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## APPLICATION OF THE MULTIMEDIA EXHIBITION TECHNOLOGIES FOR ARCHITECTURAL SPACE FORMATION OF THE OPEN-AIR MUSEUMS

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**Abstract.** The characteristics of different types of multimedia exhibition technologies are investigated in this article. The author considers the features of virtual and real historical and architectural environment interaction. The peculiarities of space formation of the open-air museums, created on the basis of architectural monuments, with the help of multimedia technical means are analyzed. The feasibility of multimedia exhibition technologies application for the open-air museums is substantiated.

**Key words:** open-air museum, architectural monument, exhibition technologies, multimedia technologies.

### 1. Introduction

The artistic organization of leisure that combines both the cognitive and entertaining functions becomes increasingly important today. This entails the need to adjust the traditional approach to the architectural and spatial organization of museums. Museum functions are supplemented, the scope of their activities expands. Most clearly this tendency can be traced in open-air museums. In modern conditions, the use of the museum environment as an entertainment space is the most interesting and actual form of preservation and demonstration of the large architectural and urban complexes or ensembles. And the multimedia technologies can help implement this approach qualitative way.

### 2. Analysis of recent researches and publications

The open-air museums are actively developed and investigated. The theoretical and methodological aspects of the architectural and spatial organization of open-air museums study begin to appear in the scientific works of foreign and native authors in recent years. Despite the popularity of this type of museums in Europe and in the world, the problem of the architectural ensembles – museumification and the creation of museums on their base is only starting to be explored in Ukraine. This issue is mentioned in the theoretical works of museum science by E. Dobrovolska, M. Maystrovskaya, O. Mishura, O. Soustin, T. Yurieneva, O. Mastenitsa. Due to the development of technical facilities and the promotion of multimedia technologies, many researchers are investigating the prospects for their use in museum exhibitions. V. Severin, L. Kalinina, T. Belofastova, I. Shevtsov and others are among these researchers. However, the use of such technologies in the open-air museums hasn't been, practically, considered in the scientific works.

### 3. Basic Theory Part

To determine the effective way of preserving and use of monuments, it is important to identify their fundamental characteristics. The main feature of architectural, urban, landscape and archaeological ensembles and complexes is large scale and complexity, due to multifaceted elements that coexist in such objects. They include the natural, historical and cultural environment, as well as the architectural and artistic image.

Large architectural and urban ensembles should be considered within the framework of the integrated approach. The specificity of open-air museums, created on the basis of mentioned objects, lies in the combination of diverse objects and the environment. The open-air museums are the most common way of multifaceted cultural heritage museumification in the world practice. The memorial ensembles should be perceived as a complex system in the place of its origin, development and modern use. Therefore, the search for the architectural solutions for the organization of open-air museums, which would create the optimal conditions for the perception of such monuments with a minimal interference in their original structure, is the most relevant.

The “in situ” method is predominantly used to create the open-air museums based on the architectural ensembles. Scilicet, the museum is created in the place of monuments’ historical emergence and functioning, that is in their authentic environment. In the open-air museums, diverse objects play the role of “exhibits” – architectural buildings and structures, economic and industrial objects, landscape and archaeological monuments. The main purpose of this type of museums is not the transformation of urban heritage objects into the objects of museum display and the use of architectural monuments as the museum premises, but the preservation of their historical and memorial value. Therefore, it is important to keep not only the material structure but the location and the historical environment during monuments museumification as well.

The plurality of the mentioned monuments maximally complicates the task of their preservation and use. Restoration, conservation, protection areas assignment and other protective measures often miss in looking the problem of high-quality transmission of historical and cultural information to the observer. The model of interaction between the museum and visitors is fundamentally changing nowadays. The “culture of participation” gains more and more popularity. It can be interpreted as a free, conscious, active participation of people in the formation of cultural and social processes, an opportunity not only to consume but also to create, to be a part of cultural events, to comprehend and actualize cultural heritage.

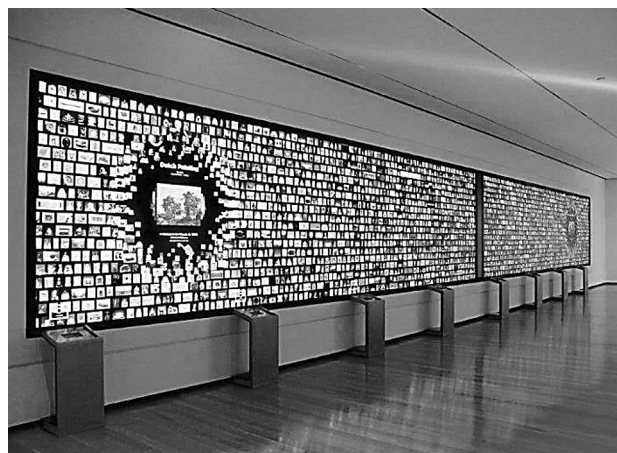
Museums exposition space goes to a qualitatively new level. Increasingly, it combines the material and virtual environment by means of new information and multimedia technologies. The use of modern technologies in museums makes it possible to expand the informational component of the exposition, to demonstrate the subject in the context of virtual space, in the atmosphere of the relevant time period. Multimedia technologies can become the means of creating various kinds of games, interactive co-ordinations, and entertainments. These technologies are used in plasma and LCD screens, projection and holographic systems, lighting design and sound accompaniment of the exposition [1].

