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CULTURAL HERITAGE INTERACTIVE MULTIMEDIA BROADCAST SERVICES: PROMOTING AND DISSEMINATING CULTURAL HERITAGE SITES TO PEOPLE ON THE MOVE

Tsekleves, E & Cosmas, J
Brunel University, Department of Electronic & Computing Engineering, Uxbridge, United Kingdom

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Abstract

The confluence of mobile communications and digital broadcast technologies is being realised by means of the EU funded project, CISMUNDUS (Convergence of IP-based Services for Mobile Users and Networks in DVB-T and UMTS Systems) has ushered the start of "a new Era" where rich services, such as European Cultural Heritage, can be disseminated to tourists, visitors and people on the move.

The CHIMBS (Cultural Heritage Interactive Multimedia Broadcast Services) research project endeavours to create cultural heritage related service scenarios in order to promote and disseminate Europe's cultural heritage sites to people "on the move" employing the CISMUNDUS system architecture and application tools (DVB-T, UMTS/GPRS), empowering the cultural heritage visitor with real-time, access of a range of synchronised media at remote locations through portable devices.

This paper discusses the conceptualisation of the CHIMBS project after giving a brief mention to the current situation of the convergence of cultural heritage and IT. The research project also investigates the cultural aspects involved in disseminating cultural heritage sites amongst the European and European Union (EU) citizens bearing in mind the multicultural and polyglot nature of Europe, as well as the commercial aspects of such project, incorporating modes and ideas of reinforcing E-commerce for cultural heritage. Finally it discusses and examines the rationale behind the design of the user interface and presents the insights gained from a survey at the Museum of London in the UK.

KEYWORDS: Cultural Heritage Sites, Interactive Digital TV, European Union, User Interface, Multimedia, Portable, Location Indexing, Programme Indexing

A.1 Convergence of Cultural Heritage and IT: Current Situation

"Europe has unique and significant wealth in its cultural and scientific heritage. Digitisation of its resources is a vital activity for providing improved access for the citizen and for preserving Europe's collective cultural heritage" (The Lund Principles, Lund, Sweden 4 April 2001, IST).

The above European Union (EU) objectives and principles beget a new era that merges together cultural heritage and Information Technology (IT), resulting in a substantial number of research projects that have been and are currently being developed in the field.

The convergence of cultural heritage and IT is nowadays evident in numerous museums and cultural heritage sites. The new interactive technology employed by these cultural institutions revolutionizes the traditional purpose and mileage of the "Museum" institution (Hooper-Greenhill, E 2000:1), transforming the Museum from a dwelling of "do not touch" exhibits to an interactive place not only to visit but to participate as well (Evans, J & Sterry, P in Bearman, D & Trant, J. 1999:114).

As the new interactive multimedia mediums substitute the old and obsolete museum printed guide, visitors can now utilise the following innovative technologies (databases, networks, multimedia) to navigate, interact and access a vast range of information:
Automated Tour Guides
Information Kiosks with Touch Screens
Portable devices
Virtual & Online exhibitions
Electronic Publishing

A.2 CHIMBS : the Promotion/Dissemination of Cultural Heritage Sites

Although the variety of the above-mentioned Multimedia technologies employed by Museums today is very encouraging, not all of them offer a true interactive experience and further shortcomings limit their usefulness.

For example, automated tour guides such as headphone handsets are relatively low cost, straightforward to use, in most cases at least, but are limited in providing visitor with audio information mainly, restricting user interactivity and diversity of media and are not particularly useful for the hearing impaired. Electronic information kiosks (especially

touch screen ones) provide visitors with greater media/material sources and thus information; their fixed location, though, minimises visitors' need for immediate access and consequently prevents them from viewing an exhibit and its related information at the same time. Mobile electronic guides (PDA, pen tablet PC, etc.), on the other hand enhance portability, and if location aware, they can act as a virtual navigation/tour guide providing information when user requests it. However, their high cost, and therefore low number of such devices owned by a cultural attraction, raises the concern of insurance policies and availability issue when lending it to the public. Online and virtual exhibitions are relatively costless for cultural attractions and very wealthy in terms of information coverage and supply. In terms of 3D and virtual graphics, 3D virtual reconstructions are very impressive and educative.

What if these different multimedia technologies where combined in one? Resent technological research, such as the CISMUNDUS project (collaboration of broadcasting and mobile networks) may render this possible.

More precisely, CISMUNDUS system architecture is offering a number of tools and services (Entertainment, E-business, E-commerce, Road Transport, etc.) that allow a vast range of Media (video, audio, WWW, 3D) to be accessed from portable devices in real-time and dependant on users location, by bridging digital TV and the computer to create a new form of portable interactive digital TV.

