VIRTUAL MUSEUMS AND ARCHAEOLOGY:
AN INTERNATIONAL PERSPECTIVE

1. VIRTUAL MUSEUMS: THE CONCEPT

Although a familiar concept for most people, defining a museum is not a straightforward affair and the internationally accepted definition, included in the statutes of ICOM (International Council for Museums), has undergone several changes since the foundation of this organization.

A lively debate has taken place concerning the role of museums, the characteristics an institution must have to be deemed as such and the activities a museum is expected to carry on. This discussion has been revived by the introduction of the dot-museum domain, in particular regarding the position of virtual museums in this community. The present paper is not going to contribute further to the debate, in which experts of museology, heritage professionals and museum curators have had so much to say. Nonetheless, it will be necessary to examine the current official definitions to understand the impact of technology on the exhibition of archaeological artifacts and the explanation of archaeological sites.

According to the current definition[1], a museum is an «… institution in the service of society and of its development, and open to the public, which acquires, conserves, researches, communicates and exhibits, for purposes of study, education and enjoyment, material evidence of people and their environment». The above sequence of activities, from acquisition to exhibition, reflects the history of the concept of museum, possibly establishing a priority, or just following the stages of the pipeline of cultural communication based on material objects.

National definitions of museum are usually based on the previous one, with different stress on some of the activities. For instance, the Italian one (GU 2003) defines a museum as «a permanent structure which acquires, conserves, orders and exhibits cultural heritage for purposes of education and study»; leaving out the enjoyment of visitors, perhaps not surprisingly for those who know the condition of Italian museums. Although the "valorization" of heritage is defined elsewhere (art. 6) as the «activities aimed at promoting the knowledge of cultural heritage and guaranteeing the best conditions for its use and public fruition», one might suspect that in the legislator's mind Italian museums (and possibly culture) are condemned to be serious and, perhaps, tedious. Spain (BOE 1985) turns "enjoyment" (*deleite* in the official Spanish

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[1] http://icom.museum/definition.html (all web references tested on 31/08/2006).

translation of the ICOM definition) into a more austere attitude, a metaphysical *contemplación* (contemplation), but is still open to taking delight from museum content. France (JO 2002) keeps *le plaisir du public* among museum goals. The Anglo-Saxon world shows a completely different perspective. In the UK, MA, the Museum Association declares at the first point of its Code of Ethics[2] that «Museums enable people to explore collections for inspiration, learning and enjoyment». Australia states that «A museum helps people understand the world by using objects and ideas to interpret the past and present and explore the future. A museum preserves and researches collections, and makes objects and information accessible in actual and *virtual* environments». The AAM (American Association of Museums) Code of Ethics[3] pays a lot of attention to political correctness without mentioning visitors' pleasure.

From this overview, one may conclude that:

1) Visitors' enjoyment, together with education, is a primary goal of museums all around the world, with some hesitancy in Spain and a significant omission in Italy. Nonetheless, enjoyment of the public is reintroduced by enlightened Italian institutions, for example by the Regione Lombardia[4], which refers directly to the complete ICOM definition but gives a leading role to exhibition over other activities, not present in the official ICOM one. According to the Italian legislation, such institutions have a role in culture and museums, the exploitation of heritage being a joint competence of state and regions.
2) Material collections are the core content, although openings to immaterial substitutes and presentation are present in the ICOM discussion and some of the above definitions.
3) Virtual museums – the focus of the debate in the MuseDoma discussion list – enter as "born digital" collections but are generally considered as virtual presentation environments, on the web in the less technological instance. Two groups appear to exist: museums existing only virtually, i.e. only in digital format, with no reference to actual material artifacts, and virtual museums which are an offspring of the "brick-and-mortar" ones, i.e. traditional ones. A third grouping of course exists, those museums who haven't yet gone virtual, or are unwilling to do so.

Evaluating the presence of virtual museums on the Internet is not an easy task.

