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The **3**rd

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27–29 August 2019

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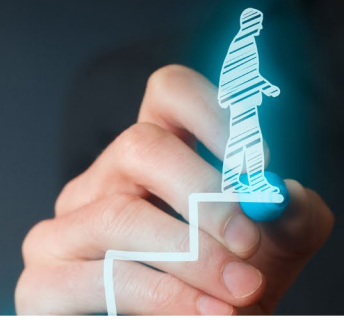"Innovation, Sustainability and Entrepreneurship in Tourism and Business"

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Digital Mini-museum as an Innovative and Affordable Presentation of Local Heritage for Tourists: Example from Serbia

Aleksandra Djukić[*]

University of Belgrade – Faculty of Architecture, Department of Urbanism, Bulevar kralja Aleksandra 73/2, 11000 Belgrade, Serbia, E-mail: adjukic@afrodita.rcub.bg.ac.rs

Branislav Antonić

University of Belgrade – Faculty of Architecture, Department of Urbanism, Bulevar kralja Aleksandra 73/2, 11000 Belgrade, Serbia, E-mail: antonic83@gmail.com

Radomir Stanković

University of Niš – Faculty of Electronic Engineering, Department of Computer Science, Aleksandra Medvedeva Str. 14, 18106 Niš, Serbia, E-mail: radomir.stankovic@gmail.com

Dušan Tatić

University of Niš – Faculty of Electronic Engineering, Department of Computer Science, Aleksandra Medvedeva Str. 14, 18106 Niš, Serbia, E-mail: tatic.dule@gmail.com

Abstract

The use of innovative digital technologies in the presentation and promotion of cultural heritage has become an imperative for the arising destinations of cultural tourism. This is especially related to the cases where this heritage has some spatial and historic limitations to be consumed by prospective tourists. However, the use of digital technologies requires a lot of financial, organisational, and professional resources – a challenge for new destinations. Accordingly, the rare examples how to overcome this challenge should be presented as role-models. This paper exemplifies a Digital mini-museum in Niš, a city in Southern Serbia with rich history and tradition. The Museum has been developed by a staff and students from the local electronic faculty, aiming to show the affordable ways to promote local urban cultural heritage in limited conditions. Final conclusions target to underline the possibilities to merge the potentials of digitised cultural heritage and their affordability.

Keywords: *digitised heritage, augmented reality, museum, tourist presentation, affordability, Niš*

1 Introduction

With the rise of the offer in cultural tourism globally, modern tourists with a lot of experience and the miles passed ask for more and innovative. Thus, new 'niches' in tourist offer are to be found, experimented, and, eventually, exploited. One of them is the use of digital technologies to adequately present and promote local cultural heritage. This is particularly significant for the heritage with certain obstacles, such as those with limited access, poor physical state, property issues, during unpleasant

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[*] Corresponding author

weather conditions or even lost recently, but with appropriate historical records. Digital technologies can be a critical element to add a new value in these circumstances, extending the consumers' real experience of cultural heritage in new ways, through augmented and virtual reality.

Nevertheless, the digitisation of the presentation of cultural heritage also requires a lot of financial resources, organisational, and professional capacitates, which have proven to be a challenge for many emerging and underdeveloped tourist destinations. Hence, the affordability of digital technologies is an important prerequisite for them.

Considering the previous gap, rare examples of how to merge the utilisation of modern technologies and their affordability should be presented as role-models. One of them is a Digital mini-museum in Niš in Southern Serbia. The city is among ancient ones in the country, with a lot of historical strata, further embedded in abundant local cultural heritage. Niš is also internationally well-known as the birthplace of Constantine the Great, the first Christian leader of the ancient Roman Empire. However, this legacy has not been appropriately presented for tourists due to the aforementioned financial problems and professional limitations. This was a motivation for a team from the local Faculty of Electronic Engineering to try to create the affordable pilot project of a digital mini-museum. They showed local heritage using different and innovative approaches: (1) 3D-manipulation and gaming by users relating local heritage, (2) 3D-presentation of lost or invisible cultural heritage, (3) 3D-reconstruction of heritage buildings, and (4) the reconstruction and transformation of black-and-white photos to coloured ones.

