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TRENDS AND SOLUTIONS: INNOVATIONS IN MUSEUM SPACES

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Abstract: This article analyzes the development and new approaches of museums through digital architecture, virtual and augmented reality, artificial intelligence and other innovative technologies that play a key role in the new museum experience. Examples of the use of modern technologies such as virtual and augmented reality, gamification and interactive displays that enable museums to engage visitors in the learning process.
Key words: Gamification, interactive, technologies, innovations.

Museum design has undergone significant changes in recent years, driven by advances in technology and visitor demands. Museums, which were once places to preserve and display art and historical artifacts, are now becoming multifunctional cultural centers, using cutting-edge technology to create interactive and immersive experiences for their visitors.
In order to determine the visitor's perception of museum activities and to increase the efficiency of using the museum collection in all types of activities, and not only in the research and study of museum objects, the problems of developing scenarios and methods of working with visitors, using interactive forms and using methods of museum pedagogy taking into account different types of viewers have been posed[1]. Innovation in Design Contemporary museum spaces often integrate the latest technological advances to improve the viewing experience of exhibits and provide unique opportunities for visitors to interact with exhibits. The introduction of digital technologies, virtual reality and augmented reality, as well as the use of retractable screens and touch panels, significantly expands the possibilities for creating multi-layered, dynamic and interesting experiences. Museums like the Museum of Art and Design in New York City are making extensive use of 3D printing to create precise replicas of artwork that are accessible to tactile interaction with visitors. This makes museum collections more accessible to people with disabilities, as well as to anyone interested in deeper imagery and the creation of works of art.
Interactivity and visitor involvement One of the most striking trends in modern museum design is the emphasis on interactivity. Unlike traditional exhibitions, where visitors simply observe exhibits, modern museums provide the opportunity to actively participate in the learning process. Using interactive displays, touch screens, augmented reality and gamification, museums are making the experience of art and history more engaging and personalized. An example is the Museum of Science and Industry in Chicago, which uses gamification to engage visitors in scientific experiments. Here, visitors can not only observe processes, but also become participants in experiments themselves, solve problems, and conduct experiments. This approach greatly increases the interest and understanding of the material, and makes it more accessible and exciting. New York Museum of Art and Technology Mercer Labs, where advanced technologies serve as a source of unique art installations.

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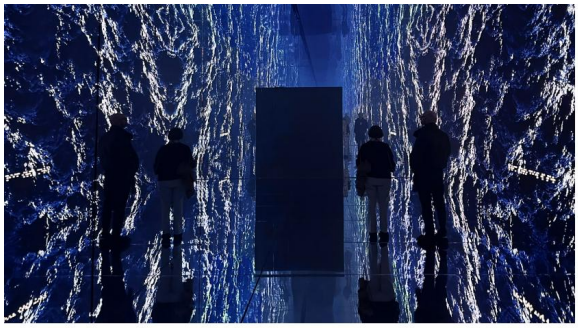
New York: Mercer Labs Museum of Art and Technology

Immersive experiences designed to wow and inspire guests of all ages. Clever and complex exhibits, very well executed. The "immersive" experience was particularly well done, as was the giant LED mirror display.
Smart and complex exhibits, very well done. The immersive experience was especially well done, as was the huge mirrored LED display. Mercer Labs (Museum of Art and Technology), as its creators claim, is the city's first fully immersive museum, and is located in an iconic and prestigious location, just across from the Oculus and the WTC tower.

New York: Mercer Labs Museum of Art and Technology

The museum is the brainchild of artist Roy Nachum, known for his Grammy-nominated artwork for Rihanna's 2016 album Anti and installations for LeBron James. While the discerning viewer has likely seen and experienced similar immersive experiences at other museums and galleries, Mercer Labs is a symbiosis of art and technology at its finest, taking even the most familiar techniques to new heights. There are museums where the main thing is sound and tactile sensations. A room with dozens of ultra-modern speakers that play some unearthly music, and the low frequencies that you feel with your whole body make even the floor tremble.
The room itself is upholstered in a super soft and pleasant material, and the air is filled with something between smoke and steam, which creates a pleasant feeling of infinity of space, where instead of air there is something heavier and more viscous. Mercer Labs is a good reason to rethink your relationship between art and technology. Use of equipment and augmented reality. Technologies of implementation and augmented reality (VR and AR) have firmly entered the museum space, opening new horizons for educational and entertainment programs. Virtual limitations allow you to "travel" to historical eras, Aliexpress remote corners of the planet, or

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even move into space that is inaccessible in the imagination of life - for example, inspected exhibits located in glass museums or storage facilities.

The Boston-based arts community uses VR to connect with historical events and cultural practices in Europe, allowing for an experience of the past. It's not just a static display, but a full experience that can be experienced not only through the eyes but also through other sensory inputs — sounds, tactile sensations, and even smells. Augmented reality, in turn, helps museums bring exhibits to life. The Louvre in Paris offers its own mobile augmented reality app that displays 3D models of historical objects or plays them as they would have been seen in ancient times. Eco-friendly and minimalist design. Modern museums increasingly prefer environmentally friendly and minimalist spaces. Museum design is focused on the use of natural materials, the creation of energy-efficient technologies and a comfortable atmosphere for visitors. This includes not only the use of environmentally friendly building materials, but also thoughtful lighting, ventilation systems, and attention to the harmony and aesthetics of space. A visit to the Museum of Forbidden Art will give you the opportunity to see the first and only collection of censored and banned art. The Museum, housed in a building in the early 20th century modernist style, features over 200 works by artists such as Warhol, Picasso, Goya, Ai Weiwei, Banksy, Gustav Klimt and others. An interactive digital guide will help you gain a deeper understanding of the history and meaning of the banned art.