The questionable solution adopted by MuseDoma[5], the association managing the .museum domain, for the second level virtual.museum domain,

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[2] http://www.museumsassociation.org/ma/10934.
[3] http://www.aam-us.org/museumresources/ethics/coe.cfm.
[4] http://www.lombardiacultura.it/museiDirettive.cfm.
[5] http://musedoma.museum/.

hides it in a messy and very heterogeneous list of 679 second level domains, which includes among other irrelevant stuff an *and.museum* domain ("and" being the conjunction) and a *forces.museum* ("forces" being the second term of air-forces). Moreover, only 36 registered virtual.museum sites exist, 26 of which are in North America and 8 by the Art Institute of Chicago in different combinations. The companion French *virtuel.museum* domain has only two sites from Canada, both corresponding to other domains in English and clearly related to a political exigency of bi-linguism.

This tiny presence is a misleading impression. Virtual museums do, in fact, play an important role on the Internet: a search on Google gives (as of 31/07/2006) about 58.700.000 hits for the English term, to which some 8.000.000 must be added considering the Spanish, Italian, French and German corresponding items. Although these statistics put together such different situations as complex and immersive Virtual Reality installments, and one-page, oversimplified web sites, they highlight a huge interest for the topic, and how this is underrepresented by virtual.museum. Under- or mis-representing is however common for .museum, where neither the Prado nor the Uffizi are present, and Fiji and Barbados appear among the states owning a .museum domain, but many larger countries with a rich cultural heritage do not, for example Hungary, Romania, Bulgaria, Egypt and Turkey.

Another ICOM related service, VLMP[6], hosts links to lists of virtual museums; they are sometimes pretty detailed, but archaeology is usually underestimated. As a volunteer service, the site is not homogeneous and it is uncertain how representative it is.

In sum, to find a virtual museum on the Internet, the only suggestion that may be given at present is: use Google, ignore the messy .museum and the irrelevant virtual.museum, have a go at VLMP, and be prepared to select the valuable material in the middle of irrelevant or unreliable information. In conclusion, a pragmatic attitude may be the most effective: a museum is a cultural institution complying with the ICOM definition, defined as such by the scientific community, considered as such by visitors and deemed as such by the appropriate public institutions. Its activities, as envisaged by the ICOM definition, range from acquisition to exhibition and explanation. Its content includes cultural objects *and* the tools necessary for carrying on its activities including communication and exhibition: without communication there is no museum. Its objectives are study, education and visitors' enjoyment. Digital technology may provide content or just help in achieving the objectives. The digital part of a museum (which may extend to cover all the content) is called a virtual, or digital, museum. Finally, the question "are museums for professionals (curators and scholars) or for people?" should receive the answer "for

[6] http://vlmp.museophile.com/.

both", keeping in mind that the salaries of the former are paid by the latter through tickets and taxes, a fact that should lead them to pay a greater respect to the interests, needs and enjoyment of the latter, which unfortunately is not always the case.

2. Virtual museum and archaeology

As far as archaeology is concerned, all the official definitions of museum of course include archaeological museums, i.e. museums with archaeological content, but they also state that archaeological sites and historic monuments have to be considered in a similar way, or even belong[7], to the category of museums. It is indeed difficult to make a theoretical distinction between collections of archaeological portable objects, such as those exhibited in archaeological museums, and sets of archaeological immovable objects, such as archaeological sites, except for the fact that the latter preserve the original spatial distribution, while the former do not and are out of context, unless this is recreated by the exhibition and the related explanations. In both cases, however, understanding "the world by using objects and ideas to interpret the past" by people is strongly influenced by the interpretation given by scholars. Even in archaeological sites, where the materiality and immovability of remains might appear to establish constraints to archaeologists' imagination, alternate interpretations of spatial features and relationships may lead to totally different results.

A question which is often debated concerns the virtuality of a digital museum as opposed to the materiality of traditional ones. Apart from considerations about long-term duration of exhibits, which is nonetheless an important problem as far as preservation is concerned, what is the difference between a virtual object and a material one? As perfectly summarized in Schweibenz (1998), generic virtual museums lack the unique qualities referred to as "aura" in museology literature. In a recent Italian case, a beautiful exhibition of virtual reconstructions of Rome and other Virtual Reality archaeological applications was superficially dismissed by a culture professional being interviewed in a popular newspaper as «lacking the aura of real». This is a conservative approach, which is present in the museum literature (Schäfer 1995), contrasted by progressive scholars (Davis 1995; Mitchell, Strimpel 1997) who claim that part of the aura is transferred to virtual objects. However, what is surprising, and perhaps disappointing, is that the above statement mechanically transfers concepts born in the domain of art to archaeology, and possibly reflects a substrate of art historians' background unexpected – and in fact inappropri-

