The Analysis of the Effects of Virtual Museums on Museum Experience

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ABSTRACT

This thesis examines the rapidly increasing number of virtual museums and the museum experience they provide to their visitors. Virtual museums, like museums, offer a certain level of experience to their visitors. There are certain criteria for them to offer this experience. In this study, existing virtual museums have been pre-evaluated and divided into two main categories as museums designed as virtual museums and museums adapted to virtual museums. The selected seven virtual museum examples were examined according to these two main categories. Each selected example was evaluated in four stages: virtual museum design, virtual environment, perception and interactivity, and the results were compared. The study was carried out through literature review, evaluation of virtual museums.

This thesis consists of five chapters. The first part of the thesis gives information about the purpose of the research and how it was carried out. In the second and third chapters, a literature review was done. The definition of museums, how they developed in history and turned into virtual museums, virtual museum categories and the virtual museum experience were examined. Finally, evaluations were made on the selected virtual museums with the criteria obtained from the literature review. This thesis is aimed to assist future studies in the field of virtual museum design and experience.

Keywords: Museums, Virtual Museums, Museum Experience, Digital Museum Design, Perception, Interactivity

ÖZ

Tez son yıllarda sayıları hızla artan sanal müzeleri ve bu müzelerin ziyaretçilerine sağladıkları müze deneyimini incelemektedir. Sanal müzelerde, müzeler gibi ziyaretçilerine belirli bir düzeyde deneyim sunmaktadır. Bu deneyimi sunabilmeleri için ise belirli kriterler vardır. Bu çalışmada, yer alan sanal müzeler ön değerlendirmeden geçirilerek sanal müze olarak tasarlanan ve sanal müzeye adapte edilen müzeler olmak üzere iki ana kategoriye ayrılmıştır. Seçilen yedi sanal müze örneği, bu iki ana kategoriye göre incelenmiştir. Seçilen her örnek, sanal müze tasarımı, sanal ortam, algı, ve interaktiflik olmak üzere dört aşamada değerlendirilerek, sonuçları karşılaştırılmıştır. Çalışma, literatür taraması, sanal müzelerin kriterlere bağlı olarak değerlendirilmesi aracılığı ile yapılmıştır.

Tez beş bölümden oluşmaktadır. Tezin birinci bölümü, araştırmanın amacı ve nasıl yürütüldüğü hakkında bilgi vermektedir. İkinci ve üçüncü bölümde literatür incelemesi yapılarak, müzelerin tanımı, tarih içerisinde nasıl gelişim gösterip sanal müzeye dönüştükleri, sanal müze kategorileri ve sanal müze deneyimin ne olduğu incelenmiştir. Son olarak, seçilen sanal müzeler üzerinde, literatür incelemesinden elde edilen kriterler ile kişisel değerlendirmeler yapılmıştır. Bu tezin sanal müze tasarımı ve deneyimi alanındaki çalışmalara ışık tutması hedeflenmiştir.

Anahtar Kelimeler: Müzeler, Sanal Müzeler, Müze Deneyimi, Dijital Müze Tasarımı, Algı, İnteraktiflik

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INTRODUCTION

1.1 Problem Statement

Museums are complex organizations: that is why conservators, exhibition designers, conservation groups, publishers, and advertisers work together to ensure that humanity's heritage and creations are adequately displayed to the public in galleries and exhibitions. The use of effective museum space design has an impact on this process. It protects and highlights the works aesthetically. While the museum area highlights the artefacts, it may also offer an entertainment environment that will satisfy the visitors. Experiencing various artefacts in different venues in museums can impact the visitor's overall museum experience. As space and experience are directly connected, a quality museum space is essential for a quality visitor experience.

The aim of starting the research was to examine the effects of museum space design on visitors and their museum experiences. Based on these effects, suggestions would be made for the design of the museum space. The Covid-19 pandemic process we went through has affected humanity in every field. In this process, museums, which were closed to visitors, became one of the most affected institutions. For this reason, this study has shifted in another direction. Museums began to digitalize long before the pandemic, accelerated in this process, and began to create virtual museums and exhibitions. Museums continued to function with the help of virtual museums. The collections and museum spaces exhibited in museums were accessible to visitors with

the help of a screen. Although virtual museums are visited with the help of a screen, they provide a certain level and a different museum experience. Therefore, the design of virtual museums has an impact on the museum experience. Many virtual museums were created in this fast-growing process, and each offers different experiences in different ways. The main points to be considered in virtual museums which are formed due to this rapidly developing process are how virtual museums and their designs as well as virtual museum and visitor interaction affect the museum experience.

1.2 Aim of the Research

This thesis concentrated mainly on the design aspects of virtual museums and the experience they provide. The aim of the thesis is to evaluate the effects of museums designed as virtual museums on the overall museum experience. Virtual museums can be divided into two, museums designed as virtual museums, which physically do not exist, and museums adapted to virtual museums, which are digitalization of the existing museums. Therefore, the museum experience provided to visitors is important in both situations. The virtual museum's, appeal to more than one sense organ; its easy accessibility, the easy movement of visitors while visiting the virtual environment, the ability to access the exhibited object and its information, and many more are the leading features in virtual museum design.

The study aims to provide an overview of virtual museum designs by focusing on virtual museums, discussing their effects on the museum experience, and to reveal what criteria virtual museums should meet to provide visitors with a certain level of quality museum experience. For the purpose of the study, the virtual museum experience, including museums and experience subjects, were the focus of the research (Figure 1).

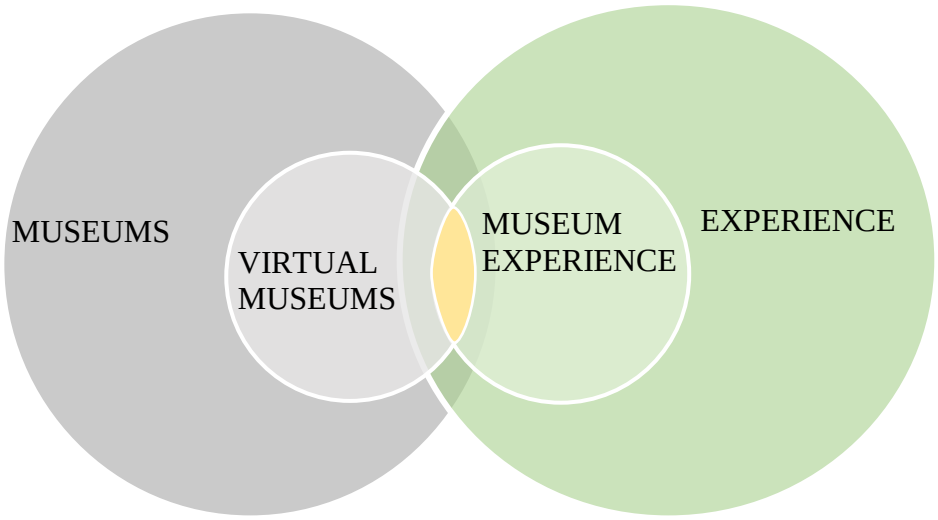


Figure 1: Relationship of the Topics of the Study (By the author)

1.3 Methodology of the Research

The scope of the work is the virtual museums and their effects on the museum experience. The method used in this research is the qualitative research type. The research method is divided into two: documentary research and case study. In the first part, documentary research, the research's theoretical information were collected, and the subjects related to museums, virtual museums and museum experience were discussed. In the second part, the case study, the selected examples are analyzed.

This thesis includes a literature review covering museums, virtual museums, and museum experience and offers background information on the topics. This literature review established criteria for the analysis of virtual museum samples. Case study analyses were made on selected virtual museum samples, and samples were reviewed between April and June 2021. The criteria obtained from the literature review, the plans and the visuals of the selected samples helped analysis and evaluation. With the criteria formed due to literature review and personal evaluations, the museum-visitor interaction during the visit, which forms the museum experience, were evaluated.

Then, how virtual museums should be designed and how this interaction affects the museum experience were discussed (Figure 2).

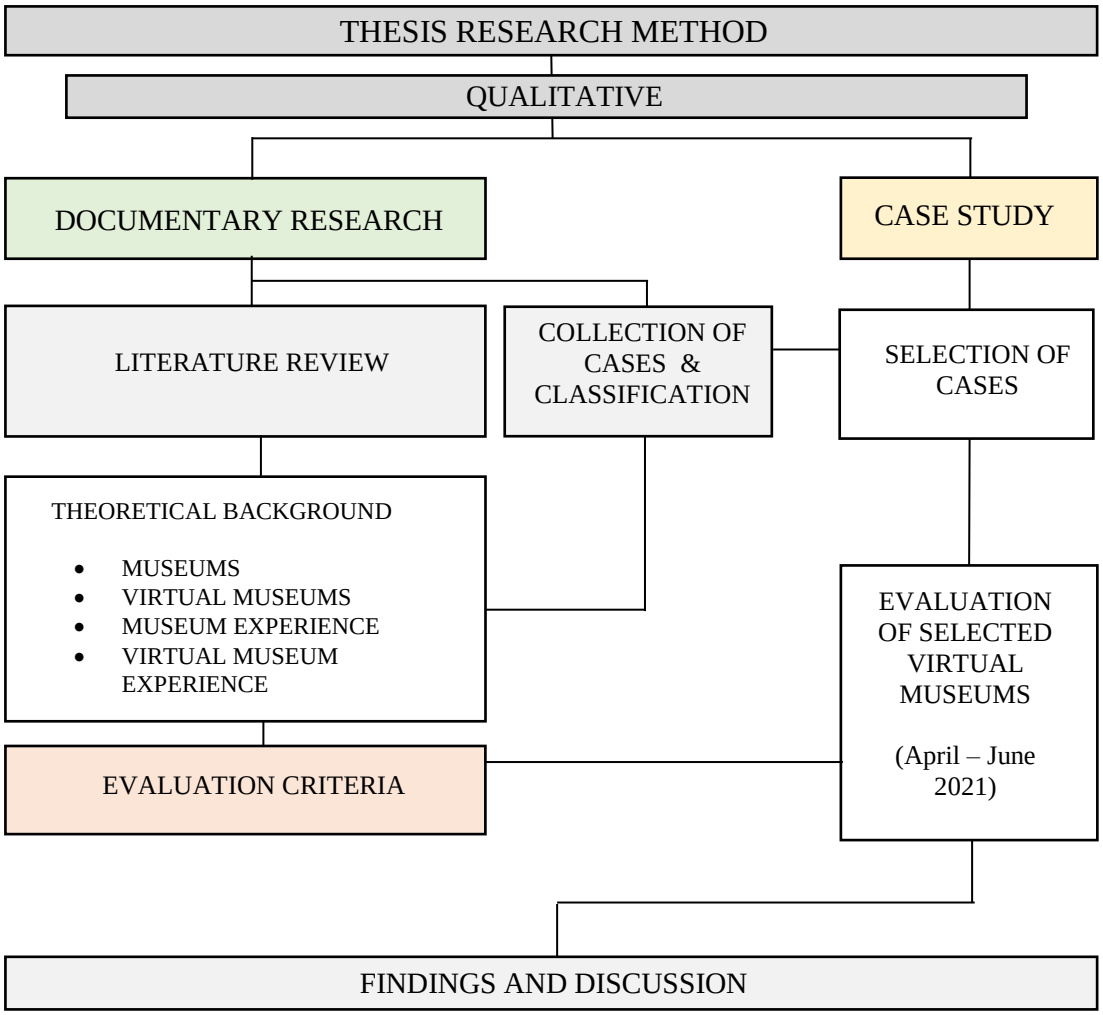


Figure 2: Thesis Research Method (By the author)

1.4 Limitation of the Research

Due to the increasing interest in virtual museums, many virtual museums have been established and continue to be established. In order to limit this study, virtual museums are divided into two categories. The first category is museums designed as virtual museums that do not exist physically, while the second category is museums adapted to virtual museums, which are extensions of physically existing museums.

The second category is divided into three subcategories. Two virtual museum examples selected for each category and subcategory. For the examples to be selected for the first category, the criterion that they have no connection with any existing museum were sought. For the second category, virtual museums of previously visited museums were selected.

Unfortunately, the opinions of the virtual museum visitors were not taken due to the current Covid-19 pandemic process. The research was conducted by personal evaluations in the light of theoretical framework. These evaluations will focus on the museum-visitor interaction during the museum visit, which creates the museum experience.

1.5 Organization of the Research

This thesis is organized over five chapters. The first chapter gives information about the general lines of the thesis. In this section, how the study is formed, its purpose and methods, and how the study will follow are explained. In the second chapter, a literature review was done about museums. The definition and historical development of the museum was examined. In order to research virtual museums, it is important to know how and where they started and how they turned into the virtual museums known today.

The third part is the last part of the literature review. This section discusses how the experience is formed and what the virtual museum experience is. The fourth part is the part where the analyzes are made. In this section, selected samples were analyzed according to criteria obtained from the literature review. The results obtained are summarized and discussed in the fifth chapter, which is the last chapter (Figure 3).

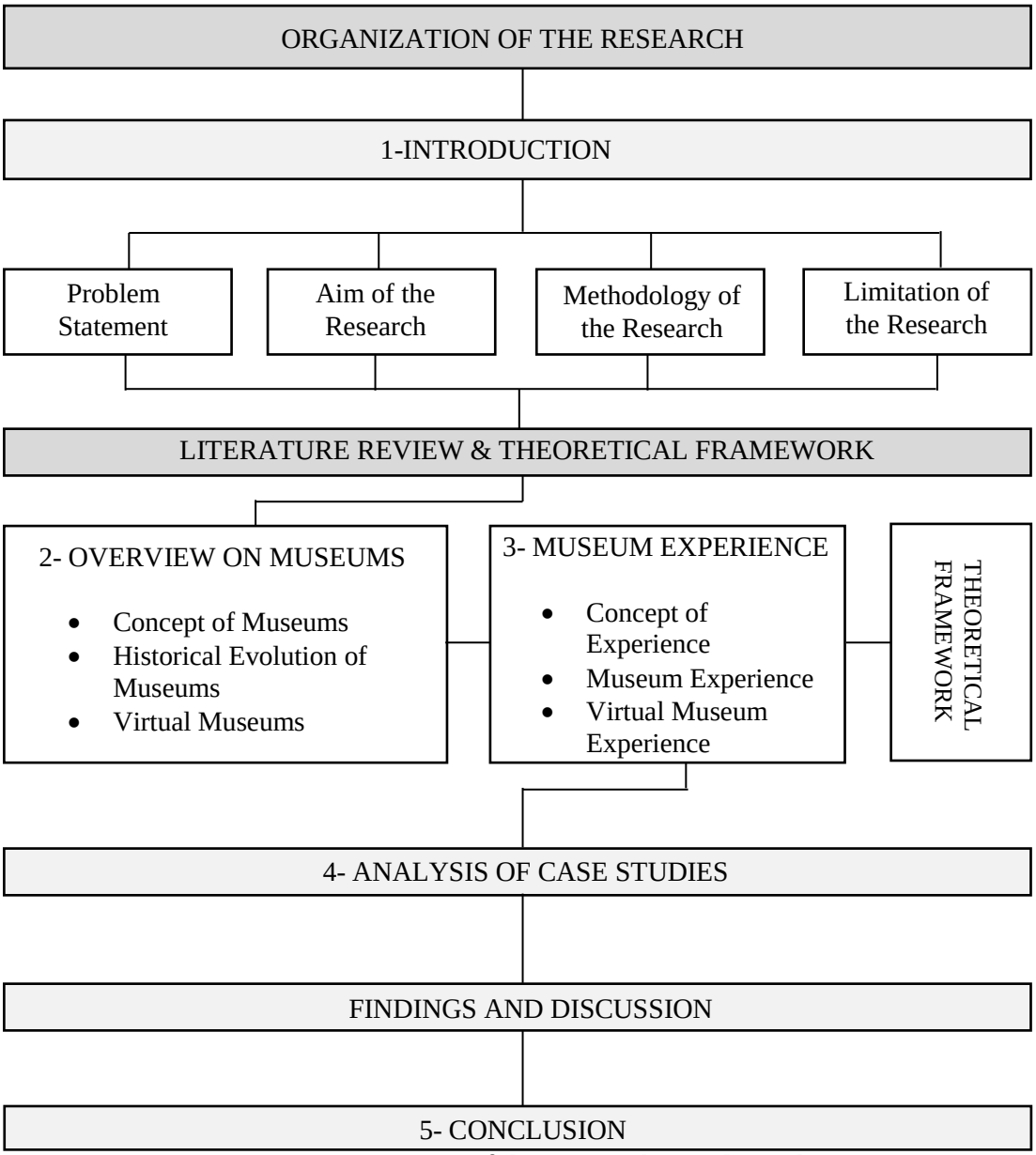


Figure 3: Organization of the Research (By the author)

Chapter 2

AN OVERVIEW ON MUSEUMS

"…That's why we have the Museum Matty, to remind us of how we came, and why: to start fresh, and begin a new place from what we had learned and carried from the old."

Lois Lowry

2.1 Concept of Museum and Museology

People have always wondered about the past and wanted to have them by collecting items from past eras. The desire to collect, which started with the instinct to meet humankind's basic needs such as nutrition, shelter, and protection, began to demand the different and beautiful as a symbol of political power, class superiority, and vanity. A significant accumulation of all kinds of objects and works of art has been formed over the centuries (Tanselle, 1998). When the collecting activity, which is the basis of this accumulation, turns into a regular and systematic action for a specific purpose, it has formed the core of collections first and enabled the creation of museums in the future.

Collections that have a longer history than museums have started with the earliest human communities (Simmons, 2010). There are reasons behind the creation of a collection. Some of these are wealth, desire to own rare items, personal taste, social prestige. Functional items and grave goods that were part of the material culture of the early people were the first examples of the collection (Simmons, 2016). What

makes the collection different is that objects are musealized in a collection. In other words, the objects have been removed from their natural or cultural environment so that they can be part of the collection (Desvalle´es, 2010).

A philosophical and mythological institution called the Temple of Muses is the source of both the museum's modern concept as a place and the word museum (Findlen, 1989). It can be said that the origin of the word museum concept, which is defined similarly by different people and institutions, dates back to the Ancient Greek period. The word "museum" is derived from the Ancient Greek word "museion". The meaning of the word museion is the temple of muses, and the muses are "The God of Inspiration" or "The Protector of Arts". In Greek mythology, in Ancient Greece, Zeus and Titan Goddess Mnemosyne had nine daughters, and they were called muses (Figure 4). These are Clio, Erato, Thalia, Euterpe, Polyhymnia, Calliope, Terpsichore, Urania, and Melpomene. Museums accepted as the temple with arts in it and the muses are protectors of art (Simmons, 2016).

Figure 4: Illustration of Nine Muses, The God of Inspiration (URL 1)

Over time, many organizations and people have defined museums. According to The Museums Association (1998), "Museums enable people to explore collections for inspiration, learning and enjoyment. They are institutions that collect, safeguard and make accessible artefacts and specimens, which they hold in trust for society."

Another definition of the museum, made by the American Museums Alliance, is that "museum is an organized and permanent non-profit institution, essentially educational or aesthetic in purpose, with professional staff, which owns and utilizes tangible objects, cares for them and exhibits them to the public on some regular schedule" (Alexander and Alexander, 2008:2 as cited in Simmons, 2016).

The definition of the museum accepted globally and currently used is the definition made by the International Council of Museums (ICOM). According to the International Council of Museums (2007);

> "A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches communicates, and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment"

Museums are organizations that are intended to protect, examine and evaluate a whole, consisting of works of cultural value for the promotion and education of the society, with various tools. Museums provide people pleasure, knowledge, and awareness in terms of the works they contain and the programs they apply. Museums have goals such as educating, providing sensitivity and instilling enthusiasm. Based on these purposes, they examine, research, and aim to pass on the works to future generations.

As a result of examination and research, many works are exhibited by being introduced to people, and there is no expectation of profit or gain from this display. The primary purpose is to motivate historical richness and to provide scientific and cultural continuity. Besides, buildings that are established under the name of museums, libraries with permanent exhibition areas, historical monuments, archive centres,

historical buildings, sites with historical and archaeological value, parks, plants and zoos, aquariums, organizations can also be included in the definition of a museum.

Alongside the museums, a body of theory gradually developed over time, the study of which is known as museology (Lewis, 2020). Museology is defined by UNESCO (n.d) as; "Museology is the theoretical study of museum practices, encompassing the history and development of museums, infrastructural organization and museum management." Today museums attained an independent discipline identity in universities under the name of "Museology". With the formation of the Museology discipline, it has been understood that museums are not just about hosting collections. Museums, museology and museum visits have developed and gained a different dimension with the contemporary approaches of museology and the help of other disciplines.

Contemporary approaches have led to a change in the roles of museums by questioning what they exist for over time. Schubert (2004) states that, over time, museums have transformed into institutions that emphasize the aesthetic and educational aspects of the museum experience, rather than hosting collections and focusing on academic purposes. Prentice (1996, cited in Doering, 1999) states that museums, like many organizations that aim to attract people to heritage, are products for experience, structures that literally enable experience. Museums enable feelings and knowledge based on personal observation or contact through visits. The museum is mostly perceived as a type of building that is prepared to evaluate and define cultural data and to show the value of culture for the changing demands of contemporary society (Giebelhausen, 2005).

2.2 Historical Evolution of Museums

As organizations that conserve and assign meaning to civilization's materials, museums have a long and diverse history arising from the human need to gather and interpret. As educational and conservation centres, museums play a significant role in preserving culture. These institutions vary in size and expertise, but each museum's mission revolves around displaying and maintaining its collection, often of many objects. Museums are among the most visited places globally (Falk & Dierking, 2013). To understand how museums emerged, it is essential to understand their origins, explore their evolution, and how they have changed over time. In a diverse variety of human cultures, the desire to collect and ordering items is a common human characteristic that takes various forms (Muensterberger, 2014). Museums were developed in response to people's need to understand the world. Museums help people make sense of the chaos around them using collections of objects (Pearce, 2017).

