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Innovative Tools for the Preservation of Cultural Heritage: EU, Australia, and Ukraine

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Abstract

In contemporary realities, cultural heritage has become a crucial and effective resource for the preservation of cultural diversity and the sustainable development of countries, regions, and communities. One of the key approaches to supporting the cultural sector is the creation of innovative cultural products based on digital and communication technologies. This article examines initiatives implemented by the European Union, Australia, and Ukraine that showcase innovative formats for cultural heritage preservation and engagement in response to modern challenges and societal needs.

Keywords

Cultural Heritage Preservation; Innovation; Digitalization; Construction of Social Reality; EU; Australia; Ukraine

Introduction

During the last years, socio-cultural and natural heritage has increasingly been recognised as a national asset. Furthermore, the long-term sustainable development of the global community calls for the identification of effective contemporary means of organizing social development and sustainability, which anticipates a harmonious relationship between the past and the future.

An increasing recognition of the importance of cultural heritage, particularly its role in the socio-economic and cultural development of regions and municipalities, is being noted. Moreover, it is becoming a resource for sustainable balanced national and regional development; and thus, its preservation and promotion activities need modern and innovative approaches and solutions. The cultural sector is encountering numerous global challenges, including pandemic and post-pandemic scenarios, wars, climate change, and so on. These challenges have drastically changed the landscape regarding the accessibility and preservation of cultural heritage sites.

The condition of cultural and natural heritage sites is unsatisfactory. Aside from climate change, there is human indifference, neglect, and violence, which further deteriorates these sites. Restoring, conserving, and integrating heritage, both tangible and intangible, to modern society, is one of the most important prerequisites. Cultural and natural sites need to be made more accessible and appreciated. Increasing the visibility of culturally valuable sites, their valorisation, and finding solutions for the revival of declining places are among the key areas of activity of the global community in the field of cultural heritage.

In connection with the above, the urgent tasks facing the international community in the field of cultural heritage now involve redefining the formats of cooperation and resource sharing. Established practices require both rapid and flexible reorganization. At present, innovative forms of developing and supporting cultural diversity are being tested for their effectiveness. In my view, addressing the challenges of employing digital tools and technologies in the cultural heritage domain and evaluating the efficacy of their outcomes lies in expanding the range of methodological approaches for organizing practices of engagement with cultural heritage.

Since the late 1980s, constructivist explorations have deepened scientific understanding, drawing attention to the capacity to construct and reveal worlds of multiple realities. The field of cultural heritage, its preservation and promotion, offers broad opportunities for the operationalization and instrumentalization of this approach. Furthermore, for the aims of this article, the studies of digital and visual cultures, as well as the potential of these domains to construct cultural concepts, are essential ([Manovich 2001](#); [Cameron 2003, 2019](#); [Deuze 2006, 2011](#); [Cameron 2019](#)).

Managing the cultural heritage sphere requires a clear understanding of what precisely constitutes the object of management, as well as how, by what means, and in which contexts particular technologies should be applied. I proceed from the premise that any innovation takes place within 'socially defined objective realities' ([Berger & Luckmann 1966](#), p. 169). The conception of reality is not universal across all actors. In fact, there is no single, unified interpretation of reality. I employ the concept of reality in line with Berger and Luckmann's understanding of it as 'a world that is created in people's (human) thoughts and actions, and is experienced by them as real' (p. 33). To be real, as they note, is 'a quality ascribed to phenomena that exist independently of our will and desire' (p. 13).

The methodological lens of Peter Berger and Thomas Luckmann's phenomenological sociology of knowledge provides an opportunity to expand the study of key trends and transformations in the field of cultural preservation and heritage, particularly those associated with the evolution of digital culture. Consequently, this approach allows for an analysis of the space of contemporary innovative cultural practices, including project-based ones, from the perspective of forming a new reality of coexistence. These practices serve as tools for generating novel ways of perceiving cultural heritage and for developing corresponding approaches to addressing the challenges of coexistence and communication.

My approach to employing innovative methods of cultural heritage preservation and promotion in international projects is based on the view that, through digital and communication technologies, individuals as users engage with specific interpretations of sociocultural realities. The exchange of knowledge and technological tools during and as a result of such projects becomes oriented toward and legitimized as a means of ‘constructing’ a shared reality, both among individuals and within the communities with which they identify.

As a result, project-based practices that focus on implementing advanced digital and communication technologies can be studied as both the medium and the space for ‘constructing the reality’ of collaboration among actors at international, national, and personal levels. Such cooperation aims to preserve cultural diversity and affirm individual and collective identity within that diversity.

The analysed project initiatives from the EU, Australia, and Ukraine exemplify successful cases of digitization that contribute to the creation of digital ecosystems at both international and national levels. This experience is particularly valuable for understanding how effective innovation can ensure the preservation and promotion of cultural heritage.

EU Innovation Experience in Cultural Heritage Preservation

One of the primary objectives of the European Union is to support initiatives related to cultural heritage that foster a sustained need for exploring and developing a shared space of interaction with representatives of other cultures, ranging from individuals to entire communities.

