

Showcasing Identity: Virtual Exhibitions of the Ukrainian Diaspora in Canada

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Abstract

Virtual exhibitions are recognized as essential tools employed by cultural memory institutions to preserve and promote the historical and cultural heritage of the Ukrainian diaspora in Canada. These platforms overcome time and geographical limitations, providing unrestricted access to cultural artifacts and narratives that celebrate the contributions of Ukrainian Canadians. This study focuses on virtual exhibitions curated by Ukrainian and Canadian institutions, using a combination of general scientific methods and specialized approaches, such as content, source, historical, and socio-communicative analyses. These methodologies enabled a comprehensive collection, evaluation, and synthesis of data from diverse online resources, offering insights into the evolution and current state of virtual exhibitions representing the Ukrainian diaspora, with a comparative analysis based on criteria, such as the chronological scope of documents, presentation formats, language, metadata, and keywords. The findings highlight shared strategies and unique approaches adopted by these institutions in representing diaspora heritage through virtual platforms.

A key novelty of this research is the creation of the “Consolidated Information Resource for Virtual Exhibitions of the Ukrainian Diaspora in Canada,” an integrated digital platform that aggregates these exhibitions, modeled using Entity-Relationship Diagrams (ERD) and Data Flow Diagrams (DFD), ensuring its effective design and functionality and offering a consistent platform for scholars, teachers, and the public to interact with the digital collections.

The research also highlights the importance of pooling the resources and expertise of Ukrainian and Canadian institutions to promote a better comprehension of the Ukrainian diaspora's cultural legacy. Creating comprehensive, accessible, and engaging virtual exhibitions and contributing to a broader understanding of global cultural dynamics in digital spaces maximizes the reach and impact of these digital platforms.

Keywords

Ukrainian diaspora, Ukrainian Canadians, cultural heritage, virtual exhibition, social memory institutions, archival collections, digital humanities, consolidated information resource

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1. Introduction

The Ukrainian diaspora in Canada, one of the largest and most culturally vibrant Ukrainian communities outside of Ukraine, has played a pivotal role in shaping Canadian society and global perceptions of Ukraine. For over a century, this diaspora has actively preserved its cultural heritage through various forms of artistic, religious, and scholarly endeavors. Central to these activities is the commitment to maintaining Ukrainian identity, traditions, and historical narratives, ensuring that the legacy of Ukrainian immigrants is passed down to future generations.

With advances in technology and globalization, preserving cultural identity has evolved, particularly in historical preservation, education, and public engagement. Virtual exhibitions (VEs) have emerged as contemporary solutions to these challenges. Unlike traditional physical exhibitions, limited by geography and time, VEs offer global accessibility, allowing diverse audiences to engage with cultural materials remotely.

The significance of VEs goes beyond their function as displays; they act as dynamic platforms of social memory, preserving historical documents, artifacts, and personal stories for wide access. These platforms enable the Ukrainian diaspora to assert its cultural identity and maintain traditions despite geographic dispersion. In light of the ongoing political and social challenges faced by Ukraine, such as the full-scale Russian invasion, maintaining a cohesive and resilient cultural identity within the diaspora is vital not only for heritage preservation but also as a form of resistance against cultural erasure.

Despite their potential, many VEs remain isolated, scattered across different institutional platforms, limiting their reach and accessibility. This study seeks to address this gap by investigating VEs dedicated to the Ukrainian diaspora in Canada, comparing the approaches of Ukrainian and Canadian institutions, and proposing the development of a consolidated information resource to unify and enhance access to these exhibitions.

Public interest in topics related to the Ukrainian diaspora can be effectively tracked through online platforms, such as Wikipedia [1], which provides insights into engagement with specific historical narratives. In examining VEs related to the Ukrainian diaspora in Canada, an analysis of the Wikipedia page "Ukrainians in Canada" was conducted to gauge public interest. The data revealed that during the period from January 1 to December 31, 2020, the page recorded 33,709 views, with an average of 92 daily views. In the subsequent year, from January 1 to December 31, 2021, the page experienced a slight increase to 33,887 views, with an average of 93 daily views. A significant surge in interest was observed between January 1, 2022, and December 31, 2022 with 52,173 views, corresponding to an average of 143 daily views. In the final period analyzed, from January 1 to December 31, 2023, the page recorded 43,531 views, with an average of 119 daily views. Figure 1 visually presents the findings from the analysis of visits to the 'Ukrainians of Canada' Wikipedia page, broken down by quarter from 2020 to 2023 (see Figure 1).

The increase in public interest, particularly after Russia's full-scale invasion of Ukraine, highlights the growing relevance of topics related to the Ukrainian diaspora. These trends underscore the importance of VEs curated by social memory institutions – including archives, libraries, museums, and academic centers – as powerful tools for disseminating the cultural heritage of the Ukrainian diaspora in Canada. Through these digital platforms, audiences can

engage more deeply with the historical narratives and contributions of the Ukrainian community to the Canadian cultural landscape.

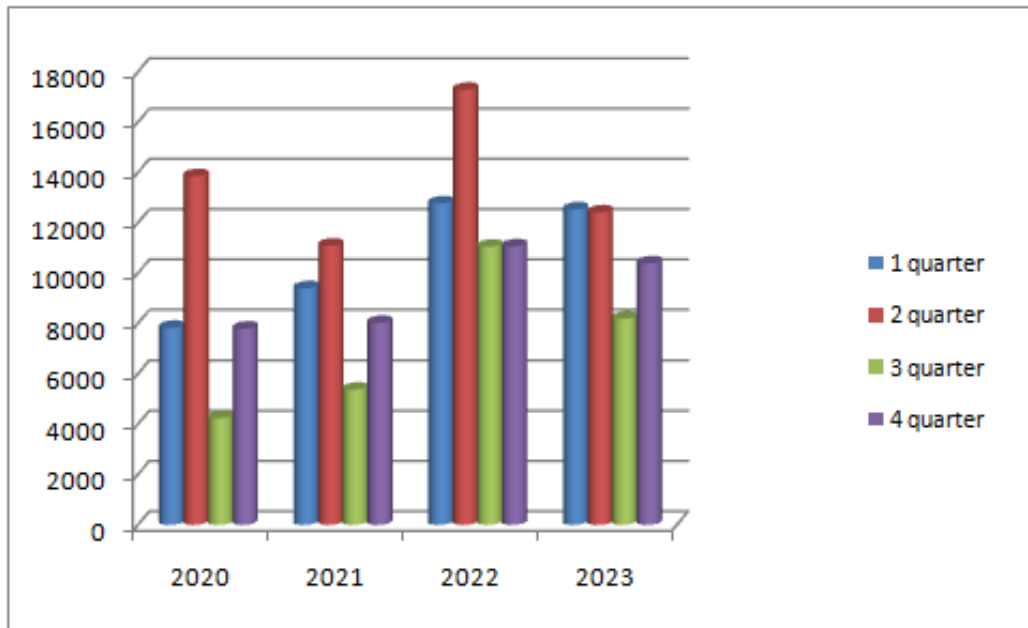


Figure 1: Visits to the Wikipedia page “Ukrainian Canadians” from 2020 to 2023 by quarters [compiled by the authors]

The goal of this article was to explore the role of VEs in the preservation of the cultural identity of the Ukrainian diaspora in Canada and to propose a framework for a consolidated information resource that enhances access to these exhibitions.

To achieve this goal, the following objectives were identified:

- To analyze the definition challenges and contextual variations of VEs while exploring their role as a tool for promoting cultural heritage and supporting diaspora studies.
- To describe VEs created by Ukrainian and Canadian social memory institutions, focusing on their content, structure, and presentation of cultural heritage.
- To examine the role of VEs as a tool for the preservation and promotion of Ukrainian cultural identity within the Canadian context.
- To propose the design and implementation of a consolidated information resource that integrates VEs from various institutions, providing broader access to cultural materials related to the Ukrainian diaspora in Canada.
- To assess the potential of the proposed resource to enhance research, educational initiatives, and cultural engagement both within the diaspora community and the broader public.

2. Literature review

2.1. Definition challenges and context

Heritage institutions are increasingly adopting new formats for showcasing their collections, such as virtual reality (VR) and augmented reality (AR), which open innovative possibilities for the use of exhibition spaces. As a result, online exhibitions have emerged as an effective format capable of reaching a broader audience. Although they present certain challenges, particularly for libraries and archives, online exhibitions hold significant potential for future-oriented development [2].

The concept of an online exhibition generally refers to an exhibition hosted in cyberspace; however, it is multidimensional, evolving in both nature and application across various cultural and institutional contexts. Consequently, the term “online exhibition” is often used interchangeably with other terms such as “electronic exhibition”, “cyber-exhibition”, “digital exhibition”, “online gallery”, “multimedia exhibition”, “multimedia catalogue”, and “VE”, and “online VE” [3],[4],[5]. They are usually based on the composition of individual, independent multimedia components such as images, sound recordings, animations, videos and texts, etc., which together form a comprehensive whole [6]. This trend became particularly evident in the late 1990s when Polish libraries introduced electronic versions of their exhibitions under various names [7]. The roots of this interchangeability trace back to the early websites of public institutions in the 1990s, when it was difficult to distinguish these exhibitions from websites or other similar forms of online communication, such as digital collection catalogues or thematic web pages. The Society of American Archivists also highlights the concept's heterogeneity, stating that “an online exhibition is also called an online exhibit, a virtual exhibit, or a VE” [8]. Similarly, ISO/DIS 25639-1(s) “Exhibitions, Shows, Fairs, and Conventions – Part 1: Vocabulary” reflects this interchangeable usage [9].

