

# Organizational aspects of ICT applications in cultural heritage “Virtual Museum” context: the permanent challenge of reconciliation of diverging scientific, technical, operational and financial objectives.

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## Abstract:

*The applications of ICT in the cultural heritage field are including a new expanding category of applications, having a “creative” character, and a multidisciplinary approach. Motivations and priorities of involved players (individuals and organizational players), are presented, through various FHW paradigm projects, in order to explore the possible impact of this kind of projects in science and cultural heritage concept, as well as to explore their hidden added value, that makes them capable to attract resources.*

**Key words:** ICT, CULTURAL HERITAGE, VIRTUAL RECONSTRUCTION.

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## Resumen

*Las aplicaciones de las Tecnologías de la Información y la Comunicación en el patrimonio cultural comprenden una nueva categoría de acciones, con un carácter creativo, y un concepto multidisciplinario. Este trabajo sirve para presentar las motivaciones y prioridades de los actores involucrados (individuos o instituciones), que participan en estos proyectos, para examinar en base a estos las posibles consecuencias de estos proyectos en el concepto mismo de ciencia y patrimonio cultural, al mismo tiempo que se explora también su oculto valor añadido, valor este que les puede permitir atraer nuevos recursos.*

**Palabras clave:** TICS, PATRIMONIO CULTURAL, RECONSTRUCCIÓN VIRTUAL.

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## 1. Introduction

The applications of ICT in the cultural heritage are covering a very wide range of applications in the field: from the simple use of working software such as the simple text processing software, to applications of data processing and material analysis, for specific archeological research and conservation works. Despite the fact that they are changing the way of work, of an archeologist for example, they have no impact in the methodology and objectives of its own science. We could call them **operational ICT applications in CH**. Changing the paper notebook to the electronic one is a new, and far more effective professional tool, improving dramatically productivity, but not a change at all in terms of the science of archeology.

The applications we are dealing with, here, are not belonging to this category.

Another kind of applications of ICT in the cultural heritage field, are concerning external from the cultural heritage disciplines applications, have an impact to the cultural heritage operation also: development of on-line networks, allowing the quick communication of results, on line publications, communication and on line conferences, even the on-line access to pictures and data that would be more costly to access with the traditional ways, etc. We could call them **systemic applications ICT applications in CH**. They have an impact on cultural field

actions, improving productivity and changing habits of work, changing and improving day-to-day operation. They are creating also, in some way, a generation gap, leading on the same time to a kind of prim of the scientific positions and knowledge of the younger generations, more familiarized with this kind of work environment. However they remain external to the core of values and objectives of the cultural heritage field.

We are not going to examine these applications either.

Finally, a third kind of ICT applications has emerged, in the field of cultural heritage: projects that combining archeological research methodologies with ICT applications, are creating results, and somehow also products, which are integrating internal cultural value. Scientific knowledge within that process is transformed to something else, which contains that knowledge but it is not part of the traditional methodological system of archaeology or history. Tangible and intangible cultural heritage (UNESCO, 2003) can be the object of this kind of projects. We can call them **Creative ICT applications in CH**. This particular kind of applications, although they seem quite marginal in terms of the total number and financial value of ICT applications in cultural heritage, they almost monopolize the interest of the researchers, networks, analysts and public comments. This is the question we are going to try to answer.

We are going to examine here, that kind of applications, illustrating 2 paradigmatic, projects of the Foundation of the Hellenic World.

## 2. Paradigms of projects

### a. The Virtual Reconstruction of the Ancient Agora of Athens

The Virtual Reconstruction of the Ancient Agora of Athens (FHW, 2007 - Ancient Agora) is a 4 years project of FHW, which has been implemented between 2004-2008. The projects objective was to rebuild, one of the modern world symbolic landmarks: the ancient Agora of Athens, present its architectonic and historical evolution through the antiquity from pre-classical to roman times.

The ancient agora of Athens has been rebuilt piece by piece following a strict scientific visualization methodology, summarized as following: scientific documentation, scientific control and validation in the visualization process, publication of documentation, choices and decisions for visualization aspects, educational oriented approach concerning presentation to the public using interactive possibilities of technology.

The approach of FHW consists on the accurate reconstruction, through various layers of scientific documentation and research, on the same time with the provision of that documentation in a scientific way, for the researchers, the educational community and the wide public.

The overall cost, from the starting point to the beginning of the operation to the public, has been around 2 million Euros, from which 550.000 contributed by EU and National funds, and the rest by FHW in work and infrastructures and other expenses.