The museums we know today did not appear anywhere. It developed gradually, from private collections to public collections, from a show of wealth to its use for the public's benefit. This development has not been in a straight line. It was formed by the combination of many different directions. There is no definite moment in history with the emergence of the museum, but some key ideas and trends in museum history can be identified (Simmons, 2016). When these key ideas and trends were taken into account, it is possible to divide the historical evolution of museums into five periods. These are; Museum in Temples, Museum in Palaces, Museum in Curiosty Cabinet, Museum for Society and Museums Towards the Digital Platform.

2.2.1 Museum in Temples (Ancient Time - BC.)

The human tendency to acquire and the question has formed the roots of the concepts of preservation and interpretation that form the museum's basis. While there are collections of objects in prehistoric tombs, evidence of exhibiting art can be seen in caves from the same period (Lewis, 2020). The cave paintings contained essential elements of exhibiting art. Cave paintings in Altamira are one example of this (Figure 5). Therefore, it is possible to trace museums back to the prehistoric period. Cave paintings are part of the common culture and legacy of these early civilizations. This public representation of artistic creation and symbolism could have various functions (Chaliakopoulos, 2020).

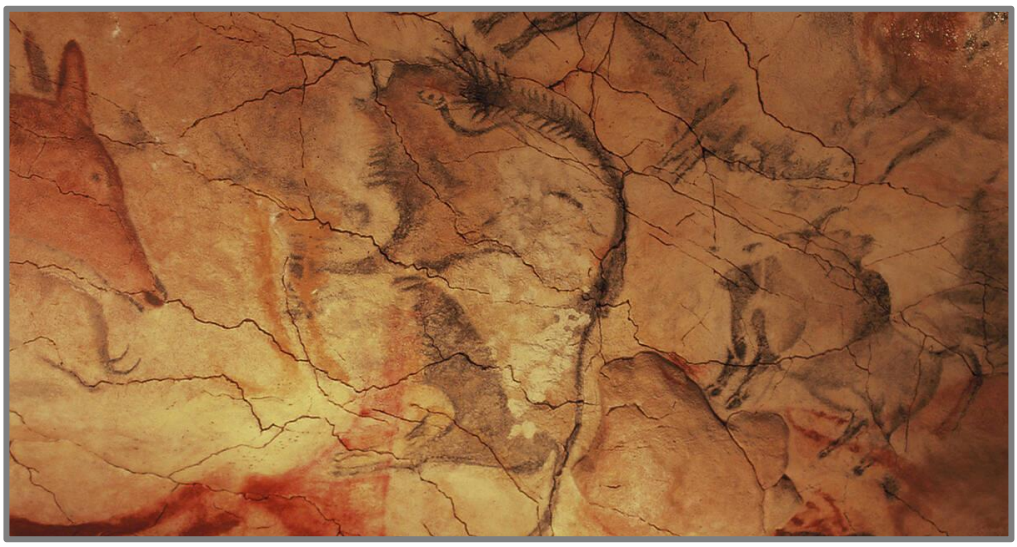


Figure 5: Evidence of Exhibiting Art: Cave Paintings, Altamira, Spain (URL 2)

Collecting, which has an important role in the formation of museums, the collection of objects that can be valuable or of interest has been carried out by groups and individuals worldwide (Lewis, 2020).

In ancient times, art or objects was displayed everywhere; temples were one of those places. Treasury buildings such as temples were built, which can be described as the modern museum prototype in the Ancient Greek period, where precious artefacts and art objects were collected. A treasury was a temple-like structure, usually consisting of a small, single room with a roofed porch (Figure 6). A temple could have one or more treasures (Bounia, 2004). Temple treasures had several purposes. These were places where the gains from wars were displayed, where victories are always remembered, and cities' wealth was shown (Bounia, 2004). In this period, daily life was shaped around God and religion, so the objects exhibited can be considered as gifts to the gods in the temple. It can be said that Greek antiquity was not in search of categorizing and exhibiting museum-like venues and collections. Therefore, these collections were not systematic collections. For this reason, they were not museums compared to today's museums. In more than one sense, these temples could be called the ancient pioneers of the museum because the objects were taken from their natural environment and brought to the temple, just like today's museums.

Figure 6: Greek Treasury: A Temple-like Structure for Artefacts – Athenian Treasury (URL 3)

The development of writing and writing materials has led to the formation of libraries where information is stored. King Ptolemy Soter Philadelpos established a centre consisting of a mousaion and a library in a part of his palace in Alexandria in today's Egypt. Described as a combination of a school of scholars, a research institution, and a library, the Alexandria Temple is similar to temples in Greece (Figure 5) (Simmons, 2016). This temple has become an important science centre where various scientific instruments and works of art are exhibited, protected and units such as an observatory. Although this building is different from today's museums, it is one of the oldest examples showing that the museum's concept has started to emerge.

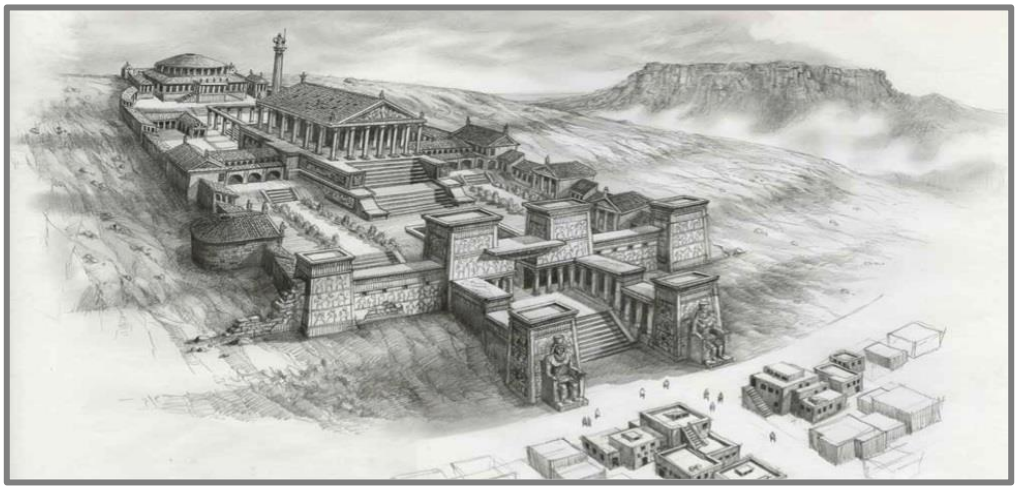


Figure 7: Oldest Example of Museum Concept: Illustration of Alexandria Temple (URL 4)

These developments were also happening in Mesopotamia. Archaeologist Leonard Woolley discovered the world's oldest collection and museum-like structure in the city of Ur, Babylon, in today's Iraq, in 1925 (Figure 8) (Wooley, 1955). King Nabonidus's daughter, Princess Ennigaldi, collected and curated Mesopotamian artefacts in 6th BC (Lewis, 2020).

The organized and even named collection ranged from clay tablets to figurative sculptures, small animal figures to stone vases with relief ornaments (Simmons, 2016). This discovered collection is considered to be the oldest known museum.

Figure 8: World's Oldest Museum-like Structure: Ruins of Ancient City Ur (URL 5)

2.2.2 Museum in Palaces (5th to 15th Century)

The development of the Christian Church, which dominated the intellectual life in Europe, and the museum concept in the Middle Ages is inseparable (Lehman, 2008). During these times, the influence of the church and the spread of Christianity had new effects on the idea of religion and culture. The monasteries were home to libraries, and the church was collecting collections of manuscripts, relics, and treasures, many of which were the gifts of travellers and nobles (Murray, 1904). With the changes in the content of the collections, all kind of religious complexes have changed as centres of learning and knowledge preservation (Simmons, 2016). Collections kept in churches and palaces had economic importance. It was also representing wealth (Figure 9). At the same time, Islamic communities were collecting relics. The foundation idea put forward by the Prophet Muhammad himself also led to the

formation of collections. Foundations were organizations where the property was given for public benefit and religious purposes (Lewis, 2020).

In general, it is possible to talk about spoils, valuable items in religious complexes, and collections of the treasures of kings and princes. Paintings and sculptures, manuscripts, sacred relics, valuable items have led to the creation of rich collections in religious complexes.

Figure 9: The Green Vaults Museum – King Augustus Palace – Dresden, Germany (URL 6)

2.2.3 Museum in Curiosity Cabinets (15th to 17th Century)

In this period, collecting objects became fashionable as a social activity for individuals. The nobles and church's passion for collecting items grew even more. Many cultural, economic, and demographic changes took place during this period with the effect of the Renaissance. The discovery of new places and the beginning of colonization is the beginning of these changes.

Objects of different cultures and artworks brought from the colonies attracted the nobility and collectors' attention, and a desire to create their own private collections arose (Simmons, 2016). One of the notable collections was the collection created by Cosimo de' Medici in Florence in the 15th century. To exhibit some of the Medici paintings, he converted the Uffizi Palace's upper floor into an exhibition space in 1582 (Figure 10) (Lewis, 2020). With the influence of Medici, kings in other parts of Europe began to use their palaces to exhibit their collections.

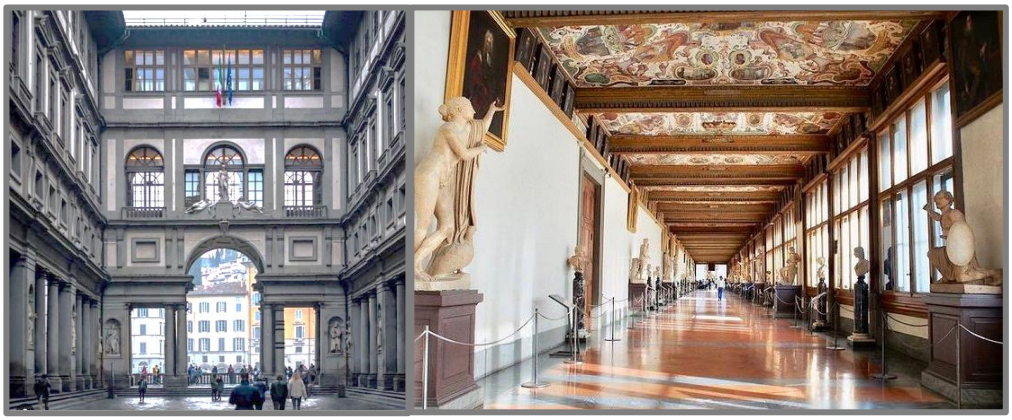


Figure 10: The first palace converted into an exhibition hall: Uffizi Palace and Interior – West Corridor -Florence, Italy (URL 7 and 8)

These places, which are a step on the way to the modern museum, were later named as a cabinet of curiosity. These cabinets could be a room, box, or cabinet. Collections were organized, labelled, and exhibited (Figure 11). There was a wide range of objects, from animals to works of art. Including human-made objects and natural objects (Pearce, 1995). The collections which emerged as part of scientific research, are organized according to personal interest and taste. The cabinets, which started to be seen in France in the 15th and 16th centuries, later became widespread in other European countries (Simmons, 2016). Thus, while the collections diversified, the spaces created for the collections and the functions of these spaces gradually changed, and the pioneers of modern museums appeared.

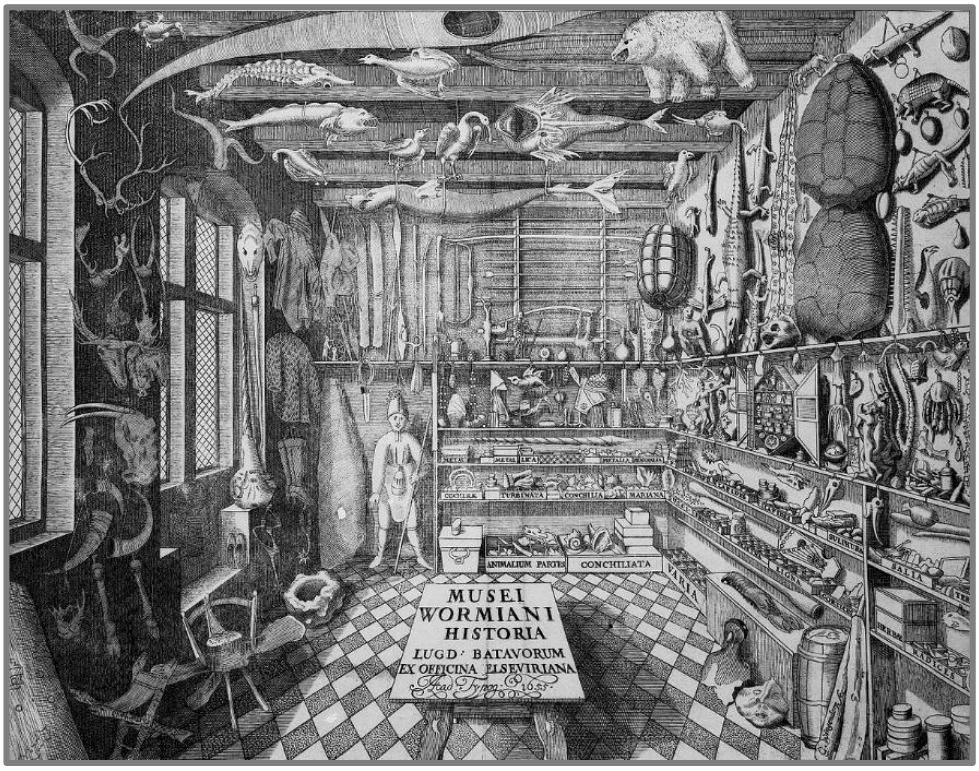


Figure 11: Illustration of Curiosity Cabinet (URL 9)

Although it is possible to talk about a great accumulation of treasure from ancient times to the Renaissance, the concept of collection in today's sense is a product of Renaissance thought. In this period, when the focus was on human life (humanism), the importance of educating the society began to be understood. The collections, which were formed by collecting valuable and intriguing objects of this period, were brought together in a certain intellectual environment and started to be used for the benefit of the society (Renaissance, 2020). The fact that the collections were used for the benefit of society during the Renaissance led to the museums that were created later to be open to the public.

Renaissance collections, symbolizing social prestige and serving as an essential element in the nobles' traditions, acquired a different meaning and purpose over time (Lewis, 2020). The 17th century creates a different beginning in terms of the formation

of the concept of museology. These collections, which are not open to the public, cease to be objects of pleasure and begin to be evaluated for social sharing and knowledge transfer (Simmons, 2016).

The first example of this understanding emerged when Elias Ashmole donated his private collection to Oxford University in 1683. Thus, a private collection that falls within the university's scope as a social space was opened to the public for the first time. According to some sources, this collection, which is the foundation of the Ashmolean Museum in England, is also known as the first public museum (Figure 12) (Lewis, 2020). With collections available to the public, people became able to access information more quickly. The enlightenment that came with this knowledge made people more aware of their surroundings. This awareness has taken museums one step further.

Figure 12: First Public Museum: Interior of Ashmolean Museum, Sculpture Collection (URL 10)

2.2.4 Museum for Society (18th to 19th Century)

The 18th century opens a new era in the field of museology with the social, cultural, and political developments that led to the institutionalization of the museum. The collections, which started to be opened to the public for the first time during the Renaissance period, gained momentum in the 18th century, so museums have emerged in the real sense. These developments, supported by the increase of discoveries and the industrial revolution, are evident at the opening of two of Europe's outstanding museums (Lewis, 2020).

One of the important initiatives of the age is the British Museum in England (Figure 13), which was created by the doctor and collector Hans Sloane, with the proposal made to the British king and parliament. Sloane left his collection to the British nation. This collection was opened to the public in the Montagu mansion in Bloomsbury, London, in January 1759 under the name of the British Museum (Lewis, 2020).

Figure 13: The British Museum, London, UK. (URL 11)

After the opening of the British Museum, other museums were opened one after another in other European cities. The Louvre Museum, which opened after the French

Revolution, where royal collections were opened to the public, became an example for many museums in the world (Figure 14). In 1793, the Louvre Palace in Paris was organized as a museum after the revolution and opened to public access as the Louvre Museum. It is striking that the Louvre, which aims at "civilizing" the citizens, is open to the public and free of charge, unlike previous museums (Chaliakopoulos, 2020).

Figure 14: Louvre Museum, Paris, France (URL 12)

With the developments in this period and the new museums established, the idea of opening the museums to the public and aiming the education of the public gained more importance. In this context, Prince Albert and Henry Cole, believing that for the development and education of society, the public should be educated about culture and art, without distinction of social class, organized "The Great Exhibition" in 1851, which is open to everyone (Dağlı, 2019). This exhibition took place in the Crystal Palace, a temporary structure built in Hyde Park in 1851 (Figure 15). Six million visitors, including Queen Victoria, visited the Great Exhibition, a temporary exhibition that can be visited from May to October 1851 (URL 13). The Great Exhibition's success and its positive impact on society prompted Prince Albert and Henry Cole to create a permanent version of this exhibition. As a result, the Victoria and Albert

Museum was established in 1857. The museum was first named the Museum of Manufactures, later the South Kensington Museum, and finally the Victoria and Albert Museum in 1899. A large part of the collection of this museum, which was established, consisted of the objects exhibited in the Great Exhibition (URL 14).

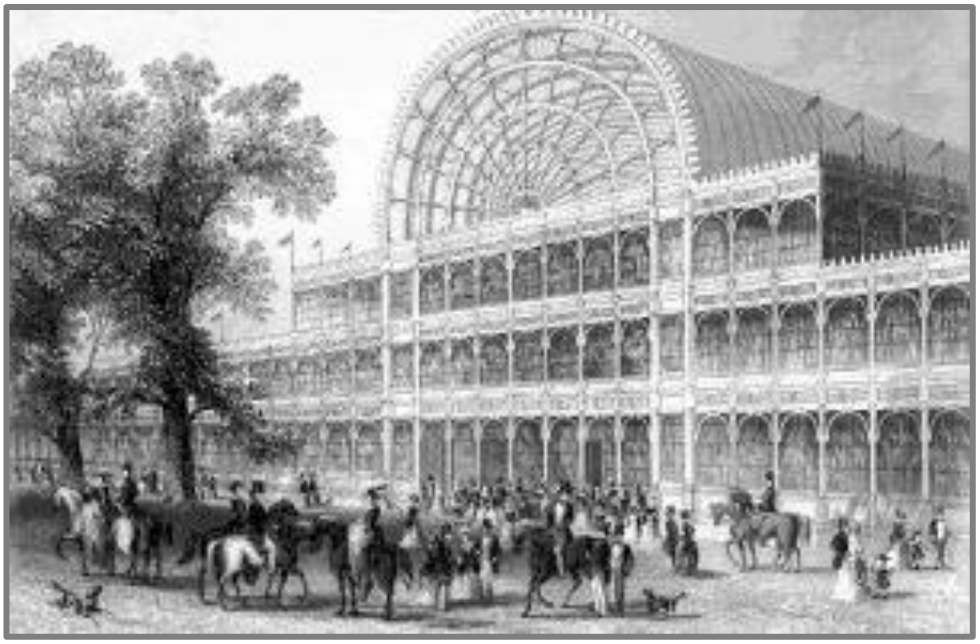


Figure 15: The Great Exhibition,Crystal Palace Hyde Park, London ,1851 (URL 15)

In the 19th century, many museums were established in Europe and countries outside of Europe. As a result of the nationalism movements that spread, especially after the French Revolution, each nation was researching its history and writing history to base it on ancient civilizations. In the early 19th century, due to public access to collections, museums were established by regional and national authorities worldwide in the following years for public benefit (Lewis, 2020).

2.2.5 Museums Towards the Digital Platform (20th to Present)

Museums that became increasingly diverse throughout the 20th century were categorized under different categories, such as science museums, natural history museums, art museums, and history museums (Chaliakopoulos, 2020). At the beginning of the 20th century, as a result of the world wars, museums were changed or had to be rebuilt. While rebuilding, museums abandoned traditional exhibition forms and began to develop modern methods. Museums have changed from the museum's architecture to labelling an object (Lewis, 2020). These modern methods have influenced museum architecture, interior design, and exhibition planning. During this period, with the changes related to museum work, designing a museum for architects became one of the competing works as a prestigious task. As a result of this task, today's landmark museums have emerged. Scientific and technological development caused to appear new types of museums, such as memorial museums (Figure 16). In addition to these new types, new sections such as laboratories, cafes, gift shops were added to museums (Simmons, 2016).

Figure 16: National WWI Museum and Memorial,
First Memorial Museum, Kansas City, USA (URL 16)

Towards the end of the twentieth century, museums attained an independent discipline identity in universities under the name of "Museology". Museums, which preserved and exhibited their collections in historical buildings, have gradually been restructured with a contemporary understanding of museology and have become non-formal education institutions located in new buildings designed according to the works they will keep.

Museums are in continuous development. Museums of the early 21st century are already different from those of the late 20th century. With the help of technology, museums started to take place on digital platforms. The pandemic process we are in has forced the museum world into a faster digital process. Museums make their collections accessible online. At the same time, museums create virtual tours and online exhibitions to maintain contact with their visitors. Museums' future is thought to be in the digital environment, but this statement does not mean that physical museums will disappear. However, museums will benefit from virtual reality, 3D and other technologies. In general, the existence of virtual museums is becoming as important as physical museums.

2.2.6 Overview of Museum Timeline

Today, museums that have functions such as the education of society and the protection of cultural heritage did not appear suddenly. There are no clear lines in the historical development of museums, but there are developments that trigger each other and lead to the formation of today's museums (Figure 17). In the early years of humanity, cave paintings with artistic value depicting daily life are among the points where cultural heritage began to emerge. The collections, which were formed with the instinct of collecting before the establishment of museums, were collected and exhibited in tombs, holy places, temples, palaces, villas and city centres for religious

and objective reasons. Before Christ, temples gained importance as cultural centres, and a part of the temple of Alexandria was organized as a science and education centre like today's museums. Later, with the emergence of monotheistic religions, collections in these temples came under the patronage of clergy and nobility and were preserved in churches in palaces, used as an indicator of wealth and power.

