Virtual Archaeology and museums, an italian perspective

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Resumen

El creciente número de museos y aplicaciones virtuales disponibles en la actualidad plantea diversas problemáticas en cuanto a uso y mantenimiento se refiere. El presente proyecto intenta establecer un análisis del problema a través del estudio de tres proyectos de musealización virtual realizados por el Virtual Heritage Lab en el Istituto per le Tecnologie Applicate ai Beni Culturali del CNR (proyectos realizados en los años 2008, 2009 y 2012(en fase de realización). Tales proyectos se realizan en base a tres aspectos: el mantenimiento, la fiabilidad en la gestión de los datos y la densidad semántica. El estudio aporta una contribución al debate sobre el desarrollo de futuros museos virtuales y las posibles formas de abordar la compleja relación entre el rigor científico y la divulgación.

Palabras Clave: *REALIDAD VIRTUAL, MUSEOS VIRTUALES, ARQUEOLOGÍA, FIABILIDAD DE LOS DATOS.*

Abstract

The growing number of virtual museums and applications today available arises many questions concerning the problems connected to their fruition and maintenance. This paper aims at setting up an analysis of the topic, through the steps of three VM projects carried on by the Virtual Heritage Lab (2008, 2010, 2012 (in progress)). Such case studies are taken into account on the basis of three topics: technical maintenance, reliability and semantic density. The analysis aims also at contributing the debate on the future development of VMs and on the management of the relationships between reliability and wide dissemination.

Key words: *VIRTUAL REALITY, VIRTUAL MUSEUMS, ARCHAEOLOGY, RELIABILITY.*

Riassunto

Il numero crescente di musei virtuali ed applicazioni attualmente disponibili solleva molte problematiche riguardo al loro uso e alla mantenibilità. Questo lavoro cerca di impostare un'analisi della questione attraverso lo studio di tre progetti di musei virtuali condotti dal Virtual Heritage Lab dell'Istituto per le Tecnologie Applicate ai Beni Culturali del CNR (progetti realizzati nel 2008, 2009 e 2012(in progress)). Tali realizzazioni vengono analizzate sotto tre aspetti: la manutenzione, la gestione dell'affidabilità dei dati, la densità semantica. Dallo studio emerge un contributo al dibattito sugli sviluppi futuri dei musei virtuali e sui possibili modi di affrontare le complessa relazione fra rigore scientifico e divulgazione.

Parole chiave: *REALTÀ VIRTUALE, MUSEI VIRTUALI, ARCHEOLOGIA, ATTENDIBILITÀ*

1. THE TEAM AND THE TOPIC

The Institute of Technologies Applied to the Cultural Heritage of CNR-ITABC, since 1981 is a centre of excellence in the field of the advanced researches and technologies. In particular, it is involved in several areas from Geophysical Prospection to VR applications for CH.

The Virtual Heritage Lab team's work (www.vhlab.itabc.cnr.it) is focussed on two research aspects: geo-spatial 3d component of cultural information and communication; on-line VR sharing (VR cooperative environments) and dissemination (VR webGIS). The team has developed 2d and 3d tools for CH, following an open source approach, specifically directed to ancient landscapes reconstruction and 3d exploration.

Since the late 90's the team has worked on many GIS and VR projects, such as the Kazakhstan Project, the Ancient Appia Projects, Virtual Rome, the Ca' Tron VM, as well as the constant work on the dissemination and support to the Open Source in CH domain, organizing the IV Italian Workshop on Open Source in archaeology (Cignoni, Palombini, Pescarin 2010).

Following such experiences, the Lab often faced some of the most common problems and issues connected to Virtual Museums and their planning, realization, everyday life. The evolution of the different choices in this sense may be a possible way to approach a wider reflection on the state of the art.

The projects taken into account in the present analysis are: the Ancient Via Flaminia Virtual Museum (2008), the Teramo Virtual Museum (2010), the Bologna Virtual Museum (in progress, to be released in 2011).