Within the EU, the European Commission aims to harness the potential of cultural heritage by developing new strategies and tools ([European Commission, 2019](#)). There are many initiatives on the local, regional, and national level working toward social, cultural, or technological innovation within this area. This includes the creation of ‘creative tourism routes’, protecting traditional crafts, and setting up innovation and heritage ‘hubs’ and ‘centres’. New forms of engagement with historical and natural sites are being developed at the EU level, which aid in their modernization and the adaptation to the challenges society faces today. The world of cultural heritage is encompassed by networks of projects that vary in scale and in the number of participants involved. Priority is given to project initiatives that have a direct impact on cultural practices in the field of heritage, with clearly defined geographic scope and target audiences.

Construction of new cultural products that focus on the use of information and communication technologies constitutes one of the primary concerns ([European Commission, 2014](#)). Within the scope of project activities, some methods of engaging with heritage are tested, which eventually become accessible to wider audiences. These technologies serve different purposes and audiences, and a wide set of project initiatives aims at uniting modern digital infrastructure for the conservation of heritage.

The use of augmented and virtual realities, digital site reconstruction, and interactive online archives and platforms opens new opportunities for wider audiences, including the less mobile ones, to access heritage actively. Projects like ‘Promoting Heritage in Virtual Environments’ illustrate the success of fusing digital technologies with conventional methods of promoting culture.

As part of support for specific projects aimed at preserving tangible and intangible heritage, museums and libraries are being transformed into lively, accessible community and individual spaces. In the preservation, development and accessibility of heritage, a commendable initiative comes from Palazzo Spinelli in Florence, Italy. An interactive platform has been designed to promote multisensory and cognitive accessibility of museums and historical sites. The project involved four countries: Italy, Spain, Portugal and Austria, which organized a series of informational events, aimed at providing specialists and local communities with opportunities to share knowledge, experience, and best practices.

Considerable resources are allocated to the preservation activities and the conversion of traditional knowledge, customs and practices into electronic formats. Digitization of archival materials assists in making them more easily available while protecting them from destruction. Particular attention is paid to initiatives that seek to foster linguistic diversity and the employment of modern technologies for augmenting cultural identity, particularly among the indigenous peoples, to promote their languages and preserve them as heritage. Documenting, archiving and restoring languages is now broadly accepted as a primary means of safeguarding cultural heritage. New instruments to document the European oral history, including the establishment of national storytelling collections and the publication of books on the internet, allow every cultural place and its history to be represented. One such project that resulted in Europe-wide initiatives, called the digital library Europeana, was funded by the European Commission ([Europeana n.d.](#)).

Theatres, arenas, concert and sports venues are becoming multifunctional platforms for uniting people. Cultural institutions are being transformed into high-tech information and education centres, which integrate into social and cultural activities for collaboration and idea sharing.

The European experience highlights the role of developing museums as centres for learning and research. The concept of SMART museums that include the usage of interactive technologies like 3D printing of models, immersion environments, and the use of virtual reality is being adopted. These technologies not only enable the observation of cultural heritage, but also active participation in it ([Hindmarch, Terras & Robson 2020](#)). The growth of virtual museums and digital archives aids in greater accessibility to historical materials, while also in their conversion for the future.

The widening social gap due to the pandemic and post-pandemic period has caused an even faster shift to digitalization. This has affected the cultural exhibitions as well as the format of events. Museums are becoming centres that combine conservation of artifacts with participatory creativity and multi-faceted entertainment. One of the most striking examples of effective innovation in the presentation of historical masterpieces alongside contemporary artifacts is the activity of the Vatican Museums. Their exhibitions allow for a deep dive into history, examining the march of humanity and the treasures from the preceding and modern times. Their collaboration with Google has turned a simple visit to the museum into an interactive adventure full of constructive play and the use of augmented and virtual reality. With the assistance of advanced technologies, visitors can now edit selfies on famous paintings using artistic filters, as well as colour famous paintings and assemble them as puzzles. Selfies can then be converted into artistic filters and integrated into the well-known art masterpieces. Visitors can also take virtual city tours and compare modern day portrayals of urban and rural landscapes with their artistic counterparts. Furthermore, museums offer online tours, multimedia archives, and debates, making discussions and meetings more artistic through supportive technology. All these features ensure that people can experience and appreciate cultural values from any part of the globe.

The conservation of cultural heritage has seen an Integration of the cultural sector and innovation industries, which has greatly changed the way innovations are incorporated. Small and medium-sized businesses join the managing process of developing the tourist destinations for historical and natural sites. In particular, the development of creative products in tourism is actively evolving. From the Interreg 2014 – 2020 and Interreg 2021 – 2027 projects, there has been an unmistakable shift in focus towards cultural tourism, which aims to enhance quality of life in Europe and promote sustainable interregional collaboration. These projects focus on green tourism, showcasing natural and cultural landscapes through the latest means of presentation. The restoration and modernization of monuments and sites are accompanied by the creation of smart tourism initiatives. They combine educational and environmental aspects, contributing to the growth of the tourist attractiveness of regions and the formation of a common cultural identity. Modern multimedia and interactive tools allow users to manage tourist activities, improving access to heritage sites and ensuring comfort for people of different ages and needs.

