors estimated annual WTP for six buildings was 108 Swiss francs per household. The external aggregated cost for the whole town was SFr. 1.5 million or SFr. 250,000 per building.

Grainger Town, Newcastle (UK)

This study by Garrod *et al.* (1996) determined whether a sample of 202 taxpayers in Newcastle were willing to pay increased taxes for the restoration of historic buildings in Newcastle's Grainger Town. Those interviewed were presented with an open-ended WTP question. The study found a median WTP of £10.00. The bid values were seen as a function of use, demographic, and other variables. Respondents were also asked to allocate financial resources to different areas of Grainger Town. It was found that precedence was given to parts of Grainger Town that had the highest levels of dereliction (Garrod and Willis 2002).

Napoli Musei Aperti (Italy)

This contingent valuation survey by Santagata and Signorello (2000, 2002) was used to determine WTP values for a group of historic and cultural monuments, the Napoli Musei Aperti (NMA), in central Naples. 468 residents of Naples were questioned for the survey. Individuals were asked if they would contribute voluntarily to a non-profit organisation running the NMA heritage sites rather than relying solely on government support.

The survey was also used to obtain an estimate of individuals' annual expenditure on cultural goods and services. Respondents were reminded of this figure before being asked a dichotomous-choice WTP bid. An open-ended question was then asked in order to elicit WTP. This form of questioning identified an anchoring bias.

The study estimated mean WTP values of 17,000 lire derived from the open-ended questions and 30000 lire from and dichotomous-choice questions. The average user WTP was 24,000 lire, compared to 8,000 lire for non-users. This was despite the city spending only 4800 lire per capita on the NMA. Various funding mechanisms were considered in light of these results.

Warkworth Castle (UK)

This study by Powe and Willis (1996) was used to determine visitor's WTP to enter Warkworth Castle, Northumbria. In this research 201 individuals were surveyed on leaving the castle. At the time of the survey the entrance fee for adults was £1.80, pensioners £1.35 and members of English Heritage gained free admission. The mean WTP for all visitors was £2.53, and the median £2.34. Of the sample groups, paying visitors had a WTP of £2.62, pensioners £2.55, and surprisingly English Heritage members £2.30.

When questioned further, over 90% of the respondents stated that they expected that some percentage of their entrance fee was used for preservation of the castle. In these circumstances, the visitor's mean WTP for entrance if the fee was not to be used for preservation of the site dropped to £1.62 and the median WTP to £1.50. The visitors were asked for their WTP if the funds were used exclusively for preservation of the fabric of the castle, assuming that they had already paid their stated WTP for entrance to the castle. The mean WTP for preservation was £0.50. It was concluded that visitors to Warkworth Castle have a mean WTP for preservation of £1.41 and a

median of £1.84 (Garrod and Willis 2002). The total benefits provided to visitors at Warkworth Castle were estimated to be more than 2.5 times the revenue gained from the entry fees. The authors suggest that if “funding for heritage sites were to be purely determined by financial revenue, generated from entrance charges, then this would lead to less preservation of heritage than would be optimal or best for society.” (Garrod and Willis 2002: 274)

The historic town centre of Noto (Italy)

This study by Signorello and Cuccia (2002) considers the preservation of the historic centre of the town of Noto in southern Sicily. Before being superseded by Syracuse in 1817 Noto was a provincial capital. This historic town centre is built in the Baroque style after a devastating earthquake in 1693. Noto in conjunction with seven other towns in the region comprise a UNESCO World Heritage Site.

The authors used a contingent valuation survey using both double-bounded dichotomous choice and open-ended question formats. The questionnaire was applied using face-to-face interviews with tourists. The scenario used was the respondents' WTP for a potential entrance fee for tourists to the historic quarter of Noto. The fee would be devoted to the conservation and maintenance of the historic buildings.

The authors identified protest bids using a question which asked for reasons for a zero response to the open-ended willingness to pay question. It was found that protest bids accounted for 16% of the sample. The principal reasons for protest bids was that some thought an entry fee to the historic centre was unfair, and some considered that the Local Authority should pay.

Mean WTP for all the tourists sampled was 11,500 ITL. A demand curve was constructed from the WTP data and a revenue maximising entrance fee was estimated to be 10,000 ITL. Both Italian and foreign tourists provided the same mean WTP which indicates that the respondents were valuing the access to the good rather than any non-use value connected with the maintenance or restoration work, which would be expected to be higher amongst Italians.

The Bosco di Capodimonte (Italy)

This study by Willis (2002) considers the Bosco di Capodimonte north of Naples in Italy. The research attempted to establish a revenue maximising entry fee for admission to the Bosco park, which at the time of study had free entry. However, the maintenance and conservation costs of the park led the managing body to consider options for charging an entry fee.

The Bosco park comprises 143 hectares of woodland bordering the Capodimonte Palace and gardens. These were built in the mid-eighteenth century as a royal hunting ground by Charles III, King of Naples. The Bosco contains a number of historic buildings, including the Royal China factory which made Capodimonte porcelain, the Royal Shooting Lodge, the Royal Stables, the Hermitage, and the church of St. Gennaro. The parkland consists of three principal types, formal avenues of trees, irregular areas with trees separated by open space, and 10 hectares of lawns with an eighteenth century irrigation system. Willis notes that the Bosco is both a cultural good (a park with both historical buildings and landscapes) and an environmental good. The park can be used as an environmental good independently of its cultural heritage nature.

A contingent valuation survey (based on iterative bidding) was conducted during the summer of 1999, during which time 494 questionnaires completed. The respondents were presented with one of three iterative bidding cards with prices which ranged from 1,500-4,000 lira on Card 1, 2,000-8,000 lira on Card 2, and 4,000-16,000 lira on Card 3. The iterative bidding question format permits a demand curve to be created using the bid amount and the proportion of respondents willing to accept that bid amount. This would be the basis for establishing the revenue maximising entry price.

A demand curve was estimated from the sample data from which a mean revenue maximising price of 5,131 lira per visit was estimated. If everyone were to pay this amount for entry the gross revenue would be 534.8 million lira per annum. However, the number of visits would decrease from 283,313 to 104,225 per annum.

Archaeological sites

Archaeological sites have been poorly represented in non-market valuations in the cultural heritage sector. Two principal studies have been undertaken:

Stonehenge (UK)

Stonehenge is managed by English Heritage and is a UNESCO World Heritage Site. Constructed during the Neolithic and Bronze Ages (between 5,000 and 3,500 years ago) Stonehenge is a circular henge monument (bank and ditch) containing the stone circle. It is located in a well-preserved remnant prehistoric landscape containing 450 archaeological sites, mainly burial mounds, on Salisbury Plain, Wiltshire. However, two roads (the A303 and A344) pass very close to Stonehenge, causing noise pollution to the visitors, and breaking up access to the prehistoric landscape complex.

This survey by Maddison and Mourato (2002, and Mourato and Maddison 1999, Maddison and Mourato 2001) was used to determine if UK residents preferred the current road layout near Stonehenge or a tunnel option that would route the roads out of site from the monument. In total 129 UK visitors to the site and 228 UK households were surveyed to determine WTP values for the alternative road options. Those surveyed were shown photographs of the current road and a representation of what the new tunnel would look like. After the respondent stated a preference regarding the alternatives they were asked for a WTP value using a payment ladder format for a two-year tax increase to support their road preference.

The mean WTP per household for the tunnel option was £12.80 and £4.80 for retaining the current road layout (giving rise to an aggregate value of £265 million for the tunnel and £116 million for the current road). There was a fairly even split between respondents on which option they would prefer (144 preferred a tunnel and 126 wanted to retain the current road layout). Using the median WTP approach, the authors found the aggregate benefit of the tunnel to be essentially zero. Despite this result the UK government is planning to build a 2km tunnel to route traffic past the Stonehenge environs.

Campi Flegrei archaeological park (Italy)

This study by Riganti (1997) and later Riganti and Willis (2002) looks at the Campi Flegrei Archaeological Park in the city of Naples. The archaeological park is on the site of the first-century-AD summer residence of the Roman emperors, and contains extensive examples of Imperial Roman remains. The authors attempted to determine the maximum monthly amount that individuals were willing to pay to preserve the

heritage site. The payment vehicle chosen was a monthly payment to an independent conservation body.

Two sets of interviews were conducted. 448 interviews were conducted in March 1995 with visitors to the site and residents of Naples (Riganti 1997), while a second survey was conducted in July 1997 which collected 497 interviews. In 1997, a double-bounded question survey format was used to retest the single-bounded format used in the 1995 survey. The samples were split into two equally-sized groups, where one group was given more background information.

The survey elicited five different WTP responses for the following scenarios: conserving the entire area of Campi Flegrei allowing the restrictions on urban development to continue; conservation of parts of Campi Flegrei that were not yet publicly available; conserving Campi Flegrei for use by future generations, conserving the Bagnoli area only; and conserving the Bagnoli area for use by future generations.

The aim of the papers is to study the methodological issues associated with nested values associated with respondents' total value for conserving the area. When different tests were used to test the internal consistency, the results suggested that the respondents did not recognize the different scopes involved with the scenarios, but greater information did help them understand the goods being studied. The average WTP per household was 420,000 lira per annum.

Theatres

Theatres have been widely studied using non-market valuations in the cultural sector. A few such sites can be considered historical entities such as the Royal Theatre, Copenhagen founded in 1748.

The Royal Theatre (Denmark)

A number of sophisticated econometric contingent valuation reports have been produced by Bille (1996, 1997, and 2002) regarding the aggregate WTP for the Royal Theatre, Copenhagen.

1,843 Danes were surveyed by telephone about their willingness to pay for the Royal Theatre in Copenhagen using tax as the payment vehicle. An open-ended WTP question was used in conjunction with a "too much, too little" question about government financial support for the Royal Theatre. Furthermore, in order to study the effect of information on WTP, a split sample was used to determine the effect on individual's WTP of being told what a Dane actually pays on average in tax for the Royal Theatre each year. The WTP difference between users and non-users of the Royal Theatre was also studied; it was found that theatre users were willing to pay at least three times as much as non-users.

The survey found that there was a mean WTP of 154 Danish Kroners (DKK). The median WTP was DKK 60. The median was found to be equal to the per capita tax expenditure on the Royal Theatre, regardless of the information that the individuals received. However, it was found that the provision of information to individuals led to an anchoring bias (45% of WTP responses equalled DKK 60). A sophisticated model is forwarded to explain the WTP, taking into account the selection issues resulting from theatre visitation (Bille 2002: 219-28).

Bille concludes that the Royal Theatre would be unable to exist if visitor income alone had to pay for operating costs. More interestingly, non-user WTP is the largest

part of the total WTP. In this way Bille argues that it is possible to economically justify the public grant received by the Royal Theatre using the taxpayer's (non-user) WTP as the basis. Billie (1996) notes that "This valuation method is far preferable to economic impact studies, which have often been used as an argument for public support of cultural activities. The Danish taxpayers value the Royal Theatre and are willing to pay the price."

Museums

Museums across Europe have been widely studied using non-market valuation techniques.

The National Museum of sculpture (Spain)

This research by Sanz *et al.* (2003) used two different contingent valuation surveys to estimate the economic value of the National Museum of Sculpture in Valladolid, Spain. One survey was used to determine the direct use value of the museum and was presented to visitors to the museum; and the other was used to try to capture the passive use value and was presented to potential users in the town of Valladolid.

Both surveys made use of a double-bounded dichotomous choice format for the valuation question, followed by an open-ended question. The payment vehicle was a contribution to a special fund for preservation and running of the museum. The contingent valuation survey for estimating use value was a self-completing survey, so that visitors themselves were the ones who filled it in when they decided to collaborate. 1,147 surveys were conducted, of which 1,108 were considered valid. The passive use value of the museum was estimated using a telephone survey of the people of Valladolid. 1,014 usable surveys were obtained.

The mean WTP of direct users of the museum ranged between €25 and €30 using a conservative scenario, and between €33 and €40 using a more optimistic scenario; the value assigned by potential users of the museum (passive use values) was approximately €27 and €36 for each of these scenarios. It also showed that there was a degree of acceptance of the payment vehicle chosen. Importantly, it was found that when parametric, non-parametric and semi-parametric valuation methods were compared in a single study (using the double-bounded dichotomous choice survey), there was no statistically-significant variation in the demand function for the analysed cultural good and its expected WTP, no matter what approach was used.

The Museum of Central Finland

This study by Tohmo (2004) aimed to determine the WTP for the Museum of Central Finland in Jyväskylä. The research also looked at the factors that could affect the resident's willingness to pay for the museum. A contingent valuation questionnaire was sent by post to a random sample of 800 Jyväskylä residents aged 18 and over in November and December 1997.

The individual willingness to pay varied from zero to 1000 Finnish Markkas (FIM). The average WTP to retain the museum was FIM 103 (with a median of FIM 50). Almost 30% of the respondents provided a zero bid for their WTP for the Museum of Central Finland. It was hypothesised that this was a function of the fact that 46% of the respondents had never visited the Museum, and these non-users would tend to feel that they gained no benefit from the site. In fact, the author suggests that based on this percentage of non-users, the proportion of zero bids could have been expected to be even higher.

