

Museum Experience of the Digital Age: Metaverse Museum

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Medallion depicting
with Medusa's head

Medusa's head
Medallion





ANCIENT FUTURES VR



Dijital Çağın Müzecilik Deneyimi: Metaverse Müze*

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Fatma Sezin DOĞRUER**

Özet

Kullanıcı sayısında bir sınırlama olmadan siber alanlarda öğrenme, yaratma, sosyalleşme, çalışma, iş birliği yapma ve oyun oynamaya izin veren devasa büyüklükte üç boyutlu sanal bir arena olan metaverse teknolojisinin hızlı yükselişi ve sanal platformların dünya çapında yaygınlaşması ile yeni metaverse müzeleri ve var olan geleneksel müzelerin NFT eserlerini sergilediği metaverse oluşumları kullanıma açılmıştır. Bu çalışmanın amacı, metaverse müzeler ile geleneksel müzeler arasında ilişkinin kurulmasına yardımcı olarak metaverse müzelerin gelişimlerini anlamaktır. Çalışma kapsamında, dünyadan ve Türkiye’den seçilen örneklerden yararlanılarak metaverse müzelerin tasarım özellikleri, işleyişleri ve müze deneyimleri hakkında yeni tartışma konuları ortaya çıkarılmıştır. Metaverse müzeler ile geleneksel müzeler arasında yapım, teşhir düzenleme, eserler, yönetim ve erişilebilirlik ile ilgili konulara dair kıyaslamalar yapılmıştır. Metaverse müzelerin geliştirilmesine yönelik hem işleyişi ile ilgili faktörlerden kaynaklanan güçlü yönleri belirlemek ve zayıf yönlerin farkında olmak, hem de kullanımın oluşturduğu olası tehditleri önlemek ve geleceğe yönelik fırsatları ortaya çıkarmak için metaverse müzelerin güçlü ve zayıf yönleri, karşı karşıya kaldığı tehdit ve fırsatlar listelenmiştir. Geleneksel müzeler ile metaverse müzeleri arasındaki ilişki güçlendikçe kullanıcı etkinliği ve buna bağlı olarak popülerliğin artacağı; bu bağlamda metaverse’te müze deneyiminin gerçek hayata olumlu ve olumsuz yansımalarının analizi yapılarak gerçek ve sanal alemde varlık gösteren mekân ve sergileme kalitesi ile teknoloji araçlarının kullanıldığı tasarımların geliştirilmesi gerektiği düşünülmektedir.

Anahtar Kelimeler: Metaverse, Müze, Müzecilik, Metaverse Müzecilik, Dijital Çağ.

Abstract

With the rapid rise of metaverse technology, which is a colossal three-dimensional virtual arena that allows learning, creating, socializing, working, collaborating and playing games in cyberspace with limitless users; and the spread of virtual platforms globally, new metaverse museums and the metaverse formations of the existing traditional museums, in which their NFT works are exhibited, were opened for use. The aim of this study is to understand the development of metaverse museums by helping to establish the relationship between metaverse museums and traditional museums. Within the scope of the study, new discussion topics about the design features, functioning and museum experiences of the metaverse museums have been revealed by making use of selected examples from the world and Türkiye. Comparisons were made between metaverse museums and traditional museums in terms of the issues related to construction, exhibition arrangement, artifacts, management and accessibility. The strengths and weaknesses of the metaverse museums, the threats they face and opportunities are listed in order to identify the strengths arising from the factors related to the functioning and to be aware of the weaknesses, as well as to prevent the possible threats posed by the use and to reveal the opportunities for the future. As the relationship between traditional museums and metaverse museums gets stronger, user activity and popularity would increase accordingly. In this context, it is thought that by analyzing the positive and negative reflections of the museum experience in the metaverse on real life, it is necessary to develop designs that use the quality of space and exhibition and technology tools that exist in the real and virtual world.

Key Words: Metaverse, Museum, Museology, Metaverse Museum Studies, Digital Age.

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Introduction

In the virtual world, a series of experiences are generated by creating technological environments that give users the sensation of being in and interacting with an alternate environment. Virtual worlds, which have been a part of our lives since the 1980s, have undergone rapid technological development and have been popular due to the freedoms they provide, such as the ability to create and own objects, establish social networks, and transfer money within a concrete financial structure. Virtual environments possess various characteristics, such as the continuity of a real-world environment, the sharing of space with multiple users at the same time, three-dimensional representation in the form of avatars, the interaction between users and objects, and resemblances to the physical environment and movement in the real world (Warburton, 2009: p. 415, 416).

Museums did not remain a spectator to the rapid rise of metaverse technology and the global spread of virtual platforms. Instead, metaverse formations, or new metaverse museums, were opened for use in places where existing traditional museums exhibit NFT (non-fungible token) works. The Covid-19 pandemic is an additional factor accelerating these formations. Innovative Metaverse technologies have enabled the transfer of museology activities to the virtual environment in museums that offer a variety of exhibitions and cultural. In this dynamic museum model, capable of constant change and transformation, it is possible to produce architectural content similar to conventional designs, as well as designs that cannot be physically built that were once beyond the realm of imagination. The accessibility of metaverse museums is global and without time constraints.