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[7] http://icom.museum/definition.html.

ate – in archaeology. If the myth that «objects speak for themselves» is being challenged for art museums (CHAPMAN 1982), it is surely wrong in archaeology and is a big mistake when attributed to a person who is in charge of public antiquities and as such should care about "communicating and exhibiting" them to people: without an explanation, the latter are going to enjoy exhibits only for their being "old things" – sometimes beautiful masterpieces of art, more often broken sherds and rusty tools.

Archaeology, and archaeological museums, are in fact intrinsically virtual. Understanding here relies upon the archaeologist's explanation, which fills the gaps of knowledge through evidence, experience and intelligence. As nowadays widely accepted (HODDER 1999), evidence is moreover based on subjectivity during acquisition and interpretation.

In sum, virtual presentation is just the last link in a chain having more immaterial rings than material ones. Dismissing it as an invalid scientific tool is just evidence of ignorance. Attitudes like the one quoted above do not take into account the legitimate needs and interests of the visitors.

Another consideration may be worth quoting. Based on official statistics[8], in Italy two archaeological complexes alone, the Coliseum and Pompeii, account for 56% of the total number of paying visitors to archaeological areas and museums, reaching a total of more than 6 million people, and for almost two thirds (64%) of the revenues. Due to the iconic nature of the two sites, well known all over the world, is it sure that visitors' attitude is not just another mass rite? In what is it different from the one of theme park visitors? When wandering in the *cunicula* of the Coliseum, what is in the visitors' mind, the scenes from "The Gladiator" or the remnants of their school education? And what is the aura of the fake centurions staying in the surroundings of the monuments and making a living out of being photographed with Japanese and American tourists?

The answers to these rhetorical questions are obvious. They should induce scholars to understand that it is necessary for them to take legitimate possession of communication and modern tools, without abandoning them to fiction, and make a correct use of them for education and enjoyment of the visitors. As evidenced in RIECHE, SCHNEIDER (2002), the concept people have of the past, as well as of archaeology and archaeologists, is biased by stereotypes, and is often the result of literary and cinema fiction. It is therefore the museum community's duty to use the same tools of entertainment for the "study and education" of the public and – why not? – for their enjoyment.

In conclusion, virtuality is not a misfit in the context of archaeological museums and sites, no more than the intrinsically necessary archaeological interpretation. Although it has not the "aura" of actual remains and ancient

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[8] http://www.statistica.beniculturali.it/Visitatori_e_introiti_musei.htm.

artifacts, it may strongly contribute to enrich it by conveying appropriate information, addressing the visitor in a natural and simple way. Relegating it in the realm of junk entertainment, with the tunics and *gladia* of the fake Coliseum centurions and the *pepla* of "sword-and-sandal" B-movies of the fifties, is not only uselessly snob, but damages the museum educational goal, as much as refusing to produce good cultural content for TV because it hosts so much trash has the only effect of depriving its huge audience of an educational opportunity.

In the era of mass communication, mass tourism and multimedia, museums and archaeology need to address the mass, and not only the small world of scholars, which so often looks to be the only reference audience of heritage professionals, as proven by dusty showcases and incomprehensible – although scientifically irreprehensible – "explanation" panels of archaeological museums and sites. As wisely pointed out in Antinucci (2005), exhibition must give precedence to explanation and communication.

3. Virtual "musealization"

Another element of virtuality affecting archaeological sites is introduced by their "musealization". The verb "to musealize" – a non-existent word in English, as the derived substantive "musealization" – is a term currently used in Latin languages to denote the operations necessary to transform a monument or a site into a tourist destination.

It actually has two implications:

1) If the site is still in use, activities are frozen, and those incompatible with the "museum" destination – sometimes including residence – are relocated. This meaning of the term is often perceived in the negative, because it is postulated that the history of the place includes its current use and population; often the negative implication is related to the change of lifestyles, relocation included, of poorer and socially weaker inhabitants, who are assumed to receive less benefits from the exploitation of the heritage resource that accompanies, or should accompany, musealization.