The developments and discoveries of the 15th century increased the nobles' interest in collecting and caused them to reserve a part of their palaces only for collections. In the 17th century, these collections became more systematic and began to form curiosity cabinets. In the following years, these private collections started to open to the public, and the first public institutions started to form. As a result of the developments in the industrial revolution in the 18th century, the idea of opening the collections to the public gained importance, and today, the well-known and most visited museums began to be established. Besides, the great exhibition held in this century pioneered the opening of the collections to the public to educate society. World wars of the 19th and 20th centuries damaged museums and caused them to be rebuilt. Also, new types of museums emerged during this period, and new sections were added to museums. Today, museums have turned into institutions that have not only exhibition purposes but also many cultural, educational and social functions. This transformation continued with the digitalization process and progressed to virtual museums. As a result of this transformation, museums have become digitalized and accessible worldwide with virtual museums. With the advantages of the 21st century, museums continue to protect cultural heritage and educate society.

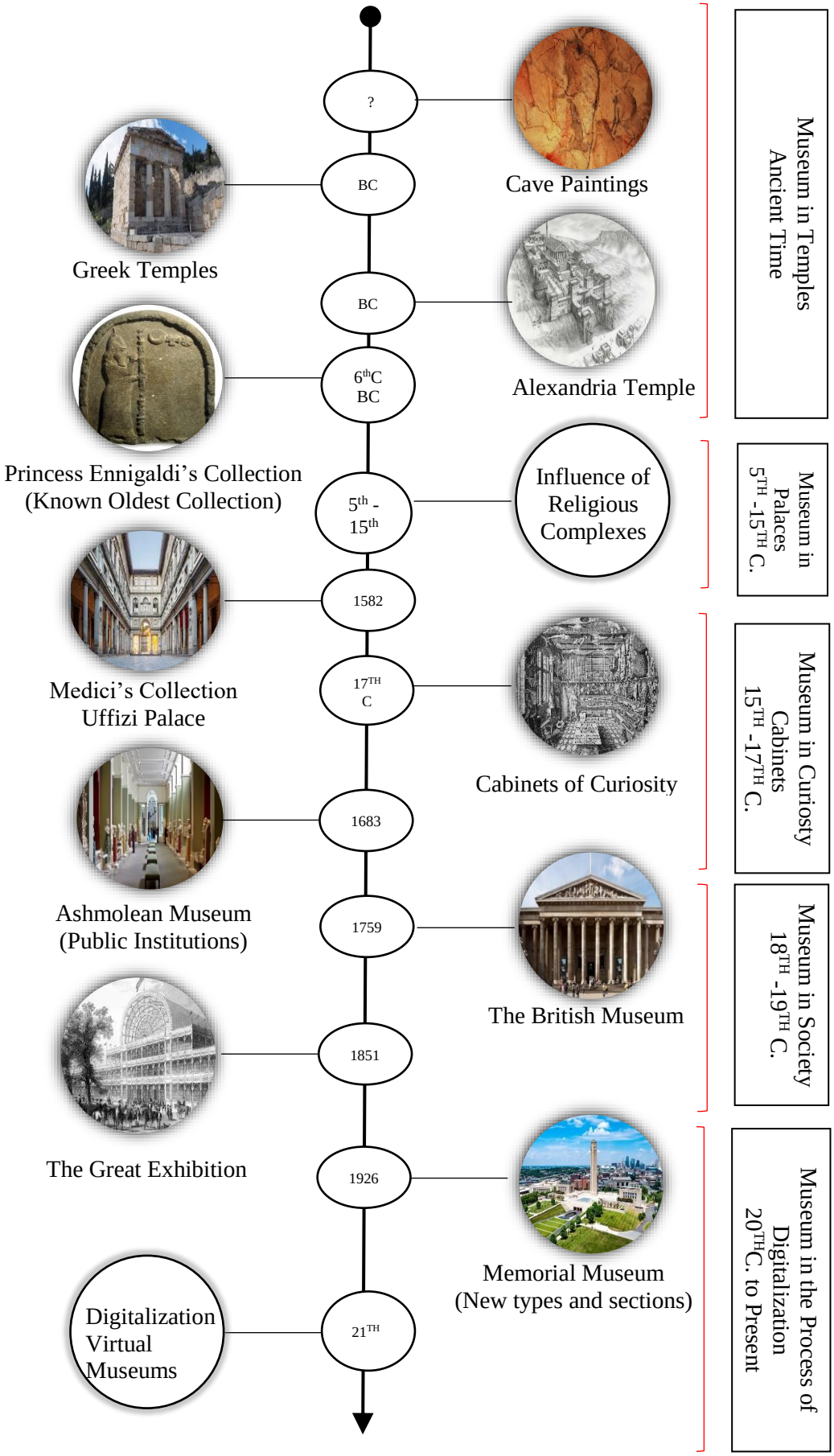


Figure 17: The Timeline of Museums (By the author)

2.3 Types of Museums

Museum types vary depending on the differences in the definition and purpose of the museum. Collections are common to all museums. Museums are divided into different types according to the collections they create (Ambrose & Paine, 2012). The necessity of classification arose because of their wide variety. The most important criterion for museums is the classification made according to the collections they have. The type of museum can be determined according to the collection it exhibits. Apart from this, the fact that the museum types are diverse in other meanings allows different classifications. Ambrose & Paine (2012) states that museums vary according to their purpose. Some museums aim to entertain tourists, others to preserve information and research. It varies according to their collections; there is a wide range of collections from insects to antique sculptures. They vary according to their collection, who runs them, and whom they serve (Figure 18).

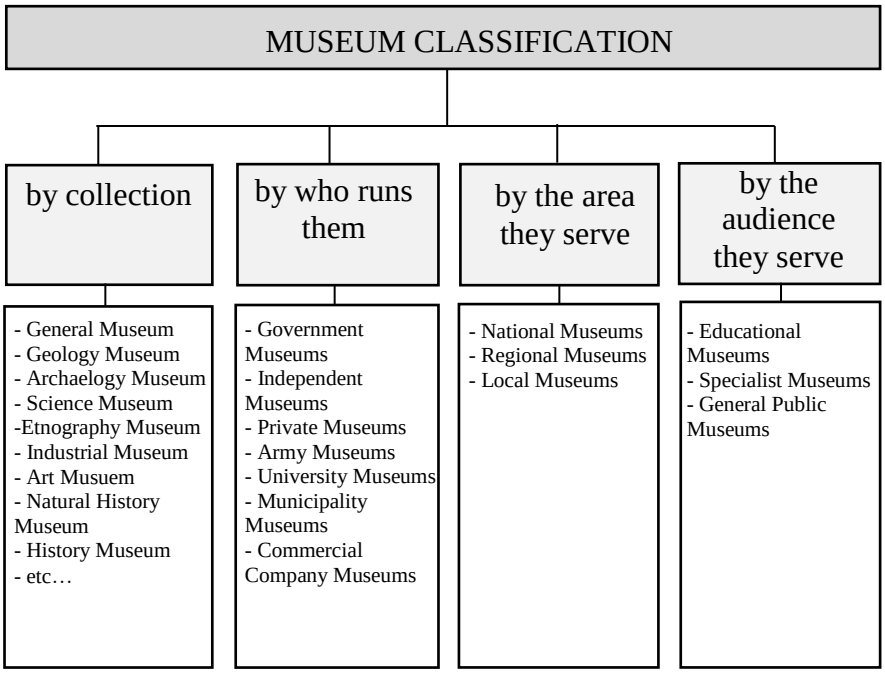


Figure 18: Classification of Museums (Adapted from Ambrose & Paine, 2012)

There are many types of museums classified according to different categories. The most common and integrated museum types classified according to their collections among various museum types are history museums, natural history museums, science museums and art museums.

The museums, which are derived from these main types, were created by developing the main types and taking new forms. The newly formed types differ from the main types from which they are derived and enrich the museum types. Therefore, the common feature of many museums under these main museum types is that they are divided into separate branches and become more specialized in their own fields. (Mehrolhassani, 2015). These main types of museums are as follows;

- **History Museums:** In a wide variety of museums, where collections are collected and presented chronologically, the term history museum is often used. History museums study the history and future of an institution, region, country, or society; documents and exhibit all kinds of objects, including art and archaeological objects (Lewis, 2020). In the collections of the history museums, there are works of historical value that reflect the characteristics of the region where the museum is located.
- **Natural History Museums:** Natural history museums where national and local exhibitions focus on nature and culture occur; They were established to educate subjects such as natural history, specimens of birds, mammals, insects, plants, rocks, minerals, and fossils. At the same time, these museums are interested in topics such as evolution, environmental problems, and biodiversity (URL 17).

- **Science Museums:** Science and technology museums, which were established to introduce the basic principles of science to visitors, make observations by experimenting, arouse curiosity and excitement, and contribute to education. These are museums where important discoveries and scientific achievements are exhibited. Science museums are also popular with children and often offer visitors opportunities to participate in education through interactive exhibition methods (URL 18).
- **Art Museums:** Art museums; works with artistic value, the accumulation or art movement of several centuries; It is a museum specializing in works of art that display drawings, paintings, and sculptures and divided into various small spaces called galleries. Aesthetic value is an important consideration in art museums when accepting items for collection because art museums use objects to communicate with their visitors (URL 19).

2.4 Digitalization Process of Museums

Today, the impact of digitalization has been widespread and profound on museums that rely on new technology to manage their collections. New technologies are integrated with the exhibition grounds, and online events are as important as physical museums (Parry, 2010). Although we often think of digitalization as an online exhibition, it is actually about the general management of collections in the digital platform (Navarrete, 2020). The collections that developed and grew over time became difficult to manage. The first attempt in the digitalization process in museums was in the period after the invention of the computer. Switching to a digital environment for easier management of collections has started this process(Williams, 2013).

After this transition to a digital environment, digital archives began to be formed in addition to the physical archives of museums. With the invention of the internet in 1989, it is generally thought that the digitalization process gained another dimension and accelerated. After these developments, museums started to create their websites to reach and encourage more visitors to visit. Later, they started to reach more visitors with digital exhibitions. These digital segments increased accessibility.

Nowadays, the point where digitalization has come is virtual museums. Virtual museums made the museum space accessible as well as collections. Especially during the pandemic process, there has been a shift towards digitalization in all areas. Therefore, the existence of virtual museums, virtual tours, and online exhibitions has enabled museums to continue their functions.

2.5 Virtual Museums

The concept of virtual museums, which we come across with technological developments and the integration of digitalization into all areas, shows that it is unnecessary to travel for a museum visit. Virtual museums allow seeing artworks and cultural heritage without travelling to different countries. Museums, which are necessary for intercultural communication and interaction, can be visited from home; thousands of works have become available online. In recent years, 3D and virtual reality have emerged as areas of interest to museums to reach visitors more easily and have different experiences. Virtual Museum has become an all-encompassing term, referring to all kinds of digital representations of digital objects created (Perry, 2017).

2.5.1 Definition of Virtual Reality

The term virtual reality, which is technically used for computer-derived 3D environments where individuals experience the feeling of being there, was defined by Meriam Webster Dictionary as follows;

> "An artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment."

Derived from the Latin word "virtus," which means power, virtual reality is defined as the power that does not exist physically but will affect the physical world. The term virtual reality, which is an oxymoron term, was first used by the French dramatist Antonie Artaud in 1938 (URL 20).

In general, virtual reality is a technology where users will feel themselves in a different place from their environment and experience a different environment in 3 dimensions. Users use devices such as glasses and helmets to experience this different environment. The user who enters the environment created by virtual reality technology is completely detached from the actual environment, and the current reality becomes the new environment created virtually. It is very important to design virtual environments in a perfect manner. If the environment is not set up correctly, the user will not feel detached from reality, and in this case, virtual reality is no different from a classic computer game.

Virtual reality, which is used in many fields today, has gone through many stages in the development process. The virtual reality idea was first introduced in 1962 by Morton Heilig; it started with a machine called "Sensorama" that appeals to our senses

of sight, hearing, smell and touch, and evolved into virtual reality glasses used today (Figure 19) (URL 21).

Figure 19: Evolution of Virtual Reality Equipment: Sensorama Machine and Virtual Reality Glasses (URL 22 and URL 23)

2.5.2 Definition of Virtual Museums

Recent developments and technologies are changing the way we use and perceive places we are in, including museums (Bandelli, 2010). The introduction of new technological media was one of the important developments of the twentieth century. The use of this type of media by artists has contributed to the emergence of new aesthetic forms such as abstract or concrete, film, photomontage, light shows, sensitive cybernetic sculptures, interactive computer environments. Museums are increasingly interested in the new technological media's opportunities to present their works outside of their walls (Huhtamo, 2010). Museums accept these new technologies as tools to enter daily life and offer visitors the opportunity to access the museum content without visiting the museum (Arvanitis, 2010).

Virtual museums can be considered as a concept that emerged with technological developments and the use of these technologies by museums. Virtual museums can be defined as museums that contain objects and information about them, have unusual display methods, can be accessed from anywhere in the world, and do not need a physical space. Although the definition of the term virtual museum is constantly being developed, virtual museums are defined by the International Council of Museums (n.d), as follows;

> "A Virtual Museum is a digital creation organized on a permanent or temporal basis in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits, in a digital way, the tangible and intangible heritage of humanity and its environment. It uses various forms of interactivity and immersion, for the purpose of education, research, enjoyment, and enhancement of visitor experience."

In this definition, two keywords that should be emphasized are communication and exhibition. The reason for this is that virtual museums deliver the objects to the visitors on a screen. These objects on the screen should communicate with the visitor. The exhibition is also essential in the formation of this communication. Besides, this exhibition must have a certain level of interactivity so that the visitors do not lose interest.

Virtual museums provide greater accessibility with their interactive exhibition environments and offer visitors the freedom to interact with the exhibits (Petridis, 2013). Thus, virtual space has emerged without the restrictions of physical museums (Bandelli, 2010).

The two main elements of the virtual museum are accessibility and information. With accessibility, museums reach more visitors and contribute to their education and

museum experience. Virtual museums should be distinguished from other online sources of information. The virtual museum is an experience, a matter of experiencing knowledge, which sets them apart from other online sources of information (Ivarsson, 2009). Rayward and Twidale (1999) state that:

> In the same way that a museum is not merely a physical storehouse or repository of artefacts that has been organized to enable the most efficient access to those artefacts, a virtual museum is not merely a database of digitized images linked to powerful information retrieval software (p.39).

The point to be mentioned here is that not every platform that provides information and visuals online or in the virtual environment is a virtual museum. For the virtual museum to be formed, there must be a certain level of interactivity besides information and visuals, and this interactive exhibition must provide an experience to the visitors. A virtual museum can provide experiences that are not possible in the physical environment of the museum (Tekin, 2017). However, it cannot provide socialization, which is one of the main characteristics of museums, and virtual environments are often thought to isolate people and deprive them of social relationships (Bandelli, 2010). In general, virtual museums are museums where communication with visitors is established through screens and applications, offering a different experience than physical museums but weak in terms of socialization.

Today, technology, which is in every aspect of our lives, is used effectively in museums. Virtual museums rely on technology to continue their functions. Some tools are needed to exhibit collections. According to Styliani (2009), these are as follows.

- Imaging technology: Bringing high-resolution images together and exhibiting objects

- Web3D exhibitions: Contents that are fully interactive on websites on the Internet.
- Virtual reality exhibitions: Creating and visually experiencing the imaginary or physical environment in 3d digital environment.
- Augmented reality exhibitions: Placement of the object created in the digital environment in the physical space with the help of programs and cameras
- Mixed reality exhibitions: The exhibition where virtual reality exhibitions and augmented reality exhibitions are used together
- Haptics: The exhibition in which special gloves are included in the sense of touch while experiencing the object in a virtual environment

2.5.3 Origins of Virtual Museums

There is no doubt that virtual museums have experienced rapid development since the World Wide Web was invented and museums began to transform into a multimedia environment. However, the idea of a virtual museum did not emerge from World Wide Web (Huhtamo, 2010). Virtual museums have also undergone a development process like museums have, and there are some points that trigger each other in their formation (Figure 20). The first steps in the field of virtual museums were taken in 1947 by the French art historian Andre Malraux. According to Malraux, art is pervasive and consists of many individual works and styles. It is impossible to fit this wide range of art in a museum space. For this reason, art should be exhibited in a fictitious museum or museum without walls (URL 24).

After the invention of Hypertext, many projects have been carried out to investigate its effects on museums. Hypertext is a linked word that allows users to go to a specific site or another section on the same document when clicking on the text. In 1991, the

Japanese telecom company NTT and the Inter Communication Center (ICC) organized an exhibition called "The Museum Inside the Telephone Network" that does not require a physical space. This exhibition was only accessible to home phone users. This exhibition aimed to explore the impact of communication networks on museums (Huhtamo, 2010). Visitors could access five channels. Visitors could listen to speeches and readings on the "Voice and Voice Channel". With "Interactive Channel," visitors could press the phone buttons to create music melodies. With the "Fax Channel", novels, artworks, and comics could be delivered to visitors. Talks between the artists could be accessed by phone via the "Live Channel". Also, visuals could be downloaded via modem and viewed on a computer monitor (URL 25).

Later, hypertext technology became effective in the creation of CD-ROM-based virtual museums. Visitors could open the information loaded on the CD on their computers and explore the created simulation interactively. The first example of the CD-ROM-based museum was the "virtual museum" made by the Apple© company. These CDs were limited in terms of the information they contained and were viewed by visitors as complementary elements to physical museums and sold as souvenirs in museums (Huhtamo, 2010). With the further development of the internet, museums started to create their websites to reach more visitors. These sites contained information and images regarding the collections. Later, they created digital exhibitions and opened them to the public. With the technological developments, the museum space has become accessible in addition to the collections and reached visitors with virtual tours. The last point reached now is the virtual museums where the museum is designed solely in the digital environment without a reference from a physical museum space, and the collections are exhibited.

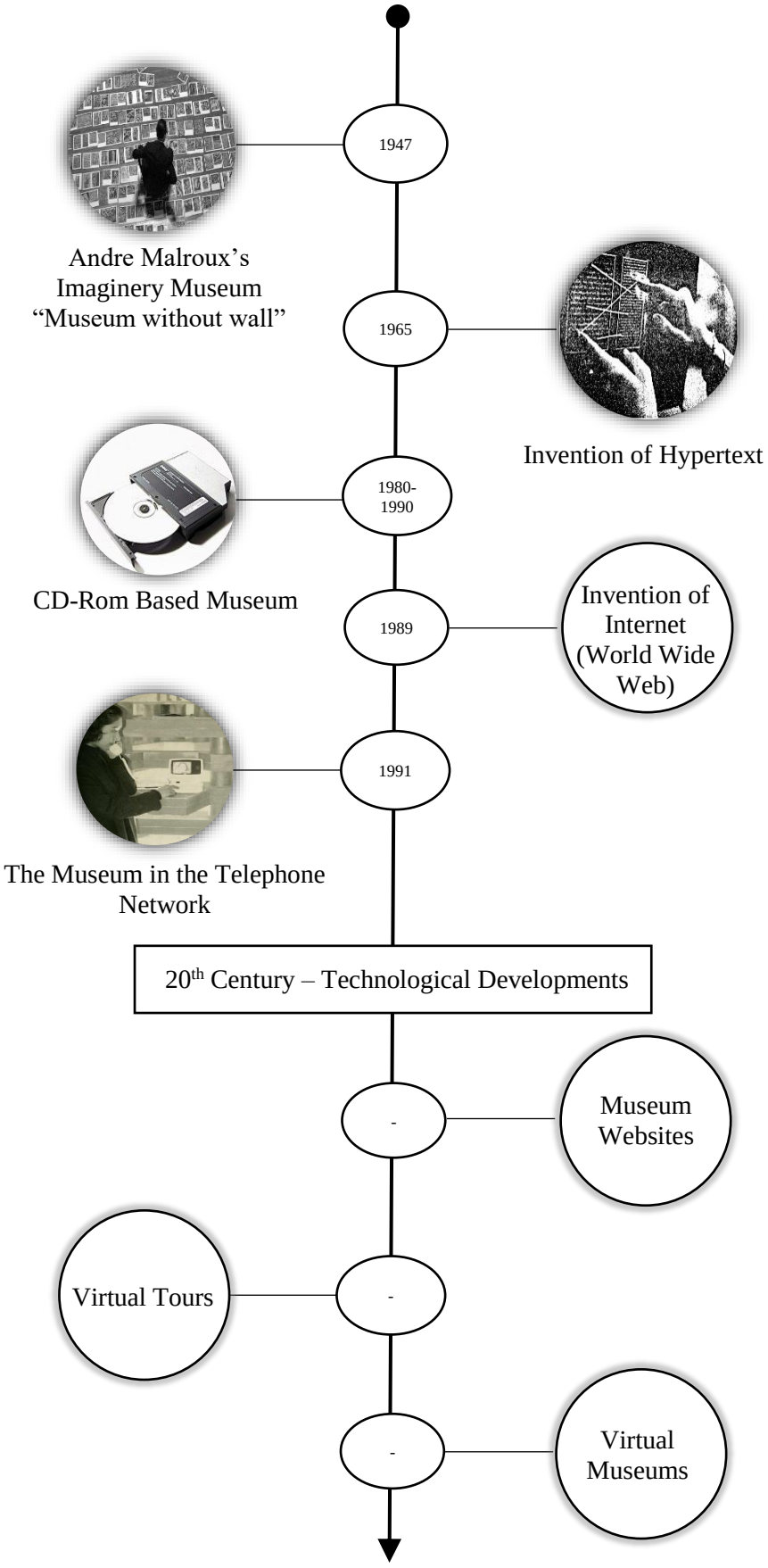


Figure 20: Virtual Museums Timeline (By the author)

2.5.4 Relationship Between Museums and Virtual Museums

Although museums and virtual museums are similar in function and purpose, they are actually different. There are some thoughts that the virtual museum is complementary to physically existing museums. However, virtual museums should not be considered as complementary or alternative to physically existing museums. Virtual museums are a new dimension that offers visitors a different experience and freedom (Ünal, 1999).