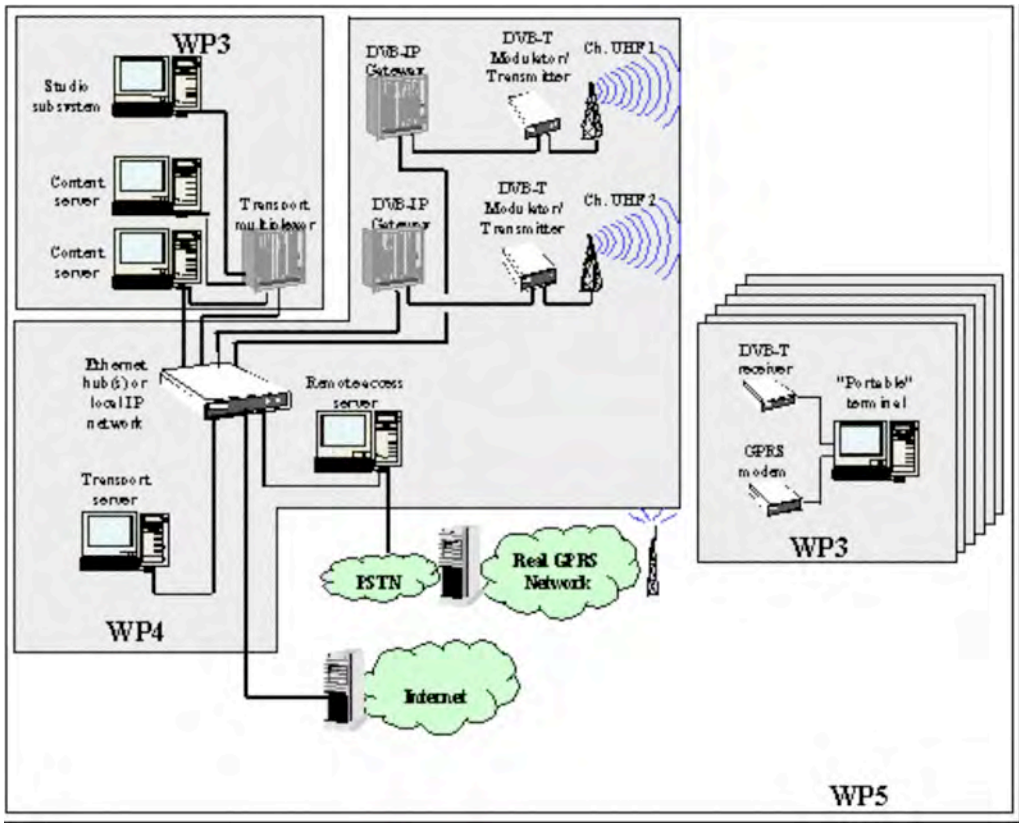

Figure I: CISMUNDUS System Architecture.

Source: Green et al (2002) The CISMUNDUS Proof of Concept Applications. Available from: http://www.brunel.ac.uk/project/Cismundus/proofofconcept.htm [20 May 2003]

This is where the CHIMBS project endeavours to translate that into a Cultural Heritage or E-Culture Service, offering the museum and archaeological sites visitor a novel interactive, informative and educative experience in the form of interactive digital TV.

This is being achieved by means of providing a great number of cultural heritage visitors with an MPEG video of the archaeological site using the broadcasting channel and at the same time providing personalised content to single users through the telecom networks. The main programme, video is segmented and indexed so that each scene calls up related synchronised media, such as 3D reconstruction models, video clips, panoramas, Internet pages and many others, that when they become available, the user can access them either while watching the main Programme or at the end of it. The user is able to access these media using a pen-tablet PC that he either owns or rents from the cultural institution he is visiting. The system involves two main scenarios: a) Programme Indexing (introduced above) and b) Location Based Indexing, where the multimedia content that the user can

access to is relevant to his/her location on the archaeological site area (location-based broadcasting).

CHIMBS service components can be summarised in the following:

Watch program related background information that is automatically called up when the main video reaches a particular scene that is associated with specific media content (Program Indexing).

Signal to the user when entering an area (broadcasting region) about the sites of cultural interest/relevance and their exact location, best route, opening hours, etc.

When on-site, information and multimedia content relevant to user's location at the archaeological site, for example in front of an ancient temple, the user receives 3D images/videoclip of the reconstructed monument. (Location Indexing)

E-Commerce Facilities allowing users to top-up their credit account and purchasing products related to the programme content (e.g. CD-ROMs, Archaeological site guides, souvenirs, booking tickets, etc.) as well as products of users personal interests

Browsing the WWW for additional historical/cultural/archaeological information.

In terms of the media availability, the cooperation of CISMUNDUS digital and mobile network systems extend CHIMBS multimedia service capabilities of incorporating and synchronising a vast range of media and thus increase interactivity. More precisely supported media include:

WWW pages: can extend a heritage site beyond its physical walls and invite virtual visitors to explore images and text at their own pace and at remote locations (Appendix 4: Screenshot 05).