While VEs are generally understood as digital representations of physical collections, their definition can vary depending on the technological, cultural, and institutional perspectives.

An early definition of VE focuses on its four distinctive characteristics: online-based, Web-based, hypertextual, and dynamic: “First, VEs are online and exist as part of and within the global computer network called the internet. Second, they are Web-based, which means that they are designed, mounted, presented, and viewed on the World Wide Web, a networked system whose graphical interface makes possible the inclusion of various forms of media. Third, VEs are hyper-textual, an aspect which collects and connects various, hyperlinked texts and can produce elements of non-linearity, de-centeredness, and inter textuality. Finally, they are dynamic, a feature which renders them more perpetual works-in-progress than static collections” [10].

The first characteristic of VEs leads to an approach that defines them as organized collections of digital objects presented via an online interface, even though, “virtual” does not refer solely to an internet presence; it can also encompass closed digital environments or localized networks, allowing VEs to be displayed on individual computers, VR systems, or restricted systems in museums or schools using specialized software without the need for internet access.

According to A. Wandel, a virtual exhibition is [...] an online presentation of digitised documents (mainly iconographic) and accompanying explanatory texts, created by an institution based on its collections. The function of virtual library exhibitions is to showcase rare and valuable cultural goods available to a wide audience, previously accessible only to a

select few, for education, display, information and advocacy [11]. This perspective focuses on the archival and educational functions of VEs, underscoring their role in making otherwise inaccessible cultural artifacts available for public consumption, education, and advocacy.

A more specific and technologically sophisticated definition positions VEs as web-based hypermedia collections: “a VE is a Web-based hypermedia collection of captured or rendered multi-dimensional information objects, possibly stored in distributed networks, designed around a specific theme, topic, concept or idea, and harnessed with state-of-art technology and architecture to deliver a user-centered and engaging experience of discovery, learning, contributing and being entertained through its nature of its dynamic product and service offerings” [12]. Bonis et al. define VEs emphasizing the use of 3D models and interactive features to create dynamic, exploratory environments: VEs are “single- or multiuser realistic three-dimensional 3D representations of artifact collections, in which visitors navigate, observe the exhibits, learn related information presented in various media, and in some cases interact with them” [13]. These two technological perspectives are integrated in the European Union FP7 project INDICATE (International Network for a Digital Cultural Heritage e-Infrastructure):

“A virtual exhibition is a hypermedia collection made up of digital items which are:

- linked together by a common theme, an inter-disciplinary topic, a concept, an idea, an anniversary, a special event, or a physical person;
- displayed in 2D and/or 3D;
- occasionally stored in distributed networks;
- made accessible through the potential provided by modern technologies, thanks to a system architecture designed to provide user-centred, absorbing experiences;
- dynamic products that can offer services and be updated periodically” [14].

However, INDICATE participants emphasize that “a collection of digital items, in and of itself, does not constitute a VE. It is only when the items are carefully selected to illustrate a topic and are tied together forming a narrative or a logical itinerary, that they constitute an exhibition”.

Building on this understanding, we propose two definitions of VE:

1. The intensional definition of a VE specifies the internal content of the concept: *A virtual exhibition is a curated digital display of multimedia content, typically organized around a central theme, presented via an online platform or digital interface, designed to allow users to interact with and explore the exhibition remotely; and*
2. The extensional definition of VE indicates the range of its applicability: *A virtual exhibition is an online, interactive event that presents curated digital content – such as textual, visual, audio, and multimedia materials – sourced from internal or external collections, organized around a central theme, and designed to engage a global audience through an immersive digital platform. These exhibitions offer flexible user interaction, including navigation, real-time participation, and multimedia exploration, transcending physical limitations and enhancing accessibility for diverse audiences, including those with disabilities.*

Our intensional definition of a VE identifies two distinct elements: 1) its most essential attribute, “a curated digital display”, which is the broader category to which the defined term belongs; and 2) its specific features that distinguish it from other members of that broader category, “of multimedia content, typically organized around a central theme, presented via an online platform or digital interface, designed to allow users to interact with and explore the exhibition remotely.”

Our extensional definition of a VE specifies key aspects of interactivity, such as user navigation and multimedia exploration, making the definition more concrete, focuses on accessibility for diverse audiences addresses an important strength of virtual exhibitions, emphasizes the adaptability of virtual exhibitions in terms of both content and user interaction, making it more comprehensive, and mention of immersive digital platforms and real-time participation highlights the engaging nature of VEs.

The practical application of these definitions becomes evident when examining how cultural and archival institutions use VEs to interact with audiences worldwide. By leveraging web technologies, VEs not only adhere to the principles outlined in their definitions but also serve as highly effective tools for these institutions to showcase their collections to a worldwide audience. Through digital platforms, VEs offer remote access to curated displays of documents, artifacts, and multimedia content, transforming the way we interact with history and culture. Specifically, VEs of historical records present digital images of carefully selected documents for public viewing, organized according to various factors that influence both their functionality and design.

Typically, electronic exhibitions are categorized based on four main factors: their type (universal, specialized, or thematic), length (permanent or short-term), importance of showcased archival materials (international, national, regional, or local), and how often they occur (periodic, annual, or one-time) [15]. Expanding on these factors, cultural organizations often classify online exhibitions into five main types [16], each focusing on different aspects of cultural and historical preservation:

1. Jubilee exhibitions: Dedicated to celebrating significant anniversaries or events, these exhibitions showcase achievements, history, or important figures and may include a variety of artifacts, documents, photographs, and multimedia materials.
2. Famous events: Highlight key historical or cultural events through original documents, photographs, and artifacts, aiming to preserve collective memory and deepen visitors' understanding of the significance and impact of these events.
3. Special materials: Focus on rare, valuable, or unique items such as documents, photographs, postcards, or even postage stamps. These exhibitions offer a chance to view materials that are rarely publicly displayed, emphasizing their uniqueness and historical significance.
4. Thematic exhibitions: Centered on a specific topic, these exhibitions explore various aspects of the subject through a range of library and archival exhibits. They provide a deeper understanding of the topic by carefully selecting and systematizing related materials.
5. Treasures: Feature valuable, rare, or unique artifacts such as documents, jewelry, artworks, and other items of high historical or cultural value. These exhibitions draw

attention to the importance of these materials, offering visitors a rare glimpse into collections that are typically closed to the public.

6. VEs are an asset for the conservation and promotion of archival materials. By offering an organized and methodical presentation of objects, they allow institutions to disseminate information globally. Whether showcasing rare artifacts or exploring specific topics, VEs ensure that historical and cultural heritage remains accessible to all. This approach not only broadens access to information but also supports educational and research initiatives by providing unique insights into significant and rare materials.

2.2. VEs as a tool for promoting cultural heritage and diaspora studies

Research on digital preservation and access has shown that VEs are a highly effective way to preserve and promote cultural heritage by providing broad access to digitized documents. These exhibitions involve the digital processing of historical documents and materials, making them widely available to the public [17]. The primary goal of such exhibitions is to share information about significant historical events, individuals, institutions, or organizations, thereby raising awareness of archival and library collections. VEs also engage users in exploring key historical and cultural issues.

In addition to this broad accessibility, documents from specific collections can be displayed on the websites of institutions, providing convenient access to these resources and further promoting historical heritage. While the primary aim of electronic book exhibitions is to display and popularize certain historical and cultural collections, scholars have also identified secondary benefits of these digital displays. For example, C. Ciurea and F. G. Filip suggest that electronic exhibitions can attract investment and increase institutional income by promoting collections in the digital space, offering visitors alternative ways to engage with cultural content that may not be available in physical exhibitions [18].

In the case of the Ukrainian diaspora, VEs play a crucial role in preserving national identity, language, and cultural heritage across generations by offering a digital platform to display and celebrate their heritage. A. Nechytailo has closely examined how these efforts, including VEs, contribute to preserving national memory, spiritual values, and cultural traditions. We agree with her conclusions that in the era of information globalization, national memory serves as a vital mechanism for safeguarding a nation's identity. The Ukrainian diaspora's contributions to preserving language, history, and cultural values are integral to national strategies aimed at maintaining identity and protecting cultural heritage. Through VEs and similar initiatives, the diaspora ensures historical continuity and fosters national consciousness among future generations of Ukrainians worldwide [19].

Yu. Kondrashevska has further expanded on the national and cultural achievements of the Ukrainian diaspora in Canada, with particular emphasis on their success in preserving Ukrainian identity. The researcher emphasizes that the experience of Ukrainian emigration to Canada is the most successful in terms of preserving national identity because, over time, emigrants have developed unique skills that enable them to integrate into Canadian society's socio-political, economic, and cultural spheres without losing their own identity [20]. This observation underscores how the diaspora's dual role – integrating into Canadian society while maintaining cultural roots – has been a key factor in the preservation of Ukrainian heritage abroad.

In parallel, significant scholarly contributions have focused on the digitization of archival collections related to Ukrainian studies outside Ukraine. Institutions like the Ukrainian Educational and Cultural Centre "Oseredok," which houses one of Canada's largest Ukrainian archives, play an essential role in preserving and providing access to key documents, photographs, audio recordings, and videos chronicling the lives and contributions of Ukrainians globally. These digital collections, often showcased through VEs, enable widespread access and engagement with Ukrainian heritage beyond national borders [21].