This research aims to present these affordable tools to digitise cultural heritage as the best practice. It is presented through the explanation of the aforementioned digital mini-museum in Niš. By this, theoretical fundamentals and the short description of the city and its urban heritage are given. The short explanation of the current presentation of local urban heritage is also displayed. The comparison between the 'classical' presentation of cultural heritage and innovative and affordable approach, enabled by digitisation, is critical to re-examine the potentials of the management and presentation of cultural heritage in a restricted financial and organisational environment. Merging these segments, conclusions target to underline the potential of the affordable use of digital technologies in the presentation of cultural heritage for prospective tourists.

2   Research methodology and material

The research is organised as a review paper in three steps. The first one is the brief explanation of theoretical relations between smart development and its affordability in the case of urban cultural heritage. The second step is to present the genesis of Niš, Serbia, with special attention to the preservation of local cultural heritage. In the final step, the digital presentation of lost and /or hidden heritage is explained by the description of the digital mini-museum at the local Faculty of Electronic Engineering. Combining both steps, final insights regarding affordable 'smart' management and presentation of cultural heritage are highlighted.

3 Theoretical fundamentals: The presentation of urban cultural heritage between smart development and affordability

The digitisation of cultural heritage, within its appropriate management, preservation, and presentation, is greeted as a key element in the contemporary treatment of cultural heritage. In essence, it is "the creation of digital objects from physical, analogue originals using a scanner, camera or another electronic device" (UNESCO, 2017). The digitalisation brings cultural heritage closer to probably the most prospective consumers, tourist visitors (Preuss, 2016). This is also highlighted by the operative Work Plan for Culture of the EU (EU, 2014).

Efforts to present digitised material cultural heritage in urban areas by information and communication technologies (ICT) tools and to develop these urban areas are rarely considered together. However, digitally presented cultural heritage facilitates the "smartness" and thereby competitiveness of cities (Angelidou et al., 2017). There are several major reasons. This kind of cultural heritage as a real structure in an urban environment can be enhanced by the use of ICT with new, digital dimension (Menezes & Smaniotto, 2017). Digitised cultural heritage can also strengthen the real-life experience of users in urban space instead to replace it. In line with the previous statement, the digitised heritage can anticipate their inspiration and a sense of shared identity (Collins, 2018). Reverse effects can also be obtained. Urban space fuels the value and use of cultural heritage due to the accessibility and number of possible users (Kuyper & van Bussel, 2014). Therefore, this mutual process can both support the socio-economic prospect of a city and promote its urban cultural heritage.

Although the digitalisation of urban cultural heritage is often seen as a desirable part of smart urban development, it also involves great financial resources and organisational and professional capacities to process it. Generally, the digitalisation of cultural heritage needs a lot of resources to be implemented. First, it is inevitably a "cross-institutional and interdisciplinary process" (Sotirova et al., 2012). Second, it involves different levels of governance, from global to local one (Preuss, 2016). Third, capable professionals for the digitisation of cultural heritage require the knowledge and experience regarding the newest ICT tools. Consequently, the process of digitisation of cultural heritage seeks a lot of organisation and professional resources, which certainly makes a burden for local/city finances.

This gap between the potentials of the digitalisation of urban cultural heritage and the affordability to enable it is obvious, but it has not been adequately stressed in relevant theoretical circles. Thus, it is an impetus to contribute to the explained issue in this paper.

4 Basic assessment: Urban genesis and urban heritage of Niš, Serbia

The case study presents the part of the urban cultural heritage of Niš, the third-largest city of Serbia. Niš belongs to the oldest cities in the country, with a rich historical heritage. The millennia-long and rich history of the city starts from Neolithic settlements, through Roman Empire, five-century long occupation by Ottoman Empire, and the German occupation in the First and the Second World War (Andrejević, 1985).

Although the area around Niš was already inhabited in prehistory (Petrović, 2007), the real blossom of the city happened during the ancient Roman period. This is particularly visible in the late Roman period when the city was known as Naissus (Mócsy, 1974). The most valuable cultural heritage from this period is the remnants of MEDIANA, *villa rustica* built by the Constantine the Great, who was born in Naissus (Fig. 1). The villa encompasses a huge complex with the both residential and economic part. The most valuable assets are marble-facing columns, mosaics and frescoes from the central villa (Ljubomirović, 2014). Nowadays, Mediana is a national monument of extraordinary importance, as well as a major tourist attraction in the Niš area (Smaniotto Costa, Artopoulos & Djukic. 2018).