Furthermore, in combination with the Internet's versatility and diversity of sources they can increase the amount of information about collections and attractions available to visitors (e.g. museum web sites, historical web pages, etc), as well as promoting cultural heritage sites at a pre-visit stage (Not, E et al in Bearman, D and Trant, J 1997:70).

Video: apart from acting as a direct view of the world and since culture can be understood in terms of symbols and images that directly mould attitudes and behaviour (Barnett, C 2000:8-9) video has a powerful role in documenting historic sites.

3D and VR images and interactive models: compose an effective and attractive medium, which besides reconstructing ancient monuments that no longer exist, illustrating what it might have been like to 'walk through' the site (Screenshot 06).
Graphics (2D, digital images, clipart), text and audio: provide digital access to reserve collections and objects that are not normally on display.

The combination of all the previously mentioned media enable CHIMBS to act as both dissemination tool to attract people to visit cultural heritage sites as well as a tour guide by merging and providing textual, oral and visual information of various exhibits and more importantly being able to synchronise all these media and access them while moving within the cultural heritage site.

A.3 CHIMBS: Test Case Scenario

To demonstrate the potential advantages and feasibility of such project the archaeological site of Sagalassos in Turkey (also used as a test-bed by the 3D MURALE project) is being used as test case. The archaeological site at Sagalassos is one of the largest archaeological projects and well preserved Greco-Roman site in the Mediterranean. A consortium of universities and companies, led by Brunel University in West London, are collaborating in the European Union supported 3D MURALE project to develop 3D measurement, reconstruction and visualisation tools for use by Prof. Waelken's archaeological team (Green et al, 3D MURALE web site, 2003).

The choice of using this site as a test case constitutes a great opportunity for demonstrating this project, since all the information, data, and media produced are based on archaeological research and therefore are historically sound. The rationale for the adoption of an archaeological site instead of a museum for the test bed lies in the fact that archaeological sites, are of more need of promotion and preservation (museums are better funded, organised and promoted). Many visitors' misconception that archaeological sites are a "bunch of rubbles and ruins" shows clearly that archaeological sites need to be supported even more by the new technology (e.g. virtual reconstructions) to motivate visitors, let them interact with virtual exhibits and provide them with a better

understanding of the place of visit. As a result CHIMBS project focuses mainly on the promotion and dissemination of archaeological sites.

Though it should be highlighted at this point, that CHIMBS could extend its services and application beyond archaeological sites to also embrace a variety of European cultural heritage attractions such as the next European Capital of Culture (city of Graz in Austria). It could be made available in tourist information centres as well as train stations and airports.

The overall performance and success of the service scenarios and project on the whole will be evaluated by a user panel through observations and user trials when the project is over. Though, to further assist us with the design, conceptualisation of the project as well as understanding of visitor-multimedia interaction a survey was conducted at the Museum of London and will be presented later on.

B. Cultural Aspects of Disseminating European Cultural Heritage Sites

B.1 Problems & Obstacles in disseminating Cultural Heritage Sites amongst Europe

"A hallmark of heritage is the problematic relationship of its objects to the instruments of their display" (Kirschenblatt-Gimblett, B 1998:149).

If we wish to disseminate cultural heritage sites among people of different EU and European countries we must do more than merely design a fancy user interface with various graphics and culturally related information. From the above statement it is evident that an effort must be also made to resolve sensitive issues involved in mutual understanding and interpretation of cultures between individuals that belong to dissimilar cultural/national backgrounds and speak different languages.

Therefore, our goal is to seek possible solutions and "unravellings" in assisting users/visitors in understanding the cultural heritage an archaeological site represents,

beyond a narrow national perspective but also in a European one, tacking into account the new opportunities that the European Union coalition has fabricated.

The issue that arises is how does this render possible in a culturally diverse and polyglot continent such as Europe. At large, Europe is often characterised as "a linguistic and cultural mosaic", where almost 45 autochthonous languages are spoken by its 368 million citizens (Ó Riagáin, D 1998:100).

Should we remove the linguistic and cultural barriers, still dividing people and consequently move towards the adaptation of a single-unified language and culture, following the 'American Model' or adopt IST/DigiCult: Key Action III objective in improving Europe's expanding repositories of cultural knowledge/awareness, while contributing to the creation of a sustainable cultural landscape? Our goal is providing a harmonic mode of balancing between the polymorphism of EU citizens' cultural traditions and a common European cultural unity, through the presentation and dissemination of Europe's cultural heritage sites strengthening the elimination of prejudice between people (Barnett, C 2000:8)

B.2 Linguistic Barriers and Diversity

"Speaking a particular language is a part of one's overall cultural behavior, that is behavior acquired through language" (Salzmann 1993:23)

Language is so closely related to our behaviour that we cannot separate it from the life and culture of the community which uses it. This is mainly due to the fact that the primary purpose a language is to communicating ideas and meanings as well as how people see, apprehend and characterise the world around them (Sapir-Whorf hypothesis of linguistic relativity in Arsky, J and Cherny, A 1997:254).