Additionally, research has explored the role of information and communication technologies in shaping public attitudes toward historical events, particularly emphasizing the importance of preserving Ukraine's national and cultural heritage [22]. One notable focus has been on efforts to safeguard cultural and archival heritage during times of war [23]. The development of digital models of architectural structures, for instance, represents one such strategy for ensuring the preservation of Ukraine's cultural landmarks, with potential for future integration into VEs. These efforts demonstrate how VEs can serve not only as tools of education and engagement but also as mechanisms for cultural preservation in periods of crisis. Kh. Vintoniv's comprehensive study on the virtual documentary and informational heritage of Ukrainians in Canada further illustrates the importance of digitization. Kh. Vintoniv has examined extensive archival electronic collections and databases that document the achievements of Ukrainian immigrants in Canada, shedding light on how these digital resources play a pivotal role in maintaining and promoting cultural identity [24].

Given the significant cultural and spiritual contributions of Ukrainians to Canadian public life, there is a strong commitment to preserving and developing national traditions. This dedication has shaped a rich cultural and informational landscape, with VEs becoming a critical tool for promoting Ukrainian culture as an integral component of preserving national identity. Through the continued use of VEs, the Ukrainian diaspora not only fosters a sense of historical continuity but also ensures that the preservation of their heritage remains accessible to future generations, reinforcing their cultural legacy on a global scale.

3. Research methodology

To address our study objectives, a rigorous methodological approach, combining both theoretical analysis and practical examination of VEs related to the Ukrainian diaspora in Canada, was adopted. The study employed a blend of general scientific methods and specialized approaches to examine how these VEs serve as tools for preserving and promoting cultural heritage. Key methods included analysis, synthesis, and a systematic framework, allowing for a thorough collection, evaluation, and synthesis of data from a variety of sources to ensure a comprehensive understanding of the factors influencing the development and impact of these VEs.

Additionally, a historical and source analysis was undertaken to track the progression of VEs representing the Ukrainian diaspora. This allowed the study to assess the current state of research and to construct a developmental timeline for these exhibitions. Through digitization, originally physical sources have evolved into digital resources, becoming part of Canada's virtual cultural space. This transition underscores the importance of digital platforms in ensuring that cultural and historical documents remain accessible and relevant.

To assess the current landscape of VEs, content analysis, as well as comparative and analytical monitoring, was conducted on various online resources. Content analysis provided a detailed review of how the information in these VEs is presented, whereas comparative methods allowed for the identification of similarities and differences between Ukrainian and Canadian approaches to structuring these digital exhibitions. This comparative analysis also facilitated the identification of best practices that could enhance the effectiveness and engagement of these virtual platforms.

Furthermore, a socio-communication approach was integrated into the study to highlight how social memory institutions contribute to the preservation of cultural heritage within the digital realm. This approach underscores the communicative role of VEs in transmitting historical and cultural narratives to a global audience, thus bridging academic, public, and diasporic communities.

An information-based approach is integrated throughout the study, as information plays a crucial role at every stage – from the initial search for sources to the final formulation of conclusions. Web exhibitions are viewed as key components of the communication system, serving as sources of information. In this context, the institutions responsible for creating these web resources act as communicators, whereas scientists, students, and other interested individuals serve as the recipients of this information.

When creating a “Consolidated Information Resource for Virtual Exhibitions of the Ukrainian Diaspora in Canada”, modelling methods were applied such as ERD in Peter Chen's notation [25], used to design and visualize database structures, and DFD in Gane Sarson's notation [26], which helps to ensure all system processes for proper design, integration, optimization, which ultimately leads to the creation of an effective and reliable system.

The process for identifying VEs on Ukrainian websites followed three steps:

1. Search among social memory institutions, including central state archives and national libraries of Ukraine.
2. Search within research centers specializing in the Ukrainian diaspora.
3. Use specific keywords in Ukrainian, such as “Ukrainian diaspora”, “Ukrainians of Canada”, “archival Ukrainica”, “museum”, “archive”, “library”, and “exhibition”.

The search for Canadian VEs preceded in two stages:

1. Use of the same keywords mentioned above, but in English.
2. Search among the organizations listed on the “Sustainable Ukrainian Canadian Heritage” website, a multifaceted research and education program from the Kule Folklore Centre at the University of Alberta: https://suchnetwork.ca/repository/-browse?page=4&sf_culture=en&sort=alphabetic&sortDir=asc.

The analysis of web exhibitions was presented in tabular format based on specific criteria, including the chronological range of documents, the form of presentation, language, keywords, metadata, and the type of exhibition. These criteria were selected for the following purposes:

1. Optimize the user experience: Understand which elements are most effective in engaging and educating the audience.

2. Improve exhibition activities: Identify opportunities to enhance the structure and content of web exhibitions.
3. Compare Ukrainian and Canadian exhibitions: Create new online exhibitions and share best practices.
4. Assess cultural and educational impacts: Evaluate how web exhibitions contribute to the dissemination of knowledge, cultural heritage, and educational practices.

This methodological framework provided a robust foundation for understanding the development and impact of VEs as key instruments for preserving and promoting the cultural heritage of the Ukrainian diaspora in Canada. By combining theoretical insights with practical analysis, the research offers valuable recommendations for improving the structure and outreach of VEs, ensuring they remain relevant and accessible to diverse user groups.

4. Electronic exhibitions of the Ukrainian diaspora in Canada on the Ukrainian online resources

The advancement of digital technologies has greatly helped promote the historical and cultural heritage of the Ukrainian diaspora in Canada, especially through electronic exhibitions. These displays are a crucial method for showcasing the history, culture, and accomplishments of the Ukrainian community in Canada to a broad audience. Through their presence on digital platforms of libraries, archives, and museums, these resources provide users with the opportunity to interact with distinct materials that greatly influence their cultural encounters. As stated in ISO 15489-1:2018, records should have the qualities of being authentic, reliable, integral, and usable, regardless of their format or organization [27]. To preserve their long-term value, digital objects featured in online exhibitions must adhere to these principles.

Building on this framework, we now review several electronic exhibitions on the Ukrainian diaspora in Canada that are available through the online resources of Ukrainian libraries, archives, and museums.

I. The Vernadsky National Library of Ukraine.

On the website of The Vernadsky National Library of Ukraine, we selected 3 out of 11 web exhibitions prepared by the Department of Foreign Ukrainica at the Institute of Book Studies (see Table 1). All 11 exhibitions share a similar structure, primarily featuring title pages of publications with accompanying bibliographic descriptions. Notably, the website is available in 40 languages.

1. The electronic book exhibition "*Ukrainian Canadian: To the 125th Anniversary of the First Settlement of Ukrainians in Canada*" features 34 scanned images, primarily of title pages from Canadian publications. These digitized materials span from 1937 to 1998 and include fiction, monographs, reports, bibliographic studies, commemorative books, articles, reviews, and conference proceedings related to Ukrainian Canadians [28].
2. The electronic exhibition "*Newspapers of the Ukrainian Diaspora (1945-2000). Part 2. America*" focuses on newspapers published by the Ukrainian diaspora in North and South America, including Canada. This exhibition is dedicated to the newspapers of the Ukrainian diaspora in North and South America. During this period, approximately ninety Ukrainian diaspora newspapers were published on the American continent,

mostly in Canada, the United States, and Argentina. The exhibition features eight Ukrainian-language newspapers, and one English-language newspaper published in Canada between 1949 and 1983, all accompanied by bibliographic descriptions [29].

3. The electronic book exhibition "*Ukrainian Prose of Canada*" was created for the Day of Ukrainian Writing and Language. It is the first part of a series titled *Ukrainian Fiction of Canada from the NBUV Collections*. It highlights twenty-four title pages in Ukrainian and English, covering Ukrainian prose from 1908 onwards, including short stories, novellas, essays, reports, dramas, and memoirs. It also features Songs About Canada and Australia by Teodor Fedyk, marking the birth of Ukrainian literature in Canada [30].

Table 1

Virtual exhibits by the Vernadsky National Library of Ukraine

Institution	Exhibit (type)	Date	Format	Languages	Keywords	Metadata
National Library of Ukraine named after V. I. Vernadsky	Ukrainian Canadian: To the 125 th Anniversary of the First Settlement of Ukrainians in Canada” (<i> jubilee</i>)	1937-1998	Text	Ukrainian, English	Ukrainian settlement, societies, libraries, immigration & emigration, diaspora, culture, literature, press	–
	“Newspapers of the Ukrainian Diaspora (1945-2000). Part 2. America” (<i>thematic</i>)	1949-1983	Text	Ukrainian, English	Ukrainian diaspora, political, religious and cultural life	Bibliographic description
	“Ukrainian Prose of Canada” (<i>thematic</i>)	1908-2006	Text	Ukrainian, English	Short stories, novellas, essays, reports, dramas, memoirs.	Bibliographic description

II. The Virtual Museum of Ukrainian Diaspora.

The Virtual Museum of Ukrainian Diaspora is an educational and scholarly platform showcasing a vast digitized collection of artifacts. Its mission is to share knowledge about the history and cultural achievements of the global Ukrainian community, highlight the activities

of Ukrainian institutions around the world, and honor notable figures of Ukrainian descent. The platform also publishes scholarly and educational materials related to diaspora topics and provides up-to-date information about events and news within the global Ukrainian community. Apart from the displays, the platform also releases academic and educational content concerning diaspora subjects and offers current updates on events and news within the worldwide Ukrainian community. The website in two languages, Ukrainian and English, showcases 565 digitalized items, with a part dedicated to “*Ukrainians in Canada*” (see Table 2), displaying 64 pictures depicting different aspects of social, religious, and cultural life from 1905 to 1930. The information provided for each exhibit consists of individuals' names, event descriptions, along with the artifacts' location, year, and place of origin [31].