2) If any case, to "musealize" means creating the infrastructure and explanation aids to facilitate visitors, as such paths, panels, visitor centres, guided tours and so on. In other words, this meaning of the term is usually in the positive sense as it represents the opening to the public of a site that was previously open only to archaeologists, and turning it into a source of direct or indirect revenue for the community.

Thus musealization brings in itself the two opposite meanings of preserving a site by means of organized actions and favouring the access and the economic exploitation of the heritage resource. Balancing between the requirements of

preservation and the curiosity of visitors is not easy, as shown by the examples of the Altamira caves in Spain (now closed to the public) and some Egyptian tombs in the Valley of the Kings (where limitations to access apply).

In most cases, however, "musealizing" an archaeological site just implies cleaning it from extraneous stuff, like raw vegetation or excavation dumping; facilitating access to the remains by creating paths and protections for dangerous passages; putting unobtrusive explanation panels written in an easy-to-understand language – sometimes multi-lingual when visitors from abroad are expected; and adding tourist facilities like seats, toilets, and a tourist center with annexed book and souvenir shop and cafe. An outside parking for cars and buses usually completes the scene. The setting of the site may additionally include some gardening, like the well-kept grass that usually surrounds English monuments and the plantation and maintenance of the trees that offer some shade to the visitors of Uxmal and Chichen-Itza.

Musealization establishes unnatural rules ("Don't touch the monuments" "Don't climb the walls"). It continuously risks turning an archaeological site into a theme park, with preservation and interpretation sometimes sliding into physical reconstruction and possibly falsification, as Evans' reconstruction of the so-called Palace of Minos at Knossos. The risks of turning archaeological sites and museums into theme parks and related attractions by an excessive, and improper use of technology has been clearly evidenced in SILBERMAN (2004). On the other hand, musealization allows normal people to enjoy and understand history and culture.

In conclusion, musealization always turns a natural place with its patrimony of history, inhabitants and current use into an artificial one, as alive as a colourful butterfly pinned on cardboard in a natural history collection: to collect and exhibit it, it was necessary to kill and embalm it. Musealization is virtualization.

In some cases, the reverse is also true. One good example has been recently proposed (NICCOLUCCI 2006). It concerns the Maya archaeological site of Calakmul, located in the Mexican state of Campeche, near the Guatemala border, declared a UNESCO World Heritage site since 2002 for its uniqueness, its cultural importance and the emerging necessities of preservation and documentation. Additionally, Calakmul is placed within a large biosphere reservation and its fascination results from the combination of well-preserved ancient remains and archaeological treasures, and the tropical forest with its rich wildlife and vegetation. For these reasons, Mexican authorities are planning to extend the UNESCO area to the entire biosphere reservation.

A peculiar feature of Calakmul is the difficulty of appreciating the spatial distribution of the monuments in the city and how it appeared in the past. This is a typical difficulty in archaeological sites, but usually it derives from the *absence* of things: buildings that have been ruined, often only with foun-

dations remaining and visualizing the past appearance of the site is a mental exercise requiring an educated imagination. Artist drawings, *maquettes*, and, more recently, 3D computer reconstructions help the visitor in this task. In the case of Calakmul, on the contrary, it is the *presence* of the vegetation that prevents an easy understanding of the place and the spatial relationships of its monumental structures, although most of them are still standing and rather well-preserved. The easy – and wrong – way to facilitate the visit and understanding by visitors at Calakmul would be to remove all the vegetation, clean the surface and offer the monuments to tourists in all their beauty. Such a solution would parallel the physical reconstruction of ruined buildings in any archaeological site – for instance, re-building the missing parts of the Coliseum. Possibly this would make the site more understandable, but would infringe all the rules of preservation and eventually create a fake. Apart from obvious cultural and environmental considerations, it would be a self-destroying commercial operation, deleting the "aura" of the site, which at Calakmul consists of the unique combination of history, architecture and environment.

