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heritage sites

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Editor: Halina Gottlieb  
The Interactive Institute

***Basic Guidelines for  
Cultural Heritage  
Professionals in the Use  
of Information Technologies***

How can ICT support cultural heritage?





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# ***Basic Guidelines for Cultural Heritage Professionals in the Use of Information Technologies***

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In recent years, digital heritage has begun to transform the process of re-creating and understanding the past. This new field, which integrates the traditional expertise of heritage management, museology, history, and archaeology with the powerful new tools of digital information technologies, has tremendous potential for addressing the new challenges and concerns of the heritage sector in the 21<sup>st</sup> century.

Within the heritage and historical disciplines, the past is no longer only the domain of specialised scholars, but is also seen as a resource for the economic development of local communities and regions, a medium for cultural identity and cross cultural communication, an edifying destination for cultural tourists, and a focus for educational enrichment. At the same time, the digital information and communications technologies (ICT) have

produced a wide range of applications for collecting and processing historical data, documenting and monitoring the physical conservation of objects and monuments, visualising historic structures and environments, and creating interactive information networks that can link professionals and scholars with students, museum-goers, and interested amateurs. The integration of heritage with digital technology has already shown the potential for greatly enhancing many aspects of the research, management, and public involvement in the material remains of the past.

However, it is important to understand that ICT is a complex field whose contribution to cultural heritage can only be realised if it is utilised in effective, sustainable ways. It cannot be considered an immediate or magical cure-all. Cultural heritage

professionals must understand what ICT can do, and in which situations or contexts it is most effective. With the rapid development of digital applications for historical research and public heritage presentation, the integration of digital technologies into the field of cultural heritage must be undertaken with the full awareness of their potential uses and effects.

This KNOWHOW booklet, based on principles in the final draft of the *ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites* (informally known around the world as the “Ename Charter”) and on the *EPOCH Sector Watch surveys and Research Agenda*, will offer cultural heritage professionals important examples of how emerging digital applications and methods can serve their wider needs.

## What are these guidelines based on?

Working with the partners in the EPOCH Network of Excellence, the Ename Center for Public Archaeology and Heritage Presentation participated in the *EPOCH Sector Watch* activities, as well as in the drafting of the *ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites*. Both initiatives, which sought to enhance the effectiveness of ICT technology in the cultural heritage field, contributed to the formulation of the guidelines described in this KNOWHOW booklet.

### *Bridging heritage and technology in EPOCH's Sector Watch*

From the inception of the EPOCH Network, its Sector Watch activities focused on creating an overview of the status and technology needs of the cultural heritage sector, in order to enhance the cross-disciplinary understanding of all aspects of the use of ICT in this field.

This activity consisted of a detailed inventory of the ICT needs of various classes of cultural heritage stakeholders, an inventory of technologies that were or could be used in processing cultural heritage data and an analysis of success factors in the implementation of ICT systems and usability of applications.

### *The Draft ICOMOS Charter on the Interpretation and Presentation of Cultural Heritage Sites*

The purpose of the ICOMOS Charter for Interpretation and Presentation of Cultural Heritage Sites is to define the basic principles of *Interpretation* and *Presentation* as essential components of heritage conservation efforts and as a means of enhancing public appreciation and understanding of cultural heritage sites.

ICOMOS (the International Council on Monuments and Sites) is a worldwide professional association of approximately 7500 members working for the conservation

## Considerations for integrating ICT with cultural heritage

The following are a few basic questions which are directly relevant to the integration of ICT in the cultural heritage sector, and are also central to the goals of conservation and public appreciation of heritage:

- What are the accepted and acceptable objectives for the Interpretation and Presentation at specific cultural heritage sites?
- How can ICT assist heritage professionals in achieving their research, administrative, curatorial, and interpretive/educational aims?
- What considerations should help determine the choice of digital heritage applications given their wide variety of specific forms and techniques?

and protection of cultural heritage sites through 105 national committees and 23 specialised international scientific committees.

Throughout the drafting of the proposed ICOMOS Charter, principles that would ensure the efficacy and sustainability of ICT were a continuing, important concern.

### **Why the need for principles or guidelines?**

The evolving field of using ICT within cultural heritage has in recent years produced a wide range of applications for scholarly research, public interpretation, and the marketing and management of cultural heritage sites. The natural focus of the activities of the EPOCH network has been specifically to identify and to develop practical applications and actions that address the existing challenges to effective and efficient integration of cultural heritage and information technology. These are not simply engineering challenges, however, as effective integration must also take into

account the current transformations and emerging structural trends in the field of cultural heritage itself.