Unsurprisingly, the average WTP of non-users was only FIM 56 (median FIM 5). For non-users the average WTP was FIM 56. Although a large percentage of the respondents had not visited the museum very often, they did report some willingness to pay for its continued existence and for the possibility of making a future visit. The author argues that this non-use value of the museum can be used to further legitimize public support.

It was found that for each citizen (in 1996) FIM 78 in tax revenue was transferred to the Museum of Central Finland. It is apparent that the residents actually contribute less in taxes to the upkeep of the museum than they report that they are willing to pay to keep the Museum open (FIM 103). The resident's willingness to pay is used to legitimise the upkeep of the museum, suggesting that at the very least the present amount of tax revenue can be directed towards the support of the museum.

Bolton Museum (UK)

Following the success of the contingent valuation of the British Library in 2003 (see below) Bolton Metropolitan Borough Council (BMBC) and the MLA (Museums, Libraries and Archive Council) commissioned a valuation of Bolton's three museums, 15 libraries and central archive. At the time of the survey the museum, art gallery and aquarium had 249,179 visits per annum.

The survey used WTP and WTA questions to ascertain value. Face-to-face questionnaires were conducted in 2005 with Bolton residents providing 325 usable surveys. The WTP question elicited a monthly mean value of £2.77 for users and £1.14 for non users, this compares to £1.16 which is contributed in tax each month per council tax payer.

The WTA question was only asked to users of the museum and provided revealed a valuation of £2,584,000. Interestingly WTA usually provides a higher value compared to WTP, the decision to exclude non-users gave a lower value than the WTP for the museum service. However, the WTA figures for the Libraries gave a total figure for Bolton of £6,431,000 compared to a WTP of 4,500,000 and the archive was valued at £889,000 compared to £250,000.

The cost of providing the museum service in Bolton was £1,800,000. The contingent valuation survey found that the total mean WTP value of users was £2,753,000 while with non-users it was £1,713,000, providing a total value of £4,466,000. This resulted in a cost benefit ration of 2.48:1.

Overall the survey found that the cost of providing the museums, libraries and archives for Bolton was £6,550,000 while the total mean user value was £7,391,000 and the non-user value was £2,954,000. The total value placed on the services by users and non-users was therefore £10,345,000. The cost benefit ratio for all three services was therefore 1.6:1 (BMRC and MLA 2005).

Archives

Interest in archives has been a relatively recent phenomenon. The only non-market valuation that has been conducted is the pilot case study at the Surrey History Centre (UK).

Surrey History Centre (UK)

This research by Özdemiroğlu and Mourato (2001) studied the Surrey History Centre, a local authority archive in Woking, UK. The History Service collects and preserves

archives and printed material of relevance to the history of Surrey, and makes them available for reference. The archives include county and government records, newspapers, magazines, journals, books, manuscripts, prints, drawings, letters, sound archives, oral histories, music collections, photographic collections, film, microfilm, maps, and collections in electronic format.

A pilot study of sixty interviews was conducted with 'users' and 'non-users' of the site in May 2000. Thirty-eight interviews were conducted with 'users' of the centre, and 22 interviews were conducted with 'non-users' who had never visited the centre in the local town of Woking. The intention was to determine if use and non-use values could be determined for the recorded heritage conserved at the Surrey History Centre. The authors stress that this was a pilot study with a correspondingly small sample size (60), and that a properly-conducted contingent valuation study would require between 500-1000 interviews rather than 60. As a consequence these values should not be considered as final results.

Two valuation scenarios were studied: the WTP to prevent the closure and dispersal of the collections and WTP to prevent the closure of the site to users but the retention of the collections. A payment ladder format was used to elicit WTP. In line with NOAA recommendations of best practice respondents were also reminded of their budget constraints. Respondents who were not willing to pay for the preservation scenarios were questioned as to their reasons.

It was found that no respondents felt that they did not benefit from the recorded heritage, while the majority indicated that they 'strongly' or 'almost strongly' benefit. The authors found that in order to prevent the closure of Surrey History Centre and the loss of its collection users were willing to pay on average £34 per annum, and in order to prevent the closure of access £24 per person per annum. On average 'non users' were willing to pay £13 per annum, for both scenarios (Özdemiroğlu and Mourato 2001: Table 11). The median of was approximately £20 for 'users' and £10 for 'non-users', because the median was lower than the mean, this was seen as an indicating that the responses are skewed towards the lower end of the willingness to pay distribution.

The authors concluded that recorded heritage is a complex good that provides multiple benefits. People are willing to pay significant amounts to preserve the recorded heritage; and, access to recorded heritage assets (or the information contained within) is crucial. The preservation of recorded heritage assets for future generations (bequest value) seems to be the dominant benefit; the WTP for access (use value) exceeds willingness to pay for preservation (existence value).

Bolton central archive (UK)

A contingent valuation survey was conducted as part of the wider economic valuation of the Bolton museums, libraries and archives service commissioned by Bolton Metropolitan Borough Council (BMBC) and the MLA (see above). Bolton's central archive had 9,293 visits per annum at the time of the survey. The cost of providing the Central archive service in Bolton was £250,000.

The contingent valuation survey found that the total mean WTP value of users was £204,000 while with non-users it was £76,000, providing a total value of £280,000. The cost benefit ratio of the service was therefore 1.12:1.

Overall the survey found that the cost of providing the museums, libraries and archives for Bolton was £6,550,000 while the total mean user value was £7,391,000

and the non-user value was £2,954,000. The total value placed on the services by users and non-users was therefore £10,345,000. The cost benefit ratio for all three services was therefore 1.6:1 (BMRC and MLA 2005).

Libraries

Although libraries technically fall outside of the definition of pure cultural heritage sites, some institutions can make a case for inclusion. One such example is the British Library, London, which contains books and manuscripts dating back to the ninth century.

The British Library (UK)

This study by Pung *et al.* (2004) uses contingent valuation to measure the economic impact of the British Library, London on the UK economy. The research was undertaken between August and October 2003. Three principal attributes of the library were valued. These were:

- The reading room services
- The document supply services, and
- Public exhibitions.

Recent digital and Web initiatives were not evaluated so as not to bias the results, and non-UK library users were excluded from the survey.

In total 2,359 individuals were interviewed for the study including, 229 reading room users, 100 remote users, in addition to 2,030 members of the general public who did not make use of British Library services.

The author's found that the questions attempting to determine 'willingness to pay' gave lower value estimates compared to questions attempting to determine 'willingness to accept'. This is a function of the fact that willingness to pay estimates are constrained by respondent's disposable income.

For non-users general public a random sample of the population of all regions of the UK was conducted. 84% of respondents felt that the British Library had value for society as a whole. Individuals were willing to pay on average £6.30 in taxes, which is double the current average contribution of approximately £3.00. The willingness to pay was found to be strongly linked to income and region with the southeast having the highest WTP, although all regions were willing to pay more on average than they currently pay through taxes (Pung *et al.* 2004: 88).

Overall the study revealed that the British Library generates £363 million worth of value per annum, both in direct value to the library's users (£59 million) and the indirect value to society (£304 million). This is 4.4 times the annual government funding of £83 million. This study is the first example of the use of contingent valuation to provide a figure for the total economic value of a major national research library.

Application to valuing ICT at cultural heritage sites

Stated preference methodologies such as contingent valuation have been widely applied to the cultural heritage sector. Although contingent valuation is not without its limitations, if applied properly it could be used to determine willingness to pay for some customer-facing IT applications at cultural heritage sites. No such studies have been undertaken so far.

Contingent choice

Contingent choice modelling was originally developed for marketing research and transport to measure preferences for different characteristics or attributes of a multi-attribute choice (Bateman *et al.* 2002). Choice modelling is similar to contingent valuation, in that it can be used to estimate both economic and non-use values for cultural heritage sites. Like contingent valuation, it is a hypothetical method, which requires individuals to make choices based on a hypothetical scenario. Unlike contingent valuation, it does not directly ask respondents to state their values in financial terms, rather the respondents are asked which scenario they prefer. Values are inferred from the hypothetical choices that the respondents make. Choice modelling comprises a family of techniques including choice experiments, contingent ranking, contingent rating and paired comparisons.

Contingent choice is particularly valuable for the evaluation of the outcomes of several policy options, where non-use values are important. Contingent choice can be used to rank options as well as estimate financial values.

The British Museum (UK)

This study by Maddison and Foster (2003) reports on work conducted to value the reduction of congestion at the British Museum. The British Museum in London is a heavily visited national attraction with 5.4 million visitors recorded in 1999. This level of visitation can affect the quality of the experience that is provided because of queuing, noise, and inability to view the exhibits. The research attempted to determine a value for the congestion costs imposed by visitors to the British Museum on other visitors. A number of potential solutions are forwarded to try to solve the issue of congestion. The possibility of charging was forwarded, and so was putting more artefacts on display. Interestingly, however, so was the use of an Internet-based virtual tour of the museum. The authors considered that this would not eliminate congestion, because a virtual tour would not provide the same levels of satisfaction as an actual visit to the site. There was also a concern that the cost of technology might outweigh the benefits of reduced congestion.

A choice experiment was conducted on 400 visitors to the museum in August 2000. The visitors were shown photographs of three exhibits at their most crowded, and photos of the same exhibits when less crowded. The survey implied that the crowded photos were associated with free admission, and the less-crowded photos with an admission charge (these were randomly chosen at £3, £6, £12, and £20). The respondents then indicated a preferred option.

The authors suggest that there is an estimated congestion cost of £5.99 imposed by the marginal visitor (i.e. the individual's assessment of the congestion cost imposed by an additional visitor was estimated to be 0.04 pence, this was then multiplied by the number of visitors to obtain the aggregate congestion cost imposed by the marginal visitor on all other visitors). The marginal congestion cost does not, however, relate to the optimal charge, because if a charge were imposed, then the visitor numbers would fall and the congestion externality would change. The authors consider that the methodology used could be applied to other sites struggling with issues of mass visitation.

St. Anne's Cathedral Square, Belfast (UK)

This study by Alberini, *et al.* (2003) focuses on St. Anne's Cathedral Square, in Belfast Northern Ireland. The square in the Cathedral Quarter is located in one of the

oldest areas of Belfast city. Much of the architecture dates to the nineteenth and early twentieth Century. The square is part of a conservation area and as such the height of buildings is not permitted to exceed six stories high.

The St Anne's Square historic area is showing signs of deterioration because of long-term neglect and a lack of investment. A choice experiment was conducted in which respondents were asked to choose between pairs of regeneration projects for St. Anne's Square or a hypothetical square that was computer generated and designed to be similar to St. Anne's in all details except for the historical and cultural aspects.

Four attributes were chosen for analysis: the building height, the comparative amount of open space and built space, the relative retail and residential usage, and the cost of the regeneration project. There were in total 72 alternative regeneration options. Of which respondents were presented with the choice of two alternatives, which were randomly selected at.

The valuation survey design is noteworthy for its omission of a *status quo* option in the choice sets, where the existing state of the square may be chosen by the respondents. Methodologically the researchers considered that the *status quo* for the hypothetical square would be poorly defined, suggesting that in order for a comparison St. Anne's must also be treated similarly. Furthermore, the analysis was not designed to estimate willingness to pay, but to assess how the preferences of respondents are influenced by the architectural and land use attributes of public spaces. Face-to-face interviews with 254 respondents were conducted in Belfast City centre in December 2001. A total of 244 usable responses were obtained.

The analysis suggested that respondents favoured regeneration projects for St. Anne's that involved more open space. While in the hypothetical square, the proportion of open space is found not to be statistically significant. The respondents also favoured projects which preserved the current six story height of buildings and increased the residential use of buildings. While in the hypothetical square, respondents' higher proportions of residential buildings were favoured less. In the hypothetical square the higher the cost of a project, the less likely respondents were to choose them. In contrast in St. Anne's Square the higher the cost of a regeneration project, the more likely it was to be favoured by respondents. The study found that the implicit marginal prices for the hypothetical square were as follows. A 50% increase in open space equated to £3.00, a single percent increase in retail space at expense of residential space equated to £0.40, and respondents WTP to avoid an increase in building height on the square was £7.20.

Galleria Borghes museum (Italy)

One of the first studies to measure the WTP associated with ICT (specifically multimedia services) at a cultural heritage site was conducted by Mazzanti (2003a, 2003b) at the Galleria Borghese museum, in Rome. The Galleria Borghese museum, located within the Villa Borghese Park in Rome, is considered by the author to be one of the most important of the state-owned cultural heritage sites in Italy. The site was refurbished between 1984 and 1997, and this research was the first major survey carried out since the restoration project.

The study was based on a survey carried out at the site in the summer of 2000, which collected 185 valid questionnaires (92% of the total conducted) after on-site interviews with visitors. The questionnaire was composed of three sections: the first looked at the subject of the study, the second contained a contingent valuation

questionnaire, and the final was a choice experiment followed by a request for socio-economic information.

