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Cultural Heritage Systems Evaluation and Design: The Virtual Heritage Center of the city of Rome

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ABSTRACT

This paper is concerned with the evaluation and potential of IS for archaeology and cultural tourism. We call the support of cultural heritage communication with ICT “*e-heritage systems*” (e-HS). Many advanced ICTs are involved in cultural projects. In this paper we shall primarily focus on evaluating the a priori potential of e-HS for fully exploiting the communicative potential of ICT. This paper applies fundamental concepts from interpretive archaeology and Heidegger’s phenomenological analysis in *Being and Time* to evaluate an example for an e-HS, i.e. the Virtual Heritage Center of the City of Rome, from a user-oriented perspective.

Keywords

cultural tourism, user requirements, systems evaluation, cultural heritage, e-heritage systems, interpretive archaeology, Heidegger’s phenomenology.

INTRODUCTION

Every year more than three million people are visiting the area of Fori Imperiali in Rome (Source: MiBAC, data from entrance tickets to Coliseum sold in 2003); most of them lack access to any facilities for providing the background essential for picturing the spatial distribution of monuments in the site before them, let alone for understanding what they represent from a cultural, historical, and artistic point of view. This archaeological site is one of the most important in the world, but it is also one of the most difficult to “read”; visitors’ difficulties are well expressed by their puzzled looks and behavior. This is due to inadequate conceptualization of the requirements for heritage interpretation support that can be implemented in e-HS.

The problem of ICT user requirement determination for e-HS is especially important for countries with extensive cultural tourism. Currently, these are mostly in Europe and South America, but the Middle and Far East also offer great potential for cultural tourism. Indeed, the European Commission perceives ICT as an enabler for unlocking the economic value of cultural heritage (Digicult, 2002). The European Commission calls the application of ICT to cultural heritage “e-culture”. The Computer Applications to Archaeology research community (CAA 2004, ACM-VAST 2001) prefers the label “Virtual Heritage” or “Cultural Heritage Systems”. However, both the European Commission and CAA community are heavily influenced by technological determinism (Markus and Robey 1988), because they have not proposed any frameworks grounded in the social and cultural sciences for analysing the expectations of the users, i.e. the public visiting museums and archaeological sites. Even if the expectations of the users are acknowledged as important, they are not a direct object of research. Rather, a direct relationship between applying more ICT and better understanding of archaeology findings is assumed. This raises two critical research questions.

- a) Which framework could help to **evaluate information systems** (IS) so that heritage interpretation can reap the potential benefits of modern ICT for both the archaeological research community and the general public interested in understanding the past?
- b) What kind of fruitful theories and methodologies could **interpretive archaeology** provide for this evaluation of e-HS, which could meet and even exceed the expectations of the general public seeking inspiration and enlightenment from visiting cultural heritage sites?

The question of design of e-HS is beyond the scope of this paper. Whereas the application of the evaluation framework proposed here might give insights for future designs, substantiating this claim would require an extensive discussion on IS development methods. The proposed framework is of course neither “objective” nor “universal”. As we shall see, interpretive archaeology is challenging the mainstream in archaeology, i.e. the “processual” (objectivist-positivist) archaeology. Using Burrell and Morgan’s (1979) terminology, the framework we seek is influenced by “subjectivism” and therefore would fall into the “social relativism” paradigm. It is neither an epistemological or methodological framework, such as the set of criteria for evaluating interpretive field studies by Klein and Myers (1999). It simply focuses on the user’s mind set and needs when seeking for pertinent explanations of cultural heritage through information technologies. Insofar the proposed framework of analysis for e-HS has normative implications for design and thereby our case analysis moves beyond the mostly descriptive stance of interpretive field studies. The approach taken here is, however, compatible with critical hermeneutics as proposed by M. Myers (1994) and others. Further elaboration of these epistemic-methodological issues would take us too far afield from the main purpose.