Perhaps, the most successful definition of the current situation can be sought in Barnett (2000:26) who claims that:
"culture can be thought of as a learned process of mental programming which distinguishes a group or class of people from a groups or classes. In order to be able to communicate we need to be able to understand each other and our cultural differences".

If we extend the above 'programming' metaphor, by comparing a natural language (e.g. English, French, etc.) to a programming language1 (e.g. C++, Pascal, C#, etc.) we can understand better the difficult part that the EU is necessitated to play.

It is true that people who use different 'programming languages' (natural languages) can have very similar results by creating and running alike 'programs' (civilisations, social life, etc.) but for delivery on different platforms (cultural boundaries, countries). Despite the fact that programming languages have very similar syntax (natural language functions: e.g. used for communicating, expressing emotions, etc.), a programmer (citizen) knowing only the 'C++' 'programming language' (e.g. German) is limited in constructing and running his program on the 'Windows' platform only (German-speaking nations/communities). If he wants to 'run' it and display it on the 'Unix' platform he has to rewrite his 'code' in order to adopt it to the new platform (e.g. Spanish culture/country).

There is a way, however, in minimizing this by using a standard 'programming language' (e.g. Java), which is recognised and adopted by most of the programmers in Europe so that he can write his code only once and then distribute it into several other platforms (Java's cross platform virtual machine compiler2). In this sense, the European Union is the 'cross platform compiler' that allows linguistic/cultural diversity both at a local/national and global European level.

B.3 Possible Solutions

What is relatively odd is that although many of the European Cultural Heritage research projects compose EU ones, targeted at promoting and disseminating EU's and Europe's cultural wealth only few of them actually treat this matter. More precisely, the PAST (exPeriencing Archaeology across Space and Time) project is one of the few to really raise the issue of understanding cultural heritage a site represents in a global European perspective rather in a narrow local/national one (IST/Digicult: PAST Project, 2002).

[1] The names of the programming languages used in this context are to assist us in explaining the argument and by no mean intend to evaluate their performance and value.
[2] Java's cross platform capability means that class files do not need to be compiled for each platform in advance (the same compiled Java program will work on PC, Mac and every other platform that runs a Java Virtual Machine).

Even less of them touch the issues of Europe's cultural diversity and how to preserve it in the context of the common EU course/process.

One way of resolving the issue of Europe's cultural diversity, in the best manner, is what Zetterholm, S (1994:1) suggests, that is to emphasise cultural variety against the background of a common cultural base, a common European civilization.

The solution proposed to this problem is 'user-profiling'. That is presenting content and information that is relevant to the profile that the user has previously chosen. By 'profile' we refer to user's age, visit purpose/goal (tourist, educational, expert, etc.), interests, cultural background and language.3

In addition to that, language diversity has implications in Europe's media. Because, as mentioned above, our research project will utilize digital video/TV to disseminate heritage attractions, a number of ways of tackling this problem are being reviewed and selected.

Hopefully, the importance of people of different languages receiving programmes in their own mother tongues was recognised at the beginning of the 1980s and several solutions have been proposed to this:
Multilanguage programmes: Programmes that use subtitles or dub audio languages in order to be viewed in several countries.
lingua-franca4: Programmes that use English or other popular language as a pan-European one to be distributed in European audiences.
language-area programmes: Programmes which involved a major language, e.g. German and were intended to be viewed in German speaking geographic areas, such as Germany, Austria, Switzerland. (Schröder, K 1995:172-175).
Very soon, it was realised that lingua-franca and language-area programmes solution were left behind due to the high cost and the laborious nature of such productions (Schröder, K 1995:173, 175).

[3] To be discussed in detailed in the Design & User Interface section (see Appendix 4:Screenshot 02).
[4] "A shared language of communication used by people whose main languages are different" (Oxford Advance Learner's Dictionary, 2000), (CIDE, 1995:827).

The Multilanguage programmes concept that is being used up to now, is considered as the best solution. However this type of resolution has its drawbacks as well, which need to be considered and evaluated before being applied to the CHIMBS project. Multilanguage programmes major features that tackle the problem of the language barrier are subtitling and dubbing. Subtitling may affect comprehensibility, since viewers are required in reading, but they retain the audiovisual-integrity of the programme and are low in cost. Duding on the other hand permit undistributed reception of the programme, though falsify the audio-visual context of the production, are very expensive (Schröder, K 1995:173) and demand the employment of highly specialised professionals.

In light of the above and bearing in mind the effectiveness and cost-efficiency of the proposed solution we decided to employ the use of subtitles in order to empower and contribute to Europe's language diversity by enabling users in viewing the video/TV programme on their desired language.