The survey actually valued a variety of elements, of which multimedia services was one. The author used a choice experiment in which the various attributes of the site were broken down so that visitors could provide willingness to pay for various hypothetical changes in the attributes. The two contingent valuation studies (using a payment ladder format) were carried out in order familiarise visitors with monetary valuation and to get information on (monetary) values attached to the current offerings for visit length and site conservation.

The various services offered by the Galleria Borghese museum were described to users including:

- The entry fee
- The level of conservation activity at the site.

The visitors were asked to make choices about:

- Increasing the level of conservation and restoration
- Increasing visit hours
- The addition of multimedia services
- The addition of multimedia services, plus a temporary exhibition.

It was found that visitors expressed a preference for an increase in spending on conservation, for an increase in the level of multimedia services and a possible temporary additional exhibition complementary to the main one. The visitors questioned were, on average, not prepared to pay for increasing the time of the average two hour visit.

Using the figures from 2000 for paying visitors and from WTP values, the author calculated the increase in economic surplus, which could be derived from a supply increase (i.e. and additional temporary exhibition and multimedia services and a conservation earmarked fund). The contingent valuation experiment revealed that the gross economic surplus, which could theoretically be captured by introducing new services and conservation funds, ranged between 21-121% of the direct revenue raised by fee charges, and between 15-88% of the total yearly economic surplus.

Knossos Palace and the Heraklion Archaeological Museum (Crete)

This study conducted by Apostolakis and Jaffry (2005) used choice modelling to value visitors' preferences and their willingness to pay for hypothetical developments to Knossos Palace and the Heraklion Archaeological Museum in Crete. Six attributes were studied: advertising, congestion, promotion, eating and drinking facilities, and other attributes which included the "use of A/V material for the interpretation of the exhibits" as well as kindergarten facilities.

To study these, a choice experiment surveys was conducted for each site. Three hundred self-administered questionnaires were distributed for each site. The questionnaires were distributed randomly in hotels across Crete. The survey targeted visitors as well as non-visitors to the two heritage attractions. In total 253 usable responses were obtained, giving a response rate for the Heraklion Archaeological Museum of 42.7%, whereas the response rate for the Knossos Palace was 41.7% (Apostolakis and Jaffry 2005: 312).

Analysis of the results revealed that three factors of the hypothetical developments had a strong influence on potential visitation rates – congestion, kindergarten facilities and A/V interpretation. At both attractions tourists with young children felt that the provision of kindergarten facilities increase the probability of visitation. A 50% deterioration in congestion levels in both sites would reduce of tourists' satisfaction levels and lead to a potential reduction in visitation. Middle-aged tourists exhibited positive preferences for the provision of A/V interpretation at the Heraklion Archaeological Museum, but not Knossos Palace. As Apostolakis and Jaffry (2005: 315) note, "given that more than half of tourists in Crete (52%) fall in the 31-50 age category. This result suggests that the majority of tourists belonging in this age group who responded to the museum survey prefer the introduction of A/V material in the form of video and 3-dimensional representations of the museum and its exhibits."

The researchers translated tourists' preferences into monetary units using marginal willingness to pay estimates. From these it was found that tourists with children younger than 10 years old reported that they would be willing to pay €4 for the introduction of kindergarten facilities in the Knossos Palace and an extra € 4.7 at the Heraklion Archaeological Museum. At the Heraklion Archaeological Museum middle aged tourists were willing to pay €2.67 for the provision of better A/V interpretation facilities. These results make it clear that tourists are prepared to pay extra in order to find out more about heritage sites through better interpretation.

Application to valuing ICT at cultural heritage sites

It is becoming apparent that of the stated preference methodologies the contingent choice family of techniques could have a direct application to the study of ICT at cultural heritage sites. Contingent choice is being increasingly used for the study of cultural heritage assets including ICT at those sites. Although contingent choice has had less methodological study compared to contingent valuation it does seem to be a strong contender for the study of ICT.

Conclusions

The use of revealed preference non-market valuation techniques, such as the travel cost and hedonic pricing studies have had fewer applications in the field of cultural heritage, despite having widely-accepted economic principles. European studies using travel cost methods are rare. An exception is the work of Bedate *et al.* (2004), which uses the travel cost method to estimate the demand curve for a historic village, a museum in the provincial capital, and a historic cathedral in the Castilla y León region of Spain. Travel cost appears to be more widely used in North America (i.e. Martin 1994, Poor and Smith 2004). Hedonic pricing has been used even less frequently as an evaluation technique (Clark and Herrin 1997, Deodhar 2004).

The use of contingent valuation is now widely accepted as a non-market valuation technique in the cultural heritage sphere. The methodology is highly attractive because of its potential to capture both use and non-use values, and has been used across all domains of cultural heritage, from archaeological and historical sites to museums and archives. In contrast because choice experiments are the most recent innovation in valuation techniques they are still rare in their application to heritage sites. However, these techniques show the most promise for the evaluation of potential ICT installations at heritage sites.

Research by Maddison and Foster (2003) used a choice experiment at the British Museum (UK) to determine the WTP to reduce congestion in the museum. This was

followed by a study conducted at the Galleria Borghese Museum (Italy), which combined a contingent valuation survey with a choice experiment. This was used to determine the WTP for entry to the Galleria, and the provision of additional (multimedia) services, and exhibitions (Mazzanti 2003a, 2003b). This is the first attempt to value ICT at cultural heritage sites.

At the present we can conclude that the potential for benefit transfer (i.e. transfer of values derived from study sites to new policy cases) is limited because of, the comparatively low number of evaluations, and their orientation towards both site- and project specific values which would not transfer well.

Table 1: European non-market valuations conducted at cultural heritage sites

Site	Study	Publications	Survey type	Survey date	Number surveyed	Breakdown	Survey method
Nidaros Cathedral (Norway)	WTP for air pollution damage to Nidaros Cathedral	Navrud (1992), Navrud and Strand (2002).	Contingent valuation	June-August 1991	163	Individuals outside the cathedral	Face-to-face interview
Durham Cathedral (UK)	WTP for entry to Durham Cathedral	Willis (1994)	Contingent valuation	1993	92	Cathedral visitors (users)	Face-to-face interview
Royal Theatre, Copenhagen (Denmark)	WTP for current services at the Royal Theatre	Bille (1996, 1997, 2002)	Contingent valuation	Autumn 1993	1,843	Danish households (users and non-users)	Telephone and some face-to-face interview
Neuchatel (Switzerland)	Damages caused by air pollution to 16 buildings in Neuchatel	Grosclaude and Soguel (1993, 1994)	Contingent valuation	1992	200	Neuchatel residents	Face-to-face interview
Warkworth Castle (UK)	WTP for entry to Warkworth Castle	Powe and Willis (1996)	Contingent valuation	June-September 1994	201	Potential site visitors	Face-to-face interview
Grainger Town, Newcastle (UK)	WTP for restoration of buildings at Grainger Town, Newcastle	Garrod <i>et al.</i> (1996)	Contingent valuation	1995	202	Newcastle taxpayers	Face-to-face interview
Campi Flegrei (Italy)	WTP for the conservation of the archaeological park	Riganti (1997), Riganti and Willis (2002)	Contingent valuation	March 1995, July 1997	448 + 497	Site visitors (users) and Naples residents	Face-to-face interview
Napoli Musei Aperti (Italy)	WTP for the preservation of the Napoli Musei Aperti	Santagata and Signorello (2000, 2002)	Contingent valuation	Autumn 1997	468	Naples residents	Face-to-face interview
Museum of Central Finland	WTP for current services at the museum	Tohomo (2004)	Contingent valuation	November-December 1997	800	Local residents (users and non-users)	Postal survey
Stonehenge (UK)	WTP for routing nearby roads through a tunnel or retaining the <i>status quo</i> .	Maddison and Mourato (2002)	Contingent valuation	March 1998	357	129 on-site users 228 UK residents	Face-to-face interview
Lincoln Cathedral (UK)	WTP for cleaning air pollution damage to Lincoln Cathedral	Pollicino and Maddison (1999, 2001, 2002)	Contingent valuation	April-July 1998	328	220 Lincoln residents, 108 residents of surrounding towns	Face-to-face interview
Surrey History Centre (UK)	WTP to prevent the closure of the Surrey History Centre	Özdemiroğlu and Mourato (2001)	Contingent valuation	May 2000	60 (pilot)	Site users and local residents (non-users)	Face-to-face interview

Site	Study	Publications	Survey type	Survey date	Number surveyed	Breakdown	Survey method
British Museum (UK)	WTP to reduce congestion in the museum	Maddison and Foster (2003)	Choice experiment	August 2000	400	Museum visitors (users)	Face-to-face interview
National Museum of Sculpture, Valladolid (Spain)	WTP for current services at the museum	Sanz <i>et al.</i> (2003)	Contingent valuation	December 2000-May 2001	1,147 (total)	Museum visitors (users)	Self-completing survey in museum (users), telephone
Galleria Borghese Museum (Italy)	WTP for entry to the Galleria, and additional services	Mazzanti (2003a, 2003b)	Contingent valuation, choice experiment	Summer and autumn 2000	185 (valid)	Museum visitors (users)	Face-to-face interview
British Library (UK)	WTP for current services at the library	Pung <i>et al.</i> (2004)	Contingent valuation	August-October 2003	2,359	Reading room users and UK residents	Telephone (users), face-to-face (public)
Bolton Museums (UK)	WTP and WTA for the museum services	BMBC and MLA (2005)	Contingent valuation	Summer 2005	325	Bolton residents	Face-to-face (public)

Table 2: Values derived from European studies⁶

Site	Study	Currency	Mean WTP	Mean WTP (Euro equivalent) ⁷	WTP	Method	Payment vehicle
Nidaros Cathedral (Norway)	WTP for preventing or repairing air pollution damage to Nidaros Cathedral	Norwegian Kroner (NOK)	318 NOK (preservation) 278 NOK (restoration)	39.64 ECU (preservation) 34.66 ECU (restoration)	Individual	Open-ended question	Tax, donation to fund
Durham Cathedral (UK)	WTP for entry to Durham Cathedral	Pounds Sterling (£)	£0.77	0.99 ECU	Individual	Open-ended question	Entry fee
Royal Theatre, Copenhagen (Denmark)	WTP for current services at the Royal Theatre	Danish Kroners (DKK)	DKK 104	13.74 ECU	Individual	Open-ended question	Tax
Neuchatel (Switzerland)	Damages caused by air pollution to 16 buildings in Neuchatel	Swiss Francs (SFr)	108 SFr for 6 buildings	59.55 ECU	Individual	Open-ended question	Donation to fund
Warkworth Castle (UK)	WTP for entry to Warkworth Castle	Pounds Sterling (£)	£2.53 (entry) £1.41 (preservation)	3.27 ECU (entry) 1.82 ECU (preservation)	Individual	Open-ended question	Entry fee
Grainger Town, Newcastle (UK)	WTP for restoration of buildings at Grainger Town, Newcastle	Pounds Sterling (£)	£13.76	16.80 ECU	Household	Open-ended question	Tax
Campi Flegrei (Italy)	WTP for the conservation of the archaeological	Italian Lire (L)	\$28.81 (to conserve CF) \$10.18 (conserving)	n.a.	Individual	Single bounded dichotomous choice + double bounded	Donation to fund

⁶ A tabular format is not the ideal mechanism for displaying the results of such non-market analyses. By necessity the data has to be simplified, it is strongly recommended that the original sources are consulted in all cases.

⁷ The Euro equivalent exchange rate has been calculated using the average annual exchange rate (Interbank rate) for the year of the *survey*. The ECU rate has been used between 1991 and 1998, and the Euro rate from January 1, 1999 to the present.