Table 2
Virtual exhibit by the Ukrainian Diaspora Museum

Institution	Exhibit (type)	Date	Format	Languages	Keywords	Metadata
Ukrainian Diaspora Museum	“Ukrainians in Canada” (<i>thematic</i>)	1905-1930	Photo, text	Ukrainian, English	Ukrainian churches, societies, farming, school, press, ad, emigration	People’s names on the photo or events, place, year, location

III. The Central State Archive of Public Associations and Ukrainian Studies.

The website of the Central State Archive of Public Associations and Ukrainian Studies, available in twenty-seven languages, hosts numerous online exhibitions related to the Ukrainian diaspora. We focused on three exhibitions relevant to our research topic (see Table 3), though individual documents can be found in other exhibitions as well.

1. The online exhibition “*Ukrainian Art: Returned Names*” commemorates International Artist Day and highlights the works of Ukrainian artists abroad, emphasizing their role in preserving national traditions during times of cultural suppression. Among the seventy-nine exhibits, fifteen focus on Ukrainian art in Canada, with metadata that includes the artist's name, title of the artwork, location, year, and archival fond number [32].
2. The exhibition “*And His Faithful Daughters and Sons Live in the Memory of the People: To the 75th Anniversary of Victory Over Nazism*” details the contributions of Ukrainians in Canada and beyond during World War II. Of the fifty-nine exhibits, forty-two pertain to the Ukrainian diaspora in Canada between 1939 and 1945. This includes clippings from Canadian Ukrainian-language newspapers, such as *Novyi Shliakh*/New Pathway and *Ukrainskyi Holos*/Ukrainian Voice, which document the experiences of Ukrainian soldiers in Allied forces. Metadata includes military personnel names, event details, publication titles, and archival fond numbers [33].

Table 3
Virtual exhibits by the Central State Archive of Public Association and Ukrainian Studies

Institution	Exhibit (type)	Date	Format	Languages	Keywords	Metadata
Central State Archive of Public Associations and Ukrainian Studies	“Ukrainian Art: Returned Names” (<i>thematic</i>)	1959-2003	Photo, picture, postcard	Ukrainian	Ukrainian pioneers, religion, traditions, monuments, military	Artist, name of picture, book title, place, year, location, fond number
	“And His Faithful Daughters and Sons Live in the Memory of the People” (<i>jubilee</i>)	1939-1945	Text, photo	Ukrainian, English	Ukrainian soldiers, Canadian Army, war	Name of military, event, newspaper title, place, year, location, fond number
	“Learn, My Brothers. Think, Read...” (<i>thematic</i>)	1936-1983	Text, photo	Ukrainian, English	Ukrainian schooling, Native Schools, bilingualism school documentation	Name of document/event, newspaper title, place, year, location, fond number

3. The exhibition “*Learn, My Brothers. Think, Read...*” highlights the educational efforts of Ukrainians in Canada, featuring 16 exhibits such as newspaper clippings, announcements, and school-related documentation that illustrate the establishment of schools, reading rooms, and community centers by Ukrainian settlers [34].

The chronological range of the analyzed documents spans from 1905 to 2003. These web exhibitions present both printed materials and photographs. The oldest document is a religious photograph from the exhibition “*Ukrainians in Canada*”, while the most recent materials are from the exhibition “*Ukrainian Prose of Canada*”. These exhibitions are digitized from the collections of three Ukrainian institutions and their partners: The Vernadsky National Library of Ukraine, the Ukrainian Diaspora Museum, and the Central State Archive of Public Associations and Ukrainian Studies. Among the analyzed exhibitions, two are commemorative, dedicated to specific events, while five are thematic, exploring particular subjects in-depth.

5. Electronic exhibitions of the Ukrainian diaspora in Canada’s virtual space

Modern information technologies have made it possible to rapidly digitize a vast number of documents that were previously stored on traditional media. The digital format allows researchers to access and study millions of documents online, many of which are held by various institutions in Canada. These documents provide a valuable resource for understanding the Ukrainian diaspora as an integral part of Canadian and Ukrainian history. This research draws upon documents digitized by Canadian institutions, which are presented as web exhibitions in the virtual space.

I. The Kule Centre for Ukrainian and Canadian Folklore at the University of Alberta.

The Kule Centre [35] holds significant research materials related to Ukrainians in Canada. In its “Books, Videos, and Exhibits” section, there are three key online exhibitions (see Table 4):

1. “*Ukrainian Wedding Exhibit*”, curated by the Bohdan Medwidsky Ukrainian Folklore Archives, highlights the vibrant traditions of Ukrainian weddings in both Ukraine and Canada through photos and videos. The exhibition includes sections on Wedding Traditions in Ukraine, Ukrainian Canadian Weddings, Video Clips, Reflections, Teacher Resources, Bibliography, and a Glossary. While the media files lack metadata, they provide valuable insights into wedding rituals [36].
2. “*Ukrainian Canadian Music on the Prairies*” showcases musical recordings from the 1920s to the present. This exhibition, part of a course at the University of Alberta, features short descriptions of 16 musicians, bands, and companies. These descriptions were created by students based on Collection 0053 from the Bohdan Medwidsky Ukrainian Folklore Archives. Each recording is accompanied by the performer’s name and the student’s description [37].
3. “*Love Letters from the Past: Courtship, Companionship, and the Family in the Ukrainian Canadian Community*” explores the lives of Ukrainians in early 20th century Canada through letters, photographs, and newspaper publications in English, French, and Ukrainian. Metadata includes the document title, date, place of creation, storage location, document/fond number, and, in some cases, the photographer’s name [38].

Table 4

Virtual exhibits by the Kule Centre for Ukrainian and Canadian Folklore, University of Alberta

Institution	Exhibit (type)	Date	Format	Languages	Keywords	Metadata
Kule Centre for Ukrainian and Canadian Folklore, University of Alberta	“Ukrainian Wedding Exhibit” (<i>thematic</i>)	1920-1970	Photo, video, text	Ukrainian, English	Wedding traditions	–
University of Alberta	“Ukrainian Canadian Music on the Prairies” (<i>thematic</i>)	–	Audio	Ukrainian, English	Folk music, culture	Performer’s name, student’s name

“Love Letters from the Past: Courtship, Companionship, and the Family in the Ukrainian Canadian Community” (<i>thematic</i>)	1899-1991	Photo, text, audio	Ukrainian, English	Letter writing, family photos, love stories	Document name, year and place, location, document/fond number, photographer’s name
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II. “First Wave of Ukrainian Immigration to Canada, 1891–1914” (Digital Museums Canada).

The virtual exhibition “*First Wave of Ukrainian Immigration to Canada, 1891–1914*” was created as part of the Digital Museums Canada program, funded by the Government of Canada. The “Gallery” section showcases 101 photographs, dating from approximately 1890 to 1988, along with two promotional materials related to immigration to Canada from 1895 and 1911. These items were digitized from the collections of several major archives, including the National Archives of Canada, Saskatchewan Public Archives, Provincial Archives of Alberta, Manitoba Archives, Ontario Archives, and various private collections. The photographs vividly capture the daily life and customs of Ukrainians in the Canadian prairies, primarily in the early 20th century. One of the highlights of the exhibition is the only known photograph of Ivan Pylypiw, the first Ukrainian immigrant to Canada, who arrived with Vasyl Eleniak in September 1891 from Nebyliw, Ivano-Frankivsk region, Ukraine. Additionally, the “Stories” section offers personal accounts, memories, and experiences of Ukrainians as they adapted to their new homeland.

Metadata for documents includes the following elements: date; location; credits (archives, museum, or private collections); landscape (cultivated rural, natural); events (educational, historic, social/entertainment, religious); people (one, two, group, family); object (transportation, tools/equipment); buildings and structures (agriculture, residential, commemorative, school, religious); sex; type – image; transport (road, rail); work (agriculture, food, forestry, construction, mining, education). Some photographs also have a brief annotation that provides details such as names of individuals in the photo, the date of the establishment of a church or school, and date and place of the photograph [39]. All the mentioned information is summarized in Table 5.

Table 5

Virtual exhibit by the Canadian Museum of History

Institution	Exhibit (type)	Date	Format	Languages	Keywords	Metadata
Canadian Museum of History	“First Wave of Ukrainian Immigration to Canada, 1891–1914” (<i>thematic</i>)	1890–1988	Photo, text	Ukrainian, Polish	Ukrainian immigrants, pioneers, homesteads, farming, school, church	Date, location, credit, landscape, events, people, object, buildings and structures, sex, type – image, transport, work

III. “Combined Virtues: Saskatchewan’s Ukrainian Legacy”.

This virtual exhibition, created by the Saskatchewan Council for Archives and Archivists in collaboration with the Saskatchewan Archives Board, University of Saskatchewan Archives, Special Collections at the University of Saskatchewan, and St. Thomas More College Archives at the University of Saskatchewan. The exhibition was archived in 2020 and is part of the UASC Digital Projects collection [40] (see Table 6).