The interface of culture and technology upon which EPOCH focuses its efforts is not a static boundary, but a shifting area of potential collaboration, where institutions in both the ICT and cultural heritage sectors face challenges from changing economic conditions, evolving government policies, and altering intellectual perspectives. In addition to these challenges are the intensifying physical threats to heritage of all types brought on by urbanisation and climate change, the ever-expanding marketisation of culture, and the use of heritage in constructing social identity in an age of increasing cultural diversity. The manner in which ICT will be able to meet these new demands will determine whether its future role in cultural heritage will go beyond the mere application of 3D-visualisation or the enhanced presentation of scientific information.

What makes the field of cultural heritage a particularly complex field for ICT integration are its ever-widening dimensions. Vernacular architecture, industrial installations, cultural landscapes, battlefield remains and the countless forms and expressions of popular and folk culture (including hand-woven textiles, photographs, posters, and personal memorabilia, etc.) are now expanding the traditional borders of what is legitimately considered to be cultural heritage. Even though the accepted methods of collecting and preserving intangible heritage are still being discussed and crystallised, the close relationship of intangible ideas and traditions to material objects, artifacts, and cultural spaces suggests that “material” and “intangible” are not separate categories of cultural heritage resources, but parts of an evolving whole in which the ideational and the physical are becoming inextricably intertwined. Thus traditional notions of data collection, structure, and analysis and metadata standards must also take into account the non-physical as well as physical evidence.

In this dynamic and ever-changing heritage environment, the need for basic guidelines has become clear.

This KNOWHOW booklet is intended to provide a basic introduction to six major areas in which ICT can, if appropriately and effectively utilised, make a contribution to the enhancement of cultural heritage for both professionals and the general public:

- Intellectual and Physical Access
- Documentation and Site Recording
- Multiple Interpretive Contexts
- Preservation of Authenticity
- Balancing Visitorship with Conservation
- Facilitating Public Participation

The following pages will focus on these thematic areas in greater detail and will describe some specific case-studies in the effective use of ICT in each.

## Intellectual and physical access

A basic goal in the contemporary management of heritage resources is to facilitate a broad public awareness and appreciation of cultural heritage sites. The *accessibility* of these sites should be of both *physical* and *intellectual* character, providing the public with the opportunity to visit a site, and to have the benefit of detailed, up-to-date historical information about it.

Effective interpretation and presentation should enhance experience, increase public respect and understanding, and communicate the importance of conservation of cultural heritage sites.

ICOMOS Ename Charter Principle 1.1

Before the advent of ICT, the objectives in the Ename Charter were often difficult to achieve due to the static nature and space limitations of descriptive panels

and uniform visitor itineraries. But with the rapid evolution of ICT in recent years, cultural heritage professionals now have almost unlimited opportunities to expand the access of the general public to an impressive range of text-based and multimedia information.

An interesting example of current possibilities for dramatically increased information access through digital technology is the **ARCHEOGUIDE project**, first developed at the site of Olympia in Greece. This project offers a compelling, user-friendly flow of heritage information to the visitor through an ICT system that links augmented reality, 3D-visualisation, mobile computing, and multi-modal interaction techniques.

The **ARCHEOGUIDE** system consists of a site information server and a set of mobile units that are carried by visitors. A wireless local network allows the mobile units to communicate with the site information server. In addition, the site is equipped with





Outfitting a visitor with an Archeoguide augmented reality binocular

a locational tracking system to determine the position and orientation of users wearing the equipment.

When in use, the visitor can access information about the specific areas he or she is walking through and gain a visual impression of the original appearance of the site through augmented reality reconstructions. In fact, it will change and enhance the visitor's personal experience of the site through immersion in content-rich



View on the Philippion Temple at Ancient Olympia, Greece

digital environment that complements the physical experience. A very different challenge is encountered at sites or monuments where substantial parts of the cultural heritage are inaccessible, damaged, or lost. The use of off-site 3D-reconstructions can be useful in resolving the apparent contradiction between a legitimate concern for the physical conservation of a particular monument and the public's right to have access to its cultural heritage.



What a visitor using Archeoguide sees with augmented reality

In cases where physical access to a cultural heritage site is restricted due to conservation concerns, cultural sensitivities, adaptive re-use, or safety issues, interpretation and presentation should be provided off-site.

ICOMOS Ename Charter Principle 1.6

An innovative example can be seen in the techniques of ICT documentation and presentation used at the beautifully sculpted **cenotaph** (or empty tomb) of **Emperor Maximilian I** in the Hofkirche at Innsbruck, Austria, the residence of the Habsburg Dynasty from 1420 to 1665. The Hofkirche, with its tomb of German Emperor Maximilian I in the center of its nave, is one of the most famous and outstanding historical monuments in the state of Tyrol.

Despite its cultural significance, for centuries the emperor's tomb had been screened from visitors by a black iron lattice and its finely carved marble reliefs were covered by glass, further obstructing visual access to the monument. However, during brief restoration works in 2002, the lattice and glass plates were temporarily removed, permitting a complete metric documentation of the cenotaph and the construction of a detailed 3D digital model that would be available even after the monument was re-covered with glass plates and enclosed in the latticework.