Among the latest technologies used to popularize cultural heritage are mobile applications with routes, short animated films and documentaries created to promote cultural monuments. Digital animation allows for the demonstration of the development of historical events and introduces viewers to historical characters, conveying their traditions and beliefs. Mapping such resources contributes to their preservation and the creation of new value content, which changes the perception of historical and cultural heritage. It also helps to reveal the uniqueness of each region, demonstrating its history, traditions and cultural ties. Considerable attention is paid to the creation of tourist information centres, joint web portals and programs for monitoring tourist flows. Such initiatives change the ways in which people interact with cultural and natural heritage, making this process more interactive and meaningful. This contributes to a deeper awareness of common values and strengthens ties between generations and communities.

In addition, modern challenges, such as extreme climate change, require new strategies for reducing the risks of natural disasters ([European Commission 2022](#)). An important direction is the implementation of environmentally friendly solutions for the preservation of natural heritage and its integration into the cultural space. Therefore, the European Union is actively investing in the development of eco-tourism, which is focused on environmentally friendly ways of recreation and the use of natural heritage resources. An important place is occupied by environmentally oriented development of natural and cultural sites. This includes environmentally responsible solutions, creation of eco-routes, eco-transport system and cross-border connections. Adaptive reuse of industrial heritage plays a special role, which enables a reconceptualization of the meaning of old industrial sites in the modern urban environment, to turn them into drivers for regional development. Investing in the preservation of natural landscapes facilitates the integration of cultural heritage into modern environmental initiatives, creating a harmonious connection between culture, history, nature and public spaces.

Sustainable innovation envisages not only the new technologies but also social changes that establish a balance between mankind and nature. The development of domestic tourism, preservation of local crafts, and arrangement of cultural activities such as festivals, exhibitions, and educational programs emphasize the participation of citizens in the governance and protection of their distinct cultural environment, social unity, and economic prosperity. This encourages individuals to appreciate their heritage, engage in cultural dialogue, and discover new values in the collective memory.

Traditional crafts and local production also, of necessity, become objects of innovative solutions. Supporting crafts and knowledge transfer through digital channels guarantees their preservation and integration into modern processes. In order to preserve and proactively mitigate the destruction of heritage while promoting it in new formats, interdisciplinary teams are formed, which include artists, conservators, restorers, IT specialists, and researchers. Such contemporary approaches to heritage maintenance restoration improve the techniques used in traditional crafts and heritage site maintenance. Educational programs, craft fairs, and collaborative projects nurture interest among the youth and the community toward the conservation of heritage. Moreover, educational tips, exchange of experience, and the combination of traditional crafting methods and modern technologies aids in modernizing and reviving craft culture, its integration in the contemporary processes of people's lives.

Thus, European innovative approaches to the preservation and promotion of cultural heritage not only effectively safeguard it, but also integrate it into modern life. With the help of modern technologies, digital instruments, cross-sectoral cooperation, and environmental initiatives, cultural heritage is transformed from an element of protection and becomes a critical factor for the inclusive development of European regions and for the responsible participation of citizens in building a sustainable future. The European Union is undergoing significant transformations in shaping a dialogical and open society. Multicultural interaction is oriented toward building a shared world of cultural diversities, fostering the emergence of a system of soft power that facilitates the organization and alignment of actions and value systems among diverse actors ([CHARTER Project 2024](#)).

Innovative Technologies for Preserving Australia's Unique Culture

In Australia, cultural heritage, tangible and intangible, has become a resource in realizing a sustainable, resilient, inclusive, and innovative nation with a rich history and diverse cultures. Australia strives and actively takes measures and initiatives to preserve its cultural heritage. This can be seen in national policy, which seeks to create a distinct Australian identity. Australia's policy aims at developing, nurturing and promoting the unique culture of Australia and its people. There are legislative, financial, and administrative initiatives aimed at encouraging and promoting expression, creativity and inclusivity. 'uniting around the collective construction of identity, as well as the development of new forms of its expression and promotion' ([Australian Government, Australia Council for the Arts 2021](#), p. 16).

The implementation of the 'Creative Nation' concept since 1994 envisaged creating conditions for the development of cultural activities, expanding opportunities for artists and creative industries, as well as state support for the competitiveness of national cultural products. Cultural and creative industries are viewed as crucial sectors for the economic and social development of a nation. Therefore, policy measures have aimed at improving support for innovations in the creation of new cultural products and services and preserving the traditional culture in its modern form. Such innovation and new methods of creative cooperation and communication have prompted the establishment of national plans for the development of culture, which underlines the need for supporting the cultural sector for the economic enhancement of a country.

Shared and recognized by both indigenous peoples and diverse migrants is a more comprehensive perception of culture as a new way of living, everyday expression, and creativity. The Australian Government's newest cultural policy ([Australian Government, Department of Infrastructure, Transport, Regional Development, Communications and the Arts, Office for the Arts 2023](#)) seeks to enhance collaboration between various departments, as well as facilitate the sustained growth of culture. This policy consists of contemporary legislation aimed at safeguarding indigenous identity, amplifying support for the regional cultural identity, facilitating collaboration among museums, galleries, archives, and other institutions, and implementing modern programs for the exchange of cultural resources.

The Australian policy of cultural heritage preservation is set within the context of a system of government programs and legislative policy to preserve historical sites. Not only do government agencies set norms, but they also fund the research and innovation development projects. Grant and tax benefits stimulate the application of modern developments in the field of technologies in the heritage field.

