

Digitization of Libraries, Archives, and Museums in Russia

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ABSTRACT

This paper discusses the digitization of cultural heritage in Russian libraries, archives, and museums. In order to achieve the research goals, both quantitative and qualitative research methodologies were adopted to analyze the current status of legislative principles related to digitization through the literature review and the circumstance of the latest projects related to digitization through the literature and website review. The results showed that these institutions seem quite successful where they provide a wide range of services for the users to access the digital collections. However, the main constraints on digitization within libraries, archives, and museums in Russia are connected with the scale of the work, dispersal of rare books throughout the country, and low level of document usage.

INTRODUCTION

Culture is one of the most important aspects of human activity. Libraries, archives, and museums (LAMs) in the Russian Federation store some of the richest cultural and historical heritage collections, some of which can be classified as world cultural treasures. As is true with other countries, LAMs in Russia are engaging in problems with digitization of their unique cultural treasures. In this regard, these repositories are implementing digital technologies to improve their work on digitization, preservation, indexing, search, and access of cultural heritage more effectively and efficiently. Information technologies can be used to preserve national knowledge and experience.¹ The digitization of cultural heritage is one of the changes that occurred at the present stage of the global information society. Researchers have made many attempts to define the concept of digital culture, which is considered to be a phenomenon that manifests itself through art, creativity, and self-realization, by implementing information technologies.² The need for digitization of unique cultural heritage has caused the rapid development of digital libraries, archives, and museums, described collectively as Digital LAMs, the multidisciplinary institutions that change the way people retrieve and access information.

Researchers and specialists involved in the digitization of information resources in LAMs work together to preserve the cultural heritage of the Russian Federation using modern information technologies. As Pronina noted, the digitization of cultural heritage began to develop actively in many countries, including Russia, around the same time.³ Many researchers analyzed digitization issues in Russia. For example, Lopatina and Neretin discussed the modernization of the system of cultural information resources and the history of preserving digital cultural heritage in Russia.⁴ Astakhova pointed out the problem of the digitization of cultural heritage and the transformation of art objects into 3D models.⁵ Miroschnichenko et al. discussed the problem of organizing digital documents in the state archives and pointed out the issues of providing digitized archival documents for wide access through open electronic resources.⁶

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Despite a long history of improvements in digitization policies and programs, issues still exist in the major cultural repositories, and Russia's level and scope of digitization research are still lagging behind many European countries.⁷ Therefore, three primary research questions guide this study:

1. What is the policy to regulate the digitization of cultural heritage in Russia?
2. What is the status of the digitization of cultural heritage in Russia?
3. What are the constraints related to digitization in Russia?

In addition, there is not enough research that fully reflects the current activities of digitization practices in LAMs in Russia. By analyzing this matter, the authors hope to present the state of cultural heritage digitization in Russia and uncover problems and limitations in this field.

BENEFITS OF DIGITIZATION IN A CULTURAL HERITAGE REPOSITORY

Before answering the key research questions, it is worth exploring the ultimate benefits of digitization in cultural heritage repositories. Digitization refers to converting an analogue source into a digital version.⁸ A large proportion of the collections related to cultural heritage repositories comprise not only the materials that are born digital, but many resources that are not originally created in digital form that have been digitized. Digitization involves three major stages.⁹ The first stage is related to preparing objects for digitization and the actual process of digitizing them. The second stage is concerned with the processing required to make the materials easily accessible to users. This involves a number of editorial and processing activities including cataloguing, indexing, compression, and storage, as well as applying appropriate standards for text and multimedia file formats to meet the needs of online Digital LAMs. The third stage includes the preservation and maintenance of the digitized collections and services built upon them.¹⁰

The benefits of digitization are improved access and preservation. Items, once digitized, can be used by many people from different places simultaneously at any point in time. Unlike printed or analogue collections, digitized collections are not damaged by heavy and frequent usage, which helps in the preservation of information. According to IFLA's guidelines, several benefits come from having digitized materials. Organizations digitize