Table 6

Virtual exhibit by the Saskatchewan Council for Archives and Archivists

Institution	Exhibit (type)	Date	Format	Languages	Keywords	Metadata
Saskatchewan Council for Archives and Archivists	“Combined Virtues: Saskatchewan’s Ukrainian Legacy” (<i>thematic</i>)	1917-2004	Photo, map, text	Ukrainian, English	Education, arts and crafts, music and celebration, literature, politics	Name, year, fond number and credit

The exhibition is divided into five sections, each showcasing a different aspect of the Ukrainian community's contributions in Saskatchewan: Education, Arts & Crafts, Music & Celebration, Literature, and Politics. These sections highlight notable events in the lives of Ukrainian Canadians in Saskatchewan, who made significant advancements in various fields. Notable figures featured in the exhibition include educator, journalist, and writer Savella Stechishin; renowned artists William Kurelek and Dmytro Stryjek; Alexander Kuziak, the first Ukrainian to serve as a Cabinet Minister in a provincial government; Senator John Hnatyshyn and his son, Ramon Hnatyshyn, Canada's 24th Governor General; and Senator Paul Yuzyk, often referred to as the “father of multiculturalism”. The “Sources” section provides comprehensive details about each document, including the name, year, fund number, and credits.

IV. Ukrainian Cultural Heritage Village.

An intriguing virtual exhibition is offered by the Ukrainian Cultural Heritage Village Museum (see Table 7), located near Edmonton. Available in Ukrainian and English, this resource provides visitors with insights into the history, culture, and daily life of Ukrainian Canadians. The English-language web guide is organized into sections: Help, Multimedia, Tours, Sources, and Web Links [41].

The “Multimedia” section features several exhibits, including 21 interviews in both Ukrainian and English about the Ukrainian buildings in the open-air museum, with details on each respondent and the building discussed. It also includes 20 gramophone recordings from the 1920s, featuring Ukrainian carols, ritual songs, wedding songs, and church services, complete with song titles, performers, and recording durations. Additionally, the section showcases 12 maps of Eastern-Central Alberta from 1908 to 1930, as well as 12 maps of Ukrainian regions from around the 1900s, all annotated with titles and dates.

The “Tours” section provides a virtual tour that is divided into four stages: Getting Acquainted, Farmsteads, Rural Community, and Townsite. Each building photograph is accompanied.

Table 7

Virtual exhibit by the Ukrainian Cultural Heritage Village

Institution	Exhibit (type)	Date	Format	Languages	Keywords	Metadata
Museum "Ukrainian Cultural Heritage Village"	"Ukrainian Cultural Heritage Village" <i>(thematic)</i>	1899- 1983	Audio, maps, photo, text	Ukrainian, English	Family photos, traditions, farming, Ukrainian immigrants, church, culture, school, town	People's names, event, year

by the building's name, year of construction, and renovation details. The exhibition also includes photographs of Ukrainian immigrants, with metadata that identifies the people in the images, the events depicted, and the approximate year.

V. University of Manitoba Libraries Digital Collections.

The University of Manitoba Libraries website offers access to over 75,000 digitized items, including correspondence, photographs, books, newspapers, and films. Among its valuable digital collections are several focused on the history of the Ukrainian diaspora in Canada. We analyzed three key collections.

The first collection, "*Prairie Prestige: How Western Canadian Artists Have Influenced Canadian Art*," is an archival collection that includes photographs, correspondence, diaries, drawings, sketches, and audio materials from prominent Western Canadian artists who made significant contributions to Canadian and global art [42].

Of the eight sections in this collection, two are of particular interest: "Leo Mol" and "Ukrainian-Canadian Artists."

1. The "*Leo Mol*" section is dedicated to the renowned Canadian sculptor and artist of Ukrainian descent, Leo Mol. It includes 62 documents dated from 1950 to 2001, such as:
 - Black-and-white and color photographs: Featuring prominent figures such as Cardinal Josyf Slipyi, Bishop Isydor Boretskyi, Pope John Paul II, Metropolitan Mykhailo Bzdyl, and Archbishop Myroslav Ivan Lubachivskyi, as well as photographs of Ukrainian Catholic churches in Canada, both interior and exterior.
 - Holy cards.
 - Textual documents: Including a commemorative brochure titled "Stained Glass in the Cathedral of Sts. Vladimir and Olga in Winnipeg," which details Leo Mol's stained glass work at the Ukrainian Catholic Cathedral of Sts. Vladimir and Olga in Winnipeg (1977), and a letter from Pope John Paul II to Cardinal Josyf Slipyi in honor of the 1000th anniversary of the Baptism of Rus-Ukraine (1979).
2. The section on "*Ukrainian-Canadian Artists – Sterling Demchinsky Fonds*" features 74 photographs taken in 2008-2009 by amateur photographer Sterling Demchinsky, who is of Ukrainian descent. These photographs depict the interiors of Catholic churches in Manitoba and Saskatchewan, highlighting the craftsmanship of Ukrainian immigrants. Demchinsky's work is also presented on his website, "*Ukrainian Churches in Canada*,"

which aims to disseminate and preserve information about Ukrainian spiritual centers in Canada [43].

The virtual exhibition dedicated to *Irene Knysh*, a journalist, writer, and researcher of the Ukrainian women's movement, includes 59 documents from 1916 to 1994 related to her active public and literary work in Ukraine, Canada, and the United States. The collection consists of:

- Photographs: Including images of Stefaniia Abrahamovska (a co-founder of the Ukrainian National Women's League of America), Ukrainian women's movement activists such as Olena Kysilevska, Olga Kobylanska, Savella Stechishin, and Mariia Okhrymovych, as well as Irene Knysh, her mother Anastasiia Shkvarok, and son Yurii. Also featured are Professor Yaroslav Rudnytskyi, artist Mariia Harasovska-Dachyshyn, and renowned dancer and choreographer Vasyl Avramenko along with his dance schools.
- Textual documents: Including announcements, Stefaniia Abrahamovska's business card, and a Christmas card with a photograph.

Each document in these digital collections can be downloaded and viewed with complete technical metadata. Descriptive entries include the following information: title, collection, description, format (text, still image, picture), date, subjects, location, creator, language, physical location, original file MIME type, local identifier, source, permalink, and copyright. All of this information is summarized in Table 8.

Table 8

Virtual exhibits by the University Manitoba Libraries

Institution	Exhibit (type)	Date	Format	Languages	Keywords	Metadata
University of Manitoba Libraries	"Leo Mol" (<i>thematic</i>)	1950– 2001	Photo, text	Ukrainian, English	Art, church, artists	Title, collections, description, format (text, still image, picture), date, subjects, place, creator, languages, physical location, original file MIME type, local identifier, source, permalink, copyright
	"Ukrainian- Canadian artists" (<i>thematic</i>)	2008- 2009	Photo	–	Art, church	
	"Irene Knysh" (<i>thematic</i>)	1916– 1994	Photo, postcard, ad	Ukrainian, English	Women, feminists, beauty shops, women - societies and clubs	

VI. Ukrainian Canadian Research and Documentation Centre.

"*The Barbed Wire Solution: Ukrainians and Canada's First Internment Operations 1914-1920*" is an exhibit displayed in the "Exhibits" section of the Ukrainian Canadian Research and

Documentation Centre website. This virtual show features 15 photos from a mobile display and a video showcasing the narratives of individuals in refugee camps post-World War II (see

Table 9). The exhibition comes with an extensive text, organized into 24 sections, delving into different elements of life in the camps, including social, economic, and political aspects [44].

The studied online displays showcasing Ukrainian Canadians, though varied in scope and focus, are united by their diversity and informative content. Each display showcases the aim of organizations committed to safeguarding and showcasing Canadian history, but they vary in the size and scope of their holdings. An example is the University of Manitoba Libraries, which provides the most extensive digital archival collections and fonds, serving as a valuable resource for both researchers and the general public. Contrary to this, displays from different institutions including the Kule Centre for Ukrainian and Canadian Folklore at the University of Alberta, the Canadian Museum of History, the Saskatchewan Council for Archives and Archivists, the Museum “Ukrainian Cultural Heritage Village,” and the Ukrainian Canadian Research and Documentation Centre offer individual viewpoints, utilizing collections to showcase separate features of Ukrainian Canadian history and culture.

Table 9

Virtual exhibit by the Ukrainian Canadian Research and Documentation Centre

Institution	Exhibit (type)	Date	Format	Languages	Keywords	Metadata
Ukrainian Canadian Research and Documentation Centre	“The Barbed Wire Solution: Ukrainians and Canada's First Internment Operations 1914-1920” <i>(thematic)</i>	1914-1920	Photos, video	English, Ukrainian	Displaced persons, Ukrainian immigration, internment, World War II	-

The studied online displays showcasing Ukrainian Canadians, though varied in scope and focus, are united by their diversity and informative content. Each display showcases the aim of organizations committed to safeguarding and showcasing Canadian history, but they vary in the size and scope of their holdings. An example is the University of Manitoba Libraries, which provides the most extensive digital archival collections and fonds, serving as a valuable resource for both researchers and the general public. Contrary to this, displays from different institutions including the Kule Centre for Ukrainian and Canadian Folklore at the University of Alberta, the Canadian Museum of History, the Saskatchewan Council for Archives and Archivists, the Museum “Ukrainian Cultural Heritage Village,” and the Ukrainian Canadian Research and Documentation Centre offer individual viewpoints, utilizing collections to showcase separate features of Ukrainian Canadian history and culture.