The background of the questions raised above is that neither the European Commission nor the publications on ICT applications in archaeology have paid attention to the new theories under development in “*interpretive archaeology*” (Tilley 1993, Thomas 2000) and even the latter has not yet discovered the relevance of *phenomenology* for cultural heritage interpretation.

On the other hand, in Information Systems (IS) research, an increasing numbers of papers have been published on using phenomenology for special types of analysis (e.g. Introna, 2002; Haynes 1999, 2002; Cass 1997) since this approach has been presented as an important research approach for the discipline (Boland 1985, 1995). Most of these authors look upon phenomenology with an “inquiring system” perspective (Haynes 2002), which is especially suited for the description of social contexts and ethical issues. However, Heidegger’s phenomenology in *Being and Time*, is also particularly well suited to the description of ICT user requirements.

With this in mind, the first purpose of this paper is to introduce a *theoretical basis for the formulation of user expectations* so that a new generation of e-HS will improve the communication of cultural heritage meanings to visitors (users). The second purpose is to point the way to an *appropriate research framework* for addressing visitor expectations by building on the insights from both interpretive archaeology and interpretive IS research. Before proceeding, we offer the following working definitions. *We call the application of IS to communicating cultural heritage “e-Heritage Systems” or e-HS.* We shall refer to e-HS informed by the philosophy of hermeneutics and phenomenology as “*Interpretive Archaeology Systems*” (IAS). The strategic intent of our research is to promote a shift from the current e-Heritage systems to IAS. The research hypothesis underlying this paper is that the Heidegger’s phenomenology is a preferred, yet much neglected basis for assessing the requirements of e-Heritage Systems, because it is particularly well suited to identify and describe *user requirements related to historical-cultural enlightenment experiences*. This is the reason why our research applies the concept of “*historicity*” from phenomenological and hermeneutic modes of analysis.

The paper first describes the e-HS users’ requirements identified by the European Commission in section 2. The next section proposes a preliminary set of evaluation criteria from the recent interpretive archaeology literature. Section 4 extracts a preferred set of evaluation criteria from Heidegger’s phenomenology of history in *Being and Time*. Section 5 attempts to capture the essence of interpretive archaeology and phenomenology concerns into an e-HS evaluation framework. This framework will then be applied to the evaluation of the Virtual Heritage Center of the City of Rome.

USER REQUIREMENTS FOR CULTURAL HERITAGE SYSTEMS

The European Commission considers cultural heritage sites a very important competitive asset for tourism (Museums, Archaeological sites, libraries, documentation centers). However, Europe does not use the potential of ICT as the USA has begun to do. A special European report is devoted to the potential use of ICT in cultural heritage: Digicult 2002. This report provides a list of user expectations from an online Delphi study. Some of these requirements do point out the considerable

gap between user expectations and the current quality of interpretive aids, which most cultural heritage institutions should be able to provide (cf. exhibit 1).

- *Applications to be user friendly, multi-lingual, providing full cultural information about the stored objects,*
- *Core information written simply and accessibly, without using jargons or making assumptions about prior knowledge,*
- *Quality and pertinence of the content,*
- *“Processes” rather than static artefacts,*
- *Increased interactivity,*
- *Fully documented collections presented in engaging ways, richer imaginative experiences,*
- *Ability to create personal collections and to surface resources in own working or learning environments,*

Exhibit 1 : User expectations for Cultural Heritage (Digicult European Report, 2002)

A PHENOMENOLOGICAL FRAMEWORK FOR EVALUATION AND DESIGN OF CULTURAL HERITAGE SYSTEMS

The word “edutainment”, derived from “education” and “entertainment” is often used without much elaboration. The two components of edutainment are linked to “sensemaking” or “interpretation”, which are at the core of current trends in interpretive archaeology (Holtorf and Karlsson, 2000; Tilley, 1993, 1994). The three principal conceptual contributions of the interpretive archaeology movement were *re-enactment*, *embodiment*, and *hermeneutics*. In its most recent discussion, the concept of phenomenology also appears, albeit without its application to concrete issues as were outlined earlier with regard to Digicult 2002.