1. to increase access to a high demand from users and the library or archive has the desire to improve access to a specific collection;
2. to improve services to an expanding user's group by providing enhanced access to the institution's resources with respect to education and life-long learning;
3. to reduce the handling and use of fragile or heavily used original material and create a backup copy for endangered material such as brittle books or documents;
4. to give the institution opportunities for the development of its technical infrastructure and staff skill capacity;
5. to form a desire to develop collaborative resources, sharing partnerships with other institutions to create virtual collections and increase worldwide access;
6. to seek partnerships with other institutions to capitalize on the economic advantages of a shared approach; and
7. to take advantage of financial opportunities, for example the likelihood of securing funding to implement a program, or of a particular project being able to generate significant income.¹¹

While digitization has benefits, there are also some problems. The most obvious one is related to the quality of the digitized objects. In the course of digitizing, we may lose some important aspects of the original document. Another problem is related to access management. Proper mechanisms need to be put in place to determine the authenticity of materials, as well as to control unauthorized access and use.

The success of digitization projects depends not only on technology but also on project planning. Since digitization is a relatively new process, institutions may concentrate on technology before deciding on a project's purpose. However, technology should never drive digitization projects; instead, user needs should be determined first, and only then should a technology appropriate to those needs be selected to meet a project's objectives. The best practices for planning a digitization project can be suggested as follows: determine the copyright status of the materials; identify the intended audience of the materials; determine whether it is technically feasible to capture the information; insist on the highest quality of technical work that the institution can afford; factor in costs and capabilities for long-term maintenance of the digitized images; cultivate a high level of staff involvement; write a project plan, budget, timeline, and other planning documents; budget time for staff training; plan a workflow based upon the results of scanning and cataloging a representative sample of material.¹²

POLICIES REGULATING DIGITIZATION OF CULTURAL HERITAGE IN RUSSIA

The policy development at the time of selection should be made early for the suitability of selection and digital object management. This policy should formulate goals of the digitization project, identify materials, set selection criteria, define the means of access to digitized collections, set standards for image and metadata capture and for preservation of the original materials and state the institutional commitment to the long-term preservation of digital content.¹³

As stated by Russian law, the cultural heritage of the peoples of the Russian Federation includes material and spiritual values created in the past, as well as monuments and historical and cultural territories and objects significant for the preservation and development of identity of the Russian Federation and all its peoples, their contribution to world civilization.¹⁴ The Decree of the President of the Russian Federation "On Approval of the Fundamentals of State Cultural Policy" extended the term of cultural heritage by including documents, books, photos, art objects, and other cultural treasures that represent the knowledge and ideas of people throughout the centuries. The government emphasized the role of the information environment and modern technologies by analyzing it at the legislative level. In the presidential decree "On Approval of the Fundamentals of State Cultural Policy," the concept of the information environment is separately distinguished, defined as a set of mass media, radio, and television broadcasting, and the internet; the textual and visual information materials disseminated through them; as well as the creation of digital archives, libraries, and digitized museum collections.¹⁵

Another important part of the government policy is to provide open access to cultural heritage objects. The problem of access was confirmed in the state program Culture of Russia (2012–2018), which stipulated the need to provide access to cultural heritage in digital forms as well as to create and support resources that provide access to cultural heritage objects on the internet and in the National Electronic Library, one of the main digital repositories in the country.¹⁶ Access to digital cultural heritage was also considered in the state program Information Society (2011–2020). The subprogram Information Environment ensured equal access to the media environment, including

objects of digital cultural heritage. The program aimed to reduce the gap in access to cultural heritage objects in different regions across the Russian Federation.¹⁷

The digitization of cultural heritage and creation of digital archives is one of the characteristics of innovative changes in the cultural sphere of the information society. The law “On Archival Affairs” notes that a significant part of the information resources of the archives has a historical and cultural value and should be considered as part of the digital cultural heritage collection, the digitization of which is required.¹⁸ With regards to libraries, on January 22, 2020, the State Duma of the Russian Federation adopted the draft law “On Amendments to the Federal Law on Librarianship” in terms of improving the procedure for state registration of rare books (rare books are defined as handwritten books or printed publications that have an outstanding spiritual or material value; have a special historical, scientific, cultural significance; and for which a special regime for accounting, storage, and use has been established) that aimed at ensuring legal protection of rare books by improving the system of protection of the items of the National Library.