Around 350 MM have been invested to the projects, from which approximately 50MM of historian archeologists, 30 MM of architects, 170 MM of 3d modelers and graphic designers, 50 MM of VR programmers, around 10 MM efforts of museum educators, and the remaining 40 MM resources were allocated to scenario writers, musicians, sound designers, producers etc.

The project results, the collection itself, is, since 2008, accessible to the public to "Tholos", an advanced dome shaped VR theater – museum, of 135 seats, belonging to the museum and cultural center complex of FHW in the center of Athens, named as Tholos from the homonym monument of the Ancient Agora of Athens, due to the dome shaped figure .

Various presentation and guidance scenarios are available to the public (scholars, pupils, tourists, simple visitors). Since then more the 300.000 persons have paid a 45 minutes visit to the virtually reconstructed ancient agora of Athens. The project has been presented and commented to various scientific publications, in different fields (academic, or technological) and has also received a high national and international visibility, through any kind of Media.

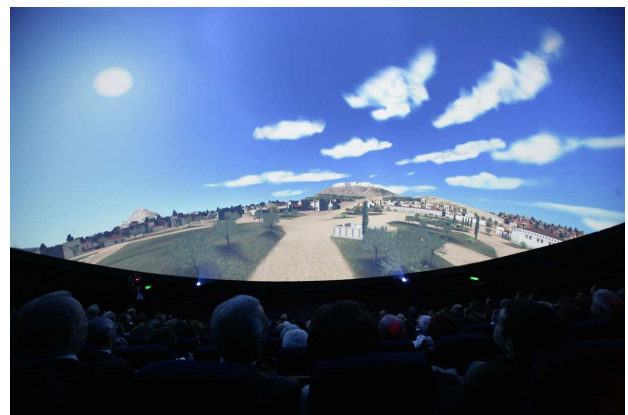
### b. The virtual reconstruction of Hagia Sophia monument, as it where in the 11th century: An on-going project

The next large scale project of FHW, actually on-going, is to create an entire, original 3D reconstruction of the church of Hagia Sophia in Istanbul, based upon its classic Byzantine form, as it was around 11th century. We also aim to present the

development, through the centuries, of certain characteristic elements of the monument, through partial, dynamic virtual reconstructions.

The project will take into account the latest evidence and studies on Hagia Sophia and, thus, will further the study of the monument creating a solid base for future research. The project aims to go beyond the experience and the possibilities explored by the existing applications and projects of virtual and 3D reconstructions of Hagia Sophia. With our principal model we aim to present both the architecture and the interior decoration of the church. Detailed aspects of the building's different phases will be presented through the development of a number of scenarios and applications, which will be connecting its development with the historical context of each period, taking into account the technological limitations. The visualisation of the details will vary, depending of the extent of the documentation. Three general categories will be distinguished: surviving elements, secure reconstructions and conjectural reconstructions. The attempted restitution of the evolution and the successive alterations of the building will ensure the dynamic character of our reconstruction.

When finished the reconstruction, Hagia Sophia will be displayed at Tholos, following 5 different scenarios, focusing of different aspects of the monument: architecture, art, religion, historical events.



*Image 1: The Ancient Agora in front of the public*

The overall project cost is going to reach more than 2 million Euros, from which 900.000 are assured through European structural funds and the remaining amount is covered by FHW resources.

Modelers, archeologists, historians, interactive application creative developers and scenario writers, scientific experts, VR programmers are involved in the project, that initially is foreseen to be completed at the end of 2012.

The virtual reality applications mentioned above have been enriched with educational scenarios, and metadata and documentation provided either on site, during the visit, either through complementary technologies, such as the internet. The methods and the archeological data of the reconstructions are exposed in the form of scientific articles, including assumptions and different interpretations on-line. Practical evaluations and studies have proved in relevant literature that learning effectiveness is accentuated through that kind of IT experiences (ECONOMOU & PUJOL, 2007).

### 3. The framework of the virtual re-creation of an ancient world

The current dominant discourse about the “reconstruction of ancient places, sites, monuments etc using Virtual reality techniques, is tending to focus on the point of view of the discipline of archeology in contrast of the “Hollywood type” fictions. However the reconstruction of an ancient world can not remain a reconstruction of the archeological knowledge only: no empty space is allowed by the medium. Sounds, visual continuity, movement capability within the environment, oblige to produce something far more complete than just the percentage of the past tackled and proved by the archeologists. It leads to the “recreation” of worlds, rather than reconstruction of a simple monument, or site.

