

Exploring digital tourism application for medieval period reconstruction

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Abstract

Europe, with all its common sights, has an enviable wealth of history and cultural heritage. With its many monuments, sites, traditions, history, art, and culture, it has always attracted curious views and tells centuries-old stories to many tourists and visitors. At the heart of Europe, Bosnia and Herzegovina (BiH), founded in the 11th century, with its picturesque past, has always been at the crossroads of faith and civilizations.

The key audience of tourism in BiH are nature lovers, adventurers and young and digital nomads, who represent great potential for the development of this sector given their nature of work, to be able to work from any location, and during the COVID-19 period. Furthermore, the importance of the diaspora for the development of tourism in BiH goes beyond tourist visits and helps BiH on its path to digital transformation.

Digital tourism refers to how we use digital tools to organize, manage and even enjoy the travel experience. It uses all of the tools of digital transformation to change how we travel and experience different sites. Through digitalization, we want to reach every individual who passes through this country and further attract lovers of European history and culture, offer them a different, more creative, and innovative approach to learning about the cultural and historical treasures it hides. The goal of digital tourism is to raise awareness of the importance of cultural heritage, provide new opportunities for visitors and bring new knowledge.

Therefore, this paper provides an overview of the possibilities of digital representations of the medieval historical period of BiH through identified pillars of digital reconstruction, and ways to connect the movable cultural heritage residing in the museums with real sites in an attempt to contribute to its promotion through digital tourism.

Keywords

Digital Tourism, 3D modeling, Cultural heritage, Reconstruction, Medieval

1. Introduction

Historical sites play a key role in building and defining the cultural aspect and identity of a community. They often remain unknown to many because of ignorance of history, lack of online

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data and content that would attract people to locations that are very often inaccessible, say by car.

Digital tourism is a significant promotion of traditional tourism and as such has numerous advantages. One of the advantages is that the desired tourist content is usually used at minimal cost to the tourist, in addition to observing the cultural content from the comfort of the tourist's own home. At the same time, digital tourists' benefits are evident during travel bans, closures, and quarantines as it is possible to enjoy the positive aspects of e-travel and be virtually present in a physical location of interest.

Authors in [1] investigate the possibility of digital tourism replacing the mass tourism and its implications in the light of recent Covid-19 pandemic. It is obvious that tourism industry, amongst others, has suffered from the traveling restriction imposed by the governments of many countries. In response, tourism industry has shifted even more towards the digital path. This process of shifting towards digital path is not only visible in tourism but also in many other domains in which investments in digital tools are far reaching and offering different types of assistance. Hence, the application of digital technologies, limited only by our creativity, addresses important humankind problems and builds the collective resilience. Authors in [2] define different terminology and interpretations of the term-concepts related to the application of modern digital technologies in the fields lacking wide academics involvement and research such as e-Tourism.

Tourism development strategies of the Federation of Bosnia and Herzegovina and Republic of Srpska for 2022-2027 [3, 4] promote a new phase in the development of tourism firmly based on the principles of sustainability, responsible and comprehensive growth. In addition, Bosnia and Herzegovina has benefited greatly from a growing global tourism market and the country's tourism industry is developing rapidly, with the exception of the last two years due to the Covid-19 pandemic. Overall, BiH is on the path to secure further increase in the most promising sector of economy. Even though, strategic priorities and measures include an attempt to increase the attractiveness of the touristic destinations in BiH the report only provides few strategic projects containing digitization of cultural and historical heritage. One of the basic principles of tourism development strategy, clearly stated in the report, is adoption of new and innovative ways in efficient and effective destination marketing using digitization.

Authors in [5] are advocating for more involvement of e-Tourism research community while seeking solutions in contrast to only using existing IT solutions and adapting them to tourism domain. They also propose that creativity be one of the six pillars for guiding transformative e-Tourism. The rest of the proposed pillars are namely, historicity, reflexivity, transparency, equity, and plurality [5].

In this paper, we propose the use of digital representations of the medieval historical period of BiH, and ways to connect the movable cultural heritage located in museums with real sites in an attempt to contribute to its promotion. In addition, we observe the identified pillars for leading transformative e-Tourism and try to apply it in the case of representing the Middle Ages and our (Federation of Bosnia and Herzegovina and Republika Srpska) collective

heritage. In this way, we are focused on ‘deliberately identifying and breaking down existing boundaries’ [5] and creating a framework that has practical relevance and unification impact.

The goal of this research is to provide a theoretical framework for the approach to digital reconstruction of historically significant landmarks that were destroyed by various disasters. As will be seen in later sections, all current research approaches and results are highly individual and therefore different, further indicating the lack of standards in this field.