The law reflects the criteria for classifying valuable documents as rare books and fixes the main stages of their registration. In case of museums, a federal law from 1996 aimed to establish the National Catalog of the Russian Federation Museum Collections. At first this national catalog was created for inventory purposes and then it was transformed into an online database to ensure open access to Russia’s cultural heritage (<http://kremlin.ru/events/administration/21027>). Annual reports “On the State of Culture in the Russian Federation” reflect the overall situation and changes in libraries, archives, and museums.

Some researchers emphasized the need to develop a unified regulatory framework for cultural heritage preservation practices. Particularly, Shapovalova stressed that the leader in this discussion should be the government, which plays a crucial role in the legal regulations of the cultural heritage policy and is responsible for the development of initiatives.¹⁹ However, Lialkova and Naumov criticized that Russian policy discusses digitization of only a few cultural objects, but does not define the legal status of such objects and does not cover objects originally created in a digital form.²⁰ Kozlova considered the issues of Russian digital culture within the framework of the obligatory library copies system.²¹ Since 1994, the National Library of Russia has accepted electronic media according to the federal law “On the Obligatory Copy of Documents,” which established the legal deposit system; the bibliographic records of deposited electronic media are available online in the electronic catalog “Russian Electronic Editions.” Acquisitions librarians use this catalog as a national bibliographic resource for adding electronic editions to their collections. Dzhigo addressed issues of digital preservation of cultural heritage and also paid attention to the federal legal deposit law.²² Yumasheva dealt with the content of the Russian normative methodic of regulating the process of digital copying of historical and cultural heritage from Russian libraries and museums.²³ Kruglikova considered theoretical and practical issues of legislation for the preservation and popularization of cultural heritage in the modern world.²⁴ Shapovalova suggested introducing the terms of digital cultural heritage objects on a legislative level, to recognize the concept of preserving cultural heritage and to provide virtual access to such objects on the bigger scale.²⁵

A review of the literature reveals various studies that discuss cultural heritage preservation using modern technologies. The majority of researchers identified issues in this field. Digitization practices are carried out mainly by the state libraries, archives, and museums which seek to

preserve cultural heritage objects in a better methodological and legislative way, and less development is seen in smaller local LAMs. Researchers express the value of preservation of cultural materials and the need to analyze and improve legislative procedures. To this day government realizes the importance of digital preservation; however, the term “digital cultural heritage” is not mentioned and the legal status of such digitized objects is not defined. In addition, legislative documents do not cover the regulation of objects originally created in digital format. Moreover, we can see a large gap between the accumulation of materials and the degree of their use despite the fact that the government seems to support open access to digital cultural heritage objects.

DIGITIZATION PROJECTS OF CULTURAL HERITAGE IN RUSSIA

To analyze the circumstances of the latest projects related to digitization, we investigated the relevant websites from May 2021 to June 2022. In this study, we chose a few representative institutions, including some national projects, based on their reputation, authority, and the scope of the collections. The data on digitization practices and current projects were collected. The list of institutions is shown in table 1.

As shown in table 1, the authors selected Russian National Library, National Electronic library, Russian State Library, and Presidential Library as the largest and most well-known libraries in Russia. Among the archives chosen for the analysis, the Archival Fonds was selected because it unites the archives in Russia in one system, and the National Digital Archive was selected because its main goal is to preserve and archive key Russian digital resources. As for the museums, the State Hermitage Museum, the State Russian Museum, and the State Museum of Fine Arts named after A. S. Pushkin were chosen for this study because they hold the richest collections of Russian cultural heritage and play a vital role in replenishment of the National Catalogue of the Russian Federation Museum Collections, the main goal of which is to unite museums across the country.

By analyzing the websites of these selected libraries, archives, and museums, we can gain insight into what projects have been undertaken to preserve cultural heritage and what are the main drawbacks of this field. However, it is true that some institutions do not share the latest information on digitized items.

In the case of libraries and archives, the numbers are fairly public on the website, but it is difficult to prove exactly when the objects were digitized. However, not all museums share information about recently digitized objects. In this case, quantitatively analyzing digitization practices is the only way. Therefore, the authors used a manual method for data collection and counted the number of digitized materials available on the website. Indeed, this could be one of the limitations of this work, as some institutions have hidden the exact amount of digitized collections; some institutions have not been able to manually count digitized copies due to huge amounts of data; and some websites may not be up to date.

