Bojana Plemić, Academy of Applied Studies Belgrade

ACCESSIBILITY FOR EVERYONE AND ARCHAEOLOGICAL HERITAGE

Abstract: This paper considers the modes for the improvement of the accessibility to archaeological heritage for people with disabilities. The aspects of communicative (cognitive) accessibility are promoted, where the use of new technologies for virtualization processes, i.e. virtual archaeology, is acknowledged as an important tool for heritage interpretation and the improvement of the contents of archaeological sites or museums. We give a review of the state-of-the-art on this topic in Serbia and point out the potential of digital technologies to ensure new types of experiences for the above-mentioned visitor group thanks to 3D printed replicas of artifacts that combine visual and tactile experiences. Upon consideration of the development of the accessibility of archaeological heritage in Serbia, we emphasize the necessity to adopt modern tendencies that see accessibility for everyone as an integral part of heritage value. To accomplish this, it is necessary to have a serious strategic approach, as the inclusion of people with disabilities is one of the imperatives of modern society.

Key words: accessibility, people with disabilities, archaeological heritage, cultural heritage, virtual archaeology, Serbia

INTRODUCTION

Today, providing accessibility to cultural heritage for everyone is increasingly accepted as an integral part of its conservation, while aspects of physical or communicative (cognitive) accessibility realized through interpretative content are viewed as equally important. In addition, accessibility is a necessary prerequisite for the successful valorization of heritage, while also being one of the methods to achieve a more complete inclusion of different social categories into cultural life. As international conventions regarding cultural heritage pay due attention to this segment, we witness an increasing number of good practices in the activities of museums or archaeological sites open to the public in the world, while this topic gains popularity in our country as well. On the other

¹ Georgieva 2016, 5; Di Ruocco et al. 2018, 1007.

² UNESCO 1983; Council of Europe 2005; United Nations 2006, art. 30; European Commission 2014; UNESCO 2020, 3.

³ The event "European Heritage Days" was held in 2021, its slogan being "Heritage for All", and cultural institutions in Serbia joined this initiative through a series of appropriate programmes entitled "Cultural Heritage for Everyone (Heritage: All-Inclusive)", https://www.europeanheritagedays.com/country/Serbia.

hand, the use of new technologies that have an important role in the presentation of cultural heritage stands out as a crucial potential for the creation of solutions for better accessibility to heritage, allowing the problems of communicative accessibility to be approached through the adaptation of digital content, which may require less effort than surpassing physical obstacles for the people with disabilities. That is why in this paper we will point out the potential of virtual archaeology as a valuable tool in regard to the field of interpretation but also in the field of education of the mentioned social category.

ACCESSIBILITY OF ARCHAEOLOGICAL SITES

The development of the accessibility of archaeological sites is a specific issue due to the complex nature of the heritage they preserve. Namely, archaeological sites may considerably vary in size, ranging from isolated monuments to entire settlements, and may belong to various historical periods. Their age and exposure to atmospheric conditions influence the state of material remains. Also, their particularity is influenced by the location, which may range from urban and rural environments to totally inaccessible terrains, on the land or in water. Although the majority of the buildings at archaeological sites have not kept their original purpose and thus represent the remains of the human past that should be observed and studied, some of them may still retain their original purpose or, in rather rare cases, be adapted so as to serve new public purposes. In the case of the reuse of the archaeological heritage building remains, it is essential that their new use complies with conservation recommendations while finding a balance between these two aspects is a topic of numerous present-day debates.⁵

Although the processes of ensuring the accessibility of archaeological sites are necessary, they pose specific challenges regarding the demands of physical accessibility for persons with disabilities. Considering the potential for physical accessibility of heritage, we must bear in mind that it is not allowed to intervene on archaeological remains in opposition to their preservation, so in certain cases, it is not possible to remove barriers that may be an obstacle to mobile accessibility. In addition, other aspects of terrain such as the particular climate, the length of tourist paths, the features of the land, and the differences in its levels should be taken into account.

As well as the physical dimension, the accessibility of archaeological sites for persons with disabilities also needs a communicative dimension, which entails certain sensory-perceptual methodology along with activities that are focused on the improvement of a visitor's orientation on the site and better accessibility of cultural content. The communicative approach can be best explained through two groups of initiatives:

⁴ According to the UN *Convention on the Rights of Persons with Disabilities*, "persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others" (United Nations 2006, 4). There are many types of disabilities, such as those that affect a person's vision, hearing, cognitive abilities and communicating, then movement and mental health. However, the accessibility issues which we discuss in this paper, may also include some different social categories such as seniors, families with young children etc.

⁵ Lauria 2017, 1025.

⁶ Naniopoulos, Panagiotis 2015.

