PRESERVATION OF DIGITIZED INTANGIBLE CULTURAL HERITAGE IN MUSEUM STORAGE*

Dijitalleştirilmiş Somut Olmayan Kültürel Mirasın Müze Depolarında Korunması

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ABSTRACT

Conservation, research and communication are the basic functions of the museums according to the new museological approach, and conservation is one of the core missions since the birth of the museums. On the other hand, collections are the hearth of the museums and contribute to their development and activities. Storage areas protect collections and provides sustainability for the collection management. In this context, one of the main duties of museums is to maintain and manage collections in storage area under appropriate and safe conditions. Most of the museums in the world exhibit only a small percentage of their collections and so many collection items are housed in storage. Storage areas require regular monitoring, control and maintenance similar to exhibition galleries. Physical and environmental conditions of storage areas, storage systems and methods differ according to the material, condition, quantity and dimensions of the museum collections. Museum collections are defined as movable, immovable as well as tangible and intangible cultural heritage. Today, digital heritage is also part of the collections. Digital museum collections can be defined as born digital, digital or digitized item. Collecting, conservation, documentation, accessing or storage procedures of movable or tangible heritage in museums are on practice with well-developed principles, standards as well as collection management and conservation policies. However, identification, documentation, the concept of authenticity or issues of ownership of intangible cultural heritage is still on discussion. Digital preservation is also one of the recent research topics and practices for safeguarding of the intangible cultural heritage. In this context, digitized intangible cultural heritage can defined as digital resources that are digitized from audio-visual recordings, photographs or ephemera which documents and preserves practices and their tools or spaces associated with. However, technology is developing much faster today and most of the digital tools have a very short life span. Thus, technological development is a challenge for preserving digitized intangible cultural heritage. In a broader sense, preservation of digital heritage in the museum storage areas including physical and environmental conditions of the storage area where the digital heritage is located, their storage system, method and the storage management procedures are different comparing to the preservation of tangible heritage or other movable cultural assets. In this framework, main research questions of this article are: How the digitalization practices contribute to the safeguarding of the intangible cultural heritage? As technology is changing rapidly, how the preservation tools and storage methods of the digitized intangible cultural heritage can be kept up with the technological developments? How long the life span of the digitized intangible cultural heritage collections can be extended in museum storage? The article will mainly focus on the storage management of digitized intangible cultural heritage, and explain their physical and environmental conditions in the museum storage area. Terms of digital heritage, digitized intangible cultural heritage, digital preservation as well as the history of digital preservation of museum collections, organizations/institutions' contributions in the field will be discussed. Information about the storage system, storage method with safe materials and procedures will be provided within the scope of literature review. The paper highlights contributions of the digitalization practices to the safeguarding of the intangible cultural heritage, major issues and challenges related to the digital preservation in museum storage, and propose steps for the sustainable storage management of digitized intangible cultural heritage.

Key Words

Digital preservation, digital heritage, digitized intangible cultural heritage, museum storage management, preventive conservation.

ÖZ

Yeni müzecilik yaklaşımına göre koruma, araştırma ve iletişim müzelerin temel işlevleridir. Koruma ise müzelerin ortaya çıkışından bu yana temel misyonlarından birini teşkil etmektedir. Öte yandan koleksiyonlar müzelerin kalbidir; müzelerin gelişimine ve faaliyetlerine katkıda bulunurlar. Depo alanları koleksiyonları korur

* Date of arrival: 14 Mart 2020 – Date of acceptance: 7 Aralık 2020
Ertürk, Nevra. "Preservation of Digitized Intangible Cultural Heritage in Museum Storage". *Millî Folklor* 128 (Winter 2020): 100-110

