

An Overview of Online Exhibitions

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ABSTRACT

To save our culture and heritage collections, online exhibitions are good conviction. Apart from saving and propagating the knowledge they play a vital role as communications link between highly valuable collections and the general public. This paper gives an overview of online exhibitions, their need, types, benefits and drawbacks. It also describes various authoring tools to create user interfaces and such online exhibitions. Some of the historical online exhibitions have also been discussed. The paper conclude that online museums have consequently reduced the distance between visitor and historical monuments and also the demand for original work has increased because of repeated exposure on World Wide Web.

Keywords: Online exhibitions, virtual exhibitions, physical exhibitions, authoring tools, SCARN.

1. INTRODUCTION

In this digital era, technological advances are rapidly changing the environment in which we live. The impact of technology can be felt in many areas, one of which is heritage information delivery. Today, a large percentage of children grow up in cities around the world, where old and culturally significant architectural structures often have to give way to modern buildings due to land scarcity. The loss of such heritage icons and reduced interaction between children and their parents who spend increasingly long hours at work, has resulted in many school children not being well informed of the historical richness of the ancestors in their society. This is quite unfortunate, because the way leading to nationhood for many countries is often paved with interesting and noteworthy events. Such events form an important part of a country's heritage. This information has to be passed to school children, so that they can better understand the efforts and sacrifices of the

people who built the nation, understand the cultural diversity in modern society, and contribute productively to foster unity.

This is where heritage exhibitions enter into the picture. During the sixties, the new and emerging educational role of museums and other such archival centres, e.g. galleries¹ was introduced. Such establishments hold carefully developed information resources of immense breadth and depth, which is continuously refreshed by ongoing research studies. They have a vital role to play as communications link between their highly valuable collections and the general public, in sharing and propagating the knowledge in their collections.

2. EXHIBITIONS

Exhibitions are public display of industrial or commercial products or artifacts. There are three major types of exhibitions: industrial, regional and

universal. Industrial exhibitions are devoted to the stimulation and progress of a specific industry or group of industries in a particular geographical region. An example is the Singapore Food Festival, which promotes local Singaporean food. The second type is regional in scope and is used to commemorate a historical event. An example is the 25 Years of Nation Building 1959-1984 exhibition, which commemorated the 25th anniversary of Singapore's independence. The last type of exhibition is the universal exposition, which is international in scope and is usually sponsored by a national government; it displays a wide variety of products from many countries in the world. An example is COMDEX, which is an annual American exhibition that showcases innovations in the computer, telecommunications and consumer electronics industries from around the world.

2.1 The Need for Exhibitions

Dudley defines an exhibition to be essentially a promotional event that is designed to communicate with the targeted audiences some form of information, products or services². The primary objective of an exhibition is to provide a communication opportunity for achieving marketing objectives, mostly involving buyer/seller transactions. Visitors attend exhibitions for various reasons such as: see new products and developments; obtain product and technical information; talk with and compare potential suppliers; gain new ideas and information; find suppliers for whom they can become distributors; and for social reasons.

According to Dudley exhibitions serve to: maximum exploitation of events and occasions; reach-out to the desired audience; opportunities to create a dialogue with its target audiences on a personal basis; and achievement of communications objectives for a wide range of organisations².

2.2 Physical Exhibitions

Physical exhibitions are found in traditional museums wherein the line of communication is direct and the curator communicates directly with the visitors³. These exhibitions have to employ much more subtle means to reach so many different types of visitors. Physical museums⁴ have been a source of traditional information; drawing and interpreting their collections in carefully designed architectural spaces for their visitors like schools, public, tourists, scholars, etc. According to Teather⁵, there are a number of factors normally considered in actual traditional exhibitions. These include international boundaries, customs procedures for the movement of works of art, design

of exhibition space, loan agreements, insurance policies, conservation work, transportation time for works of art, fixed hours of operation, and number of visitors that can be handled simultaneously.

Physical museums⁶ choose cultural artifacts for display in such a way that they incorporate the narratives about history, nature, technology, culture and science. One of the most important visible statements that museums make is the selection, labelling and physical arrangement of individual items and whole collections. Physical museums tend to carry out a range of activities and produce a variety of resources. The purpose is to make visitors aware of what is available in the collections, to guide visitors through the collections in numerous ways, and increase their understanding and enjoyment of these collections. Physical museums give visitors a real sense of the artifacts on exhibit. People visit art museums to enjoy, explore and understand cultural backgrounds of the physical exhibitions that operate on the real space that can communicate directly with the public.

2.3 Limitations of Physical Exhibitions

The limitations of physical exhibitions lie in their size and bulk¹. Although they have some degree of mobility (hence called as "travelling exhibitions"), they are in a fixed location for most of the time. This limits the demographic reach of their target audience: while students in one area are viewing the exhibition, their counterparts in other areas have to wait for the exhibition to be unpacked, moved and re-installed at their respective sites-processes that are expensive in terms of costs, manpower and time. Besides, physical museums need extensive efforts to implement the ideas in addition to facing a few constraints like manpower-heavy operations, costs and space. Every initiative has to be planned in advance and suffers from many limitations in terms of space, cost and reachable audience. Furthermore, physical exhibition space can never provide as much information as the virtual space of the Internet. Static representations are not efficient for portraying real life events, as we need to provide dynamism and interactivity of cultural artifacts. Moreover, these exhibitions are open to public access at certain times of the day only, being manned by humans, with their limited working hours. Visitors have to visit the museums physically in person to gather information. Furthermore, given that most of the information is presented in a physical format, teacher may find it difficult to obtain take-away copies of the materials to incorporate into their teaching.

