Contributions To Preservation Of Historic Sites In The Digital Era

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Abstract

The present work proposes uses of technology and digitalization in the process of preservation of historic sites, addressing sustainability, function and the status of the user in historic spaces – traditional in appearance but interpreted in a contemporary understanding which challenges Heidegger's philosophy regarding the human body as measurement unit. The digital revolution begun in the 20th century and the fast-evolving technologies have determined a series of changes in architectural approaches. Moreover, eco-friendly trends increased the need to digitalize the creative processes, the bureaucratic procedures, and, to some extent, the use of spaces and buildings. Tincuţa Heinzel concludes: „The hyper-reality of the digital era, transforms the current architecture into a 'computational performance' art" [1]. In this respect, historic sites are ambivalent architectural challenges: on one hand, they are subjected to strict regulations aiming accurate preservation, on the other, their use today is conditioned by technological upgrade in order to become functional according to contemporary comfort and safety standards. What is more, thanks to new technologies that are now widely accessible, the history can be brought to life. The historic value of a certain site can be virtually materialized, thus better perceived. Information is no longer stored in hardly accessible archives, but due to digitalization, it is part of daily life.

Rezumat

Lucrarea de faţă pune în discuţie posibilitatea integrării noilor tehnologii şi a digitalizării în practicile de conservare a patrimoniului contruit, urmărind sustenabilitatea, funcţiunea şi repoziţionarea utilizatorului în raport cu spaţiul istoric – în aparenţă conservat în sensul consacrat, dar reinterpretat într-o manieră actuală care pune la îndoială perspectiva heideggeriană privind corpul ca măsură a lucrurilor. Revoluţia digitală a debutat în secolul XX şi a dus la dezvoltarea a noi tehnologii care au determinat schimbări ale limbajului arhitectural. Tendinţele aplecate spre ecologie par a accentua nevoia de digitalizare a proceselor creative, a procedurilor birocratice şi, într-o oarecare măsură, exploatarea clădirilor şi a spaţiului. Tincuţa Heinzel concluziona că „Hiper-realitatea erei digitale face ca arhitectura astăzi să fie o artă a `performance-ului` informatic" [1]. Din acest punct de vedere, siturile cu valoare istorică sunt provocări arhitecturale ambivalente: pe de o parte, ele sunt protejate de legi stricte ce urmăresc conservarea, pe de altă parte, refuncţionalizarea lor este condiţionată de standarde de confort şi siguranţă în exploatare. În plus, datorită noilor tehnologii, din ce în ce mai accesibile, istoria poate fi readusă la viaţă. Valoarea istorică a unui sit poate fi materializată virtual, deci mai uşor de

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perceput. Informaţia nu mai este stocată în arhive izolate, greu accesibile, ci, datorită digitalizării‚face parte din cotidian.

Keywords: Cultural heritage, Digital Era, Virtual Reality, Architecture, Historic Sites

1. Introduction. Digitalisation in architectural practices

The present work is a short questioning of a possible scenario regarding heritage management in the digital era. As Maria Luisa Palumbo notes in *Listening Spaces- espacios a la escucha*, life can be easily described as physical – hardware and non-physical (software) [2]. We live in a time when technology expands possibilities to extends regarded as unattainable not so long ago. Digitalisation, virtual reality (VR) and artificial intelligence (AI) are interfering more and more with daily life. In 1965, Ivan Sutherland in his article *The ultimate display*, writes about the power of the computer to reshape the common rules of physical reality, which can ultimately lead to the home where the mere existence of matter will be digitally controlled [3]. Similarly, William Mitchell describes a new concept of *body* resulted from microtechnologies interconnected by exonerves [4]. The utopia of disembodiment in VR has been an inciting subject in the 20th century cinema production and later. *Tron*, *Matrix*, *Ghost in the Shell*, *Ex Machina* are just some examples that approach the delicate subject of spatial, mental and perceptive shifts that have or might happen due to technological advances. The interference between physical and non-physical, augmented by such a curiosity that pushes the limits, requires a discussion regarding the relationship of humans with architecture, both as responsive organisms. From this point of view, architecture becomes something dynamic, the buildings are not inhabited by humans anymore, but they should co-exist in an *organic* manner as Pau Alsina notices [3]. The limits between architecture, life and body are still to be defined.

