

When the Cultural Heritage cannot be physically visited

*Original*

When the Cultural Heritage cannot be physically visited / Minucciani, V.; Garnero, G.. - ELETTRONICO. - (2017), pp. 508-517. ( World Heritage and Disaster. Knowledge, Culture and Representation - Le Vie dei Mercanti \_ XV International Forum Napoli, Capri 15-17 giugno 2017).

*Availability:*

This version is available at: 11583/2709305 since: 2018-06-01T11:46:09Z

*Publisher:*

La scuola di Pitagora

*Published*

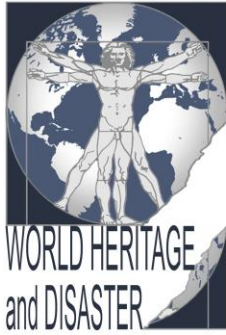
DOI:

*Terms of use:*

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

*Publisher copyright*

(Article begins on next page)



Le Vie dei  
Mercanti

XV FORUM INTERNAZIONALE

# WORLD HERITAGE and DISASTER

Knowledge, Culture and Representation

Naples 15 - Capri 16,17 June 2017

## WHEN THE CULTURAL HERITAGE CAN NOT BE PHYSICALLY VISITED

Valeria MINUCCIANI,<sup>1</sup> Gabriele GARNERO<sup>2</sup>

(<sup>1</sup>) Department of Architecture and Design, Polytechnic of Torino, Italy

[valeria.minucciani@polito.it](mailto:valeria.minucciani@polito.it)

(<sup>2</sup>) Interuniversity Department of Regional and Urban Studies and Planning, Polytechnic and University of Torino, Italy

[gabriele.garnero@unito.it](mailto:gabriele.garnero@unito.it)

### Abstract

The word "disaster" can imply different meanings, and, consequently, also different effects on cultural heritage.

Of course earthquakes and natural disaster simply destroy cultural heritage or they damage it so much that it becomes inaccessible for security reasons from the point of view of visitors. But, in the same time, the uncontrolled management of tourism can require a drastic reduction of visitor for safeguard reasons, from the point of view of heritage.

Figuratively, also an economic crisis can be a "disaster". It generates social injustice (the cultural growth is more and more a privilege: traveling requires an adequate standard of income, and many people don't have).

The result is, in all cases, that cultural tourism, nowadays as time ago, is not "for all".

Technology can help in all that cases. Even if we're aware that real tourism is the better solution in order to know places, peoples and cultural heritage, this paper shows how virtual tourism, if well organized as *experience*, could (partially) compensate for that, and how necessary technology is *already available*.

Basic keywords are *immersivity* and *physical movement*. Tools like "walkmouse" can nowadays really offer a holistic experience, even when the real places are not available for visit (and it's particularly important to pay and to maintain specific attention to them, when they risk falling into oblivion, after disasters).

**Keywords:** Virtual tourism, Virtual reality, Augmented reality, Immersivity, Accessibility.

### 1. Introduction

The word "disaster" can imply different meanings. Undoubtedly, earthquakes and natural disaster destroy cultural heritage, making it completely inaccessible. In other cases, they do not destroy Heritage but they damage it to the point that it remains for a long time inaccessible the same, waiting for recovery operations and restoration.

But there are other "disasters" that make the Cultural Heritage cannot be physically visited, even if it isn't damaged: the economic crisis, for instance. It triggered the increasing difference among people. It created profound differences between social classes, increasing the gap between them and creating social injustice. Among the consequences, there is the difficulty to ensure to all the people a cultural growth: that is more and more a privilege and new modes to approach cultural heritage are necessary. Not only: also the cultural institutions suffer from the crisis and they need innovative means to promote and disseminate their selves. Yes, indeed, the word "disaster" can imply different meanings, and always the result is some sort of "inaccessibility" of Cultural Heritage.

Technology can offer solutions. It can question the reference framework and the current practices, and not just improve the existent ones. At Polytechnic of Turin, in occasion of specific Horizon 2020 call, we developed a project<sup>1</sup> that prefigures many different scenarios of use.

We explored the *virtual travel* intended in a novel sense, and we believe it can be used in a “disaster” frame.

When Cultural Heritage cannot be physically visited, suddenly it exit from tourist circuits and it actually risks being quickly forgotten. Therefore it has to be more and more recalled, and it has to be presented also in unconventional contexts of use [3, 6, 7, 10].

The tourism field must be combined with the cultural and creative industries, cause innovation in cultural field needs creativity, but always giving priority to user experience perspective.

It is important to have a brief digression on the *virtual tourism*. It is now a current expression but it implies different meanings. The so-called virtual tourism is an umpteenth expression which is “opposed” to something real. Even in this particular application context we can already mention first, second and third generation of virtual tourism [11, 12, 15, 19].

The first one is nothing but a special version of e-commerce, and no doubt has changed a lot (if not revolutionized) the way you plan and organize trips: the user can customize a holiday package including transport, accommodation, meals, visits to museums, tickets for shows and participation in trade fairs. And all this by choosing price ranges, comparing services and offers, and customizing them accordingly. Virtual tourism second generation has exploited the potential of geo-referencing: the user can not only view the services offered in its range (and possibly book them), but also -with the help of special apps- receive news, be guided in thematic tours of his choice, and so on. So not only more services “upstream of” the trip, aimed at its organization, but also services “during” the journey, to accompany the visit and support it from the point of view of content.