C. Commercial Aspects of Disseminating European Cultural Heritage Sites

The advent of the Internet has transformed the provider-consumer market. It is customary practice nowadays, that people sell and buy several products and services on-line using the WWW as a commercial medium (E-commerce). Particularly, revenues of approximately 30 billion Euros (€) were raised in Europe in 2002 from consumer online shopping and figures are expected to be doubled by the year 2005 (Sharman, C 2001:3).

The key characteristics of mobile E-commerce (convergence of technologies, location-independence, personalization) enhance the opportunity for an individual to make more purchases and therefore increase revenues. According to the Ovum forecast (Davison, J et al 2000:6), Western Europe will be the most significant region in terms of usage and revenues, with almost 165 million users and €74 million by the end of 2005.

In light of the commercial opportunities created by E-commerce and especially mobile E-commerce, museums and cultural heritage sites can make use of mobile terminals and the

Internet to raise revenue. Since there is a growing trend for museum and heritage site visitors to purchase souvenirs such as books, DVDs and other kinds of E-souvenirs, why not offer visitors the opportunity of purchasing these products on-line, through their mobile phones and portable devices. Reviews show that these kinds of media (books, CD-ROMs, DVDs, etc.) have great popularity and success in the on-line market, where on-line bookstores such as the Amazon.com demonstrates that several commodity products can be sold more cheaply over electronic channels since the customer pays a basic delivery charge instead of the 30-40% retail store margin (Thomson, I. (1999:36).

In the sphere of tourism, culture is ascribed a potential role in raising revenue and capitalising on cultural assets as part of place-marketing strategies to attract investment. In terms of figures, in 1999 tourism accounted for around 12% of world Gross Domestic Product, 11% of world investment and 8% of world exports of goods and services (World Travel & Tourism Council) (Market Assessment International July 2000:7).

This is true indeed for Europe, especially if we take into account the fact that from the 180 European Tourist Attractions reviewed in 2000, 120 were considered as cultural (Market Assessment International July 2000:55-72). Thus, considering Europe's cultural wealth we realise that tourism at European cultural heritage attractions can use cultural-heritage-related multimedia systems/tools to help increase visitor audiences to museums and archaeological sites thereby increasing their revenues.

D. Cultural Heritage Visitors & Multimedia: Survey Insights

A survey conducted on the 8th of May at the Museum of London, provided us with several valuable insights about the way people view and use multimedia in the cultural environment, as well as composing the first formal test/evaluation of the CHIMBS research project.

The aim of this survey was the collection of data in order to comprehend better the way cultural heritage visitors utilise the new multimedia technology in a cultural setting, their priorities for a cultural heritage multimedia project/application and their views on the

CHIMBS research project. The survey was formulated by the completion of questionnaires based on standardised face-to-face interviews (Deacon, D et al, 1999:64) and observations. More precisely the questionnaire was divided into three major sections (Purpose of Visit/Visit Experience, Design Evaluation of Multimedia projects, CHIMBS Design and concept Evaluation), with a number of both open and close-response questions (see Appendix 1). Fourteen people from different cultural backgrounds, nationalities, genders and age groups took part in the questionnaire-filling-interviews and twenty more were observed using the Museum of London's Multimedia terminals.

Despite the fact that the sample number was not large, it provided us with several interesting results, since the participants were carefully chosen to represent an indicative percentage of all categories of cultural heritage visitors (Tourists, intentional visitors, specialists in the domain, see Appendix 2) and age groups.

From the analysis of the data collected we realise the following:

Nearly half (50%) of the cultural heritage visitors can be characterised as casual tourists5, while a considerable number of them (36%) admitted a personal motivation/interest in visiting museums and archaeological sites. Specialists in the domain, such as archaeologists and people involved in the cultural heritage industry account also for a respectful figure of 14 %.

93% (36% history, 36% culture, 21% both) of the visitors interviewed acknowledged that enriching their history knowledge and discovering more about cultures, composes the main driving force for visiting a cultural institution, while only a small percent (7%) is solely attracted by the cultural institution's exhibits.

A very encouraging insight is that almost nine (64%) out of fourteen visitors confessed doing pre and post-visit reading about the exhibits to be viewed/cultural heritage site to be visited (even 55% of the casual tourists responded this way).

When asked how should European cultural heritage sites be viewed, 79% responded both at a national and European level, 14% replied that it depends on the exhibits and 7% responded at a national one only.

[5] See Appendix 2

Interesting were also the results regarding the use of Multimedia facilities in cultural heritage. More precisely, twelve out of fourteen of the visitors interviewed stated that they like the idea of personalisation in terms of content/media, age and purpose of visit. 86% acknowledged that they want to interact alone with the PC in contrast to 14% that wishes to interact along with their friends or family. Extremely useful are the responses users gave when asked about their personal priorities for a cultural heritage multimedia project/application. As you can see from the figure below, ease of use (usability) composes the most important issue with 30%, while interactivity and media diversity come second with 25% each. Internet access and animation comes last with 10%.