Site	Study	Currency	Mean WTP	Mean WTP (Euro equivalent) ⁷	WTP	Method	Payment vehicle
	park		parts of CF not open to the public)			dichotomous choice	
Napoli Musei Aperti (Italy)	WTP for the preservation of the Napoli Musei Aperti	Italian Lire (L)	17,000 ITL	8.84 ECU	Household	Single bounded dichotomous choice + open ended question	Donation to fund
Museum of Central Finland	WTP for current services at the museum	Finnish Markkas (FIM)	FIM 103	18.24 ECU	Individual		Tax
Stonehenge (UK)	WTP for routing nearby roads through a tunnel or retaining the <i>status quo</i> .	Pounds Sterling (£)	£12.80 for the tunnel £4.80 for the current road	18.92 ECU for the tunnel 7.10 ECU for the current road	Household	Payment card / conjoint analysis	Tax, entry fee for non-UK nationals
Lincoln Cathedral (UK)	WTP for cleaning air pollution damage to Lincoln Cathedral	Pounds Sterling (£)	£49.77 Lincoln residents £26.77 Lincolnshire residents outside Lincoln	€ 73.58 Lincoln residents € 39.57 Lincolnshire residents outside Lincoln	Household	Double-bounded dichotomous choice	Tax
Surrey History Centre (UK)	WTP to prevent the closure of the Surrey History Centre	Pounds Sterling (£)	£34 for loss of collections (users) £24 for loss of access (users) £13 both scenarios (non-users)	€ 55.85 for loss of collections (users) € 25.64 for loss of access (users) € 21.35 both scenarios	Individual	Payment card	Tax
British Museum (UK)	WTP to reduce congestion in the museum	Pounds Sterling (£)	£5.99 congestion cost imposed by the marginal visitor	€ 9.84 congestion cost imposed by the marginal visitor	Individual	Conjoint analysis	Entrance fee
National Museum of Sculpture, Valladolid (Spain)	WTP for current services at the museum	Euros (€)	€ 25-40 (direct use) € 27-36 (passive use)	€ 25-40 (direct use) € 27-36 (passive use)	Individual	Double bounded dichotomous choice + open ended question	Donation to fund
Galleria Borghese Museum (Italy)	WTP for entry to the Galleria (CV), and additional services (CE)	Euros (€)	€ 1.47-4.03 (conservation) € 0.46-0.75 (multimedia) € 1.14-2.55 (multimedia + exhibition) Total € 8.7	€ 1.47-4.03 (conservation) € 0.46-0.75 (multimedia) € 1.14-2.55 (multimedia + exhibition) Total € 8.7	Individual	Payment ladder, choice experiment	Entry fee
British Library (UK)	WTP for current services at the library	Pounds Sterling (£)	£116 for reading room users £6.30 UK residents	€ 167.75 for reading room users € 9.11 UK residents	Individual	Open-ended question	Donation
Bolton Museums (UK)	WTP and WTA for the museum services	Pounds Sterling (£)	£2.77 per user, £1.14 per non-user per month	€ 4.07 per user, € 1.68 per non-user per month	Individual	Open-ended question	Donation to fund

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The Political Economy of Rehabilitation: the Case of the Benedettini Monastery

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1. Introduction

This paper is aimed at exploring some aspects related to the issue of conservation, using as a case study the conservation of the Benedettini Monastery in Catania. Starting from this case, we will try to draw attention to general issues of political economy, such as the identification of the actors involved in the decisions of conservation, the ways in which conservation can be carried out and the role of the consumers / users. Four questions will be addressed - what should be conserved? why do we conserve?, who should conserve? how conservation should be carried out? - and some insights coming from the literature will be underlined. The "contemporary history" of the building will be examined in a political economy framework to see whether any "lesson" can be derived from this example. Among other things, it will be examined whether such an experience provides any hint to address the problem raised by Peacock (1994, p.2) "of marrying public support for conservation with appropriate public action".

The analysis develops as follows: in section 2, some information on the Benedettini Monastery is provided. In section 3, cultural heritage is defined and the specific aspects of the choice on what should be conserved, in the Benedettini case, are discussed. In section 4, the main reasons for conservation of cultural heritage are underlined, while in section 5 we will present the different ways of carrying out conservation. Section 6 discusses the issue of who should carry out conservation. Concluding remarks are offered in section 7.

2. The Benedettini Monastery

The Benedettini Monastery belongs to the national artistic endowment. It was included in the national treasures list in 1939. The Monastery is one of the largest in Europe: in its golden years, before the abolition of religious corporations, it sized 100.000 m², i.e. about 1/14 of the size of Catania at that time. Nowadays, the site sizes 40.000 m² only. In its long history it has passed through various phases. Reviewing these different stages is outside the scope of this paper⁸. Some notes on the subject might be useful to stress how such a complex is also an example of "stratification" through time of different artistic styles. The construction of the Monastery started in the middle of XVI century. At the end of the same century, the church was begun too. In 1669, an eruption badly damaged the church, but it was an earthquake in 1693 which destroyed the building. In 1702, the few surviving monks decided to rebuild the Monastery on a huge scale. The most famous artists of the time were employed for the new project. The construction lasted almost three centuries, and many architects gave their contribution with the inevitable mix of styles (baroque, neo-classic, and neo-gothic). The building belonged to the Benedettini order until

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⁸ For an overview, see De Carlo (1988).

1886 when, after the abolition of religious corporations, its property was transferred to the Municipality. The Monastery was the place of local political power and, at the same time, the place where the members of the aristocratic families were trained to carry out their “right/duty” to government.

The Monastery’s recent history is one of progressive decay. Because of its huge size, it was difficult for the Municipality to manage it. It was divided in various sections and used for military purposes, as secondary school and municipal offices. This division was the cause of a heavy degradation of the Monastery and made it not accessible by visitors. A turning point came in 1977, when the Municipality donated the Monastery to the University.

The University started a complex, long and burdensome restoration activity (see technical notes in the Appendix), which is still ongoing. As a result, the Benedettini Monastery is nowadays the site of the Humanities Faculty and, at the same time, a leading place in the city cultural life (see table II in the Appendix).

3. What should be conserved ?

The variety of uses and styles makes the Monastery a good example of the difficulties related to the decision of what should be conserved. This decision is quite important since it obviously affects the stock of goods which are thought of deserving conservation. By influencing the composition of this stock, it may be also relevant to the decisions on the way cultural heritage is conserved and used. The answer to the question “what should be conserved” implies a definition of cultural heritage.

Even if different authors may provide different definitions of *cultural heritage*⁹, there is a general consensus on the fact that it identifies a set of goods which 1) belong to the past and 2) are an expression of the cultural development of a society (see Koboldt, this volume)¹⁰. We will not go through a discussion of this, or alternative definitions of cultural heritage, but we would like to point out how these two features bring along some of the economic problems related to cultural heritage. The first property puts forward the main problem discussed with respect to cultural heritage, namely the need to **conserve**¹¹ what, because of its age, is subject to decay. More importantly, the second characteristic implies the social relevance of cultural heritage goods. A good belongs to the set of cultural heritage if “society” values it as a testimony to its cultural evolution. This has the further implication that there must be some social “rule” by which the “cultural” qualification is assigned. In other words, the determination of what, in practice, is to be considered as cultural heritage belongs to some form of collective decision-making.

One can think that the process of identification of cultural heritage is something related to the formation of a society-wide feeling about the importance of objects belonging to the past, so as to classify these objects as *naturally* belonging to cultural

⁹Since the arguments developed in this section are then applied to *cultural built heritage*, they will be developed having in mind this subset of cultural heritage. Cultural built heritage has been identified by Lichfield (1988, p.66) as including “the works and buildings and their associated land”.

¹⁰A similar definition is due to an Italian Parliamentary Committee which refers to cultural heritage as something which is able to show “evidence of the civilisation” of a society (Franceschini Parliamentary Committee, 1967). See Bobbio, 1994.

¹¹Conservation can be used with a wide meaning, ranging from the need to prevent any further deterioration all the way to restoration of the original status. See below, section 5.

heritage. Even if this is true, problems of information related to the specific history of each object, may, however, give room to specialists for playing a central role in the process of identification of cultural heritage¹². “[Cultural heritage] become identified as heritage goods usually by archaeologists and historians who have obtained some form of official recognition or public acceptance of their status as experts in determining their artistic or historical significance” (Peacock, 1994). Moreover, because of the existence, and relevance, of institutional listing of heritage, other actors may be involved in the process of identifying cultural heritage, even if they may not have any expertise at all. Let’s think of the role played by local councils, or government officials. Without disregarding the relevance of the “spontaneous” identification by society at large of cultural heritage, we would like to stress the role played by specific actors in the formal decision-making process.

Obviously, since there is no objective way of identifying what is a testimony to the past of a society, which deserves to be conserved, the actual identity of those involved in this kind of decision is quite relevant to determine the stock of cultural heritage. There is probably no clear cut way to relate, for instance, the size of this stock to the influence of specific actors. This influence may be rather recalled, as a way to explain the inclusion of a certain object in the set of cultural heritage. If experts are the final decision-makers, this could favour certain types of objects, or certain ages, according to the school of thought to which experts may belong; politicians may prefer other objects, because their inclusion can be beneficial to influential interest groups. One could also think of the increasing influence of “protectionist” groups in modern societies. Overall, then, the inclusion, or the exclusion of a certain object from the set of cultural heritage is the outcome of a complex game played by many actors. Even if it is difficult to relate the size of the stock of cultural heritage to specific influences, a growing demand for conservation has been actually observed in some countries, e.g. France. Benhamou (1994) points out two reasons for the extension of the objects included in the set of cultural heritage: 1) “historical additions”, since “ever more recent buildings are included as they represent the national heritage of the future”; 2) “typological extension”, since “new listings included gardens, original decor in restaurants, cafés, shops and swimming pools, parts of the nation’s industrial heritage”.

The questions addressed in this section have a specific relevance in the Benedettini case. The features of the building are such that the question of whether it deserves to be conserved does not arise because its relevance as a testimony to the past is unambiguous. Since the Monastery is the result of the stratification of many styles through time, can it be considered a unique object of conservation, whatever meaning we give to such a concept¹³ ? No positive answer can be given to such a question. An example is given by the recent discovery of the rests of a Roman villa in the basement of the Monastery. As the archaeologists working in this excavation have found out, both the 16th and 18th century foundations of the Monastery were built on the rests of such a villa. The remains of the mosaics and frescos did not prevent, however, the construction works while, nowadays , the discovery of the ruins of the Roman villa has been enough to stop all the works in this area of the Monastery. This shows how the identification of what is cultural heritage and, moreover, of what deserves to be

¹²The institutional **listing** of cultural heritage, existing in most countries, can be thought of as an answer to these informational problems.

¹³See below section 5.

protected can vary through time¹⁴. The existing system of rules can explain such a situation. In Italy, in fact, the conservation of the archaeological sites pertains to the Sovrintendente¹⁵ who acts according to the absolute rule that calls for stopping any activity which is perceived as contrasting with the conservation of the site, regardless the economic implications of the decision taken. The concept of conservation which is usually adopted is very strict¹⁶, being the Sovrintendente liable for any damage the heritage could suffer from the works carried out on the site, while no responsibility is borne for the economic damage caused to the owner, as a consequence of the fact that the use of the heritage is interdicted. Basically, the University's ownership right to rehabilitate the Monastery according to its own priorities¹⁷ is at the moment severely limited. Therefore, the existence of different testimonies of various historical ages creates problems, since each one may require different modes of intervention, which might be even incompatible with each other.

4. Why should we conserve ?

Even if an object is widely recognised as cultural heritage, and even formally listed as such, this does not imply that it will be actually conserved. Actual conservation is, first of all, dependent on the existence of a demand for it.

Use, option and bequest values have been investigated by the economic literature¹⁸. The difference between use, bequest and option benefits is relevant to explain actual conservation choices. The first can be individually appropriated while the others have the features of a public good. The Benedettini case demonstrates the relative strength of different interests and their relevance to the choice of conservation.

A potential demand for conservation, due to bequest and option benefits, probably existed when the building belonged to the Municipality, but it was unable to commit and implement any conservation action. This shows how weak option and bequest interests have been through time. The demand should have generated a public opinion consensus in support of conservation initiatives¹⁹. Moreover, if we allow for the existence of fiscal illusion (citizens enjoying the local benefits of public expenditure being not aware of contributing to it as national taxpayers), the fact that conservation was to be achieved using public funds but without imposing any direct burden on local finance was likely to be a further element of consensus.

The intuitive argument needs to be further explored because it does not explain why the decline affecting the monument lasted for so long, without any real public opinion movement contrasting it. Probably, the demand for conservation did exist but was latent and not active because of the high transaction costs needed to develop it visibly. The usual public good argument could explain why a specific interest (implying relevant marginal benefits) was probably needed to aggregate the consensus and to

¹⁴On this issue see Guerzoni in this volume.

¹⁵The Sovrintendente is the head of Sovrintendenza, a local branch of the Ministry of Heritage. In Sicily, because of the special autonomy of the region, the Sovrintendenza is a branch of the regional government.

¹⁶On the different concepts of conservation see below

¹⁷It is useful to stress that these priorities had already been approved by the Sovrintendenza when the overall rehabilitation project had been submitted: a new discovery is now putting under discussion existing rights. On such uncertainty, see below

¹⁸See Throsby (1994).

¹⁹ Swiss referenda on cultural matters provide an example of public support for public intervention in the cultural field.

develop the existing latent demand: such an interest might be identified in the University desire for expansion. The University committed itself to rehabilitating the building for its own institutional aims and to permitting compatible public and private cultural uses.

5. How do we conserve ?

There are different sources of demand for conservation and these demands may be satisfied in conflicting ways. Different meanings can be assigned to the word “conservation”. Lichfield (1988) provides a list of different interventions on cultural built heritage that can be regarded as conservation, including: 1) prevention of deterioration; 2) conservation; 3) consolidation; 4) restoration; 5) rehabilitation; 6) reproduction; 7) reconstruction²⁰. These different meanings of conservation can be regarded as different ways of conserving cultural heritage.

The way cultural heritage is conserved is somehow linked to the demand for actual conservation and, more precisely, to the relative strength of the different demands of those who are interested in conservation; as a consequence, in some circumstances, a conflict among the different objectives which can be pursued through different ways of carrying out conservation might arise. In section 3, an interesting example of such a kind of conflict has been already offered: the recent discovery of the ruins of a Roman villa in the basement of the Monastery, where a reading room was planned, has stopped the restoration works.