Almost obvious consequence has been the evolution given by “augmented reality”, with specific apps connected to QRcodes, where the information apparatus comments and complements the visible reality. That’s a true, communicative mediation in real time [8, 9].

Another development, with different features, stands in between second and third generation of virtual tourism: that is the inevitable advent, also in this field, of social media.

The tourists and visitors community grows and exchanges views directly, further reducing the role of intermediaries. The availability of a huge photographic documentation and many comments and opinions (TripAdvisor first) has enabled a greater awareness and self-determination of the trip experience [21].

There have been some cases where these communities close the loop, so to say: achieving real contacts between people<sup>2</sup>.

As regards the third generation of virtual tourism, it doesn’t consist only in the preparation and organization of the real experience; no more *support* in real time of real experience, but -as the term “virtual” itself suggests- *replacement* of real experience.

At this point, therefore, a new route is opened, although already foreshadowed by many products, but this is not a *déjà vu*. What does exist for some time, in this field, is indeed the construction of a virtual world (not existing in the real world, or existing in the past but now disappeared - typical application in the archaeology field): here, through keyboard before, and later through more and more natural interfaces, the user can move around by performing a real visit.

In these cases, the tourist is almost always played by a sort of avatar: see the testbed performed for the Virtual Museum of the Ancient Via Flaminia<sup>3</sup>. Other times, the visitor can move around in person in virtual environments: among the first applications, see the famous case of the Queen Nefertari tomb<sup>4</sup>. Still other systems exploit *kinect* and similar instruments to transmit in the virtual world the physical movements of the visitor, thereby adapting the visuals that come his way. For obvious reasons, it is necessary to establish a sort of “movements abacus” that correspond to different situations (advancing, turning, stopping etc.). This is an experience limitation, in terms of immediacy: one of the first cases

---

<sup>1</sup> *viNcent Project (the Virtual Grand Tour of XXI CENTury)*, Politecnico di Torino (coordinator), Ideazione srl and InformAmuse srl (Italy), Helsinki Aalto University (Finland), University of Vienna (Austria), Lisboa Ensilis Educação and Formação and IDS Institute (Portugal), 2015

<sup>2</sup> See, among others, the “Angels for travelers” initiative, a large-scale project: it collects people available as local guides – or for simple suggestions on the places in which they live. They’re also available to real encounters once the tourist has physically reached the place (<http://www.angelsfortravellers.com/site/it/index>)

<sup>3</sup> Multiuser virtual reality application, installed in 2010 in the National Roman Museum at Diocletian Baths, with the coordination of the CNR: <http://www.vhlab.itabc.cnr.it/flaminia> [20]

<sup>4</sup> On the occasion of exhibition “Nefertari: Light of Egypt” carried out in Rome at Palazzo Ruspoli in 1994. The virtual reconstruction of the monument, by now inaccessible, was carried out with a system developed by ENEL and Infobyte, with the CNR contribution, in a room with projections to be observed with stereoscopic glasses. The visitor was able to literally move around the environment, where depicted figures came alive, going beyond the opportunities of a traditional visit.

was the experimentation carried out within the European project V\_Must at the Vatican Museums in 2013<sup>5</sup>.

Another technique aiming at allowing people to view sites they may never gain access to is stereo panorama photography. Experiments in this field have been recently performed by the scholars of the Center of Interdisciplinary Science for Art, Architecture and Archaeology (University of California, 2013): more specifically, they have used stereo panorama photography to create visual immersive experiences enabling the viewer to see the site of Luxor in any direction, from a static point<sup>6</sup>.

The use of video panoramas to simulate the visit of a city centre is another possible approach, too. In 2011 K. Kwiatek evaluated people's reactions to the virtual visit of Krakow: the study pointed out the appeal of such an approach, entailing the use of video panoramas<sup>7</sup>.

But the challenge of the "virtual tourism" third generation is still different: it must get to allow the visitor to (virtually) move in the *real place* and in *real time*. No need to rebuild worlds, real or imagined.

A first, remarkable experiment in which real journey and virtual journey seem to coincide is the "virtual journey on the Trans-Siberian Railway"<sup>8</sup>. However, natural limits of the project (in itself, extremely interesting) place it halfway between traditional documentary and "virtual tourism" last generation.

The challenge - we said - is more complex because it aims to give back as much as possible the subjectivity of the travel experience, with the opportunity to look towards you like (while the Trans-Siberian Railway camera is unmovable) and to move "there and now" while remaining physically "here". On this track, interesting experiments have already been carried out. In August 2014 has been presented the project *After Dark* by the research team of Ross Cairns, David Duke and Di Tommaso Lanza, in collaboration with the Museum Tate Britain in London: it proposes the use of robots on the ground (according preset trajectories but also with remote control) to visit the museum at night. In this case, the robot can simulate the visitor who walks in the rooms<sup>9</sup>.

The most advanced lines of research are currently focused on the use of drones precisely on avatar's stead. Researchers David Mirk and Helmut Hlavacs (University of Vienna, Research Group Entertainment Computing) have recently written about Using Drones for Virtual Tourism [1, 2], addressing in particular the interface issue<sup>10</sup>.

Our project will overcome the current situation, as it will allow "to be in the places" and "to move across the places", not in stationary way but really involving the physical dimension and understanding the natural and urban environments as systems.