According to Schweibenz (2019), virtual museums and physically existing museums have the same characteristics but are also very different. Both of these types of museums try to connect with visitors with the objects they exhibit. However, they use different methods, and there is a more restrictive environment in physically existing museums, while virtual museums have a freer environment.

Ünal (1999) explains the relationship between the museum and the virtual museum in three categories. The first of these is the "virtual environment in the museum" and can be considered a complementary element. In this relationship, a part of the museum space is equipped with virtual reality technologies and offers a different experience within the museum. The second type of relationship is the "museum transferred to the virtual environment." In this type of relationship, the existing museum is recreated in the virtual environment with every detail. It is aimed to reach more visitors by transferring the existing museum to the virtual environment. The last type of relationship is "museum in the virtual environment". In this kind of relationship, the virtual museum has no relation with any existing museum, and it functions completely independently.

2.6 Classification of Virtual Museums

Since virtual museums are newly developed, no direct source has been found for the classification of virtual museums. In this sense, the classification created within the scope of the thesis emerged as a result of the following method. It was determined by evaluating the data from the literature and 101 museums obtained from the internet between April and June 2021. Accordingly, it has been determined that the museums are divided into two main headings. These are “museums designed as virtual museum” and “museum adapted to virtual museum”. “designed as virtual museum” does not have a museum physically, but only includes digitally designed museums. The other is the adaptation of the existing museum to the virtual museum with different methods. Since the first category is very new, it has not been divided into any sub-divisions, and only two examples of it have been found. The museums adapted to the virtual museum are also divided into four sub-headings. These are as follows; Catalog, Virtual Tour, Virtual Tour + Doll House and Timeline (Table 1 & Figure 21). Among these sub-headings 42 of them belong to catalog, 42 of them belong to virtual tour, 14 of them belong to virtual tour + dollhouse, and 1 of them belongs to the timeline category.

Table 1: Pre-evaluated 101 Virtual Museums (By the author)

MUSEUMS DESIGNED AS VIRTUAL MUSEUMS			
1	Virtual Online Museum of Art (VOMA)	2	Valentino Garavani Virtual Museum

Table 1: (Continue)

MUSEUMS ADAPTED TO VIRTUAL MUSEUMS					
CATALOG MUSEUMS					
1	National Gallery of Art, Washington DC	16	Indianapolis Museum of Art at Newfields – Indianapolis, USA	31	Royal Collection Trust, UK – London, UK
2	Sorolla Museum – Madrid, Spain	17	The Toledo Museum of Art – Toledo, USA	32	The Phillips Collection – Washington, USA
3	The Munch Museum – Oslo, Norway	18	National Gallery of Victoria – Melbourne, Australia	33	Reading Public Museum – Reading, USA
4	Kunsthaus - Zürich,Switzerland	19	Royal Museums of Fine Arts of Belgium – Brussels, Belgium	34	National Gallery Prague – Prague, Czechia
5	Städtische Galerie im Lenbachhaus and Kunstbau – Münich , Germany	20	Scottish National Gallery – Edinburgh, UK	35	Fondazione Musei Senesi – Sienna, Italy
6	The Kröller-Müller Museum – Otterlo, The Netherlands	21	Kimbell Art Museum – Fort Worth, USA	36	Franz Marc Museum - Art in the 20th Century – Kochel am See, Germany
7	LIFE Photo Collection – New York, USA	22	Yale Center for British Art – New Haven, USA	37	Hungarian National Gallery – Budapest, Hungary
8	New Masters Gallery, Dresden State Art Collections – Dresden, Germany	23	Walker Art Gallery, Liverpool – Liverpool, UK	38	The Olympic Museum – Lausanne, Switzerland
9	Philadelphia Museum of Art – Philadelphia, USA	24	Whitney Museum of American Art – New York, USA	39	Auschwitz-Birkenau State Museum – Oświęcim, Poland
10	Detroit Institute of Arts – Detroit, USA	25	The Walters Art Museum – Baltimore, USA	40	Centre Pompidou – Paris, France
11	San Francisco Museum of Modern Art (SFMOMA) - San Francisco,USA	26	Château de Chantilly – Chantilly, France	41	Ca' Pesaro - Galleria Internazionale d'Arte Moderna – Venice, Italy
12	Georgia O'Keeffe Museum – Santa Fe, USA	27	Hong Kong Museum of Art – Hong Kong	42	Ateneum Art Museum – Helsinki, Finland
13	Nagoya City Art Museum – Nagoya, Japan	28	Artizon Museum, Ishibashi Foundation - Chuo City, Japan		
14	Harvard Art Museums – Cambridge, USA	29	Korean Art Museum Association – South Korea		
15	Museo Botero, Bogotá – Bogotá, Colombia	30	Fundacion MAPFRE – Madrid,Spain		
VIRTUAL TOUR					
1	Musée d'Orsay, Paris - France	6	Leopold Museum – Wien, Austria		
2	MoMA The Museum of Modern Art – New York – USA	7	MASP - Museu de Arte de São Paulo Assis Chateaubriand - São Paulo,Brazil		
3	Uffizi Gallery – Firenze, Italy	8	Tokyo National Museum – Tokyo, Japan		
4	The Art Institute of Chicago – Chicago – USA	9	Palace of Versailles – Versailles, France		
5	The Metropolitan Museum of Art – New York, USA	10	La Galleria Nazionale – Rome, Italy		
11	Museo Dolores Olmedo – Mexico, Mexica	27	MAK – Museum of Applied Arts – Wien, Austria		
12	The State Hermitage Museum – St.Petersburg, Russia	28	Rmn-Grand Palais – Paris France		
13	Belvedere – Wien,Austria	29	National Gallery of Modern Art – New Delhi, India		

Table 1: (Continue)

14	The National Gallery-London, UK	30	Art Gallery of New South Wales – Sydney, Australia
15	Alte Nationalgalerie, Staatliche Museen zu Berlin – Berlin, Germany	31	Museo e Real Bosco di Capodimonte – Naples, Italy
16	Mauritshuis – Deen Haag, The Netherlands	32	Museo del Novecento – Milan, Italy
17	The J. Paul Getty Museum – Los Angeles, USA	33	The Bronx Museum of the Arts – the USA
18	Kunsthistorisches Museum Wien – Wien, Austria	34	Yamatane Museum of Art – Shibuya City, Japan
19	Tate Britain – London, UK	35	MuMa - Musée d'art moderne André Malraux – La Havre, France
20	The State Tretyakov Gallery – Moscow, Russia	36	Oscar Niemeyer Museum – Curitiba, Brazil
21	Museo Frida Kahlo – Mexico, Mexica	37	Sakıp Sabancı Museum – Turkey
22	Acropolis Museum – Athens, Greece	38	Long Museum West Bund – China
23	Museo Reina Sofia – Madrid, Spain	39	Museu Coleção Berardo – Lisbon, Portugal
24	The National Museum in Krakow – Krakow, Poland	40	Today Art Museum – China
25	The Museum of Fine Arts, Houston – Houston, USA	41	Vancouver Art Gallery – Vancouver, Canada
26	Van Gogh Museum - Amsterdam	42	Rijksmuseum- Amsterdam
VIRTUAL TOUR + DOLL HOUSE			
1	Smithsonian National Museum of Natural History – Washington DC, USA	8	European Museum of Modern Art – Barcelona, Spain
2	Montclair Art Museum – New Jersey, USA	9	Shackleton Museum – Athy, Ireland
3	The National Museum of Computing – Bletchley, UK	10	Birmingham Museum and Art Gallery – Birmingham, UK
4	The George Eastman Museum – Rochester, USA	11	CHP Museum – California, USA
5	Jeff. Smiths Parlor Museum – Skagway, Alaska, USA	12	History of Science Museum – Oxford, UK
6	The National Gallery, Sainsbury Wing - London, UK	13	Anne Frank House - Amsterdam
7	Oxford Museum of National History – UK,	14	The Dali Theatre Museum
TIMELINE			
1	The Museum of The World – British Museum - UK		

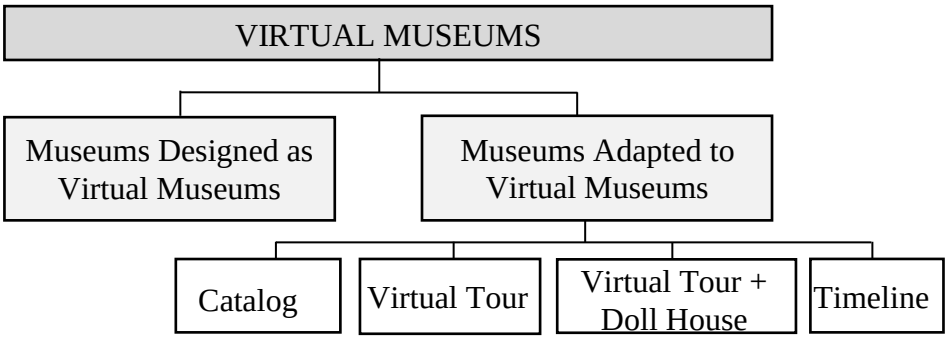


Figure 21: Classification of Virtual Museums (By the author)

In the catalog type, the museum works as a website with images and texts. Visitors can only see the images of the artefacts. In the virtual tour type, museums can be visited in street view mode, which is also in map applications. In this type of museum, it is possible to take a tour within the museum space. In the virtual tour + dollhouse type, besides the street view, there is a 3D model of the museum. Finally, in the timeline type, the artefacts are displayed on a line chronologically and can be moved back and forth on this line.

As a result of the preliminary evaluation, it has been concluded that catalog and virtual tour, virtual museum types are in the majority among these categories, and these types have been designed as virtual museums until today. In addition, studies on virtual museum types designed as timeline and virtual museums have just begun.

Chapter 3

MUSEUM EXPERIENCE

> *"Experience, in its fundamental sense, is that which, by putting us in play ourselves, modifies us profoundly in a way that after having crossed, endured, traversed it, we will never be the same again: undergo an illness, mourning, joy, loving, travelling, writing a book, painting are "experiences" in the first philosophical sense, surely simple, but nevertheless trivial."*
>
> (Romano, 1998, p. 197).

3.1 Concept of Experience

In the century we live in, the word "experience", which has become a complement to knowledge and influences the process of acquiring knowledge, was derived from the Latin word "experientia", which means "trial, proof, or experiment" in English. The words "Erlebnis" and "Erfahrung," which are the German equivalents of experience, express two different concepts of experience, although they are referred to as a single word in English. The word 'Erlebnis' means everyday life and usually represents personal moments in everyday life; The word 'erfahrung', on the other hand, establishes a relationship with memory, together with external stimuli (Jay, 2005). The word experience can be defined differently by each community, and it can contain broad meanings by relating to more than one word and language.

Merriam-Webster Dictionary (n.d.) provides a variety of definitions of the term experience as follows:

1. a: Direct observation of or participation in events as a basis of knowledge.

b: The fact or state of having been affected by or gained knowledge through direct observation or participation.

2. Practical knowledge, skill, or practice derived from direct observation of or participation in events or in a particular activity.
3. Something personally encountered, undergone, or lived through.
4. The act or process of directly perceiving events or reality.

The meaning that can be derived from these definitions is the experience defined as the knowledge or understanding gained through participation in an activity or event. The processes by which conscious organisms perceive the world around them are defined as experience (Silins, 2015). Fox (2008) states that "from an individual perspective, the experience is a complex interaction between the body, sensory input, and neurological processes. As individuals encounter messages and interpret them, they establish a relationship with the world" (p.41). The word "experience" has several different meanings. These different meanings must be distinguished from each other. In everyday language, the word "experience" can sometimes refer to a person's expertise in a topic in general. On the other hand, the word experience discussed here is the "perception", or "observation" dimensions (Figure 22).

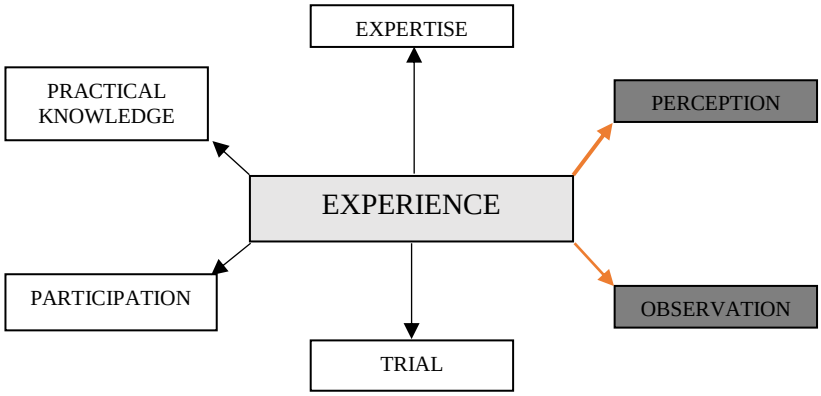


Figure 22: Different meaning of the word experience (By the author)

According to Fox (2008), “individuals make sense of experiences in their space by observing, participating in instant human relations through cultural, cognitive, subconscious and personal interpretation layers” (p.41). Experience is considered one of the most complex concepts in the world. In fact, it can be said that this complexity comes from the essence of the concept because the experience itself is a complex concept. Most of the time, it is the constantly changing situations that cannot be imagined, and most of the time, they form their own reality (Jay, 2005).

According to Jay (2005), the experience cannot be transferred to another person; even if it is wanted to be transferred, this cannot be successful. He argues that only the person who experiences can know the process of experience and the information obtained from this process. The reason for this is that the experience is formed at the end of the perception process. Each individual perceives his / her environment differently. Experience is formed with the help of the information obtained in the process of perception (Figure 23). Therefore, the experience and the perception process are closely interrelated. The relationship between these two terms affects the experience to be lived. Because after the perception process, experience is formed as a result of the processing of the obtained data in mind. For this reason, it is important to collect data correctly through the sensory organs in the process of perception.

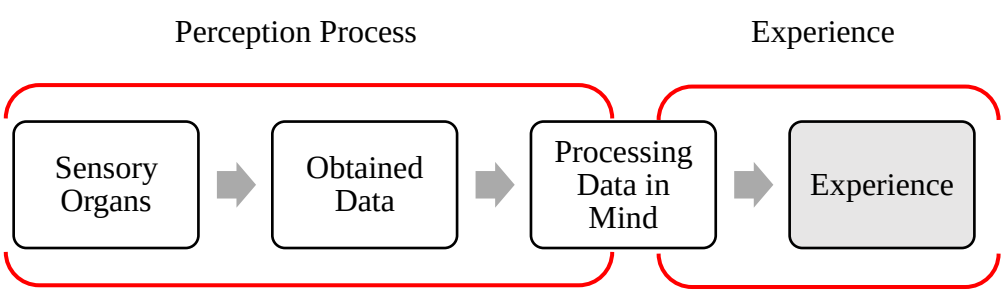


Figure 23: Perception and experience process relationship (By the author)

The concept of experience has been evaluated by many people throughout history, seen as a source of acquiring knowledge, and has become the knowledge itself. Heidegger, who has a phenomenological approach, sees the experience as a means of making sense of the world. Experience also treats space as a field of experience and calls it being in the world (Sharr, 2007). On the other hand, Dewey defines experience as "the emergence of interactions between the organism and the environment". Experience, which is not just about what is in the mind, is an interaction between the organism and the environment in which a state of satisfaction or equilibrium can be reached. Dewey's concept of experience is based on the interaction between humans and the environment around them, so it is a communicative phenomenon rather than an individual or a mental one (Acampado, 2019). The term experience, which is perceived differently by each individual and has various meanings, does not refer to situations that can be perceived positively or negatively. However, nowadays, the experience is often attributed to positive meanings (İnce, 2015).

3.1.1 Spatial Experience

The term experience, which is divided into many sub-categories, takes place in the architectural field as a spatial experience. The spatial experience created by human communication with architectural space is directly related to how humans perceive architectural space. While forming the spatial experience, what architectural message space wants to convey to the people and how people perceive and evaluate these messages play an important role. Therefore, perception is one of the important factors in the formation of spatial experience.

According to Lang (1987, as cited in İnce, 2015), perception consists of two stages; mental and sensory. Individuals start the perception process with their sense organs and collect information, and then this collected information is compared and matched

with the information and experiences in mind. The process of perception is individual, and each person shapes perception with the knowledge he/she has previously acquired. In this process, the individual's cultural background and life are effective (İnce, 2015).

Spatial perception and spatial experience also process that develops with perception (İnce, 2015). Individuals first collect the information of the space they are in, with their sense organs and then process this information in the mind and form the spatial experience. According to Zaman (2020), "spatial experience is the process by which we locate ourselves within our environment, and understand and interact with it" (p.5). Spatial experience includes not only the perception of the environment, but also the built environment, other people, values, cognition, and aesthetics. When perception and cognition come together, space is truly experienced (Gärling & Golledge, 1989).

In the process of spatial experience, the individual and space cannot be separated from each other because it is important in the interpretation of the individual as well as the information obtained from the environment. With the senses and mind's help, individuals interact with space, communicate and create their individual spatial experiences.

3.1.2 Virtual Experience

Each individual can assign different meanings to the human-space relationship, and the spaces designed for human beings can be perceived differently by each individual. Virtual reality technologies that give people the feeling of being in a different place can be explained as an interface between humans and machines and can be associated with the physical space concept (Makaklı & Yücesan, 2020).

In this context, the concept of virtual reality, which allows a realistic experience of physical space with computer-aided programs, has begun to be integrated into all areas of our lives. The virtual experience process has similar characteristics with the spatial experience process but it differs in terms of perception. The most obvious difference between virtual experience and spatial experience is the absence of kinesthetic perception while experiencing virtual experience. Kinesthetic perception is the perception process experienced with the body and its movements in the space. We cannot experience such a perception process because we cannot be in the place while having a virtual experience (Yi, 2018). However, individuals interpret the information obtained from the computer screen in the virtual experience in their minds and create the experience. For this reason, the similarity of the virtual world with the real world is important because individuals establish a relationship with the virtual world with this similarity.

This relationship is established with the help of an interface. The user interface acts as a bridge between the virtual environment and the person and defines how to communicate (Kılıç, 2016). With this interface, the person collects information from the virtual environment, and after interpreting it in his mind, a virtual experience occurs. The virtual experience quality depends on the believability, interactivity, explorability and immersiveness of the virtual environment (Figure 24) (URL 26).

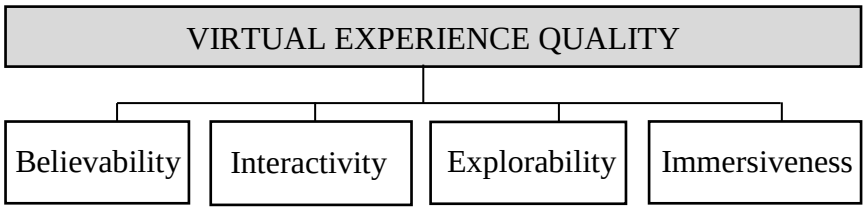


Figure 24: Factors Affecting the Quality of Virtual Experience - Adapted from URL 11 (By the author)

3.2 Experiencing the Museum

Museums, which have gone through many different stages in the historical process, in modern times, besides their collection, exhibition, and research functions, also have functions such as educating society, providing socialization, and providing interaction between people and exhibitions. Museums, which have become a growing industry, take place in our lives as one of the most important places where people spend time (Falk & Dierking, 2013). For this reason, instead of collecting more collections, museums focused on visitors and reshaped their functions.

As Recupero (2019) mention, in the century we live in, the museums that exist for society could not contribute to society's development, education, and quality time by focusing on their collections. In this context, museums that emerged as collection-oriented have changed in a visitor-oriented manner. While the traditional understanding of the museum focuses on the exhibition, today's understanding of the museum tends to impress visitors by creating meaningful experiences (Hooper-Greenhill, 2000 as cited in Recupero, 2019).

Today, museums are one of the most visited venues in the world. With the increase in museum visits, the experience in the museum has gained importance (Falk & Dierking, 2013). In order to understand the museum experience process, it is necessary to understand the visitor. It is estimated that each year, visitors visit at least one museum alone or in groups. In the words of Falk (2013), "the museum visitor is not an empty vessel waiting to be filled with our wisdom" (p.7). Therefore, understanding visitors and providing a quality museum experience is of paramount importance. Falk &

Dierking (2013) categorizes museum visitors in 7 different categories based on human personalities;

1. Explorers
2. Facilitators
3. Professionals/Hobbyists
4. Experience Seekers
5. Rechargers
6. Respectful Pilgrims
7. Affinity Seekers

Explorers are visitors who are curious about the contents of museums. During the visit, they expect to see things that will interest them and arouse their curiosity. Facilitators focus on each individual of a social group learning and experiencing the museum. This type of visitor can be thought of as a teacher with a class visiting a museum. Professionals / Hobbyists such visitors will find the museum content and their interests very close. Their visits are to satisfy themselves in terms of their hobbies. Experience Seekers consider museums as must-see places. It is important for them to be in the museum space. Rechargers see the museum as a spiritual place. They visit the museum to escape from the modern world's fast life and relax mentally. Respectful Pilgrims are those who visit the museum without feeling any responsibility. Affinity Seekers are visitors who visit specific museums and exhibitions with whom they connect with their personalities (Falk & Dierking 2013). Each museum is different, and each museum provides its visitors with different levels of experience. Visitors' interests, background information, time spent in the museum, the design of the museum space and exhibition areas, and the interaction in the museum affect the museum experience.