The purpose of this study is to comprehend the evolution of metaverse museums by establishing the relationship between them and conventional museums. In the scope of this study, new discussion topics regarding the design characteristics, operations, and museum experiences of selected international and Turkish metaverse museums are explored. The research questions include, “What are the characteristics of metaverse museum designs?”, “What distinguishes metaverse museums from conventional museums?”, and “What are the strengths and weaknesses of metaverse

museums, as well as the threats and opportunities they face?” The questions raised were recently evaluated, but it should be noted that the findings of this research, which focuses on the cyber world, is susceptible to technological advancements, may likely change over time.

1. Metaverse

Metaverses are vast, three-dimensional sandboxes that permit unrestricted cyberspace learning, creation, socialisation, work, collaboration, and gaming (Argan et al., 2022: p. 35). The term metaverse was coined by Neal Stephenson in his 1992 science fiction novel *Snow Crash*, as a virtual reality-based successor to the internet, derived from the words “meta” and “universe,” used as a noun. It refers to “a dimension beyond the material world” (Dionisio et al., 2013: p. 34:4, 34:6). In the Turkish equivalents, “other universe,” “fictional universe,” and “virtual universe” are also emphasised (Terzi, 2022: s. 13).

With the use of virtual reality in the metaverse, the previously two-dimensional virtual world can now be perceived three-dimensionally and felt in the environment. It is represented in virtual reality (VR), augmented reality (AR), mixed reality (MR), and extended reality (XR). These technological advancements provide users with interactive environments and immersive experiences (Argan et al., 2022: p: 34, 37, 58). In order to digitise the social structure, the metaverse dematerializes physical reality. In contrast to the previous phases of the internet, which were characterised by a social media presence centred on a handful of service providers, the decentralised character ecosystem now enables effortless participation in the collective experience. With the metaverse, where real-time social activity can be displayed, a transition has occurred from the asynchronous social network to applications that allow users to make new discoveries and transition from one experience to the next (George et al., 2021: p. 5).

Metaverse environments, which can also be referred to as “Parallel Digital Universes,” can be viewed as a continuation of real life because they permit a variety of real-world actions and simulate interactions. With the incorporation of metaverse technology into

live performances and similar events, a personalised experience can be created for everyone in the comfort of their own seats (George et al., 2021: p. 4). Similar to physical reality, users are in a different perception of reality with the virtual dimensions of the environment. With the hybridization of the real and virtual worlds, space transitions and exchanges are feasible. With the existence of this synthetic universe, as the individual's and the world's perceptual capacities change, the way of thinking and behaving can be drastically altered (Aydoğan et al., 2022: p. 56, 58).

In such metaverse environments, "immersion" in the atmosphere is intended to provide the user with the sensation of being physically present (Aydoğan et al., 2022: p. 58). It is well known that physical life is simulated to easily adapt to the system. For instance, real-world structures are frequently utilised in the metaverse so the relationship between metaverse environments and physical life is highlighted. For viewers to experience immersion and a sense of belonging, it is essential to provide for the possibility that they have similar physical routines (Güven and Güven, 2022: p. 1474). Individual avatars, also called digital twins, are virtual identities (Aydoğan et al., 2022: p. 56). In virtual channels such as Minecraft, Roblox, and ZEPETO, the avatars of users interact with one another (Lee et al., 2022, 80).

Blockchain technology provides the infrastructure that enables the rapid development of metaverse technology. The first studies on blockchain technology, which has become a part of our lives with the advent of the crypto economy, were published in the 1980s (George et al., 2021: p. 2). NFTs and cryptocurrencies were adopted by the blockchain ecosystem, which was incorporated by Web 2.0. The cryptocurrency Bitcoin and the term "chain" were first mentioned in an article by Satoshi Nakamoto published in 2008. With the blockchain, which represents data integrity similarly to a chain, a secure area where digital data cannot be altered was established. Blockchain technology has an intermediary feature; a system in which the owner of the NFT and the collector approach each other, the original of the NFT can be preserved, the rights of the work can be transferred through commerce, and smart contracts prevent the unauthorised duplication and reproduction of the NFT. In Web 3.0, which purports to eliminate issues such as democratisation, trust, ownership, and belonging, users' data are now produced, processed, and evaluated by machines rather than servers or

platforms (Önder, 2022: p. 579, 580, 592). The metaverse environment enables the creation of a digital economy with the production of multiple NFTs and token assets, and the utilisation of crypto wallets such as Trust Wallet and Meta Mask (George et al., 2021: p. 2). The metaverse is open source-not connected to a centralised system-and based on blockchain (Oduncu, 2022: p. 68, 77) A rapid development advantage is provided in many areas. It has a financial potential; platforms such as Decentraland, which opened in 2020, have uses where users and investors can generate income such as designing, renting, and selling "land." This platform, which has its own currency, has become a significant sector of the global economy (Aydoğan et al., 2022: p. 57, 59). Using Cryptovoxels, a platform based on the Ethereum blockchain, players can purchase land, construct shops, and open art galleries (Cryptovoxels, 2022, par.1). This is also an example of the reinterpretation of the constructed environment.