2. Middle Ages digital representation in BiH and its connections to Digital tourism

In the Middle Ages, the medieval Bosnian state arose on the territory of today’s Bosnia and Herzegovina. From the 12th century as a banovina, and in 1377 it became a kingdom. The first king was Tvrtko I., and the last was Stjepan Tomašević. Bosnia’s title of kingdom was recognized by the pope (who was the only one in the Western world who had the right to confer that title) only in 1461, and its final collapse in 1463 was caused by the Ottoman Empire. Thus, Bosnia existed for 86 years as a kingdom, and for 197 years as a banovina.

The architecture of medieval Bosnia finds expression in the defensive fortresses and courts of rulers such as the magnificent Bobovac, Blagaj and Jajce as summer residences and winter ones such as Kuknje and Samobor on the Drina river. There is also the use of stone as a building material in everyday housing culture, while the most famous monument of Dalmatian architecture is the church of St. Luke in Jajce.

The most valuable monuments of Bosnian culture are tombstones, stećci. In Bosnia and Herzegovina there are over 50,000 preserved stećak tombstones with various shapes, symbols (sun, crescent, lily, vine, wreath, etc.), ornaments and epitaph messages. The largest concentration of stećak tombstones is in Herzegovina (Bileća, Stolac, Trebinje, Gacko, Neretva Valley), and the most famous necropolis is Radimlja near Stolac. The most famous individual stećak tombstone is the Zgoščanski stećak tombstone.

2.1. Overview of the most important sites

Below we will give a brief overview of the most important sites from this period:

2.1.1. Bobovac

The ancient capital of Bosnian rulers and their most powerful fortress, is one of the most valuable medieval monuments in Bosnia and Herzegovina (Figures 2.1.1 and 2.1.1). As a typical representative of the defense architecture of its time, Bobovac is also a significant object in scientific terms.



North tower



Funeral chapel

Figure 1: The pictures of Bobovac

2.1.2. Jajce (Franciscan Monastery of St. Luke)

First built in the 14th century and was the capital of the Bosnian kingdom during that period. On the hill above the city is the royal city, with towers and bastions, which for centuries resisted the invasions of invaders and the ravages of time. It is well known that the Franciscans in Jajce at the beginning of the 15th century had the monastery church of St. Mary (2. In 1460 - 63, next to the church, the tower of St. Luke, which got its name because the powers of the saint were kept in the church in those years, which were brought there by Queen Mara.



Figure 2: The remnants of Saint Mary's Church and Saint Luke's Bell Tower [6]

2.1.3. Visoko

Visoko was once the center of the medieval state of Bosnia. The most important places related to that period are the old town of Visoki, its suburbs and the trade center of Podvisoki, Mile as the coronation place of Bosnian kings, and Moštra, which was occasionally the table place

of kings (Figure 3). Many important events for the medieval state of Bosnia have taken place in the Visoko Valley. The first Bosnian king, Tvrtko I Kotromanić, was crowned and buried in the church in Milama, where the Franciscan monastery was located, as well as the venue for the state assembly. The town and fortress of Visoki, from where some charters were written, protected the suburbs of Podvisoki, which was a trading center and occasionally the seat of Bosnian kings.



Figure 3: The old town Visoki [7]

2.1.4. Ključ

The last capital of the Bosnian king Stjepan Tomašević, who withdrew from Jajce to Ključ before the Ottomans, so the city rightly received the epithet of the Royal City (Figure 4). In 1463, the last episode between the Bosnian and Ottoman armies took place under the ancient town of Ključ, marking the end of the independence of the medieval Bosnian state.



Figure 4: Ključ [8]

2.1.5. Franciscan Monastery of the Holy Spirit - Fojnica

The movable treasure of this monastery, such as museum exhibits, old books, archives, paintings, and similar was declared a national monument before the monastery itself. All exhibits are preserved in museums. The monastery has a rich archive and library. In addition to many manuscripts, there is also the famous Ahdnama of Sultan Mehmed II the Conqueror and the coat of arms of Fojnica. The monastery treasury is very rich in art objects of practical ecclesiastical application made of metal or cloth. Most of the metal art crafts were created in Fojnica's goldsmith workshops. There was also a mint of Bosnian rulers in Fojnica.

3. Digital reconstruction

Today, there are a small number of scholars in Bosnia and Herzegovina who deal with the digitization of cultural heritage [9]. Thanks to their work, we have a digitized medieval Bosnian tombstone stećak from Donja Zgosca [9], Sarajevo Old town, Sarajevo City Hall, and similar.