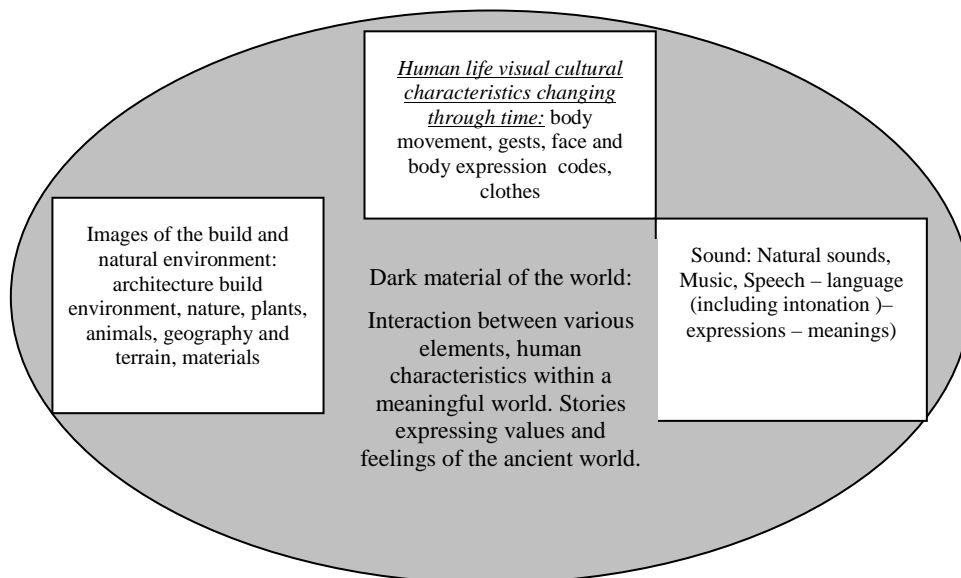
A real world is composed by objects, build environment, clothes, human and natural sounds, language (written and spoken), music, natural environment as transformed by humans, but also human bodies, and faces, body movements and expression and facial expression (both elements changing through time and

cultures), natural movements, temperature, and far more. Wherever somebody starts from, the rest also will be needed.

A virtual world is composed, in the mind of the visitor, from the same elements with the real world. During any virtual reconstruction operation, explicitly or not, consciously or not, at the end those elements are there. Even if some of them are not included, they still are perceived by their absence.

Who is making up decisions for those elements though? About the sound or the language, about the plants, about gestures? Wouldn't be more reasonable that these aspects should be claimed by other than archeology disciplines and arts? Philology, theater, musical studies, natural history sciences, biology, climatology etc.

And beyond that a virtual world recreation leads definitely to the recreation of meanings, values and feelings, historical facts and explanations, expressed through story telling techniques: moving and acting characters, historical facts narrated, the human situation recreated (scheme 1).



Scheme 1: Components of a virtual world: a creative process

In conclusion the virtual re-creation of a past world (even the most limited piece of a past world), involves a lot more disciplines and arts than archeology. And even though a large aspect of any world will be unrecoverable, the dark material of the past, that has to be represented in the virtual space, values, meanings, actions. VR does not allow empty space. That space is filled finally by the unique capacity of human imagination: that is the process of creativity.

All those aspects of the virtual recreation are actually studied by number of disciplines and arts, using different methodologies and approaches, with many methodological difficulties to communicate.

All those aspects virtual recreation are representing decisions to be taken within the recreation process that are taken anyway by somebody. If the right person is not involved and is not there, they will be taken by somebody else: if there is no musicologist

somebody will decide about the sound, if there is no historian, somebody else will decide about the facts and values, if there is no theater persons somebody else will decide about human body and face movements, if there are not creative people or others, modelers and programmers, will take their place. A struggle of power of players involved and to-be-involved is in place. Who is distributing the roles?

### 4. The involved players and their objectives

Each separate group of scientists and players involved in these projects has a different set of objectives and personal priorities, depending on its own background and position within the discipline he/she belongs as well as his current organic position

related to the project (external writer, or collaborator, scientific committee member, internal programmer etc.).

- ARCHEOLOGY AND ARCHEOLOGISTS UNDER VARIOUS ORGANIZATIONS: INTERNAL FHW TEAM, with established work methodology, external experts and scientific committee working for the project. They provide the core scientific information for the project. They work with different roles, as data providers, solution providers, and validation actors.