Consequently, any solution to musealize Calakmul can only be soft and virtual, as proposed by the Calakmul Virtual Museum Project, carried on by a joint team formed by the archaeologists working on the site and researchers from several Mexican universities (RUIZ-RODARTE 2006).

In conclusion, Calakmul is an example of the equation: musealization needs virtualization. Without virtual explanations, the site is amazing but incomprehensible; making it accessible, both physically and intellectually, would not only damage the environment, but also destroy his unique features; the grave goods, which complement and explain the structure of power and the political history of the city and are necessarily stored far away from their archaeological context, would reduce to beautiful, "primitive" artifacts as many others exhibited in the well organized Mexican museums.

Calakmul thus epitomizes a condition that is common to many, if not all, archaeological sites and their "musealization".

4. MUSEALIZATION, TECHNOLOGY AND VIRTUALITY

Nowadays, a great number of technological tools for virtualization is available to museum and archeological site curators. Several projects have explored the possibilities provided by modern computer visualization technologies.

Especially within the Community's Fifth Framework Programme 1998-2002, interdisciplinary teams of engineers and heritage professionals have successfully attempted at visualizing the past appearance of sites and at enriching the explanation of museum exhibitions with multimodal interfaces. Such EU-funded FP5 projects have mobilized a vast amount of resources, in terms of budget, skills and human work, pushing additional resources to be invested by national research

programs and projects in the member states which have paid more attention to such trends in international research. However, statistics published in Niccolucci, Geser, Varricchio (2006) show that European countries have benefited from this kind of investment in an uneven way, but do not allow us to evaluate the cascade effect on national research activity. This is summarized by the national reports published in the same volume (Niccolucci, Geser, Varricchio 2006), which, however, do not take into full account the most recent developments and trends, that are more difficult to assess without further investigation.

In UK, the Methods Network[9] is a multi-disciplinary partnership providing a national forum for the exchange and dissemination of expertise in the use of Information and Communication Technologies (ICT) for arts and humanities research. It is funded by the AHRC (Art and Humanities Research Council) ICT programme, aimed at capacity building in the use of ICT for arts and humanities research. The Netherlands Organization for Scientific Research NWO has launched CATCH[10], a programme funding several projects on digitization some of which are related to virtual access to heritage information, among others RICH[11], providing access to collections of historical glass from archaeological excavations. To cite some Mediterranean examples, Greece has supported projects aiming at the valorization of its remarkable cultural heritage through the programme "Competiteveness", managed by the General Secretariat for Research and Technology[12], co-funding (Action 4.5.3) 12 technological cultural projects for a total of more than 12M Euro; and Spain's decentralized governments are actively pushing similar projects in the autonomous regions.

As far as Italy is concerned, apparently the FIRB programme should provide an avenue for similar interdisciplinary projects, but the lack of information does not allow us to evaluate how much is destined to cultural heritage (the programme covers many disciplines): the Ministry of University and Research (MIUR) is not interested in publishing information about the funded projects – or at even the project names – and only bureaucratic data are provided on the MIUR site[13]. Here, a glimmer of hope is represented by the activity of the CIVR (Committee for the Evaluation of Research)[14], which includes an area for the technologies for the valorization of cultural heritage. The 15-f panel, in charge of this area, has produced an enlightened report, available on the Internet, about the state of such interdisciplinary research in Italian Universities. The impact of the report on the disastrous academic condition of this field is

[9] http://www.methodsnetwork.ac.uk/.
[10] http://www.nwo.nl/nwohome.nsf/pages/NWOP_5XSKYG.
[11] http://www.referentiecollectie.nl/richglas/glascollectie.php.
[12] http://www.gsrt.gr/.
[13] http://www.miur.it/0003Ricerc/0524FIRB_-/index_cf3.htm.
[14] http://www.cicr.it/.

unfortunately uncertain, and as yet non-existent. The report mercilessly depicts a general situation with areas where «the research is languishing or, at most, recycled subjects are re-published». Academic positions are described as assigned by "a conservative corporation" through a "untrustworthy" mechanism, and an independent evaluation of researchers' results might be an «obstacle difficult to bypass for [current] carve-up practices» by nomination committees.