Among the digital transformations that arose during the global shutdowns over two years caused by the Covid-19 pandemic which emerged in the second half of 2019, the metaverse became one of the most notable offline activity substitutes. Due to the social isolation that accompanies existing communication models, alternative models have been developed, and the use of digital built environments has become increasingly prevalent. Since people cannot remain in closed environments for extended periods of time, as during pandemic conditions, a rise in activities known as contactless culture have been observed in museums. Thus, metadata offered users an online existence. In this virtual life, where the audience and the work meet in the digital environment, "multi-layered alternative life forms, kneaded with hybrid reality systems, are dominated by lifestyles equipped with endless possibilities" (Aydoğan, 2022: p. 62; Lee et al., 2022: p. 79).

2. Virtual Museums

The concept of the museum (Museum Definition, 2022, paragraph 1), which is "a non-profit, permanent institution that researches, collects, conserves, interprets, and exhibits tangible and intangible heritage at the service of the community" (ICOM, 2022) has begun to transform and become more complicated due to the economic, social, and political developments of the 19th and 20th centuries (Karatay, 2015: p. 6). With

the emergence of technologically connected cities and the disappearance of physical proximity, the concept of virtual museology emerged in the 1990s, and works began to be offered to individuals, and made available to broader audiences (Kahraman, 2021: pp. 147, 150). Considering these developments, the museum visitor has transitioned from a passive to an active participant that influences the creation of the work. In addition, museums enrich the ways in which societies communicate by utilising technological advancements, which are essential in our modern era. Widespread use of interactive systems has increased the effectiveness and entertainment value of exhibitions. For the effective utilisation of technological infrastructures in museums, efforts are being made to enable the virtual world, such as augmented reality, to be experienced in the real world. Museums can adapt innovations to their structure and increase appeal in this manner.

With the help of information technologies, solutions are sought for issues such as high exhibition costs, preservation concerns, and space constraints (Karatay, 2015: p. 15). In contrast to studies conducted in an effort to expand the traditional understanding of museology, many museology activities have shifted to the virtual universe. It can be observed that the methods of evoking emotion to affect the audience's senses, instructive displays to educate, and education-based exhibition methods employing audio-visual tools are also continued in the virtual exhibitions (Kalyoncu Fırat and Gülaçtı, 2022: p. 2398).

As a result of the pandemic that began in 2019, the number of museum visits in Türkiye and around the world has decreased significantly. The number of visitors to museums, which approached thirty-five million in 2019, decreased to approximately nine million in 2020 (Museum Statistics, 2022, par. 1). Virtual museums have become a significant means of access for users who are unable to physically visit a museum but wish to view its artefacts. They provide 360-degree panoramic images and the ability to virtually walk through the museum. Fifty-one museums and ruins affiliated with the Ministry of Culture and Tourism of the Republic of Türkiye were made accessible virtually as of November 2022.

(Figure 1) (Virtual Museums, 2022, par.1). The Eczacıbaşı Virtual Museum, which opened to the public

in 1999, was the first of the virtual museums established by the private sector in Türkiye (Kahraman, 2021: p. 153). Similarly, the world's leading museums such as the British Museum (<https://britishmuseum.withgoogle.com>), the Solomon R. Guggenheim Museum (<https://artsandculture.google.com>), and the Louvre (<https://www.louvre.fr>) are continuing to use virtual museums.

Numerous computer- and technology-based concepts and procedures have emerged due to the rapid development of technology. For instance, haptic technology product tactile display devices (Figure 2) simulate the sense of touch by sending feedback to the audience's fingertips (Kalyoncu Fırat and Gülaçtı, 2022: p. 2408). In recent years, arrangements for virtual museums or digital museums have been made in the metaverse environment, where physical construction is being replaced by virtual construction. The virtual museum continues to gain speed with innovative technological developments. The metaverse museum concepts accelerated by the pandemic paved the way for digital museum experiences.

3. Metaverse Museums

With the pandemic and the development of NFTs, traditionally centralised museums have begun to take place in the metaverse, despite the fact that decentralisation is a key principle (Ando vd., 2013: p. 218). This coexistence of art and technology is now open to worldwide participation (Oduncu, 2022: p. 73). NFTs are digital representations of rare and collectible assets. As a result of collaboration between the Digital Transformation Office of the Presidency and the Turkish Language Association, the Qualified Intellectual Deed (Nitelikli Fikrî Tapu) has been proposed as the Turkish equivalent of an NFT (Turkish Translation of NFT, 2022, par.1). NFTs stored with blockchain technology are one of the fundamental components of Web 3.0 and constitute a model of digital art ownership (Kalyoncu Fırat and Gülaçtı, 2022: p. 2408). Due to the rapid and unmediated operation of the blockchain infrastructure via software algorithms, the data, and consequently the NFT works, have become immutable and serve as the author's signature. Some museums have adapted to the digital age by auctioning off world-renowned artworks that have been converted into non-fungible tokens (Oduncu, 2022: p. 73).

As an alternative to traditional institutional museum models, metaverse museums offer opportunities such as rethinking and reinterpreting the art experience in the museum, as well as easier access to the community (Decoded: Museums in the Metaverse, 2022, par.2).

