

Research, Recommendations and Knowledge Transfer for Digitalisation and Accessibility of Cultural Heritage

Abstract. The context of the research and findings includes a review of national, EU and international regulations, recommendations and trends for digitalisation, providing better access and safeguarding of cultural heritage in memory institutions - galleries, libraries, museums, and archives. Part of the main aims and obligations of museums are to preserve, educate and transfer knowledge and valuable artefacts and cultural elements for the next generations.

The paper presents research and results related to the digitalisation and accessibility of cultural heritage, formulation of recommendations, evaluation criteria, digital presentation tools and transmission of knowledge, related to the digital transformation and socialization of cultural heritage in Bulgaria.

The paper presents analytical and empirical research with over 100 museums and cultural heritage sites in Bulgaria carried out between 2016 and 2023 about the digitalisation process and providing accessibility (incl. for disabled people) in the field of cultural heritage and museums in Bulgaria. Based on the research we present recommendations, results, possible applications, and digital transfer of knowledge internationally, learning for next generations, evaluation, and passportisation. The research also includes questions and information related to financial aspects of the digitalisation process, as well as related software, training of personnel, management, and different challenges that museums and their workers face. The presented approach can be useful and used on a national and international level for different memory institutions.

Keywords: Cultural heritage, Museums, Digitization, Accessibility, Passportisation, Disabilities, Blind people, Impaired vision

1 Introduction

The context of the research and the findings include existing regulations and recommendations at the national, European and international level for digitalisation and improved accessibility to cultural heritage, trends for digitization, ensuring better and easier safeguarding of cultural heritage in institutions of memory in Bulgaria - galleries, libraries, museums, archives. According to various UNESCO and EU Commission documents, making cultural heritage in countries more accessible, valued and shared is also essential for better understanding between different communities and nations and for maintaining peace between them.

Some of the main goals and duties of museums are to preserve, educate and transmit valuable knowledge, artefacts and cultural elements and information, related to them, to future generations. Digitization and accessibility of museums in Bulgaria is still in development, compared to those in other European cultural heritage sites. Some museums, libraries and archives in big cities are also more advanced on that topic than others.

Most of the museums in the country do not have a well-developed and practiced working model and policies in this direction to be followed or their efforts are partial and cover only some parts of digitalisation or only a small amount of their collections and cultural heritage. Therefore, it is important to develop the information and communication technologies (ICT) and capacity in museums, as well as consult with specialists in the fields of museology and information sciences. Digitalisation efforts should also be supported and financed on a national and international level.

All of the above also raises the question of the use of various digital tools, software and platforms for digitization, accessibility and presentation of cultural heritage and the digitization of the work and collections of museums and memory institutions in general. The successful development of digitization processes and accessibility requires not only the implementation of information and communication technologies in the field of museums but also consultations with specialists in the field of museology and information sciences. It also refers to changing and improving local and national policies, standards, guidelines and work approaches on the topic.

This article presents problems, research and possible solutions, related to the digitization and accessibility of cultural heritage in Bulgaria and the dissemination of knowledge on this topic. The authors conduct research and examine to what degree museums in Bulgaria have accessibility and digitization.

The article aims to present research and results related to the digital presentation, safeguarding and accessibility of cultural heritage [1-12] in Bulgaria and worldwide with a focus on accessibility, digitalization, access to digitised collections in museums, evaluation criteria, approaches for digital presentation and knowledge and materials online related to digital and general socialization of museum heritage.

2 Research and observations of physical and digital accessibility

The authors present in the article results from several consecutive studies of scientists from Bulgarian Academy of Sciences with authors' participation on physical and digital accessibility of public sites, cultural sites and museums (in 2015-2016, 2021-2022, 2022-2023). The experience, results and observations from this research enable us to formulate recommendations and possible solutions on the topic of improving digitalisation, cultural knowledge transfer and accessibility for various groups including people with disabilities. Some of the research and experience on digitisation of museums in Bulgaria includes also a review of good practices for accessibility certification internationally.