3D modeling is the process of creating a mathematical representation of a three-dimensional object. What is created is called a 3D model. Since 3D modeling is taught through courses at technical universities, most of these projects are actually student projects and final papers of their first or second cycle of studies. Most of these projects are the reconstruction of sites or the digitization of important sites and objects that already exist in museums. Thus, the process of digitization is significantly facilitated because it is known in advance what the reconstruction should look like.

Reconstruction of buildings from medieval Bosnia, which we have previously listed, is a far greater challenge. For example, Bobovac currently looks like Figure 1 and there is very little data available in the form of written documents or images of its original appearance. Museum exhibits are available but the modeling of the interiors of these buildings is largely based on assumptions, since the series of data contained in all permanent forms of cultural documentation represents an incomplete view of these buildings. Furthermore, the data contained in visual and textual documents have never been merged with the physical remains of these buildings. Instead, they are in a separate form, physically and contextually separate from their original settings.

Due to the extreme importance of this period, the goal of digital reconstruction is to show these cities and monuments as they were, and enable the users to walk through these streets, tour and visit the streets, palaces, monasteries, that formed this area.

3.1. Approaches to digital reconstruction

Thanks to advances in technology, the creation of virtual content is now significantly accelerated, thus instead of creating only models of individual objects, we now have digital reconstructions of entire cities that have rich cultural heritage and history. In addition to basic

reconstructions of individual models, which can be viewed separately in a 3D environment, we now have project websites that bring together in one place comprehensive sources of information such as original source materials that historians of art and architecture use, images, stories, and like.

Florence As It Was, is one such digital project that aims to reconstruct the city the way it appeared at the end of the fifteenth century. Here the user can review, inspect, tour, and visit the streets, palaces, churches, shops, and offices that formed the fabric of one of Europe's most vibrant cities [10]. The user is enabled to use their Pointcloud models and a Sketchfab collection that includes impressive 133 models.

The Map of Early Modern London is comprised of seven projects that comprise: the digital edition of the 1561 Agas woodcut map of London; an Encyclopedia of London people, places, topics, and terms; a Library of marked-up texts rich in London toponyms; an anthology of old-spelling and modern editions of all the Elizabethan, Jacobean, and Caroline mayoral shows (modern editions forthcoming); a versioned edition of John Stow's Survey of London; the London Parish project; and Browsing the Bookstalls of St. Paul's project [11]. All files are located in databases. The map allows users to visualize, overlap, combine and search information from the created database in 2D format.

CyArk strives to connect new audiences to heritage through place-based web, mobile and immersive experiences that inspire reflection, conversation and imagination [12]. They have worked with partners from over 200 cities in more than 40 countries. They produce storytelling experience and 3D models of places and sites. They also offer training and open-access to 3D cultural heritage data for educational and non-commercial use via Open Heritage 3D.

The lack as well as the variety of these examples, unfortunately, indicates the lack of defined standards in this area. All examples are based on individual strategies and approaches selected by the principal investigators or project team for the specific work.

Furthermore, analyzing the museums that opened their virtual doors to visitors during the pandemic, one gets the global impression that they have embraced digitalization and turned to a new era of presentations of their collections. However, a report released by the International Council of Museums [13] shows that attempts to address the loss of revenue caused by the Covid-19 pandemic through new ways of generating revenue remain marginal. 6 out of 10 surveyed museums (59.1 %) stated that they did not experiment with new ways of generating income. The other 4 have either expanded their online sales or created new products.

4. The pillars of digital reconstruction - case study evaluation

The pillars of transformative research [2] applicable to the study of digital representation of Middle Ages in BiH are presented below. A brief summary is also provided in the Figure 5.