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ve koleksiyon yönetimi açısından sürdürülebilirlik sağlar. Bu bağlamda, müzelerin temel görevlerinden biri, depo alanındaki koleksiyonları uygun ve güvenli koşullar altında muhafaza etmek ve yönetmektir. Dünyadaki müzelerin çoğu koleksiyonlarının sadece küçük bir bölümünü sergilemekte ve bu yüzden birçok koleksiyon öğesi depo alanlarında bulunmaktadır. Sergileme salonlarındaki gibi depo alanlarında da düzenli denetim, kontrol ve bakım yapılmasına ihtiyaç vardır. Depo alanlarının fiziksel ve çevresel koşulları, depolama sistemleri ve yöntemleri koleksiyonların malzemesine, koruma durumuna, sayısına ve boyutlarına göre farklılık göstermektedir. Müze koleksiyonları taşınır, taşınmaz, somut ve somut olmayan kültürel miras olarak tanımlanmaktadır. Günümüzde dijital miras da koleksiyonların bir parçasıdır. Dijital müze koleksiyonları, dijital ortamda oluşturulmuş, dijital veya dijitalleştirilmiş öğeler olarak tanımlanmaktadır. Müzelerde taşınabilir veya somut mirası toplama, koruma, belgeleme, erişim veya depolama prosedürleri, doğru hazırlanmış ilkeler, standartlar, koleksiyon yönetimi ve koruma politikaları ile uygulanmaktadır. Öte yandan, somut olmayan kültürel mirasın tanımlanması, belgelenmesi, özgünlük kavramı veya mülkiyet meseleleri hala tartışılmakta; somut olmayan kültürel mirasın dijital olarak korunması ise yeni araştırma konuları ve uygulama alanlarından birini teşkil ermektedir. Bu bağlamda dijitalleştirilmiş somut olmayan kültürel miras, uygulamalar ve bunlarla ilgili araçları ve yerleri belgeleyen ve koruyan görsel-işitsel kayıtlar, fotoğraflar veya efemeradan dijitalleştirilmiş dijital kaynaklar olarak tanımlanmaktadır. Mamafih günümüzde teknoloji çok daha hızlı gelişmektedir ve dijital araçların çoğunun ömrü kısadır. Bu sebeple, teknolojik gelişmeler dijitalleştirilmiş somut olmayan kültürel mirasın korunmasında karşılaşılan zorluklardır. Daha geniş bir ifade ile dijital mirasın müze depo alanlarında korunmasında, dijital mirasın bulunduğu depo alanlarının fiziksel ve çevresel koşulları, depolama sistemi, yöntemi ve depo yönetimi ilkeleri, somut mirasın veya diğer taşınır kültür varlıklarının korunmasına göre farklılık göstermektedir. Bu çerçevede makalenin temel araştırma soruları şunlardır: Dijitalleştirme uygulamaları somut olmayan kültürel miras mirasın korunması açısından nasıl bir katkı sağlıyor? Teknoloji hızla değiştikçe, dijitalleştirilmiş somut olmayan kültürel mirasın koruma araçları ve depolama yöntemleri teknolojik gelişime nasıl ayak uydurabilir? Müzelerin depo alanlarındaki dijitalleştirilmiş somut olmayan kültürel mirasın ömrü ne kadar uzatılabilir? Makalede temel olarak, dijitalleştirilmiş somut olmayan kültürel mirasın depolama yönetimine odaklanılacak ve müze depo alanının fiziksel ve çevresel koşulları açıklanacaktır. Dijital miras, dijitalleştirilmiş somut olmayan kültürel miras ve dijital koruma kavramları, müze koleksiyonlarının dijital olarak korunmasının tarihçesi, kurum ve kuruluşların alana katkıları tartışılacaktır. Alanyazın taraması çerçevesinde, depolama sistemi, güvenli malzeme ile depolama yöntemi ve prosedürler hakkında bilgi verilecektir. Bu makalede, somut olmayan kültürel mirasın korunmasına dijitalleştirme uygulamalarının katkısı, müzelerin depo alanlarında dijital koruma ile ilgili önemli konular ve zorluklar vurgulanmakta; dijitalleştirilmiş somut olmayan kültürel mirasın sürdürülebilir depo yönetimi ile ilgili olarak atılacak adımlar belirtilmektedir.

Anahtar Kelimeler

Dijital koruma, dijital miras, dijitalleştirilmiş somut olmayan kültürel miras, müzelerde depo yönetimi, önleyici koruma.

1. Introduction

Collecting, conservation, documentation, research, exhibition and education were the basic functions of the museums in which object-centered museological approach was dominant. As a result of the social, economical and political changes brought by the World War II, museums have transformed to adopt the visitor-centered museological approach. In today's museums, although the new concepts such as participation, inclusiveness or sustainability are being discussed, conservation continues to play a dominant role as one of the basic funtions of museums along with research and communication.

On the other hand, collections are the core elements of museums and all museum activities such as permanent and temporary exhibitions, incoming/outgoing loans, research, educational programs, other cultural or social activities are shaped according to the collections. Museum collections are defined by different types of material evidences since the birth of the museums, but today tangible heritage, intangible cultural heritage and digital heritage are part of the museum collections.

The term of intangible cultural heritage, which is one of the main issues of this article, has become a topic of international concern through the work of United Nations Educational, Scientific and Cultural Organization (UNESCO). With the launch of the

UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage in 2003, intangible cultural heritage is defined, methods for safeguarding intangible cultural heritage both at the national and the international levels are explained, and in this regard the preservation of intangible cultural heritage elements has become prominent as an international concern.