⁷ Lauria 2017, 1027.

off-site initiatives and on-site initiatives. Bearing in mind that people with disabilities must plan their visit to heritage sites with the utmost care, off-site initiatives are related to obtaining information about accessibility through internet presentations, brochures, audio-visual devices, mobile applications, and similar methods. On the other hand, on-site initiatives include ensuring easier touring, ranging from reserved parking spaces to marked paths and accessible infrastructure (ramps, elevators, marked paths, box offices, toilets, resting areas, etc.) along with adapted content that ensures a clear understanding of the heritage (aids for visually or hearing impaired in the form of notifications in Braille or tactile signs, video materials with sign language translation, audio systems, enlarged print material, and virtual reality systems). It can be stated that all of the abovementioned initiatives, both off-site and on-site, add up equally to the final model of accessibility for everyone in a particular place, which is imperative in the present-day presentation of archaeological heritage.

PHYSICAL ACCESSIBILITY OF ARCHAEOLOGICAL HERITAGE IN SERBIA

Regarding the capacity for the development of archaeological heritage accessible for persons with disabilities in Serbia, although this issue has not been addressed with sufficient care,9 we can state that there has been certain improvement in this field lately, especially due to the fact that there has been intensive work on the presentation of the sites and on the processes related to the interpretation of heritage. 10 According to the last comprehensive research conducted in 2009, the analysis of the practices in museums as institutions that house archaeological heritage showed that only 15% of museums were accessible to people with disabilities, while educational workshops and programs for this category of visitors were organized by 51% of museums. 11 Today, only a few more museums have ensured accessibility in the form of ramps, 12 while some can boast of being organizers of permanent or international programs aimed at people with disabilities.¹³ However, on the archaeological sites that are open for visitors, there is much less accessible infrastructure and content, while in domestic literature this topic has been scarce. One of the rare later examples of research was conducted in 2015 when electronic surveys on accessibility were sent to museums in Zaječar (for the site of Felix Romuliana), the archaeological sites of Vinča and Viminacium, and the Institute for

⁸ Darcy 2001, 2.

⁹ Масликовић 2015, 239.

¹⁰ Plemić, Rabotić 2018, 124-125.

¹¹ Martinović, Jokić 2009, 12-13.

Preliminary results of the research entitled "Inclusive museums: facts, challenges and prospects" conducted by The Institute for Cultural Development Research (Belgrade), which evaluates the accessibility of museums and galleries, show that with regard to physical accessibility, more than a half of these institutions are inaccessible. In addition, only around 20% of these are fully accessible, while a little less than 25% of the insitutions are partially accessible (Zavod za proučavanje kulturnog razvitka, https://www.facebook.com/photo/?fbid=31326388081092 2&set=a.266583498812294)

¹³ Balkan Museum Network 2019; The Gallery of Matica Srpska, Inclusive programs with the Per.Art Association, https://www.galerijamaticesrpske.rs/en/youth-programs/inclusive-programs-with-per-art-association; The National Museum Leskovac, Inclusive Workshops, https://muzejleskovac.rs/inclusive-workshops/?lang=en.

Protection of Cultural Monuments in Sremska Mitrovica (the archaeological site of the Imperial Palace in Sremska Mitrovica) and Niš (the sites of Mediana, Justiniana Prima, Vrelo-Šarkamen, and Ravna). The survey results show that the situation at these sites is somewhat better in terms of physical accessibility compared to accessible interpretation tools adapted for people with disabilities. It is noticeable that solely in the case of Felix Romuliana, where prior experience showed that most of the groups of people with disabilities came on organized tours, accessibility can be evaluated as being at a higher level, in terms of accessible roads and parking as well as terrain that does not require considerable adjustments of level nor tactile paths. Also, ramps have been placed where needed and printed material in Braille and audio guides are available. The same research shows that the Viminacium site has data about organized tours for people with disabilities, but also about individual visits that are enabled by the proximity of road infrastructure. At this site, the roads and parking are accessible, while the difference in the level of the terrain is regulated by ramps (Fig. 1-3). However, the lack of content and interpretative tools for people with disabilities is pointed out in the research. In the case



Fig. 1. Access ramp at the main entrance of the Domus Scientarium Viminacium building, Viminacium Archaeological Park (source: Documentation of the Institute of Archaeology in Belgrade)

of Mediana, it is recorded that only sanitary facilities are in compliance with the articles of the code regarding technical standards of accessibility. The data showed that there is no accessibility infrastructure in Justiniana Prima, Vrelo-Šarkamen, or Ravna, while there was no response from Sremska Mitrovica.

¹⁴ Масликовић, Томић 2015, 224-225.

 $^{^{15}}$ Министарство грађевинарства, саобраћаја и инфраструктуре РС 2015.