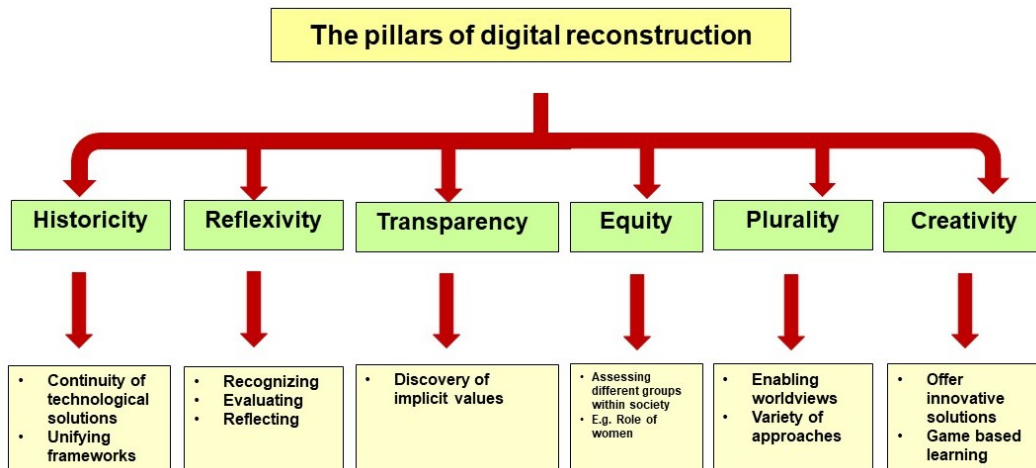


Figure 5: The pillars of digital reconstruction

Historicity in digital tourism relates to obtaining continuity of technological solutions applicable to tourism industry and providing unifying frameworks that are nevertheless emerging due to disasters not only relevant to Covid-19 pandemic but encompassing natural disasters as well. The frameworks should be designed conscientious of their effects on individual, social, economic, legal, or political aspects of life. Hence, we argue that continuing designing frameworks with promotion and preservation of cultural heritage in mind could be related to tourism domain improvements in BiH [Reference existing solutions [9]]. Focusing on new technologies without applying theory, in this case history, poses a major risk to the research community and its course of action. It is necessary to emphasize the importance of combining technology and history in the presentation of digital cultural content.

Reflexivity in digital tourism relates to recognizing, evaluating, and reflecting on the factors that are important in knowledge creation. In particular, knowledge and awareness of cultural heritage promotion and protection, the values of protected areas, as well as the sustainable use of resources, are quite limited in BiH. In some parts of the country, there is still an opinion that any activity within protected areas is prohibited. Therefore, general resistance to the establishment of new protected areas remains strong among local communities. In addition, there is a lack of awareness of the values of protected areas and the special services they provide to the public.

Transparency by which we mean the discovery of implicit values. According to [2], modern science has replaced value-based argumentation with calculative forms of thinking. When implicit values seem explicit, transformative e-Tourism research is critical not only because it focuses on socially problematic aspects, but also because it is aware that ‘scientifically’ developed concepts and technologies always relate to certain values that are promoted and strengthened if these technologies are later applied in society. Transparency is particularly

important in e-Tourism domains such as big data analytics or the design and evaluation of recommender systems.

Equity in digital tourism relates to assessing its impacts of different groups within society. In particular, research activities could adequately address the role of women as a source of intangible cultural heritage in rural communities, and that appropriate activities be implemented to empower women in rural areas in order to achieve greater economic benefits.

Plurality in e-Tourism represents enabling more worldviews and a variety of approaches that can enrich the world transformation post Covid-19. In this particular case of digitization of cultural heritage, it means developing innovative solutions by engaging with other scientific fields and creating policies and sustainability plans after, say, the expiration of certain financial grants. It is common knowledge that in the Western Balkans countries with low economic indicators, with the expiry of funding, the upgrading of online content usually stops.

Creativity - perhaps the most lacking component or pillar Today. As Millennial consumers represent the generation that spend the most in 2020 [14], the research community must focus on breaking down existing boundaries and constraints and creating innovative solutions with high scientific impact. Game based learning or game based engagement represents a good way forward in combining the history and practice through fun and engaging ways of interaction [15]. Playing games would motivate users to visit real locations and thus experience complete immersion of the past and present.

5. Conclusion

Historical sites are often hidden, inaccessible yet important cradels of cultural heritage globally and in BiH alike. Digital tourism is ever present technology transforming travelers' experiences and allowing for easy access to already digitized sites and artefacts. Hence, technological advances have changed our vision and capabilities. Digital tourism is transforming due to, until recently, unforeseen global halt of activities such as Covid pandemic induced immobility.

Tourism strategies in BiH are reflecting on a need to change by adoption of new and innovative ways in efficient and effective destination marketing using digitization. In addition, e-Tourism research community suggests employing IT solutions developed with consultations from interdisciplinary research community.

Thanks to the innovative work of computer scientists, game designers, curators and archaeologists, we now have the knowledge and capacity to recreate the physical environment of sites that no longer exist. However, this variety of technology offered many different solutions on the market and thus indicated the need to create standards in this area. We consider this paper to be our modest contribution to this process.

Following the previously defined pillars, a theoretical framework is now given on the basis of which we can approach the digitalization of Medieval Bosnia and Herzegovina. The future practical implementation of this project will further enable researchers to create the following (new) digital reconstructions of objects of interest in the same way. Such further development will also be of great importance from the aspect of human-computer interaction, as it will significantly facilitate users' movement through different locations (digital Tourism) regardless of the team of researchers who worked on the reconstruction.

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