As with traditional museums this type of museum is created by interdisciplinary professionals. In addition to professions such as architects, curators, archaeologists, art historians, and designers, there are also three-dimensional (3D) artists or CGI designers, game experts, crypto artists, and NFT artists among the participants. The contents of such museums may consist of NFT renditions of physically existing works or virtual world specific assets. Platforms for the metaverse also permit the production of works of art that undergo constant transformation. Viewers not only consume content but also contribute to the art economy through their participation and content production (Aydoğan vd., 2022: pp. 62, 63).

While some virtual world platforms are utilised within a pre-designed environment, architecture can also be created by users designing and producing content on platforms that serve as empty space. This enables designers and architects to create designs that are distinct from the physical environment, and it enables the use of various visualisation techniques, such as rendering and video. Additionally, new technology products are utilised when designing metaverse museums like game engines and 3D modelling programmes such as 3D Max, Blender, Cinema 4D, and Maya. In addition to creating digital duplicates of real-world structures, new metaverse designs are also being developed. It is evident that the incorporation of artificial intelligence into the metaverse environment enhances design and automation. Thanks to applications such as virtual reality, mixed reality, augmented reality, and augmented reality, a fictitious atmosphere is created using illusion and manipulation techniques; the metaverse experiences of users are enhanced, and the effect on the senses is amplified (Aydoğan vd., 2022: p. 62). On metaverse platforms, there can be permanent and temporary exhibitions, cultural festivals, and various organisations.

In the environment of the metaverse global communications are enabled. Exhibitions opened by institutions, organisations, or individuals may have a different appearance or the same appearance as

museums, galleries, or art institutions in the physical world (Aydoğan et al., 2022: p. 62). Considering that the metaverse will “take its inspiration and foundations from the physical universe,” it is expected that there will be structures with the same design as the physical universe; it is common practise to use collective memory products during the period of acclimatisation to metaverse environments (Güven and Güven, 2022: p. 1470).

3. 1. 3.1. Examples of Metaverse Museums from Around the Globe

The metaverse, a three-dimensional virtual world where users can freely move for their own purposes, was described as a promising education and research platform in the 2010s, where it was viewed as a functional representative of the Second Life Metaverse environment that enables users to construct objects and architectural products (Thawonmas and Fukumoto, 2011: p. 153). Second Life, one of the earliest examples of the metaverse, contained numerous museums and was easy to use in terms of avatar control (Ando et al., 2013: p. 218). Due to its lack of a game-like objective and skill, it is viewed as a type of front metaverse in the present tense (Aydoan et al., 2022: p. 59).

At the end of the 2010s, other metaverse environments and environments with only museum functions began to be developed. VOMA, Musée Dezentral, Museum of Crypto Art, African Museum of the Metaverse, 6529 Museum of Art, Serpentine Galleries, and Toledo Museum of Art are examples of metaverse museums created with blockchain technology in the present day (Decoded: Museums in the Metaverse, 2022, par.5).

3. 1. 1. VOMA

VOMA, which began development as a meta-museum in 2019, is a 2020-opening metaverse museum designed to offer a photo-realistic, three-dimensional internet browser experience and serve as an alternative to traditional museums (Figure 3, 4). In addition to providing a social experience, the museum also incorporates the audience’s voices (VOMA, 2022, par.1). The museum, which is open to the public free of charge, displays digital reproductions of significant works from museums such as the Orsay Museum, the

Art Institute of Chicago, and the Metropolitan Museum of Art, as well as new works (Kahraman, 2021: p. 155).

The museum is situated in a virtual environment with topographical features resembling those of the real world. The museum is surrounded by landforms and natural elements such as lakes, mountains, and various tree species. The entrance to the museum building, which is situated on a small island and accessible via a simple wooden bridge, is colonnaded. The interior space is formed by exterior walls with the appearance of plastered stone and interior walls made of exposed concrete. There are ceiling and near-ceiling windows through which the sky can be seen. The works are displayed indoors, on white panels mounted to the walls or on low wooden structures in the centre of the room.

3. 1. 2. Musée Dezentral

The metaverse's Musée Dezentral is a decentralised NFT museum (Figure 5, 6). Connection to a wallet is required for NFT minting (Musée Dezentral, 2022, par.1). The museum tour, which begins in a hall with a high ceiling, continues to the courtyard, which is reached by two flights of stairs, and then to numerous exhibition spaces connected by stairs and corridors. Marble and wooden parquet-like floors, columns, and vaults stand out in the predominantly white and grey structure. Artefacts are hung from the ceiling of the corridor that encircles the courtyard and are displayed in the niches on the walls. The sky is visible through the skylights. Water and landscape elements are incorporated into the design of the museum structure, which was inspired by real-world architecture, so that the audience could experience a sense of belonging.

3. 1. 3. Museum of Crypto Art

A multi-stakeholder, decentralised art curation and exhibition platform established the Museum of Crypto Art, the first cultural institution of crypto art (Figure 7). The museum's permanent collection consists of 231 works by 231 artists and is known as the Genesis collection (Museum of Crypto Art, 2022, par.1). In the Somnium Space environment, virtual tours of distinct parcels and structures can be conducted. It is understood that most exhibition designs are metaverse designs (Somnium Space, 2022, par.1).