The first accessibility research (in 2015-2016) [3] focused primarily on physical accessibility. A team from the Institute of Mathematics and Informatics at the BAS, together with volunteers from the target groups of people with special needs: visual and physical difficulties, conducted field surveys of part of the list of the 100 national sites in Bulgaria (over 100 sites). During the research, a large number of museums were also visited and studied as part of the 100 national sites. The results show that most museum

objects are completely inaccessible to people with mobility problems. Tactile accessibility for people with visual impairments has also been analyzed and such accessibility is lacking almost everywhere in the period of research. The analysis observations on site include: availability of accessible entry and floors; stair accessibility, availability or not of elevators, wheelchairs elevators and ramps, marked paths, sound and light signaling, audio sound and tactile techniques to individual exhibits like sound description and braille inscriptions, screen readers and text/ object magnifiers, special glasses, is there an audio guide, recording or a life speech by person, possibility for tactile familiarization with the objects and artefacts and others. (for people with physical disabilities and limitations and blind people).

The Law on Cultural Heritage of the Republic of Bulgaria requires equal access to cultural heritage for everybody. To ensure accessibility for people with disabilities, construction adjusting and access facilities, technology, software and different media solutions are needed, depending on the type of disability.

In 2021-2022, the regional museums of the previously observed 100 sites were checked for available physical accessibility improvements, as well as tested for digital accessibility and detailed approach and results were described in papers [3,4,5,7] The research implemented in 2021-2022, focused again on physical and digital accessibility of museums and including more detailed focus and review on digital accessibility and facilitating tools enabling different groups for better access to cultural heritage and museums including people with disabilities and blind people. The research methodology is via phone interviews and digital review analysis. Includes 55 of 209 museums in total in the country in that period. All except one of the 55 analyzed and tested museums have their own websites with digital content in images and text. Most of the museums have virtual tours or recordings and few of them have 3D models, virtual collections, multimedia, online storytelling or vast online archives. Only 10 of the researched museums did not have links to social networks on their webpage, most museums tried to be present and publish in social networks. The Virtual Heritage and Museums Center of Tutrakan - <http://www.museumtutrakan.com> is among the mentioned good examples.

Bulgarian museums started to use digital tools to present online their cultural heritage, but still in a limited manner and mostly for promotion, with limited open access to artefacts, data and collections. Similar outcome was concluded in the next research [13] concerning the state and importance of digitalisation in Bulgarian museums. In the 2022-2023 period, 30 of the above-mentioned regional museums were also tested via automated software (WAVE) and real functional testing by visually impaired people. The results showed that over 75% of sites were in a big extent inaccessible to visually impaired people, according to basic web accessibility criteria and standards [4, 5, 12]. Specialized accessibility testing software can be used for basic digital accessibility testing of large number of sites, but in-depth detailed and functional testing, evaluation and improvement recommendations of a site include trained accessibility experts or people and groups with disabilities.

It is important for museums and other memory institutions to consider and include in their plans possibilities for accessibility improvements, including digital technologies [14, 15], website platforms, archives and providing better access and accessibility

for all people including those with disabilities and limitations. Some opportunities for improvement include braille inscriptions, annotations, sound and tactile facilitating tools to individual exhibits (for people with impaired vision); specialized visual and digital tools (for people with hearing loss); ramps (for people with limited mobility), etc.

“Museums in Bulgaria often have much more artefacts and information from tangible and intangible cultural heritage than they can actually display in the physical exhibition halls of the museums”[4]. The paper also offer possible solutions and good examples for providing digital access to cultural heritage in museums via virtual collections and digital audio guide platform, suitable even for blind people.

There are both physical access challenges in museums and challenges related to the use of digital technologies and online platforms. Digitization and digital online access to cultural heritage and museum collections is an important part of its socialization and accessibility to different groups, including those with limitations and impairments. Cultural heritage is of public importance.

3 Study of Digitization As A Factor for The Development of Museums In Bulgaria

During the period 2022-2023, a study was carried out on digitization as a factor for the development of museums in Bulgaria with an emphasis on regional museums. In this section they are considered some of the problems in Bulgarian museums, connected with digitization and with key aspects such as the legal basis, use of modern technological means, software, etc. According to research [13] conducted as of January 2023, there are 214 museums in Bulgaria in 109 Bulgarian cities (30 national museums; 31 regional; 122 municipal museums; 20 departmental; 6 private; 5 museums with mixed participation).