Table 1. Institutions responsible for digitization of cultural heritage in Russian LAMs

Type	Name	Size	Description
Libraries	Russian National Library http://nlr.ru/eng/RA2403/digital-library	650,000 scanned copies	As of the beginning of 2019, the Digital Library included scanned copies of books, magazines, newspapers, music publications, graphic materials, maps, audio recordings, and more. The scanned materials include items from the National Library of Russia and from partner libraries, publishing organizations, authors and readers.
	National Electronic Library https://rusneb.ru	1,700,000 digitized books ²⁶	The NEL project was designed to provide internet users with access to digitized documents from Russian libraries, museums, and archives. NEL combines rare books and manuscripts, periodicals, and sheet music collected from all major Russian libraries.
	Russian State Library https://www.rsl.ru	1,500,000 documents	This is the largest public library in Russia; the digital collection contains copies of valuable and most requested publications, as well as documents originally created in electronic form. The electronic catalog contains information on more than 21 million publications, 1.5 million of which have been digitized.
	Presidential Library https://www.prlib.ru/en	1,000,000 units	The Presidential Library is a nationwide electronic repository of digital copies of the most important documents of the history of Russia. The volume of the Presidential Library collections is more than a million storage units including digital copies of books and journals, archival documents, audio and video recordings, photographs, films, dissertation abstracts, and other materials.

Type	Name	Size	Description
Archives	Archival Fonds of Russia (Central Fonds Catalog) https://cfc.rusarchives.ru/CFC-search/	959,576 archival fonds ²⁷	Annually, the volume of documents of the Archival Fonds of the Russian Federation increases by an average of 1.7 million units. As of December 13, 2020, the Central Fonds Catalog included 959,576 items from 13 federal archives and 2,225 state and municipal archives of the Russian Federation.
	National Digital Archive https://ruarxive.org	282 websites ²⁸	The purpose of this initiative is to find and preserve websites and other digital materials of high public value and at risk of destruction. The NDA Project collects official accounts on social networks, official websites of government bodies and political parties, and historical data. However, not many websites were collected in comparison with other countries' initiatives. Unlike the Internet Archive, the NDA Project make a complete copy of everything that is on the site, including archive channels on Twitter, Instagram, and Telegram.
Museums	National Catalogue of the Russian Federation Museum Collections https://goskatalog.ru/portal/#/	23,193,078 units	The catalog is an electronic database containing basic information about each museum item and each museum collection included in the Museum Fonds of the Russian Federation. According to the latest statistics (2020), over 23 million units were recorded in the National Museum Catalog. However, the total amount of museum objects across Russia is more than 84 million.

Type	Name	Size	Description
	State Hermitage Museum https://www.hermitagemuseum.org	400,000 units	The State Hermitage Museum is the second largest museum in the world. The Hermitage exposition is gradually moving online. This process is slow and very laborious. The entire collection of the Hermitage has not been digitized, but the website already contains 400,000 exhibits (that is, approximately only one tenth of the entire collection). The online collection includes paintings, sculptures, numismatics, archaeological finds, and other exhibits.
	State Russian Museum https://www.rusmuseum.ru/collections/	3,682* * the number of digitized collections were manually counted on the website	This is the world's largest museum of Russian art. The collection of the museum has about 400,000 exhibits and covers all historical periods of Russian art. At the moment on the museum website only a small part of the collection is available in digitized form. However, the museum is maintaining the Virtual State Russian Museum Branch project, the main goal of which is to give free access to digital and printed materials from other institutions online.
	State Museum of Fine Arts named after A. S. Pushkin https://pushkinmuseum.art	334,000	As of March 1, 2019, the museum's database contained information on 670,000 museum items, 334,000 (49%) of which have images. In total there are about 683,000 images in the database (not counting special photography) with a volume of about 35 TB.