3. 1. 4. Nemo Virtual Museum

Billed as the first design museum of the metaverse environment, The Nemo Virtual Museum has NFTs on display and for sale, in addition to the brand concepts and collection of the Italian lighting company Nemo (Nemo Virtual Museum, 2022, par.1). Four walls and floors without a ceiling are used as the structure's architecture. The exhibition spaces are separated by passageways consisting of narrow corridors. A work-oriented strategy has been adopted via a straightforward design. On the surfaces, white and grey hues are used. The artworks are displayed in niches in the walls or on pedestals on the floor.

3. 1. 5. NFTism

The virtual art gallery NFTism, created by Zaha Hadid Architects, is characterised by its dramatic composition, user experience, and spatial designs centred on social interaction, and it provides an online massive multiplayer gaming and interaction technology service (Figure 9). The architecture of the art gallery incorporates parametric design technologies such as audio-video interaction (Developed by ZHA, 2022, par.2). It has a unique design that makes no reference to the real world and was created specifically for the virtual world.

3. 2. Examples of Metaverse Museum from Türkiye

In addition to these global examples, the use of metaverse museums in Türkiye has begun, concurrently with the rest of the world, albeit in small numbers. On the Decentraland platform (Kalyoncu Fırat and Gülaçtı, 2022: p. 2408), which was opened by Yapı Kredi Bank in May 2022 and displays Atatürk's belongings as NFTs, users play games with their avatars, buy and sell land with MANA-their own currency-and socialise, produce, and sell NFTs in the metaverse museum. Represented are digital artworks that can be authenticated via blockchain (Decentraland, 2022, par.1). The first floor of the Yapı Kredi Bank building, a three-story structure located at the coordinates -112, -43 in Decentraland, serves as a metaverse museum. Originally displayed in the virtual museum, NFT versions of works such as Atatürk's

medals, rosary, wooden walking stick, gramophone, and Zübeyde Hanım’s spectacle frames were created and displayed in the metaverse (Yapı Kredi Metaverse, 2022, par.2).

İş Sanat, which carries out museum and artworks on behalf of Türkiye’s İş Bank, opened a temporary NFT exhibition titled A Walk on the Bosphorus with Paintings (Tablolarla Boğaziçi’nde Bir Gezinti) between April 8 through 20, 2022 in Decentraland, where the bank’s figure collection was displayed (Figure 10) (İş Sanat’s Metaverse, 2022, par.1). In accordance with the exhibition concept, a steamboat-shaped exhibition was created.

In addition to these museums which belong to Türkiye’s prominent banks, research has begun to transfer the artefacts in the Zeugma Mosaic Museum, which is affiliated with the Ministry of Culture and Tourism, to the metaverse. Within the scope of the study, the museum’s Zeugma Dionysos house was scanned in three dimensions and added to the metaverse environment (Zeugma with Metaverse, 2022, par.1).

There are also examples of digital displays and metaverse environments being exhibited in conventional museums. In the temporary metaverse exhibition titled Ancient Futures (Antik Gelecekler) at the İstanbul Archaeology Museums of the Ministry of Culture and Tourism of the Republic of Türkiye in October 2022, digital environments were created in the same environment as the museum works, physical sculptures, and AR works were displayed (Figure 11) (in İstanbul Archaeology Museums, 2022, par.1).

3. 3. Differences between Metaverse Museum and Conventional Museums

It can be seen that physical structures and natural environmental elements are used in metaverse museums, which conduct research, conservation, interpretation, and exhibition activities, and exhibit works in the same manner as traditional museums, which are non-profit institutions at the service of society, and hold a variety of activities for the service of society. In addition, there are disparities in production, exhibition arrangement, work-related issues, administration, and accessibility (Table.1).

Table.1 Traditional Museum and Metaverse Museum Differences

	Traditional museum	Metaverse museum
Production/Exhibition Arrangement	Specific/limited resource and space	Unlimited space
	Land/construction cost	Land/software cost
	Buildability in terms of construction system and building material	Flexibility in design and material, Not seeking constructability
	Limitation on space sizes	Expandable spaces
	Making changes in the exhibition of works in a long time and inconvenience	Exhibition renewal is quick and easy
	The requirement to comply with the zoning legislation in new museum constructions, and the conservation le	Use of legally binding smart contracts and standards
Work	Limited number of exhibits	Unlimited NFT exhibitability
	Does not entail sales.	NFT sale possible
	Limited by artifact size	Flexibility in artifact size
	Methods for the transferability of works	Artefacts from all over the world can be brought together without difficulty
	Possibility of artefact theft	Prevention of plagiarism, forgery, and theft in works
	Limitation of the approach so as not to harm the artefact	Possibility to get as close to the artefact as desired
Management	Traditional method of operation	Internet technology dependence in museum operations
	Specific opening and closing hours	Navigation without time constraints
	Non-profit motive	Profit motive
Accessibility	Geographic distance is at issue	Accessibility on a global scale, the potential for quick transitions and roaming between museums
	Permitting one museum tour at a time	Ability to simultaneously visit multiple museums