For the goals of the research, a methodology and tools were developed. Qualitative methods were used - a semi-structured interview. A survey was created and conducted, including 36 questions, divided in 5 main block:

- B1.** Digitization in principle as an activity;
- B2.** Digitization and specific activities, financing, projects, management;
- B3.** Digitization and software;
- B4.** Digitization and prepared trained personnel;
- B5.** Digitalization - virtualization - gamification - interactive communication.

The methodology was applied to 33 museums in 26 different cities in Bulgaria. Target group of the study with museum specialists (including. directors, deputy directors, experts, specialists, employees, etc.). They are sent emails and with the survey to 103 representatives of the target group. Answers were received from 52 respondents from 33 museums in Bulgaria (17.7% of all museums in Bulgaria - according to data of NSI as of 2022, there are a total of 186). The largest share is occupied by the representatives of the regional museums of 16 Bulgarian cities.

For the purposes of this scientific article, special attention will be paid on the analysis of the answers received (A1-A6) of the questions **Q1- Q6**.

Q1. What are the activities carried out by museums that you think contribute to digitization in the museum?

(A1) Popularization - 40.4%; Shooting - 30.8%; Storage - 28.8%; Digitization of inventory books - 21.2%; Digitization of scientific passports - 17.3%; Scan - 11.5%; Scientific research activity - 9.6%; There are no activities to be carried out by the museum - 5.8%; Creation of a catalog system and/or digital archive - 5.8%;

Q2. What are the results of the activities as a specific form or manifestation that you associate with the digitalization of museums: website, social networks, online forms, electronic correspondence and others?

(A2) Visits to the site - 28.8%; Use of social networks - 13.5%; Electronic correspondence - 13.5%; Digital exhibitions - 7.7%; Workflow facilitation 3.8%; Access to electronic publications - 3.8%; 3D visualization of exhibits - 3.8%; Use for scientific purposes - 3.8%; Use of interactive elements - 3.8%; Creation of a digital museum fund - 3.8%; Virtual walks - 3.8%; Online forms - 5.8%; Other answers - 15%;

Q3. What are the main purposes for using social networks?

(A3) Informative - 26.9%; Popularization - 23.1%; Advertising - 11.5%; Communicative - 11.5%; Expansion of the museum audience - 13.5%;

Q4. What are the financial aspects of digitization?

(A4): Limited financial resources of museums - 5.8%; Low available budget - 3.8%; Insufficient funds for hiring external specialists - 1.9%; High costs for software and hardware - 1.9%; Low wages - 5.8%; Resource and financial provision of projects - 1.9%;

Q5. Is there a special application developed for you to use in the museum, in connection with the digitization?

(A5): Yes - 15.4%; Not - 76.9%; I don't know - 7.7%;

Q6. Is there a professionally prepared and trained employee/s in the museum who is/are responsible for the digitization or the digital collections and what is his/her digital competence/literacy?

(A6): Yes - 13.5%; Not - 63.5%; I don't know - 11.5%; Another answer - 11.5%.

According to the analysis of the answers received (A1) to question Q1, the activities of promotion, storage, recording and digitization of inventory books contribute the most to the implementation of digitization in museums. Technological innovations in museums create new opportunities such as easier access to cultural heritage, for the preservation, protection and promotion of cultural values, for the promotion of scientific research and educational activities, etc.

The results of the answers to Q2 show that the respondents perceive digitalization and its specific forms and manifestations as an important process for expanding the audience and as a promotion factor. At the same time, however, the employees in the museums in Bulgaria rather do not consider digitization as an activity for the preservation and research of cultural heritage and do not use its possibilities sufficiently thoroughly. The conclusion reached is that digitization could improve access to information about exhibits stored in museums, facilitate communication and ways of interacting with visitors, and will contribute to improving the accessibility and preservation of cultural heritage in museums in a modern and contemporary way.

According to the answers received to question Q3, museum experts see digitization and social networks as a media-related significant tool to reach a wider audience, with both informative and promotional purposes, including as an opportunity to communicate and expand existing museum audiences with young and more diverse visitors. Opportunities are being established for museums to develop and strengthen their communities, share knowledge, and engage in the global cultural space.

No less important are the financial aspects, which have a significant role for the development of museums in the integration of digitization at different levels (Q4). Problems such as low budget and salaries, lack of funds, high costs of purchasing hardware and software, hiring external specialists, securing projects, etc. are indicative of the presence of financial challenges and difficulties in the integration of modern technologies.