After the 2003 UNESCO Convention, tangible and intangible heritage are added to the International Council of Museums' (ICOM) latest museum definition in 2007 and it is stated that "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 hummanity and its environment for the purposes of education, study and enjoyment" (ICOM 2018: n.p.). In this context, this new definition broadens the concept of museum collection from material evidence to heritage. Furthermore, all museum issues related to tangible and intangible cultural heritage have been more on discussion since then.

In 2019, ICOM announced an alternative museum definition to be discussed in the 25th ICOM General Conference. Although the definition had not approved, there are some important points to reconsider the role and the functions of museums. The proposed definition is as follows: "...museums hold artefacts and specimen in trust for society, safeguard diverse memories for future generations and guarantee equal rights and access to heritage for all people...museums work in active partnership with and for diverse communities to collect, preserve, research, interpret, exhibit and enhance understandings of the world..." (ICOM n.d.: n.p.). In this context, digital preservation provides an input in terms of safeguarding both tangible and intangible cultural heritage for future generations, equal physical and intellectual accessibilities with digital tools, interpretation of collective memories for better understanding of the world cultural heritage.

Conservation of tangible, intangible and digital cultural heritage is still one of the major topics in the museums' agenda. Conservation practices in museums include active conservation, preventive conservation, disaster management and risk management. Storage management, which is the totality of storage standards and principles applied to protect collections in safe physical and environmental conditions with safe storage systems, methods and materials, is one of the activities in preventive conservation. Hence, several studies, projects and publications have launched about the storage management of tangible heritage. Deterioration factors of organic, inorganic or composite materials, their storage method, safe storage and packing materials, storage procedures have already discussed in the conservation field. Accordingly, policies, standards or conservation plans in relation to tangible heritage have developed at institutional, national or international levels. However, storage management approaches of intangible cultural heritage in museums need to be studied. At this point, digital preservation methods should be discussed as a tool for the safeguarding of the intangible cultural heritage, which is relatively a new topic both in museum studies and conservation fields.

By the 20th century (also known as the Digital Age), some of the museums have started to digitize their collections and share them via online platforms; digital applications have used as a communication tool in exhibitions or educational activities; virtual museums or online exhibitions have launched. Today, documentation methods, intellectual accessibility, display techniques, security measures or preservation of tangible collections both on display and storage are already developed with digital technologies. However, development of new storage systems or methods of digitized collections according to technological changes is still a challenge for museums.

Within this framework, the research questions of the article are as follows: How the digitalization practices contribute to the safeguarding of the intangible cultural heritage? As technology is changing rapidly, how the digital preservation tools and storage methods of the digitized intangible cultural heritage can be kept up with the technological developments? How long the life span of the digitized intangible cultural heritage collections can be extended in museum storage? The purpose of the article is to define the terms of digital heritage, digitized intangible cultural heritage and digital preservation; explain history of the digital preservation of museum collections as well as leading organisations/institutions working in the field; discusses storage systems and methods, safe storage materials and storage procedures of digitized intangible cultural heritage elements, as well as physical and environmental conditions of their storage area. The paper highlights contributions of the digitalization practices to the safeguarding of the intangible cultural heritage, major factors effect the preservation of digitized intangible cultural heritage in museum storage and propose steps for their sustainable preservation. The scope of the article covers general principles and practices of storing digitized intangible cultural heritage collection in museum storage facility. The paper excludes digitizing process, data storage and management, digital archive of intangible cultural heritage. Literature review was used as a research method in the article.

2. Terms of Digital Heritage, Digitized Intangible Cultural Heritage and Digital Preservation

Digital Age has started by the beginning of the 20th century. Museums have started to launch their web sites by 1990s. Digital tools and applications are used in exhibitions, museum collections are digitized and digital images of collections become accessible or virtual museums are launched since then. On the other hand, the earlier discussions on digital heritage and digital preservation have mainly started with the digitized collections of libraries and archives.

Digital heritage, which is a relatively new approach in heritage-related issues, is developed by UNESCO. According to the *UNESCO Charter on the Preservation of the Digital Heritage* in 2003, digital heritage is defined as follows: *"Digital heritage* consists of unique resources of human knowledge and expression. It embraces cultural, educational, scientific and administrative resources, as well as technical, legal, medical and other kinds of information created digitally or converted into digital form from existing analogue resources" (UNESCO 2003: 1).