In this paper, we have taken the phenomenological foundations one step further by building explicitly on Heidegger’s concept of historicity. The implications of the historicity concept for our analysis of e-HS evaluation are summarized in table 1. The theoretical basis of this table was introduced by Monod and Klein (2005).

The current table slightly expands and modifies the criteria proposed there. We consider that one component of edutainment, *entertainment*, can be associated to four e-HS phenomenological evaluation criteria, i.e. re-enactment, embodiment, self projection and possibilities of being: the aim of entertainment here is to transform the visitor in an active agent of the process of knowledge, able to use his imagination to re-enact historical events and picture the historical characters, their values and world views in his mind. The visitor should be able to project himself, his present being, into the past and make a cognitive effort to compare his values and conditions of life with those of people who lived a long time ago: this comparison can give meaning to the present and open up his mind to the many different possibilities of being which might have occurred in the past but could also occur in the present or the future.

The other component of edutainment, *education*, can be associated to context, historical self, inquiry being, universality in uniqueness, because education here is meant to create a context for the visitor’s experience, to provide background knowledge helping him to understand and interpret what he sees. The visitor must be able to go from particular and unique objects and monuments to the general historical context and viceversa, and from the specific historical event to what is universal in human experience, using the informations available to carry on a deeper ‘investigation’ of the past, which can tell something about the present too.

These criteria can find partial justification in the user requirements identified by the European Commission in the Digicult report. The willingness to build “applications to be user friendly” and to have “core information written simply and accessibly” might be understood in the light of re-enactment, contextualization and self-projection. Only user friendly applications and an accessible language style can help the user to ‘re-enact’, and maybe to “get into” the historical matter. The requirement for “processes rather than static artefacts” might be linked not only the re-enactment, but also to self-projection, because history is not only about interpretation of objects, but also about understanding action through self-involvement. “Increased interactivity” may be related to the “inquiring being”, because depending on the E-HS capabilities, this inquiry might search for “possibilities of existence” and maybe even a “historical self”. The phrase of “richer imaginative experiences” is also clearly linked to the inquiring being and may contribute to the “historical self”. However, interpreting the Digicult requirements from the hermeneutic-phenomenological perspective proposed here, provides not only a theoretical grounding for them, but also adds new dimensions of meaning with considerable design implications to them, which will be elaborated in future research.

	Criteria	Question for IS evaluation (e-Heritage Systems)
ENTERTAINMENT	1. Re-enactment	Does the e-HS help the visitors to re-live the historical events in their mind? Does it help them to picture themselves as part of the historical events? Can they grasp the mindset of the historical characters?
	2. Embodiment	Does the e-HS give an opportunity of a bodily experience of the past to the visitors?
	3. Self-projection	How does the e-HS stimulate the visitors to project themselves into in the past so that the past gives meaning to their current conditions of existence?
	4. Possibilities of being	Does the e-HS present the past “in terms of its many possibilities” so that the visitor is lead to wonder what specific historical characters could have done and what the constraints of their situation were?
EDUCATION	5. Context	Does the e-HS give an occasion for a “reflexive experience of history”? Which pre-understandings (intuitions) does the e-HS interface presume and does it provide tutorial aids to acquire the necessary background knowledge? Does it lead the user to engage in hermeneutic circles, which reduce the distance between the present and the past contexts of understanding?
	6. Historical self	How does the e-HS help the visitors understand themselves as historically constituted so that they can learn the possible meanings of their existence from the values, actions and life situations of historical characters?
	7. Inquiring being	Does the e-HS give an opportunity to the visitor to reflect "alternative modes of being", e.g. by investigating his or her own possibilities of existence or does the current era afford the kind of life that corresponds to what he or she feels is true and right?
	8. Universality in uniqueness	Does the e-HS identify for the visitors how to see “the universal in what is historically unique” and thereby help them to see alternative possibilities for their own existence in the present?