According to Falk & Dierking (2013), the museum experience consists of 3 stages, "before the visit", " during the visit" and, "after the visit" (Figure 25). The museum experience starts with the idea of visiting a museum. It continues with the decision of which museum to visit. After this decision is made, expectations begin to form in the minds of visitors. A visitor to the history museum expects to see objects of historical value during their visit. When individuals come to the museum, they come with expectations about what to do and see. Personal interests and prior knowledge of the museum are important in creating these expectations.

Then, the museum experience process continues with the interaction within the museum. This interaction happens between the museum space, the artefacts on display, the museum staff and visitors. With this interaction, meaningful experiences begin to emerge. Finally, the museum experience process ends with the memories remembered after the visit. The memorability and impact of these memories affect the quality of the experience.

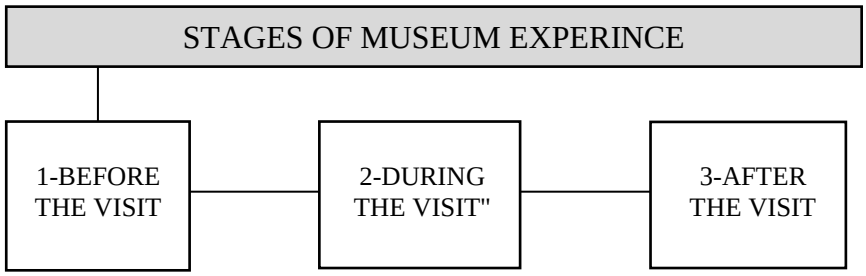


Figure 25: Stages of Museum Experience (By the author)

With the opportunities provided by the 21st century and especially the pandemic process, the transfer of museums to the digital and virtual environment has gained speed. Virtual museums formed as a result of the digitalization process also contribute to the museum experience. Digital technology creates a museum experience that

expands the scope and time scale of the museum visit and goes beyond the boundaries of physical space (URL 27). Although virtual museums differ from other museums in many respects, the experience process is the same. The only difference in the experience process is that the museum is in a virtual environment. Museums and virtual museums can be viewed in two ways in terms of museum experience, visitor freedom and interaction; passive and active (URL 28).

Passive Museum Experience: This type of museum experience is experienced in museums that can be physically visited. Passive museum experience in museums depends entirely on our communication with space, so spatial design, design elements, colour and material design are important for the museum experience (Meerwein, 2007). Space and visitor, as well as the relationship between objects and visitors, form the basis of the passive museum experience. Although the passive museum experience contributes to visitors' experience with the social environment it provides, it is also restrictive in terms of visitor and exhibition interaction because there are rules to be followed in museum spaces. There are some restrictions while enjoying the passive museum experience. In some of the physical museums we can not touch the objects and look in more detail; the time we can spend in front of the object is limited, the duration which we can be in the museum, the collections and places that we can see are predetermined. Although these restrictions are to protect the object, they are seen as a disadvantage in terms of the museum experience. In general, the passive museum experience is a non-subjective museum experience process shaped by predetermined limits, where the interaction between visitors is strong. However, the interaction between visitor and objects is weak because physical museums have rules to be followed.

Active Museum Experience: This type of museum experience can be experienced in virtual museums. In the active museum experience, the similarity of the virtual environment to the real world, the quality of the virtual museum application or website, and the design of the museum and exhibitions in the virtual environment are important in the museum experience. The relationship between visitor, object and virtual museum application form the basis of the active museum experience. The active museum experience provides visitors with a more liberal museum experience, unlike the passive museum experience. However, it is an antisocial experience as it cannot provide social interaction between visitors. Being able to examine the objects with all their details in the virtual environment, to provide the feeling of touching the object, to be able to rotate the object, to be viewed from different angles, to be able to control the time spent in the museum provides freedom for the visitor. With this freedom, a unique museum experience is created. In general, the active museum experience is a subjective museum experience process where the interaction between visitors is weak. However, the interaction between the visitor and the object is strong, with the limits created by the visitors themselves.

3.3 Evaluating Virtual Museum Experience

People go through a wide range of different spaces in their lives. Some spaces are only functional and used in daily routines and are not meant to require a degree of attention. Some of the spaces are part of the living environment and designed according to the user's taste, making them comfortable and familiar to the user. Besides, there are spaces that are designed to push us away from our usual environments and give us an experience beyond the ordinary for everyday functions, such as museums (Simonsson, 2014).

Social and technological changes have helped museums move beyond their spatial boundaries. Understanding museums' space and their collection alone is not enough to design the museum experience; it is also necessary to understand the realities formed in the minds of the visitors (URL 29). What makes the museum space different from other spaces is that museum space is designed to send a message to the visitors and offer an experience. Museum spaces should not be seen as rooms where only objects are exhibited because it is the space that provides the main museum experience, not the objects exhibited. Space has a great impact on communication with the exhibited objects and the overall museum experience.

The use of virtual reality, which has increased in recent years, has significantly taken place in many areas of our lives. Therefore, virtual reality technologies have started to occur in museums as well, affecting the way visitors experience cultural heritage. Technologies such as virtual reality, which provide alternative ways for museums to interact with their visitors, have created opportunities for museums (Shehade, 2020).

With virtual reality technology, which creates an alternative presentation environment for museums, the ability of visitors to discover digitalized artworks through the virtual museum has attracted interest and value in museums all over the world (Kabassi, 2019). Virtual museums affect and change the experience in museums. This is because it affects how we experience the museum and cultural heritage. The virtual museum experience needs to be evaluated at different levels because each virtual museum offers different levels of virtual reality sensation (Shehade, 2020).

Visitors' views are needed in evaluating the museum experience a museum provides. However, to evaluate the museum experience in general, the factors affecting the

museum experience are sufficient. Evaluating the museum experience is actually evaluating the communication and interaction between the museum and the visitor. Because visitors create meaningful experiences through communication, they establish with the museum space and exhibitions (Walhimer, 2015).

The importance of communication with visitors increases even more in the evaluation of the museum experience in virtual museums. Because in virtual museums, the only tool that can communicate with visitors is the screen. For this reason, the design, usability and virtual environments of virtual museum applications are important in order to establish quality communication and contribute to the experience. Since museum-visitor communication, which has an important place in the museum experience, is provided by these applications in virtual museums, the evaluation of these applications is important for understanding the virtual museum experience.

In order to evaluate the design of virtual museums in terms of museum experience, it is first necessary to understand how they were created. According to Charitos (2001), the formation of a virtual museum consists of 3 stages. The first stage is the digitisation of artefacts. The second stage is the development of the environmental and spatial elements of the virtual museum. The third stage is to integrate the first two stages with each other (Figure 26) (Charitos, 2001).

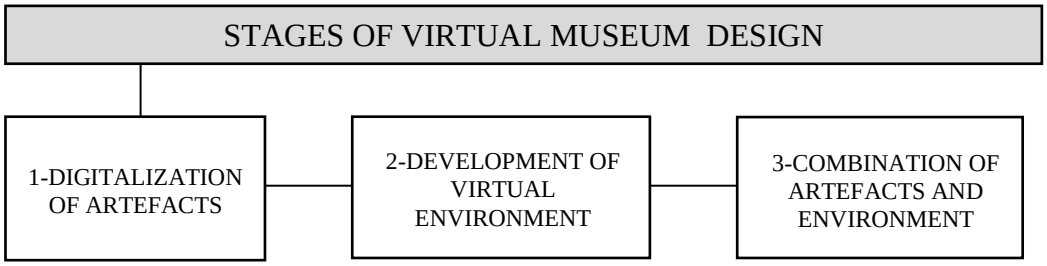


Figure 26: Stages of Virtual Museum Design (By the author)

One of the most important points in the design phase of virtual museums is creating a database containing all the resources related to virtual exhibitions. The virtual museum database should contain both textual and numerical data and multimedia content such as images, audio, video, 3D models etc. (Charitos, 2000). When creating a database, the variety and quality of the data are important. While creating the virtual museum database, a very high-quality photography method is used for 2D artefacts, while 3D photography, 3D scanning or 3D modelling is used for 3D artefacts. The method that gives the fastest results but has a low quality is 3d photography. It is the combination of photographs of the object taken from every angle. 3D scanning is the most suitable method for objects that are suitable for the scan. The method that gives the best quality results but takes time is 3d modelling (Charitos, 2001). Which of these methods will be used varies according to the artefact to be exhibited. Keeping the data and changes up-to-date after creating this database is important for the quality and functioning of the virtual museum.

In museums, the experience is formed by the messages that the places give to the visitors. These messages are influenced by how objects are placed in the space and the relationship of these objects with other objects in the general exhibition organisation. For this reason, spatial organisation is of great importance in virtual museums. Spatial design in virtual museums focused on functionality in terms of user navigation and content presentation (Charitos, 2001). There are factors such as lighting, positioning, the orientation of the exhibitions, categorisation of exhibits, and the physical structure of the exhibition spaces that also affect user navigation and content presentation. Another important point in virtual museum design is the reality level of environmental elements. According to Charitos (2000), the high level of reality causes restrictions in the virtual museum and reduces the quality of the museum experience. For this reason,

the spaces in the virtual museums are discontinuous, and the teleportation between the spaces and the absence of physical rules in the spaces create a positive effect on the museum experience.

The virtual environment is of great importance in the virtual museum experience because it provides the museum experience to the visitors. Since communication in the virtual museum experience is provided through what appears on the screen, it is more accurate to evaluate the features and how the virtual environment was created rather than the museum's content and design in terms of understanding the virtual museum experience. There are some criteria for understanding and evaluating virtual environments according to Sutcliffe and Gault (2004);

1. Natural engagement: how close the interaction is to the real world.
2. Compatibility with the visitor’s task and the domain: how close the behaviour of objects is to the real world and affordance for task action.
3. The natural expression of action: does the system allow the visitor to act naturally?
4. Close coordination of action and representation: quality of the response between visitor movement and Virtual Environment.
5. Realistic feedback: visibility of the effect of visitor’s actions and conformity to the laws of physics.
6. Faithful viewpoints: the naturalness of change between viewpoints.
7. Navigation and orientation support: naturalness in orientation and navigation. Is it clear where they are and how they return?
8. Clear entry and exit points: clearness of entry and exit points.
9. Consistent departures: consistency of departure actions.
10. Support for learning: promotion of learning.

11. Clear turn-taking: clearness of who has the initiative.
12. Sense of presence: the naturalness of the visitor's perception of engagement in the system and being in a 'real' world.

In general, it is important to know how it is designed to evaluate the virtual museum experience, which is different from the museum experience. The virtual museum experience can be evaluated from many different angles. A comprehensive evaluation can be made in terms of perception or the interactiveness of the virtual museum. These require different interdisciplinary studies. However, since it will be evaluated in terms of interior architecture discipline, space, that is, the virtual environment, comes into play.

In this respect, virtual museum design is shaped under three main headings. The first step is to digitize the artefacts in all formats and make them ready for the exhibition. The second stage is the development of the environmental and spatial elements of the virtual museum so that the artefacts can be exhibited. The third phase is to integrate the first two phases with each other. In addition, to evaluate the virtual environment of the virtual museum, the usability of the virtual environment, the level of reality and the feedback it gives should be evaluated.

Chapter 4

ANALYSIS OF VIRTUAL MUSEUMS

4.1 Method of Analysis and Selection Criteria of Cases

In line with the classification outlined in the 2.6 Classification of Virtual Museums section, virtual museums are divided into two categories: museums designed as virtual museums and museums adapted to virtual museums, and selections have been made over this category. The selected virtual museums were evaluated between April-June 2021 according to the evaluation criteria.

The research is based on personal evaluations as visitor views cannot be obtained due to the pandemic process, so care has been taken to select museums that have been visited and experienced before. Previously experienced museums were selected in order to reveal how the experienced physical museum space turned into a virtual museum space, to reveal the differences between these two spaces and to be able to comment on the differences in experience between the virtual museum and the museum.

Catalog virtual museums that only provide information and function like museum catalogs were not included in the study. The museum type criterion was not sought in selected museums. The museums that are excluded from catalog museums and which are appropriate according to the categories created as a result of the preliminary examination were selected. While selecting the museums, the criteria for differences

in use and design within each category was sought. Two virtual museum samples were selected for each category. Virtual Online Museum Of Art (VOMA) and Valentino Garavani Virtual Museum were chosen for museums designed as virtual museums. Since they are the only examples of this category, no criteria were sought. For museums adapted to virtual museums, Van Gogh Museum and Rijksmuseum for Virtual Tour category, The Dali Theatre Museum and Anne Frank House for Virtual Tour + Doll House category, and The Museum of the World (The British Museum) as the single example of this category for Timeline category were selected (Figure 27).

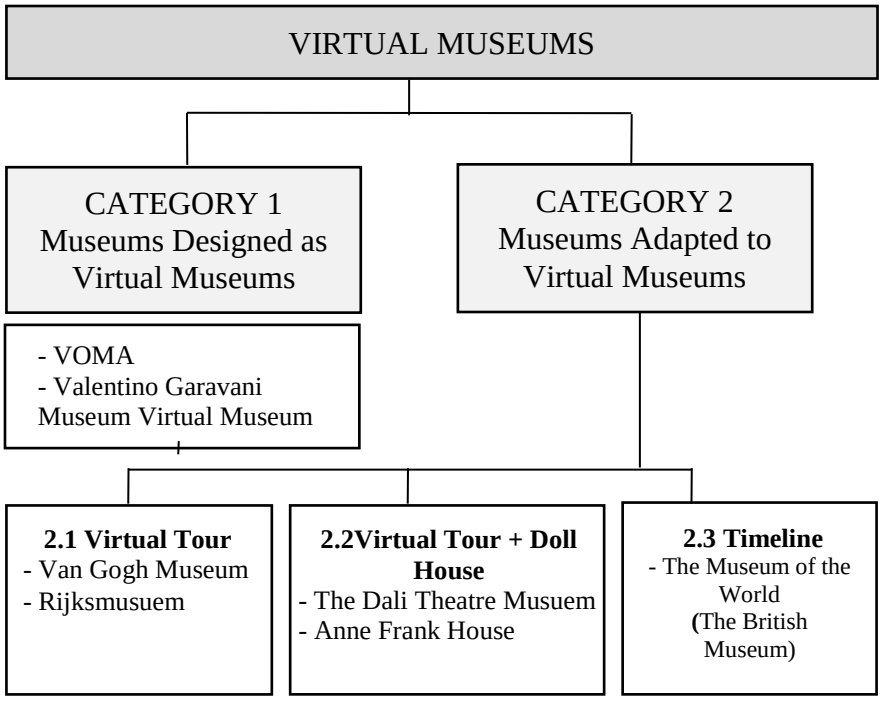


Figure 27: Selected and Categorised Virtual Museums (By the author)

Based on the information obtained from the theoretical background information, criteria were created to evaluate virtual museums. Then, these criterias were tested on selected museums, and a conclusion was reached. Analyzes were made under four headings according to the design, virtual environment, perception and activity-passivity level of the virtual museum. In terms of design, the evaluation made under three headings— digitalization of artefacts, development of virtual environment and bringing artefacts and virtual environment together. In evaluating the virtual environment, the focus was on the usability of the environment and its feedback. The evaluation of perception, which sensory organs it appeals to and how artefacts are perceived were evaluated. Finally, in the activity-passivity level analysis, how much freedom and interaction the virtual museum provides were evaluated. With the data obtained from these analyses, evaluations were made on four factors that affect the virtual museum experience, and conclusions were made in terms of virtual museum design and experience.

In addition, the evaluation tools were formed from the questions created as a result of personal evaluations as a result of the examination of 101 virtual museums in line with the information obtained from the literature review. These questions are divided according to the main headings of the analysis. While separate questions were asked in the three sub-headings of the 1st main title, questions covering all of the other main titles were asked (Figure 28).

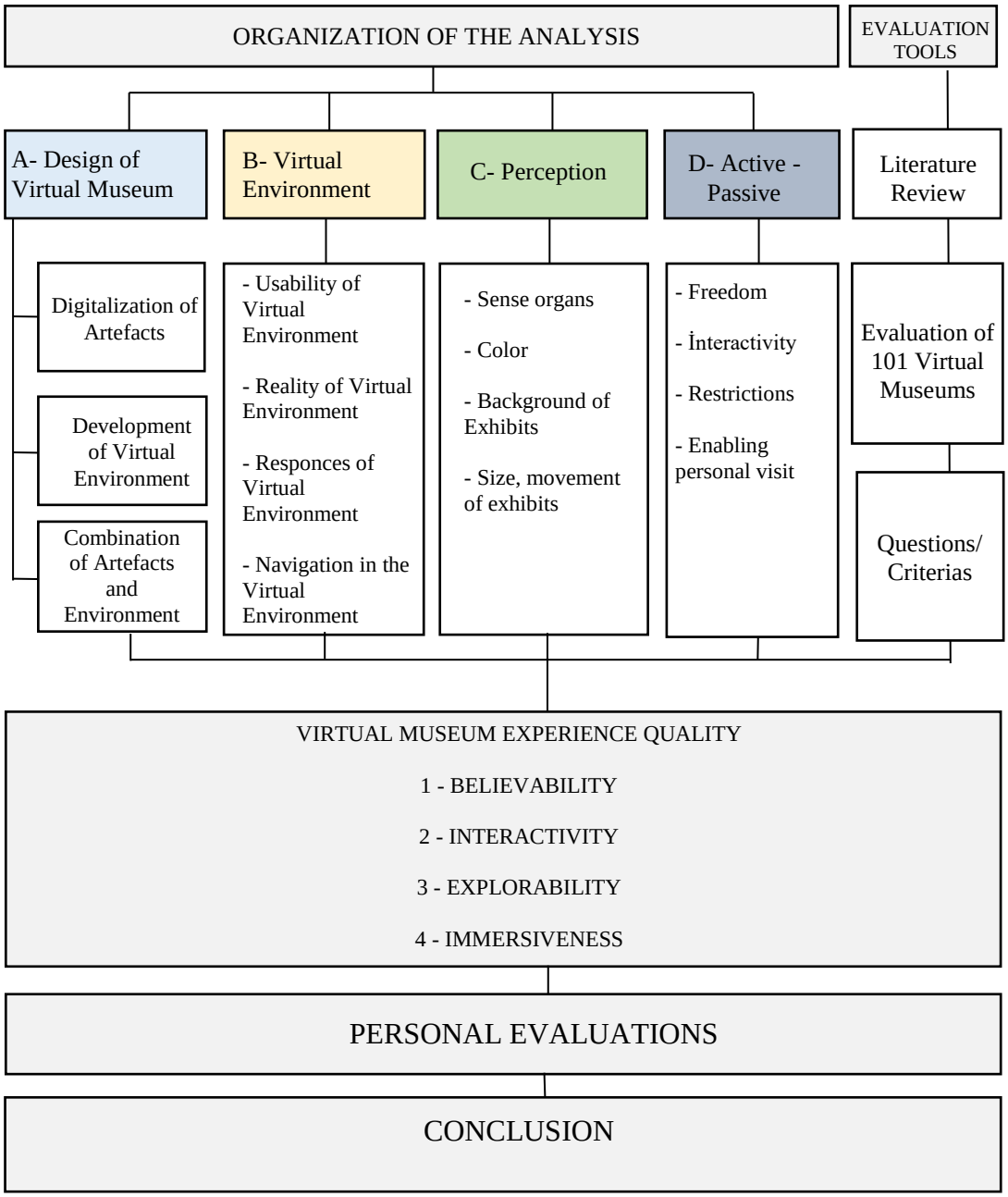


Figure 28: The Organisation of the Analysis and Evaluation Tools (By the author)

4.2 Factors of Analysis

Based on theoretical knowledge, factors that will evaluate the virtual museum and virtual museum experience have been created. These factors were examined through the selected virtual museums, and as a result, personal inferences were made. These factors, which impact the virtual museum and the virtual museum experience, are grouped under four main headings. While separate questions were asked at each stage

for the main heading of the design of the virtual museum, questions covering all were asked for the other three main headings.

A- Design of Virtual Museum:

Evaluation of the virtual museum in terms of design was made over three sub-headings; digitalization of artefacts, designing the virtual environment and combining the two. Digitalization of artefacts in virtual museums has an impact on experience because they reach visitors through these digitized artefacts. For this reason, a quality virtual museum must have a quality artefact database. This database should contain information on the artefacts in different formats. These;

A.1 - Digitalization of Artefacts:

1. Is there a text describing the artefact?
2. Is there a 2D visual of the artefact?
3. Is there a 3D model of the artefact?
4. Is there a voice narration of the artefact?
5. Is there a video explanation of the artefact?
6. Are there 360 degrees visuals of the artefact?

The development of the virtual environment, which is the second title of the design phase, focuses more on the organization of the space and how the circulation is in the virtual museum. Experience in virtual museums, as in other museums, is based on exhibitions and inter-space circulation from the entrance to exit. Therefore, the following criteria should be considered in the design of the virtual museum.

A.2 - Development of Virtual Environment:

1. Organizational scheme of the place. Does the organization of the space move the visitor through space without interruption?
2. Is there an entrance that welcomes visitors?
3. Is there a path for visitors to follow during the visit, or are there options for visitors to create their own path?
4. Is there a plan or a 3d model of the museum so that visitors can understand what place they are in?
5. Are exhibits categorized and numbered according to artefacts?
6. Is the arrangement of the exhibits one-sided, or is every surface used?
7. Is there one type or more than one exhibition type?
8. Are there direction indicators and labelling?
9. Are there any features that give information about the size, height and dimensions of the place?

A.3 - Combinatio of Artefacts and Virtual Environment:

In the third title, which is the last stage of the design part, it becomes important how the digitized artefacts and the designed space come together. At this stage, the things to be considered are that digitalized artefacts do not lose quality.