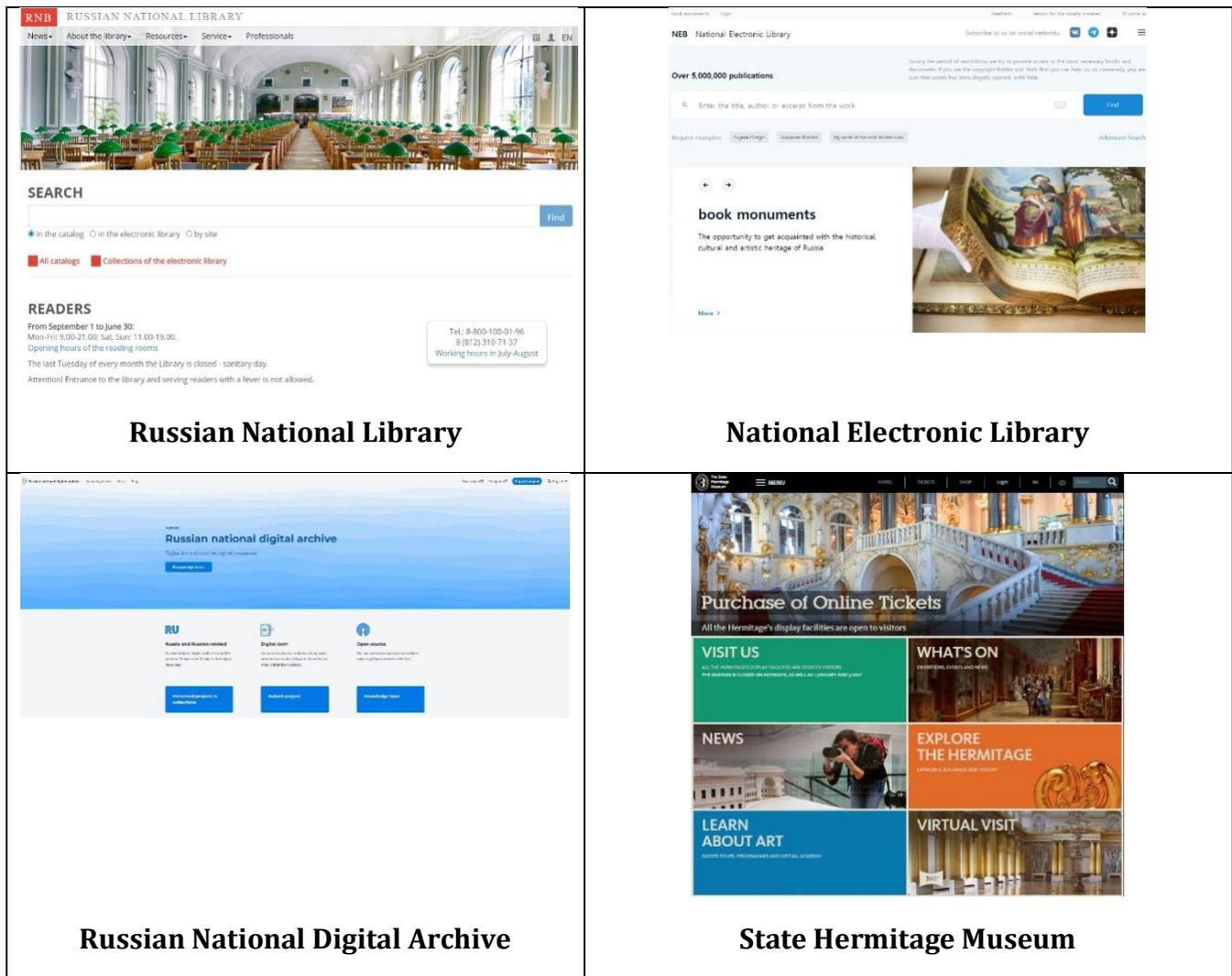


Figure 1. Screenshots of the websites of some of the institutions listed in table 1.

A further analysis of Russian museums shows that 2,773 state and municipal museums have more than 84 million items, but only a few are displayed in digital form. Biryukova et al. reviewed the interdisciplinary approach to preserving cultural heritage and creating virtual museums.²⁹ Povroznik also analyzed virtual museums that preserve the cultural heritage of the Russian Federation.³⁰ The author concluded that virtual museums and its resources need to be studied, developed, and improved more. Kondratyev et al. considered the issues of digital heritage preservation from the security, integrity, and accessibility perspective, and analyzed the concept of a smart museum.³¹ Lapteva and Pikov represented the experience of the students of the Institute for the Humanities of Siberian Federal University working with the State Russian Museum and the State Hermitage Museum, the leading Russian museums that are playing the important role in country digitization practices.³² The authors noted that results of implementing modern information technologies in museums create a comfortable infrastructure for the audience by preserving and representing cultural heritage in interactive contexts.