The last few decades witnessed a complex interaction of ancient cultural practices with modern technology and cultural heritage management in Australia. Current technology plays a crucial role in reframing cultural assets' value transformations. The use of 3D scanning and intelligent sensor systems enhances artifact preservation methodologies. High-powered digital scanners and photogrammetry provide the possibility of making detailed digital copies of monuments and, therefore, make them safer and more accessible. There are ongoing studies on the use of artificial intelligence in predicting the needs for heritage conservation that would facilitate proactive conservation of heritage. Constructive measures for heritage sites need to ensure that constant monitoring of threats is possible so that valuable artifacts are not destroyed. For example, drones are being used to survey remote areas while environmental conditions are monitored by sensor systems, which demonstrates the effectiveness of technology in this regard.

Moreover, virtual and augmented realities present novel possibilities in interacting with cultural heritage by allowing people to immerse themselves in the ancient cultural settings, which 'takes them back' to the world of their ancestors, and helps them realize the relationship between their past, present, and what the future holds for them, along with the community's role in it.

In order to preserve the cultural heritage effectively, there should be a dynamically functioning collaboration of the private sector with the communities, and of the government with the research and educational institutions. It is critical that these players come to terms with the fact that they possess the

knowledge on how to preserve cultural heritage and resources and make plans of action. In addition to government policies, education and participation of citizens are viewed as complementary to the whole process. The education aspect is highly important for Australia. The public is educated through educational programs, workshops, and interactive exhibitions about the features and capabilities of modern technologies and how to use them. This fosters the build-up and strengthening of a cultural community dedicated to the preservation of Australia's cultural heritage, placing this process in the centre of the public life.

Technological advances can make preservation efforts more efficient, which enables easier reinterpretation of historical and cultural values. However, with these new opportunities come challenges. The integration of technologies must consider environmental and historical factors, not only contributing to the preservation of the past, but also strengthening the connection with the present. Additionally, the regions' geographical and socio-cultural diversity needs to be considered, from remote localities to heavily populated cities. It becomes necessary to adapt technological tools in such a way that they not only preserve but also support the cultural identity of different communities. It is the amalgamation of modern technology and great cultural reverence that makes it possible to form a rational approach to the effective and adaptive management of Australia's cultural preservation. Not surprisingly, in Australia, an emerging social issue is that of smart heritage management, where preservation and promotion efforts provoke regional economic growth and citizen welfare, for instance, by digitization and participative practices that foster international and domestic cultural tourism. Moreover, public use of digitized interactive multimedia sources greatly increases participation in the preserving processes of the cultural heritage, hence creating a positive attitude towards the responsibility for preserving the heritage.

Accordingly, a comprehensive approach is being taken to preserving and promoting Australia's cultural heritage, encompassing both tangible and intangible aspects. Indigenous communities, with their unique knowledge and traditions, play a key role in this process. Australia is a country where each region has a deep understanding of the harmony of Indigenous cultures. These communities preserve historical, spiritual and cultural ties with their regions. The Australian government helps fund containers or supports structures for art, language, and cultural practices of Aboriginal and Torres Strait Islander peoples. To preserve and promote their heritage, the state adopts a variety of programs and projects, which aim to foster digital inclusion, artistic inclusion, and tradition preservation.

Among such initiatives is the Digital Culture Strategy 2021-24, which seeks to foster the development of First Nations art and culture by employing digital technologies. In this case, steps are being undertaken to apply new technologies for the creative development of Indigenous peoples, widen their cultural and artistic participation, and make the digital space welcoming and safe for everyone involved ([Australian Government, Australia Council for the Arts 2021](#)). To meet these objectives, the First Nations Digital Inclusion Plan (2023-26) ([Australian Government, National Indigenous Australians Agency 2023](#)) was formulated. Its purpose is to provide greater and better digital access to Indigenous people. The plan focuses not only on increasing the level of digital skills of Aboriginal people in Australia but also on ensuring their participation as a distinct and unique group, safeguarding cultural identity, and creating new ways for participation. One major result of the collaboration between hundreds of cultural organizations and government bodies in Australia is the Trove platform that brings together hundreds of collections from Australian museums, galleries, libraries and archives. As a result of digitization, these collections can now be accessed and viewed by anyone interested in Australian culture and history at National Library of Australia. Creative Australia has also begun the Think Digital Initiatives in 2024, which has been a part of the Digital Culture Strategy. This initiative is especially remarkable for supporting the transformation of art and cultural institutions, considering contemporary technological shifts. With this program, organizations can evaluate and enhance their digital capabilities, increase digital literacy, employ eco-friendly approaches to the preservation and management of cultural and historical resources, and involve community members in the preservation and promotion of cultural heritage ([Creative Australia n.d.](#)).

Aid is extended to independent cultural institutions which solely increase their activities in the advocacy of cultural policy. The activities of [A New Approach \(ANA\) \(2025\)](#) is one of the efforts oriented towards the development of national culture, support of cultural diversity, and the revival of Indigenous traditions. This organization mobilizes industry experts, researchers, and academics to study cultural phenomena, formulate prescriptions, and establish a social network for ideas and knowledge to flow. Tranby is an educational organization that offers courses for Indigenous communities. These courses are aimed at enhancing professionals and community leadership skills. There are ongoing initiatives to educate Indigenous communities in the use of digital mapping tools and technologies, see for example the Indigenous Mapping Workshop Australia. In the context of safeguarding traditional knowledge, beliefs, skills, and languages, the focus is on the protection of cultural heritage. The research regarding the use of blockchain and digital engineering for the safeguarding of the intellectual property of Indigenous people is ongoing.