When evaluating the construction and exhibition arrangements, there are no restrictions on the locations where metaverse museums can be established, whereas traditional museums must define a specific source and location prior to project design. While land cost is an issue for both types of museums, the traditional museum incurs construction project and implementation costs, while the metaverse museum incurs software and digital design costs. While constructability is sought in terms of construction and building materials in the

traditional museum, flexibility in design and material is evident in the metaverse museum, where structures that are extremely difficult or impossible to build can be designed. In addition, there are no restrictions on the size of spaces in metaverse museums, so expandable spaces have been implemented. While traditional museums take a long time to complete projects and implementation studies-for changes in the exhibitions of artefacts- these studies can be completed more easily and quickly in the virtual environment of metaverse museums. New museum constructions are required to adhere to zoning regulations, and if the museum is a registered cultural property, it must also adhere to conservation regulations. In metaverse museums, non-binding smart contracts and standards are utilised.

In conventional museums, the number of exhibitable works is limited proportionally to the size and number of available spaces, when the works are evaluated, and based on their subject matter. However, an infinite number of NFTs can be displayed in metaverse museums due to their expandable spaces. In contrast to traditional museums, which prohibit the sale of artworks, it is possible to sell NFTs and exchange ownership in metaverse museums. In these museums, there is no restriction on the size of the space, and the NFT is also unrestricted in size. Regarding the portability of the artefacts, various procedures and preventative protection measures are implemented in traditional museums to prevent the artefacts from being damaged. However, in the environment of the metaverse, it is simple to combine works from all over the world. Plagiarism, counterfeiting, and theft can be prevented in conventional museums, although theft of the works is possible if the necessary security measures are not taken or are insufficient. While the approach to physical artefacts is restricted for protection purposes, digital NFTs can be approached to any extent desired.

When management-related issues are considered, metaverse museum operation is becoming increasingly dependent on internet technology, in contrast to the traditional museum model. While the opening and closing times of conventional museums are fixed, there is no time limit for visiting metaverse museums. As stated in ICOM's definition of a museum, it is evident that non-profit museum operations have become profit-driven with the introduction of NFT sales in the virtual world.

When metaverse museums are evaluated in terms of accessibility, geographical distances disappear and accessibility, transitions between museums, and global circulation are possible in a short amount of time. With the ability to visit multiple locations simultaneously, metaverse museums gain prominence.

3. 4. Metaverse Museums' Strengths and Weaknesses, Opportunities and Threats

For the development of metaverse museums, it is essential to identify the strengths resulting from the functioning factors and also to be aware of the weaknesses, as well as preventing threats resulting from use and to reveal future opportunities. As a result of the study's research, the strengths, and weaknesses of the metaverse museums, as well as the threats and opportunities they face, are enumerated.¹

3. 4. 1. Strengths of Metaverse Museums

- The use of materials in museum designs is flexible; constructability is not required.
- In the three-dimensional museum design, it is possible to freely navigate using avatars and to get very close to the artwork.
- A displayable collection can be created.
- Resources and space are unlimited.
- There is no need to protect works like in real life.
- Blockchain technology is employed to prevent plagiarism and piracy of works.
- Museums have no construction costs, only virtual land, and digital design costs.
- Museums are open without time restrictions.

¹ The items under the headings are based on the data gleaned from the review of the relevant literature and the results of previous experience. It does not include importance ranking.

3. 4. 2. Weaknesses of Metaverse Museums

- There is a reliance on internet-based technologies.
- The sensation of interacting with physical objects in the real world cannot be replicated in the virtual world.
- Smart contracts and non-binding standards are implemented.
- In metaverse museums, the effect and intensity of being in the same location as the original work and the monumental museum buildings do not occur.

3. 4. 3. Opportunities of Metaverse Museums

- An infinite number of NFTs may be displayed.
- The economic potential with the sale of NFTs.
- Artists from around the globe can easily collaborate.
- Opportunities for cultural diversity.
- Provides new opportunities for business.
- Worldwide accessibility, transfers between museums, and circulation become feasible rapidly.
- The size of the work is adaptable.
- Offers expandable spaces.
- Exhibits can be updated more quickly than in conventional museums.
- Stands out with virtual socialization opportunities.

3. 4. 4. Threats Faced by Metaverse Museums

- The line between fact and fiction is blurring.
- It is possible that the use of three-dimensional glasses, etc., may cause health issues.
- There is the potential for health issues to arise because of decreased movement.
- Due to the extensive use of virtual applications such as metaverse museums, it is believed that real-world business and relationships are neglected.
- Contrary to the non-profit concepts of traditional

museums, NFT sales are possible in metaverse museums, and making a profit is the primary objective.

Conclusion

In recent years, the information age has been shaped by the rapid rise of metaverse technology, where users can produce and interact with other users through avatars, and users can immerse themselves in the virtual world, as well as the increasing proliferation of virtual reality platforms around the world. In this environment, which is intended to present multiple dimensions of the concept of reality, technological advancements are utilised to expand and diversify reality. In the universe of the metaverse, which promises an interdimensional experience, museums and other institutions use these virtual platforms to interact with users.