## 2. Objectives

Inaccessibility of Cultural Heritage is a disaster in itself, but it can turn into an inclusive phenomenon, capitalizing on the available digital technologies to overcome the barriers that can prevent physical visits. In this framework, the creation of interactive and satisfactory "virtual tourism" experiences will be seen as a way to partially substitute the physical presence. This kind of tour is an occasion to knowledge the multi-faceted nature of the cultural heritage, promoting through digitally-mediated experiences not only the worldwide known masterpieces of art and architecture, but also the territories whose potential in terms of tourism is still emerging and/or untapped. If wars make off limits certain places, then it is the

---

<sup>5</sup> The project was coordinated by Sofia Pescarin, CNR, 2013) at the Vatican Museums, which proposed the interior of an Etruscan tomb as it appeared originally (with items that you could actually observe in the museum showcases).

<sup>6</sup> The user tests highlighted that this approach communicates a deep sense of place, even though technological improvements in the provision of high-fidelity images and seamless movement between images are recommendable.

<sup>7</sup> Moreover, it raised the importance of finding appropriate and engaging models to communicate not only visual images but also explanations of the cultural contents, suggesting that an effective way to achieve this objective is represented by storytelling, especially non-linear narratives. Now these systems are more common, allowing to connect different point of views, and they are used in many occasions to promote monuments and cultural environments: see the outdoor/indoor virtual tour <http://mondovi.altervista.org/VirtualTour/Mondovi1/html5/Mondovi1.html> G.Garnero-V.Minucciani, 2017)

<sup>8</sup> Moscow-Vladivostok: virtual journey on Google Maps, originated by a collaboration between Google Maps and the Russian State Railways, <http://www.google.ru/intl/ru/landing/transsib/en.html>. A simple camera records the landscape from the window of a train compartment for all the more than 9,000 kilometers of the trip. The virtual tourist can also hear sounds and noises typical of the journey - the noise of the rails, the radio that is proposed in the wagon. He can also "go down" at the stops he prefers, where elements of natural or cultural interest are pointed out.

<sup>9</sup> The remote control of robots has also been experimented in Italy, in the historical residences belonged to the Royal family of Savoy (November 2014): in this case, the use of robots has been conceived as a way to allow visitors to explore areas of the buildings not accessible to the public due to conservation and/or logistic reasons (e.g. lack of personnel).

<sup>10</sup> D. Mirk, H. Hlavacs, Virtual Tourism with Drones: Experiments and Lag Compensation, DroNet 2015 - Workshop on Micro Aerial Vehicle Networks, Systems, and Applications for Civilian Use, Florence, Italy, May 18 2015. You can view their experiment on [http://www.youtube.com/watch?v=17gTWCJ\\_Nnw#t=44](http://www.youtube.com/watch?v=17gTWCJ_Nnw#t=44)

whole territory that cannot be visited nor understood. For this reason, the virtual tour must also be able to disclose the system in which the cultural heritage is inserted. But from this point of view, the products to which we are accustomed are often inadequate.

The challenge this projects deals to is avoid simply looking at a screen. We want the typical involvement of the real visit is in some way safeguarded, and the physical motion is one of the most important features.