The Museum of Modern Art in Barcelona is built in an eco-friendly style, where the architecture and interior are carefully designed to create spaces that are not only beautiful but also sustainable. This allows the museum to be not only a cultural institution, but also an environmentally responsible one. Social and cultural significance of museums. An important aspect of contemporary trends in museum design is the ability to perform a protective function. Museums become platforms for discussing current social issues such as climate change, equality, inclusion and cultural diversity. More and more attention is being paid to exhibition themes that reflect the cultural, social and environmental challenges of our time. The Museum of Modern Art in New York has become a famous exhibition dedicated to a small number of people, social justice and environmental issues. These themes not only attract visitors' attention, but also stimulate their reflection on the future of our world.

The Museum of Technology and Future (Tokyo, Japan) is a unique place where technology and innovation are at the center. This museum is dedicated to the implementation of advances in science and technology and their impact on the future. The main goal of the museum is not only to show current achievements in technology, but also to give an opportunity to see how these technologies can develop in the future and what changes they bring to the life of society. The Museum of Technologies and Prospects is focused on getting acquainted with advanced technologies, such as artificial intelligence, robotics, virtual and augmented reality, biotechnology and many others. He actively uses modern discovered means and virtual tours, so he visits contacts with exhibits and takes part in various scientific experiments. The museum offers the opportunity to ensure the technological future through practical interaction with exhibitions, which significantly increases the educational value. Technological barriers for older visitors. Many modern exhibits, such as virtual reality or artificial intelligence, may be constructs for older people or those who do not have much experience with modern technology. This may result in some visitors not being able to fully enjoy the exhibition. In order for a museum to be able to present an innovative exhibition, significant financial costs are required for the maintenance and updating of equipment. New technologies quickly become obsolete, and the museum must constantly update its collection, which causes an additional burden on the budget.

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Data security and privacy issues. With the introduction of modern technologies such as artificial intelligence and biometrics, the issue of visitor data security arises. Since many exhibits require statistical data collection for more accurate interaction, the museum must ensure strict measures to ensure privacy and prevent information leaks. Solutions Training and support for different age groups. To address technological complexity, the museum can organize training programs and workshops for older visitors or those who are not familiar with new technologies. It can also offer simple and clear instructions for using VR devices and other technologies. Investing in Long-Term Competition and Partnerships with Companies To reduce the financial burden, a museum can partner with technology companies that can provide equipment through sponsorship or long-term agreements. This will help reduce the cost of updating and maintaining technology. Ensuring data security through anonymization and encryption The museum must strictly comply with data protection laws and implement systems for anonymizing and encrypting information collected from visitors. To increase trust, a museum can publicly state its security measures and provide full information about how data is used.

Using the symbolic meaning of worldview in works of art, its modern trends are also revealed. An exception is the development of a miniature sanatorium with everything necessary for admission to the sanatorium. [2.].

Conclusions. The Museum of Technology and Futures in Tokyo plays a crucial role in popularizing science and technology by showcasing the achievements of modern civilization and the ways in which they can be developed. However, despite its innovativeness, the museum faces a number of challenges, such as technological barriers for certain groups of visitors and high maintenance costs. Addressing these challenges requires a comprehensive approach, including training, partnerships with technology processes, and ensuring data security. Despite these challenges, the museum continues to grow and attract more visitors, reflecting a unique perspective on the future of technology and its impact on society. Museology began to acquire its theoretical system, concepts, methods and place among the sciences, having gone a long way in generalizing practice and systematizing material. But only in the last decades has the formation of basic concepts and the creation of elements of a general theory of the discipline taken place, which has become the most important direction in its development [3].

A modern museum exhibition is the result of a creative union| of a research fellow and an artist-exhibitor, in which a scriptwriter sometimes takes part. There are still many unresolved and even controversial problems in the art of museum exhibition. The means of creating a museum image, the specifics of museum spectacle, the genre features of exhibitions, or what in art is commonly called the “laws of the genre,” have not been sufficiently developed in a theoretical sense. The methodology of artistic design requires comprehension and generalization across a broad spectrum of issues. Therefore, the art of museum exhibition, like museum work in general, needs creative experimentation, thanks to which it can be protected from templates and stereotypes.

Conclusion Contemporary trends in museum design are leading to significant changes in the placement of museums in cultural and educational institutions. Technologies play a key role in creating new forms of interaction with exhibits, as well as in expanding educational opportunities. Interactivity, virtual and augmented reality, an ecological approach and social responsibility - all these elements make museums not just a place for admiring art, but active participants in the educational and cultural process, opening up new horizons for the knowledge and perception of history and art. Thus, the museum design of the future is becoming not only technologically advanced, but also more accessible, engaging, ecological and socially oriented, which opens up new opportunities for interaction with visitors and helps to more deeply

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understand and appreciate cultural heritage. Museology began to acquire its theoretical system, concepts, methods and place among the sciences, having gone a long way of generalizing practice and systematizing material. But only in the last decades has the formation of basic concepts and the creation of elements of the general theory of the discipline taken place, which has become the most important direction in its development.

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