Not only is the metaverse a physical reflection of the real world, but it is also a medium for interaction. The metaverse museum, an art medium in which works are digitalized, exhibited, and sold as NFTs, has produced a new world model. In addition to permanent and temporary exhibitions, metaverse museums also host cultural festivals and art organisations. Thus, with the emergence of technological concepts such as museology, metaverse, and NFTs, it has become a dynamic concept and acquired a new action domain. Intercultural contact was established through the exhibition of NFT works outside of space and time. It is evident that metaverse museums with a profit motive have financial value in addition to design and education. It creates a multicultural environment because of its global reach.

The museum structures in the virtual environment can be identical to the examples in the physical world, or they can be of a different design, including structures that are extremely challenging or impossible to build in physical dimensions. It is simple and quick to edit museum designs created in the metaverse, which are not constrained by land, space, location, or size.

Similarly, the study reveals differences in production, exhibition arrangement, work-related issues, management, and accessibility.

Consequently, as the relationship between traditional

museums and metaverse museums strengthens, user activity and popularity will rise. Even though it is debatable whether the concept of a metaverse museum has a negative impact on traditional museums, it is clear that designs in both types of museums have similarities and differences, as well as their own challenges and opportunities. It is open to debate how future experiences will evolve in relation to potential weaknesses and threats, as well as strengths and opportunities brought about by technological advancements. In the metaverse, the positive and negative effects of the museum visit on the real world will become more apparent over time. Through analysing these criteria, it must be ensured that the quality of space, and exhibition in the real and virtual worlds, as well as the designs of technological tools, are improved.

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Appendix



Figure 1: Çanakkale Troy Museum, Virtual Museum (Çanakkale Troy Museum, 2023).

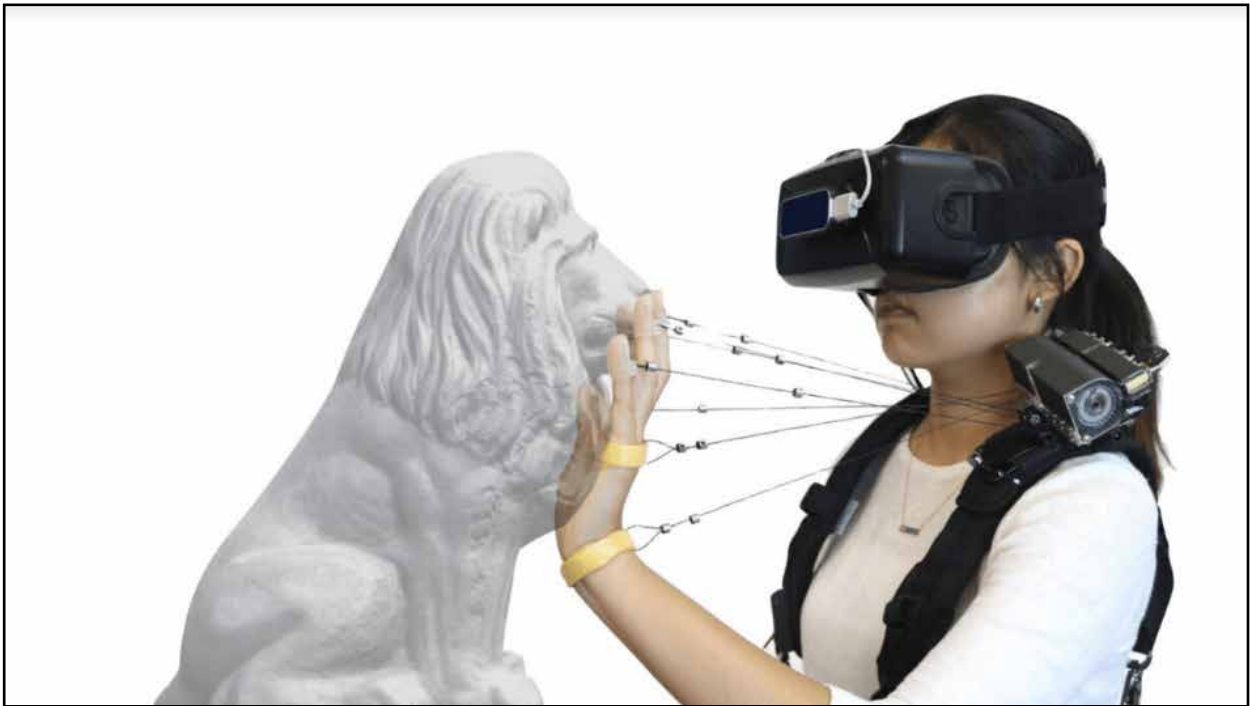


Figure 2: Haptic Technology (This Haptic Device, 2022).



Figure 3: VOMA Museum Design (VOMA, 2022).



Figure 4: VOMA Exhibition Area (VOMA, 2022).



Figure 5: Musée Dezentral Entrance (Musée Dezentral, 2022).



Figure 6: Musée Dezentral Exhibition Area (Musée Dezentral, 2022).