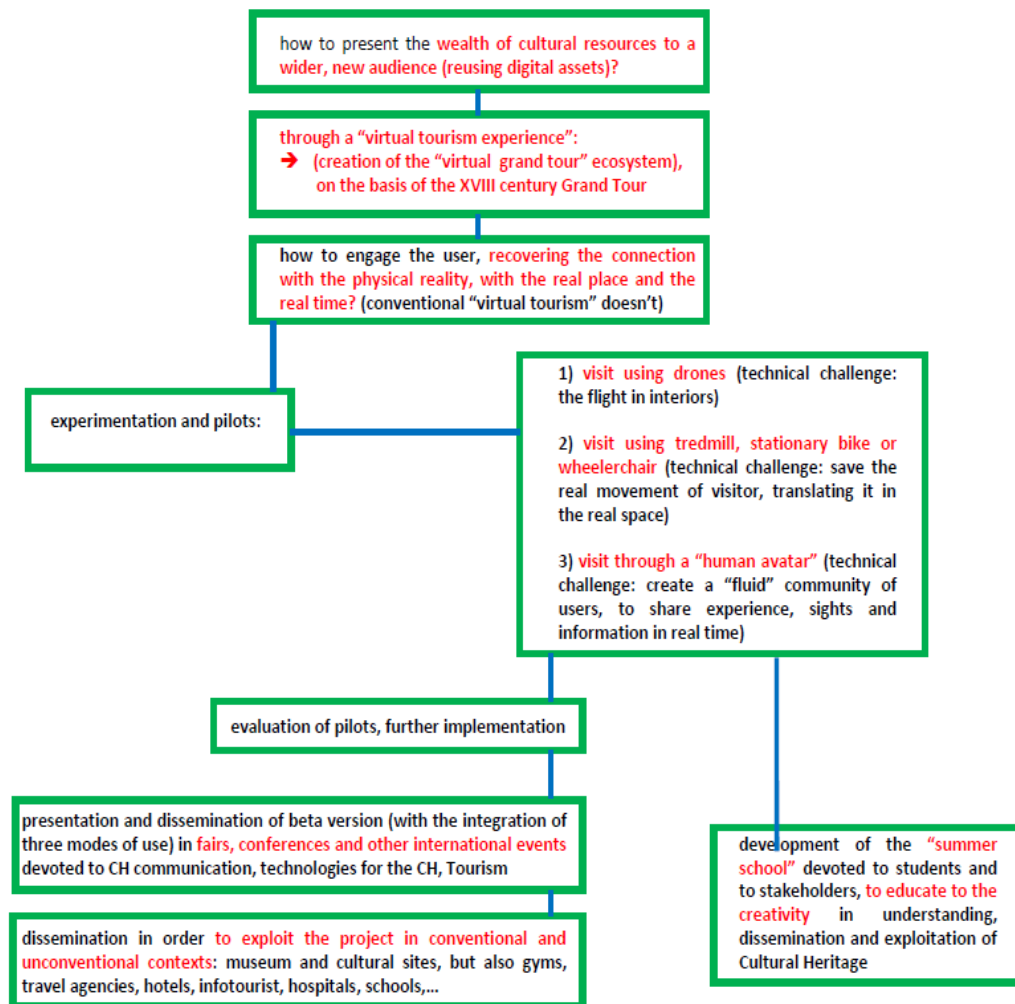


Fig. 1: "concept" flowchart

Then we envisioned three different scenarios of use:

- 1) *an indoor visit*, through a drone: it is a way to physically "enter" in a monument when it's inaccessible for security reason: people cannot visit inside, but drone can. In this case, you visit in real time the monument, and you wath trough the "eyes" of a camera on the drone;
- 2) *a visit through a treadmill, a stationary bike, a wheelchair*: it is a way to "visit" a site when it's inaccessible for various reasons (because there is a war; because it has been destroyed by a disaster; but also because people cannot visit for income paucity of for disabilities...). In this case, you visit in pre-recording way, but you can choose your personal route and above all you are involved from the physical point of view, having the perception of distances;
- 3) *a visit through the eyes of other visitors*: when the monument is accessible, but some people cannot reach it (again, for security reasons – i.e. wars, or terroristic alerts – as well as for income or health reasons). In this case you interact with a sort of "human avatar", that is another person who stands on site and can be guided by you with a camera.

Trips generate a personal memory, a personal interpretation and, at the end, a better memorization.

Virtual tourism can also offer a satisfactory experience, but its concept has to be renovated under new perspectives (till now, it isn't a true "driving branch" creating opportunities for growth and job, nor the real exploitation of cultural resources).

Does the virtual tour the typical XXI century experience that allows to enjoy cultural sites damaged, if not destroyed, by disasters? Actually, this could not be a great novelty: rather, innovation is that it aims to rejoin virtuality and reality, overcoming barriers that are typical of the use of digital resources. The

proposed fruition mode aims to reduce the gap between direct experience and digital experience due to the generalized shift to digital.

The needed innovation doesn't only consist of technological one, (the technology in itself can't ensure results), but above all consists of the innovative ideas, because the crucial aspect is "how" technologies are used.

Undoubtedly the gap between real and virtual tourism is unfillable, but this project aims to offer a travel experience to including not only cultural heritage strictly speaking, but also other typical expressions of the cultures. It's necessary to connect the different elements of a "cultural frame": monuments and landscape, sites and typical products. Last but not least, the physical interconnection between cultural items (whose fruition, particularly if in virtual mode, doesn't consider relations, distances, proportions...). Then, we said the inaccessible heritage risks to exit from tourist circuits: conversely, we believe this experimentation can maintain it in the spotlight. While the cultural (real) tourism only reaches a selected public, this project aims to reach the widest possible audience in bringing cultural content to new audiences in unconventional contexts (among others, like gyms, travel agencies, hotels, retirements houses...), also thank to a great flexibility concerning:

- the installation: it will be in very different environment (gyms and museums; hotels, travel agencies and cultural sites; info tourists and retirements residences), on site as well as in remote mode;
- the different levels of contents, with different level of interactivity to be adapted to users;
- the organization, as it can be related to the cultural tourism as well to the "business tourism";
- the context of use: it will produce new jobs and new services, according to different scopes of the visit (e.g. the "human avatar" could be related to a disable person, or to scholars)
- the type of fruition: according to the scale implied in the input mode (walking, biking, stationary...), the detail of information will be different.

For this reason, the *user experience* is a key factor, the hearth of the project.

Inaccessible heritage has to be particularly enhanced, but – against the most common misconception – we believe we don't need another amazing innovation (from the technological point of view), but rather we have to exploit the already existing ones. In fact, often the attention is devoted more to technologies in themselves, rather than to their innovative *use*, and to innovative *ideas*. This project aims to find new uses of existing technologies, improving some technological elements, and offering new ways of interacting with users. The proposed innovations have both an educational and commercial potential, as they introduce "new services" in the tourism. Tourism is the mainly suffering sector when disasters occur on the territory, thus it specially needs support. We're aware the real tourism won't be considered as an alternative but a completion, but in disaster cases it's impossible.

Another keyword in cultural heritage accessibility is *inclusion*. Even if the real tourism is the better solution in order to know places, it is not for all (nowadays as time ago), and disasters can further accentuate the difficulties of access for some segments of public. Virtual tourism, if well organized as *experience*, could (partially) compensate for that. As the real tourism is *holistic experience*, it's crucial to reproduce different aspects and sequences of events that are typical of real travel.