According to the *UNESCO/PERSIST* (Platform to Enhance the Sustainability of the Information Society Transglobally) *Guidelines*, *digital heritage* means heritage which is made up of computer-based materials, whether born digital or digitized from other formats, which emanates from different communities, industries, sectors, regions and requires active preservation approaches to ensure its authenticity, accessibility and usability through time. Digital heritage in museums can be divided into the following categories; born digital items in the collection, digital or digitized information about the collection and digital representations of physical artefacts in the collection (Choy et. al. 2016: 7, 16).

In this context, digitized intangible cultural heritage can be defined as digital resources that are digitized from audio-visual recordings, photographs or ephemera, which documents and preserves practices, representations, expressions, knowledge, customs, oral traditions, skills practiced by the members of a group or community, which can also include the instruments, tools, artifacts and cultural spaces associated with. Different types of audio-visual recordings such as recorded interviews or other physical

representations of intangible cultural heritage can all be digitized and kept in museum storage.

Digitized intangible cultural heritage collections provide intellectual accessibility which may help to ensure the longevity of certain traditions, validate the custom or tradition for the community, or even revitalize a practice that has gone out of use. It encourages the community to maintain an appreciation for their unique customs, traditions, and helpful in terms of promotion because it gives outsiders a chance to see what kinds of intangible cultural heritage are present in other parts of the world. If digitized intangible cultural heritage collections share via online platforms, it allows quick and easy access and this virtual space becomes an arena wherein community members can engage. In some cases, community members can contribute material to such collections by uploading scanned images/documents or personal recordings in an inclusive way. In these cases, it provides a sense of continuity and connectivity with specific customs and traditions. Although physical records or digital collections of living heritage are always in danger of being lost or damaged, the digitalization of any type of object is an act of backing-up that helps to ensure that this material is more-or-less lasting, as it is transferred into an additional format (Museum Association of Newfoundland and Labrador for the Canadian Heritage Information Network n.d.: n.p.) All these approaches contribute to the safeguarding of the intangible cultural heritage as it is stated in Articles 13, 14, 15 of the *UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage.*

Digitalization of intangible cultural heritage elements is one of the tools to preserve this heritage for future generation. Therefore, digital preservation plays a crucial role in terms of sagefuarding of the intangible cultural heritage. "*Digital preservation* combines policies, strategies and actions to ensure the most accurate rendering possible of authenticated content over time, regardless of the challenges of file corruption, media failure and technological change" (American Library Association 2010: n.p.).

"Digital preservation is one of the technological approach that can be used for preservation of intangible culture heritage. It is not only a way of preserving the cultural heritage but it also provides an easy tool to archive the material as references for educational purposes" (Idris, Mustaffa and Yusoff 2016: 11).

Today, digitized collections are becoming widespread among museums. For instance, Louvre Museum, The British Museum, The Getty Museum, Museum of Modern Art (MOMA), Guggenheim Museums and Sakıp Sabancı Museum in Istanbul have started to digitalize part of their collections and share these digital collections online. Digital collections provide a resource for research and educational purposes and can also be used as a communication tool.

3. History of the Digital Preservation of Museum Collections

UNESCO is one of leading institutions about digital preservation. UNESCO developed the first legal instrument on digital preservation named as *Charter on the Preservation of the Digital Heritage* (2003). The treat of loss of digital heritage due to the rapid changes in the technology is the main concern of the Charter. It calls different stakeholders to take the necessary actions for the preservation of digital heritage. The Charter is not only focusing on museums, but also libraries, archives and other cultural institutions.

Besides UNESCO, the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) contributes to the digital preservation field through its training programs and publications. Hence, the first training program in the world about digital preservation entitled *Sound and Image Collections Conservation*

(SOIMA) was launched by ICCROM in 2006. The program is organised every year as a capacity building activity in the field. (Tandon et.al. 2017: 6).

UNESCO launched a Digital Preservation Programme and international experts met at the Memory of the World Conference in Vancouver in 2012 in the framework of the programme. It is agreed that there is a need to establish a roadmap that ensure long term access and preservation of digital information. *The UNESCO/UBC Vancouver Declaration* was the starting point of the UNESCO/PERSIST (Platform to Enhance the Sustainability of the Information Society Transglobally) Project, which was launched in 2013 (Choy et.al. 2016: 3), in order to safeguard the digital information and ensure its access (Harvery and Weatherburn 2018: 177). One of the important outputs of the UNESCO/PERSIST Project is *the UNESCO/PERSIST Guidelines for the Selection of Digital Heritage for Long-term Preservation* (2016) which gives information about the principles and recommendations for the digital preservation and access to digital heritage.