FINDINGS

Digitization in Russian Libraries

Creating a digital collection has become a normal library activity in Russia.³³ Within the framework of the main development of activities to preserve Russian library collections from 2011 to 2020, one of the main programs of the national library is the digitization of rare books. Rare books, according to the federal law “On Amendments to the Federal Law on Librarianship,” include handwritten books or printed publications that have outstanding material value or special historical, scientific, and/or cultural significance.³⁴ Thus, the law elevated the book to the same level of protection as other objects of cultural heritage at the national level. The website of the Register of Rare Books (<https://knpam.rusneb.ru>), hosted by the Russian State Library, became a part of the National Library Collection Preservation Program developed in 2001. From 2001 to 2009, the subprogram Rare Books of the Russian Federation was created to provide a regulatory framework and methodological support for all areas of library activities related to the preservation of library collections. This program includes not only libraries but also other institutions such as museums, archives, and scientific and educational institutions. However, in order to implement the state registration of rare books, it is necessary to further develop regulatory documents that can control the reference procedure and registration procedure of rare books.

Another initiative for book preservation is the Federal project Digital Culture, designed to provide citizens with wide access to the country’s unique cultural heritage. It was expected that ten to twenty libraries of different Russian regions will take part in the digitization project, each offering at least 50 documents from their collections to the project. However, the problems of this program are related to the work scale, as well as the dispersal issue of rare books throughout the country. As the 2011–2020 Library Preservation Report emphasizes, many of these rare books remain unknown to the wider scholarly community. Approximately half of the valuable collections available in the country’s repositories are not described as integral objects of cultural and historical heritage. The Russian State Library noted that the main problems associated with rare books include comprehensive function to identify and record rare and valuable books; ensuring the safety and security of the books; copying valuable materials requires special equipment; and the need for proper storage as the most important condition for the preservation. Another main center of digitization is the Digital Library of the National Library of Russia (NLR, <https://nlr.ru>). The Digital Library is an open and accessible information resource that includes over 650,000 digitized copies of books, magazines, newspapers, music publications, graphic materials, maps, plans, atlases, and audio recordings. The digitized materials include items from the holdings of the National Library of Russia, partner libraries, publishing organizations, authors, and even readers. For now, the digital collection of the library includes various collections such as landmarks of the NLR, rare books, Rossica, maps, and manuscripts.

Hosted by Russia’s National Library in 2004, the National Electronic Library (NEL, <https://rusneb.ru/>) was launched to create an electronic library sponsored by the Russian Federal Ministry of Culture. The NEL is a service that searches the full text of scanned books and magazines that have been processed using optical character recognition and converted them into text. It is stored in a digital database available through the internet and mobile applications. One of the main tasks of the NEL is the integration of the libraries of the Russian Federation into a single information network. As of June 15, 2022, the NEL collection had a total of 5 million artifacts including electronic copies of books, educational and periodical literature, dissertations and

abstracts, monographs, patents, notes, and visual and cartographic publications. The Russian State Library became the main operator of the National Electronic Library project in 2014. Since 2015, the National Library of Russia has expanded its digitization program and the site now publishes a list of publications that require digitization. Readers vote for publications directly on the site by clicking the Vote for Digitalization button. For example, as of November 2020, a list of 1,998 publications on a variety of topics ranging from physics and mathematical literature to psychology and music was available for voting.

Digitization in Russian Archives

Archives have historical, scientific, social, and cultural significance, which is an essential part of the process of preserving Russian cultural heritage. Digitization projects in Russia began as an element of the digital cataloging of the largest archives from the 1980s to the 1990s. Initially, the main purpose of the digitization project was to create digital copies to ensure the preservation of original archive documents and to eliminate the distribution of rare or poor originals in the reading room. Since then, digitization has become an integral part of creating digital archives in Russia.³⁵ Currently, one of the main goals of digitizing archival documents is to provide open access to legal entities and individuals to archival documents from the Russian Federation.