When you physically visit a place, you don't simply visit single monuments and sites like isolated fragments, but:

- you *move* through streets, landscapes, urban systems: so you appreciate distances and relations
- you *meet* people
- you *learn* about countries and traditions
- you *buy* typical products and souvenirs
- you *compile* a diary
- ....you *enjoy yourself*, and you do what you prefer.

This project aims to propose a similar experience, from remote.

### 3. The main assumptions

Sometimes some places are *dangerous*, or even impossible, to visit. It's necessary contrast their oblivion, also involving these sectors of population that cannot afford to travel (who hasn't adequate income; who cannot find the time to travel; the old or infirm people) but also people who prefer to devote their free time to other activities like *games* or *gym exercises* or *social life*. This project seeks to meet both. It's targeted to "virtual tourism" experience, *NOT* intended as:

- reservation or purchase via web
- visit in not existing world, nor visit in the imaginary past
- fixed, previously recorded visit (always the same visit, for all the visitors)

*BUT* intended as:

- tour in *real* places, in the *present time*, as if we really was in place, moving where we want, and looking at what we want.

We intend to experiment several systems to do it, according to different point of view, to be harmonized in an overall experience, whose *fil rouge* is the physical connection with reality, or with the real time. In some cases this connection will be ensured by a sort of *avatar*, that really will be in place; in other cases it will be ensured by the real, physical movement of visitor.

The contents organization is a crucial issue: it be elaborated evaluating the different alternatives, from the story telling solution to the free surfing. Different "starting points" are possible: geographical or thematic graphs, rather than artistic or historical ones. A strong attention has to be paid to the *user experience* [4, 5, 13, 14].



Fig. 2: graphs entry

An engaging experience is the best way to invite and attract people to visit cultural sites, even if damaged or inaccessible (in this cases, sites particularly need attention by the public). As we said, three different modes of virtual visit are thus prefigured:

1) **an indoor visit, through a drone** (in museums, but also in other relevant interiors). While the exterior is, almost always, visible without limitation, the access to interior spaces of monumental, architectural and artistic heritage is instead subject to greater constraints: because of lack of staff, or visiting hours, or – in disaster cases - lack of security conditions, or recover works in progress. Other times, interiors are still visible, but different types of barriers effectively exclude whole sectors of visitors. A drone could fly in place of the visitor, offering original and different visuals. The project envisages a system to recreate in a closed and confined environment a microgeodetic reference system, to allow remote control by virtual visitor: all the more important when you consider the protection of the cultural heritage itself. This will offer a visit experience truly immersive, and certainly even more exciting thanks to the possibility to fly, in addition to the enrichment with a didactic augmented reality.

It should of course face a number of related issues. The drone must tend to the smallest possible footprint (although the first experiments contemplate large spaces, one can envisage a future in which the environments will be more limited, and in the same environment you will have multiple drones simultaneously), and the video system plays a very important role: it must be sophisticated (360 degrees), allowing to appreciate details even at very large scale.

Of course, devices for UAV must meet the highest demands of lightness, without restricting the output quality and sharpness. It's clear that another key node is the flight autonomy, however an indoor tour even if very short can imply a great experience.

The outdoor flight is not excluded, of course: its fundamental problem seems to remain the security and the stringent regulations recently adopted.

2) **the visit through a treadmill, a stationary bike or a wheelchair** (to really *include people*) - **able to translate our movements into real displacements in the places**: often the "virtual tourism" is defined as "stationary tourism", but this project aims to definitely overcome this concept. As one the main features of the travel experience is the *movement*, this virtual tour will begin through a gym equipment that is used as input device.