One of the first international meetings with a specific focus on the digital preservation of intangible cultural heritage entitled *Libraries and Archives and the Preservation of Intangible Cultural Heritage: Defining a Research Agenda* was held at New York University in 2016. "In the keynote address, Dr. Innocenti proposed to create standards and guidelines for collecting, managing and providing access to intangible cultural heritage collections in digital form, including multilingual vocabularies and technologies for storage and visualization (Bonn, Kendall and McDonough 2017: 31).

In terms of digital preservation of museum collections, "International Council of Museums (ICOM) International Committee for Documentation (CIDOC) has founded two working groups. *Digital Preservation Working Group* provides guidance in collecting, preserving and documenting processes of the digital heritage. *Digital Strategy Development Working Group* is aimed to assist museums in their digital strategy development process" (ICOM CIDOCa n.d.: n.p.; ICOM CIDOCb n.d.: n.p.). "American Institute for Conservation (AIC) has also founded a working group named as *Electronic Media Group* (EMG) for developing the preservation standards of electronic media tools" (American Institute for Conservation n.d.: n.p.). Canadian Conservation Institute (CCI) is also active in the field with various publications (CCI Notes) about storage management, electronic media, digital preservation of museum, library or archival collections.

The latest initiative is *The Declaration of Cooperation on Advancing Digitisation of Cultural Heritage.* The Declaration has signed among the European countries in 2019. It is not only focusing on museum collections, but also monuments and sites. Member States share their experiences through digitalization projects including intangible cultural heritage and projects' poteantial impact on accessibility (European Commission 2018: 4).

In brief, digital preservation of intangible cultural heritage became one of the main topics with the launch of the 2003 UNESCO Convention. In fact, preservation of digital heritage that includes movable and immovable cultural heritage are under discussion since 2003 as well. The discussions are more about digitizing process, data storage and management, documentation, digital archive, collection management, preservation, security, accessibility, interpretation methods, principles and standards.

4. Storage Area of Digitized Intangible Cultural Heritage

There are ten agents of deterioration that can cause damage and loss of value of museum collections. These are as follows: Physical forces (earthquake, inadequate handling or storing, overload, transportation, etc.), criminals (theft, vandalism, terrorist attack, etc.), fire (lightning, gas leaks, faulty electrical installations, etc.) water (tsunami, river flood, water pipe leaks, inadequate cleaning procedures, etc.), pests, pollutants, light

and ultraviolet, incorrect temperature, incorrect relative humidity, dissociation (Pedersoli, Antomarchi and Michalski 2016: 26-27). On the other hand, especially fire, water, incorrect temperature and incorrect relative humidity are the main risks for the digitized intangible cultural heritage because these risks can diretly damage digital formats, if the necessary preventive conservation measures and periodic control do not operate in museums properly.

Risks can cause total or partial loss of value. However, risks may differ according to the museum building and its location, material and size of museum collections, museum storage space and units. Additionally, preventive conservation measures differ from one museum to another according to the institutions which museums are affiliated to, museum budget and number of experienced staff. For instance; if a museum does not install fire alarm and fire suppression systems, digital as well as organic collections can easily be damaged because of fire because digitized collections can burn completely. Flood, firefighting or cleaning procedures can cause damage to water-sensitive materials such as digital or organic collections. Digitized collections can be effected negatively by incorrect temperature or incorrect relative humidity, if they are too high, too low or if there are any fluctuation. "Failure in the digital collections storage system where the only existing copy of the collection inventory is kept will cause irreversible loss of information and will compromise intellectual access" (Pedersoli, Antomarchi and Michalski 2016: 56).

In order to minimize risks in digital collections storage area, museum storage management process should also be practiced properly. Whether a collection item is an acquisition or incoming/outgoing loan, there are a number of processes in which the collection will be subjected to, and the units in the storage areas are planned according to these processes. These units are as follows; loading/unloading platform, inventory room, photography workshop, packing room, quarantine room, loan room and fumigation room. All these units are planned mainly for tangible collection items. Digital heritage is different from tangible heritage in terms of content, material and dimensions. Thus, storage management process and procedure of the digitized heritage are different.

In case of digitized intangible heritage or digital heritage in general, the collection item should access to the museum storage under the supervision of collection manager/curator, documentation specialist, conservator-restorator and security officer. It should be recorded and photographed by the documentation officer. Organic, inorganic or composite materials should be kept in the quarantine room before the opening of their packages because quarantine room is used to prevent insects or microorganisms in collection items or packing/boxing materials from invading other items. Packed/boxed digital heritage should also be kept in the quarantine room like other materials.