Medieval and five-century long Ottoman period were very turbulent due to the strategic position of Niš on the main crossroad, which consequently left a less valuable heritage. The main heritage site from the late Ottoman period is ĆELE-KULA (eng. *Skull Tower*), a unique stone structure with embedded human skulls (Fig. 2). The tower is constructed after the failure of First Serbian Uprising against Ottoman rule in the early 19th century. Ottomans built this structure from the skulls of the fallen rebels, trying to terrify the local Serbian population and prevent further uprisings. However, the Second Serbian uprising started a few years later, entering doors for Serbian independence in the second half of the 19th century. The Tower has eventually become a place of Serb pilgrimage (Blaisavljević, 2003). The Skull Tower is among the declared cultural monuments of exceptional importance, and it is regularly visited by tourists.

Fig. 1:   Mediana archaeological site (following Marcin Szala, 2013).

Fig. 2:   Ćele-kula (following Djina, 2014).

NIŠ FORTRESS is also a cultural heritage from the late Ottoman period (Fig. 3, upper part). The fortress is located in the centre of the city, on the right bank of Nišava River, looking on the main city square on its left bank. Although the present-day fortress was built by Ottomans, the older layers (ancient Roman, Byzantine, and medieval) are beneath it. The fortress is also a huge structure, covering 22 hectares and including eight bastion terraces and four massive gates (Đorđević, 2012). The fortress is a declared cultural monument of great significance. The central, open-air part of the

fortress is the main green area in central Niš, which seasonally turns in a mass-event ground. Fortification buildings also serve as the parts of National Museum of Niš.

OLD CITY CORE carries Ottoman and early modern influences (Fig. 3, lower part). After the annexation of Niš to the Principality of Serbia in 1878, Serbian authorities tried to modernise the city, as well as to wipe out the entire urban fabric as an unwanted legacy of the previous ruler. The city matrix was corrected, and new buildings were built in line with the dominant style in Europe (Kojić, 1970). However, this process has never been completed, so the architecture and ambient of the city core is an exceptional mixture of oriental, Balkan, and European styles.

Fig. 3:   Niš Fortress with old city core (following Tourist Board of Niš, 2018)

The described cultural heritage in the urban area of Niš functions as an open-air museum today. Aside from them, there are many buildings, historic sites and ambient zones that are the declared cultural monuments, but with lesser significance. Then, there are several museums in the city, which are responsible for smaller tangible and intangible cultural heritage. The most prominent of them is the National Museum in Niš, which occupies several buildings in the city (NMN, n.d.). Apart from the main building, it manages Mediana site, Ćele Kula, "Sinagoga/Synagogue" Gallery, "Crveni Krst" concentration camp, and buildings in the fortress. (NMN, n.d.). The buildings in the fortress were a mosque and an arms storage building the arsenal and they are presently art galleries.
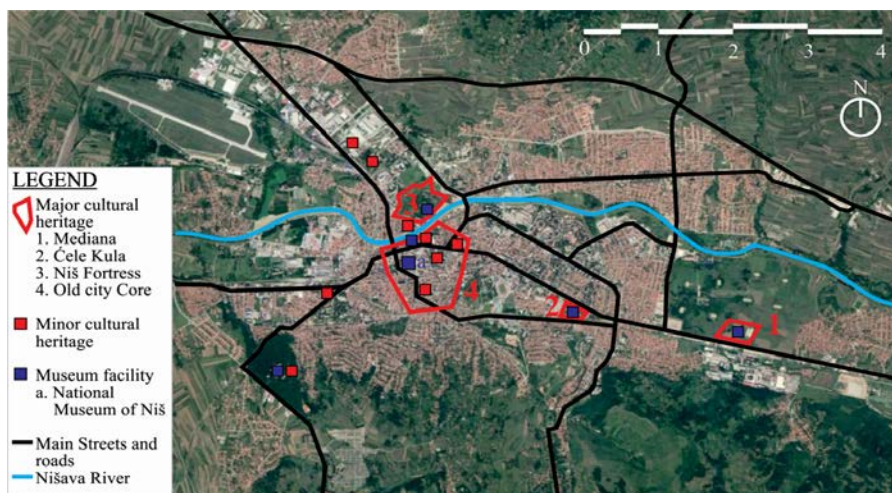