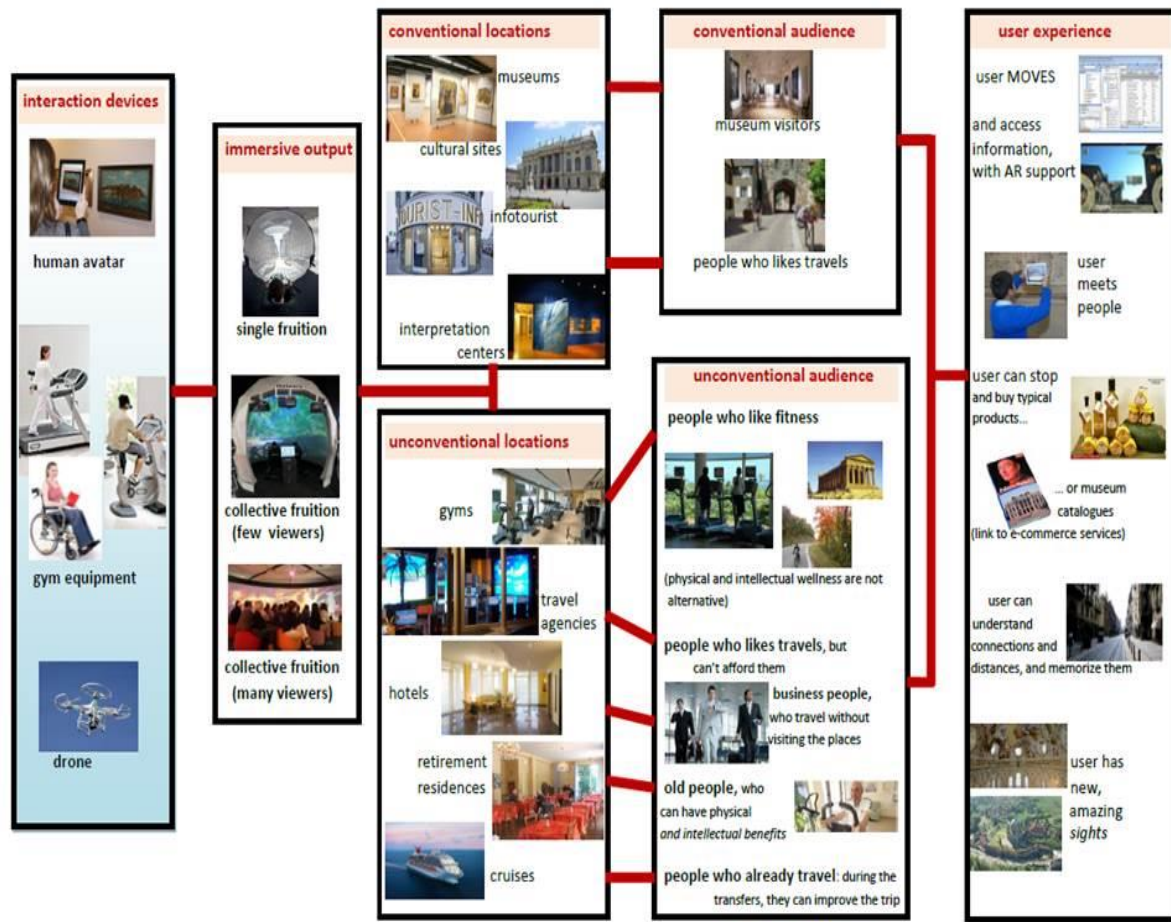


Fig. 3: scenarios of use

In this way we can really able acquire new audiences:

- people that already devote their time to Cultural Heritage, but do not like fitness practices, will probably appreciate the integration of both the activities in a holistic experience.
- people that have not matured so far a particular interest for Cultural Heritage, will be reached in places and occasions different from the conventional ones (gyms, hotels...)
- people who are excluded from tourism for health reasons, or for advanced age (i.e. they could use this equipment in hospital, or in retirement home, as physiotherapy session)
- young people who dislikes the stationary access to digital cultural resource (a further evolution of the idea will carry out the collective experience of the travel). With reference to our leisure time, in fact, the project wants to overcome the alternative between cultural activities and recreational/sports entertainment: the virtual journey could be the right compromise, provided that it preserve the distances perception, and proportions and morphologies of sites (i.e. the understanding of territories as "systems").

The project therefore intends to explore a tour simulation with three basic features:

- it offers to the "tourist" a real and immersive vision of what he would see across the places he's visiting, without turning to city models or synthetic worlds;
- it brings together the virtual displacement on sites with a physical motion really made by the "tourist", who can visit the places walking/ running or cycling;
- it uses shared databases.

Of course, increase of data sharing (e.g. data related to systems as primarily Google Earth, Google Maps and Street View, and last but not least Mapillary - now in common use) are opening entirely new scenarios, as well the augmented reality and the unstoppable spread of smartphones. All that still requires a cultural, strategic reflection.

This second part of the project is devoted to exteriors, in urban environment and in extra-urban context. The physical motion made by the visitor needs a special input platform that allows the

corresponding visit of the site: nowadays these “walkmouses” are already available. This will also provide:

- typically "touristic" services (both cultural and commercial). An intuitive interface can give information, and the visitor can virtually *stop* in front of typical shops and buy local products (thanks to a simple system of e-commerce). The journey *souvenirs* will join the tourist very soon at home (let us focus on the serious difficulties of the typical products commerce in disaster areas)
- the implementation of several functions (about display, selection, access) that in real tourism would not be possible;
- interaction with Web 2.0: in this trip, the tourist will be able to *meet people*.

The main challenge of this specific experimentation is not only provide sites, monuments and museums with new tools, but also and especially to reach new audiences (and maintain them, when disaster occurs): in all cases, the study of the tourist motivation is a crucial element to reach better results: the project aims thus to design, set and perform such an experience that can motivate different audiences.

### 3) **the visit through the eyes of other visitors** (“human avatars” within a “visitors community”).

This could be performed both for outdoor and indoor environments. Through a *tablet* or other devices able to provide live feeds and interactions, a visitor could identify other tourists that in the same time are visiting comparable sites, and he could ask them to *look at some objects, or details*, in his place. Thus, a *real community* will be originated: they could share views, exchange opinions and questions. Furthermore, this could be a new type of job for people that only can offer their time: they could literally play as *human avatars*. In the same time, they could improve their own culture, as secondary effect. Also the service to disabled people, to visit sites and museums in their stead, is a significant element. The possibility to share thoughts and experiences to build a social experience based on storytelling and content sharing of the tour is another example of how the virtual experience will lead to “real” results.

## 4. **Trans-disciplinary considerations**

Such a project involves different skills and disciplines, and actually needs a transdisciplinary vision. In fact the virtual tourism is a form of “tourism”, and as such it has to be faced, but it is a *digital experience*, and as such it has to be designed. Many different expertises will converge: history and cultural Heritage communication; museography, history of art and architecture; but also computer science, geomatics, ICT. They will be blended in a whole, multifaceted, flexible and complete ecosystem, to be adapted for all different situations [18].