View for the first time of the cenotaph of Emperor Maximilian I without lattices and glass plates

Researchers from the University of Innsbruck, under the direction of Prof. Klaus Hanke, used both close-range photogrammetry and 3D scanning techniques. A common geodetic control point system was installed for both methods. Photogrammetric work consisted of stereo pairs and separate color images. 3D scanning was accomplished with a MENSII S25 for the overall structures and a GOM ATOS II at high resolution for the relief plates.



3D reconstruction of the cenotaph of Emperor Maximilian I



Different perspectives of reconstructed details from the cenotaph

With the GOM scanner, several scans had to be taken for every plate because of the limited field of view at high resolution and to reduce the amount of hidden areas due to the complex 3D scenes. But the result was a highly accurate and detailed visualisation for both scholarly and public use.

These examples show the enormous potential of ICT to enhance access to cultural heritage sites and the information they contain.

## Documentation and site recording

Making cultural heritage sites accessible and understandable both to scholars and the general public is dependent above all upon data, on the kind of information that has been collected (through architectural studies, archaeological excavations, archival research, and materials analysis) and the way in which that data has been structured.

In recent years, great strides in the management and processing of heritage data have been made with the development of a wide range of digital database applications and Geographical Information Systems (GIS), whose potential for cross-referencing and comparison is great. In addition to structural and physical data, new categories of intangible heritage are now being systematically collected and inventoried. ICT can offer new applications to link the entire spectrum of heritage resources.

Interpretation should show the range of oral and written information, material remains, traditions, and meanings attributed to a site. The sources of this information should be documented, archived, and made accessible to the public.

ICOMOS Ename Charter principle 2.1

Digital visualisations, including Virtual Reality and 3D reconstructions, have recently become important elements of the documentation of cultural heritage sites. New ICT applications have begun to utilise visualisations in a systematic way.

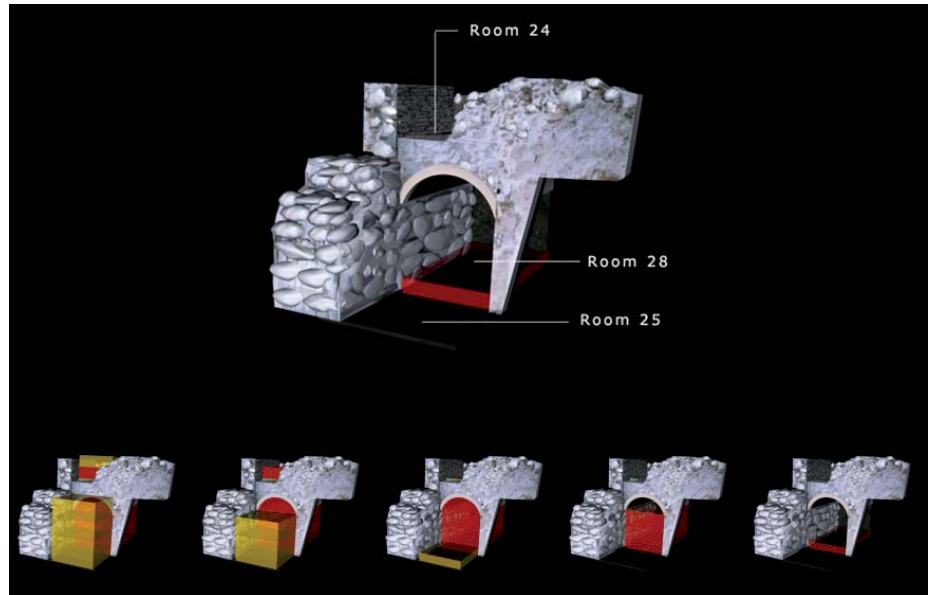
One of the most comprehensive efforts to collect and structure visualisation data is the **3D MURALE DATABASE PROJECT** carried out at the site of Sagalassos in Turkey. This project developed methods of photogrammetric reconstruction by calibrated cameras to acquire multiple

pictures of an object or landscape to determine its position and shape. The advantage of using photogrammetric reconstruction in comparison to other techniques is that it delivers high accuracy 3D data. In addition, this portable technology can easily be taken into the field. The information collected was then processed in a stratigraphic visualisation tool, **STRAT**, to provide plan, profile and perspective views of the data, allowing for the temporal structuring and visualization of landscapes, buildings and objects.



A typical digital camera with calibration target and camera positions tagged by pyramids

In this way, the data on which the visualisations are based, as well as the visualisations themselves, are clearly documented, enabling



Example 3D view using STRAT. Different levels can be seen

alternative or refined reconstructions based on the same evidence to be made.