Therefore, the issue we would like to stress here is that there are different demands for conservation that can be satisfied in ways which are mutually incompatible and that a solution to this conflict cannot be given by the existent structure of ownership rights because relevant externalities may arise from the conservation activities. This provides room for some form of public intervention in the solution to this conflict and, among the various forms this intervention can take, regulation is the most widely used. It is usually implemented by imposing restrictions on alteration of buildings and, consequently, by limitation of ownership rights²¹.

The strength of these restrictions directly affects the investment costs associated to conservation, the maintenance costs and also the costs connected to the restricted use.²² Different positions in regulation²³ bear relevant consequences upon the very

²⁰Following Lichfield’s (1988) definitions, prevention of deterioration could be identified in a sound maintenance programme; conservation implies “keeping the object in its existing state of repair to prevent further decay”; consolidation consists in “adding or applying supportive materials into the actual fabric in order to ensure its continued durability and structural integrity”; restoration is the “reviving of the original concept, either or both in relation to the fabric or use”; rehabilitation is an adaptation of the building “to a contemporary use which will be capable of sustaining it”; reproduction means “copying an existing artefact in order to replace some missing or decaying parts”; reconstruction is used for “rebuilding anew in imitation of the old, as necessitated by disasters such as fire, earthquake or war” (p.26).

²¹Lichfield (1988) identifies the “effects of listing [which] involve control and restriction on the owners and occupiers of the site, and duties on the public authority. These range over: consent for alteration or demolition; action by the authority; control on erection of advertising; maintenance and repair; restoration; expropriation; incentives” (pp. 86-87).

²²These costs may arise as reduction in the benefits from conservation, for instance when there are restrictions on the alterations needed to adjust an old building to the comforts typical of modern buildings.

possibility of conserving heritage. One can take, for instance a really “conservationist” view. The main consequences could be an extension of the list of objects belonging to cultural heritage and a set of strong restrictions on the ways of preserving these objects. As stressed above, this has the important implication of restricting the extent of private sector intervention, increasing the demand for public sector intervention. Thus, the “conservationist” approach ends up in draining an ever increasing amount of resources from the public sector. The diversion of resources towards conservation activities may have, however, undesirable allocative and, above all, equity consequences. The supporters of conservation compete with other claimants of public financial resources. They might be better organised in exercising pressure on decision-makers, since the benefits from conservation are generally quite spread out and, therefore, difficult to organise. In other words, a “conservationist” approach can produce consistent decisions in terms of listing of objects and regulation of conservation modes, but then faces a severe constraint as far as availability of resources is concerned. This can be the starting point of a vicious circle, which, because of the strong, and unmet, pressure on public funds, produces further decay, further reduction of private benefits from conservation, further pressure on public funds, and so on.²⁴

Therefore, one of the main outcomes of regulation is to alter the costs and benefits arising from conservation and, consequently, to influence the economic calculus of both private and public sector, when they take their decisions about conservation. This argument leads to the final question on who should carry out conservation.

6. Who should conserve ?

6.1 The main implication of a wide and strict regulation is that it calls for an extended public action which, in turn, implies some form of financial intervention. This can be of different nature: direct investment in cultural heritage owned by the public sector, subsidies to private sector, direct or indirect, through tax incentives. The features of the Benedettini Monastery are such that any private intervention was very unlikely, even if supported by fiscal incentives. Therefore, only the public solution was left.

The Municipality could have decided to carry out the intervention directly as well as the activities related to the use of the building, to contract out these activities or to alienate the building.

From the point of view of the Municipality, the donation of the building was a positive sum game: giving up the ownership of the building in favour of a peculiar non-profit entity²⁵ such as the University, the Municipality pursued appealing values such as promoting culture, stimulating urban renewal, supporting education, etc. without bearing any cost, plus saving the building maintenance costs and the political

²³The way the regulation solves the conflict depends on the relative strength of the different groups and individuals interested into conservation, and therefore in their relative ability to influence the decision-maker. Moreover, the same groups or individuals will try to influence the implementation of those regulations in a way favourable to themselves. On the issue of regulation, see Throsby in this book.

²⁴In a different context, this issue has been stressed by Giardina and Rizzo (1994).

²⁵ We do not label the university as public administration, though, strictly speaking, Italian Universities are, indeed, branches of public administration. Because the activity they carry out is quite peculiar and is perceived as such by public opinion too, a recent reform, law .n. 537/93, assigns them a quite peculiar status within the public administration context.

costs deriving by its degraded status²⁶. On the other hand, acting in favour of a public entity gave a guarantee to public opinion that public interest was pursued. Fewer guarantees did exist for the donor in terms of the result: what incentives did the University have for pursuing the public goal of preserving the building and making it available to the public, i.e. to fulfil the donor's objectives? The literature on non-profit organisations can provide a rationale for the municipal choice²⁷.

Commercialising monuments is still a highly debated issue among non - economists and it would have been a politically costly decision for the Municipality. Since the Municipality was willing and, probably incapable, of undertaking the conservation itself, it would have been risky and unpopular committing it to the profit-making private sector. Moreover, the size of the monument as well as the restrictions imposed on its rehabilitation or restoration made it very unlikely for a private firm to carry out such an initiative.

A public institution like the University, at that time almost completely subsidised by the National Ministry for Universities, was the best candidate to carry out conservation. Why did the University decide to be involved? The restoration of the Benedettini Monastery is the most relevant intervention of a wider strategy enacted by the University to "consolidate and extend the presence of the University in the historic centre and in the most delicate tissue of the city, in the direction of a requalification, both functional and cultural, of 'places' which indifference and impotence have caused to be degraded through isolation or neglect" (Giarrizzo, 1990, p.91)²⁸. The question was whether such a choice was profitable for the University itself. The answer depends on many issues. First of all the University is not a single decision-maker but many agents interact²⁹. When the decision was undertaken, the financing system was based on central government specific subsidies and the competition for funds within the University was not very severe. This was, probably, one of the main conditions allowing for the decision; nowadays, with severe financial constraints as well as a budgetary financing system, the decision would probably not have been undertaken. Problems of competition among faculties might have arisen as far as the distribution of capital expenditure was concerned. Therefore, given the changed institutional context, even the University could not have taken the decision.

If higher education is considered to be the only relevant University aim, the choice of locating the Faculty of Humanities in the Benedettini Monastery could be considered highly disputable. It implied a very demanding investment in terms of capital expenditure³⁰ as well as foreseeable high maintenance costs compared with the amount of space to be used for educational reasons. In fact, the building, though

²⁶Before the decision of donating the Monastery to the University was taken, we can presume the existence of a demand for "cultural consumption" which could not be expressed, since the Monastery was transformed, at that time, in a set of separated parts, not accessible by visitors.

²⁷This is the well known general argument that the non-profit feature of the organisation makes less severe, for the principal, the problems deriving from the asymmetrical information. See, for a general overview Powell (1987).

²⁸Some other relevant examples stress the existence of a close connection between the University and the city. In the 1950's the baroque Villa Cerami was acquired and restructured for the Faculty of Law; in 1981 Palazzo S. Giuliano was acquired and in 1990 Palazzo Pedegaggi. Nowadays, the University is involved in a European project (Urban) to restore, with functional as well cultural objectives, two other ancient buildings in the historical centre.

²⁹The University had at that time nine Faculties.

³⁰See Appendix, table 1.

historically and artistically prestigious, cannot be considered the best solution as far as the fulfilment of educational needs is concerned: with the same amount of resources the University could have realised a more functional and suitable building, with lower maintenance costs³¹, more efficient services to students and more comfortable offices for the staff.

But even accepting the questionable assumption that the only University aim is education, it might be argued that the University would not have received the same amount of resources for projects other than the restoration of the Monastery. This is true, for instance, for the share of regional funds which was mainly directed to heritage conservation³² and would not have been available for the construction of an educational building as such. In other words, the opportunity cost of these resources (which are not a relevant share of the total amount) was low (for other University objectives) given that the same amount of resources would not have been available for other reasons.

Moreover, an alternative location of the Faculty of Humanities would have implied its movement from the centre of the city³³, where the main libraries and offices were, and are still now located. The benefits of having such a central location are quite relevant if one thinks that the academic life of students and staff in this University is not organised in a campus, but there are offices dispersed throughout the centre, and therefore students and staff would have borne the additional cost, monetary and in terms of time, of moving far away from this central area.

Should not it be overlooked that the “Benedettini operation”, being very rewarding in terms of prestige, has been supported by the efforts of leading personalities within the University who have invested their time and their reputation in this “operation”. Probably, this highly valuable human capital would not have been equally available for other less rewarding and gratifying building “operations”. Though in these cases measurement is always very difficult and not very reliable, an interesting indicator of the special involvement can be given by a simple observation: the major basic works, needed to make the building available for institutional higher educational reasons were completed before the contractual term was expired, i.e. the institution (or the people involved in such “operation”) performed more efficiently than usually. In other words, not only the external constraints (the deadline indicated in the donation act) but also the gratifying features of this “operation” were effective incentives to fulfil the claimed objectives³⁴.

The controversial arguments underlying the “Benedettini operation” can be further developed if the approach to the University activity is enlarged. If it is recognised that its aim is to promote culture, in a wider sense than only offering higher education,

³¹ The maintenance in historical building is labour intensive and therefore affected by the “Baumol disease” (see Benhamou, 1995), with the consequence of increasing costs through time.

³² See Appendix, table 1.

³³ A project of a new building for the Faculty, to be constructed in the University campus, outside the city centre, was in fact under discussion.

³⁴ Internal strength has exhibited ups and downs and has reached the minimum level of activity quite recently, in the 90s. A tentative explanation is that the marginal benefit of the completion is perceived as decreasing by the institution as such (and not necessarily by the single persons directly involved). As a consequence, efforts have been directed toward other aims within the University. See the technical notes in the Appendix.

then the choice of preserving and operating the Benedettini Monastery seems more coherent and less disputable. From the point of view of the University institution, and of the people operating within it, further prestige and gratification derive from being a point of reference for cultural activity in town: the number of cultural events (exhibitions, concerts, etc.) which have taken place in the building since 1981³⁵ shows how such an opportunity has not been missed, in line with what had been the role of the Monastery in cultural life of the town. This has increased the prestige of the University as such and the relevance of its contribution to city life.

So far, the supply features have been identified and a tentative conclusion has been reached: for both suppliers -the Municipality as well as the University- the decision of preserving the Monastery along the lines described has provided relevant private benefits, i.e. political consensus for the former and prestige and cultural reward for the latter. But, apart from the private benefits accruing to the main actors of this brief history, has the rehabilitation of the Monastery satisfied demand? As the Monastery is a multi-product building, though mainly oriented toward a specific use, i.e. higher education, at least two groups of consumers can be identified: university students and the community. As far as the former is concerned, the relevance of the opportunity cost of the conservation choice seems to be severe, less stringent as far as the investment as such is concerned, while it is strict when maintenance is taken into account³⁶. On the other hand, students, belonging to the University, might enjoy the increased prestige of the institution, such a benefit depending on the closeness of their relationship with the University. Indeed, the evaluation of such a choice remains an open question, depending on whether the University is identifiable with academic decision-makers, and/or with its users, since the relevant costs and benefits differ.

And what about the community as such? Of course, nothing can be said whether community's preferences were taken into account in setting the agenda for the development of heritage and, therefore, whether the intervention on the Monastery was, indeed, scheduled with a priority assigned. The specific interest of the University, which generated the demand for conservation, earmarked the operation since the beginning. Looking at specific groups within the community, some other comments can be added because distribution effects are likely to arise. More precisely, the conservation of the Monastery, having increased the flow of people visiting the area and, eventually, living in it (students, University staff, visitors, tourists, etc.) exerts relevant effects on those living in the same area, which used to be and still is quite degraded. These effects do not necessarily go in the same direction: people involved in commercial activity as well as estate owners gain considerable benefits, while other residents are negatively affected because prices tend to increase.

7. Concluding remarks

In this section only tentative conclusions will be drawn from the Benedettini case study, to offer some insights on the general issue of conservation.

Since the monument is included in the national endowment list, with all the implied constraints (types of use, modes of restoration, etc.) no economic incentives could have been envisaged for a private solution of the rehabilitation problem. At the same

³⁵ See Appendix, table 2.

³⁶ The recently enacted policy of charging for the use of the building, when exhibitions, conferences, lectures or any other cultural event take place, is a way for reducing such an opportunity cost which still remains and in perspective tends to be more severe.

time, the territorial dimension of the intervention being mainly local (the monument has no national or international prestige among non-specialists) and its financial size being quite relevant, no sponsorship aimed at merely restoring the building would have turned up as being economically convenient. As a result, conservation could rely only on public resources. In cases such as this, the public solution to the conservation problem becomes “inevitable” also because uncertainty affects the outcome of conservation. Whenever, as it usually happens and as indeed happened in the Benedettini case, heritage is the result of the stratification of different styles and historical periods, any discovery which takes place during the intervention may reduce the space for planned uses. The occurrence of such a situation depends on the extent of regulation and, therefore, on the definition of what deserves to be conserved. When the extent is very large, as it is in the case under study, the risk of investment becomes too high to be borne by any private investor.