Fig. 4:   Map of Niš with the location of the main cultural heritage (Author: B. Antonić, 2018 / Substrate map: Google Earth, 2015)

Nevertheless, the mentioned major heritage is sprawled across Niš and its suburbia (Fig. 4), so it requires visitors a lot of efforts, time, and good guidance for a visit. For example, Mediana site is six kilometres east of the city centre, which limits its accessibility. Moreover, many small monuments are hidden in the city fabric, which demands proper information and orientation for prospective visitors. Finally, the dozens of historic buildings and ambient zones have been lost in the already explained turbulent history of the city.

5 Digital Mini-Museum of the Faculty of Electronic Engineering in Niš, Serbia

Before focussing on the digital mini-museum of the Faculty of Electronic Engineering, it is necessary to mention that the innovative, digital presentation of cultural heritage in Niš is not limited to the chosen case. For example, digitalisation has already implemented in the aforementioned Mediana archaeological site, where digital tools were used to create a guide-platform for tourists, which combines games and education (Smaniotto Costa, Artopoulos & Djukic. 2018). However, Mediana site is a national monument of extraordinary importance for the Republic of Serbia. Therefore, this is a nationally important cultural heritage and their promotion by using digital tools did not have noticeable financial obstacles.

The chosen case, the digital Mini-museum, was opened in 2013. It was developed by the staff and students of the Faculty of Electronic Engineering in Niš, Serbia. Information technologies are among the central teaching subjects at the Faculty. A part of their applications is focused on the presentation of cultural and urban heritage due to the rich history of the City of Niš. In this context, the Museum has been established within the Faculty of Electronic Engineering with a twofold goal. The first goal is educational – instead of convincing students in the technical field to visit museums more frequently than they typically do, a museum was brought in a minimal and digital frame to them. The second goal was practical and socially oriented – the museum serves as a part of an open lab where it is possible to practically use theoretical knowledge in information technologies in the behoof of wider society, by presenting lost and/or hidden local heritage to it.

The Museum consists of several components, and it is located in four niches at the wide central entrance hall of the Faculty building (Fig. 5). An especially designed projection device enables the simultaneous projection of two multimedia signals on two planes under the angle of forty-five degrees. A plane is a specially selected glass, creating in this way a kind of a holographic effect that resembles objects floating in the air. All presented objects are connected with Google maps, which allow the geographical location of 3D models of architectural and other structures on the projected map.
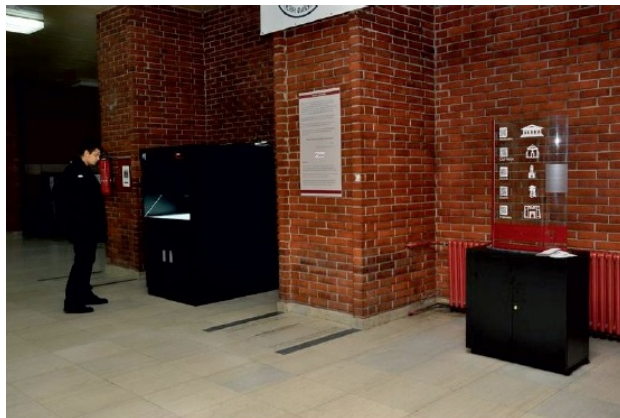
Fig. 5:   Digital mini-museum at the entrance hall of the Faculty (Author: R. Stanković, 2014).
Fig. 6:   Digital mini-museum – the colon equipped with QR-codes (Author: R. Stanković, 2014).

A projection pyramid also serves for presenting 3D models and related information about them. A glass-based, totem-like colon, equipped with a series of QR-codes, offers information about certain particular historical places and monuments throughout the city (Fig. 6). The last device used in the Museum is a combination of a projector and Microsoft Kinect, enabling gaming by gesturing with purposely developed computer games based on historical events. An especial exhibit is an A4 format table with a QR-code the scanning of which offers the video presentation how the faculty building looked like after 66 days of bombing Niš in 1999.

The content of the presentations and projections is selected to adequately cover the history of Niš from the ancient Roman epoch to the recent time.