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Ethimologically, the term *architect* originates from the Greek *arkhitekton*, where *arkhi-* means 'chief' and *-tekton* 'builder'. As the name of the profession shows, the one who conceived the building was the master builder who would also deal with tasks that are today the responsibility of the engineer or the constructor as well. The separation of the professions as known today, happened in the Middle Ages, as a result of expanding knowledge and the increasing complexity of buildings and building technologies. Nowadays, for the same reasons, new sub-fields of architectural practices have emerged: the project manager, the one responsible with detailing the project, the interior designer, etc. Technology has had a great impact on the becoming of the architectural practice and the computer with dedicated softwares has caused a great shift in the relationship between architects and clients, architects and buildings and buildings and beneficiaries. Here are only a few examples:
- Drawing takes less time and errors are easily corrected. In some softwares, while drawing the plan of a building, the sections, the facades and the 3d model are simultaneously generated.
- There is less trust needed between the architect and the client since 3d visualisations allow the beneficiary of the project to explore the virtual model of the future building. In the past, the architect was the only one who could manage most aspects regarding the project. Even so, the building could and usually did suffer adjustments in the making. But nowadays, due to regulations, once officially approved, the project should not be altered. Moreover, both the architect and the client have the necessary instruments to share the same perspective over the project so that it can be discussed in detail before undergoing the legal procedures for authorisation.
- Multiple scenarios can be analysed based on the virtual representation of the building.
- One recent feature of architectural softwares is the VR ready component which allows the client to immerse in the 3d model and to experience in advance the building.

These aspects impact on monument preservation processes as well. Rigorous measurements done by man or with scanners and translated in architectural drawings are a useful tool in both archaeological research and architectural and restoration studies and solution finding. What is more, if enough data is available, the original building can be reconstructed as well as its evolution stages or, in case of insufficient information, possible interpretations of the existing ruins can be illustrated for a more detailed scientific research.

2. Interdisciplinary research in heritage conservation through digitalisation

2.1. Vărădia de Mureș – archaeological research and setting new premises

The ruins in Vărădia de Mureş in Arad County have been discovered decades ago, during four campaigns in 1971-1973. The site is referred by locals as *La Cetate*. There are at least three historic periods overlapped on this site, ranging from the Dacian Era to the Ottoman conquest in the 16th – 17th centuries. The existing ruins are the remains of a medieval stone church, little researched to this day. During the mending of the DN7 national road, part of the site was disturbed drawing attention to the yet unknown ruin [5].

Recent studies conducted by archaeologists Florin Mărginean and Zsolt Csok revealed some inconsistencies in the published data so far, which led to reassessing the evidence. In this respect, a new topographic survey was done and we have been contacted to model the new data collected from the site. Once the site was modelled, a 3D representation of the existing ruins has been added (Fig.1.). This allowed a better understanding of the relationship between the site and the existing geography, emphasising important details should the ruin be musealised sometime, such as the natural slopes which determine water-flows during rains. Without further excavations there are many uncertainties regarding the original building and its evolution. However, the two archaeologists concluded that there are only two possible scenarios regarding the volumetric shape of the former church. With their close assistance, both scenarios were modelled in 3D, including the surrounding cemetery (Fig.2.).
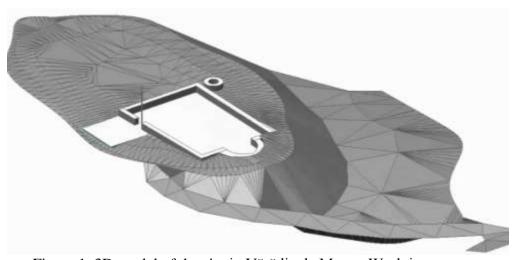

Figure 1. 3D model of the site in Vărădia de Mureș. Work in progress.