**Objectives:**

- Personal success and visibility to the archeological and academic community through accurate scientific results including sometimes primary research
- Publication of “findings”
- Personal visibility within the community of archaeologists
- Always need to get more time and effort

- ARCHITECTURE AND ARCHITECTS SPECIALIZED IN ANTIQUITY. Working in close collaboration with modelers in order to guide the rebuilding process, feeding them with drawings, materials for colors textures

**Objectives:**

- Personal success and visibility within the community of architects and general visibility, by achieving to provide accurate and correct architectural instructions for the project
- Individualization of their input as a separate scientific input from the archeological one
- Always need to get more time and effort

- 3D MODELERS AND GRAPHIC DESIGNERS: building the site column by column, reconstructing from the scratch literally: the drawings provided by architects and the data of the archaeologists and the scenarios of the art direction.

- Personal success and visibility within the community of modelers and general visibility concerning the quality of graphics
- Personal creativity’s accomplishment
- Always need to get more time and effort

- VIRTUAL REALITY PROGRAMMERS

**Objectives:**

- Personal success through the achievement of programming tools, creating more effective solutions, able to integrate the highest quality of graphics in the real time world of Virtual reality.
- Always need to get more time and effort

- ART DIRECTORS, SCRIPT WRITERS FOR INTERACTIVE EXPERIENCES, MUSIC CREATORS

**Objectives:**

- Wider possible visibility and acceptance of the entertainment and aesthetical part of the work, success to the target group

- Personal visibility through the artistic part of the project and visibility of results

- HISTORIANS AND WRITERS OF SCIENTIFIC TEXTS

**Objectives:**

- Publish new research results and be recognized by their community within a high level scientific corpus.
- Avoid trivial subjects in research
- Have comfortable deadlines

- ADMINISTRATORS AND MANAGERS

**Objectives:**

- Keep finances and funding within the initial budget plan, update if and when necessary: means actually to be able count progress (not easy word in the humanities field).
- Keep timetable within reasonable schedule
- Act, inform and report to owners and funding bodies, following the guidelines
- Extract quick decisions and agreements from different players.
- Assure convergence of decisions and avoid diverging positions
- Always ask for acceleration and oblige the scientists, engineers, artists to make the steps they are not use to do, within their strict scientific field, in order to meet the other scientists needs as well as the administrative and financial background.
- Succeed to set up compromises leading to the better possible result.

- OWNERS AND FUNDING BODIES

**Objectives:**

- Have a high visibility result acceptable to all communities and the wider public
- Keep expenses as low as possible and monitor the overall alignment with the legal and financial framework of operation of the organization and of the precise project.
- Meet overall timetable
- End with a high cultural added value result

## 5. Diverging forces

Analyzing the above mentioned priorities and objectives of different players we can identify various diverging scientific/personal objectives, leading to the development of strong desegregating forces:

- modelers have to accept lower quality of graphics according the programming restrictions and the monuments themselves,
- programmers have to accept and be forced to resolve problems of real time power processing systems in order to

meet the project technology limiting needs creating robust applications for industrial operation with the wide public,

- Archeologists, in the case of visualization projects, have to deal with the way that resolved scientific issues are visualized, and integrated to the metadata of the project, instead of advancing research with new hypothesis and discoveries. They have more to synthesize than analyze.
- Historians and archeologists and other social scientists have to write articles within a thematic corpus, dealing with Hellenic culture, short in size, compressed somehow, scientific information, that would be probably less meaningful out of the corpus as a separate article.
- Educators and scenario's designers are working under the very hard restrictions of mass interaction virtual reality devices, such as virtual reality theaters, in terms of time of the visit, objectives of the scenario, limitations of the interaction.
- Creative persons have to deal with the limitations related to the archeological and historical information, in terms of accuracy and ethics.
- Owners and funding bodies are undertaking considerable costs and risks from the evolution of the technology and immaturity of technological applications in some cases.
- Finally, managers are transformed to creative motivators. They have to be able to understand the concerns and priorities, set up compromises in terms of choices of persons and choice of solutions in order to assure the integrity and success of the project.

## 6. Disintegrating forces

- Fast technological evolution creates often unpredictable tensions within the project lifecycle, imposing serious changes to project plans and content design
- ICT technologies immaturity and rapid change create doubts about the possibility of the result to survive in a longer period of time (essential for creative work and science)

## 7. Gravitational forces

Given the diverging objectives of the different “clans” involved in this kind of projects, it becomes legitimate to ask the question “*what keeps all that together?*”

Certainly there is one common value to everybody involved in the project: the professional relationship with the project: everybody is paid for his/her work.