The main archival center is the Archives Fond of the Russian Federation (<http://archives.ru/af.shtml>). The Archives Fond has more than 609 million items from the early eleventh century to the present and performs important functions to preserve historical memory, replenish information resources, and provide access to the public. The main task of digitization is to preserve Russia's cultural and historical heritage. Each year, the total volume of archives across Russia increases by an average of 1.7 million items. Despite the relatively small amount of equipment for digitization, we can still see progress. In 2015, 8,750 documents were digitized, while in 2019, the annual total had reached 27,518 documents. This increase in the number of digital documents shows that digital copy production is directly related to equipment acquisition. However, the researchers found that the level of use of these documents was not high and tended to decrease. For example, in 2015, there were 18,155 document views, while in 2019, there were only 19,417 document views. Therefore, it is necessary not only to promote the service of the archive agency but also to increase the demand for archive documents.

A portal was created under the auspices of the Archives Fond of the Russian Federation (<http://www.rusarchives.ru>) to encourage archiving services for users and to organize all archives throughout Russia. The portal collects information resources of Russian archives on the internet and publishes archival directories and regulations. The establishment was an important breakthrough in organizing access to the documents of the Archives Fond of the Russian Federation. Since 2012, the website has operated the Central Catalog Software Complex, which provides information on the composition of federal and regional digitized fonds. As reported by the Federal Archival Agency, 32 virtual exhibition projects are posted on the official website and portals of the Federal Archival Agency. This website provides information about online archive projects, including virtual exhibitions, digital collections, and inter-archive projects. Users can search for materials on the website by three publication types: virtual exhibition, document collection, and inter-archive project. The project covers four subjects: The Great Patriotic War, Statehood of Russia, Soviet era, and Space exploration.

The Federal Archival Agency's main website also provides five catalogs and databases that guide users through digitized collections. This list includes the Central Stock Catalog

(<http://cfc.rusarchives.ru/CFC-search>), State Register of Unique Documents (<https://unikdoc.rusarchives.ru/>), Guides to Russian Archives (<https://guides.rusarchives.ru/>), Electronic Inventories of Federal Archives (<https://rusarchives.ru/elektronnye-opisi-federalnyh-arhivov>), Database of Declassified Cases and Documents of the Federal Archives (<http://unsecret.rusarchives.ru/>), and Database on the Places of Storage of Documents on Personnel (<http://ls.rusarchives.ru/>). As of January 1, 2022, 859 documents were included in the State Register of Unique Documents of the Archival Fund of the Russian Federation. A total of more than 98,000 documents are stored in the database. A project to digitize documents from the Soviet era is still in progress, and the new collections of digitized copies of archival documents stored in federal archives across Russia will be displayed on the website in the future (<http://sovdoc.rusarchives.ru/#main>).

One of the major drawbacks of the digitization process in Russia is that archival agencies and cultural heritages are scattered throughout Russia. To develop digital archiving initiatives in different regions of Russia the Culture of Russia (2012–2018) program was developed. Archives of the constituent entities of the Russian Federation can take part in this program and get funding from the regional budget to digitize collections as a part of the Regional Program for the Development of Archival Affairs.³⁶

Despite some improvements and ongoing projects, there are still no initiatives for the long-term preservation of born-digital materials and no requirements for mandatory long-term preservation of information. However, the National Digital Archive (<https://ruarxive.org>) was created to find and preserve websites and other digital materials that have a high public value and are at risk of destruction. This initiative proposes the general idea of archiving modern digital heritage and consists of many projects. The main one is Preserved Government, which aims to preserve official materials in the following areas: official accounts on social networks; official sites of government managers, officials, political parties; historical documents; and especially databases. Future plans include developing tools that will help collect digital materials faster and more efficiently and also better systematize what has already been collected.

Digitization in Russian Museums

The active introduction of information technology into museums began at the end of the twentieth century. A new area of study, museum informatics, has emerged in Russian higher-education institutions. This area of study focuses on museum work and modern information technology to develop and improve museum activities.³⁷ Museums have developed many digitization projects to preserve their collections and give free and easy access to cultural heritage items. The modern Russian museum system consists of about 2,773 museums, although the exact number of museums is not known. Since the 1970s, the rationale for Russian museum digitization practices has been quite similar to that of many other countries, finding that information and collection management are needed to ensure that museum objects are listed and properly preserved. The museums plan to create electronic collections, open valuable collections to the public, create a State Catalog of the Museum Collection of the Russian Federation (<https://goskatalog.ru/portal/#/>) and integrate all works from all museums in Russia. As of 2020, more than 23 million museum items are registered in the national catalog of the museum collection. The catalog is planned to be complete by 2026, when metadata and images of the museum's collection are included in the register and posted online. Digitization of museum collections is an important process that has recently received stable support from the government.