Fig. 2. Access ramp in the Domus Scientarium Viminacium atrium, Viminacium Archaeological Park (source: Documentation of the Institute of Archaeology in Belgrade)

As it has been more than half a decade since the research was conducted, we will point out the updated data on accessibility at our archaeological sites that are presented either on websites of particular sites and institutions that govern them or in the relevant literature. With regard to that, it can be said that most of the Imperial Palace site in Sirmium is accessible to wheelchair users, which is also the case in Lepenski Vir, where exists a well-designed protective construction with galleries and paths for visitors` movement. Also, the Viminacium site has been enriched by a site tour on a tourist train that facilitates touring for visitors with slight mobility impairments or older people, and the elevators in the main museum building are planned to built-in in near future. Finally, the archaeo-ethno park at Ravna, as well as the Timacum Minus site, have facilities that are in line with physical and cognitive accessibility requirements, such as mobile assembling ramps and monitors with touchscreens.

The overview of the current situation regarding the accessibility of archaeological heritage sites in Serbia for persons with disabilities points to a visible lack of strategic planning of accessibility modes, which is especially relevant in light of the need to establish the abovementioned balance with the protection and presentation activities. One of the opportunities for such compromise, in the case of physical accessibility, may be ensured by an innovative use of GIS (Geographical Information System), as seen in an example of the Greek archaeological site of Philippi. Namely, this site has been chosen for a case study in the AccAeS project (ACCessibility on archAEological Sites), 18 because

¹⁶ Vasić-Petrović, Momčilović-Petronijević 2015, sl. 1.

¹⁷ The Homeland Museum of Knjaževac, https://www.muzejknjazevac.org.rs/en/useful-informations/visit-us.

¹⁸ Ioannidis, Vozikis 2007.

of its physical complexity, as it consists of a few rather large entities and, despite the fact it is one of the most important sites in Greece, it has not received sufficient attention from the public. GIS has been used in archaeological research for quite a long time, and here it is applied to create a specific model that combines various types of information (2D or 3D surface i.e. a digital model of the terrain, rasters and ortho images, with information on qualitative data about the site and its technical features or infrastructure) in order to create a map of accessibility as a suggested route for people with disabilities. Such a result has not only enabled information for the safe movement of these people and their easy access to the heritage (parking, ramps, paths, ticket box, sanitary facilities, etc), but it has also pointed to a potential mode for the upgrading of the overall existing infrastructure that would not endanger the safety of the heritage if planned in that way. In our opinion, the application of such a methodology can be especially useful in the



Fig. 3. Access ramp in the Domus Scientarium Viminacium building, Viminacium Archaeological Park (source: Documentation of the Institute of Archaeology in Belgrade)

case of sites that are being prepared for extensive presentation to the general public, ensuring that the planned policy for the development of physical accessibility is embraced as a strategic commitment. Additionally, it can have a significant role in cases of the creation of thematic routes based on archaeological heritage in Serbia, such as those linked to the projects *Road of Roman Emperors in Serbia* (*Itinerarium Romanum Serbia*)¹⁹ or *Danube Limes Brand*,²⁰ which are directly connected to the preparation of the Roman and Early Byzantine archaeological sites along the Danube in Serbia for the inclusion into UNESCO World Heritage List as an entity known as *Frontiers of the Roman Empire – The Danube Limes (Serbia*).²¹

¹⁹ Korać 2013.

²⁰ Golubović, Mrđić 2013.

²¹ UNESCO World Heritage Centre, Frontiers of the Roman Empire, https://whc.unesco.org/en/list/430/.

ACCESSIBILITY AND VIRTUAL ARCHAEOLOGY

Before looking at the potential for the development of communicative accessibility i.e. interpretative tools for people with disabilities visiting the archaeological sites in Serbia through virtual archaeology, we will investigate the current state of the abovementioned *off-site* initiatives. Namely, it has already been emphasized that this visitor category must carefully plan their visit to a heritage site, and the information regarding accessibility on relevant websites (websites of museums or institutes for the study of cultural monuments that are in charge of particular archaeological sites) are of great importance to them. However, in our country, this information is often scarce or not visible enough, so the relevant internet pages need substantial revision to ensure the accessibility of information. Following the worldwide encouragement of the development of so-called digital accessibility, which entails the adaptation of web content for the use of tools such as text-to-speech conversion or screen readers, it is also necessary to gravitate towards that goal in the processes connected with presenting information about the accessibility of a particular site in local practice.²²