For the investigation of local culture, educational programs and tours are supported as part of the DUMAWUL project. Training programs deal with the matters of language repatriation and the impact of colonization within the scope of cultural heritage exploration (such as The Djaara Cultural Competency Program (DCCP)). Some organizations are actively working in the performance art area for Aboriginal students (NAISDA), support Indigenous dancers and choreographers (BlakDance) as well as assisting Indigenous creative professionals in textile design and fashion (Flourish First Nations Textile Design & Fashion Innovation Fund).

The development of indigenous audiovisual content is implemented through the NITV channel and the Australian Film, Television and Radio School (AFTRS). Some projects are aimed at training talented Indigenous people in the film industry, supporting national film production, and sponsoring talented artists. A media association strives to maintain cultural heritage by using radio and audio-visual recordings (Central Australian Aboriginal Media Association (CAAMA)). Aboriginal History WA: Aboriginal History Research Services (AHRS) aids Indigenous people in researching their genealogy using publicly available databases. Authentic audiovisual materials are being produced and distributed as living archives of customary practices and rites (see for example The Mulka Project). An engaging example is The Digital Bricks at the Science Gallery Melbourne, which specializes in the intersection of technology, architecture, and Aboriginal cultures through multimedia exhibitions. Another innovative project is My Grandmother's Lingo, a web documentary that uses animation and voice technology to raise awareness of endangered Indigenous languages.

The [Black Writers' Group \(2024\)](#) assists in the independent creation and in publishing works by Aboriginal authors, and thereby improves their competencies as writers. Further funding is available for the support of Indigenous art centres and the visual arts, such as the Indigenous Visual Arts Industry Support (IVAIS) program ([Australian Government, Office for the Arts 2025](#)). These grants for arts and crafts contribute to the improvement of the economy of the regions. Among the leading art centres is Badu Art Centre ([Badu Art Centre 2026](#)), which encourages Aboriginal artists to reclaim and articulate their artistic and cultural heritage. The centre hosts workshops in digital animation and textile arts and organizes exhibitions.

The programs listed above are only a small part of the system for the preservation of Australian Communities' Heritage, which has been growing progressively in the preceding years. The combination of Indigenous traditional knowledge with modern technologies encourages the development of digital inclusion and Indigenous arts and education, as well as cultural support through multimedia, mapping, and other interactive forms. Because of these initiatives, Indigenous people not only safeguard their history but also engage in contemporary society while still upholding distinctive traditions. The creation of an interactive environment for collaboration enhances the collective influence on government policy in the fields of culture and cultural heritage. Through partnerships between governmental institutions and civil society, new and contemporary forms of open dialogue are being established among Indigenous populations,

non-Indigenous communities, and numerous migrant groups. Programs and projects are being developed and implemented to foster interest in cultural heritage, encourage experiences of cooperation, and promote knowledge exchange. In turn, these initiatives contribute to the development of cultural self-identification and self-realization skills.

Digital Approaches for Heritage Protection in Contemporary Ukrainian Realities

Both European and Australian practices in the safeguarding, conserving, and promoting cultural heritage indicate that cultural virtualization is one of the principal patterns formed as a result of globalization and glocalization of interpersonal and intercultural communication. For contemporary Ukraine, this is not only a trend but is rather critical. Cultural heritage has been, and is still, paramount in defining the Ukrainian society's spiritual and materialistic construction. It has played, and still plays, an enormous role in the context of reinforcing the Ukrainian identity, national integration, and building a democratic and independent country. It is not by accident that Russia pursues a comprehensive strategy of destruction of Ukraine's tangible and non-tangible cultural heritage, aiming to ruin the roots of the Ukrainian identity and nationhood. The aggression is directed toward the destruction of the established system of creating and consuming cultural content, the eradication of identity, of the unique Ukrainian way of life and its corresponding system of values.

The state of war has necessitated rapid communication and swift, coordinated action. Ukraine is developing its own experience of self-organization in the sphere of protecting and preserving the uniqueness of its culture, particularly in times when the established social reality faces the threat of destruction.

In the context of war, Ukraine faces an unprecedented threat to its cultural heritage. The destruction of Ukrainian monuments began in 2014 and has continued to this day. Religious architecture and historical sites, natural and cultural monuments, and museums have suffered. The war does not just result in physical destruction, but also removes any possibility of the infrastructure, such as galleries, theatres, or museums, operating within combat zones or in previously occupied regions, where many institutions were looted or destroyed. As a result of Russian aggression in Ukraine, as of the end of February 2026, 1,685 cultural heritage sites have been damaged ([Ministry of Culture and Strategic Communications of Ukraine n.d.](#)). Despite international law and the protected status of many sites, their physical protection often becomes practically impossible. In modern Ukrainian realities, technological innovations are becoming an important tool for preserving cultural heritage. The transfer of cultural sites to digital format is becoming necessary to preserve them for future generations. This contributes to the stabilization and, in the long term, to the inclusive and equitable reconstruction of the national cultural space ([Gorbul, T. & Rusakov, S. 2022](#)). Initiatives in this area have appeared relatively recently. They are implemented thanks to state and international support, grants or volunteer efforts. In recent years, the participation of civil society organizations in the preservation of cultural heritage has significantly increased.