2. THE PROJECTS

2.1 The Virtual Museum of the Ancient Via Flaminia

The Virtual Museum of the ancient Via Flaminia is a project financed by ARCUS S.p.A and developed in collaboration with the Archaeological Superintendence of Rome. The application is permanently exposed in a multimedia room at the National Roman Museum-Terme di Diocleziano in Rome (FORTE, 2008).

The final product is a 1 h 20" multiuser application with short movies connected to interactive 3d environments (in stereoscopy).
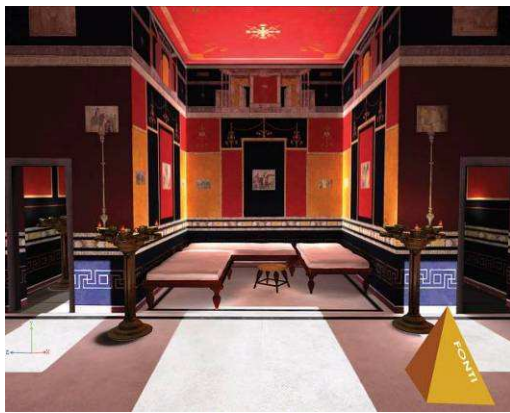

Figure 1. the Virtual Museum of the Ancient Via Flaminia: triclinium of the Livia's villa: the yellow pyramid activates a source window (see text) [courtesy E.Pietroni, M. Di Ioia, L. Vico].

Since the beginning main issues that appeared to be the most problematic have been:

1. **Maintanance.** The system installation comes together with a specific training program for the Museum's personnel. The personnel has been, for the most part, very interested in the topic, and in all the application needs, such as the daily switch on and off and the maintenance. Anyway, this kind of installation implies different levels of possible problems, in terms of software, hardware, settings, which can not be easily solved by non-expert personnel. This is probably one of the reasons why many Museum applications "dies" so early. The solving of the arisen maintanance issues has requested a level of engagement, in terms of work, time and availability, higher than in any expectation.

2. **Interpretation**. This is maybe the most discussed problem connected to Virtual Museums: how to manage uncertainty and represent the different reliability levels of the monuments? In current times, the graphic quality of VM applications is rapidly growing, as well as the risk, for the users, to mislead the esthetic quality as an index of the reliability. The development of this project made we often face such a question. The solution chosen was double: on the one hand marking each room of the monument visited by the avatars with one two or three stars as an index both for the architectural and the decoration reliability (hypothetic, probable, certain); on the other, setting up the

faculty, for the users, to open some informative windows representing the monuments used for chronological and functional comparisons.

3. **Semantic density.** The choice to concentrate in an unique application all the information contents and levels (technical and emotional) in the same applications, resulted in a very heavy product, hard to be fully lived and comprised.

Such problems were the most discussed topics during the analysis of the visitors' reactions in the early opening months. The results of such considerations were the heritage we reached in the perspectrive of experimenting new solutions.

2.2 The Teramo Virtual Museum

The Teramo Virtual Museum is a project started in 2009, on behalf of the local Soprintendenza, focussed on the virtual reconstruction of the St. Maria Aprutiensis Cathedral, destroyed in XIII century.

The current archaeological complex is composed of the ruins of the cathedral and some roman domus, and one of the project needs was to emphasize the evocative effect of such wall remains, whose height rarely overcome one meter.

The final release implied three different outputs:

1. A touch-screen application containing a technical reconstruction of roman domus, in the current and original conditions, in order to provide technical informations for an expert fruition (archaeological plans, historical and chronological details and so on).

2. An interactive VR application, in which a couple of characters, following the story-telling approach, lead the user inside the virtual model of the ancient cathedral, to discover the history of the city.

3. An integrated system of music, movies and random spotlights into the archaeological site, following the visitors tour.