Table 1. An Interpretive and Phenomenological Framework for the Evaluation of e-Heritage Systems

THE ROME’S VIRTUAL HERITAGE CENTER

During the last years, LUISS University, Tor Vergata University and CNR have developed a set of multidisciplinary competencies aimed at the exploitation of cultural heritage through IS applications, which are able to increase the emotional and learning aspects of cultural experiences. Thus they are inducing customers to include cultural heritage sites in travel planning. With this in mind, the above mentioned academic institutions are encouraging the creation of Excellence Centers where specific and highly innovative competencies are marshalled to create prototypical E-HS with the following two principal aims in mind (according to the framework of the Open Tourism Consortium, the Excellence Centers). One is to exploit the possibilities offered by new ICT solutions (from wireless networks to virtual reality, from semantic webs to RFID) to build applications which improve the accessibility and enjoyment of Cultural Heritage. The other aim, pursued at the same time, is to support tourists in each phase of their travels, i.e. pre-tour, on-tour and post-tour.. The final objective of the project is to develop the “Virtual Heritage Center of the City of Rome” at Mercati di Traiano, which represents an excellent opportunity to apply the concept of *experience management platform*, which is expected to increase tourism to the archaeological sites in Rome. Such tourism growth effects have already been registered during the World Expo of Virtual Archaeology “Imagining Ancient Rome”; it took place at Mercati di Traiano in the fall of 2005 and measured an increase of visitors as high as five times the average number of visitors of the previous months.

The technologies used for the Virtual Heritage Center are :

1. Mobile Web portal
2. 3D virtual reality movie
3. On site computer with 3D VR
4. VR Side wall
5. Time well
6. Mobile compass (GPS + fixed images + commentaries)

The Virtual Heritage Center should build an exhibition itinerary developing two macro-contexts of visual interaction, thus two exhibitions: *virtual storytelling* (movies) and *virtual reality systems*. Virtual storytelling should precede and contextualize the virtual exploration experiences, allowing an increase of attention and learning in a ‘crescendo’ process.

Virtual theaters’ main objective is the reconstruction of the original appearance of architectures and monuments and their tridimensionality. Two types of installations can be provided:

- A big screen (or a system of screens) to be put in a room, where introductory movies can be shown, illustrating monuments and their history, using immersive and stereoscopic visual systems (figure 3).
- Video boards, located in different rooms, on which more information on sites, monuments and art masterpieces can be visualized.

Our proposal include a basic experience addressed to all visitors, consisting in non interactive movies, 12-17 minutes long, displayed in different rooms on big screens, in such a way that visitors can choose to see the movies in their own preferred sequence (there is no standard linear itinerary).



These short movies are of critical importance and they must be conceived with a double purpose: they must show the sites through very accurate virtual reconstructions of fine aesthetic quality and with overlapping and fading effects, so as to allow an easy identification when the tourist will be on the physical site, but on the other side the places and monuments shown must be contextualized into a story, a narration using the motion picture language, insisting on the historical aspect of what the visitor is watching.

Other activities are to be added to this information ‘core’, providing chances to gain a deeper knowledge. They consist in environments, whose general name could be “Past Future”, which can be visited with no pre-defined sequence:

- 1) In the first environment the visitor can go deeper in the knowledge offered by the movies he’s been shown before: through individual multimedia systems the visitor can find complete and systematic information to satisfy his curiosity about history and places seen in the movies.
- 2) The second environment is the technological gallery. Here the visitor finds experimental technological devices, like Cave, 3D olographic images, immersive and virtual reality devices: technologies of the future applied to the past, and in particular to monumental roman past.

This “technological” section could be the place where other communication instruments are managed and distributed. Such communication devices should be “customized” and support the visitor when he is “on the field”: itineraries in Rome could be studied where tourists, using mobile systems (UMTS, PDA, GPS, etc.), have the possibility to go on interacting with information and models provided by the Virtual Heritage Center even when they are in the territory.