The analysis of the answers to questions Q5 and Q6 establishes the lack of professionally prepared and trained employees in museums to be responsible for digitization and digital collections. Most museums in Bulgaria do not have specialized applications for the purposes of digitization (for data processing and information storage, for carrying out official and research activities, for communication, etc.).

In summary, the conclusion of the conducted research is that the respondents positively assess the role and significance of digitization as an important factor and priority for the future development of museums, as work has been actively done in this direction for the past few years.

Some museums in Bulgaria and around the world are situated in old architectural buildings and sites and physical accessibility improvements and new facilities might be limited in order to preserve the original authentic look of the building and place. Deteriorating and decay in time and being exposed to crises and disasters endangers valuable cultural heritage places, objects, artefacts and knowledge. The availability of digitized resources, platforms, archives and the use of modern digital technologies and multimedia [14, 15], provide new, better opportunities for safeguarding and accessibility of cultural heritage to all, including people with disabilities and limitations. Online access also provides cross-border reviewing and international popularity and knowledge of important regional and national heritage.

4 Conceptual Model of Passport of Accessibility

Some of the problems mentioned above can be overcome by the authors' proposed conceptual model for accessibility passportsation, incl. by borrowing experience and good practices applied in other countries of Europe and the world to improve access to cultural heritage in general, as well as for people with special needs (visual impairments). Regarding the accessibility of museums for people with special needs, various scientific publications as well as official documents were previously studied, which supported the idea of developing the conceptual model [16], [17]. For the basis of the conceptual model proposed by the authors, a study of accessibility for blind people from the Institute for Vocational Rehabilitation and Staff Training was used, as well as the developed

passport and methodical guide for accessibility for people with impaired and/or impaired vision, as some of their main aims are to establish the degree of accessibility of the museum institution for people with special needs, as well as to promote opportunities for increasing the indicators and the level of accessibility, etc.

Based on all this research and results on the subject, our team chose to focus on the target group of visitors to museums in Bulgaria with visual impairments, and our proposal is to adapt an appropriate methodology for accessibility certification. Particular attention in the proposed model is paid to the provision of access opportunities in a virtual environment for people with visual impairments, the study, analysis and establishment of good practices for improving the accessibility of museums in Bulgaria in view of the various types of disabilities.

In this paper, we propose an updated conceptual model and a passport with and accessibility of a separate museum/cultural object (including the first steps towards passporting the accessibility of museum objects in Bulgaria). The main purpose of developing an accessibility passport is to investigate to what extent the institution and its services are accessible to people with disabilities and, after analyzing the problems, to propose solutions.

The proposed model contains the main groups of examined criteria, including, and the characteristics for each of the groups, problem analysis and proposed solutions. Emphasis is placed on the criteria, about relating to digital accessibility. The purpose of the criteria mentioned above is to propose a methodology for certifying the accessibility of museums as institutions of memory and in view of people with disabilities. The concept of integrating the approach within the framework of the Republic of Bulgaria, where the aforementioned studies were conducted, is also laid down. The specific methodology was approved in 2023, as in a prepared questionnaire aimed at the needs of museum specialists, in which the main criteria are included. In the same year, the preliminary conceptual model of a digital passport for the accessibility of museums in Bulgaria for people with disabilities was presented to the Regional Ethnographic Museum in the city of Plovdiv.

With the help of and with the participation of people with visual impairments, the study created an updated conceptual model of a separate cultural object (fig.1), including the main criteria (C1-C4), their characteristics, analysis of the individual criteria and possibilities and proposals for solutions (P1-Pn).

In aid of and with the participation of people with visual impairments, in research, there is created an updated conceptual model of a separate cultural object (Fig.1), including the main criteria (**C1-C4**), their characteristics, analysis of individual criteria and possibilities, and proposals for solutions (**P1-Pn**).