The same is evident in database applications specifically designed to collect, curate, and

communicate data relating to community memory and intangible heritage, such as the **MUVI, the VIRTUAL MUSEUM OF THE COLLECTIVE MEMORY OF LOMBARDIA**, in which the photographs, personal

memorabilia, and memories scattered through different family archives in the region of Lombardy are collected and made publicly accessible.

As both examples show, the great potential of ICT in the documentation of cultural heritage is not only the efficiency of cataloguing and the accuracy of documentation, but the possibility of establishing thematic, geographical, historical, and anthropological connections that would not otherwise be seen.

### Multiple interpretive contexts

Cultural heritage sites often have multiple functions, ranging from the religious to the recreational, and these varying (and sometimes conflicting) functions pose a special challenge for a well-balanced presentation of perspectives and interpretations to the visitor. A primary goal of both research and public interpretation of cultural heritage sites should be to show how they relate to their surroundings.

Interpretation should explore the significance of a site in its multi-faceted historical, political, spiritual, and artistic contexts. It should consider all aspects of the site's cultural, social, and environmental significance and values.

ICOMOS Ename Charter principle 3.1

ICT is uniquely suited to offer a wide range of information types and perspectives to visitors at cultural heritage sites. At the ancient Indian capital of Hampi, for example, **Icinema's PROJECT PLACE-HAMPI** conjoins three kinds of narrative spaces in a modular interactive cinema. Each relies on different sources of information and each provides a different perspective on the site. Today, the old Vijayanagara capital is still an active pilgrim site, not simply an historic area, and the cylindrical displays comprise augmented high resolution stereoscopic panoramas that present the most significant archaeological, historical, and sacred locations at the site.



Panoramic stereo camera used on location for Place Hampi

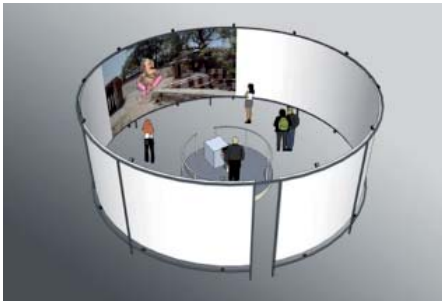


Capturing the movements of a dancer

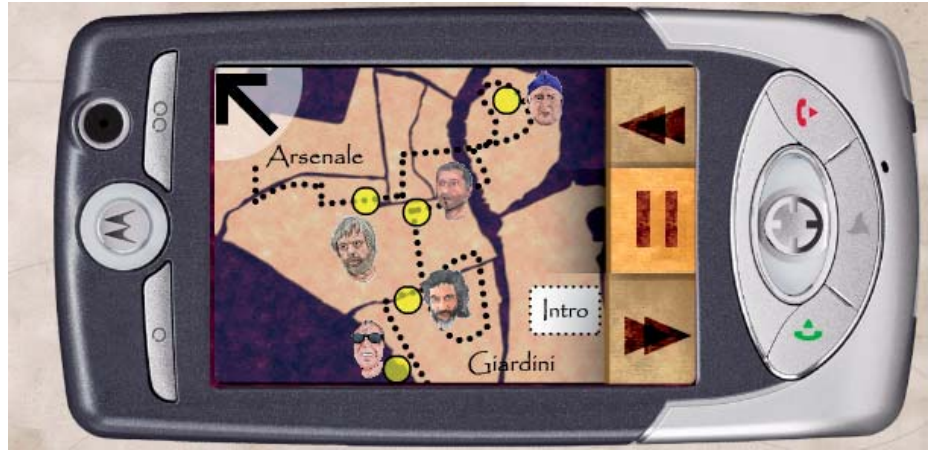




Virtual character embedded on stereoscopic image



Place Hampi setup with central platform module



History Unwired is a walking tour delivered through multimedia phones and PDA's

A less elaborate, though effective, digital method for the public interpretation of a site's range of oral and written information, material remains, traditions, and personal testimonies is illustrated by the **HISTORY UNWIRED PROJECT** that was tested in Venice and sponsored by University of Architecture, Venice and the MIT Department of Urban Studies and Planning.

History Unwired offers visitors a walking tour through one of Venice's more hidden neighborhoods, delivered through location-aware, multimedia phones and PDAs. Developed in 2005, this project was a first-ever mix of mobile video, animation, audio, and Bluetooth locative technologies in the tourism sector. The tour takes visitors around the neighborhood of Castello, one of Venice's



With History Unwired visitors can walk around freely and learn about local life in Venice

lesser-known areas, guided by the voices of Venetian citizens who depict a particularly local experience of art and craft, history and folklore, and public and private spaces.

Both projects illustrate the potential of ICT for offering simultaneous or alternative streams of interpretive content that can significantly contribute to the visitor's appreciation of the full range of meanings and significance connected with cultural heritage sites.