Projection in the first niche is devoted to the antique Niš and in particular, a *villa rustica* in the Mediana site, built purposely for Roman emperor Constantine the Great. Working for these projections, students practised modelling, animation, synchronizing, and related tasks in presenting physically existing archaeological artefacts.

The second presentation is devoted to the reconstruction of five houses from Ottoman time. None of the presented buildings exists today due to turbulent 20th century (two world wars). Reconstructions are usually prepared based on a single photo from the nineteenth century. Further analysis was carried to determine their interior and the related distribution of rooms, staircases, and auxiliary spaces (Fig. 7 and 8).
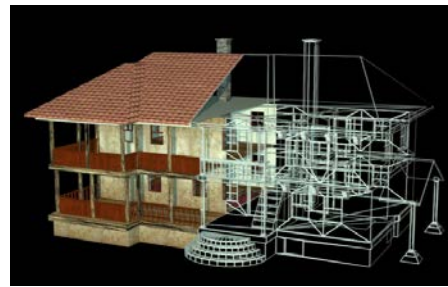
Fig. 7 & 8: Hristodulo House in Niš was the first museum of Niš. A Left figure is the 19th-century photography of the house, which is destroyed by allied bombing in 1944 (Source: Nišiokolina, 2011). The right figure is the model of the house developed for the Museum (Author: R. Stanković, 2015).

The third presentation concerns the architecture in Niš in the period of Modernism. To create it, the students learned how to insert black and white photos from the 1950s into the actual colour photos, taken from the same position.

The computer games are offered in the fourth niche, and they involve playing with Roman time arms like catapults, large arches, etc., as well as with Roman numbers. Therefore, the students practiced in classic computer-game programming and the usage of related tools while learning crucial historical facts at the same time.

Apart from presenting historic facts and achieving teaching goals, the economic aspect is also taken into account in creating and running the Digital mini-museum at the Faculty of Electronic Engineering. The background idea is to make the projection devices purposely designed and used in the Digital museum as inexpensive as possible. In that order, the classical hardware as desktop PCs, laptops, or tablets is replaced with much cheaper hardware like Raspberry Pi and similar. Simultaneously, dealing with these devices requires student work in programming environments like Scratch or Python that are out of the scope of classical curricula, officially accepted at the Faculty of Electronic Engineering in Niš.

In the end, the mini-museum is just the first step in the further digitisation of the promotion of cultural heritage. The main obstacle is currently its location within the Faculty, which limits the possibilities of its promotion among and use by a wider audience.

6   Conclusions

Cultural heritage located in a city cannot be excluded from its urban environment. Thus, the traditional way of its management, preservation, presentation, and promotion carries all the advantages and disadvantages of that environment. On the other side, the relatively new tools of digital technologies have opened a completely new dimension to manage and present cultural heritage. They have enhanced and expanded the presentation into digital, virtual, and augmented

reality and widen the prospective number of cultural-heritage visitors thereof. Nevertheless, this is still a novelty for less developed countries, where the implementation of digitisation is an obstacle for local resources.

The digital mini-museum at the Faculty of Electronic Engineering in Niš is a good example of how the digitised presentation of cultural heritage can be done simply and affordably. Apart from this conclusion, it is also important to underline that it confirms the usability of this approach in the case of destroyed and spatially hidden cultural heritage. It shows that it can present all major cultural-heritage sites together, which can be a qualitative substitute for specific situations, such as bad weather or wintertime. Finally, it is a good example of synergy between education and cultural heritage management.

This synergy can certainly be exploited better if the other levels and actors will be involved, as it was stated in the introduction. For example, the location of the mini-museum in the faculty building, far away from all enlisted historic sites, proves to be the main problem for its promotion and wider use. Hence, the most fruitful approach is, without doubt, the combination of the traditional and digital presentation of cultural heritage. At cultural-heritage sites, both presentations can be easily used to upgrade the cultural value of the site and to approach to the broad spectra of visitors/consumers.

However, the digital presentation of cultural heritage should be organised in the other, the most vibrant places in a city, such as the main squares, streets, and parks. In that way, the digitised presentation indirectly facilitates the use of the real sites of cultural heritage, fulfilling its main aim, to bring the heritage to the wider community in the proper way, respecting albeit utilising its cultural values.