Nowadays the use of technology is noticeable in all segments of life, and its importance is especially prominent in the development of communicative accessibility. Applications for mobile phones and tablets may be used in museums or archaeological sites to facilitate tours of the premises for people with disabilities or for a better understanding of the presented heritage. Such tendencies are supported by virtual archaeology, nowadays defined as the scientific discipline, which seeks to research and develop ways of using computer-based visualizations in order to contribute to the study, interpretation, and management of cultural heritage assets.²³ Also, technology that used to be only a visual tool, focused on the impression of photographic reality, ²⁴ nowadays triggers other senses as well, and is a significant addition to the interpretation of artifacts with a tendency to reconstruct an impression of life in the past.²⁵ Hologram projections and 3D models of architecture can replace certain parts of content when it is physically inaccessible, with an enormous educational capacity, especially regarding young people. This is particularly important since modern archaeology can process, interpret and convey a lot more data than in past centuries.²⁶ Also, global technological development opens opportunities for so-called assistive technologies, that are of huge importance to successful inclusion.²⁷ However, although these audio-visual tools are very useful in the case of remote archaeological sites as well as those with unfavourable terrain where accessible infrastructure is problematic or those not open to the general public, recently a dilemma has arisen among researchers as to whether these tools can be a replacement for physi-

²² We can single out examples of good practice in Serbia in the following institutions: The National Museum Leskovac (https://muzejleskovac.rs/accessibility-information/?lang=en) and The Homeland Museum of Knjaževac (https://www.muzejknjazevac.org.rs/en/useful-informations/visit-us).

²³ The London Charter 2009, 4; The Seville Principles 2017, 3.

²⁴ Reilly 1990.

²⁵ Liritzis et al. 2015, 38.

²⁶ Ibid.

²⁷ Lazor 2017, 4.

cal presence.²⁸ On one hand, it is emphasized that virtualisation of heritage with digital dissemination in cases of endangered or barely accessible sites, is a form of democratization of knowledge that can reach the general public, notwithstanding geographical, linguistic, or cultural barriers,²⁹ while on the other hand, the creation of digital replicas of archaeological artifacts cannot always be considered a good solution in cases of comprehensive dissemination, primarily because of their focus on visual impressions.³⁰

However, innovations in the field of virtual archaeology, which turns to the creation of 3D printed replicas in addition to classical visualization, may offer solutions for overcoming the above-mentioned limitations. This methodology is based on the fact that tactile impression is not only an indispensable tool for visually impaired people, but that, in the case of people without such an impairment, touch in combination with sight is the most productive method of perception.³¹ One of the examples of good practice regarding the use of 3D printed replicas was noted in Sicily, where, thanks to virtual archaeology, a statue of an archaic kouros from Leontinoi was reconstructed from fragments housed in different museums. On that occasion, not only did the creation of a 3D printed replica allow the general public to see the complete sculpture, enabling a certain tactile experience, but the process of enriching the virtual artifact by the sense of touch was enabled by haptic technology, which opened numerous new opportunities for the development of the cognitive accessibility of heritage.³² Also, as the use of the sense of touch is perceived as being prohibited in classical museum exhibitions, the creation of 3D replicas is being introduced into museum practice as an option that allows a tactile experience without putting heritage at any risk and represents an upgrade of perception among all visitors, including those with disabilities.33

Recently, the virtualization of archaeological sites has been aimed at various media as a result of the need to examine their educational potential. One example of this can be found in Cyprus, where the Neolithic settlement of Choirokoitia was chosen for a case study for several reasons. First, the site is located on inaccessible and rather rough terrain with differences in soil levels, which makes it difficult in terms of accessibility for people with disabilities. Second, this settlement has an enormous educational significance and it is studied in history classes in state schools, while only children from nearby towns usually visit it. Third, it is one of the most visited archaeological sites in Cyprus, and it has been on the UNESCO World Heritage List since 1998.³⁴ Due to the need to make this site accessible to the general public as well as to people with disabilities, a digital reconstruction of the site was created and adapted to a virtual reality system (VR) and desktop computers. Research, which included 40 middle-aged subjects, showed that the virtual reality system provides a more comprehensive experience and impression about the site, while processes of knowledge acquisition, i.e. cognitive ability processes, were more prominent in subjects who watched the site through desktop computers. Thus, it

²⁸ Ioannidis, Vozikis 2007; Масликовић, Томић 2015, 225.

²⁹ Addison 2007.

³⁰ Mc Linden, McCall 2002.

³¹ Zimmer et al. 2008; Onol 2008.

³² Stanco et al. 2017.

³³ Wilson et. al 2017.

 $^{^{34}}$ Kyrlitsias et al. 2020, 2.

was concluded that VR technology firstly provides a visual sensation, which is why the presented audio information about the site was neglected by the respondents, and that the future development of virtual heritage presentation must be based on a more engaged approach in which cognitive content will be presented visually as well, as the strongest sensory component in this methodology.35 However, it is also clear that this represents a limited solution in terms of inclusion, as it excludes people who are visually impaired or blind, namely, people who cannot perceive content in this way.