Then, the “sciences of tourism” (from both theoretical and practical points of view) are crucial to guide and address all other project activities; to identify the specific target group who will be addressed by the “virtual tourism” experiences; to define methods and instruments for the assessment of the experimentations from a tourist point of view; to study the impact of the project.

Furthermore:

- as the virtual tourism is “tourism”, it has an economic impact;
- as the virtual tourism is “tourism”, it has a social impact.

The future exploitation must to be structured, developed, analyzed and assessed from these point of view [16, 22].

## 5. **About innovation**

From the technological point of view, even if this project doesn’t aim to carry out new, amazing technologies, nevertheless it deals with some interesting technological issues. Among them, the indoor positioning. In fact, GPS does not work well indoors. Anyway, some indoor positioning solutions work similar to GPS<sup>11</sup>. Other solutions use light or magnetic fields to determine location.

Furthermore, indoor positioning detects the location of a person or object, but not always its orientation or direction. The best solution for indoor and outdoor positioning may be a hybrid. While the goal of indoor positioning for some users, notably hospitals and malls, is to provide navigation aid, others want to use indoor positioning to better market to customers, provide just-in-time information via audio for tours, offer video or augmented reality experiences or connect people of interest in proximity to one another. The U.S. Federal Communications Commission hopes to use indoor positioning to provide timelier and more effective emergency services.

Major tech players are working in the indoor space.

---

<sup>11</sup> Locata, an Australian company, offers beacons that send out signals that cover large areas and can penetrate walls. Locata receivers work similarly to how GPS receivers work. Nokia uses beacons that send out Bluetooth signals. While any Bluetooth device can read them, they only cover a few square meters.

In Cultural Heritage field, this project is inserted in a cutting-edge perspective. Also the “gym equipment” use for Cultural purposes is innovative. Some experimentations have already been carried out, even if in different context of use [17].

First at all, Technogym (a leader corporate in the gym equipment sector) has already proposed some products connecting the physical exercise to prerecorded video. They didn't have any cultural or touristic content, but simply tried to avoid the “boredom” of the treadmill (or stationary cycle) exercises<sup>12</sup>.

Other experimentations have been carried out using treadmill and stationary bike, but with reference to the security and to physiotherapeutic purposes<sup>13</sup>.

## 6. Conclusions

The damaged or destroyed Cultural heritage risks oblivion and carelessness, thus it needs particular focus and attention (this is also essential in order to find funding). Then, we need improve their accessibility and increase visits, though it may seem absurd or impossible.

Only a virtual visit can perform this. But it has to be a really engaging, really interesting, really innovative experience.

Furthermore, we must give support not only to single monuments and sites, but also to social and economic context of disaster areas. This project tries to pay attention to this particular side, opening perspectives for new jobs and further innovation.

## Bibliographical References

[1] D. Mirk, H. Hlavacs (2015): *Virtual Tourism with Drones: Experiments and Lag Compensation*, DroNet 2015 - Workshop on Micro Aerial Vehicle Networks, Systems, and Applications for Civilian Use, Florence, Italy, May 18 2015.

[2] Minucciani, V.; Garnero, G. (2015): *Nuovi scenari di turismo virtuale con gli UAV*, ARCHEOMATICA, vol. 6, p. 28-30, ISSN: 2037-2485

[3] Minucciani, V.; Garnero, G. (2015): *Pressure of tourism on heritage and technologies for an inclusive society*. In: HERITAGE and TECHNOLOGY - Mind Knowledge Experience. p. 1671-1674, Napoli: La scuola di Pitagora editrice, ISBN: 978-88-6542-416-2, Aversa-Capri, 11-13 giugno 2015

[4] Cappellini, V. (2014): *Electronic Imaging & the Visual Arts: EVA 2014* Florence, Firenze: Firenze, University Press

[5] Minucciani, V. (2013). *Tecnologie, museo virtuale e ICT per la musealizzazione archeologica*. In: M. Vaudetti V. Minucciani S. Canepa. *Mostrare l'archeologia*. p. 130-140, TORINO, Allemandi & C., ISBN: 9788842222484

[6] Minucciani, V.; Garnero, G. (2013). *Virtual tourism: the new frontier for cultural heritage databases*. In: Geodesign Summit Europe. Esri Nederland, Werwijnen, settembre 2013

[7] Minucciani, V.; Garnero, G. (2013). *Available and Implementable Technologies for Virtual Tourism: A Prototypal Station Project*. In: Computational Science and Its Applications – ICCSA 2013. p. 193-204, Berlin-Heidelberg:Springer, ISBN: 9783642396489, Ho Chi Minh City, Vietnam, June 24-27, 2013, doi: 10.1007/978-3-642-39649-6\_14

[8] Garnero, G.; Corrias, A.; Manigas, L.; Zedda, S.V. (2013): *VGI, Augmented Reality and Smart Web Application: Projects of Development in the Territory of the Sardinia Region*, in B. Murgante et al. (Eds.): ICCSA 2013, Part IV, LNCS 7974, pp. 77--92. Springer, Heidelberg

[9] Agarwal, J., Sharma, N., Kumar, P., Parshav, V., Srivastava, A., Goudar, R.H. (2013): *Intelligent search in E-Tourism services using Recommendation System: Perfect guide for tourist*, 7th International Conference on Intelligent Systems and Control, ISCO 2013, art. no. 6481190, pp. 410-415.