The interface is simple and easy to use

### Preservation of authenticity

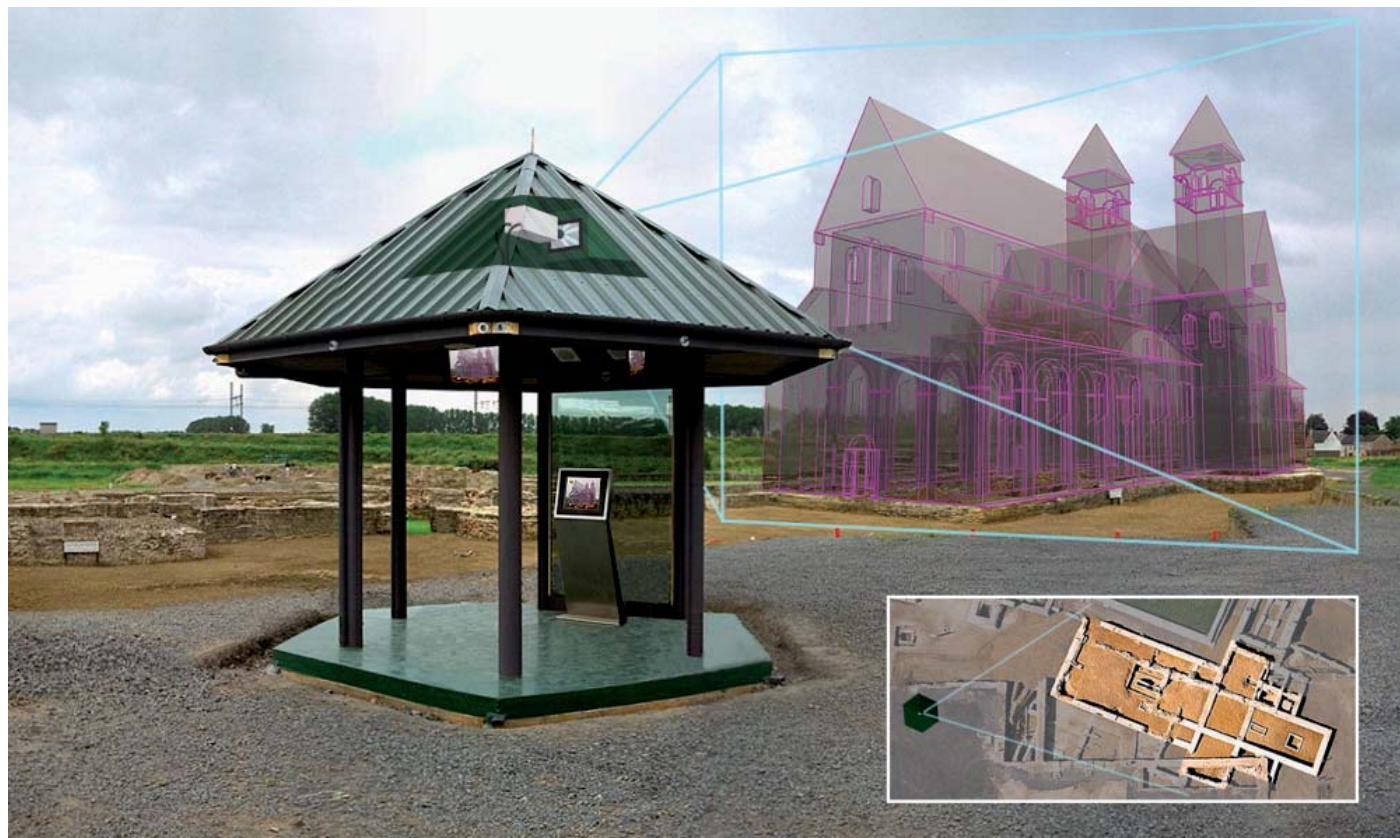
One of the cardinal principles of heritage conservation is respect for the original fabric of historic structures and in-situ archaeological remains. Indeed Article 15 of the 1964 Venice Charter strongly discourages extensive physical reconstruction or alteration of the authentic remains of archaeological and historical sites. This principle has become a cornerstone of effective site management and interpretation.

Interpretation and presentation should contribute to the conservation of the authenticity of a cultural heritage site by communicating its significance without adversely impacting its cultural values or irreversibly altering its fabric.

ICOMOS Ename Charter principle 4.2

Since the 1990s, digital reconstructions of archaeological remains have been used to serve the needs of interpretive reconstruction without damaging or changing the original fabric. One of the first digital applications of this type, the interactive **TIMESCOPE** kiosk at the archaeological site of Ename in Belgium, combined live video with overlaid 3D reconstructions to allow viewers to understand the history of the site.

Further elaborations of this augmented reality approach have been produced in



Timescope kiosk at the archaeological site of Ennemy in Belgium



the context of the **ARCHEOGUIDE** and **3D MURALE PROJECTS** described in previous sections.