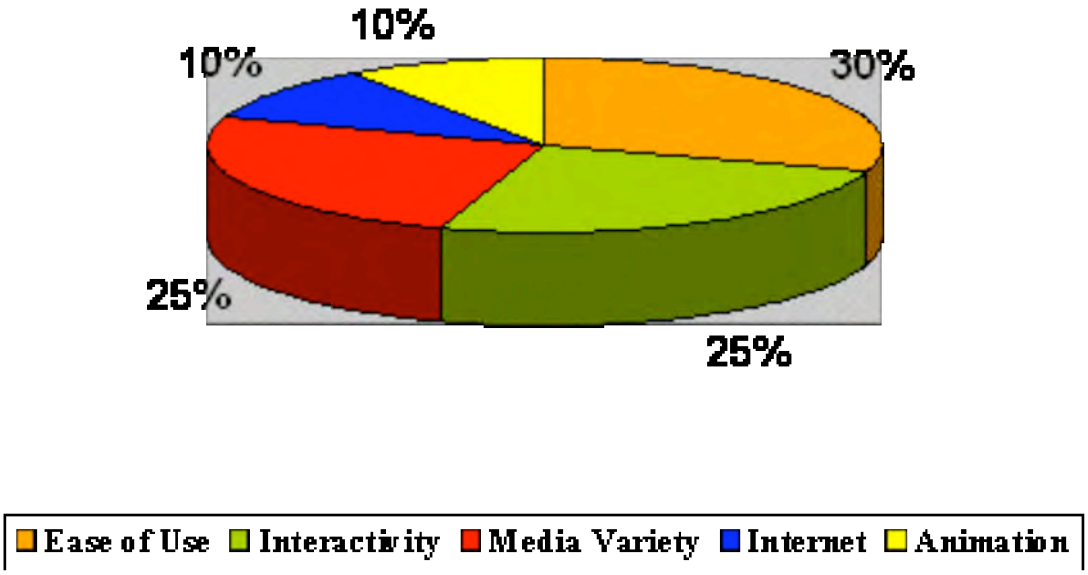

Figure II: Priorities for a Cultural Heritage Multimedia Project/Application

More useful information was though collected from observing visitors using the Museum of London multimedia terminals. In particular, the adult users' age ranged from 25 to 66 with and it was very encouraging that senior citizens and elderly couples were interacting with the multimedia systems. Eleven out of the twenty people observed used the museum facilities to look for specific information while the rest of them were mainly browsing the media. The time spent on interacting with the terminals varied from 1 – 35 minutes. Quite surprisingly about 50% of the users spent 10 – 35 minutes with 30% spending 1 – 5 minutes and 20% 5 – 10 minutes. Furthermore it is imperative to mention that adults and senior citizens did spend more time viewing the media and reading information.

The level of satisfaction was fairly high with almost 50% of the users being satisfied up to a point, 30% of them being fully satisfied and a 20% of puzzled and frustrated users. At this point it should be highlighted that the museum's multimedia terminals were fast in terms of processor speed, with friendly user interface and a great number of rare video clips (early 90s). The fact though that the user interface did not contain any documentation/help pages caused uncertainty and in some cases frustration. Though when the users managed with the help of someone else (e.g. a younger person sitting in the nearby PC) to find how to start off, they navigated easily through the application and enjoyed it. A "Quick Start Guide" in this case would have resolved the problem quite effectively and resulted in greater number of people using the computers.

Lastly another exceptional finding was that although the Museum of London has two groups of multimedia terminals (1st floor by the entrance: London before London Gallery and ground floor: World City, 1789-1914 Gallery), a greater number of users interacted with the later. The main difference between the two is that the second one utilises video clips. The fact users spent more time on watching the educational videos (observation) and that when interviewed (questionnaires) 65% of them classified video as the most important/interesting media type (21% selected animation and 14% 3D) reinforces and verifies the point made above (A.2 CHIMBS: the Promotion/Dissemination of Cultural Heritage Sites) that video has a powerful role in documenting historic sites.

E. User Interface Design & Usability Issues

E.1 Task-Oriented Vs User-Centred Design Approach

It should be highlighted that the design of CHIMBS User Interface (UI) composed a very interesting challenge, since CHIMBS is required to form a bridge between information appliances (digital TV) and the computer.

Designing usable interactive products involves the following two key considerations: a) the target audience using the system and b) the context in which the product is going to be used. Those two dictate in turn the kind of tasks that users will expect to perform and the different types of activities, information, and user interfaces that users shall receive according to their personal needs and interests.