Although this is an ongoing research, the access to a 3D modelling software made it possible to analyse the existing data in a coherent holistic manner, to visualise the scenarios and, most important, all of this in a non-intrusive manner. The conclusions drawn so far emphasise the need of further investigations on site. Due to lack of funds, time and experts, this might take a long time to happen. However, digitalisation of the archaeological site and the ruin equals to creating a coherent, easily accessible and interactive archive which will hardly alter, but will rather be completed by the time further archaeological excavation happens.
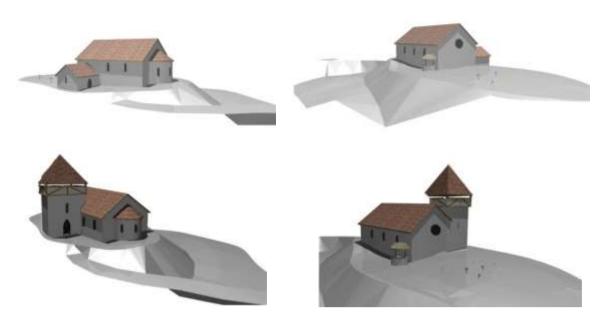
Figure 2. 3D model of the two scenarios regarding the original shape of in Vărădia de Mureș:
above- scenario 1; below – scenario 2. [5]

2.2. Tauţ – data integration and virtual musealisation

The archaeological site of the village Tauţ in Arad County is not very known, nor advertised. However, for scholars, it is of great interest due to the vast amount of information available and the complex evolution of the former fortified church which existed here in the Middle Ages until the 16th century. Five years of archaeological investigations revealed that the site was inhabited in pre-medieval times as well. The fortified church dates probably in the 13th – 14th century.

The first stone building was a late Romanesque church (13th century) which was repeatedly extended with Gothic additions along more than three centuries. In the end (16th - 17th century), the building became an impressive Gothic church, measuring 39 x 22 meters. An interesting fact is that the only Romanesque detail that persisted was the lateral walls of the aisle – the only remaining part of the former church integrated in the structure of the latter. The church was demolished after the Ottoman conquest.

Digitalisation played an essential part in the making of a long term proposal to put the ruins to good use. Firstly, based on the available information offered by archaeologist Florin Mărginean, it was possible to reconstruct the Romanesque church as well as all known transformations it underwent until the Gothic state (Fig. 3). Moreover, including captures of the model in a chart, one could map and scale the interventions, which was a good starting point for structural, historic and conceptual studies which eventually led to a complex musealisation project (Fig. 4).

The general idea of the musealisation project was to exhibit not only the ruins but their evolution and involution as well. The supposed visitor is to follow an itinerary, during which he/she is gradually informed about the history of the archaeological site, of the medieval church and of the village. Then, after being prepared with the basic knowledge, the visitor will experience the ruins by entering the main pavilion designed to protect them. This involves descending within the archaeological excavation, a subtle metaphor of the transformation of the former building into the nowadays ruins. The journey culminates with the exit from the pavilion and the ascent on a designed lookout point from where one can admire the scenery and have a bird's eye view over the archaeological reservation, the visiting itinerary, but also the village and its surroundings.

What is more, in virtual reality, where everything is possible, an underground museum was proposed – an almost utopic idea for real life.
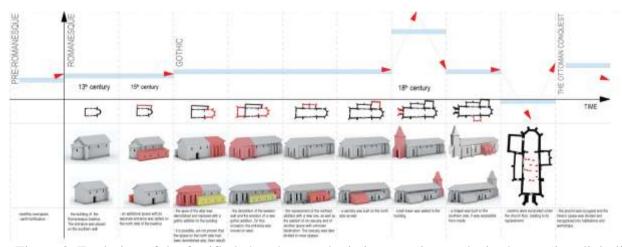
Figure 3. Evolution of the fortified church – synthetic intervention analysis chart, using digitalized models of successive additions.
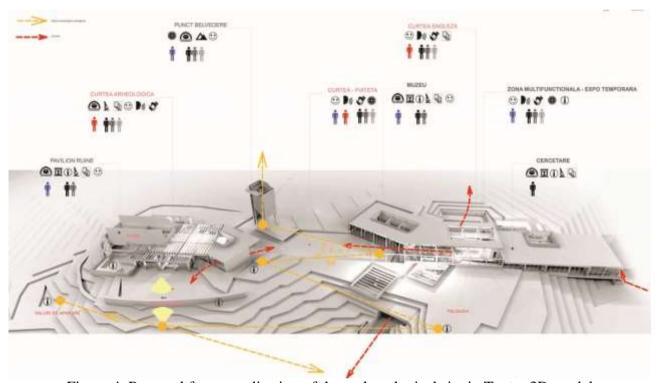