If a lesson has to be drawn, it is a mere confirmation of the fact that unless a system of incentives is created, no private resources are available for conservation of monuments other than “superstars”. Moreover, on the demand side, the Benedettini experience seems to provide an example of how the expression of demand for conservation is likely to be driven by specific interests, with the possible outcome that some preferences are more influential than others.

This argument leads us to the second point. Public resources have been available because the University financing was based on a “cost-plus” system or, it is better to say, on a targeted subsidy system, reducing the perception of the opportunity cost of resources as well as of the degree of competition about their uses. Nowadays, with the present budgetary system, even cultural public institutions such as the University should carefully define the trade-off among objectives and would not underestimate the opportunity costs of resources. As a general conclusion, the idea that different rules affect institutions behaviour and their accountability and responsiveness to the public gets further support, with the likely implication that, when approaching the conservation issue, severe resource constraints must be taken into account.

Appendix *

Technical notes

The successful intuition that the restoration and transformation of a complex monument would subtract it for an extensive period of time from use and enjoyment, until the restoration work was completed, has made possible an intervention strategy combined along three directions, which instead of being articulated in a series, as is common practice, are approached in parallel, allowing for the achievement of immediate concrete results.

More precisely, the three articulation of the conservation strategy implemented in Benedettini case are:

A- Preliminary research, planning, search for financing;

B- restoration and rehabilitation work;

C- use.

For what pertains to sector A, resources and skills, internal to the University as well as external, were employed.

In addition to the Administration offices (Technical, Legal, Works and Expenditures), the Faculty of Arts (Literature) and the Institute of Art History have collaborated.

External collaborations have included architects, engineers, photographer surveyors, etc. A total of 58 professional assignments have been carried out, of which:

16 for investigations and surveys

12 for consultations

20 for planning

10 work direction.

The total spending sustained is of nearly 1.400.000.000 ITL.

Sector B concerns restoration work that has been subdivided into 5 categories and separated into work completed and work still in progress.

From 1977 to December 1994, a total of 327 contracts have been conferred, for a total of 21.390.000.000 ITL distinguished as follows.

* This Appendix is based on a contribution provided by A. Leonardi, who has acted as an inestimable source of information on the Benedettini Monastery past and recent history. Our acknowledgement for the time spent with us, and for his deep enthusiasm for the Monastery. The responsibility for the interpretation of data and information provided by Leonardi is ours only.

Table I

Description	Work Completed		Work in Progress	
	No. of contracts	ITL (million)	No. of contracts	ITL (million)
Masonry work	146	11.447	6	3.754
Installation work	61	2.643	3	1.212
Furnishing and equipment	43	1.294	---	-----
Miscellaneous	45	285	---	-----
Restoration	22	748	1	7
Total	317	16.417	10	4.973

The listed amounts include IVA and are net of technical expenditures.

In addition, all preliminary procedures have been completed and project contracts for a total of 2.500.000.000 ITL are under way.

For the completion of the restoration work, a future expenditure of 12.000.000.000 ITL is foreseen.

Table II
Cultural events

Events	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	Tot.
Exhibits	1	4	3	2	6	3	5	3	7	8	4	3	7	3	59
Concerts	-	1	1	-	-	5	8	17	10	5	-	1	-	2	50
Presentations	-	-	-	1	1	1	4	-	1	3	1	-	3	1	16
Meetings	-	-	1	1	2	7	7	12	17	10	8	8	2	1	76
Conventions-Congresses	-	1	1	2	4	4	6	7	3	12	5	6	5	10	66
Lectures	-	-	2	-	2	1	6	6	8	5	3	2	4	1	40
Total	1	6	8	6	15	21	36	45	46	43	21	20	21	18	307

Appendix

This appendix completes the picture represented in the first issue of the Report on the State of the Union with the reports from two countries not included there, Sweden and Bulgaria.

Sweden

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1 Policies

The role of cultural institutions

The cultural policies in Sweden are administrated by The Swedish Ministry of Education, Research and Culture.

Under the ministry of Education and Culture there are several areas of responsibility and activities and a few of them drive the heritage policy in Sweden. This report is focusing on the Culture, Research and Education areas with a direct focus on the Cultural Heritage and digital media.

The focus areas of this report listed:

- Cultural Environments
- Museums and Exhibitions
- Research and development within the area Cultural Heritage
- Education within the area Cultural Heritage

Under these areas of responsibility lies an amount of authorities that has goals and regulations set by the government. Below is a selection of these authorities with short texts of information.

Cultural Environments

The two authorities under the Cultural Environments department are the National Heritage Board (Riksantikvarieämbetet, RAÄ) and the Cultural Heritage of the Industrial Society (Industrisamhällets Kulturarv, ISKA).

Through government subsidies to cultural environment these two give care, maintenance, provide knowledge building and arrange spreading of information to ensure that the historic environment is preserved in the most effective manner. These efforts gives a large part of the Swedish population a possibility to get in direct physical contact with the

Cultural Heritage. The last years investments in the cultural heritage of the Industrial Heritage, as well as the policy work in the Cultural Heritage area within the large cities, has given a increased understanding for the values of contemporary cultural environments.

The National Heritage Board (Riksantikvarieämbetet, RAÄ)

<http://www.raa.se/>

The National Heritage Board is the agency of the Swedish government that is responsible for heritage and historic environment issues. Their mission is to play a proactive, coordinating role in heritage promotion efforts and to ensure that the historic environment is preserved in the most effective possible degree.

The following list is the rules and regulations set by the government for the national Heritage Board.

The goal for the authority is to further develop the work with the cultural environments preservation and use. The National Heritage Boards aims are:

- to work for a long-term and durable development,
- to strengthen the cultural heritage and the cultural environments position in the regional and local work and development
- to ensure that the cultural heritage and the cultural environments shall be taken care of in various social sectors,
- to develop the structure of knowledge and spreading of knowledge of cultural heritage and environment,
- to develop the research with in the sector cultural heritage and see that the results are spread,

Further the goal is to ensure that the authority of practice and the government subsidies should achieve the largest possible effect and benefit for the cultural environment.

The Cultural Heritage of the Industrial Society (Industrisamhällets kulturarv, ISKA)

<http://www.iska.nu/ipage.asp?id=119>

The framework programme ISKA in Västernorrland (a region in the north of Sweden) is an initiative based on broad regional collaboration, whose aim is to support development projects dealing with our cultural heritage. ISKA is built on the insight that cultural heritage can be a resource in regional development. It is their conviction that cultural heritage has the potential to provide improved quality of life and growth in our country.

ISKA's main directions and goals in their activity:

- to influence attitudes on the cultural heritage an environment.
- to increase the availability to the historic materials in archives, museums and in the subject area.
- to increase the usage of the cultural heritage as a resource in today's society.
- to make us all take a responsibility in our own cultural heritage.

1.1 Museums and exhibitions

The governmental efforts with in the museum- and exhibition area aims to preserve the cultural heritage and to make it accessible, to develop and mediate the knowledge of the cultural heritage and by that give a perspective on the contemporary society.

Some of the authorities (museums) that have this area of responsibility are the following:

National Historical Museums (SHMM)

http://www.shmm.se/default___160.aspx

National Historical Museums (SHMM) in Sweden is a central museums agency comprising the Museum of National Antiquities, the Royal Coin Cabinet and Tumba Papermill Museum. The agency administers culture heritage and provides a perspective on our existence in order to strengthen the democratic development of society. All the three museums have free entrance.

The Museum of National Antiquities

[<http://www.historiska.se/info/english.html>]

The museum is responsible for Swedish cultural history and art from the Stone Age to the 16th century.

The Royal Coin Cabinet

[<http://www.myntkabinettet.se/engl.htm>]

The Royal Coin Cabinet is a national museum with special responsibility for areas such as the history of money, the history of finance and the art of medals.

Tumba bruksmuseum

<http://www.tumbabruksmuseum.se/>

The National Maritimes Museums

<http://www.maritima.se/Home/Myndigheten%20SMM/Om.aspx>

The National Maritimes museums are three units that work for the preservation and making the Swedish marine cultural heritage come alive. Their ambition is to develop arenas for organisations, associations and individuals that are interested in their field of work. They are located in Stockholm and Karlskrona.

The Vasa Museum

[<http://www.vasamuseet.se/Vasamuseet/Om.aspx?lang=en>]

The Vasa is the world's only surviving 17th-century ship and one of the foremost tourist sights in the world. The ship is displayed in a purpose-built museum in Stockholm.

The Maritime Museum

[<http://www.sjohistoriska.se/Sjohistoriska%20museet/Om.aspx>]

The Maritime Museum reflects all sides of life at sea. Our permanent displays cover big subjects such as merchant shipping and shipbuilding techniques

The Naval Museum

<http://www.marinmuseum.se/Marinmuseum/Om/Museet.aspx>

The Naval Museum has a long tradition stretching back to 1752, when Adolf Fredrik, the then King of Sweden decreed, that a Ship's Model Room be established in Karlskrona, and ever since the Museum has been charged with the collection and

conservation of artefacts which would document the history and development of Sweden's Navy.

1.2 Research and development within the Cultural Heritage area

Several institutions around Sweden are involved in research- and development projects concerning access to the Cultural Heritage. Today some of these universities carry on education in cultural heritage on a basic level but research on doctoral and on a post doctoral level is of a more temporary character. But the trend on more theses written in the area is strong and coming. The problem is to find these issues because of their broad area of interest, from humanities and social studies to technical sciences. This report has the focus on the involvement of digital media so below is a list of research projects held by main operators in the field.

There is a proposal to build an institute for research in cultural heritage in Sweden [<http://www.kulturarv.org>. The proposal was ready in February 2006 and it was commissioned by The National Heritage Board (RAÄ) and National Historical Museums (SHMM).

TEMA Q

<http://www.isak.liu.se/temaq>

<http://www.historiebruk.net/>

There is a strong tradition at Linköping University of organising research and postgraduate studies in an interdisciplinary way and across faculty lines. At the Faculty of the Arts and Sciences, research is conducted in broad subject fields, so-called Tema (“themes”). Tema Q pursues five research directions that focus on different aspects of the part culture plays in society, but which also have many points in common:

1. Cultural Heritage and the Uses of History
2. Cultural Production and Cultural Policy
3. Cultural Patterns and Local Developments
4. Mediated Culture
5. Creative Processes in Culture and Media

The Museum Laboratory

<http://www.tii.se/v4m/activities.htm>

During the year 2005, V4M, Svenska kulturfonden and Finland’s Svenska Hembygdsförbund started a two year long Research & Development project called the Museum Laboratory. Three Finland-Swedish home district museums, Bjärgas, Kilen and Pargas are taking part in the project. It aims to enhance the attraction of museums, to inspire the participating museums with new pedagogical methods and to increase the museums' staff's knowledge and experience of new techniques in museums and cultural heritage environments sensitive to large changes.

Museums and Exhibitions

http://cid.nada.kth.se/cc/museum_exhibits.html

Museums and Exhibitions is a multidisciplinary project that aims to bring together current research on museums, learning, technology and user-centred design. It has two main research goals. First, we want to investigate how the expressed educational goals of museum exhibitions can be accomplished through the use of modern computer technologies. Second, we want to involve end-users (i.e., visitors) throughout the entire exhibition production cycle and evaluate how their work influences the resulting exhibitions. Our hypothesis is that such a design partnership will have similar positive effects to those that have been documented elsewhere in computer application design.

1.3 Education within the area Cultural Heritage

As mentioned above there are several universities that runs basic education in the area cultural heritage.

The efforts on making education within the area digital media and cultural heritage are sporadic and on short terms. For that reason the we have divided them up into; education, seminars and workshops.

Education:

IT-utbildning på arkiv- och kulturområdet

<http://www.kks.se/templates/ProjectPage.aspx?id=3609>

The archives are the memory of the society. With the help of IT the archives can inform of and mediate these sources to researchers and the general public. When digitalizing the archives plus the material from the museums and libraries they can complement each other.

This about the content of an education institution specially designed for 100 handling officers. This education will make them more efficient in their jobs with the help of IT.

Exhibition visitors and new media

<http://www.draminst.se/kurser/avslutadekurser/avslutadekurser/digitalamedierochutstallningar/>

A four weeks long study course "Exhibition visitors and new media," 4 credits, was held by V4M at Dramatiska Institutet, the University College of Film, Radio, Television and Theatre, in Stockholm. 15 professionals – exhibition designers, museum employees and IT/multi media producers

Mediated Culture: Medias, experience and culture production (10 p)

<http://www.isak.liu.se/pub/jsp/polopoly.jsp?d=5113&a=30529>

This course at Linköpings university intend to give theoretical and analytical tools to give a more profound for mediated culture, culture production and experience tourism. A special interest is devoted to historic and contemporary mediation of the society and the every day life, media techniques, intermediation and remediated processes.

Digital Historia

<http://www.digitalhistoria.nu/utbildning.htm>

Seminars:

<http://cid.nada.kth.se/seminarier/disputation2.html>

Participatory design in museums – visitor-oriented perspectives on exhibition design.

Workshops:

V4M organizes workshops on account of Forum for exhibitioners(uställare) – A workshop with practical and concrete proposals on how to use interactivity in exhibitions. Hands-on exercises that gives the participator a sense of how to connect different components to create interactivity.