As an example, the area of Fori Imperiali could be covered with mobile services recalling informations from the VHC, and in the VHC visiting itineraries could be suggested, including details to be discovered on the field by the tourist when he finds himself in front of the monument. The exchange between real and virtual, where it is possible, multiplies the content and contexts of information and opens up the VHC to the territory.

Specific installations will be created within the Archaeological area of Mercati di Traiano in order to enhance the experience of visiting the archaeological site and provide some additional services. They are:

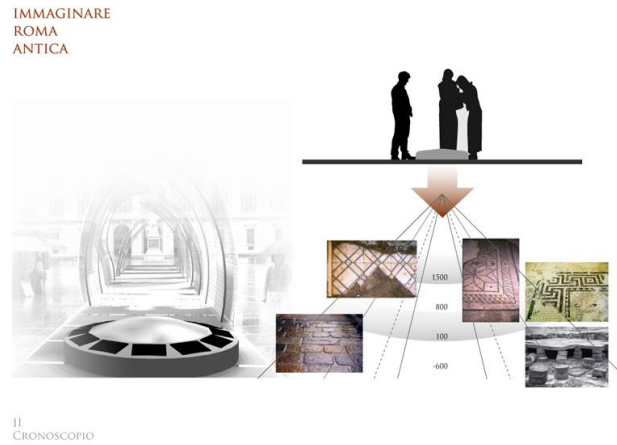
- Individual multimedial points
- Information Kiosks
- Virtual or physical reconstruction of monuments
- “Side Walls”
- Centers for on demand printing of personalized guides, digital contents uploading/downloading, access to booking services etc.

Some possible applications developed around a theme like “The past seen from the future”, could be the following:

- **SIDE WALL** (or azimuthscope) a tunnel structure, made of sails and screens, introducing a virtual element in the horizon. The service provided by sidewall can vary according to its positioning with respect to the monument of interest.



- **TIME WELL** (or chronoscope) which, through zenithal projection, allows to see what can be found in different material layers at different levels under the ground. The visitor can choose what layer (age) he wants to visit and observe different materials and findings belonging to different periods of time.



- **MOBILE COMPASS** (or giroscope). Some strategic points in the archaeological site are selected, where spatial coordinates are indicated on the ground. The user, orienting himself thanks to such coordinates, can receive informations about the monument he is visiting, combining audio and video, using the mobile phone to receive virtual images and reconstructions.



The fundamental characteristic of the wireless platform will be versatility in a multidevice logic, with a bunch of contents coherent with the device in use. Information will be delivered through:

- Mobile phones
- Palm computers
- Ad hoc devices available in the Center.

Portable instruments like palm computers, videophones UMTS, augmented reality devices can be rented by visitors. The general purpose of such devices is “to recall and to remember” what tourists have seen in movies in the Center, once they are on the physical site (it is important to point out that their purpose is only to remember, once on site, what has already been showed: these devices and their use in the open air don’t allow a good quality delivery of images).

PHENOMENOLOGICAL EVALUATION OF THE ROME VIRTUAL HERITAGE CENTER

In the following table the authors scored the “Virtual Heritage Center” e-HS against the criteria summarized in table 1.

Criteria/ Media	Criteria/ Media	Web portal	3D virtual reality movie	On site computer with 3D VR	VR Side wall	Time well	Mobile compass (GPS + fixed images + commentaries)
ENTERTAINMENT	1. Re-enactment		+++	+			+
	2. Embodiment		+		++		+++
	3. Self-projection		+++	+			+++
	4. Possibilities of being			+			+
EDUCATION	5. Context	++	+++	++	++	++	+
	6. Historical self		++				+
	7. Inquiring being		++				+
	8. Universality in uniqueness		++				+

It appears that this e-HS is, indeed, informed by the philosophy of hermeneutics and phenomenology, but it does not meet all the criteria for being considered an “Interpretive Archaeology System”.