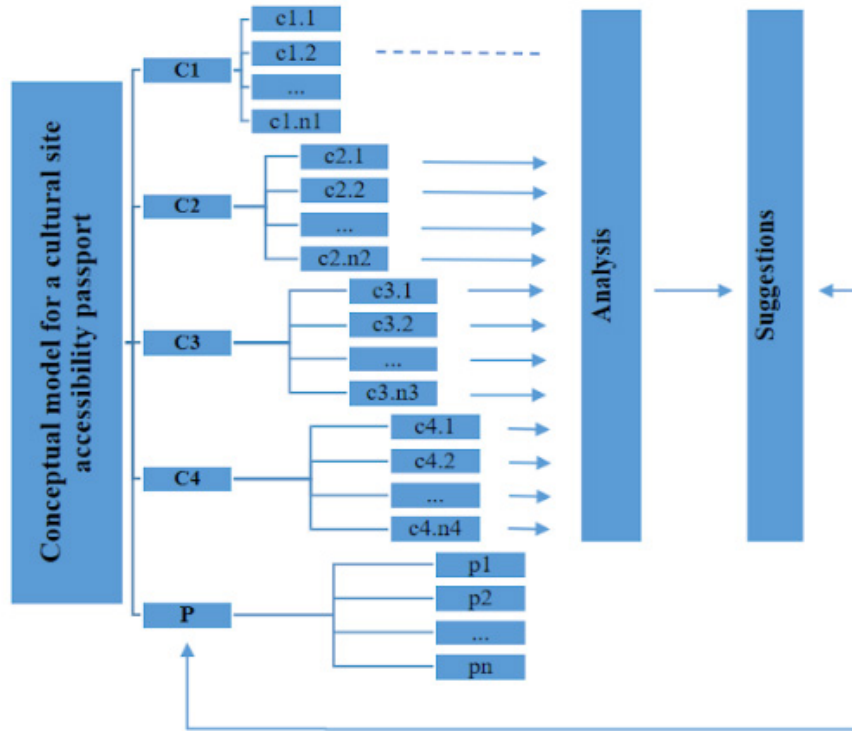


Fig. 1. Conceptual model of passport of accessibility.

The main criteria, characteristics, possibilities, and solutions that we offer in the updated conceptual model are:

C1. General and information about the researched cultural object (name; address; year of construction of the building; form of ownership; territorial affiliation, specifics of the building and funds, etc.);

C2. Characteristics of activities in the cultural institution (types of services; form of service; age categories of visitors; planned capacity, degree of digitization etc.);

C3. State of physical accessibility of the object for disabled people and persons with reduced mobility (route to the object; distance from public transport stops; presence of a pedestrian path; functionality; availability of funds and etc.);

C4. Digital accessibility for people with disabilities (compliance with the WGAG standard; general assessment of digital accessibility; providing digital accessibility (DA); Web page; guide, audio, sign language; description of objects for the blind, accessibility of digitized resources etc.);

P1-Pn are fields for suggestions and possibilities for ensuring better accessibility (adaptation of the main structural elements of the site and digital accessibility, for example recommendations for adaptation of building entrances, platforms, etc.; compliance with adjacent territory; physical accessibility for people with disabilities; digital accessibility, etc.).

The proposed conceptual passportisation accessibility model is based on all research results, observations and experiences mentioned above. It includes possibilities, recommendations and tools or approaches to improve accessibility, both physically and digitally. This often requires management and staff involvement and capacity, besides resources.

5 Conclusion

This article presents the results of a study of the digitization and accessibility of cultural heritage in Bulgaria and the transfer of knowledge about it internationally for future generations. Cultural heritage access is of public importance.

Digitalisation is reviewed as an important priority factor for the development of museums and memory institutions in Bulgaria and internationally. The respondents consider digitalization to be vital for expanding audiences and a factor for popularization and dissemination, but there is more work to be done for digitalising and providing access online to more collections and archives and safeguarding and transferring knowledge for cultural heritage. The successful development of digitization processes and accessibility requires not only the implementation of information and communication technologies in the field of museums, but also developing better staff capacity, consultations with specialists in the field of museology and information sciences, as well as direct support and cooperation and guidance on national level and international levels.

The first section of the article examines research and observations related to the accessibility of museums in Bulgaria. The next section presents the results of a study conducted on digitization as a factor for the development of museums in Bulgaria. There are both physical access challenges in museums and challenges related to the use of digital technologies and online platforms. Digitization and digital online access to cultural heritage and museum collections is an important part of its socialization and accessibility to different groups, including those with limitations and impairments. The last section presents a conceptual model and recommendations for evaluation, passportisation and possibilities for improvements of accessibility of museums in Bulgaria, including physical access and digitalisation and online platforms, archives, presentations and tools as possible solutions and steps for improvement on the topic.

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