After the conservator-restorator decide to open the package of the collection item, it is opened by the preparation team in the packing room, accompanied by the collection manager/curator, documentation specialist, photographer and security guard. Loan items are transferred to loan room. If acquisition needs any conservation-restoration treatments, the collection item moves either to the conservation-restoration workshop or laboratory for analysis. Fumigation room is needed for organic or composite materials in order to fight with pest with a proper fumigant. In case of digital heritage, fumigation process is not required. After the aforementioned process is conducted, collection items are stored according to their materials. In this respect, digital heritage should be stored in a separate storage room which is used only for digital collections.

Collection content, its material, condition, size and quantity are the major factors in the museum storage management. "When designing the museum building, 60% of the storage area should be reserved for storage systems and 40% for collection and circulation" (Lord and Lord 2002: 83).

Museum storage area should be planned on the ground floor whether it houses tangible, intangible cultural heritage or digital heritage. "Basements and attics are usually not appropriate due to the temperature fluctuations, extremes of relative humidity, and potential leaks of floods" (Canadian Conservation Institute 2002: 1).

Storage areas are closed to the visitors. Thus, museums should have a separate and controlled collection entrance apart from the entrance of visitors and staff. Conservation-restoration workshop and lift for the collections should be designed close to the storage area. Connection between the storage areas and exhibition galleries should also be planned. Easily flammable liquids, food and garbage should be stored far from the storage area.

As it is stated in the The European Commission Recommendation on *Digitisation and Online Accesibility of Cultural Material and Digital Preservation,* "digital material has to be managed and maintained, otherwise files may be unreadable when the hardware and software used to store them becomes obsolete, material may be lost when storage devices deteriorate over time" (The European Commission Recommendation, 2011: 57).

Several tests have done among the digital tool manufacturers. Hence, it is recommended that "CD-R, DVD-R, and DVD+R discs should have a life expectancy of 100 to 200 years or more; CD-RW, DVD-RW, DVD+RW, and DVD-RAM discs should have a life expectancy of 25 years or more" (Byers 2003: 13).

In addition to the technological changes, environmental conditions of storage area, storage method and handling procedures will directly affect the life span of the digital heritage collections.

4.1. Environmental Conditions

Climate control in the storage areas depends on the collection comfort rather than the human comfort because storage areas are closed to visitors unlike the exhibition galleries. According to the materials in the museum's collection, relative humidity and temperature ratios in the storage areas vary. Hence, temperature in the storage areas should be kept lower than the exhibition galleries in order to ensure the chemical stability of the collections and to save energy (Erhardt, Tumosa and Mecklenburg 2007: 15). Comparing to the other collection items, digital heritage should be kept in cool, dry and dark locations (National Park Service 2010: 1).

In the digital heritage storage, "the recommended relative humidity range for extended storage is 20% to 50%, with relative humidity never falling below 10% and temperature range is from -10°C to 23°C, with the temperature never exceeding 32°C. If discs are stored under recommended conditions, error rate and playability of representative samples should be tested every 5 to 10 years" (Canadian Conservation Institute 2020: n.p.).

Exposure to pollutants and light should be limited as much as possible. The negative effects of light are not a problem, if discs are returned to their cases promptly after use (Canadian Conservation Institute 2020: n.p.).

According to the Canadian Conservation Institute's article entitled *General Precautions for Storage Areas*, it is stated that the brightness level in the storage areas including digital heritage storage should be 150 lux or below. Unlike exhibition galleries, lights should be turned off when storage areas are not used. Windows should be closed with

curtains or blinds to eliminate harmful sources of daylight (Canadian Conservation Institute 2002: 2).

4.2. Storage Systems and Methods

Museum storage area is mainly divided into organic and inorganic materials. If the museum facility has enough space for storing collections, in that case, collections can be kept in separate storage areas such as painting, sculpture, paper, stone or metal. Organics and inorganics such as paper and metal should not be kept in the same storage area because they interact chemically. Storage systems and methods differ according to the collection material, dimension or vulnerability. For instance, papers are kept horizontally in drawers; mid-sized ceramic or glass objects can be boxed and kept in a compact storage system or cabinet, and carpets can be rolled.

Closed storage systems (such as compact storage systems, cabinets or drawers), which are more protective than open storage systems, should be preferred in museum storage areas. Storage systems must have the strength to bear the weight of the collection items, therefore they should be designed and manufactured according to the collection.

In case of digitized intangible cultural heritage, discs are stored vertically in standard-sized jewel cases; audio discs are kept in slimline cases and digital video discs are kept in amaray cases (or alternatively in snapper cases) (Canadian Conservation Institute 2020: n.p.; Byers 2003: 19). All types of digital heritage are kept in drawers. Drawers can be either part of the compact storage systems or cabinets. Separate chest of drawers can also be preferred. "Paper or plastic sleeves are not recommended as they provide little physical protection, they may interact chemically with the disc and/or they can scratch the disc surfaces" (Canadian Conservation Institute 2020: n.p.).