However this fact does not explain all. The salaries of the persons involved in the creative ICT projects in CH, are not higher than those for the same persons in their traditional scientific or industrial work. Although the persons needed are usually more skilled working under harder restrictions within cultural heritage ICT creative projects, than their counterparts in their respective sectors, especially persons coming from human sciences.

Additionally the cost of the projects raises another question: why those projects are funded? Why the decision makers in our societies (through private or public funds) are spending significant amounts of resources in this kind of projects? We have also to keep in mind that one of the common aspects of creative ICT projects in CH, is also the relatively higher cost compared to any traditional pure scientific action (i.e. field research and a book for example) or industrial application (i.e. a video game). Why private and public organizations are deciding to fund visual reconstructions, virtual museums, and large scientific databases etc.? Do the funding bodies earn directly money out of that? The answer is “no”, given the high development and operation costs, and the fact that most of them are public or non-for-profit organizations.

A possible explication of the phenomenon, is attaching the general interest to the attractiveness of the classical antiquity, for the wide public, proved by references everywhere, even in commercial publicity, as presented by Athanasios Sideris (SIDERIS, 2008; Σιδερης, 2008). That idea is certainly part of the explication. But it is not justifying alone the general trend leading to the development of applications not only in the classical antiquity but in other heritage fields also. Something more is hidden in the projects adding value for individuals and certainly at the end of the day, creating a new field of value for the final product itself, independent from each separate objective and priority.

## 8. Social Visibility

Looking back to the individual objectives and success priorities of all players involved, we will find a common objective toward a different target group: visibility and at the end recognition.

The creative ICT applications in cultural heritage are assuring a high cross-public visibility for up-to-now, marginally visible fields of science: visualized know ledge, the power of image, the power of synthesis around a context, touches directly the collective imaginary about the past. On the same time the scientific credits of the method, liberates this process from the accusation of being a vulgar Hollywood product or on the best to be just popular science.

Scientific aesthetical choices made within high visibility projects are dressed even unconsciously with the power of the image and public acceptance, influencing balance of power within historians and archeologists scientists, for the interpretation of the past. The catalogue of subjects of the entries of the Encyclopedia of the Hellenic World is touching the core idea of the Modern Greek identity and on the same time it interacts with the western identity, it creates an imaginary fact. The visual approach of the ancient Agora of Athens and the immersion to this environment, given that it is dressed with the scientific approval, creates emotional reactions to the core of our western identity, even if the approach remains neutral.

In fact it seems that social visibility of creative ICT applications on cultural heritage, has a double source: the emotionally charged fascination of the wide public (including the members of the scientific bodies) from the evolution of internet and visual technologies and the collective curiosity and emotional approach of the past, as a reference to our modern values and identities.

It seems that this meeting point is creating a new space, beyond the traditional borders of human sciences and creative arts:

archaeologists or historians are starting to consider that new mediums such as Virtual reality reconstructions or new knowledge collections are emerging as a new field of scientific work, where they are not alone any more. Programmers and modelers, multimedia designers, musicians and artists, are creatively integrated by motivators and coordinators within that new Cultural heritage domain.

This seems to be the main factor that creates the gravitational force attracting resources, brains, creativity to the development of creative ICT applications on cultural heritage: visibility and released scientific and artistic creativity within the creative IT environments.

A new power struggle is organized around the new tool, archeological and historical views are not neutral views: they are part of modern identity construction and closely linked with that process (PLANTZOS & DAMASKOS, 2008).

Participating to this adventure, seen suspicious in the beginning by academics, seems to be slowly seen as inevitable: individuals participating in this kind of creative projects, through their social visibility and trans-discipline acknowledgment and validation, are modifying the traditional balance of power within their own discipline. Going back to Michel Foucault, and its own archeology of knowledge (FOUCAULT, 1969), we could

probably suspect that a new line of scientific “discourse” and a new “concept” has been rooted and lunched? It remains to be proved. What seems certain is that internal balance of powers and possibly validation processes of disciplines involved in the multidisciplinary process under Creative ICT projects in cultural heritage, are going to start changing.

Questioning the limits of the convention of UNESCO for the intangible heritage, given the geometrical expansion of new ICT applications digitizing one way or another our scientific knowledge, using visual and other creative techniques, could we consider the results of this kind of projects as something more than a simple addition of their components? Would it be legitimate to think that some of them really start to form part of our future intangible cultural heritage, creating a new field, merging arts, human sciences and informatics? If the current trend is generalized and amplified in the future, bringing far more resources in the process, could we suppose that our new cathedrals and libraries, will be built by pieces of algorithms located in massive storage devices?

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