The national Information Society (2011–2020) program includes a project to create a new virtual museum based on the collections of the country's largest national museum. The term "virtual museum" is used to characterize various projects linked to digital technology in virtual and museum space.³⁸ It can be represented by a collection of works of art on the internet and the publication of the museum's electronic expositions. Currently, there are about 300 virtual museums available in virtual form across the country (<https://www.culture.ru/museums>). The most-visited museums are the State Hermitage Museum in St. Petersburg (<https://www.hermitagemuseum.org/>), the State Tretyakov Gallery (<https://www.tretyakovgallery.ru>), and the State Russian Museum (<http://en.rusmuseum.ru>). These museums offer users a wide range of activities, including the use of modern technology. For example, since 2003 the Russian art collection at the State Russian Museum (the world's largest museum) started to implement the Russian Museum: Virtual Branch project, opening virtual branches in museums, universities, cultural centers, and institutions of additional education around the country. Thanks to computer technology and digitization, thousands of Russian residents in near and far places have access to the value of Russian culture, Russia's historical and artistic past, and the richest collection of Russian art. International Business Machines (IBM) collaborated with the Hermitage Museum to make it one of the most technologically advanced museums in the world. IBM built the State Hermitage Museum website in 1997, later called the "World's Best Online Museum" by National Geographic Traveler.³⁹ The Hermitage has unique experience in developing digitization programs and uploading collections to websites. Currently, the museum collects more than 3 million items, and the online archives presented on its website provide easy search and the possibility of creating your own collection on the website. In 2020, the Hermitage released a documentary feature film in virtual reality (VR) format, "VR—Hermitage: Immersion in History with Konstantin Khabenskiy" (<https://www.khabenskiy.com/filmography-vr-hermitage-immersion-in-history-with-konstantin-khabenskiy/>). Visitors can tour the history of the Hermitage in a VR format based on the most important events in the history of the Hermitage from the eighteenth century to the present. The Pushkin Museum, the largest museum of European art in Moscow, offers another example of using VR technology. The Joy of Museums offers virtual tours of more than 60,000 museums and historic sites around the world, including the Pushkin Museum (<https://joyofmuseums.com/museums/russian-federation/moscow-museums/pushkin-museum/>).

Virtual museums can display electronic versions of exhibits longer than actual museum exhibitions limited by region and time zone and have the means to record information about past exhibits, including electronic collections of exhibits, as well as data on opening times and concepts. For example, the website of the State Tretyakov Gallery contains a virtual archive of past exhibitions. Therefore, the virtual museum has considerable research potential and is actively contributing to the preservation of cultural heritage. Digital copies of the original culture and arts form an electronic archive of great value from two perspectives. This is the preservation of rarity for future generations, the broad access of users to the rarest and most unique artworks in historical significance, and the possibility of research. On the other hand, it is an opportunity to find commercial use of artifacts, additional sponsorship, and investment proposals for museums.

CONCLUSIONS AND FURTHER STUDY

The two most obvious benefits of digitization are improved access and preservation, so that libraries, archives, and museums can represent Russian culture and introduce rare and unique cultural heritage artifacts to future generations. In this work, we have addressed some legislative

principles and outlined major digitization projects. The general problem of digitization in Russia is related to the size of works, the tendency of documents to decrease without high use, and the scatter of rare books nationwide.

In the case of libraries, one of the problems of digitization is also related to the uneven distribution of rare books throughout the country. The most important materials are concentrated in the largest federal library, and many rare books are housed in many central libraries in various parts of the Russian Federation. Work using book memorials should be planned as long-term activities performed at different levels. In the case of archives and museums, one of the major drawbacks of the digitization is the dismantling of national archives and cultural heritages.

Based on this preliminary study, there are several further research topics that can enhance understanding of digitization of cultural heritage in Russia. In particular, since digitization is a complex process that requires both management and technology, future research needs to be divided into three aspects: management, technology, and content.

ENDNOTES

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