Recently, the modes of virtual archaeology have been increasingly applied at archeological sites in Serbia. Despite the fact that they are not primarily designed to improve accessibility for people with disabilities, it can be said that they improve the presentation of heritage for all categories of visitors. We can single out the contents at



Fig. 4. "Virtual excavation" of Felix Romuliana mosaic, Holograd augmented reality mobile application (source: Urban Development Center)



Fig. 5. TECHCOOLTOUR augmented reality mobile application (source: Urban Development Center)

the Felix Romuliana site within the multimedia visitor center where it is possible to see the 3D reconstruction of this imperial complex³⁶ or other virtual solutions through the mobile application based on augmented reality (**Fig. 4-5**),³⁷ while similar practice can be found in the Imperial Palace in Sirmium.³⁸ In terms of Viminacium, a 3D reconstruction of the amphitheater, legion fortification, mausoleum and city baths was made,³⁹ such as an application based on virtual reality and the concept of digital storytelling within the

³⁵ Ibid., 9.

³⁶ Plemić 2018, 227-231:

³⁷ I owe a gratitude to colleague Rade Milić from Urban Development Center, who kindly provided me with photos published in this work.

³⁸ Plemić 2018, 231

³⁹ Golubović, Mrđić 2017.

project *Roman Heritage in the Balkans*.⁴⁰ Likewise, the archaeological site Timacum Minus and the archaeo-ethno park in Ravna have a special application for android devices and a part of the information can be obtained by scanning QR codes in certain places in their area.⁴¹ Finally, more effort is dedicated to solutions of virtual tours such as the Viminacium,⁴² Late Roman Tomb in Brestovik,⁴³ and Lepenski vir tour,⁴⁴ which can be classified as the aforementioned *off-site* initiatives, with a great potential to upgrade the general accessibility of our archaeological heritage.

CONCLUSION

Based on all the previously stated facts, we realize that the problems of accessibility to heritage must be approached from several perspectives, which primarily relate to the needs of people with different types of disabilities, with an individual approach to each site. Also, it is necessary to emphasize that the accessibility of archaeological heritage must be taken into account during the process of its valorization and preservation, with equal emphasis on ensuring both physical and intellectual accessibility through presentation and interpretive programs.⁴⁵ The complexity of the mentioned issues certainly requires a developed strategy as an integral part of a responsible cultural policy, including activities and support at the national level, which, unfortunately, is currently more noticeable in Serbia through various recommendations than in practice. The development of such a strategy would include the following mandatory activities: involving users from different groups of people with disabilities in the process itself, in order to truly understand their needs and provide suitable solutions; establishing constant cooperation between the competent institutions and stakeholders with organizations representing people with disabilities; finally, organizing training for museum and staff of archaeological sites on accessibility modalities and training to work with new assistive technologies, as part of a long-term process of audience development for this group of visitors. The inclusion of people with disabilities is one of the imperatives of modern society while ensuring accessibility to cultural heritage must be seen as a potential for their increasingly active involvement in cultural flows, both locally and globally. Furthermore, the importance of accessibility for a more complete valorization of archaeological heritage, or its consideration as an important heritage value, should not be neglected.

Today many archaeological artifacts in Serbia are kept in museum institutions that are most physically accessible to people with disabilities, and virtual systems and digital reconstructions are convenient or necessary replacements in the process of disseminating knowledge about certain sites. However, it must be taken into account that

⁴⁰ Nikolić et al. 2021, fig. 2.

⁴¹ The Homeland Museum of Knjaževac, https://www.muzejknjazevac.org.rs/en/useful-informations/visit-us.

⁴² Viminacium – Roman city and legionary fort, Viminacium virtual tour, http://viminacium.org.rs/viminacium-virtual-tour/.

⁴³ Rimska grobnica u Brestoviku, https://www.theasys.io/viewer/KjHkmxGrsUF1iDLpJq4QhvR3i7KzpH/.

⁴⁴ Lepenski vir virtual tour, https://www.360serbia.com/panorama/lepenski-vir/.

⁴⁵ ICOMOS 2008.

a visit to all monuments composes stimuli into a unique experience for visitors. ⁴⁶ Therefore, the task ahead of us as a society is extremely responsible. We need to take an effort to provide access to all cultural heritage monuments and sites present in the territory of our country for all categories of visitors. The author of this paper hope that some of the modalities and potentially applicable interpretative tools pointed out on this occasion will contribute to a better understanding of the complex issues of the development of so-called accessible tourism on archaeological sites in the coming years.

BIBLIOGRAPHY

Addison 2007 – A. Addison, The vanishing virtual: safeguarding heritage's endangered digital record, in: *New Heritage: New Media and Cultural Heritage*, (eds.) Y. Kalay, T. Kvan, J. Affleck, London 2007, 27–39.

Balkan Museum Network 2019 - Balkan Museum Network, Crafting Access Booklet, Balkan Museum Network 2022, http://www.bmuseums.net/wpcontent/uploads/2019/03/Crafting_Access_booklet.pdf, accessed January 15th, 2022.