In general, inert materials should be used during the storage and packing processes. Different types of inert materials can be accepted as safe materials. Polycarbonate or polypropylene can be choosen as a safe case material in the digital heritage storage.

Regular monitoring and maintenance are the key issues in the digital heritage storage similar to the other storage areas in order to ensure the sustainability of collections and extend their life span.

Copies should be made when preserving digitized intangible cultural heritage. "Three copies should be created on at least two different types of storage media and one of the copies should be stored off-site. If the same type of storage media is used for one of the copies, different brands should be used" (Canadian Conservation Institute 2020: n.p.).

In terms of handling, "discs should be hold by the centre hole and the outer edge between the forefinger and the thumb. The disc surface should be touched with gloves as fingerprints will interfere with readability" (Canadian Conservation Institute 2020: n.p.).

In general, different types of digital heritage collections are kept in organic storage areas because of limited space. On the other hand, number of separate storage room for digital heritage is increasing in the last one decade. Smithsonian's National Museum of the American Indian and Musée du quai Branly are the best examples of housing digitized intangible cultural heritage in separate rooms within their storage areas. Both of the museums follow the latest development in digital preservation technology and standards as well. In the last years, "Government of Canada is also working on the preservation digital heritage and has developed a *Digital Preservation Plan Framework for Cultural Heritage Organisations*. The document is used for any digital preservation activity and includes an action plan for the related institutions" (Government of Canada n.d.: n.p.).

5. Conclusion

In the 21st century, museum collection is defined as tangible and intangible heritage, rather than material evidence. Today, digital heritage is also part of the museum collections and kept in museum storage. The main difference between the digital heritage from tangible and intangible cultural heritage is its format and life span which is directly effected from the technology-based developments.

Digitized intangible cultural heritage, which is the main research topic of this article, can contribute to the basic functions of museums. It plays an important role in terms of museum documentation and provide quick and easy access to documentation data system. If the documentation system is shared partially or completely via online platforms, it provides intellectual accessibility and contributes to the museum research function. Digitalization contributes to promotion, education and awareness-raising of museum collections which is part of the museum communication function. Above all else, digitized intangible cultural heritage collections whether they shared via online or not, contribute to the safeguarding of heritage as it is one of the preservation tools.

Digitizing process, data storage and management, digital archive as well as preserving digitized intangible cultural heritage in museum storage are related, but also different research topics. In the context of this article, technological changes might be costly, if museum storage system and methods have to be changed. Thus, digitalization is a challenging and complex situation for museums.

Some of the big-scale museums in the world have information technology departments. On the other hand, external services are procured in various museums. Both of these methods can be used in order to follow the latest technological developments and get updated information in relation to the digital preservation. Collection managers/curators, conservators-restorators and information technology specialists should work together in order to develop a digital preservation strategy, policy and procedures including preservation tools and methods according to the digital preservation framework. Digital preservation policy should be a separate document from museum collection management policy and conservation policy because needs, priorities and challenges of digital heritage are different from tangible collection items. Digital preservation policy is designed to secure the long-term future of digital heritage in museum storage area. It will also provide appropriate steps to address future threats and action plans.

Fire, water, incorrect temperature or incorrect relative humidity are major risks that can cause damage and loss of value of digitized intangible cultural heritage collections. First of all, conservators-restorators should take the necessary preventive conservation measures in museum storage area and control storage facility periodically in order to minimize all potential risks and extend the life span of the digitized intangible cultural heritage. A separate storage space should be designed specifically for digital heritage in museum storage facility, and its physical as well as environmental conditions should be planned according to the standards of digital heritage storage management. It is recommended to allocate a conservator-restorator who is specialized in the field of digital heritage preservation in museums.

Consequently, various measures and approaches can be used to ensure the safeguarding of the intangible cultural heritage as it is also stated in the 2003 UNESCO Convention. Museums house the world's collective memory and heritage for future generations. In this context, intangible cultural heritage can be preserved by digitalization and digitized intangible cultural heritage that are kept in museum storage are used for the sustainability

of shared values. Digitized intangible cultural heritage can also be shared through museum online platforms in order to provide research opportunities, intellectual accessibility, communication, promotion and increase community awareness.