1.4 Priorities for ICT applications to Cultural heritage

Within the rules and regulations for authorities set to preserve the Cultural heritage given by the government, the priorities lie on access for the disabled.

Projects working on the availability to experience the Cultural Heritage in Sweden

LDB – The Centre of long-term digital preservation

<http://www.ra.se/ra/dokument/kulturarv.htm>

By initiative of the National Archives a new national competence centre is created with an aim to develop and spread methods and in the long run secure the Swedish digital heritage. The work is going to be on an cooperative basis between public authority, municipality, and the county

council and private organisations to preserve digital information to future generations. Two organisations a the National Library of Sweden and the Swedish National Archive of Recorded Sound and Moving Images.

KMM – Knowledge Management Systems in Museums

www.framtidenskultur.se/bev2004.htm

The KMM-project is a concentrate on research within the area knowledge management in museums and cultural heritage. The project emphasize on soft infrastructure, intelligent user centred learning environments, knowledge systems and knowledge organisation with the museums as the speciality. The goal in five years is that the KMM-platform will be established as the leading research and development environments in museums and within the EU.

The project is financed by the organisation The Foundation on Culture of the Future.

Image databases and digitalisation – a platform for ABM-coexistence

<http://www.rj.se/37965.htm>

Lately several archives, libraries and museums has digitalized their collections and presented them in databases. The goal of this project is to have common standards, norms and regulations for digital image management.

The ACCESS-project

<http://www.kulturradet.se/index.php?pid=2745>

The national Council of Cultural Affairs has additionally assigned 23,5 million Swedish kronor as governmental access-subsidies to create employment that aims to

preserve and make the cultural heritage, archives and museums, more accessible for everybody.

Nordic Handscape

http://www.historiska.se/collections/research/dokument/FOU_200505_nordic_handscape.pdf

Nordic Handscape is a project that aims to investigate and develop possibilities to convey the cultural heritage by mobile technology. The project is initiated and financed by the Nordic Council of Ministers. The project is coordinated by the Museum of National Antiquities in Stockholm and administrated by the Nordic Council of Ministers' Museum Committee.

The Swedish NetMuseum (Sveriges nätmuseum)

www.shmm.se/Documents/MN1_museer_pa_natet1.pdf

The Swedish NetMuseum is a collaboration between Swedish museums where the goal is to have 10 percent of the museums most important collections in a digital form on the internet within the next five years. The plan is to have the service established in one year and open for the public in three years.

24-hour-museum/The internet window to Swedish museums (24-timmarsmuseum)

<http://www.museifonstret.se/>

The 24-hour museum is a website/portal where schools can find information and learning material on the Swedish museums webpages. The 24-hormuseum is managed by the Swedish schoolnet and the Museum of National Antiquities commissioned by the Swedish National Agency for School Improvement with a financial support by The Swedish National Council for Cultural Affairs.

ABM-centrum

<http://www.abm-centrum.se/>

The ABM-centre is a common project for coordinating the collaboration between archives, libraries and museums. Their overall goals are the following:

- Promote the understanding and cooperation between archives, libraries and museums.
- Stimulate and develop the work to digitalize the archives, libraries and museums.
- Promote the usage of new technique to make the collections easier to access.
- Give subsidies to ABM-oriented development educations.

Associations and networks

Other interesting links:

http://www.cdisweden.com/sve/om_cdi/index.html

<http://www.tii.se/v4m/>

<http://www.nodem.tii.se>

<http://www.forumforutstallare.se/>

<http://www.sverigemuseer.se/modules/content/?id=1>

<http://www.digitalhistoria.nu/>

Conferences

How to handle our Cultural heritage in a time of globalization? (Hur hantera vårt kulturella arv i globaliseringstider?)

<http://www.vr.se/huvudmeny/forskningvistodjer/humanioraochsamhallsvetenskap/slutfordaprojekt/hurhanteravartkulturellaarviglobaliseringstider.4.12d0b1b510b193dbac18000873.html>

In December 2004 a interdisciplinary conference was held in Norrköping. The topic of the conference where cultural heritage and cultural politics.

Scientists and experts from the Nordic countries met and discussed and the main purpose was to initiate research the cultural politics in each country from a democratic point of view.

Seminars

A web seminar on The Swedish Museum of Architecture.

The Swedish Museum of Architecture presented their learning from their pedagogical work on their website. The Internet window to Swedish museums (Svenska museifönstret) and other media agencies gave view of perspectives on the matter of the future development and digital techniques.

1.5 Funding sources for IT projects and research within the area of Cultural heritage

Below are some of the organizations and main contributors to the research and development of the access to cultural heritage in Sweden.

The Knowledge Foundation (KK-stiftelsen)

<http://www.kks.se/templates/StandardPage.aspx?id=84>

The Knowledge Foundation was established in 1994. The foundation has since invested almost five billion Swedish kronor in projects related to research, competence development in industry and IT development in the schools. During this time, new working methods have been designed, with the foundation functioning as an initiator, financial backer and source of knowledge for research projects at new universities and university colleges.

The Bank of Sweden Tercentenary Fund (Riksbankens jubileumsfond)

<http://www.rj.se/default.asp?ItemID=22770>

Riksbankens Jubileumsfond provides support for advanced research in the form of project grants to individual researchers or research groups that apply for funds. The foundation is actively engaged in broad fields of scientific research, which is reflected in the range of expertise among the researchers on the Board of Trustees and in the preparatory committees.

During the latter part of the 1990s, Riksbankens Jubileumsfond drew attention to the role of archives, libraries and museums and the work of scholars in research on our cultural heritage and the historical perspectives that stretch beyond contemporary

history. Among other things, the foundation arranged conferences to discuss questions concerning research connected with these bodies and intends to follow up developments in these areas, partly through the new sector committee which is to focus on research on pre- and early modern times.

The Swedish Research Council (Vetenskapsrådet)

<http://www.vr.se/2.69f66a93108e85f68d480000.html>

<http://www.vr.se/huvudmeny/forskningvistodjer/humanioraochsamhallsvetenskap/slutfordaprojekt/hurhanteravartkulturellaarviglobaliseringstider.4.12d0b1b510b193dbac18000873.html>

The Swedish Research Council provides support for basic research in all academic disciplines.

The Foundation for the Culture of the Future (Framtidens kultur)

<http://www.framtidenskultur.se/engelska.htm>

The Foundation for the Culture of the Future was established by the Swedish Government in 1994, and was allocated capital amounting to 529 million Swedish kronor.

The purpose of the Foundation is to financially support long-term and innovative cultural projects, thus stimulating regional culture in a wide sense. One of the underlying aims of this is to encourage economic growth and development in the regions.

The Royal Swedish Academy of Sciences

http://www.kva.se/KVA_Root/index_eng.asp

The Royal Swedish Academy of Sciences has during the recent years shown a strong commitment in the museums possibilities to engage in research. They cooperate with Riksbankens Jubileumsfond in financing a doctoral program at the Nordiska Museet and establishing a post doctoral posts/jobs at the central museums, authorities, archives and libraries in the cultural historic area.

The Swedish Foundation for Strategic Research (SSF)

<http://www.stratresearch.se/eindex.html>

The Swedish Foundation for Strategic Research was founded in 1994 with a founding capital of SEK 6 000 million from the former so-called wage-earner funds. The purpose of the Foundation is to support research in natural science, engineering and medicine that will strengthen Sweden's competitiveness. The Governing Board of 13 members is appointed by the Swedish government

2 Practices

2.1 Past projects

Projects that have become significant milestones in the history on digital media in Swedish cultural heritage are the following.

Installations

Avesta Verket

<http://www.verket.se/>

Verket i Avesta is a large scale immersive installation where the visitor uses a flashlight to experience how the iron works was used in the old days.

Verket i Avesta won 2005 The Best in heritage –award from the European Heritage Association.

This representation of the blasting iron works gives different visitors a phenomenal and attractive experience as well through pedagogical as narrative layers. The use of augmented reality interface inside this old industrial iron plant, creates an excellent contrast between the declining industrial society and the rising information society.

An Interactive game in Gamla stan – The Dead Children

http://www.nordichandscape.net/sverige/g_sspel.htm

During five occasions in September 2005 the interactive story game was tested in the Old Town of Stockholm. In the game the mobile phones turns into receivers of remembrances of feelings from the past. By the received feelings the participants were guided through the Old Town of Stockholm.

Historical Digital Theatre

<http://www.cdisweden.com/eng/artiklar/uddateater.html>

DI has collaborated during the summer of 2004 with Udda Joxx Kultur in a project exploring the use of digital media in a theatre performance. We have seen digital technique being used in many cultural contexts and now wanted to find out which digital media could add an extra dimension to a theatre performance. The historical background to the project was the “Svinhuvud” dynasty, which has been important in the history of both Falun and Sweden.

Måns Nilsson Svinhuvud had a role prominent in Gustav Wasa’s assumption of power in Sweden in the 16th century.

Web Sites and On-Site Kiosks

Akvas bank of knowledge – an interactive learning method

<http://www.kks.se/templates/ProjectPage.aspx?id=4527>

<http://www.akva.net/>

http://www.pite-havsbad.se/cgi-bin/pitehavsbad/meny/frameset.cgi?menu_top=menu_top_p.html&clickflik=6&meny=swe_vad_gora_privat.txt

The aim for the project is to search for new ways to with IT and interactive media develop and spread knowledge about the echo-system, history, culture and the trade and industry around the area of Pite älv. A way to strengthen the identity and create a foundation of development in the area around Pite älv.

Address Fittja

<http://www.kks.se/templates/ProjectPage.aspx?id=4523>

<http://www.adressfittja.com>

Address Fittja is a site about the cultural heritage and the spreading of knowledge in a village built up round a crossroad. There are nearly 7000 people in Fittja speaking 470

different languages. Fittja is an old settlement with an ancestry from different epochs. With the help of interactive media Fittja wants to present the cultural heritage in a mix with the present and with the dreams of the future.

An interactive coffee table

<http://www.tii.se/v4m/activities.htm>

A digital application, "Dreams about living in Stockholm" aims to combine a social activity like having a coffee with the one of art exploration.

The prototype is under construction to be exposed at Stockholm's City Museum as a part of the Interactive Salon.

Mobile guide in the footsteps of Arn

<http://www.nordichandscape.net/sverige/arn-e.htm>

In cooperation with Skara Museum, Nordic Handscape runs the pilot project "In Arns Fotsteps, a mobile guide". The tests will be held on different locations in Västergötland, Sweden, held together by the project "In Arns Fotsteps". The concept for the mobile guide is that you call a phone number to a voice-server that tells you information about the place.

The Internet window to Swedish museums

<http://www.museifonstret.se/>

The 24-hour museum is a website/portal where schools can find information and learning material on the Swedish museums webpages. The 24-hour museum is managed by the Swedish schoolnet and the Museum of National Antiquities commissioned by the Swedish National Agency for School Improvement with a financial support by The Swedish National Council for Cultural Affairs.

From the seal to the battery charger – Objects tell stories

<http://www.stadsmuseum.stockholm.se/>

The Stockholm City Museums first interactive exhibition, "From the seal to the battery charger – objects tell stories". With a handheld and a pair of earphones the city and objects come alive. The handhelds visualize the parts of Stockholm that do not show and no longer exist.

The Maya-game at the Museum of National Antiquities

<http://www.historiska.se/exhibitions/2006/maya/>

Students from schools can choose between different characters in the Maya-game when they come to the museum. With the help of fictitious interviews and other sound and image arrangements the student's character guides him or her through the exhibition at the museum.

2.2 On-going projects

Installations

Mobile guide in the in the Old Town of Stockholm

<http://www.nordichandscape.net/sverige/guide-e.htm>

Mobile guide at Ale stenar

<http://www.nordichandscape.net/sverige/ales.htm>

Digital guide at Birka

<http://www.nordichandscape.net/sverige/birka.htm>

E-guide for Falun World Heritage

http://www.cdisweden.com/eng/artiklar/e_guide.html

Web Sites and On-Site Kiosks

The Museum of National Antiquities own educational pages on their web site.

<http://www.historiska.se/learning/index.html>

Graninge works II

<http://www.iska.nu/ipage.asp?id=163>

Projekt Digitalisering

<http://www.iska.nu/ipage.asp?id=112&pid=85>

<http://www.sollefteamuseum.com/97.html>

2.3 Virtual heritage content producers

Software Tools companies:

<http://www.nordichandscape.net/sverige/index-e.htm>

2.4 Journals and links to sites of interest

Links:

<http://www.sics.se/>

<http://www.tii.se>

<http://www.verket.se>

www.hicira.org/swe/pdf/svedese.pdf

www.raa.se/publicerat/9172094109.pdf

[www.vv.se/fud-resultat/Publikationer_000001_000100/
Publikation_000086/VisaVag_projektrapport.pdf](http://www.vv.se/fud-resultat/Publikationer_000001_000100/Publikation_000086/VisaVag_projektrapport.pdf)

Books and essays:

Alzén, A. and Hillström, M. (eds.) *Kulturarvet, museerna och forskning, Report from a conference 13th-14th of November 1997*. The Bank of Sweden Tercentenary Fund & Gidlunds Förlag.