Figure 4. Proposal for musealisation of the archaeological site in Tauț – 3D model

3. Discussion

Digitalization is an essential research and advertising instrument in architectural practices today, especially when dealing with heritage that should be investigated in non-invasive manners and where the proposals are strictly regulated by law. But the contemporary world is more and more confronted with the presence of the non-physical element: *information*, which led to the recent outbreaks in science and technology such as *immersive reality* and *artificial intelligence*. From some points of view, in a not that far future, this could be the key to create active relationships between buildings and their surroundings on one hand, as well as buildings and their inhabitants. Responsive architectures, technology infused spaces, or, in other words, the *new bodies* – as Maria Luisa Palumbo names them, are reactive: they *see, hear, feel* and react. They are able to perceive

the variations of the ambient and to respond in order to preserve themselves. Projects such as intelligent houses available nowadays or *Blur* (by Liz Diller and Ricardo Scofidio), *Ada* (by The Nanoinformatics Institute of Zurrich) and the list can go on, demonstrate that living/reacting architectures is not an abstract concept anymore, but reality. These buildings can be seen as unpredictable entities, which benefit from their own self-sustaining metabolism, which is in a balanced relationship with the exterior through a continuous exchange of energy and information. Bertfalanffy names this process as *Fliessgleichgewigt* – a fluid equilibrium.

Monument preservation today is a difficult process that consumes multiple resources, such as time, knowledge, finances, and requires the involvement of numerous people. In what heritage is concerned, digitalization is the first and the most accessible form of musealisation. A recent example is *Iconem,* a French start-up aiming to save Syrian heritage destroyed by war by creating 3D replicas and storing them in a virtual database. However, when imagining the future of heritage in a digitalized world, some interrogations rise. In the summary of the book *Building a New Heritage. Tourism, Culture, and Identity in the New Europe*, the authors emphasise the key-role heritage plays in tourism industry:

> „ … a number of possible heritages can be shaped from the European past depending on the purposes for which they are intended. Through different methods of management intervention, heritage can fulfil a variety of functions, becoming a major commercial resource in the form of the tourism industry, or enlisted in the creation and maintenance of place identities." [6]

However, Françoise Choay argues that as necessary as tourist activities are for putting heritage to good use, they also damage the monument irremediably due to permanent visitation. Summing up those two perspectives, new technologies can make a historic site more appealing for visitors with less resources and one-time efforts, as in the case of Tauț presented above. Nowadays, digitalised heritage can be virtually visited from the comfort of one's home thanks to VR and immersive reality systems. This would bring more visitors, as virtual tourism requires less effort, risks, stress and expenses, plus the monument can be changeable, reconstructed in its original form. Moreover, the actual heritage would be subjected to less wearing which could help long-term preservation.

From another point of view, though, virtual reality can become so appealing that there is an undeniable danger of losing interest in the physical monuments, which would inevitably lead to neglect and, eventually, to decay.

Conclusions

Heritage management has always been a delicate challenge and the emergence of new technologies and digitalization pose many questions regarding the future relationship between people, architecture, science and historic sites. As any innovation, new technologies open appealing new possibilities in what heritage valosrisation is concerned, but the unknown requires caution. Digitalisation is an essential tool nowadays in architecture and especially in musealisation projects, but as interesting and empowering as virtual reality is, the equilibrium with the physical one should not be lost.

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