Hundreds of thousands of distinct artifacts have been relocated, evacuated, or have ended up in temporarily occupied regions. For this reason, the process of digital transformation and the documentation of destruction in Ukraine is happening at a record speed. Currently, the Ministry of Culture and Strategic Communications is dealing with the creation of a register of immovable cultural heritage and a register of objects of Ukraine's museum fund ([Ministry of Culture and Strategic Communications of Ukraine n.d.](#)).

A database called Stolen Heritage was established with the aim of collecting information on stolen or destroyed cultural heritage items from state and private collections. This information is useful for attempts to address the illegal trafficking of looted artifacts as well as for loss identification and recovery of valuable cultural heritage items. With the support of the government, there is currently an initiative to document the

destruction caused by Russia's invasion, which is called The War Up Close Project. This project has a team of specialized videographers who, using 360 panoramic photography, aerial recordings from drones, and 3D imaging, document the magnitude of violence against historical monuments.

A number of media projects were started in Ukraine, which, at first, served as a means of promoting Ukraine's historical and cultural legacy, particularly with a focus on revealing underexposed parts of culture, history, daily life, unique places, traditions, and the lives of citizens. With this information, textbooks have been designed to enhance learning and domestic tourism. Interactive features are being incorporated within virtual environments to enhance the understanding of Ukrainian culture, including its intangible and tangible heritages such as cuisine, crafts, architecture, and natural as well as cultural landscapes. Such wide-scale media projects include *Ukrainer* and *Authentic Ukraine*. These projects had to shift their areas of focus after the full-scale Russian invasion. Culture research and presentation shifted toward documenting the realities of war, especially the violent erasure of historical memory and cultural landmarks (through photographs, interviews, and expeditions). Collections of media materials are being collected, books are being published, and documentaries about the culture and history of Ukrainian regions are being created, together with the virtual tours of museums, theatres, famous and forgotten architectural monuments, and religious buildings.

Cultural heritage in Ukraine is being revitalized through the efforts of unique teams who creatively use innovative methods to promote and preserve Ukrainian culture. The state has ceased to be the sole determinant of policy in the field of cultural heritage. These enthusiasts are not only capturing historical sites but are also building an accessible digital archive that helps future generations experience, explore, and interact with the past in virtual reality. One of the teams that applies digital technologies in heritage preservation is Skeiron. This company specializes in the digitization of architectural monuments and museum collections. It works on the 3D reconstruction of objects, video recording, and creating 360° panoramas and virtual tours, as well as cultural heritage promotion projects. A significant project by Skeiron is the 3D tour of the Mariupol Drama Theatre that was blown to pieces by Russian soldiers. Skeiron specialists utilized traditional photographs, spherical images, and video tours to reconstruct the theatre's exterior and interior to produce a robust three-dimensional model with depth mapping. This aids in the memorialization of the cultural landmark and helps in its restoration in the future.

Another such team is Pixelated Realities. This company specializes in 3D scanning of the historical monuments in Odesa. They developed interactive models and a database to study the objects in detail. With their models, users can take a virtual tour of the city or look at monuments in augmented reality with a smartphone. Their scans are also used as a 3D model for decorative pieces. AERO 3D also undertakes the production of virtual 3D tours. Their methods include the use of photogrammetry, laser scanning, augmented reality, and drone videography. Their virtual tours are accessible through Matterport and Google platforms. Their work includes not only museum exhibits and architectural structures, but also landscapes.

Along with volunteers from *Mapa Renovatsii*, EverScan has taken steps to safeguard architectural heritage using current digital technologies. They have come forward to produce an interactive online map of historical buildings located within the Ukrainian capital. Volunteers document and locate historical buildings that are in imminent danger, contemplate new ways to adapt these buildings, and EverScan uses laser 3D scanning to document these structures. This partnership aids in capturing the present state of the buildings and provides accurate information to reconstruct the facades of heritage buildings. These digital models serve as the basis for future restoration or reconstruction works.

Because of these teams' efforts, Ukraine's cultural monuments are receiving a second life in the digital world. Modern technologies provide new means for the preservation and promotion of heritage and protect it from being destroyed or forgotten. These activities enable the safeguarding of history while making it

accessible to all, from researchers and restorers to the general public interested in understanding their history and culture.

Drawing on the efforts of HeMo Ukrainian Heritage Monitoring Lab, which is funded and managed by the NGO Tustan, the documentation of cultural heritage losses and the mapping of destroyed sites have led to dozens of expeditions which made it possible to establish an information database on damaged monuments HEMO. One of the particular areas of focus of the team's work is the study of the consequences of the humanitarian and environmental catastrophe that followed the damage by Russian forces to the Kakhovka Hydroelectric Power Plant. This disaster led to the flooding of a large region where several cultural heritage places were located, a large number of which have been destroyed or severely damaged. Researchers analyse satellite imagery of museum locations prior to and after the explosion of the Kakhovka dam. From this information, a map was developed depicting flooded areas, delineating cultural heritage places and institutions (museums and libraries).