In terms of chronological coverage, these exhibitions collectively span from approximately 1890 to 2009. The documents showcased differ greatly in format, encompassing manuscripts, printed materials, audio and video recordings, maps, and photographs, with photographs standing out as the most prevalent category in all displays. The oldest document featured is a

photograph of a Ukrainian house interior from circa 1890, displayed in the exhibition “First Wave of Ukrainian Immigration to Canada, 1891–1914”. In contrast, the most up-to-date records are from the "Ukrainian-Canadian Artists" display, showcasing images of Ukrainian churches in Manitoba and Saskatchewan between 2008 and 2009. In spite of their unique qualities, all of the examined shows have a thematic focus, aiming to delve deep into specific subjects by showcasing carefully chosen items from various archival sources.

6. Enhancing access to heritage: The case for consolidating VEs of the Ukrainian diaspora in Canada

Consolidated electronic information resources are designed to provide broad user access, preserve cultural heritage, and create a unified, high-quality information environment. Such resources typically integrate the collections of libraries, museums, archives, and research institutions into a single virtual platform. These institutions, which have been responsible for collecting, organizing, preserving, and sharing humanity's accumulated knowledge for millennia, play a vital role as custodians of cultural and intellectual heritage [45],[46].

In today's information-rich world, individuals face increasing challenges when searching for, selecting, and organizing reliable information. This challenge spans many areas of activity, as people frequently turn to social internet platforms for solutions to their inquiries. Consequently, there is a pressing need for consolidated information resources that provide comprehensive, expert-verified data for each specific subject area [47].

The Ukrainian diaspora in Canada, comprising over one million people, has a rich history and cultural heritage and has made significant contributions to the development of Canadian society. However, the dispersion of archives, libraries, and museums that house this heritage makes access difficult for both researchers and the public. In the digital age, the need to create a consolidated information resource that centralizes electronic exhibitions related to the Ukrainian diaspora in Canada is critical.

A consolidated information resource for VEs on the Ukrainian diaspora in Canada would offer several key benefits, including improved accessibility and greater promotion of the community's rich cultural heritage. It would also significantly support research and educational programs. By gathering all relevant information in one location, this resource would become an invaluable tool for academic research and education. Researchers could more easily find the materials they need, while educators could use the resource to develop teaching materials and conduct lectures. Ultimately, this would enhance the study of Ukrainian history and culture and foster greater academic interest in Ukrainian studies.

6.1. Information and functional models for the consolidation of VEs of the Ukrainian diaspora

Information modeling involves creating abstract representations of informational objects, processes, or systems to better understand, analyze, and predict the behavior of real-world entities. In this case, we employ the "Entity-Relationship" (ER) diagram in Peter Chen's notation [25] (see Figure 2). The ER model visualizes the relationships between entities and their attributes, helping to identify key interactions and the information that needs to be captured on a website for users.

The information model consists of seven entities, each with specific roles, all interconnected by relationships. Examining these entities individually helps clarify their importance within the overall system:

- “*User*” represents all individuals interacting with the consolidated information resource. Users are divided into two categories: internal users (those involved in the development and administration of the resource) and external users (end users or visitors to the site). Key attributes include a unique identifier, user type, and other relevant personal information.
- “*VirtualExhibition*” is the core entity representing a virtual exhibition created by social memory institutions and research centers. It contains various forms of information – text, images, audio, or video – that convey the content of the exhibition to users. Each exhibition is assigned a unique identifier (ExhibitionID) and includes essential details.
- “*ExhibitionDetail*” contains additional information and descriptions about each virtual exhibition, linked to the main exhibition entity through ExhibitionID.
- “*Feedback*” is an entity for managing user feedback. Each feedback entry is associated with a specific user (via UserID) and includes a message and creation date.
- “*InteractiveMap*” represents geographic markers for VEs. Each marker is linked to a specific exhibition via ExhibitionID and includes location coordinates and descriptions.

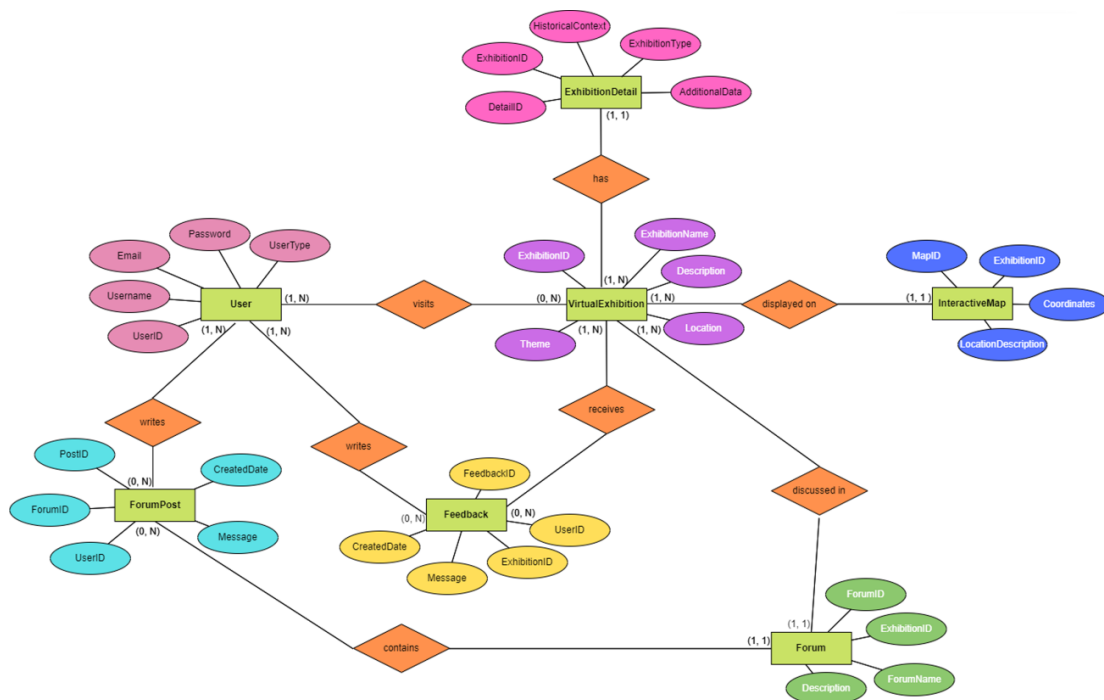


Figure 2: ER diagram in Peter Chen's notation illustrating the relationships among entities [developed by the authors]

- “*Forum*” allows users to discuss exhibitions and other topics. Each forum has a unique identifier and is associated with a specific exhibition via ExhibitionID. It includes a forum name and description.
- “*ForumPost*” is intended for users to post messages in the forum. Each post has a unique identifier (PostID) and is associated with a specific forum via ForumID and with a specific user via UserID. It includes the text of the message and the date it was created.

The relationships between these entities can be explained as follows:

- “User visits VirtualExhibition”: A user can visit multiple VEs, and each exhibition can be visited by many users.
- “User writes Feedback”: A user can submit multiple feedback entries, but each feedback entry is linked to only one user.
- “VirtualExhibition has ExhibitionDetail”: Each virtual exhibition may have one or more detailed descriptions, but each detail is specific to one exhibition.
- “VirtualExhibition receives Feedback”: An exhibition can receive multiple feedback entries, and each feedback entry can relate to one or more exhibitions.
- “VirtualExhibition displayed on Map”: Each virtual exhibition can have multiple markers on the map, but each marker corresponds to one exhibition.
- “VirtualExhibition discussed in Forum”: VEs can be discussed in one or more forums, with each forum associated with a specific exhibition.
- “Forum contains ForumPost”: A forum can host multiple posts, but each post belongs to one forum.
- “User writes ForumPost”: A user can create multiple posts in the forum, but each post is linked to only one user.

These relationships, illustrated in the ER diagram, ensure the integrity and structure of the data in the consolidated information resource.

The next phase involves creating a functional model to outline the system's operational features and its interactions with both internal and external components. The Data Flow Diagram (DFD) [26] illustrates the flow of data within the consolidated information resource. The Gane-Sarson notation is used for the DFD (see Figure 3), specifically for the “Operation of the Consolidated Information Resource of VEs of the Ukrainian Diaspora in Canada”.