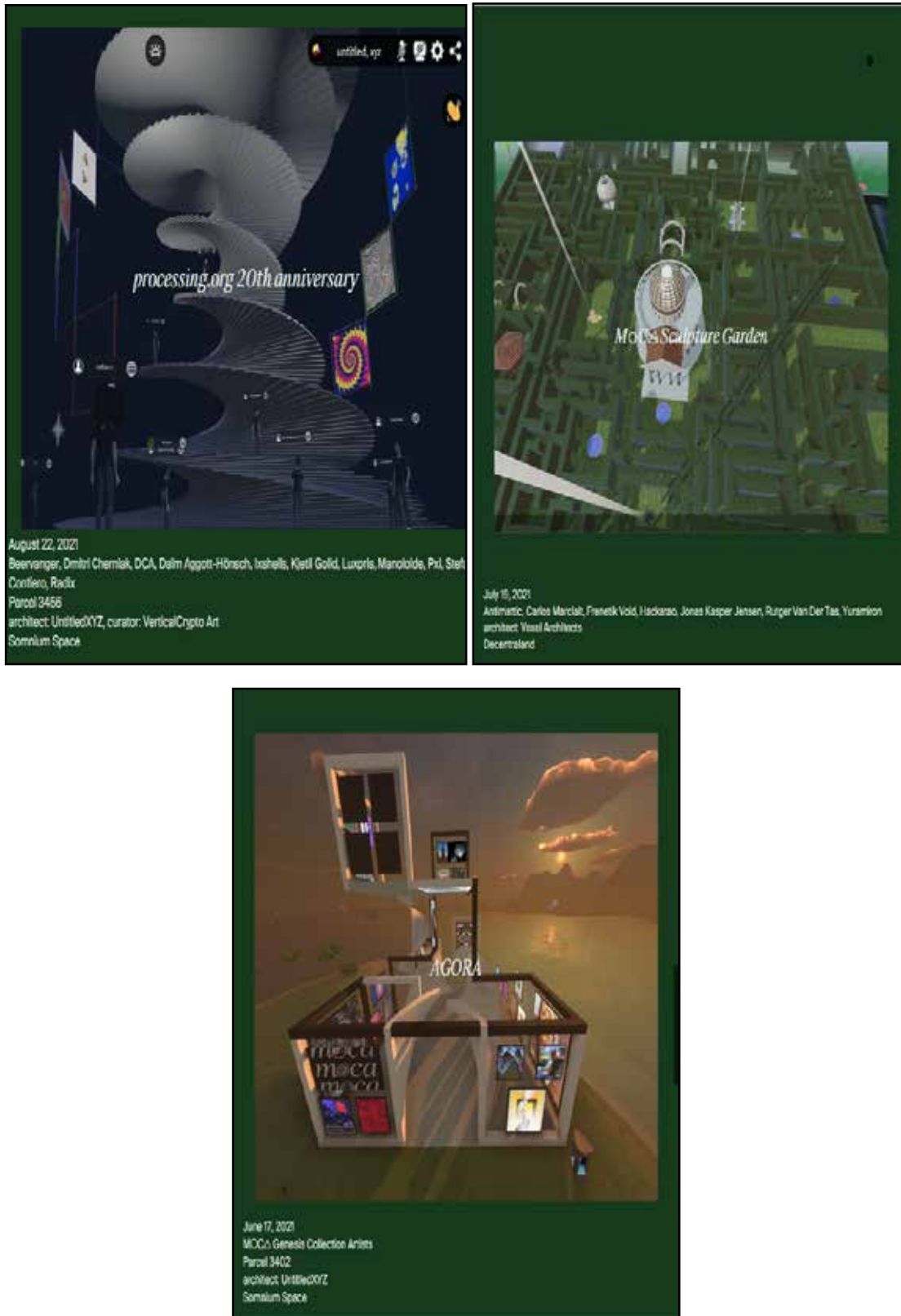


Figure 7: Museum of Crypto Art Exhibition Areas (Museum of Crypto Art, 2022).



Figure 8: Nemo Virtual Museum (Nemo Virtual Museum, 2022).

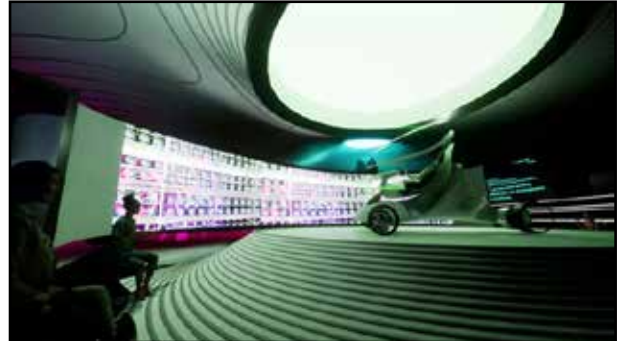


Figure 9: NFTism (Developed by ZHA, 2022).



Outdoor (İş Sanat New, 2022)



Interior (İş Sanat in Metaverse, 2022)

Figure 10: İş Sanat NFT Exhibition.



Figure 11: “Ancient Futures” Exhibition (İstanbul Archaeology Museums, 2022).