The Teramo project represented, thus, an evolution of the VM's concept, in relation to the three topics stressed above. The *semantic density* is now shared in three different applications in an increasing scale of interaction and knowledge requested (from 3 to 1).

The maintenance issue was studied in order to reduce as much as possible the personnel actions, which is absolutely null for applications 3 (chronometric auto- switch on and off) and need only a limited effort for the others.

The problems connected with reliability was crucial in this situation, as the ancient cathedral was completely destroyed and its architectural structure, with the exception of the plan, is completely hypothetical. Thus, the situation made particularly important to remark the difference between reality and virtuality. Among the many possible ways, we opted for an experimental meta-narrative approach, making the game explicit through the presence of a special character, *Virtuvius*, the virtual architect, who explains to the public how hypothesis and virtual buildings are made.

Figure 2. the Teramo Virtual Museum: Virtuvius, the virtual architect, at work reconstructing the ancient Cathedral [Courtesy of E.Pietroni, M.Di Ioia, C.Rufa].

Figure 3. The reconstructed city of Bologna (20th century): Courtesy of CINECA: Silvano Imboden and CNR ITABC: Daniele Ferdani

2.3 Bologna Virtual Museum

The Bologna Virtual Museum Project is a stereoscopic short movie aimed at bringing visitors of the new City Museum inside 30 centuries of history. Bologna and its territory are reconstructed (from the 9th century BC) through a tremendous scienfic work, dedicated to the communication and the story-telling of its long and complex   history. The project is developed by CINECA in cooperation with CNR ITABC and will be released in 2011.

Starting from the whole city model, and its neighbourings, two ouputs will be available:

1. A short movie (about 10 min. long) representing a trip inside and around the city (in stereoscopic view).

2. A very simple interactive application which will allow to explore the same scenarios and reach specific information.

As it is clear that, here too, the maintenance is reduced to a very low level of interaction, the semantic density in this case is thinned down through its distribution on the lenght of the applications (the movie will be about ten minutes long). Anyway, here too, there will be a two level fruition: the first completely passive, the second interactive.

An important research feature of the project, is the use of procedural modeling tools for the city buildings, through the software Blender and City Engine (MUELLER ET AL. 2007). Such a strategy allowed to reduce the modeling work and, thus, to preserve more effort to the graphic quality of the whole context (PESCARIN, PIETRONI, FERDANI, in press). Such an advantage was used to try a new (again meta-narrative) approach to the reliability topic.

The graphic quality was set up avoiding an "hyper-realistic" look, and choosing a "cartoon" graphic color palette.

The particular color atmosphere automatically suggests an idea of "unrealistic reality", implicitly marking the distance of virtuality from the real world.

3. CONSIDERATIONS

Trying to sum up the experience of the described works, it is possible to state some indications as possible strategies to be discussed in order to face specifical VM's aspects.

Manteinance: A VM should be planned (both in hardware and software terms) as to limit as much as possible the need of museum operators' technical intervention. Particular effort should be paid to the realization of scripts to automate procedures, and even operations of computer switch-on and shut down – where possible – should be programmed to be automatically activated at time.

Interpretation: In the current state of the art, many solutions have been experimented in order both to express different level of reconstruction reliability and the whole concept of *virtuality* as something ontologically different from *reality*. Among all the possible ways in such a direction, it seems interesting the challenge of the *meta-narrative* approach, to make explicit the virtual reconstruction work, inserting in the virtual world characters or elements referring to it.

Semantic density: This is a hard topic to be faced, as there are not standard solutions. The starting observation is that a very heavy amount of contents (historical, artistic, geographical and so on) may result unshared for the the same application. Possible solution can be found in the content segmentation through different kind of applications, with different knwoledge and interaction requirements, thus sharing more semantic levels levels on different outputs.

Beyond such considerations, it is still important to stress the need of systematic analysis of VMs,, in order to focus their impact on the users and build a theoretically strong corpus of considerations on the topics related to their evolution and life (or death).

ACKNOWLEDGEMENTS

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