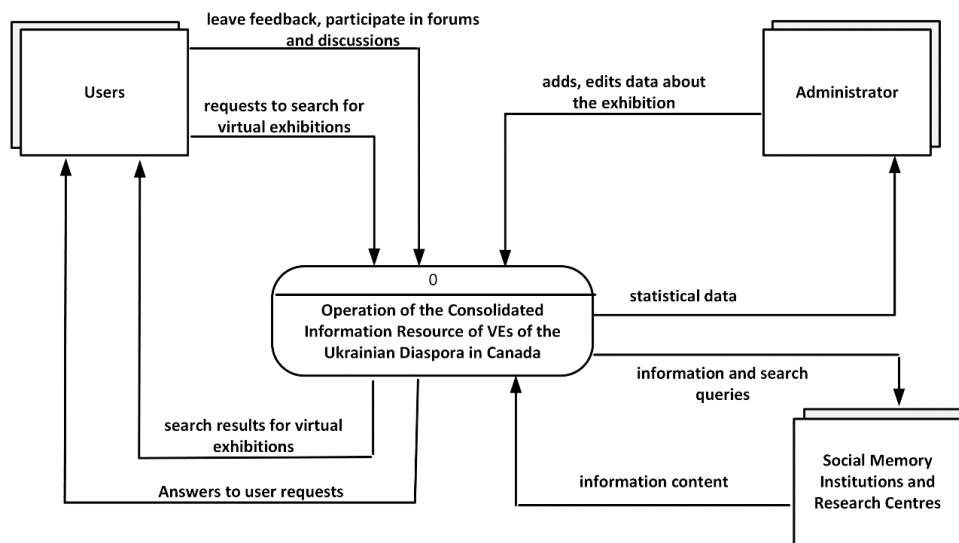


Figure 3: Context diagram of the consolidated information resource for VEs of the Ukrainian diaspora in Canada [developed by the authors]

The DFD identifies three external entities involved in the system's operation:

- *User*: Visitors who interact with the system.
- *Administrator*: Responsible for managing content, moderating forums, handling feedback, and updating information.
- *Social Memory Institutions and Research Centers*: Institutions that provide information about VEs related to the Ukrainian diaspora in Canada.

The main process, “Operation of the Consolidated Information Resource,” is divided into four subprocesses, with input and output flows and three data stores (see Figure 4):

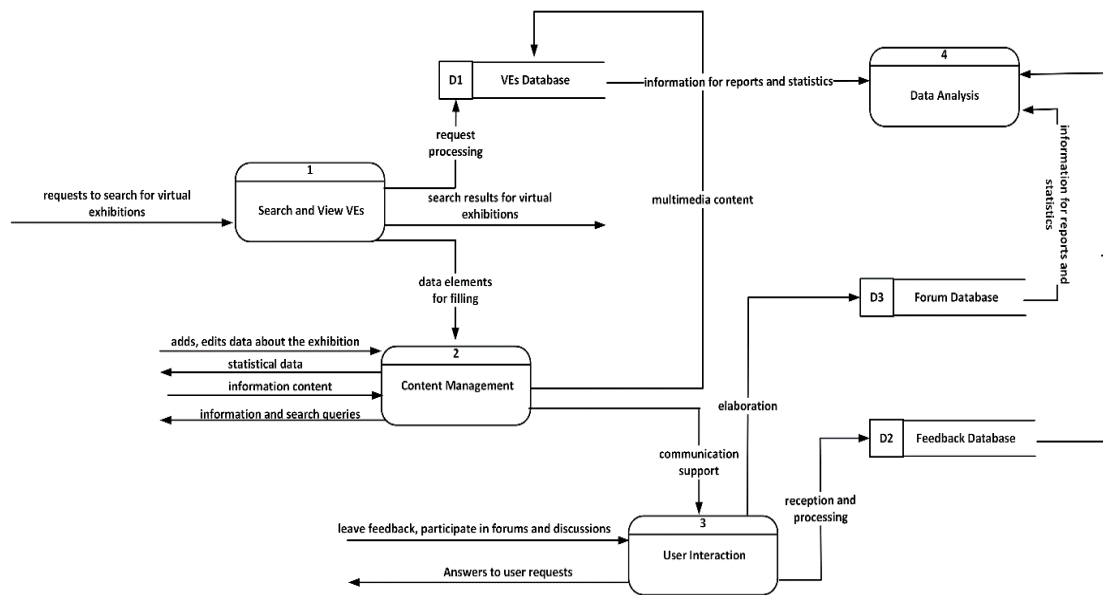


Figure 4: DFD Level 1 decomposition of the process “Operation of the consolidated information resource of VEs of the Ukrainian diaspora in Canada” [developed by the authors]

- “Search and View VEs”: Users search for exhibitions, and the system retrieves data from the “VEs Database” to return search results.
- “User Interaction”: Users submit feedback, which is stored in the Feedback Database. Users can also engage in forum discussions, with messages stored in the “Forum Database.”
- “Content Management”: Administrators add or edit data about exhibitions, which is stored in the VEs Database. Social memory institutions provide new information through this process.
- “Data Analysis”: Information from all data stores is analyzed to create reports and statistics, helping improve the system's functionality.

The next stage involves breaking down the identified processes into more detailed subprocesses (Level 2 decomposition). For instance, the “Search and View VEs” process is divided into three subprocesses (see Figure 5).

“Data Collection”: Interacts with social memory institutions to obtain exhibition data, including themes, content, and locations.

“Data Processing”: Organizes and classifies the collected data for presentation in VEs.

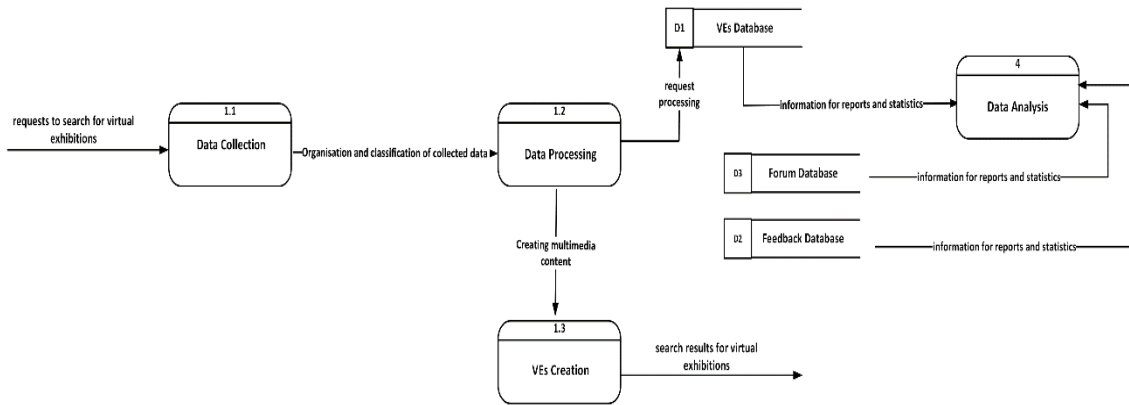


Figure 5: Level 2 DFD Decomposition of the process “Search and View VEs” [developed by the authors]

“VEs Creation”: Consolidates processed data into a format suitable for publication, including integration with the interactive map to display geographic locations related to the exhibitions.

6.2. Implementation of the consolidated information resource for VEs of the Ukrainian diaspora in Canada

To enhance the accessibility and promotion of VEs related to the Ukrainian diaspora in Canada, as well as to support research and educational initiatives, a consolidated information resource has been developed in the form of a website. This resource is designed to simplify the process of finding thematic information, systematizing data from multiple channels into a unified platform.

The consolidated information resource for VEs of the Ukrainian diaspora in Canada (<https://ukrainiandiasporae.wixsite.com/my-site-1/en>) features key components such as a home page, an interactive map, detailed descriptions of VEs, feedback options, and a forum. This platform offers a modern approach to researching, preserving, and promoting Ukrainian culture abroad, available in both Ukrainian and English.

The main elements of the consolidated information resource include:

- *Home Page:* The primary entry point of the website, featuring navigation links to all main sections. The home page welcomes users with a project mission statement and includes interactive features such as a keyword search tool for quickly locating exhibitions or specific information. It also offers a language toggle, allowing users to switch seamlessly between Ukrainian and English (see Figure 6).
- *Interactive Map:* This feature showcases all available VEs, enabling users to explore exhibitions based on geographic locations. The map also provides interactive content with additional information about each exhibition (see Figure 7).

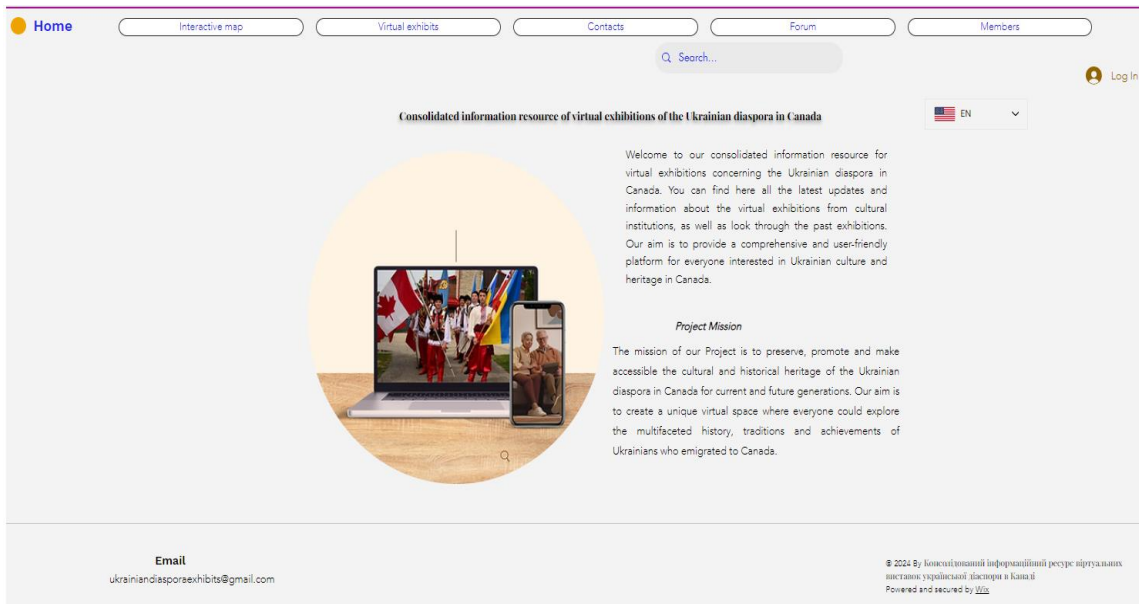


Figure 6: Home Page of the consolidated information resource [developed by the authors]