Bolin, H. (ed.) (2001). *Kulturarvsvetenskap – utbildningar och sektorsbehov*. Röster från en konferens om kulturvetenskapliga utbildningar vid Riksantikvarieämbetet 12 oktober 2000.

Aronsson, P. and Hillström, M. (ed.) (2005). *Kulturarvens dynamik*. Det institutionaliserade kulturarvens förändringar. Linköpings universitet Grundberg, J. 2000.

- Grundberg, J. (2004) *Historiebruk, Globalisering och Kulturförvaltning. Utveckling eller konflikt*. Göteborgs universitet, Institutionen för arkeologi, Gotarc Series B no. 28 & Etour. Riksantikvarieämbetet.
- Snickars, F. (ed.) (2001). *Culture, Society and Market*. The Swedish research seminar held at Sigtuna, January 24-25, 2000. The Bank of Sweden Tercentenary Fund and the Swedish national Council for Cultural Affairs.
- Gottlieb H., Geijer L. and Insulander E. (2005). *Det kändes som om man var där*. The Stockholm Institute of Education.

Bulgaria

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ICOMOS Bulgaria

1. Policies

Institutional framework

The government implements its policy on preservation of cultural tangible heritage at both central and local level. But the need to mobilize a wide range of call for the active support of the business world, private owners, the voluntary sector and society at large

National administrations

1. The Ministry of Culture

The Ministry of Culture formulates, administrates, coordinates and exercises control over the implementation of the government policy in the sphere of protection and promotion of the cultural-historical heritage; it also allocates the subsidy from the state budget allotted for protection of the cultural-historical heritage

1.1. The National Council for the Preservation of the Monuments of Culture

The National Council for the Protection of the Monuments of Culture assists the Minister of Culture in his activities relating to the preservation of the immovable monuments of culture.

1.2. The National Institute for the Monuments of culture (NIMC)

The National Institute for the Monuments of culture (NIMC) is a body within the Ministry of Culture, for assisting the Ministry in the implementation of the state policy for the protection of the immovable monuments of culture. According to its statute it provides among other issues

- Research, study, documentation, declaration and registration of the immovable monuments of culture and the monitoring of them;
- Maintenance and administration of the National Archives Fund of the immovable monuments of culture;
- Scientific research and training in the field of preservation of the immovable cultural-historical heritage;

2. The Ministry of Regional Development and Public Works

The Ministry of Regional Development and Public Works takes part in the activities for protection of territories, which are protected pursuant to The Monuments of Culture and Museums Act,

3. The Ministry of Environment and Water

The Ministry of Environment and Water formulates and enforces the government policy in the sphere of the preservation of protected natural areas in compliance with the

Protected Areas Act. This Ministry has units, at both regional and local level, which monitor and exercise control over the conducting of environmental protection activities

4. The Governmental tourist agency

Among other tasks, it develops and enforces the national policy for the development of cultural tourism; it approves of thematic cultural routes related to the cultural-historical heritage, which are of national and European importance, as well as, with the involvement of the municipalities, local cultural routes.

5. The Bulgarian Academy of Sciences

The Bulgarian Academy of Sciences conducts activities in connection with the research and promotion of the cultural-historical heritage in the following of its institutes:

- Archaeological Institute and Museum;
- Architectural Science Centre;
- Science of Art Centre.

6. Governmental agency for information technology and communication

This governmental agency implements the policy on effective use of information technologies and communications, aiming to build up information society for insuring speeded socio-economic development of the country. It provides and enforces policy for integration with European Union. One of the departments, named “Information society and information technology;” elaborated strategies for development of this sector, defines the priorities, and formulates the principles for

services in Information society, including e-government. The department “Innovations and management of projects” is responsible for funding, national and regional projects (including cultural topics), updating of the infrastructure.

Regional and local government

The heritage preservation is implemented at regional and local level through the state structures and the local government bodies (i.e. municipalities).

State structures

The Ministry of Culture administrates and supervises the preservation of the immovable monuments of culture with the assistance of the district administration.

The District Governors enforce the state policy for preservation of the cultural-historical heritage on the territory of the respective district

The regional historical museums facilitate the implementation of the state policy for preservation at regional level. They take part in the preparation of the suggested allocation of funds from the state budget for restoration and conservation, exercise supervision on the monuments of culture preservation, promote the cultural heritage and assist the municipalities in the preparation of programs and projects for preservation of the monuments and for raising investments and aids.

The local self-government bodies

The Municipal Councils, mayors of municipalities and mayors of regions and mayoralities take part in the preservation of the immovable cultural-historical heritage within their territory by: preparing suggestions for granting, exercising control over the condition of the immovable monuments of culture; determining the subsidies from the municipal

budget and the Municipal Culture Fund for preservation and promotion of the cultural-historical heritage

Specialized municipal units with defined functions in the running and preservation of the monuments of culture operate in certain municipalities, within the territory of which there are reserves, as well as in the municipalities of Sofia and Plovdiv (the two biggest cities in Bulgaria, having the largest number of monuments of culture) and in the municipality of Nessebar (World Heritage); these units are as follows:

The municipal historical museums deal with such activities, too, but at a lower level – only within the territory of the respective municipality

Legal regulations

1. Monuments of Culture and Museums Act

This Act regulates the protection and promotion of the monuments on the territory of the country and the development of museums organization. The Act points out the Ministry of Culture as the main subject of state administration of the process of the cultural-historical heritage protection.

1.1. Some regulations by the Ministry of Culture,

- Ordinance No. 6 on Usage and Presentation of the Immovable Monuments of Culture
- Ordinance No. 26 on the Development, Usage and Management of the Automated Information System “Archaeological Map of Bulgaria” (The Official Gazette No. 34 of 1996)

2. Culture Protection and Development Act (The Official Gazette No. 50 of 1999).

This Act stipulates the main principles and priorities of the national cultural policy for protection of the culture. The Act settles the establishment of the National Fund “Culture” and the municipal funds “Culture”, which support the development of culture by raising, managing and spending the funds destined for implementation of the national and municipal policy in the field of culture.

3. Territorial Development Act.

Regarding cultural heritage, this Act provides rules for implementation of *integrated conservation* according to the three Conventions – for architectural, archaeological heritage and for cultural land scapes.

4. Important role is defined to the Voluntary organisations

The activities of the voluntary and non-governmental organizations in Bulgaria are regulated by and in compliance with:

4.1 The Not-for-Profit Legal Bodies Act (the Official Gazette No. 81 of 2000), entered into force on 01.01.2001. According to this Act the voluntary organizations – associations and foundations – should be registered as Legal Bodies whose activity for the benefit of society may be encouraged and assisted by the State by means of taxation and other financial and economic preferences.

4.2 The European Social Charter (revised) ratified pursuant to a law passed by the 38th National Assembly on 29th March 2000 (The Official Gazette No. 30 of 2000) and issued by the Ministry of Labour and Social Policy (The Official Gazette No. 43 of 2000)

Funding of ICT applications

Reliable information about funding ICT applications is extremely hard to come by owing to the wide variety of budgets involved (central government, local authorities, public institutions or quasi-public agencies, etc). One thing that is true is that, in the years ahead, the public sector is going to be ever less capable of footing the heritage bill and its presentation, with the result that cross-funding, involving contributions from various sources, will become ever more essential in order to finance projects of any size.

Provisions for use of ICT into cultural projects and special funds for ICT applications are at initial state. Currently a law for implementation of ICT has been preparing

Although the implementation of IT is very rapidly developing in the country, it is still focussed on business and administration sectors. In the cultural field indispensable is the usage of new technology, the training for personnel; the communication between the institutions and maintenance and updating of the facilities)

Networks and associations.

The dynamic times of transition from central to market economy and the near inclusion of the country in the European Union fostered numerous initiatives for implementation of IT in cultural field. The development of IH heritage is still at initial stage. but important steps forward have been made. The government issued National Plan for Development for the period 2007-2013 and National Strategy for Development of Information Society. In these documents it is clearly stated that key points towards information society and integration in European Union is the development of education (through usage of ICT), science and culture. Special attention is paid to cultural heritage and its best presentation, as a resource for cultural tourism industry.

At present the organisations supporting the development of IH through promoting and/or subsidising Programs and Projects are:

1. at international level:

- European Union
- UNESCO – through the Bulgarian Commission of UNESCO
- The British Council
- The Japanese Government

2. at national level:

- The Presidency
- The Government
- The Ministry of Culture
- Governmental agency for information technology and communication
- Bulgarian Academy of Science (BAS)
- Universities
- Professional NGOs in cultural domain
- Private sector

3. at local level

- Municipalities

- Regional Districts

2. Funding sources and projects

Funding sources, public and private,

Public sources

1. Central government

The Republican Budget regarding heritage is submitted according to the following scheme:

- Through the annual budget of the Ministry of Culture (for monuments, sites, archives, museums, monitoring). A system has been established for controlled assignment of conservation activities (by means of regulated tenders)
- Through the budget of the Ministry of Finance (occasionally ensures loans for research and protection of the monuments discovered in the course of construction works)
- Through the Department of Ecclesiastical Matters with the Council of Ministers (ensuring funds if the site is a place of worship,).

2. Regional and local government

- Annual targeted subsidy from the Ministry of Culture
- Municipal budgets
- The Municipal Funds “Culture”,

The amount of sums from p.2 vary depending on the heritage needs, located at a certain municipality

Private sources

- The owners of monuments - no officially published data for that
- Foundations, national and international non-governmental organizations:

Example: ICOMOS/Bulgaria ensured from:

- Japanese Government - \$1 000 000 – ongoing project
- ” A.G. Leventis Foundation”, Cyprus – around \$ 200 000 for the last 3 years
- World Monument Fund - around \$ 120 000 for the last 3 years

There is no officially published statistics on private funding yet. Recently a law on donations was passed, aiming to support social development and culture including

3. Practices

On-going and past projects

1. Virtual school of European cultural heritage

Funded by EU Program Culture 2000,

Open to 39 countries

Partners: Bulgaria (Foundation) Spain (CECE-Confederation of the Spanish Educational Centres), England (Norton Radstock College)) Germany (BBS Technik ILudwigshafen)
Prepared 2002

2. Cultural corridors of South –East Europe (2005, 2006).

Supported by Bulgarian Presidency and UNESCO and UNESCO,

Participants: all the countries from SF Europe

3. Digitalization of the archives if the Ethnographic Institute and Museum , Bulgarian Academy of Science

4. Repertorium of Old Bulgarian Literature and Letters:

<http://clover.slavic.pitt.edu/~repertorium/index.html>

The **Repertorium of Old Bulgarian Literature and Letters** was conceived as an archival repository capable of encoding and preserving in SGML (and, subsequently, XML) format archeographic, palaeographic, codicological, textological, and literary-historical data concerning original and translated medieval texts represented in Balkan Cyrillic manuscripts. The files are intended to serve both as documentation (fulfilling the goals of traditional manuscript catalogues) and as direct input for computer-assisted philological research.

3 Good practices

Lately the e-government is functioning in Bulgaria, it refers not only about technological change, but also about re-structuring of the public sphere itself. The information society (IS) has much deeper implications, including re-design of the power relations in society, re-consideration of the role of the state and the functions of the public administration. That definitely supports the implementation of ICT in cultural heritage sphere.

4 Books, papers and essays

- Brochure named “Contemporary IT solutions in cultural heritage domain”, Institute on mathematic and informatics, Bulgarian Academy of Science.
- The electronic multi-topical “Journal of International Research Publications” is issued by Science Invest Ltd.- branch Bourgas with cooperation of the Scientists’ union in Bulgaria.

The main goal of the publisher is to extend the opportunities and to shorten the terms for publishing of the scientific results, given by Bulgarian and foreign scientists and specialists.

The journal is issued in English. The journal is multi-topical, which means that there are articles from different trends of science published.

The journal is issued in two formats:

- **Online HTML & SWF format** of the virtual server: <http://www.ejournalnet.com>

- **In offline version on CD Rom** the content of the journal is published for a publishing year in format: **eJournal Offline** /HTML & SWF/

The journal is financed by its own incomes and by sponsors.

5 Needs

The most relevant needs concerning IH (policies, funding, training, research, etc.) perceived referring to Bulgaria are:

- New law on Cultural heritage (with requirements for standardised collection of data, management and presentation of heritage assets in modern ways)
- More funding and better mechanisms for attraction sponsorships
- Regular training of professionals and education of public in appropriate ways
- Development of research on IH and collaboration with research centres abroad

6 Final comments and notes

Regarding the impact of implementation of national and Community policies on ICT Applications to Cultural Heritage – there are no statistics, but what I observe in my practice as a professional is that it has been very well accepted and , relatively rapidly implemented, and needs to be enlarged.

Regarding training, at present attention is paid to the training of the professionals (<http://daskalo.com>)

The dissemination of projects is pretty well organised (web, publication, training courses, etc), but the projects are insufficient in number. In general, this field needs more rapid development and intensive exchange of expertise on regional and European level. The richness of the cultural heritage in the country requires diverse instrumentation, broad approach and high level of education.