Multimedia technologies provide the exhibition interactivity, visitor’s engagement in the game, active participation in the display, they demonstrate the phenomena and processes impossible or difficult to be observed in a real life, as well as serve as an orientation point in a museum space, being important in open-air museums, which often occupy a large territory.

Multimedia technologies provide a wide area for action, and technological development makes them increasingly flexible in use. They are mostly used indoors now, but they are also often used outdoors while organizing various shows and cultural events (Fig. 1). Therefore, for a valuable information transmission in the open-air museums, it is quite a rational solution to fill the environment with multimedia that would transform valuable architectural spaces into a kind of exposition without destroying the integrity.



**Fig. 1.** 3D mapping in Lyon, France.  
Project by 1024 Architecture [2]



**Fig. 2.** Wall touchscreen  
at Cleveland Museum of Art, USA.  
Inspiration Author:  
Jeremy Weatherford, Zenith Systems, LLC [3]

The main approach to an open-air museums space formation created on the basis of architectural and urban architectural ensembles is the principle of minimal interference with the historical structure of monuments. Transformation in the viewers' perception also gives a reason for the new spatial solutions. Visitors are more oriented towards getting pleasure, rather than prescriptive, educational information. Hence, the multimedia exhibition technologies that supplement authentic exhibits will enrich and popularize the exposition.

Multimedia museum technologies include a variety of exhibition systems: interactive booths, special information zones, integrated into the museum computer network, that allow the visitor to work with databases of various collections, multimedia installations, embedded in exhibition space, museum guides, various role or simulation games, holographic and projection devices, as well as light and sound equipment [4].

The use of information touch screens is quite popular today. The variety of their forms and design, as well as the compactness and the ability to be located practically anywhere in the museum, make these tools indispensable for obtaining the necessary information with illustrative additions.

The use of floor information booths is widespread for the architectural and spatial organization of the museum environment. The use of such booths, where displays are integrated into a common horizontal surface is much less common. Wall-mounted displays are used more rarely (Fig. 2). The advantage of using this technology is that the interactive screen can be integrated into the object of industrial design [1]. Information booths are easily combined with any small architectural form that does not ruin the integrity of the ensemble.

In order to show artificially created by humans environment of existence and self-realization to the visitor, museum space should include a set of the physical and symbolic objects [5]. The means of complementary and virtual reality are gaining more popularity today. The use of such technologies is of great interest to young people, for which electronic sources of information have become more common than books. Practically all people own mobile phones or tablets. That provides a wide range of actions. The relevant software will give visitors the opportunity to see things in the virtual environment that do not exist in reality. And this applies not only to supplementing information. The structure of ensembles and complexes includes many elements. Some of them may be damaged or completely lost. Restoration of destroyed monuments can be carried out in individual cases, in the presence of sufficient scientific base and illustrative materials that allow accurate reproduction of the object, as well as on the condition of its exceptional value. But such actions are not recommended by both native and foreign law in the field of monuments protection. Multimedia technologies using QR-codes or similar coding will allow visitors to observe lost elements of monuments or even individual structures, without ruining preserved objects. Such a technology can show some hypothetical images if there is no confirmation how exactly a particular element looks like.



**Fig. 3.** Reconstructive model in the Carnuntum Archaeological Park, Austria.  
Scientific developer:  
Ludwig Boltzmann Institute [6]



**Fig. 4.** Reconstructive model in the Siponto historical park, Italy. Author:  
Edoardo Tresoldy [7]



**Fig. 5.** Holographic installation at the Abraham Lincoln Museum, Springfield, USA. Realization:  
BRC Imagination Arts [8]

Occasionally, the image of lost or damaged elements and structures of architectural and urban architectural ensembles is reproduced by means of temporary or permanent installations that do not ruin the environment and preserved parts of the monument. This may be, for example, a transparent screen with a drawn image that, from a certain point of view that shows the original appearance of the monument (Fig. 3), or a light model made of a metal mesh (Fig. 4). In combination with the multimedia exhibition technologies, such solutions will become even more appealing to the visitor. For example, a conventional glass screen, similar to the one mentioned above, is used for a holographic installation in the Museum of Abraham Lincoln, Springfield, USA (Fig. 5).

In the approaches to the architectural and spatial organization of open-air museums, the preservation of a free space, which focuses on exhibits and creates space for interactive coordination between the visitor and individual monuments, is actual today. Because of versatility of architectural monuments, the visual environment, in which the visitor's attention focuses on the exhibit due to the illumination, color, and sound making an increased emotional impact on the viewer, as well as raising the cognitive value and expressiveness of monuments, is created. The development of computer graphics and virtual technologies enable museums to create the effective sensory feelings. These feelings are those emotional interactions that evoke the audience's interest and promote the visitor to immerse in the exposition [9].