B - Virtual Environment:

In the second main topic, the virtual environment, how the virtual environment is used and their feedback to the visitors are emphasized. In this context, the following criteria are important for the virtual environment of a virtual museum to contribute to quality and experience. These are;

1. Are there similarities between the virtual environment and the real world?

2. Are the objects in the virtual environment similar to the real world?
3. Does the visitor have freedom of movement within the virtual environment?
4. Does the virtual environment provide feedback to the visitor?
5. Are these feedbacks realistic?
6. Are the transitions between images natural?
7. Does the system allow the visitor to teleport between areas in the virtual environments?
8. Does the system inform visitors where they are, how and where they can go?
9. Does the virtual environment have a specific entrance and exit?
10. Does the virtual environment give the feeling of being in the current place?

C - Perception:

In the third title of the analysis, the perception part, the focus is on the sensory branch of perception. The more we perceive, the more we experience. For this reason, the following criteria are important for examining perception in virtual museums.

1. How many senses do the virtual museum appeal to? Is it more than one?
2. Is there audio support besides the visuals?
3. Does it support haptic apparatuses?
4. Does it support VR glasses?
5. Are there different language options?
6. The selection of colours in the exhibitions. Do the colours bring the artefacts to the fore or cause the artefacts to disappear in colour?

D - Active-Passive:

The last part of the analysis, the active-passive part, is about how interactive the virtual museum is. For a virtual museum to be active, it must involve the visitor. In order to

include the visitor, the visitor must be given freedom within the virtual space and allowed to create their museum visit. In addition, to include the visitor, it must be able to present the non-museum functions in museums today to the visitors. These functions are as follows:

1. Is there chat boxes that provide socializing?
2. Is there a gift shop?
3. Are there reading areas?
4. Is there a library?
5. Are there multimedia rooms?

Finally, it has been interpreted on four titles that have an impact on the virtual museum experience and quality—believability, interactivity, explorability and immersiveness. In order to be able to interpret according to these titles, the following criteria were sought. For a virtual museum to be believable, its artefact database must be of high quality and artefact variety. In addition, the virtual environment and the feedback given by the virtual environment should be close to real. For a virtual museum to be interactive, it must involve the visitor, and for this, it must meet the criteria in the active-passive analysis. For a virtual museum to be explorable, it must provide freedom to the visitor. This freedom of movement can be thought of as planning a visit. Finally, for a virtual museum to be immersive, the three-dimensional virtual environment surrounding the user must be immersive. Therefore, it must meet the criteria of the four main headings of the previous analysis. Although this is a virtual museum evaluation, it can actually be accepted as a model, and in the future, this study can be used to determine the effects and deficiencies of virtual museums on human experience by interviewing a very large group of people visiting virtual museums.

4.3 General Information About Selected Virtual Museums

1. **Museums Designed as Virtual Museums**

- **Virtual Online Museum of Art (VOMA)**

  Virtual Online Museum of Art is an art museum established in 2020. The collections are curated by Lee Cavaliere and architecturally designed by Emily Mann. The museum can be visited without any entrance fee 24 hours a day through its website. In addition, there are two exhibition venues, Galery Zero and Galery One, a Café with the opportunity to chat, a reading room where visitors can read articles about art, and a gift shop where visitors can shop online (Table 2).

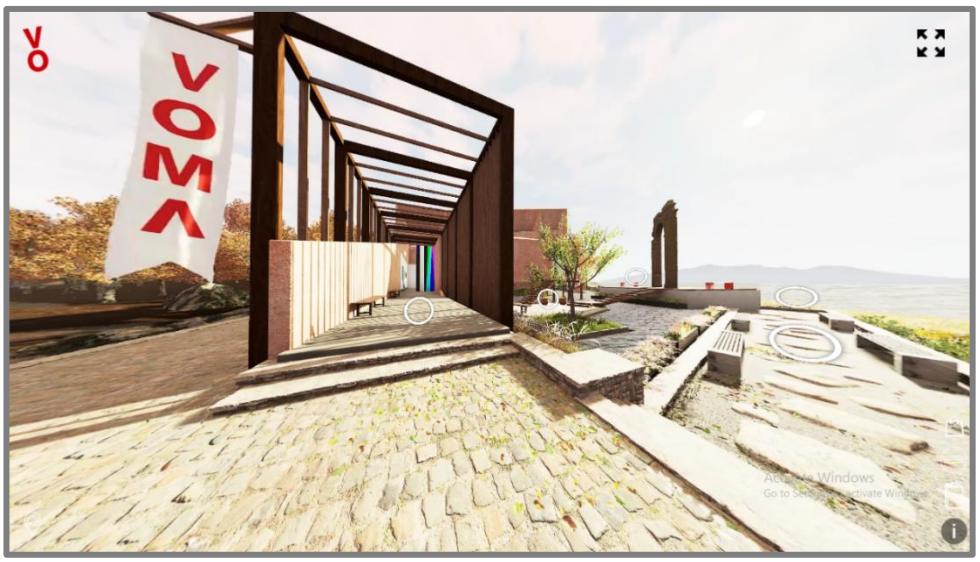
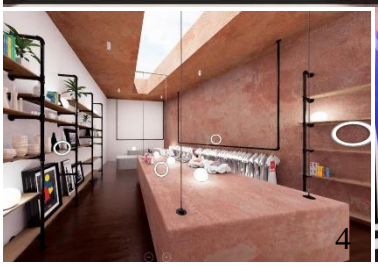
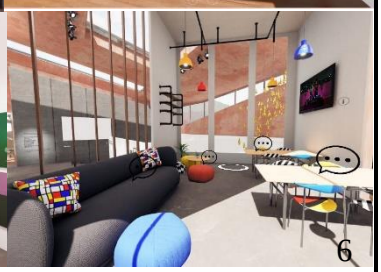


Figure 29: Entrance View of the Virtual Online Museum of Art (URL 30)

Table 2: General Information Table of Virtual Onlime Museum of Art (URL 31)

GENERAL INFORMATION TABLE			
Museum Name	Virtual Online Museum of Art - VOMA	Foundation Year of Virtual Museum	2020
Museum Type	Art Museum		
Museum Category According to Research	Museum designed as Virtual Museum		
Link of the Museum	https://visit.voma.space/		
How to visit	Through Web site	Open Hours	24 hours
Entrance Fee	Free Entry	Requirements to visit	Internet
Curator of Museum	Lee Cavaliere		
Architect of Museum	Emily Mann		
Virtual Design	-		
Additional features	Café, chatbox, reading area, gift shop		





1-Plan of the museum, 2-Entrance, 3-Exhibition Hall, 4-Gift Shop, 5-Reading Area, 6-Café

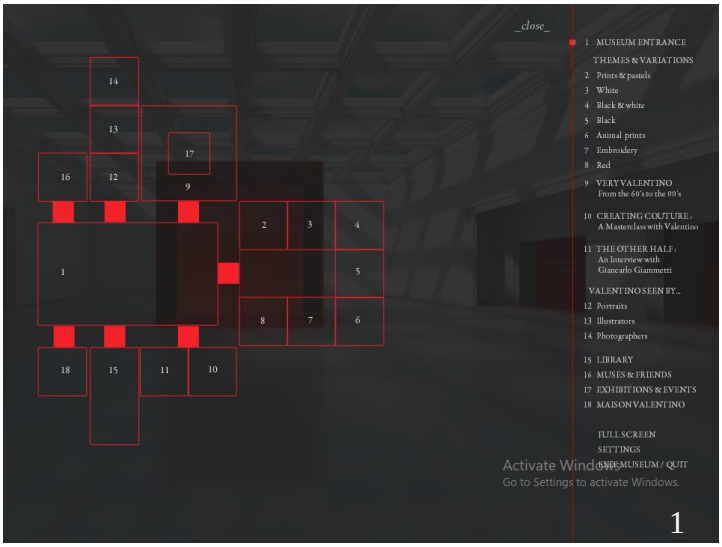
- **Valentino Garavani Virtual Museum**

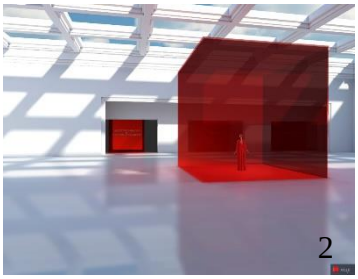
  Valentino Garavani Virtual Museum is a fashion museum founded in 2011 by Valentino Garavani and Giancarlo Giometti. The museum can be visited via its website and application. The collection of the museum consists of dresses designed by Valentine Garavani. The architectural design of the museum was done by Patrick Kimonot & Antonio Monfred, and Novacom Associes created the virtual environment. The museum has multimedia rooms and a library, as well as different types of exhibition spaces (Table 3)

Figure 30: Entrance View of the Valentino Garavani Virtual Museum (URL 32)

Table 3: General Information of Valentino Garavani Virtual Museum (URL 33)

GENERAL INFORMATION TABLE			
Museum Name	Valentino Garavani Virtual Museum	Foundation Year of Virtual Museum	2011
Museum Type	Fashion Museum		
Museum Category According to Research	Museum designed as Virtual Museum		
Link of the Museum	http://www.valentinogaravanimuseum.com/		
How to visit	Through web site and application	Open Hours	24 hours
Entrance Fee	Free Entry	Requirements to visit	3D Graphic card with 128Mo VRAM 1024x 768 min. screen resolution
Curator of Museum	Valentino Garavani & Giancarlo Giametti		
Architect of Museum	Patrick Kimonot & Antonio Monfred		
Virtual Design	Novacom Associes		
Additional features	Library, Multimedia rooms		





1-Plan of the museum, 2-Entrance Hall, 3-Library, 4- Red Exhibition Hall, 5- Black Exhibition Hall

2. Museums Adapted to Virtual Museum

- **Rijksmuseum**

The Rijksmuseum is a museum of history and art located in the Netherlands. The adaptation of the museum to the virtual museum was provided in cooperation with Google Arts and Culture. The museum can be visited without any entrance fee 24 hours a day through its website. In addition, the museum is included in the Virtual Tour category within the scope of research (Table 4).

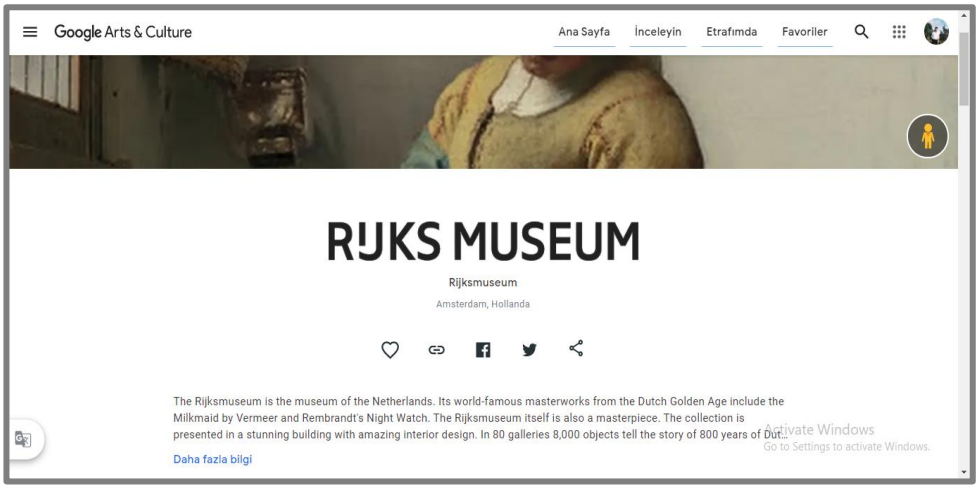
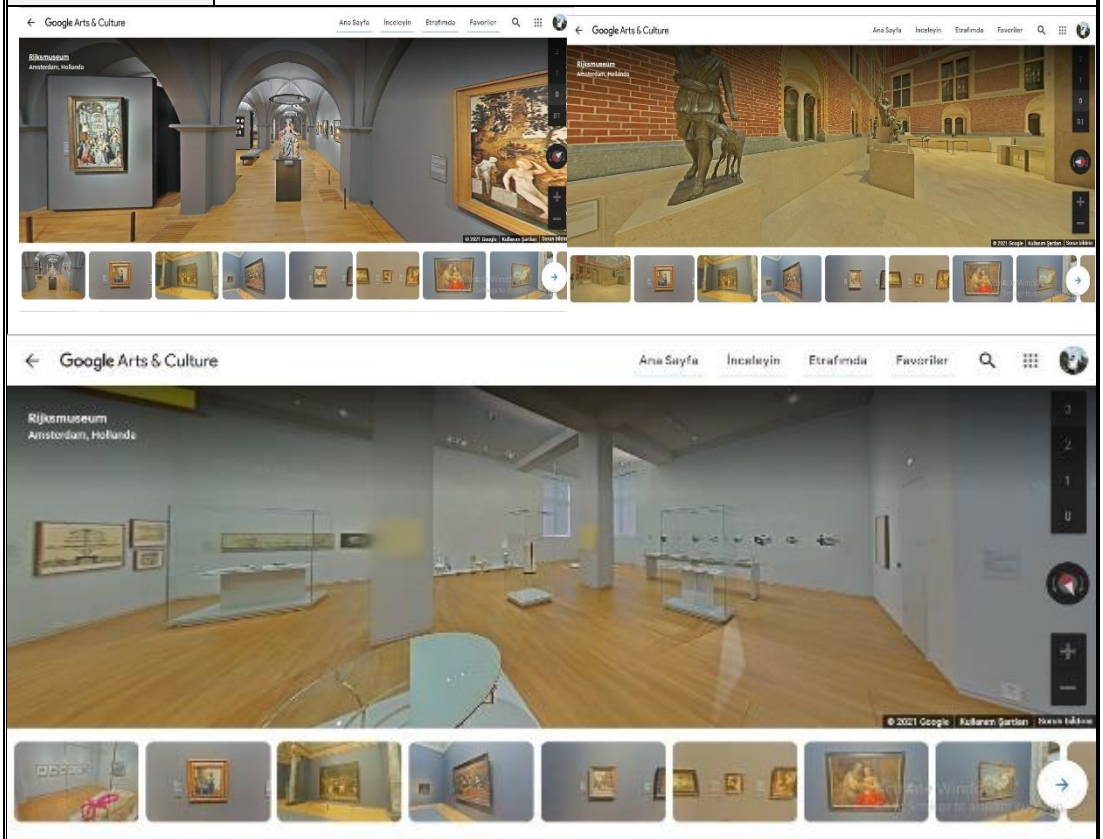


Figure 31: Starting View of the Rijksmuseum (URL 34)

Table 4: General Information Table of Rijksmuseum (URL 35)

GENERAL INFORMATION TABLE			
Museum Name	Rijksmuseum	Foundation Year of Virtual Museum	-
Museum Type	Art & History Museum		
Museum Category According to Research	Museums adapted to Virtual Museum – Virtual Tour		
Link of the Museum	https://artsandculture.google.com/partner/rijksmuseum		
How to visit	Through web site	Open Hours	24 hours
Entrance Fee	Free Entry	Requirements to visit	Internet
Curator of Museum	-		
Architect of Museum	-		
Virtual Design	Google Arts & Culture		
Additional features	-		



- **Van Gogh Museum**

  Van Gogh Museum is an art museum located in the Netherlands. The adaptation of the museum to the virtual museum was provided in cooperation with Google Arts and Culture. The virtual museum can be visited without any entrance fee 24 hours a day through its website. In addition, the museum is included in the Virtual Tour category within the scope of research (Table 5).

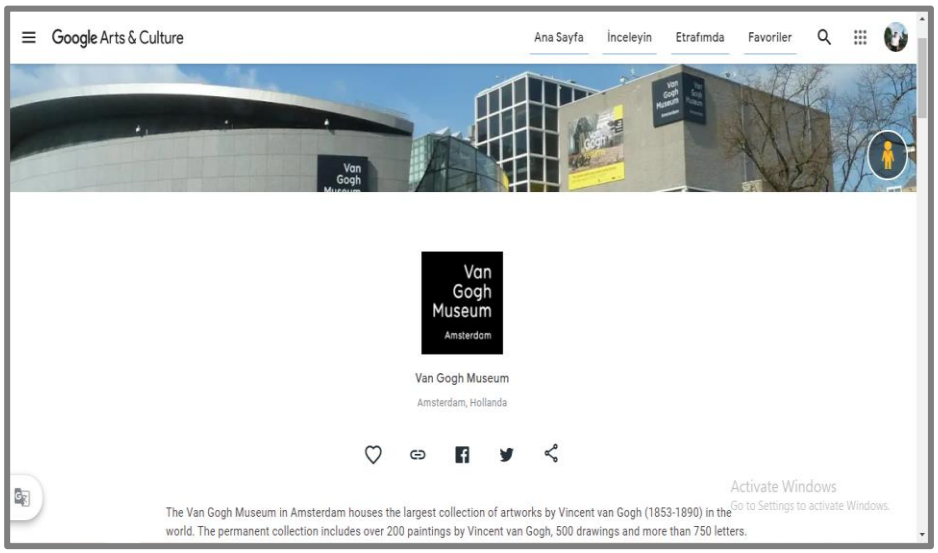
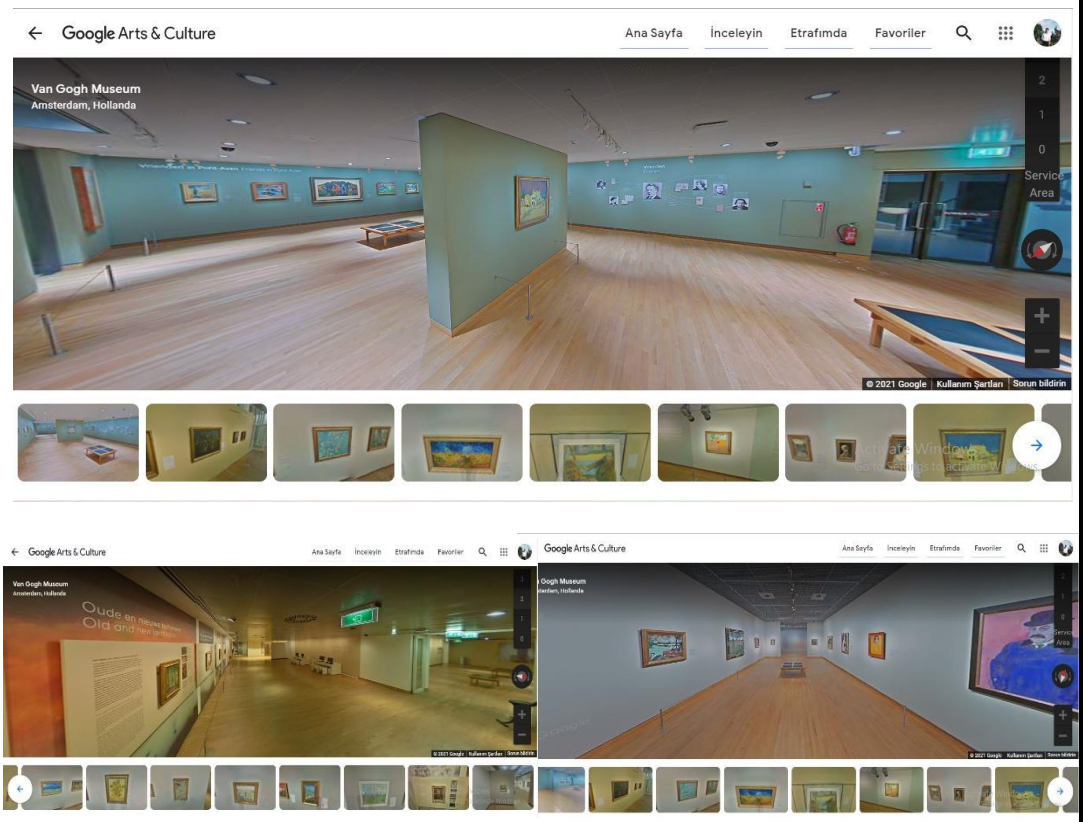


Figure 32: Starting View of the Van Gogh Museum (URL 36)

Table 5: General Information Table of Van Gogh Museum (URL 37)

GENERAL INFORMATION TABLE			
Museum Name	Van Gogh Museum	Foundation Year of Virtual Museum	-
Museum Type	Art Museum		
Museum Category According to Research	Museums adapted to Virtual Museum – Virtual Tour		
Link of the Museum	https://artsandculture.google.com/partner/van-gogh-museum		
How to visit	Through web site	Open Hours	24 hours
Entrance Fee	Free Entry	Requirements to visit	Internet
Curator of Museum	-		
Architect of Museum	-		
Virtual Design	Google Arts & Culture		
Additional features	-		



- **The Dali Theatre Museum**

  The Dali Theater Museum is an art museum. While the museum was adapted to the virtual museum, the existing museum was transferred to the virtual environment, and its design was made by Matterport. The virtual museum can be visited without any entrance fee 24 hours a day through its website. The museum is included in the Virtual Tour+Doll House category within the scope of research. A 3D model of the museum is available. It has a View in VR feature and measure mode (Table 6).