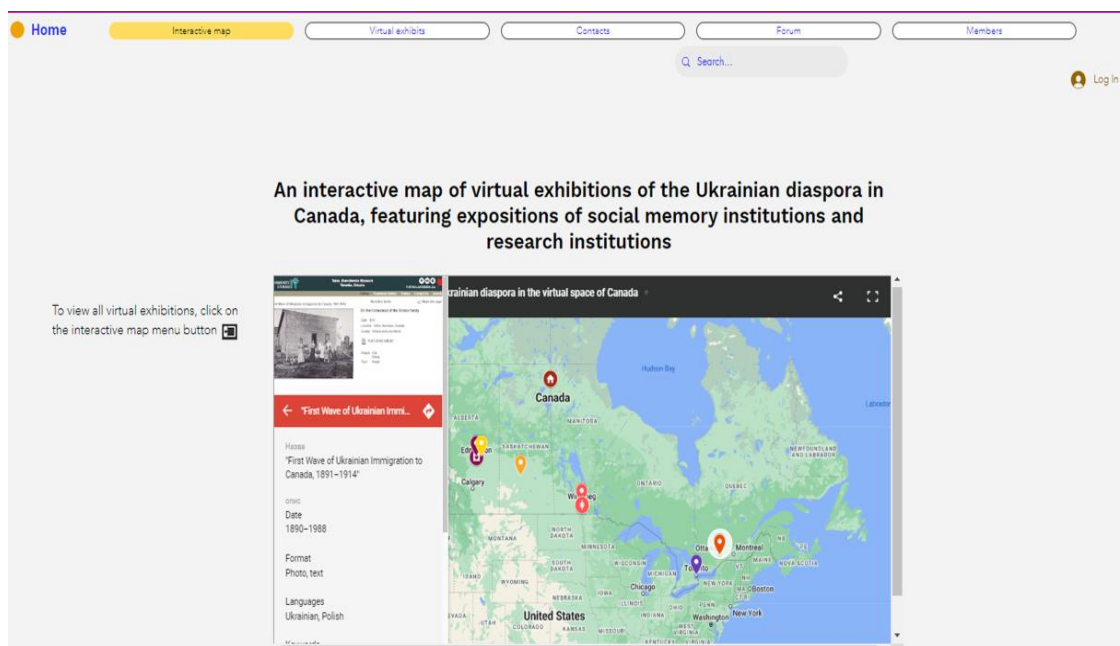


Figure 7: A screenshot the "Interactive Map" page [developed by the authors]

- *Virtual Exhibits:* An interactive gallery displaying all VEs, each accompanied by brief descriptions. This format allows users to engage deeply with the content and understand the significance of each exhibition (see Figure 8).

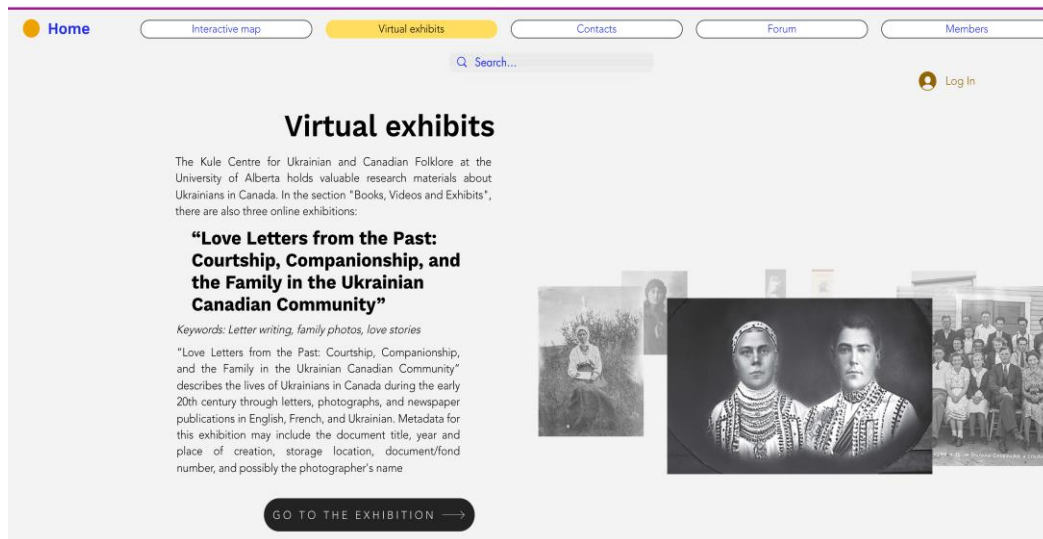


Figure 8: A screenshot of “Virtual Exhibits” page [developed by the authors]

- *Contacts:* This section includes a feedback form, contact details, and user support. The feedback form, with fields for name, email, and message, facilitates direct communication between users and the website administration, enabling inquiries, suggestions, or participation in the project.
- *Forum:* An interactive discussion platform where users can exchange ideas, ask questions, and share experiences related to the VEs of the Ukrainian diaspora in Canada. The forum encourages community building around the topic and serves as a valuable source of new ideas and suggestions for improving the resource.

6.3. VEs as Tools for Instruction and SoTL Projects

The resource generated through this study not only preserves culture, but also shows promise as a tool for educational initiatives. VEs offer a flexible platform for instructional design by providing a vast collection of historical and cultural artifacts, allowing instructors to create immersive and informative educational experiences. In addition to these educational applications, VEs open up new avenues for Scholarship of Teaching and Learning (SoTL) research, inspiring potential projects and raising important questions, such as:

1. Project Title: *Integrating VEs into Higher Education: A Case Study of the Ukrainian Diaspora.*
 - Research Question: *How can VEs of the Ukrainian diaspora in Canada enhance students' engagement with cultural heritage in an online learning environment?*
2. Project Title: *Evaluating the Impact of VEs on Interdisciplinary Learning Outcomes.*
 - Research Question: *In what ways do VEs facilitate interdisciplinary learning in courses that combine history, cultural studies, and digital humanities?*

3. Project Title: *Students as Curators: Collaborative Learning through VEs.*
 - Research Question: *How can students' involvement in curating VEs contribute to their understanding of digital scholarship and cultural heritage preservation?*
4. Project Title: *Digital Platforms for Cultural Identity Preservation: VEs as Educational Tools.*
 - Research Question: *What roles do VEs play in promoting cultural identity preservation, and how can this role be leveraged in SoTL projects focused on multicultural education?*

By integrating these digital platforms in SoTL research, educators can investigate how VEs enable novel types of student interaction, analytical thinking, and team-based learning. Additionally, the interactive components of the created tool - like feedback choices, discussions, and the interactive map - offer chances for students and teachers to interact with the content in significant ways, promoting a better comprehension of both the cultural impact of the Ukrainian diaspora and the importance of preserving digital heritage.

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7. Conclusions

Over the course of nearly 130 years, Ukrainian immigrants in the Canadian prairies have not simply assimilated into Canada's multi-ethnic society but have instead formed a strong ethnic community. This community has played a vital role in shaping Canadian social and cultural life. In a foreign land, Ukrainians have produced a wealth of valuable documentary materials that chronicle their experiences in Canada, creating an integral part of both Ukrainian and Canadian history. As the global digitization of archival collections accelerates, more of these materials are becoming accessible to scholars online, facilitating further research and exploration.

The comparative analysis of Ukrainian and Canadian web exhibitions highlights key differences in exhibit creation and presentation, spanning over a century of Ukrainian immigration to Canada. Ukrainian exhibitions focus on printed documents and photographs, while Canadian exhibitions offer a broader range of materials, including multimedia. Canadian web exhibitions are often narrative-driven, with cohesive thematic sections, whereas Ukrainian exhibitions emphasize lists of digitized items. Despite these structural differences, both types of exhibitions share the common goal of preserving and promoting the Ukrainian diaspora's heritage. The comprehensive metadata provided by institutions like the University of Manitoba Libraries plays a crucial role in enhancing the accessibility and usability of these collections. The successful development of a consolidated resource for housing these virtual exhibitions in Canada was achieved through a combination of

informational and functional modeling methods, ensuring effective system design, data management, and long-term preservation.

The consolidated resource offers significant benefits for researchers, educators, and the general public, as it brings together diverse exhibitions in one platform. This integration enhances research and educational initiatives and promotes the preservation of Ukrainian culture.

Further research may focus on expanding the database of Ukrainian diaspora exhibitions from other countries and further improving user experience through the integration of new technologies. In particular, the use of artificial intelligence (AI) holds potential for enhancing archival processes, such as accessioning, metadata creation, and search optimization. AI tools can assist archivists in evaluating and sorting materials, creating contextual notes, and improving document discovery [48]. The incorporation of AI in the development and management of VEs could be a compelling direction for future research, helping to streamline processes and create more engaging and accessible digital collections.

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