On-site applications such as these can provide visitors with a wealth of information that offers far more than just a 3D reconstruction, and certainly more than a static physical reconstruction ever could. The **virtual reconstruction of a Roman bath in Isthmia**, Greece, for example, both documents the evidence for the virtual reconstruction and highlights the contrast between the ancient and current appearance of the site. Undertaken as a project of the Advanced Computing Center for the Arts and Design of Ohio State University (USA), this application also includes comments by the archaeologists on why particular elements of the reconstruction were chosen, thus ensuring the possibility that the current visualizations can be reconsidered in the light of new information. This would obviously not have been possible if the

on-site reconstructions were done with physical building materials.

An even more extensive use of digital visualisations for virtual reconstruction has been tested in the **POINT DU HOC BATTLEFIELD MONUMENT PROJECT** of the Center for Heritage Conservation at Texas A&M University.

The site of Point du Hoc in Normandy is an important place connected with the 1944 D-Day Invasions, located between Omaha and Utah beaches at the tip of a sheer chalk cape that towers more than 100 feet above a narrow, rock strewn beach. Interpretation of the site is complex and includes the various German defensive structures; allied intelligence attempts to discover what the Germans had constructed on the site; the role of allied bombing in the partial destruction of the site in the two months prior to D-Day; and the role of the allied battle fleet who shelled the site on D-Day itself.

In order to capture the complexity of this short but decisive historical era, various interpretation methods are being developed. The first is the production of a 3D digital model of battery's command post, which will allow both visitors and the internet users the opportunity to examine this important building that is no longer publicly accessible. The second method is the production of two-dimensional site plans that show the destruction of the site by aerial bombing and naval bombardment. These plans are developed by combining survey data with analysis of aerial photographs taken in the months preceding D-Day as well as archival information.

With the physical conservation of heritage resources being a paramount concern for professionals in the sector, these examples have illustrated ways in which ICT-based reconstruction technologies can provide a better understanding of a site's significance while avoiding an adverse impact on the heritage resources themselves.

## Balancing visitorship with conservation

The two primary goals of the heritage sector, ensuring the physical conservation of historical sites and monuments and encouraging the public to visit them, often come into conflict when visitor numbers exceed levels that the heritage resources can bear. The impact of increased traffic congestion, pollution, vibration, and the presence of crowds in sensitive heritage settings can threaten their stability and integrity. In such cases, however, public interpretation is still important, and must be provided in different forms.

In cases where physical access to a cultural heritage site is restricted due to conservation concerns, cultural sensitivities, adaptive re-use, or safety issues, interpretation and presentation should be provided off-site.

ICOMOS Charter principle 1.6

This approach is illustrated by the **VALHALLA PROJECT** of the University of West England. Its objective is to provide web-based real-time interpretative data on historic gardens in England and France, with “hot-spot” information points generated in matching VRML viewpoints from a 3D spatial information system. The project integrates video cameras with a controllable real-time overview of the gardens; 3D models of the gardens that link through to a database and serve to interpret the video images; and a website for “virtual” visits to the largely inaccessible private gardens.

ICT can also serve as an important interpretive, and management, tool at sites where visitorship is permitted, but must be kept at carefully monitored levels. Such is the case with the **CAPPELLA DEGLI SCROVEGNI** in Padua, Italy, where ICT plays a central role in the overall conservation and interpretive design.

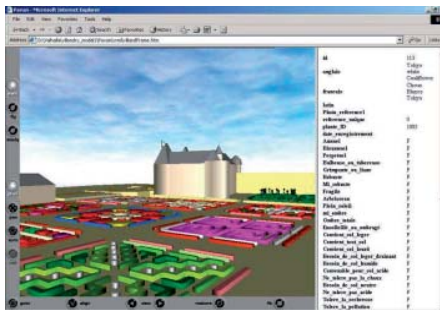
This chapel, also known as Arena Chapel, is a masterpiece of 14th century Italian painting. Over the centuries, its extraordinary



Dome camera at Hatfield house



Valhalla webmap video control



VRML model with plant data

wall frescoes have suffered damage due to deterioration from age, earthquakes, and other environmental factors. In recent years the quality of the air within the much-visited chapel has become a real concern for conservationists. A solution utilising ICT was devised both to preserve the fragile frescos and to allow the public to continue visiting the chapel. A special air-conditioned environment was created inside the edifice to preserve the

paintings from any further deterioration. The tour is limited to fifteen minutes inside the chapel. Due to this time constraint, and in order to give visitors the opportunity to fully appreciate the site, a multimedia room at a nearby museum was created with interactive workstations enabling visitors to interact virtually with the frescos through the use of real and multimedia reconstructions as well as interactive applications. This interpretive programme both conveys information about the heritage value of the site and highlights its ongoing conservation issues.