As a result of the tangible threat, the safeguarding of cultural heritage and the promotion of museum collections are increasingly moving into the cyberspace. Museums are now actively harnessing digital tools, such as the development of virtual exhibitions, interactive showcases, and mobile applications, in order to sustain contact with the public and comply with contemporary international standards. One of such initiatives is the Virtual Museum of Hryhorii Skovoroda, which makes it possible to interact with cultural heritage regardless of the location of the exhibits. Skeiron also actively works on innovative solutions and uses augmented reality technologies to promote historical monuments. Among other developments of the company are AR cards with images of important Ukrainian cultural monuments. With the use of a mobile application, users can see three-dimensional models of the monuments along with the historical information about their creators and the processes of constructing them.

Another mobile app, Virtual LitMuseum, was created by the Literature Museum of Kharkiv and Track Holodomor History. It documents the history of Holodomor. Thanks to the unique virtual travel project 'Open-air Museums', access is provided to seven authentic Ukrainian open-air museums. Through this project, everyone has the opportunity to visit the museum online, travel back in time, feel the atmosphere of past centuries, and get acquainted with Ukrainian culture and everyday life. The Museum Portal has collected a large database of information and virtual tours of many museums of Ukraine.

At the moment, Ukraine is making advances toward the digitization of historical manuscripts and books. For instance, Rivne Regional Museum of Local History has digitized rare ancient books and now makes them available through the museum's website. This is one of the components for Ukrainian Old Books Digitization. Along with the books, the museum staff is also working on digitizing porcelain and traditional clothing, as well as photographs and negatives that tell the history of Rivne. Rare books, manuscripts, and even maps collected by the Mykolaiv Regional Museum of Local History are also undergoing digitization. To maintain this activity, the museum received some professional brand camera on a loan from the Cultural Resilience Agency as part of the Mobile Digital Laboratory (MOCEL) project.

The Museum of Books and Printing of Ukraine is also participating in the digitization process. The Virtual Portal of the Museum of Books and Printing project's objective is to digitize handwritten books, rare print versions, and over 1000 graphic pieces, as well as to create a virtual 3D model of the museum's ancient building, the former monastery printing house, which is a UNESCO World Heritage Site. The scanned artifacts will be provided with appropriate scientific commentaries. In addition, some audio recordings will bring new life into the unique collections of historical hymns. The results of the digitization will be accessible through the museum's website in the Online Collection section with an accompanying electronic catalogue of old printed books and manuscripts. The online platform Starodruk is still the largest source for books printed in Ukraine between 1574 and 1800.

Problematic Issues of Innovative Transformations for Cultural Heritage

The trends toward structuring diverse practices in the field of cultural heritage through digitalization reflect an active search for ways of constructing shared worlds that are most relevant to the contemporary condition of societies. The modern information society and its communication systems simultaneously provide opportunities and pose new challenges for the preservation of the heritage of multiple unique identities and their peaceful coexistence.

The digital sphere of interaction with cultural heritage is being shaped within the context of balancing knowledge and information. Innovation in this domain depends on connecting diverse sources of knowledge and their carriers. The forms of project organization analysed in this article demonstrate multiple benefits in the exchange of knowledge and information. They enable both direct and indirect coordination of the actions of numerous actors in the cultural heritage sector, fostering collaboration and the search for partners. Through interactivity, shared experiences of knowledge use are developed. The space for acquiring and applying knowledge about one's own culture expands, as does the interest in supporting cultural diversity. This, in turn, broadens participation in the preservation of other cultures' uniqueness while reinforcing a sense of belonging to a shared value space.

In the virtual environments of museums, galleries, and interactive platforms, new spaces emerge where subjective realities 'communicate' in a way. Within this reality of engagement with heritage, constant and direct identification takes place. For the subject of interaction, the presence of significant others is essential for the 'construction' of subjective reality. With the expansion of direct access to other 'realities' – to repositories of knowledge created by 'authors' of different life-worlds (from other generations, cultural communities, and their individual representatives) – the processes of identification are intensified. Objects of tangible and intangible heritage that acquire new digital forms of representation become means of objectifying the lived experiences of past and present generations ([Hindmarch, Terras & Robson 2020](#)). Through these objectifications, actors with diverse 'biographies' gain real opportunities to align the value and meaning coordinates of their own reality with those of others. As a result, access expands not only to other cultures but also to one's own.

Thus, beyond addressing organizational and financial-economic issues that constantly arise in the operations of institutions related to cultural heritage, the transformation of formats for heritage preservation and promotion creates opportunities for acquiring new experiences with both familiar and previously unknown cultural content – for preservation, consumption, study, and creation of cultural values and goods. This experience is not a secondary substitute for the real and habitual one; rather, it is an alternative experience ([Castells 1996](#)).

In today's realities, such an expansion of shared space may help compensate for, or at least balance, the contemporary 'compression' of social spaces. In this regard, the issue of innovation is linked to the fact that the effectiveness of actions is determined not only by the quality of the organizational and instrumental forms of communication created. The more these develop, the higher the demands for their meaningfulness become.