Anyway, there are excellent results produced by European research that can be very useful for the virtualization of archaeological heritage, both in museums and on sites. Among those concerned with virtual museums and archaeological reconstructions we may quote ARCHAEOGUIDE[15] (Vlakahis *et al.* 2001), providing AR (Augmented Reality) technology and mobile display, with application to classical Greek sites; 3D-MURALE[16] (Cosmas *et al.* 2001; Van Gool *et al.* 2002), which has developed tools to measure, reconstruct and visualize archaeological reconstructions in Virtual Reality using as a test case the site of Sagalassos in Turkey[17]; ViHAP 3D[18], which aimed at providing tools for the acquisition, post-processing and presentation of digital collections of 3D models, very suitable for the creation of virtual 3D museums[19]; CHARISMATIC (Arnold 2002), providing economic ways of reconstructing ancient environments.

All these projects, as the others funded by the EU former DigiCult Unit, now Learning and Cultural Heritage[20], were carried on by interdisciplinary and trans-national partnerships including heritage or archeological institutions and provided applications on significant archeological case-studies. They have produced innovative technology, particularly designed for heritage applications, showing that generic technology needs further development to be suitable for heritage use. The results of all these projects are being integrated, together with newly created tools, by EPOCH[21], the European Network of Excellence on ICT applications to museums, monuments and sites. EPOCH is also undertaking the task of creating user scenarios, aimed at switching from a *technology-centered approach*, starting from technology and applying it to the solution of the problems of virtual musealization, adopted in many previous projects, to a *heritage-centered approach*, starting from the problems curators and site managers face in their activity and providing the technological tools that may be used to solve them.

[15] http://archeoguide.intranet.gr/project.htm.
[16] http://dea.brunel.ac.uk/project/murale/.
[17] http://www.sagalassos.be/.
[18] http://www.vihap3d.org/news.html.
[19] See http://vcg.isti.cnr.it/downloads/3dgallery/vclgallery.htm for a gallery of samples including archaeological artifacts.
[20] http://cordis.europa.eu/ist/digicult/index.html.
[21] http://www.epoch-net.org/.

EPOCH has already developed a number of showcases (see a list and short explanations on the project web site or in Cain *et al.* 2004): they vary from virtual replicas of valuable exhibits to be used as visitors' interface (also presented in Petridis, Pletinckx, White 2005), to AR applications and virtual reconstructions, populated by virtual humans and revitalization of ancient life, as those previously developed on Pompeii in the EU project LIFEPLUS[22] (Vlakahis *et al*. 2003). As already mentioned, more complex user scenarios are forthcoming.

Possibly, such a task will not be fully accomplished during the lifetime of EPOCH, which will end in the Spring of 2008, because of the complexity of systematizing such problems and the difficulty of creating a cross-fertilizing collaboration between technologies and the humanities. Nonetheless, it is expected that EPOCH's results will give substantial insights and set the foundations for an expansion of the virtual side of heritage, led together by heritage and technology professionals and not only, as so often happened in the past, just by the latter.

To conclude this partial list of notable examples, it is worth citing the national German project TroiaVR (Kirchner, Jablonka 2001; Jablonka, Kirchner, Serangeli 2003). Managed by archaeologists in collaboration with computer specialists, the objective of the project was to produce a reconstruction of Troy based on sound archeological grounds. It formed the core of an exhibition attended by millions of visitors and is a perfect example of a virtual exhibition making intensive use of computer visualization techniques. This example brings up the question of what happens to virtual exhibitions when they are concluded, and if any preservation is arranged, like those provided by ADS (Archaeological Data Service[23]) for archaeological datasets. Unfortunately this is not the case, also because many of these models use proprietary formats and software – often to optimize the performance – and are unsuitable for storage.

This leads to another important aspect, that is standardization and open formats. Standardization, and consequent maintainability, is paramount for the diffusion of virtuality in museum applications. Adopting standard formats, better if open source, reduces production and management costs by allowing the use of widely diffused packages for the creation and visualization, and perhaps also stimulates the production of open source equivalents. Standards allow easier maintenance and upgrade. In principle, they permit interoperability. Standardization is a foundation of EPOCH's work, and the project is strongly committed in proposing a "Cultural object format" based on widely diffused standards and incorporating all the features dictated by cultural exigencies. Being work in progress, no reference is as yet available, but the project web site reports the interim results and allows participation in the discussion on this topic.