As a result of the above the design approach adopted was based on the Task-Oriented mode, since it is considered to be more appropriate for heritage attractions interactive multimedia systems, due to the fact that museum and archaeological site visitors' goals/roles (tourist, expert, etc.) and age background (children, adults, etc.) differs. In this respect Task-Oriented design can provide museum visitor with the most suitable multimedia presentation taking into account user's specific task model and purpose (Paterno, F & Bucca, M in Bearman, D and Trant, J 1997:23). This is achieved by means of profiling the user at the beginning of the system (see Appendix 4: Screenshot 01).

CHIMBS user-profiling system is divided into four parts:
Age Group (Children, Teenagers/Adults), the user interface changes to reflect user's age
Purpose of Visit (Casual Tourist, Intentional Tourist, Expert), not all visitors have the same amount of time, interests and motivation, thus it is important to match individual preference with the content and piece of information that the user receives.
Cultural Background and d) Language (already explained in section B. Cultural Aspect of Disseminating European Cultural Heritage Sites, a user profiling system).

Though as Wood, L successfully indicates, designing a user interface without involving users is as impossible as designing one without a pencil, paper and a computer (1998:83). Initially the solution to that seems to be the User-Centred design approach, which adopts a strong involvement of prospective users in all phases of the design process, while others structure their UI and design according to the user's conceptual model of the possible activities that user will be involved with when interacting with the system.

Essentially, User-Centred design is very useful in positioning users as a testing and evaluation service for designers to ensure that user's needs, requirements and goals are met (Druin, A et al 1999:28), but should be used mainly in this context and not in all phases of the design process. In particular, involving users in all phases of the design process can facilitate the designer with large amount of feedback (what is good, bad, should be altered, etc.), though there is the risk that the kind of feedback obtained by users is based on reaction rather than initiation (Müller, Wilman, and White 1993 in Druin, A et

al 1999:29). Furthermore there is a concern on how the designer will interpret and translate user feedback and reactions.

In light of the above, a productive combination of User-Centred design -as a mean testing and evaluating the multimedia design product- and Task-Oriented model -for designing the UI and profiling users seems as the best approach in designing user-accepted and effective interactive multimedia presentations/systems for museum and cultural heritage sites visitors and is the mode used in the design of the CHIMBS user interface.

E.2 CHIMBS Design Mental Concept & the Use of Metaphors

"A well-known approach to applying knowledge about everyday psychology to interaction design is to emulate, in the digital world, the strategies and methods people commonly use in the physical world" (Preece et al 2002:90).

The usefulness of the adoption of design and UI metaphors in helping users to better understand and learn how to use a system is well echoed in literature (Laurel, B 1999:26), (Wood, L 1998:295), (Preece et al 2002:56).

CHIMBS design concept is based upon the wide use of metaphors. In particular the teenager/adult UI adopts the TV metaphor, where the user interacts with the system by means of a toolbar resembling a remote control (Appendix 4:Screenshot 04). The rationale behind the adoption of such metaphor lies in the fact that, primarily, can enhance user interaction, even amongst technophobes since it is based on something all people are familiar with and have used before; and secondly it relates to the display medium, since CHIMBS composes a service for interactive digital TV, enabling, in a sense, users to "view digital TV through their TV user interface".

The child UI on the other hand employs the time-machine metaphor (Appendix 4:Screenshot 03). The choice of this particular metaphor was made to subconsciously assist the cultural/historical notion of the project "taking children back to time", as well as keeping them stimulated.

Figure III: Menu-Driven Vs. GUI

Menu-Driven UI			Graphical UI	
Strengths	Weaknesses		Strengths	Weaknesses
No need of remembering long lines of commands	The user must scan through every option to make a selection		The user mimes the action by manipulating representations of objects	Processor demanding (slowing the system)
The user sees the options and then makes a choice	Confuse users when there are many items		Pleasant to the eye (aesthetics)	
	Screen space (great number of options)		Use of visual metaphors	
			Easy to learn	

Based on: Faulkner, C (1998) The Essence of Human-Computer Interaction London: Prentice Hall, pages 62, 75-76
Laurel, B (1999) The Art of Human-Computer -Interface Design London: Addison-Wesley, page 106

Moving on, the user interface can be mainly described as Graphical (GUI), though the user is able to interact using a Menu that can be toggled on and off, as an alternative mean of navigation. The rationale behind the use of the two different user interface types lies in their strengths and weaknesses presented in the table above.

Regarding some aspects of the Design, the UI is designed in such way to provide users with visual clues about the content received. For instance in the adult UI the statue of Julius Caesar on the top left corner of the main window changes to Marcus Aurelius to reflect the succession of Roman Emperors (Appendix 4:Screenshots 05-06) in the ancient city of Sagalassos (the programme's main theme).

Further more the UI is composed of a 800 x 600 pixel resolution (primary) window that contains the toolbar (navigation elements) and a series of smaller (secondary) windows that pop up when the user requires additional information. For functionality purposes, the navigation is more clear this way and the user can have access to both the main video and a range of media simultaneously, without having to navigate back and forth each time a new media or piece of information becomes available.