Council of Europe 2005 - Council of Europe, *Convention on the Value of Cultural Heritage for Society*. Faro 2005. https://rm.coe.int/1680083746, accessed March 6th, 2022.

Darcy 2001 – S. Darcy, *Anxiety to access: Tourism Patterns and Experiences of New South Wales People with a Physical Disability*, Sydney 2001.

Di Ruocco et al. 2018 – G. Di Ruocco, F. Primicerio & E. Sicignano, The modern approach in designing the inclusivity of historic sites and buildings. *REHAB 2017*, R. Amoeda, S. Lira and Pinheiro (eds.) (Proceedings of the 3rd International Conference on Preservation, Maintenance and Rehabilitation of Historical Buildings and Structures, June 2017, Braga, Portugal), Barcelos 2018, 999-1008.

European Commission 2014 - European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Towards an integrated approach to cultural heritage for Europe.* Brussels 2014. https://ec.europa.eu/assets/eac/culture/library/publications/2014-heritage-communication_en.pdf, accessed March 6th, 2022.

European Heritage Days - European Heritage Days, https://www.europeanheritagedays.com/country/Serbia, accessed January 14th, 2022.

Georgieva 2016 – D. Georgieva, Rethinking Accessibility to Cultural Heritage: Sensing Archaeology. *Moderna konzervacija* 4, 2016, 91-105.

Golubović, **Mrđić**, **2013** –S. Golubović, N. Mrđić, Danube limes as UNESCO world heritage Site. *Archaeology and Science* 9, 2013, 101–118.

Golubović, **Mrđić 2017** – S. Golubović, N. Mrđić, Rebirth of the Past – Recreating Viminacium in 3D and Presenting Roman Cultural Heritage. *Archaeology and Science* 13, 2017, 155-167.

ICOMOS 2008 – ICOMOS, *The Icomos Charter for the Interpretation and Presentation of Cultural Heritage Sites*, Ratified by the 16th General Assembly of ICOMOS. Québec 2008. http://icip.icomos.org/downloads/ICOMOS_Interpretation_Charter_ENG_04_10_08.pdf, accessed January 15th, 2022.

Ioannidis, **Vozikis 2007** – C. Ioannidis, K. Vozikis, Application of a GIS for the accessibility of archaeological sites by visitors with disability and visitors with reduced mobility. *CIPA* **2007**. *AntiCIPAting the Future of the Cultural Past*, A.Georgopoulos (ed.), (Proceedings of the XXI International

⁴⁶ Naniopoulos, Panagiotis 2015, 241.

Symposium CIPA 2007, 01-06 October 2007), Athens 2007. https://www.isprs.org/proceedings/XXXVI/5-C53/papers/FPL011.pdf, accessed January 15th, 2022.

Korać 2013 – M. Korać, Pre-feasibility Study Itinerarium Romanum Serbiae. *Archaeology and Science* 9, 2013, 9–35.

Kyrlitsias et al. 2020 – C. Kyrlitsias, M. Christofi, D. Michael-Grigoriou, D. Banakou & A. Ioannou, A Virtual Tour of a Hardly Accessible Archaeological Site: The Effect of Immersive Virtual Reality on User Experience, Learning and Attitude Change. *Frontiers in Computer Science* 2:23. https://www.frontiersin.org/articles/10.3389/fcomp.2020.00023/full, accessed January 16th, 2022.

Lauria 2017 – A. Lauria, Accessibility to archaeological sites. From the accessibility dimensions to an access strategy. *REHAB 2017*, R. Amoeda, S. Lira, S. & C. Pinheiro (eds.), (Proceedings of the 3rd International Conference on Preservation, Maintenance and Rehabilitation of Historical Buildings and Structures, June 2017, Braga, Portugal), Barcelos 2017, 1025-1034.

Lazor 2017 – M. Lazor, *Katalog asistivne tehnologije*. Beograd 2017. //http://socijalnoukljucivanje. gov.rs/wpcontent/uploads/2017/04/Katalog_asistivne_tehnologije.pdf, accessed January 15th, 2022.

Liritzis et al. 2015 – I. Liritzis, P. Volonakis, S. Vosinakis & G. Pavlidis, Cyber-archaeometry from Cyber-archaeology: New dynamic trends in archaeometric training and research. *Virtual Archaeology (Methods and Benefits)*, D. Hokk (ed.), (Proceedings of the Second International Conference held at the State Hermitage Museum 1–3 June 2015), Saint Petersburg 2015, 38-40.