Indeed, the interest of many users in visual and digital data is often driven by the desire to discover their cultural and ethnic identities. People need to feel their belonging to particular cultural forms, especially when the authenticity and authority of these forms are validated by cultural institutions and organizations engaged with digital resources in the heritage domain. This enables the integration of creativity with cultural traditions and ethnocultural ties. However, this requires considerable effort. The difficulty lies, in part, in the fact that under conditions of increasing technologization across all spheres of life and as a consequence of growing unification and massification of collective and individual consciousness, many knowledge carriers exhibit a certain inertia. There is a noticeable trend toward declining demand for new knowledge

([Johannessen & Olsen 2010](#)). Consequently, there may be a lack of internal resources necessary for constructing realities where meaningful and responsible interactions with other carriers of distinct cultures and unique heritage can take place.

Another pressing issue concerns the regulation of digital platform content and the dependence of digitized objects, their publication and dissemination on the subjective preferences of curators and their political or sociocultural positions. Digital materials possess social value and contribute to the democratization of interactions with cultural heritage. Virtual tours and digital applications project desirable realities, offering opportunities and conditions for collective participation in shared cultural directions. Users gain the ability to act autonomously within the global infosphere ([Cameron 2019](#)).

However, this autonomy is limited not only by the quantity of available content. Information delivered through digital channels is necessarily subject to selection ([McKinsey 2022](#)). For example, when ‘travelers’ navigate museum spaces and interact with collections, this interaction occurs within the parameters of pre-programmed navigation. The selection of heritage objects for digitization and their number depends on the decisions of particular actors, which, in turn, are influenced by cultural, political, and economic contexts.

During interactions in digital and virtual spaces, subjective reality is sustained by the data associated with it. The construction of this reality depends on both the volume and the nature of the data offered to users. Digital resources and aggregators provide models of interaction with the world in general and with the world of cultural heritage in particular. Influence is exerted, for instance, through recommendation systems and curated datasets ([McKinsey 2022](#)). Moreover, the quantity of undigitized works of art and culture far exceeds that of digitized content. The issue of copyrights also remains complex.

The work of digital collection aggregators often shows bias through limits on which objects can be included. This leads to distorted or unbalanced representations of certain cultures — some are overrepresented, while others are underrepresented. Inaccurate or poor classification methods can make these problems even worse. This, in turn, affects how societies perceive different cultures, their development, and their role in the broader picture of the world, as well as the formation of cultural identities among various communities and individuals.

Conclusion

The EU, Australia, and Ukraine are all actively engaged in the conservation of cultural heritage through a very delicate process which combines innovation, tradition, and socio-political and ecological issues. In the modern world, digital technologies are becoming a key tool for preserving cultural heritage. It is not only a technological process, but also a certain philosophy of preserving memory that shapes the identity of communities and individuals. The digitization of cultural heritage fulfills more than just preserving the memory of the past. Through the digitalization of artifacts, works of art, interactive platforms, virtual museums, tourist routes, digital archives, 3D reconstruction, and augmented reality, the new possibilities of preserving cultural diversity and promoting its sustainable development expand remarkably. The preservation of culture, history, and art could not be achieved without the use of AI, as it facilitates the reconstruction and restoration of lost historical monuments. People are able to engage in cultural content appreciation through the use of augmented reality and virtual reality technologies that let them experience the culture and art from different eras.

The use of modern technologies introduces new possibilities for digitizing historical and cultural objects while simultaneously highlighting the necessity of preserving authenticity, as well as the rights of communities and Indigenous peoples. The incorporation of local communities and civil society actors in decision-making processes cultivates responsible heritage management accompanied by its sustainable preservation.

Combining cultural heritage with innovative technologies opens unprecedented opportunities for humanity. The opportunities not only preserve our past, but also to build and maintain a sustainable connection between generations that allows everyone to identify themselves, find a connection with culture, realize its value, and pass this experience on to future generations. Such collaborative practices serve as crucial anti-entropic elements in the accumulation and maintenance of a shared reality.

The question of national identity, which is intrinsically interlinked with history and cultural heritage, is a matter of great importance during social and political crises and challenges. The destruction of historic sites endangers cultural identity and national memory ([CHARTER Project 2024](#)). Therefore, emergency documentation, digital preservation and restoration of cultural heritage are becoming current key strategies. The latest technologies help not only to minimize losses, but also to make the preservation process open, accessible and democratic. An innovative approach ensures high-quality restoration of cultural objects and their integration into the modern world, where heritage continues to live, even if it no longer physically exists.

Entering the global digital environment while preserving the distinctiveness of one's cultural identity, as well as national and personal value systems, raises complex questions of responsibility for the quality of both content and services. The use of material and human resources must be grounded in a critical approach to the implementation of innovative forms and instruments of engagement with cultural heritage. As a countermeasure to the risks of content absorption by digital innovations and the fetishization of data, it is essential to strengthen systems for knowledge exchange. These may include educational and informational learning platforms, online forums, conferences, and master classes. Equally important is the development of platforms that do more than simply transmit information provided by those authorized to create and curate content. There is a growing need for dialogical and interactive forms of engagement within this emerging digital cultural space.

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No AI tools were used in the development or presentation of this submission.

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