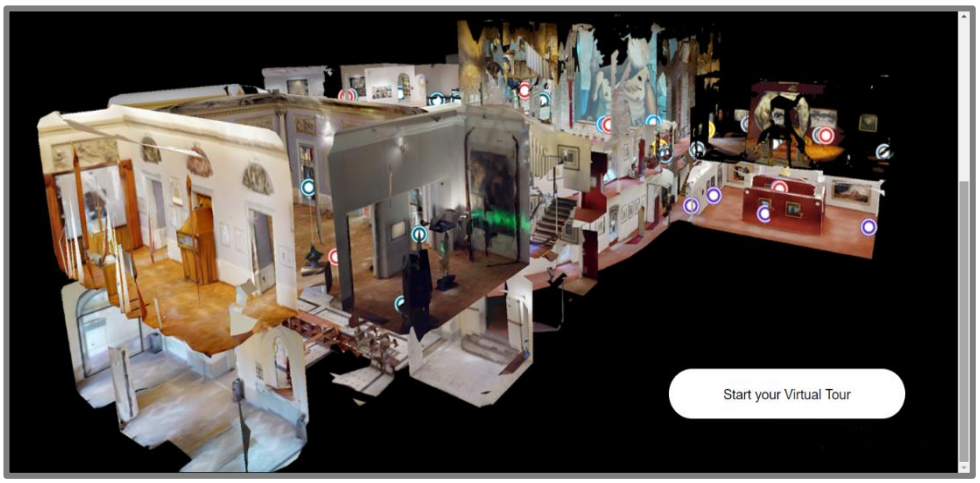
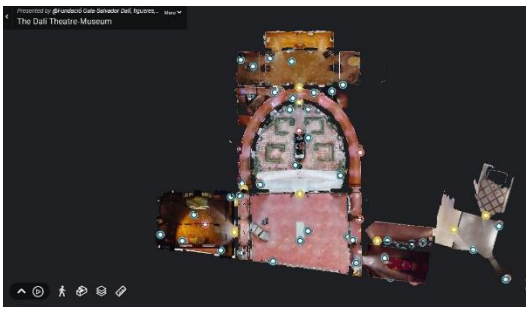
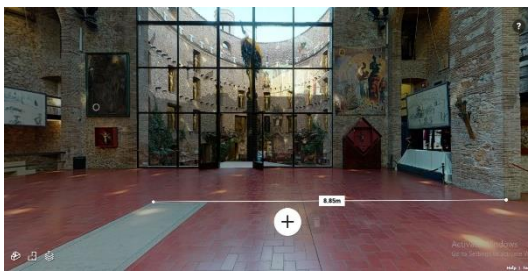


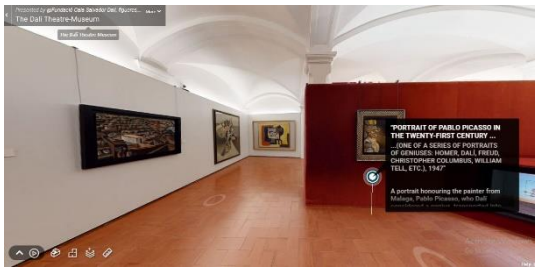
Figure 33: Starting View of The Dali Theatre Museum (URL 38)

Table 6: General Information Table of The Dali Theatre Museum (URL 39)

GENERAL INFORMATION TABLE			
Museum Name	The Dali Theatre Museum	Foundation Year of Virtual Museum	-
Museum Type	Art Museum		
Museum Category According to Research	Museums adapted to Virtual Museum – Virtual Tour + Doll House		
Link of the Museum	https://www.salvador-dali.org/en/museums/dali-theatre-museum-in-figueres/visita-virtual/		
How to visit	Through web site	Open Hours	24 hours
Entrance Fee	Free Entry	Requirements to visit	Internet
Curator of Museum	-		
Architect of Museum	-		
Virtual Design	Matterport		
Additional features	3d model, View in VR, Measure Mode,		





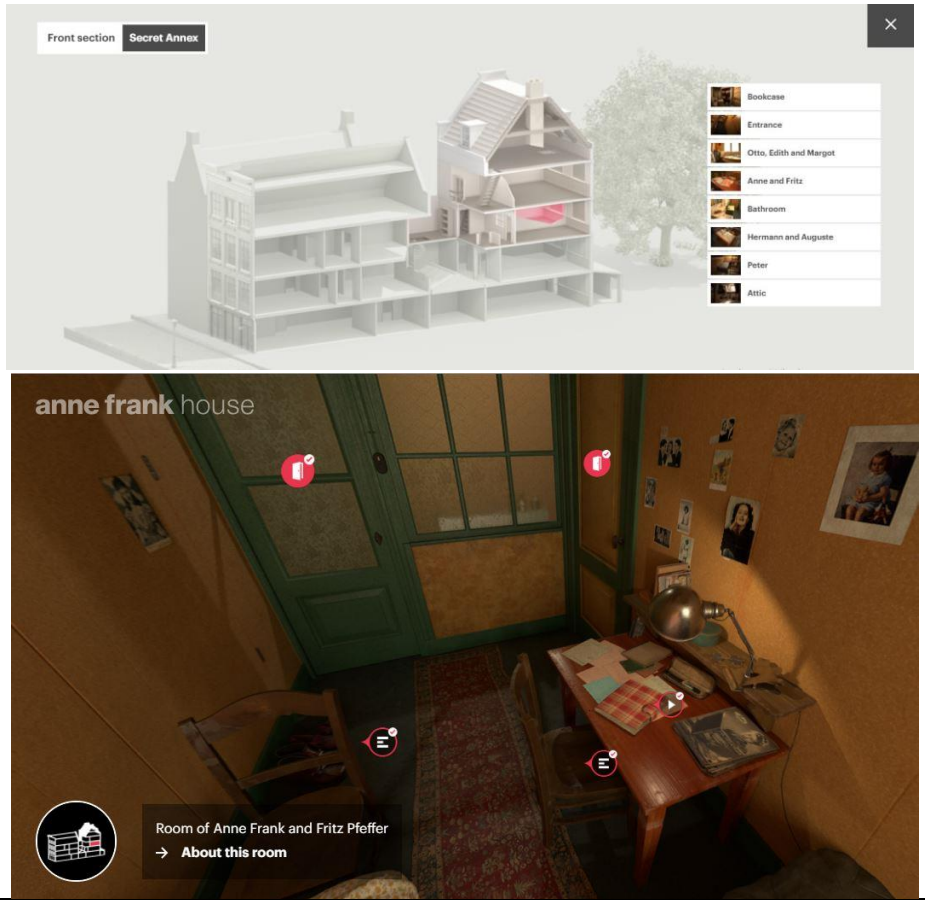


- **Anne Frank House**

  Anne Frank House is a historical house museum. While the museum was adapted to the virtual museum, the existing museum was transferred to the virtual environment. It can be visited without any entrance fee 24 hours a day through its website. The museum is included in the virtual tour+Doll House category within the scope of research. A 3D model of the museum is available (Table 7).

Figure 34:Starting View of the Anne Frank House (URL 40)

Table 7: General Information Table of Anne Frank House (URL 41)

GENERAL INFORMATION TABLE			
Museum Name	Anne Frank House	Foundation Year of Virtual Museum	-
Museum Type	Historical House Museum		
Museum Category According to Research	Museums adapted to Virtual Museum – Street View + Doll House		
Link of the Museum	https://www.annefrank.org/en/anne-frank/secret-annex/room-anne/		
How to visit	Through web site	Open Hours	24 hours
Entrance Fee	Free Entry	Requirements to visit	Internet
Curator of Museum	-		
Architect of Museum	-		
Virtual Design	-		
Additional features	3d model		
			

- **The Museum of The World**

  The Museum of The World is a history museum. The museum was created in collaboration with The British Museum and Google Arts and Culture and operates as a branch of The British Museum. The virtual environment design of the museum was made by WEIR – WONG. It can be visited without any entry fee 24 hours a day through the virtual museum website. The museum is included in the Timeline category within the scope of research (Table 8).

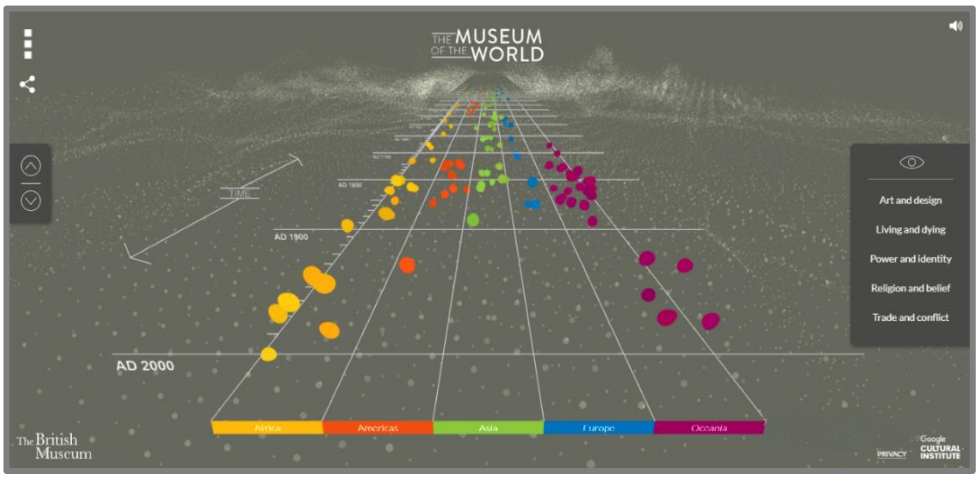
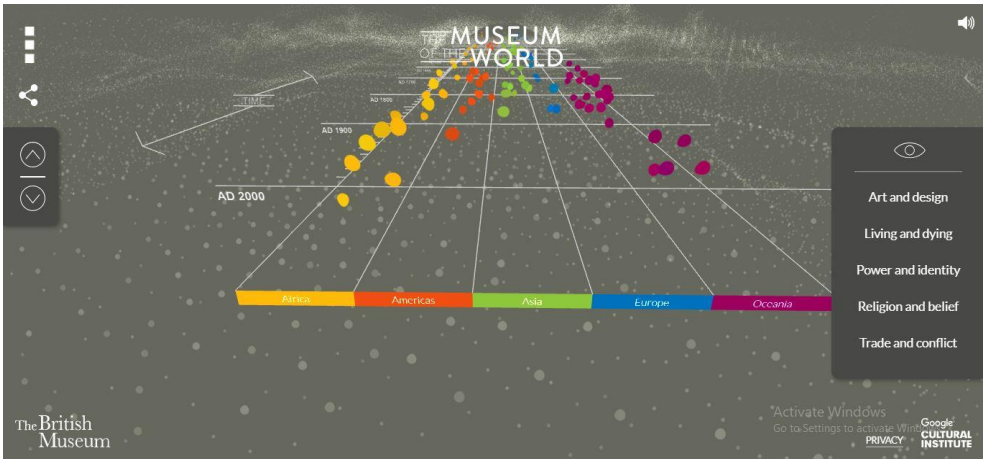
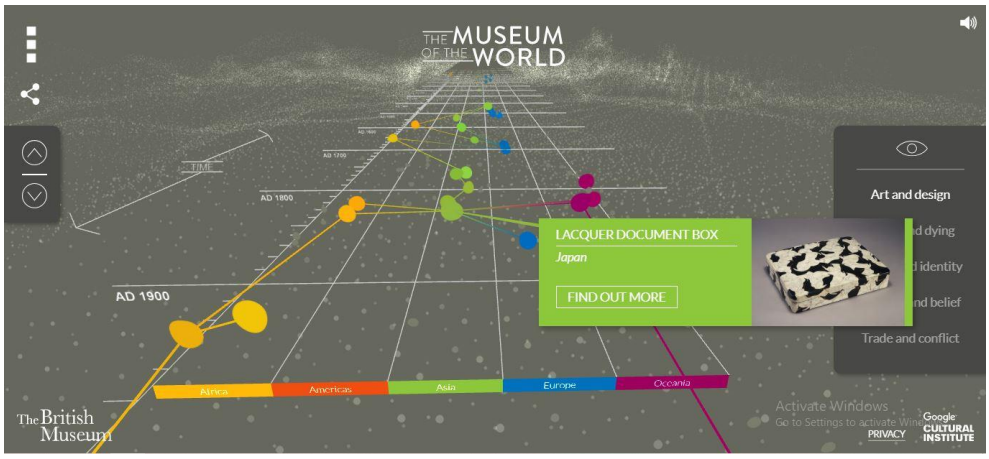


Figure 35: Starting View of The Museum of The World (URL 42)

Table 8: General Information Table of The Museum of The World (URL 43)

GENERAL INFORMATION TABLE			
Museum Name	The Museum of The World	Foundation Year of Virtual Museum	-
Museum Type	History Museum		
Museum Category According to Research	Museums adapted to Virtual Museum – Timeline		
Link of the Museum	https://britishmuseum.withgoogle.com/		
How to visit	Through web site	Open Hours	24 hours
Entrance Fee	Free Entry	Requirements to visit	Internet
Curator of Museum	The British Museum & Google Arts & Culture		
Architect of Museum	-		
Virtual Design	WEIR - WONG		
Additional features	-		





4.4 Comparative Analysis of the Virtual Museums

1- Museums Designed as Virtual Museum

Table 9: Evaluation Table of Design of Virtual Museum-Category 1 (By author)

Design of Virtual Museum			
Digitalization of Artefacts			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		Virtual Online Museum of Art	Valentino Garavani Virtual Museum
1	Is there a text describing the artefact?	X	X
2	Is there a 2D visual of the artefact?	X	X
3	Is there a 3D model of the artefact?	-	X
4	Is there a voice narration of the artefact?	X	X
5	Is there a video explanation of the artefact?	-	X
6	Are there 360 degrees visuals of the artefact?	-	X
Development of Virtual Environment			
1	Organizational scheme of the place. Does the organization of the space move the visitor through space without interruption?	-	X
2	Is there an entrance that welcomes visitors?	X	X
3	Is there a path for visitors to follow during the visit, or are there options for visitors to create their own path?	-	X
4	Is there a plan or a 3d model of the museum so that visitors can understand what place they are in?	X	X
5	Are exhibits categorized and numbered according to artefacts?	-	X
6	Is the arrangement of the exhibits one-sided, or is every surface used?	X	X
7	Is there one type or more than one exhibition type?	X	X
8	Are there direction indicators and labelling?	X	-
9	Are there any features that give information about the size, height and dimensions of the place?	-	-
Combination of Artefacts and Virtual Environment			
1	Do the digitized artefacts lose quality while combining?	-	-

Table 10: Evaluation Table of Virtual Environment-Category 1 (By author)

Virtual Environment			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		Virtual Online Museum of Art	Valentino Garavani Virtual Museum
1	Are there similarities between the virtual environment and real-world?	X	X
2	Are the objects in the virtual environment similar to the real world?	X	X
3	Does the visitor have freedom of movement within the virtual environment?	-	X
4	Does the virtual environment provide feedback to the visitor?	X	X
5	Are these feedbacks realistic?	-	X
6	Are the transitions between images natural?	X	X
7	Does the system allow the visitor to teleport between areas in the virtual environments?	X	X
8	Does the system inform visitors where they are, how and where they can go?	-	X
9	Does the virtual environment have a specific entrance and exit?	X	X
10	Does the virtual environment give the feeling of being in the current place?	-	X

Table 11: Evaluation Table of Perception-Category 1 (By author)

Perception			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		Virtual Online Museum of Art	Valentino Garavani Virtual Museum
1	How many senses do the virtual museum appeal to? Is it more than one?	X	X
2	Is there audio support besides the visuals?	X	X
3	Does it support haptic apparatuses?	-	-
4	Does it support VR glasses?	-	-
5	Are there different language options?	X	X
6	Do the colours bring the artefacts to the fore or cause the artefacts to disappear in colour?	X	X

Table 12: Evaluation Table of Active - Passive Museum-Category 1 (By author)

Active-Passive			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		Virtual Online Museum of Art	Valentino Garavani Virtual Museum
1	Is there chat boxes that provide socializing?	X	-
2	Is there a gift shop?	X	-
3	Are there reading areas?	X	-
4	Is there a library?	-	X
5	Are there multimedia rooms?	-	X

When the museums designed as virtual museums were evaluated according to criteria created within the scope of the research, it observed that both museums generally gave similar results in terms of digitalization of artefacts. However, the Virtual Online Museum of Art has some shortcomings compared to the Valentine Garavani Virtual Museum. Since artefact digitalization gains importance in virtual museums in terms of experience, the digital presentation of artefacts in many different formats is an important point in the virtual museum experience. While Valentino Garavani Virtual Museum offers digital artefacts in all formats, Virtual Online Museum of Art does not provide 3d model, video explanation and a 360-degree view of the artefact to the visitors. In terms of the development of the virtual environment, it has been observed that the Valentino Garavani Virtual Museum provides a more uninterrupted visit as it has successive spaces. On the other hand, in the Virtual Online Museum of Art, the spaces are scattered. This may cause the visitor to feel lost in the space. Both museums have an entrance, and the visit starts from these entrances. Since the museum experience is a process that lasts from the entrance to the exit, the presence of entrance

spaces has a positive effect. There is no path for visitors to follow in the Virtual Online Museum of Art. In fact, being able to create their own path can lead to a unique museum experience but also to confusion. On the other hand, places are numbered in Valentino Garavani Virtual Museum, and all places can be visited according to these numbers. There is no worry about not seeing a place. Both museums provide visitors with a museum plan, but visitors are not informed of where they are on these plans. This can make visitors ask, "where am I now?" and feel lost. Valentino Garavani Virtual Museum exhibits are categorized by year and colour. For this reason, visitors can make their visits in a certain order and sequence, and the exhibitions that are arranged one after the other in a complementary manner have a positive effect on the museum experience. In both museums, all surfaces were used for exhibition and had different types of exhibitions. Also, there is no opportunity to get information about the dimensions of the spaces in museums. In both museums, quality was not lost during the merging of digital artefacts and the virtual environment.

When these two museums are compared in terms of the virtual environment, it is observed that Valentino Garavani Virtual Museum is more successful. There is a similarity between the virtual environment and the real world in both museums. This similarity helps the visitors to relate to the museums they visit in the real world and to imagine themselves in that place more easily. It has a positive effect on the experience. Both museums give feedbacks, but this feedbacks are not realistic. While the speed of the transitions between images varies according to the internet speed, the faster it is, the more natural it looks. Both museums have a teleport feature. This makes it easier for visitors to commute between venues. Since spaces of museums are designed close to reality, it has been observed that it gives the feeling of being in that place. In addition, the integration of nature sounds in the Virtual Online Museum of Art, and

different music in every place in Valentino Garavani Virtual Museum also supports the virtual museum experience.

When these two museums are considered in terms of sensory perception, it has been observed that they appeal to the sense of hearing as well as the sense of sight. Both museums do not support tactile apparatus. Besides, the artefacts exhibited are placed in front of a simple background in one colour, making it easier to perceive. In addition, different language options are available in both museums.

Finally, when we evaluated the museums in terms of active-passive, it was seen that the Virtual Online Museum of Art was more successful because it has been able to socialize with its café and chat box feature. Museums, which are social institutions, lose these features when they pass to the virtual environment. For this reason, it can be said that the Virtual Online Museum of Art is the first of the virtual museum examples that provide socialization. In general, both museums have positive aspects in terms of the virtual museum experience. The virtual environment created in both museums has a sufficient level of credibility with its similarity to reality. While the Valentino Garavani Virtual Museum is weak in terms of interactivity, the Virtual Online Museum of Art is strong in this respect. While both museums have aspects that motivate the visitor to explore, their virtual environment cannot go beyond imitating the real world in terms of immersion. By combining the virtual environment features of the Valentino Garavani Virtual Museum and the social features provided by the Virtual Online Museum of Art, virtual museums that provide a quality virtual museum experience can be created.

2- Museums Adapted to Virtual Museum

Table 13: Evaluation Table of Design of Virtual Museum-Category 2.1 (By author)

Design of Virtual Museum			
Digitalization of Artefacts			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		Rijksmuseum	Van Gogh Museum
1	Is there a text describing the artefact?	-	-
2	Is there a 2D visual of the artefact?	X	X
3	Is there a 3D model of the artefact?	-	N/A
4	Is there a voice narration of the artefact?	-	-
5	Is there a video explanation of the artefact?	-	-
6	Are there 360 degrees visuals of the artefact?	-	N/A
Development of Virtual Environment			
1	Organizational scheme of the place. Does the organization of the space move the visitor through space without interruption?	-	-
2	Is there an entrance that welcomes visitors?	-	-
3	Is there a path for visitors to follow during the visit, or are there options for visitors to create their own path?	-	-
4	Is there a plan or a 3d model of the museum so that visitors can understand what place they are in?	-	-
5	Are exhibits categorized and numbered according to artefacts?	-	-
6	Is the arrangement of the exhibits one-sided, or is every surface used?	X	X
7	Is there one type or more than one exhibition type?	X	X
8	Are there direction indicators and labelling?	X	X
9	Are there any features that give information about the size, height and dimensions of the place?	-	-
Combination of Artefacts and Virtual Environment			
1	Do the digitized artefacts lose quality while combining?	X	X

Table 14: Evaluation Table of Virtual Environment-Category 2.1 (By author)

Virtual Environment			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		Rijksmuseum	Van Gogh Museum
1	Are there similarities between the virtual environment and real-world?	X	X
2	Are the objects in the virtual environment similar to the real world?	X	X
3	Does the visitor have freedom of movement within the virtual environment?	-	-
4	Does the virtual environment provide feedback to the visitor?	-	-
5	Are these feedbacks realistic?	-	-
6	Are the transitions between images natural?	-	-
7	Does the system allow the visitor to teleport between areas in the virtual environments?	X	X
8	Does the system inform visitors where they are, how and where they can go?	-	-
9	Does the virtual environment have a specific entrance and exit?	-	-
10	Does the virtual environment give the feeling of being in the current place?	-	-

Table 15: Evaluation Table of Perception-Category 2.1 (By author)

Perception			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		Rijksmuseum	Van Gogh Museum
1	How many senses do the virtual museum appeal to? Is it more than one?	-	-
2	Is there audio support besides the visuals?	-	-
3	Does it support haptic apparatuses?	-	-
4	Does it support VR glasses?	-	-
5	Are there different language options?	-	-
6	Do the colours bring the artefacts to the fore or cause the artefacts to disappear in colour?	X	X

Table 16: Evaluation Table of Active - Passive Museum-Category 2.1 (By author)

Active-Passive			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		Rijksmuseum	Van Gogh Museum
1	Is there chat boxes that provide socializing?	-	-
2	Is there a gift shop?	-	-
3	Are there reading areas?	-	-
4	Is there a library?	-	-
5	Are there multimedia rooms?	-	-

At this stage of the evaluation, the Rijksmuseum and Van Gogh Museum, which are included in the virtual tour, which is the first category of museums adapted to the virtual museum, were examined. When the museums were evaluated according to the criteria derived from theoretical knowledge, it was observed that they did not meet the majority of the criteria. When museums were evaluated in terms of the design of the virtual museum, it was observed that Rijksmuseum were very weak in terms of artefact digitalization. Since Van Gogh Museum collection consist of paintings it is not correct to consider as weak in terms of digitalization. Some criteria were not applicable for Van Gogh Museum. The fact that there are only 2D visuals and therefore the visitor cannot get enough information negatively affects the virtual museum experience.