Martinović, **Jokić 2009** – D. Martinović, B. Jokić, *Muzeji Srbije* – *aktuelno stanje*, Beograd 2009. **Масликовић 2015** - Д. Масликовић, Елементи за имплементацију инклузивности. *Кулшура* 147, 2015, 226-241. (D. Masliković, Elementi za implemetaciju inkluzivnosti. *Kultura* 147, 2015, 226-241).

Масликовић, Томић 2015 - Д. Масликовић, Б. Томић, Приступачност археолошких локалитета особама са инвалидитетом. *Сшаринар* LXV, 2015, 221-227. (D. Masliković, B. Tomić, Pristupačnost arheoloških lokaliteta osobama sa invaliditetom. *Starinar* LXV, 2015, 221-227).

McLinden, **McCall 2002** – M. Mc Linden, S. McCall, *Learning Through Touch: Supporting Children with Visual Impairment and Additional Difficulties*, London 2002.

Министарство грађевинарства, саобраћаја и инфраструктуре PC 2015 - Министарство грађевинарства, саобраћаја и инфраструктуре PC, Правилник о шехничким сшандардима иланирања, пројектовања и изградње објеката којима се осигурава несметано кретање и приступ особама са инвалидитетом, деци и старим особама (Сл. Гласник PC 22/2015), Београд 2015. (Ministarstvo građevinarstva, saobraćaja i infrastrukture RS 2015 - Ministarstvo građevinarstva, saobraćaja i infrastrukture RS, Pravilnik o tehničkim standardima planiranja, projektovanja i izgradnje objekata kojima se osigurava nesmetano kretanje i pristup osobama sa invaliditetom, deci i starim osobama (Sl. Glasnik RS 22/2015), Beograd 2015).

Naniopoulos, **Panagiotis 2015** – A. Naniopoulos, T. Panagiotis, A methodology for facing the accessibility of monuments developed and realised in Thessaloniki, Greece. *Journal of Tourism Futures* 1/3, 2015, 240-253.

Nikolić et al. 2021 – E. Nikolić, I. Danković & Ž. Jovanović, Digitalne priče iz Viminacijuma: Učešće na projektu Roman Heritage in the Balkans, u: *Arheologija u Srbiji. Projekti Arheološkog instituta u 2019. godini*, S. Vitezović, M. Radišić, Đ. Obradović (ur.), Beograd 2021, 363-374.

Onol 2008 – I. Onol, Tactual explorations: a tactile interpretation of a museum exhibit through tactile art works and augmented reality, in: *Touch in Museums: Policy and Practice in Object Handling*, H. J. Chatterjee (ed.), Oxford 2008, 91–106.

Plemić 2018 – B. Plemić, New Technologies in the Presentation of Serbian Archaeological Heritage: Impact on Tourism, in: *Giving gifts to God, Proceedings of the 1st & 2nd Kokino International Conference*, ed. D. Gjorgjievski, Kumanovo and Skoplje 2018, 225-236.

Plemić, **Rabotić 2018** – B. Plemić, B. Rabotić, Uloga i značaj interpretacije u promociji arheološkog nasleđa Srbije, u: *SITCON 2018, Kultura, nasleđe i razvoj turizma*, M. Stanišić (ed.), (Zbornik rado-

va međunarodne naučne konferencije SITCON 2018, 12. oktobar 2018), Beograd 2018, 123-130. **Reilly 1990** – P. Reilly, *Towards a Virtual Archaeology. Computer Applications and Quantitative Methods in Archaeology*, Oxford 1990.

Stanco et al. 2017 – F. Stanco, D. Tanasi, D. Allegra, F. L. M. Milotta, G. Lamagna & G. Monterosso, Virtual anastylosis of Greek sculpture as museum policy for public outreach and cognitive accessibility. *Journal of Electronic Imaging*, 26(1), 011025, 2017. https://doi.org/10.1117/1. JEI.26.1.011025, accessed January 16th, 2022.

The Gallery of Matica Srpska - The Gallery of Matica Srpska, Inclusive programs with the Per. Art Association, The Gallery of Matica Srpska 2022, https://www.galerijamaticesrpske.rs/en/youth-programs/inclusive-programs-with-per-art-association, accessed January 17th, 2022.

The Homeland of Knjaževac - The Homeland of Knjaževac, Visit us, The Homeland of Knjaževac 2021, https://www.muzejknjazevac.org.rs/en/useful-informations/visit-us, accessed January 17th, 2022.

The London Charter 2009 – The London Charter, *The London Charter for the Computer-Based Visualisation of Cultural Heritage*, draft 2.1., H. Denard (ed.), London 2009. https://www.londoncharter.org/fileadmin/templates/main/docs/london_charter_2_1_en.pdf, accessed March 7th, 2022.

The National Museum Leskovac - The National Museum Leskovac, Inclusive Workshops, The National Museum Leskovac 2022, https://muzejleskovac.rs/inclusive-workshops/?lang=en, https://muzejleskovac.rs/accessibility-information/?lang=en, accessed January 17th, 2022.