---

<sup>12</sup> See the U-TV interface, that integrates TV, radio and personal, multimedial contents. Anyway, the specific application here proposed has been presented to Technogym that stated its interest to this project.

<sup>13</sup> See jDome WalkAround, <http://www.youtube.com/watch?v=aqDdf0WtFis> and jDome BikeAround <https://www.youtube.com/watch?v=MvBlrnEW9Oc>. The context of use that originated this products was aimed to raise the quality of life for patients with dementia. JDome BikeAround is a Swedish product, developed by Division by Zero in partnership with the Centre for Health Technology in Halland at Halmstad University. This experiential bike has received a great deal of attention, both in Sweden and abroad. The bicycle, which was launched in 2013, offers virtual cycle tours for people suffering from dementia. The exercise bike is linked to a tablet computer and the cyclist is surrounded by a curved projector screen, on which he/she can see a view chosen using Google Street view. Then, Division By Zero was continuing with the development of another stage, jDome WalkAround.

- [10] Caraceni, S. (2012): *Musei virtuali-Augmented heritage. Evoluzioni e classificazione delle tipologie di virtualità in alcuni case histories*, Rimini Guaraldi
- [11] Maymand, M.M., Farsijani, H., Tahery Moosavi, S.S. (2012): *Investigation of the key success factors in virtual tourism*, Indian Journal of Science and Technology, 5 (7), pp. 3073-3080.
- [12] Hu, Z., Cao, Z., Shi, J. (2012): *Research of interactive product design for virtual tourism*, Lecture Notes in Electrical Engineering, 140 LNEE, pp. 411-416
- [13] Kapp K. M. (2012): *The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education*. John Wiley & Sons
- [14] Chase-Levenson, A. (2012): *Annihilating time and space: Eclecticism and virtual tourism at the Sydenham Crystal Palace*, Nineteenth-Century Contexts, 34 (5), pp. 461-475.
- [15] Kuntarto, G.P., Gunawan, D. (2012): *Dwipa search engine: When E-tourism meets the semantic web*, International Conference on Advanced Computer Science and Information Systems, ICACSIS 2012 - Proceedings, art. no. 6468741, pp. 155-160.
- [16] Zhang, Y., Zhang, X. (2012): *An integrated application of tourism planning based on virtual reality technology and indicator assessment*, Lecture Notes in Electrical Engineering, 107 LNEE, pp. 1435-1442.
- [17] Kim, L.C., Lam, T.K., Talib, A.Z. (2011): *Acoustical heritage for virtual tourism on mobile platform*, Proceeding of the International Conference on e-Education Entertainment and e-Management, ICEEE 2011, art. no. 6137804, pp. 273-276.
- [18] Hsu, C. (2011): *The feasibility of Augmented Reality on virtual tourism website*, Proceedings - 4th International Conference on Ubi-Media Computing, U-Media 2011, art. no. 5992081, pp. 253-256.
- [19] Gerosa, M.; Milano, R. (2011): *Viaggi in rete. Dal nuovo marketing turistico ai viaggi nei mondi virtuali*, Milano: Franco Angeli
- [20] Pietroni, E. (2011): *Ricostruzioni del Patrimonio culturale: il museo virtuale della via Flaminia Antica*, in Rami Ceci, Lucilla. Luoghi e oggetti della memoria, Roma: Armando
- [21] Wang, C. (2011): *Application of virtual reality technology in digital tourism*, Proceedings - 3rd International Conference on Multimedia Information Networking and Security, MINES 2011, art. no. 6103831, pp. 537-541.
- [22] Wang, F.-X. (2011): *Design and implementation of Hainan tourism spots virtual reality system*, Key Engineering Materials, 474-476, pp. 2217-2220
- [23] Gärtner, M., Seidel, I., Froschauer, J., Berger, H. (2010): *The formation of virtual organizations by means of electronic institutions in a 3D e-Tourism environment*, Information Sciences, 180 (17), pp. 3157-3169.
- [24] Dong, H. (2010): *Review on the websites and virtual tourism of World Heritage sites in China*, 2nd International Conference on Information Science and Engineering, ICISE2010 - Proceedings, art. no. 5691830, pp. 6112-6114.
- [25] Hashim, K.H.B.; Jusof, M.J.B. (2010): *Spherical high dynamic range virtual reality for virtual tourism: Kellie's Castle*, Malaysia, 16th International Conference on Virtual Systems and Multimedia, VSMM 2010, art. no. 5665945, pp. 297-300.
- [26] Ricciardi, F. (2005): *Il viaggio dell'innovazione*. Informatica, beni culturali e turismo, Milano: Vita e Pensiero
- [27] Hernández, L.A., Taibo, J., Seoane, A.J. (2001): *Immersive video for virtual tourism*, Proceedings of SPIE - The International Society for Optical Engineering, 4520, pp. 63-73.
- [28] Cheong, R. (1995): *The virtual threat to travel and tourism*, Tourism Management, 16 (6), pp. 417-422.
- [29] Williams, P., Hobson, J.P. (1995): *Virtual reality and tourism: fact or fantasy?*, Tourism Management, 16 (6), pp. 423-427.