In terms of the design of the space, it has been observed that there are deficiencies. The Rijksmuseum and Van Gogh Museum have been transferred to the virtual environment as they actually exist. There were no changes in venues or exhibitions. Although the lack of change provides familiarity for those, who visit the actual museum, the quality of experience provided by the museum has not increased but

decreased. When visiting these two museums, which are included in the virtual tour category, only the venues can be viewed. It is not possible to reach any information about these places and the artefacts on display. Since they are prestigious museums in the world, differentiation in terms of design could not be expected. Therefore, these two museums were transferred to the virtual environment as they are, and it was observed that only the ability to travel between places was added.

In the evaluation of the virtual environment, it was observed that these two museums were only similar to the real world. Apart from this, they do not give any freedom or feedback to the visitor. When it is evaluated as sensory perception, no feature specific to the virtual museum has been developed. If the visitor has not visited these museums in real life, it is thought that it will be difficult to perceive the exhibited artefacts. Finally, these two museums do not have any features that involve the visitor. Therefore, virtual museums of Rijksmuseum and Van Gogh Museum can be considered passive.

In general, it has been observed that museums included in the virtual tour category of museums adapted to virtual museums are weak in terms of the virtual museum experience. The virtual tour feature added to the museum website, that is, the ability to view the museum spaces in a virtual environment, could not go beyond just viewing. It has been observed that the quality of the museum experience provided by these two previously visited museums has decreased while adapting to the virtual museum.

Table 17: Evaluation Table of Design of Virtual Museum-Category 2.2 (By author)

Design of Virtual Museum			
Digitalization of Artefacts			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		The Dali Theatre Museum	Anne Frank House
1	Is there a text describing the artefact?	X	X
2	Is there a 2D visual of the artefact?	X	X
3	Is there a 3D model of the artefact?	-	-
4	Is there a voice narration of the artefact?	-	-
5	Is there a video explanation of the artefact?	X	-
6	Are there 360 degrees visuals of the artefact?	-	-
Development of Virtual Environment			
1	Organizational scheme of the place. Does the organization of the space move the visitor through space without interruption?	-	-
2	Is there an entrance that welcomes visitors?	-	X
3	Is there a path for visitors to follow during the visit, or are there options for visitors to create their own path?	-	-
4	Is there a plan or a 3d model of the museum so that visitors can understand what place they are in?	X	X
5	Are exhibits categorized and numbered according to artefacts?	-	-
6	Is the arrangement of the exhibits one-sided, or is every surface used?	X	X
7	Is there one type or more than one exhibition type?	-	X
8	Are there direction indicators and labelling?	X	X
9	Are there any features that give information about the size, height and dimensions of the place?	-	X
Combination of Artefacts and Virtual Environment			
1	Do the digitized artefacts lose quality while combining?	-	X

Table 18: Evaluation Table of Virtual Environment-Category 2.2 (By author)

Virtual Environment			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		The Dali Theatre Museum	Anne Frank House
1	Are there similarities between the virtual environment and real-world?	X	X
2	Are the objects in the virtual environment similar to the real world?	X	X
3	Does the visitor have freedom of movement within the virtual environment?	-	-
4	Does the virtual environment provide feedback to the visitor?	X	X
5	Are these feedbacks realistic?	-	-
6	Are the transitions between images natural?	-	X
7	Does the system allow the visitor to teleport between areas in the virtual environments?	X	X
8	Does the system inform visitors where they are, how and where they can go?	X	X
9	Does the virtual environment have a specific entrance and exit?	-	X
10	Does the virtual environment give the feeling of being in the current place?	-	X

Table 19: Evaluation Table of Perception-Category 2.2 (By author)

Perception			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		The Dali Theatre Museum	Anne Frank House
1	How many senses do the virtual museum appeal to? Is it more than one?	-	X
2	Is there audio support besides the visuals?	-	X
3	Does it support haptic apparatuses?	-	-
4	Does it support VR glasses?	X	-
5	Are there different language options?	-	-
6	Do the colours bring the artefacts to the fore or cause the artefacts to disappear in colour?	X	X

Table 20: Evaluation Table of Active - Passive Museum-Category 2.2 (By author)

Active-Passive			
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name	
		The Dali Theatre Museum	Anne Frank House
1	Is there chat boxes that provide socializing?	-	-
2	Is there a gift shop?	-	-
3	Are there reading areas?	-	-
4	Is there a library?	-	-
5	Are there multimedia rooms?	-	-

At this stage of the evaluation, The Dali Theater Museum and Anne Frank House, which are included in the Virtual Tour + Doll House, the second category of museums adapted to the virtual museum, were examined. When evaluated in terms of design, it was observed that the artefact digitalization was weak as in the previous category. In terms of the virtual environment development, there is no path for visitors to follow in both museums. It has been observed that it has a negative effect on the virtual museum experience as it is not certain in which order the spaces should be displayed.

When entering The Dali Theater Museum for the first time, the visit starts from the entrance area. In contrast, the visit starts directly from the main venue at the Anne Frank House. Starting from the entrance area gives visitors the freedom to choose the venues to view, resulting in a more positive virtual museum experience. There are 3D models of both museums. In addition, The Dali Theater Museum has a measure mode that allows measuring in plan and space. While the Dali Theater Museum loose quality during merging digitalized artefacts with the virtual environment, Anne Frank House does not lose quality.

During the evaluation of the virtual environment, both museums were transferred to the virtual environment as they exist in real life. Therefore, the rate of similarity with the real world is high. Freedom of movement is limited in both museums, and it has been observed that it is possible to move only on designated points. The ability to teleport between spaces and information about where visitors are located are available in both museums. In addition, The Dali Theater Museum is a museum that can give the feeling of being in the place as it can be visited with VR glasses.

It has been observed that The Dali Theater Museum offers a better quality experience in terms of the virtual environment, while Anne Frank House offers a higher quality virtual museum experience in terms of sensory perception. While Anne Frank House appeals to the sense of hearing as well as the sense of sight, The Dali Theater Museum has been observed to appeal only to the sense of sight. Finally, these two museums do not have any features that involve the visitor, so The Dali Theater Museum and Anne Frank House virtual museums can be considered passive.

It has been observed that the museums included in the Virtual Tour+Doll House category, which is generally adapted to the virtual museum, are more successful in terms of virtual museum experience than the Virtual Tour category. In addition to the virtual tour added to the museum website, the presentation of a 3D model of the museum has made it easier to understand the museum spaces and their connection with each other. It has been observed that while the museums in this category create a better perception of museum space and positively affect the museum experience with the information they provide with space, they are insufficient in terms of artefact digitalization and negatively affect the museum experience.

Table 21: Evaluation Table of Design of Virtual Museum-Category 2.3 (By author)

Design of Virtual Museum		
Digitalization of Artefacts		
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name The Museum of the World
1	Is there a text describing the artefact?	X
2	Is there a 2D visual of the artefact?	X
3	Is there a 3D model of the artefact?	-
4	Is there a voice narration of the artefact?	X
5	Is there a video explanation of the artefact?	-
6	Are there 360 degrees visuals of the artefact?	-
Development of Virtual Environment		
1	Organizational scheme of the place. Does the organization of the space move the visitor through space without interruption?	X
2	Is there an entrance that welcomes visitors?	-
3	Is there a path for visitors to follow during the visit, or are there options for visitors to create their own path?	-
4	Is there a plan or a 3d model of the museum so that visitors can understand what place they are in?	-
5	Are exhibits categorized and numbered according to artefacts?	X
6	Is the arrangement of the exhibits one-sided, or is every surface used?	-
7	Is there one type or more than one exhibition type?	-
8	Are there direction indicators and labelling?	-
9	Are there any features that give information about the size, height and dimensions of the place?	-
Combination of Artefacts and Virtual Environment		
1	Do the digitized artefacts lose quality while combining?	X

Table 22: Evaluation Table of Virtual Environment-Category 2.3 (By author)

Virtual Environment		
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name The Museum of the World
1	Are there similarities between the virtual environment and real-world?	-
2	Are the objects in the virtual environment similar to the real world?	-
3	Does the visitor have freedom of movement within the virtual environment?	X
4	Does the virtual environment provide feedback to the visitor?	X
5	Are these feedbacks realistic?	X
6	Are the transitions between images natural?	-
7	Does the system allow the visitor to teleport between areas in the virtual environments?	-
8	Does the system inform visitors where they are, how and where they can go?	-
9	Does the virtual environment have a specific entrance and exit?	-
10	Does the virtual environment give the feeling of being in the current place?	-

Table 23: Evaluation Table of Perception-Category 2.3 (By author)

Perception		
#	Criteria ("X" = YES , "-" : NO , N/A = Not applicable)	Museum Name The Museum of the World
1	How many senses do the virtual museum appeal to? Is it more than one?	X
2	Is there audio support besides the visuals?	X
3	Does it support haptic apparatuses?	-
4	Does it support VR glasses?	-
5	Are there different language options?	-
6	Do the colours bring the artefacts to the fore or cause the artefacts to disappear in colour?	X

Table 24: Evaluation Table of Active - Passive Museum-Category 2.3 (By author)

Active-Passive		
#	Criteria (“X” = YES , ”-“ : NO , N/A = Not applicable)	Museum Name The Museum of the World
1	Is there chat boxes that provide socializing?	-
2	Is there a gift shop?	-
3	Are there reading areas?	-
4	Is there a library?	-
5	Are there multimedia rooms?	-

In the final stage of the evaluation, The Museum of The World, a branch of The British Museum, which is included in the timeline, the third category of museums adapted to virtual museums, was examined. As a result of the evaluation, it has been observed that the timeline type virtual museum gives different results compared to other museums. It has been observed that it can provide sufficient information to the visitors in terms of artefact digitalization.

However, in terms of the virtual environment design, very different results have been obtained compared to other museums. The Museum of The World has no designed virtual space. The artefacts are listed in chronological order and categories on a timeline. As a virtual environment, no resemblance to the real world has been observed. When it is examined in terms of sensory perception, it has been observed that the sound features it provides have a positive effect on the virtual museum experience that will be experienced by appealing to more than one sensory organ. Adding a sound to every movement on the timeline in the virtual environment

reinforces this experience. Finally, it does not have any features that include the visitor, so it can be considered passive.

In general, it has been observed that The Museum of The World, which is a Timeline type, has the potential to prove that virtual museums do not need spaces as known, with the fun and different virtual museum experience it provides. Furthermore, it has been observed that the presence of sufficiently high quality digitalized artefacts and sound elements; however, the absence of the space directs the focus of the visitor from the space to the information and makes the virtual museum experience more educational and unique.

4.5 Findings and Discussion

Randomly selected, 101 existing virtual museums were subjected to a preliminary evaluation and categorized. These categories are grouped under two main headings—museums designed as virtual museums and museums adapted to the virtual museum. Then, according to the determined criteria, a total of 7 virtual museums were selected for examination. These museums were evaluated according to the criteria of virtual museum design and experience obtained from the literature review.

As a result of the evaluations, it has been found that the digitalization of the exhibited artefacts has a great impact on the virtual museum experience. The more information that can be conveyed to visitors, the more impressive the experience will be. From this point of view, it has been observed that museums designed as virtual museums are more successful in terms of artefact digitalization, and the quality of the virtual museum experience is high. Furthermore, the design of the museum space, which completes the museum experience, is an important point in virtual museums. Since

virtual museums cannot be visited physically, the virtual space design is one of the factors affecting the virtual museum experience. In terms of virtual museum design, it has been observed that the spaces of museums designed as virtual museums are more realistic and more similar to physical museum visits. Since such museums are created from scratch, each point has been considered in more detail.

On the other hand, the museums adapted to the virtual museum could not go beyond transferring the museum spaces to the virtual environment because they exist physically. Although the effort to resemble the real place has made museums feel close to the visitors before, it has been observed that it creates differences between the virtual and physical museum experience. This is because what can be done in the physical museum cannot be done in the virtual museum. It has been observed that the museum of the world, which is included in the timeline category of museums adapted to virtual museums, does not offer any spatial elements, unlike other virtual museums. The artefacts are displayed on a timeline as if they were in outer space. In the absence of a place, they do not expect from the place, and the visitors focus more on the artefacts. For this reason, it can be said that space has lost its importance in virtual museums.

In the evaluation of the virtual environment, which is the second stage of the evaluation, evaluation was made on the use of the virtual environment and the opportunities it provides. It has been observed that usability in the virtual environment has gained importance. In the creation of the virtual environment, it has been understood that the museums designed as virtual museums are more successful than the adapted ones. Although the selected museums spaces are similar to the real world, the virtual environment created does not offer the same opportunities. It has been observed that there are restrictions on movement in the adapted museums and that it is

possible to move only through certain points. This causes the people who have visited these museums before to not have the same experience. On the other hand, since there is no chance to physically visit and experience the museums designed as virtual museums, every detail has been considered in more detail. It has been observed that the existence of features such as the presence of more defined entrance areas, providing sufficient information to the visitor, which can be visited at every point of the spaces, make virtual museums designed as virtual museums more successful because they are not for promotion; but they took over the role of physical museums.

In the sensory perception part of the evaluation, it has been observed that the more sense organs are addressed, the more successful and quality experience the virtual museum offers. Since experience is related to perception, it has been understood that the more virtual museums support the perception of artefacts, the more successful the experience. In this direction, it has been understood that it is important for the exhibitions to provide audio and video support besides visual artefacts. As a result of the evaluation, it has been observed that the museums designed as virtual museums are more successful in terms of sensory perception. Since it is not possible to physically visit the museum, artefacts must be presented in the best way to be perceived. In museums designed as virtual museums, it is seen that this is understood by the designers.

On the other hand, it has been observed that it is difficult to perceive the artefact exhibited in museums adapted to virtual museums and reach information about it. In the active-passive part, where the virtual museum includes the user in museum visits, it has been observed that museums designed as virtual museums are successful and provide a higher quality experience. Furthermore, with the chat rooms and gift shops

they provide, it is possible to get away from the isolating environment of the virtual museum. Therefore, it has been seen that they provide a sociable virtual museum experience closer to the real museum experience.

Table 25: Results of the Analysis (By the author)

Museums Designed as Virtual Musems		**Museum Adapted to Virtual Museums**
Design of Virtual Museum		
More successful in terms of artefact digitalization. Offers artefacts in different formats	Digitalization of Artefacts	It offers artefacts in one type of format.
Since it was designed from scratch, every detail has been considered. understandable spaces	Development of Virtual Environment	It could not go beyond repeating the existing museum,
Artefacts do not lose any quality during the combination process	Combination of Artefacts and Virtual Environment	Artefacts lose quality during the combination process.
Virtual Environment		
It resembles reality and is easier to use. Allows visitors freedom of movement		It resembles reality, but there are problems in its use. It allows visitors to move on certain points.
Perception		
By addressing more than one sense organ, the perception of the artefact has become easier.		Provides artefact information in a uniform format and appeals to only one sense
Active-Passive		
It allows visitors to interact with each other with features such as chat.		There are no features that allow visitors to interact.

Finally, if we interpret the results based on four factors that affect the virtual museum experience, a virtual museum must have a high level of believability. Accordingly, for a virtual museum to be believable, first of all, the artefacts must be very well digitized. Then, the virtual space should be designed in the most similar way to reality with all its details. Also, while moving in the virtual space, the movements should relate to reality. Interactivity, another factor, can actually be said to be the most important one. In museums, which are social institutions, people benefit from social interaction. With this interaction, people reinforce their museum experiences by sharing with each other. Therefore, a virtual museum must be interactive. This interactivity can be achieved by establishing communication between visitors. Finally, explorability and immersiveness, which are other factors, can be considered parallel. A virtual museum is explorable and immersive if it encourages the visitor to visit the museum, spend time in that museum, visit every place, focus on every detail, and learn something.

Table 26: Interpretation of Results According to Four Factors (By the author)

Believability	Interactivity	Explorability	Immersiveness
Artefacts must be very well digitalized. Virtual space should resemble the real space	It should allow social interaction between visitors and interaction between artefacts and visitor.	It should encourage the visitor to explore artefacts by having all the information about artefacts.	Museum must have high reality level and interactivity supported with sound and music.

As a result, for a virtual museum to provide a certain level of virtual museum experience, it must meet the criteria of the four factors mentioned above. In addition, virtual museums should have high quality and digitized artefact databases in various

formats. Since knowledge and experience are transferred to the visitor with these artefacts, well-digitized artefacts have an important place in the virtual museum experience. For a virtual museum to offer a quality experience, its space must be designed from scratch. Because if the museum is adapted to the virtual environment, the visitor expects to experience the experience he had previously physically in the museum in this adapted space. In general, it has been seen that the adapted museums have not been very successful in this sense.

For this reason, the visitor's expectation is not met, and the museum experience is left unfinished. As a result, it has been understood that space has lost its importance in virtual museums, and it is necessary to focus on artefact and their presentation rather than space. The best example of this situation was seen in the museum in the timeline category. For this reason, it has been understood that in order for the virtual museum to offer a certain level of museum experience, space should not be redesigned and adapted; otherwise, it will not go beyond imitation.

Chapter 5

CONCLUSION

Museums, which are the guardians of the cultural heritage of humanity, have passed through many stages from the first time they started to form to the last point they have reached today. Over the years, museums have acquired important functions such as educating society and providing social interaction, as well as protection and exhibition functions. In the century we are in, it has been understood that not the museum with the largest collection, but the museum that presents its collection in the best way is successful in terms of experience. Understanding the importance of providing a quality experience to the visitor, museums have sought different ways to provide a quality experience. With the virtual museums that emerged due to this, a different, never-before-seen museum experience was presented to the visitors. In recent years, attempts to create virtual museums, which have emerged due to the increasing interest in virtual museums, have gained momentum during the Covid-19 pandemic period, and many virtual museums have been created. The museum experience it provides in these rapidly created virtual museums has become open to discussion. For this reason, in this thesis, virtual museums are examined and categorized. Then evaluations are made on the selected virtual museums. It is examined how a virtual museum should be designed and what criteria it should meet to provide a certain level of a museum experience.

The research set out to discuss how the rapidly increasing number of virtual museums affect the museum experience in general and what is necessary to have a quality virtual museum experience. The rapidly increasing number of virtual museums and the different levels of experience each of them provides are considered as the main problem of the study. For this reason, the research tries to give information about the formation process of virtual museums and the virtual museum experience process in order to provide quality virtual museum design and experience.

The theoretical background information of the research started with how museums have developed since their first establishment and how they have come to this day, and then how they provide experience to visitors. Theoretical information has proven that museums started with the prehistoric collections, then passing these collections into the hands of important people in the society, then opening these collections to the public, causing the formation of museums. Many other events that trigger each other constitute the development process of museums.

With the effect of technological developments experienced by humanity in the 20th century, museums have gained a different dimension. It has been understood that virtual museums, which are formed due to the digitalization process experienced by museums, also underwent a development process and provided an experience, unlike other museums. Examining the differences between the virtual museum and physical museum experience within the theoretical knowledge emphasized that the virtual museum experience is different and should be handled differently. Examining the experience from the word meaning to the virtual museum experience led to the result that the museum experience is a process and that it should be designed during this process.

According to the created virtual museum categories, seven virtual museums were evaluated in the light of the evaluation criteria, first within their own categories and then compared between other categories. As a result, it has been found that a virtual museum should be handled differently from other museums to provide a quality experience, and the virtual museum and physical museum experience are different. Accordingly, it has been concluded that it should be designed from scratch without adapting for a virtual museum to offer a quality experience. Moreover, its collection should be digitized sufficiently. Besides, it should be easy and understandable to use in every way, and it should satisfy the visitor by offering interactive features.

Considering the factors affecting the virtual museum experience, such as believability, interactivity, explorability and immersiveness. For a virtual museum to be believable, it must be very well digitized, the virtual environment must be similar to the real world or not at all, and it must be easy to move around in the virtual museum. For a virtual museum to be interactive, it must enable communication between visitors and also interaction between visitor and artefacts by providing social interaction. Finally, for a virtual museum to be explorable and immersive, it should offer more than one different exhibition and different venues instead of one type of exhibition. Having reading rooms, places where movie screenings are held, as in real museums, and appeal to hearing and, if possible, other sense organs as well as sight contributes to the explorability and immersiveness of virtual museums.

The topics covered in this thesis are museums, virtual museums, museum experience and virtual museum experience. The fact that this thesis examines and categorizes existing virtual museums can be considered as the first of the studies in this field. This thesis can be a reliable resource for those who want to research in the field of virtual

museum design and virtual museum experience. The factors affecting the virtual museum experience were evaluated in this evaluation, and how the virtual museum experience and virtual museum experience should be examined. Based on the information obtained from the theoretical background information, criteria were created for the evaluation, and the evaluation was made in line with these criteria. Although this is an evaluation, the criteria created can also be considered as a model and checklist for creating a virtual museum. With the help of this checklist, it is possible to transfer the museums, which we feel lacking more recently, to the virtual environment in a better quality way. More comprehensive results can be obtained with a survey study in which this checklist will be developed and included in its visitors for future studies to create virtual museums that provide a better quality virtual museum experience. In addition, for future studies, the effects of generational differences between users on museum experience can be examined.

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