Information carriers should be located not only outdoors. In open-air museums, restored exteriors of architectural monuments often are supplemented by museumified interiors of individual buildings, where additional expositions are placed. Small interactive installations can be integrated into the public welfare, accompanying the visitor at the locations of the main attractions outdoors. The large size of most open-air museums makes it necessary to arrange the recreation areas. Here a larger technique, that will provide some entertaining and performance activities – for example, the interactive games, can be placed. The use of the projection screens and interactive windows will be the most optimal in the interiors of the individual buildings. Using the architectural projection, holography and complemented reality means with the help of special equipment will be expedient inside and outside the museum. Light and sound equipment will also enhance the emotional impact of the monument exhibits both indoors and outdoors. One-time shows and other entertainment activities with multimedia means can be arranged as well.

The application of the multimedia exhibition technologies is becoming a promising direction of the museums' development today. The cooperation of the multimedia specialists, museum designers, restorers, and architects is extremely important for their effective involvement in organizing the open-air museums, created on the basis of monuments ensembles. It is also worthwhile to use world experience in the implementation of multimedia technologies in the museum environment in Ukraine. Over the past decades, under the auspices of the International Council of Museums, there is the Multimedia Working Group, which specializes in developing the methodological principles of using the abovementioned technology by the museums.

#### 4. Conclusions

Expansion of the activity spheres creates the need to revise the previous approaches to the creation of museum exhibitions and, accordingly, its architectural and spatial organization. The complex, multilevel system of open-air museums performs a number of functions. Among them, the artistic organization of leisure, the integration of cognitive, entertaining and artistic and creative functions are becoming more and more prominent. The wide range of the modern multimedia exhibition technologies possibilities gives grounds for their application for open-air museums. They are especially effective for transmitting the maximum amount of information to the visitor while maintaining the authentic structure and the environment of large urban ensembles, which include architectural, landscape, archaeological and historical monuments, inextricably linked together. In the open-air museums, it is possible to use such technologies inside the individual monuments as well as outside them, complementing the museum space with virtual elements. They not only can play the role of auxiliary means but also act as an independent tool for the formation of architectural space of the open-air museum. Such particular tools property as the ability to combine with the elements of industrial design leads to their being an excellent way to organize the interior. On the other hand, the large-scale equipment, which is expediently placed outdoors, allows forming attractions and recreation areas in the exterior. Thus, multimedia exhibition technology is an effective means for architectural space formation of the open-air museums.

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#### ВИКОРИСТАННЯ МУЛЬТИМЕДІЙНИХ ВИСТАВКОВИХ ТЕХНОЛОГІЙ ДЛЯ ФОРМУВАННЯ АРХІТЕКТУРНОГО ПРОСТОРУ МУЗЕЇВ ПІД ВІДКРИТИМ НЕБОМ

***Анотація.** Сьогодні художня організація дозволяє поєднує у собі пізнавальну та розважальну функції, що спричиняє необхідність коригування традиційного підходу до архітектурно-просторової організації музеїв. Основною особливістю архітектурних, містобудівних, ландшафтних та археологічних ансамблів та комплексів є великий масштаб і складний характер, тому їх варто розглядати в рамках комплексного підходу. У світовій практиці поширеним способом музеєфікації багатогранної культурної спадщини є музеї під відкритим небом. У сучасних умовах, використання середовища музеїв під відкритим небом як розважального простору є найцікавішою та найбільш актуальною формою збереження і демонстрації великих архітектурних та містобудівних комплексів чи ансамблів. Одним зі способів якісно реалізувати подібний підхід є використання мультимедійних технологій. Багатогранність згаданих пам'яток ставить перед нами важке завдання – якісно транслювати історико-культурну інформацію спостерігачеві. Сьогодні модель*

взаємодії музею з відвідувачами принципово міняється, все більшої популярності набуває “культура участі” – можливість не тільки споживати, але і бути частиною культурних заходів.

Використання сучасних технологій у музеях дають можливість розширити інформаційну складову експозиції, а технологічний розвиток робить їх дедалі гнучкішими у використанні. Популярним сьогодні є використання інтерактивних кіосків, інформаційних сенсорних екранів, мультимедійних інсталяцій, голографічних та проекційних установок, засобів доповненої та віртуальної реальності, світло- та звукоапаратури, а також організація різних рольових або симуляційних ігор. Мультимедійні виставкові технології можуть відігравати роль і допоміжного засобу, і слугувати самостійним інструментом формування архітектурного простору музею.

Широкий спектр можливостей сучасних мультимедійних виставкових технологій дає підстави для їх використання у музеях під відкритим небом. Вони є особливо ефективним для трансляції максимального об'єму інформації відвідувачеві при збереженні автентичної структури і середовища великих містобудівних ансамблів, які включають архітектурні, ландшафтні, археологічні та історичні пам'ятки, нерозривно поєднані між собою. Таким чином, мультимедійні виставкові технології доцільно використовувати для формування архітектурного простору музеїв під відкритим небом.

**Ключові слова:** музей під відкритим небом, пам'ятка архітектури, виставкові технології, мультимедійні технології.