Interpretation and presentation should be an integral part of the conservation process, enhancing the public's awareness of specific conservation problems encountered at the site and explaining the efforts being taken to protect the site's physical integrity and authenticity.

ICOMOS Charter principle 5.4



Virtual reality room with frescos from the Cappella degli Scrovegni

ICT can thus be an effective tool for achieving a sustainable compromise between public interpretation and conservation when it is integrated in the wider conservation and management strategy of a cultural heritage site.

### Facilitating public participation

As public heritage broadens its categories of significance to encompass vernacular architecture, community memories, and intangible traditions, the involvement of the general public is essential, as active



Virtual reality reconstruction of the inside of the Cappella degli Scrovegni

participants rather than passive consumers of heritage experiences.

In the case of local museums or community heritage groups in particular, new structures are needed to facilitate communication, curation, and interpretation of personal artifacts, texts, photographs, and places that acquire public heritage significance. In addition, official funding programmes and heritage legislation are increasingly recognising the right of a range of official and non-official stakeholders to be heard.

The Interpretation and Presentation of cultural heritage sites must be the result of meaningful collaboration between heritage professionals, host and associated communities, and other stakeholders.

ICOMOS Charter principle 6

ICT, as a medium for communication as well as the collection and processing

of data, has facilitated a number of innovative applications for community and individual involvement in heritage. With the advent of Web 2.0, with enhanced possibilities for personal online interaction, the use of web-based technology has proven to be very successful in widening public participation.

Projects such as **COINE** (Cultural Objects in Networked Environments) encourage use of simple digital technology for sharing stories, memories, and traditions by local communities throughout Europe. Working through websites operated by heritage sites, museums, schools, and community groups, COINE enables people with even limited ICT skills to record and present stories, personal histories, and recollections; to display photographs and pictures; and to upload sound recordings and oral testimonies.

Two servers are used in the COINE system: a database server that holds all the “user-generated content” and a web server

that hosts the website to communicate with other databases. The servers can be located anywhere in the world and accessed remotely.

Another example of web-based technology used for the creation of community heritage is the **CIPHER** project, which aims to create regional online Cultural Heritage Forums that enable communities of common interest to explore, research and build content. CIPHER defines a Cultural Heritage Forum as an online space where people can participate and learn through accessing and contributing to a range of heritage resources organised around a common theme.

Even in more formalised history museums, the collection and presentation of social history contributed by community members are becoming increasingly common. The **Museu d’Història de la Immigració de Catalunya (MHIC)**, for example, used **COINE** system to collect stories on immigration in Catalonia. And along the same lines is the

public website of the **VIRTUAL MUSEUM OF THE COLLECTIVE MEMORY OF LOMBARDIA**, mentioned earlier in connection with its database for photographs, personal memorabilia, and memories scattered through different family archives on the region of Lombardy.

Examples such as these show that creative, basic ICT approaches can help broaden public participation in heritage and change the very nature and scope of community memory.

### Summary

Accessibility, multiple perspectives, concern for conservation and public involvement are all central themes in the evolving field of cultural heritage in the 21<sup>st</sup> century. The role of ICT within the cultural heritage sector reaches far beyond the collection of digitised data and the creation of impressive virtual reality.

ICT can offer scholars and visitors alike unprecedented access to historical,

archaeological, iconographical and anthropological data. It can link collections and distinct types of heritage information, contribute to the sustainable management of even fragile heritage sites and involve local communities in the creation of historical narratives and exhibitions as active participants rather than as a passive audience.

The watchwords for the future of heritage are *place*, *network*, *memory*, *identity* and *communication*. ICT can provide the context and tools for these new approaches to heritage not merely by recording, data processing and visualisation, but by helping to shape the meaning and direction of the entire enterprise.

Working closely together to address the basic themes highlighted in this booklet, and illustrated by the projects described in the other booklets of the KNOWHOW series, digital technologists and cultural heritage professionals can effectively integrate research questions, heritage objectives and emerging technologies to create more inclusive, sustainable, and meaningful methods of preserving and reflecting on the past.

## Appendix

ICOMOS Charter for Interpretation and Presentation of Cultural Heritage Sites ([www.enamecharter.org](http://www.enamecharter.org))

Archeoguide (<http://archeoguide.intranet.gr/project.htm>)

Cenotaph of Emperor Maximilian I (<http://www.isprs.org/istanbul2004/comm5/papers/588.pdf>)

3D Murale Database (<http://epubs.cclrc.ac.uk/bitstream/928/MURALE01.pdf>)

STRAT ([http://www.epoch-net.org/index.php?option=com\\_content&task=view&id=121&Itemid=216](http://www.epoch-net.org/index.php?option=com_content&task=view&id=121&Itemid=216))

MUVI, the Virtual Museum of the Collective Memory of Lombardia (<http://www.muvido.it/>)