KAYNAKÇA

American Institute for Conservation. "Electronic Media Group" (n.d.) 8 October 2020. <https://www.culturalheritage.org/membership/groups-and-networks/electronic-media-group>

American Library Association. "Definitions of Digital Preservation" (18 January 2010) 8 March 2020. <http://www.ala.org/alcts/resources/preserv/2009def>

Byers, Fred R. *Care and Handling of CDs and DVDs: A Guide for Librarians and Archivists*. Washington D.C.: National Institute of Standards and Technology, 2003.

Bonn, Maria, Kendall, Lori and Jerome McDonough. *Libraries and Archives and the Preservation of Intangible Cultural Heritage: Defining a Research Agenda.* U.S.A.: University of Illinois at Urbana-Champaign, 2017.

Canadian Conservation Institute. "General Precautions for Storage Areas CCI Technical Notes 1/1" (2002) 10 March 2020. <https://www.canada.ca/content/dam/cci-icc/documents/services/conservation-preservation-publications/canadian-conservation-institute-notes/1-1-eng.pdf>

____. "Longevity of Recordable CDs, DVDs and Blu-rays CCI Technical Notes 19/1" (2020) 10 March 2020. <https://www.canada.ca/en/conservation-institute/services/conservation-preservation-publications/canadian-conservation-institute-notes/longevity-recordable-cds-dvds.html>

Choy, Sarah C.C. and et.al. *The UNESCO/PERSIST Guidelines for the Selection of Digital Heritage for Long-term Preservation*. Paris: UNESCO, 2016.

European Commission. *Cultural Heritage: Digitisation, Online Accessibility and Digital Preservation. Consolidated Progress Report on the Implementation of Commission Recommendation* (2011/711/EU) 2015-2017. Luxembourg: European Union, 2018.

Erhardt, David, Tumosa, Charles S. and Marion F. Mecklenburg. "Applying Science to the Question of Museum Climate". *Museum Microclimates: Contribution to the Copenhagen Conference* (19-23 November 2007). eds. Tim Padfield, Karen Borchersen. Copenhagen: National Museum of Denmark, 2007: 11-18.

Government of Canada. "Digital Preservation Plan Framework for Cultural Heritage Organisations" (n.d.) 8 October 2020. <https://www.canada.ca/en/heritage-information-network/services/digital-preservation/plan-framework-museums.html>

Harvey, Ross and Jaye Weatherburn. *Preserving Digital Materials*. London: Rowman & Littlefield Publishing, 2018.

ICOM. "Creating a new museum definition – the backbone of ICOM" (n.d.) 4 October 2020. <https://icom.museum/en/resources/standards-guidelines/museum-definition/>

____. "What is ICOM's definition of a museum?" (31 May 2018) 4 October 2020. <https://icom.museum/en/faq/what-is-icoms-definition-of-a-museum/>

ICOM CIDOCa. "Digital Preservation" (n.d.) 8 October 2020. <http://cidoc.mini.icom.museum/working-groups/digital-preservation/>

ICOM CIDOCb. "Digital Strategy Development" (n.d.) 8 October 2020. <http://cidoc.mini.icom.museum/working-groups/digital-strategy-development/>

Idris, Muhammad Zaffwan, Mustaffa, Norsimaa and Syed Osman Syed Yusoff. "Preservation of Intangible Cultural Heritage Using Advance Digital Technology: Issues and Challenges". *Journal of Arts Research and Education* 16 (2016): 1-13.

Lord, Barry and Gail Dexter Lord. *The Manual of Museum Exhibitions*. New York: Altamira Press, 2002.

Museum Association of Newfoundland and Labrador for the Canadian Heritage Information Network. "Digitizing Intangible Cultural Heritage: A How-To Guide" (n.d.) 3 October 2020. <https://www.canada.ca/en/heritage-information-network/services/digitization/guide-digitizing-intangible-cultural-heritage.html>

National Park Service. "Digital Storage Media". *Conserve O Gram* 22/5 (2010): 1-4.

Pedersoli, Josè Luiz, Antomarchi, Catherine and Stefan Michalski. *A Guide to Risk Management to Cultural Heritage.* (n.p.): ICCROM, Government of Canada, Canadian Conservation Institute, 2016.

Tandon, Aparna and et.al., eds. Unlocking Sound and Image Heritage: Selected Readings from the International 2015 *SOIMA Conference*. Rome: ICCROM, 2017.

The European Commission Recommendation. "Digitisation and Online Accessibility of Cultural Material and Digital Preservation". *Official Journal of the European Union* 283/39 (2011): n.p.,

UNESCO. "Charter on the Preservation of Digital Heritage" (2003) 12 March 2020. <https://unesdoc.unesco.org/ark:/48223/pf0000133171_eng>.