7 Acknowledgements

8   Literature

Books

Andrejević, B. (1985). *Споменици Ниша и околине [Monuments of Niš and Surrounding]*. Niš: Zavod za spomenike.

Blaisavljević, M. (2003). *Narodni muzej - Niš; Ćele-kula [National Museum of Niš: Skull Tower]*. Niš: Sven.

European Union – EU (2014). *EU Work Plan for Culture (2015-2018)*. Brussels: EU.

Kojić, B. (1970). *Варошице у Србији XIX века: регионално-урбанистичка студија [Small Towns in Serbia in 19th Century: Regional and Urban Study]*. Belgrade: Gradjevinska Knjiga.

Mócsy, A. (1974). *Pannonia and Upper Moesia: A History of the Middle Danube Provinces of the Roman Empire*. Abingdon-on-Thames, UK: Routledge & K. Paul.

Papers within edited collections

Menezes, M. & Smaniotto Costa, C. (2017). People, public space, digital technology and social practice: an ethnographic approach. In A. Zammit & T. Kenna (Eds.), *Enhancing Places through Technology* (pp. 167-180). Lisbon: Edições Universitárias Lusófonas.

Sotirova, K., Peneva, J., Ivanov, S., Doneva, R. & Dobreva, M. (2012). Digitization of Cultural Heritage – Standards, Institutions, Initiatives. In K. Ivanova, M. Dobreva, P. Stanchev & G. Totkov (Eds.), *Access to Digital Cultural Heritage: Innovative Applications of Automated Metadata Generation* (pp. 25-67). Plovdiv: University Publishing House "Paisii Hilendarski".

Journal articles

Ljubomirović, I. (2014). Резултати најновијих истраживања на Медијани [Results of Recent Research at Archaeological Site Mediana]. *Teme, 38*(2), 733-745. Retrieved from http://teme2.junis.ni.ac.rs/public/journals/1/previousissues/teme2-2014/teme%202-2014-15.pdf.

Petrović, V. (2007). Pre-Roman and Roman Dardania: Historical and Geographical Considerations. *Balcanica, 37*, 7-24. Retrieved from http://www.balkaninstitut.com/pdf/izdanja/balcanica/Balcanica%20XXXVII%20(2006).pdf.

Preuss, U. (2016). Sustainable Digitalization of Cultural Heritage - Report on Initiatives and Projects in Brandenburg, Germany. *Sustainability, 8*(891), 1-15. DOI: 10.3390/su8090891.

Smaniotto Costa, C., Artopoulos, G. & Djukic. A. (2018). Reframing Mediated Public Open Spaces And Cultural Heritage – Outdoor Digital Practices. *Journal of Communication and Languages, 48*, 143-162.

Published conference papers

Angelidou, M., Karachaliou, E., Angelidou, T. & Stylianidis, E. (2017). Cultural Heritage in Smart City Environments. In *The proceedings of the 26th International CIPA Symposium 2017* (pp. 27-32). Ottawa: CIPA.

Kuyper, A. & van Bussel. G. J. (2014). Dismantling urban history Cultural heritage in public spaces using new media technologies. In *The proceedings of the 22nd international BOBCATSSS symposium* (pp. 30-35). Boras: University of Boras.

Unpublished papers

Ђорђевић, М. (2012). Перспективе развоја културног туризма у Нишу на примеру Нишке тврђаве [The Perspectives of the Development of Cultural Tourism in Niš on the Case of Niš Fortress]. MSc Thesis, Singidunum University Belgrade.

Online papers

Collins, C. (2018). *Digital innovation can enhance cultural heritage, hears conference*. Physo.org. Retrieved from https://phys.org/news/2018-03-digital-cultural-heritage-conference.html (accessed online: 22.04.2019).

National Museum in Niš – NMN (no date). *Историјат музеја [Museum History]*. Retrieved from http://narodnimuzejnis.rs/o-muzeju/istorijat-muzeja/ (accessed online: 20.04.2019).

United Nations Educational, Scientific and Cultural Organization – UNESCO (no date). *Fundamental Principles of Digitization of Documentary Heritage*. Paris: UNESCO.org, Retrieved from http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/mow/digitization_guidelines_for_web.pdf (accessed online: 22.04.2019).