ICINEMA Place Hampi ([http://www.icinema.unsw.edu.au/projects/prj\\_hampi.html](http://www.icinema.unsw.edu.au/projects/prj_hampi.html))

History Unwired (<http://web.mit.edu/frontiers/>)

Timescope ([http://www.ename974.org/Eng/pagina/arceo\\_concept.html](http://www.ename974.org/Eng/pagina/arceo_concept.html))

Reconstruction of Roman Bath in Isthmia (<http://accad.osu.edu/~japley/html/isthmia.html>)

Point du Hoc Battlefield Monument ([http://archone.tamu.edu/rburt/PDH%202004%20Field%20Report%20DRAFT\\_RB.htm](http://archone.tamu.edu/rburt/PDH%202004%20Field%20Report%20DRAFT_RB.htm))

Valhalla Project (<http://www.cultivate-int.org/issue7/valhalla/>)

Cappella Degli Scrovegni ([http://www.itd.ge.cnr.it/ted03/scrovegni\\_descrizione.htm](http://www.itd.ge.cnr.it/ted03/scrovegni_descrizione.htm))

COINE (<http://www.uoc.edu/in3/coine/eng/access.html>)

CIPHER (<http://cipherweb.open.ac.uk/d13/>)

## Image references

“Outfitting a visitor with an Archeoguide augmented reality binocular”- by Nicos Ioannidis and Dusan Arsenijevic, Archeoguide.

“View on the Philippion Temple at Ancient Olympia, Greece” - by Nicos Ioannidis and Dusan Arsenijevic, Archeoguide.

“What a visitor using Archeoguide sees with augmented reality”- by Nicos Ioannidis and Dusan Arsenijevic, Archeoguide.

“View for the first time of the cenotaph of Emperor Maximilian I without lattices and glass plates”, Klaus Hanke

“3D reconstruction of the cenotaph of Emperor Maximilian I”, Klaus Hanke

“Different perspectives of reconstructed details from the cenotaph”, Klaus Hanke

“A typical digital camera with calibration target and camera positions tagged by pyramids”, 3D murale

“Example 3D view using STRAT. Different levels can be seen”, 3D Murale

“Panoramic stereo camera used on location for Place Hampi” Place-Hampi Sarah Kenderdine, Museum Victoria & Jeffrey Shaw, iCinema Centre 2006.

“Capturing the movements of a dancer “ Place-Hampi Sarah Kenderdine, Museum Victoria & Jeffrey Shaw, iCinema Centre 2006.

“Virtual character embedded on stereoscopic image“ Place-Hampi Sarah Kenderdine, Museum Victoria & Jeffrey Shaw, iCinema Centre 2006.

“Place Hampi setup with central platform module“ Place-Hampi Sarah Kenderdine, Museum Victoria & Jeffrey Shaw, iCinema Centre 2006.

“History Unwired is a walking tour delivered though multimedia phones and PDA’s“ History Unwired, Untravel Media  
“With History Unwired visitors can walk

around freely and learn about local life in Venice“ History Unwired, Untravel Media

“The interface is simple and easy to use“ History Unwired, Untravel Media

“Timescope kiosk at the archaeological site of Ename in Belgium” Ename Center for public archaeology and heritage presentation

“Valhalla webmap video control” Dr John Counsell

“Dome camera at Hatfield house” Dr John Counsell

“VRML model with plant data” Dr John Counsell

“Virtual reality room with frescos from the Cappella degli Scrovegni” Maurizio Forte

“Virtual reality reconstruction of the inside of the Cappella degli Scrovegni” Maurizio Forte



# Guidelines

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The watchwords for the future of heritage are place, network, memory, identity and communication. ICT can provide the context and tools for these new approaches to heritage not merely by recording, data processing and visualisation, but by helping to shape the meaning and direction of the entire enterprise.

Working closely together to address the basic themes highlighted in this booklet, and illustrated by the projects described in the other booklets of the KNOWHOW series, digital technologists and cultural heritage professionals can effectively integrate research questions, heritage objectives, and emerging technologies to create more inclusive, sustainable and meaningful methods of preserving and reflecting on the past.

The KNOWHOW booklets are an inspirational series cataloguing existing examples of a variety of projects which use ICT for the recording, display and interpretation of cultural heritage. These booklets highlight functional information covering the design, development and implementation of ideas and their solutions, and give thoughtful suggestions for alternative applications within the cultural heritage sector. The KNOWHOW booklets aim to support people working in the area of museums, heritage sites and monuments. The information covered within the booklets benefits managers, exhibition producers/curators, pedagogues and professionals working with digital restoration, as well as those working with communication and audiences. These booklets cover projects developed by the partners of EPOCH, and are divided into the following categories: MUSEUMS, HERITAGE SITES and MONUMENTS.

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