E.2 Obstacles in Outputting the UI

Multimedia designers and artists are comfortable in designing user interfaces and services via programming languages such as Java, JavaScript, etc. On the contrary they prefer working with authoring packages, such as Macromedia Director. People in the broadcasting industry though do not wish to use packages such as Director because of the royalties they have to pay to Macromedia and other companies. Apart from that the UI and content should be outputted in a format that the Multimedia Home Platform (MHP) of the broadcasting terminal recognises. Director on the other hand is a very good tool for prototyping user interfaces and services. Therefore a possible solution to this obstacle is to prototype the service using Macromedia Director 8.5 and then output it into an XML file, which is supported by the MHP, employing CISMUNDUS User Interface XML Generator.

Further research is being done at the moment in improving the XML description and automating the way and format the files are outputted. When this is being achieved the number of Multimedia designers involved in the creation of services for the digital TV shall be increased, creating new vocational opportunities that up to now are being taken by computer engineers, people that are not specialised in delivering as attractive services/user interfaces as Multimedia artists.

Conclusion

In this paper we have presented a new cultural heritage service that aims in promoting and disseminating cultural heritage sites using interactive digital TV. We have also considered the issues involved in disseminating cultural heritage sites to people amongst the

European Union/Europe as well as its commercial aspect and how cultural institutions can benefit from them. Finally we have reviewed several insights about the use of Multimedia in a cultural setting, gained from a survey conducted at a British Museum and explained the rationale behind the design of CHIMBS user Interface, focusing on usability in addition to functionality and aesthetics. The technology is out there, though what is really important and is missing is the content (new services for interactive digital TV, in this case), in this case new services for interactive digital TV. And that's where we should encourage Multimedia designers and artists to work with.

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APPENDICES

Appendix 1

Appendix 2

Cultural Heritage Visitors Profiles/Categories

Profiles	Goals
"Casual/Common" Visitors/Tourists: Driving by the archaeological site or passing through the region. They are probably not aware of the archaeological site & are mainly interested in getting a general view of the site and the related information.	-To find out what is so interesting about that particular cultural heritage attraction. -Curiosity -Chance of using the new technology and their tablet PC. -Spend some time in a fairly entertaining/attractive and constructive environment. -cultural heritage attraction listed as one of their sightseeing preferences.
"Intentional" Visitors/Tourists: They have some knowledge or at least a significant interest about the subject domain and wish to learn more about it.	-To learn what the site represents at a national and European level (culture, way of life, traditions, history) -Personal Motivation/Interest -Cultural Tourism
"Specialists": in the subject domain, (archaeologists, history students, etc).	-Research purposes -Academic purposes -Refresh/revise existing knowledge in a different setting (informal) and with the use of the new technology.

Appendix 3

SURVEY RESULTS

Priorities for a Cultural Heritage Multimedia Project/Application

	Less important					More important
	1	2	3	4	5	6
Ease of Use	-	-	1*	1	10	2
Interactivity	-	-	2	2	7	3
Variety of Media	-	-	2	2	6	4
Internet	1	3	2	4	4	-
Animation	1	1	4	4	3	1

* These figures correspond to the number of interviewees who rated the above.

	Less important (%)					More important
	1	2	3	4	5	6
Ease of Use	-	-	7 %	7 %	72 %	14 %
Interactivity	-	-	14 %	14 %	50 %	22 %
Variety of Media	-	-	14 %	14 %	43 %	29 %
Internet	7 %	21 %	14 %	29 %	29 %	-
Animation	7 %	7 %	29 %	29 %	21 %	7 %

CHIMBS Design Evaluation

	Poor/Inadequate (%)					Excellent
	1	2	3	4	5	6
Design (Visual)	1	-	2	1	8	2
Design (Rationale)	1	-	1	2	8	2
Variety of Media	-	-	1	4	7	2
Scope/Objectives	-	-	1	3	7	3
Overall Project Rating	-	-	1	2	11	-

	Poor/Inadequate					Excellent
	1	2	3	4	5	6
Design (Visual)	7 %	-	14 %	7 %	58 %	14 %
Design (Rationale)	7 %	-	7 %	14 %	58 %	14 %
Variety of Media	-	-	7 %	29 %	50 %	14 %
Scope/Objectives	-	-	7 %	21.5 %	50 %	21.5 %
Overall Project Rating	-	-	7 %	14 %	79 %	-

Appendix 4

Screenshot 01: CHIMBS User Profiling System Profiling users for a)Age Group, b)Purpose of Visit, c)Cultural background, d)Language.

Screenshot 02: Promoting the EU and its Cultural Heritage Sites.

Screenshot 03: Children's UI (Time-Machine Design Metaphor).

Screenshot 04: Adult's UI (TV/remote control Design Metaphor). Main Programme with Subtitles.