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[22] http://lifeplus.miralab.unige.ch/.
[23] http://ads.ahds.ac.uk/.

5. Virtual museums: the user's perspective

Users of virtual museums correspond to the use envisaged for them in the definition: scholars ("study") and visitors ("education and enjoyment"). There is a third category which is often regarded as "users" of virtual technology, that is museum curators and managers, for the passive attitude they adopt in many cases towards technological aspects. Often only the latter are considered when dealing with users' needs and wishes, possibly because decisions are taken by them and the reactions of the public towards virtual museum environments are little explored. However, some studies have recently been developed in this direction. The simplest form of virtual museum, i.e. on the web, has been studied e.g. in the *Museums and the Web* series of conferences. Using the concept of user profile, an evaluation methodology has been proposed (Di Bias *et al*. 2002), leading to evaluation surveys of the web sites of archaeological museums (Di Bias *et al*. 2004). Hit statistics provide also measurable criteria for success and appreciation by the public.

However, when more complex technology is concerned, research is still in its infancy. An evaluation methodology extending the one used for web sites to 3D on-line archaeological reconstructions is currently being tested by the author, basing on the collaboration of his students as test "visitors". An additional difficulty on this regard concerns the limited availability of such applications outside the scope of their creation, and this implies the need of ad hoc, on site surveys. Some recent papers were presented at VAST2005 (Abad *et al*. 2005; Alzua-Sorzabal *et al*. 2005; Owen, Buhalis, Pletinckx 2005), and more are planned at VAST2006, investigating the visitors' reactions towards virtual exhibitions and museums.

The statistical base of surveys is still rather small to draw general conclusions, but it seems that there is generally a good acceptance of virtual communication tools when their use is not intimidating or cumbersome. A seamless, unobtrusive approach appears to be the best accepted one. In general, however, visitors' reaction to such tools seems more positive than that of scholars', in part for a generic diffidence of humanities researchers towards technology, in part on account of difficult software interfaces that often require specific skills to be properly used, and in part because innovative uses of advanced technology for scholarly purposes have yet to be fully explored (for a seminal paper see Hermon, Niccolucci, D'Andrea 2005).

One of the aspects that scholars require from reconstructions is verifiability and credibility. Reconstructing the past involves different levels of reliability that should be reflected in the reconstruction, as indicated in Frisher *et al*. (2002) and discussed in the extensive bibliography quoted there. Development on this issue is twofold. On one hand, it is advocated that the difference in the degree of reliability be made visible in the result, and methods are be-

ing investigated both to evaluate and express it (Niccolucci, Hermon 2006; Sifniotis *et al*. 2006) and to visually represent it (Roussou, Drettakis 2003; Zuk, Carpendale, Glanzman 2005).

On the other hand, a methodology is being defined to document all the stages of the logical process leading to the actual reconstruction, and provide detailed information about it (Beacham, Denard, Niccolucci 2006). This kind of documentation and explicit statement of the model credibility will hopefully substitute the present necessity of relying only on the authority of scholars involved in the interpretation, and will eventually make the difference among serious visual supports to explanation and "education", and representations mainly based on imagination and spectacularization. In other words, recognizing the difference between virtual museums and theme parks will no more need to be based – as it is sometimes today – on the tediousness of the former and the entertainment of the latter.

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Franco Niccolucci
PIN – University of Florence

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F. Niccolucci

ABSTRACT

Current official definitions of "museum" in different countries are examined, together with their implications: the role of museums, their characteristics, the activities museums are expected to carry on. The presence of virtual museums on the Internet is also evaluated. As far as archaeology is concerned, the term "musealization" is analyzed, which denotes the operations necessary to transform a monument or a site into a tourist destination; therefore it brings in itself two opposite meanings of preservation, by means of organized actions and favoring the access and the economic exploitation of the heritage resources. The aspects of technology and virtuality available to museum and archaeological site curators are given in detail, mentioning dedicated international projects. The Author concludes by analyzing the issue of the user's perspective in the virtual museum as well as the requirements of specialized scholars.