The Seville Principles 2017 – The Seville Principles, International Principles of Virtual Archaeology (Ratified by the 19th ICOMOS General Assembly in New Delhi, December 2017), ICOMOS 2017. https://icomos.es/wp-content/uploads/2020/06/Seville-Principles-IN-ES-FR.pdf, accessed March $6^{\rm th}$, 2022.

United Nations 2006 – United Nations, *Convention on the Rights of People with Disabilities*, New York 2006. https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/convention-on-the-rights-of-persons-with-disabilities-2.html, accessed March 6th, 2022.

UNESCO 1983 – UNESCO, Recommendation concerning the most effective means of rendering museums accessible to everyone, in: *Conventions and recommendations of UNESCO concerning the protection of the cultural heritage*, Paris 1983, 115-123. https://unesdoc.unesco.org/ark:/48223/pf0000059218/PDF/059218engo.pdf.multi, accessed March 6th, 2022.

UNESCO 2020 – UNESCO, Accessible Digital Documentary Heritage. A set of Guidelines for the preparation of documentary heritage in accessible formats for persons with disabilities, Paris 2020. https://unesdoc.unesco.org/ark:/48223/pf0000374995/PDF/374995eng.pdf.multi, accessed March 6th, 2022

UNESCO World Heritage Centre - UNESCO World Heritage Centre, Frontiers of the Roman Empire, UNESCO 2022, https://whc.unesco.org/en/list/430/, accessed January 16th, 2022.

Vasić-Petrović, Momčilović-Petronijević 2015 – E. Vasić-Petrović, A. Momčilović-Petronijević, Zaštitne konstrukcije na arheološkim nalazištima u Srbiji. Potreba ili trend?, u: *Ocena stanja, održavanje i sanacija građevinskih objekata i naselja* (Zbornik radova IX naučnog stručnog međunarodnog savetovanja, Zlatibor 2015), 113-121.

Viminacium, Roman city and legionary fort – Viminacium, Roman city and legionary fort, Viminacium Virtual Tour, Viminacium 2022, http://viminacium.org.rs/izlozbe/viminacium-virtual-tour/, accessed March 7th, 2022.

Wilson et al. 2017 – P. F. Wilson, J. Stott, J. M. Warnett, A. Attridge, M. P. Smith & M. A. Williams, Evaluation of Touchable 3D-Printed Replicas in Museums. *Curator, The Museum Journal*, vol. 60/4, 2017, 446-465.

Zimmer et al. 2008 – R. Zimmer, J. Jefferies & M. Srinivasan, Touch technologies and museum access, in: *Touch in Museums: Policy and Practice in Object Handling*, H. J. Chatterjee (ed.), Oxford 2008, 150-162.

Rezime:

PRISTUPAČNOST ARHEOLOŠKOG NASLEĐA ZA SVE

Ključne reči: pristupačnost, osobe sa invaliditetom, arheološko nasleđe, kulturno nasleđe, virtuelna arheologija, Srbija

U radu su razmatrane mogućnosti za poboljšanje pristupačnosti arheološkog nasleđa za osobe sa invaliditetom. S obzirom na moderne tendencije i sve učestaliju upotrebu novih tehnologija u procesima interpretacije i prezentacije kulturnog nasleđa, odnosno porast aktivnosti virtuelne arheologije, pažnju smo usmerili na pregled takvih rešenja koja mogu unaprediti komunikativne tj. kognitivne sadržaje pristupačnosti na arheološkim lokalitetima. Ukazano je i na potencijale za obezbeđivanje novih vrsta doživljaja za osobe sa invaliditetom uz pomoć 3D štampanih replika artefakata koje kombinuju vizuelna i taktilna iskustva, kao i edukativni potencijal virtuelnih rekonstrukcija arhitekture nalazišta. Dodatno, sagledali smo situaciju vezano za arheološko nasleđe u Srbiji, ukazavši da relativno skorije implementacije rešenja virtuelne arheologije na našim lokalitetima, iako nisu namenski kreirane za poboljšanje pristupačnosti, mogu unaprediti dostupnost nasleđa za sve kategorije posetilaca. Pošto se na koncipiranju modaliteta pristupačnosti u pogledu domaće arheološke baštine još uvek nedovoljno radi u praksi, naglašena je i neophodnost razvoja ozbiljnijeg strateškog pristupa tim pitanjima, podrazumevajući aktivnosti i podršku na nacionalnom nivou. Budući da je inkluzija osoba sa invaliditetom danas jedan od imperativa modernog društva, obezbeđivanje pristupačnosti nasleđa predstavlja dobar put za njihovo aktivnije uključivanje u kulturne tokove ne samo na lokalnom, već i globalnom nivou.