One of its points of strenght is the capability to satisfy the requirement of contextualization: pre- understanding and background knowledge are available at a very early stage of the experience, when the visitor uses the web portal to gather information before reaching the site, and are subsequently provided by all media in the system, with a constant concern not only in ‘giving more infomation’ but in driving the tourist’s attention from the part to the whole and viceversa (hermeneutic circle).

Other criteria met by several media are re-enactment, embodiment and self projection, which can be explained as follows. The visitor experiences a re-enactment of historical events at the beginning of his tour through the vision of 3D virtual reality movies; they can show what sort of events were taking place in the physical site visited, recreate the historical characters who populated the site and lived in the buildings, which are now ‘monuments’. This affords the visitors an opportunity to re-live such events, deeds, historical turning points and pictures the men and women in their minds who were the agents in these events. On site computers and mobile compass recall, repeat the immersive re-enactment experience of the videos once walking on site. The possibility of a bodily experience of the past is enabled by the immersive, multimedia information flow of videos and VR sidewalls and by augmented reality devices, while the opportunity to project ourselves into the past is supported by all media (once again, videos, 3D VR, mobile and augmented reality devices).They are able to describe the life conditions and constraints of ancient Romans, thereby conveying a sense of what their historical values, feelings and world views (“Weltanschauungen”) could have been. By understanding the conditions of their lives we can make comparisons with our own lives, values, and conditions of human existence. In this way past experiences can give meaning to the present.

Other criteria are satisfied by a limited number of media, so that globally we might say that the experience is likely to be highly significant as an “interpretive” experience only if visitors will have access to the whole package of services. They

need to have convenient use of all media and technological devices for benefitting from a wholistic synergy effect rather than be induced to choose only a limited number of opportunities (due to pricing policies for example).

However, the interesting point is that the two media producing the highest technology scores for the “entertainment” component also apply to the “education” component. These two media are the 3D virtual reality movies and mobile compass. Therefore the theoretical basis proposed here retroactively justifies two technologies that are also highly recommended by the European Commission in Digicult, 2002.

5- CONCLUSION AND LIMITATIONS

The purpose of this paper was to propose a framework for the analysis of the users expectations based on interpretive and phenomenological perspective. The theoretical basis of the framework included both the insights from interpretive archaeology and interpretive IS research. When we applied this framework to the study of a specific e-HS, the Virtual Heritage Center of the City of Rome, it appeared that this e-HS is informed by the philosophy of hermeneutics and phenomenology, but it does not meet all the criteria for being considered as an “Interpretive Archaeology System”. This gave the designers of this particular e-HS valuable hints for improving the future interface of their prototype.

One obvious limitations of this paper is the lack of discussion about the design of interpretive archaeology systems. An important question is, “what kind of IS development methods could or should be used in order to develop e-HS that would fulfil the expectations of cultural heritage visitors?” Another limitation is the lack of epistemological discussion about subjectivity (Burrell and Morgan, 1979; Habermas 1988) and the link with an interpretive field studies evaluation framework (e.g. Klein and Myers, 1999). These research directions will be investigated in the future. However, one principal reason for our conclusion is that archaeology as a science in general shrinks from interpreting isolated facts in a larger context, which would necessarily involve many speculative elements reaching beyond established “historical artefacts”. One of the reasons for this hesitancy is that the methods of archaeology are not grounded on its most natural and pertinent philosophical foundation, i.e the interpretive philosophies of hermeneutics and phenomenology.

Once interpretivism is accepted as a solid foundation for archaeological *upstream* research in general, it would only be a small step to point out how this could help to meet user expectations for interpreting archaeological findings for a broader audience “*downstream*”. Good downstream interpretations in turn are then the prerequisite for developing computer applications that make sense to both archaeological experts and a generally educated public. In future work we shall expand this line of work to include the importance of Heidegger’s phenomenology for complementing the “hermeneutical mission” of archaeology. This should include the important function of good e-HS interpretation of the world heritage systems for political democracy at a global scale.

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