2.4 The Shift from Physical to Online Exhibitions

The move from physical to virtual form of exhibition is not a new phenomenon. Long before the terms 'interactive' and 'multimedia' became technological buzzwords in the 1990s, museums were presenting multimedia displays and exhibitions to their visitors and encouraging interaction between the visitor and the exhibit objects⁷. Interactive multimedia computer technology, in the form of kiosks, was recognised as a way of allowing a greater degree of public participation and involvement in the learning experience.

Multimedia kiosks are workstations designed specifically for public access⁸. They may be stand-alone or belong to a larger computer system. Information is presented in various forms, e.g. text, images, animations, sound and video. In applications where information is to be delivered to a wide audience, a kiosk with just a screen for user interaction is a robust, attractive and economic solution. While some kiosks have a keypad or keyboard for user input, the majority employ a touch screen for human interaction. Kiosks present a wealth of information in an interesting and user-friendly fashion, bringing otherwise dull texts to life with multimedia. In many exhibitions, kiosks are used to complement the physical exhibits, providing an alternative and more proactive experience for the visitor. The problem of kiosks is their static location; the user still must walk up to the kiosk to access its information base, and the fact that their accessibility is constrained by the operating hours of the building in which they are located in. Sometimes kiosks are located in pre-designated positions far from the works they are describing, hence they do not support the opportunity for the visitors to see, compare, and verify the information received against the actual objects. Moreover, due to their design, kiosks do not allow the visitor to save portions of their information base for use in school projects.

Another innovation to add multimedia experience to physical exhibitions is museum wearables⁹ where they are real time storytelling devices. They evaluate the visitor's preferences by observing his/her path and length of stops along the museum's exhibit space, and select content for the wearer from a large database of available movie clips, audio, and animations. These devices offer a new type of entertainment and experience of informative museum, similar to mobile immersive cinema⁹, offering museums an opportunity to augment their perception/memory/experience of their exhibits to the visitors. Although museum wearable are not able to cater for wide

group of users, still they have paved the way for future developments in online museum exhibitions.

2.5 Online vs Physical Exhibitions

Online exhibitions present a practical and cost-effective solution to the limitations of physical exhibitions. They are no longer limited in time, distance and space. Instead of being open to the public at certain times of the day, they are available round the clock via the Internet. An additional advantage is that students need not travel all the way to the exhibition site to see it. The exhibition is delivered right to their homes and classrooms via the Internet. The storage of artifacts in digital form also helps to reduce maintenance costs. There is no longer the need to dismantle and re-build the exhibition to make it available to new audiences. New materials can be added easily, while existing material can be updated with less effort too. This dramatically reduces the lead time and eliminates costly physical space required to mount an exhibition.

In fact, once the exhibition is put online, it becomes immediately available to students all over the world, forming part of the global cultural exchange. Teachers will also find it easy to download the digital materials for integration into their teaching syllabi. Students can also use the online information for their school projects, i.e. create new information products. This provides a different kind of learning experience, as students gather information, organise it, create meaning, reach insight, and present their findings online. In fact, by the last act, they invite a global audience to share the experience¹⁰. Online exhibitions also offer better flexibility, encourages experimentation and dynamism compared to their physical counterparts. Visitors can select the level of information they wish to consult, thereby offering something to audiences of all ages and experiences. The fact that online exhibitions can link to relevant and complementary information available at other websites further underlines the flexibility and possibilities of this new online medium¹¹.

2.6 Benefits of Online Exhibitions

Online exhibitions provide many benefits to institution:¹² (i) enhance learning and scholarship by providing more detailed information on cultural and heritage issues of a country, to meet the needs of different categories and levels of visitors; (ii) broaden access to the content as the exhibition materials can be used for teaching and learning, stimulating and enriching the experience of visitors; (iii) teachers

can combine the online resources in their curriculum, while students can use the resources for their assignments or project work; (iv) widen the reach of the visitor population as online exhibitions can be seen by many people, including those who could not visit the museum in person; (v) expand the content and context to provide various levels of information that are often hard to present in a physical exhibition such as information collection or conservation; (vi) the boundaries of the traditional interpretive spaces are limitless as visitors click and navigate around the website according to their personal information needs; (vii) increase information comprehensiveness, by connecting to other sites with additional information; and (viii) protect priceless collections from the wear and tear of the physical exhibition process.

Myers¹³ also sees many advantages of web-based exhibitions in education: (i) enhancement of the learner's motivation through novelty and excitement, which is sustained as electronic exhibitions move from stand-alone kiosks to the Internet; (ii) increased access to information-students learn how to manage and acquire new knowledge at blistering speed. Students now obtain a view of the wider world previously only possible through travel. They are also using a technology which will ultimately become a part of their adult working life; (iii) offers information in a variety of ways and forms which students can access and manipulate at their own pace, without being restricted by conventional teaching syllabus time periods; (iv) enhanced interactivity features over the passivity of classroom learning-multimedia technology provide an expanded representation of ideas in a lively and interactive environment; (v) increased collaboration opportunities, even with students from other countries, as the Internet reshapes class rooms into inter-connected self-sufficient workshops; and (vi) increased productivity in the students' preparation of assignments, since the materials are available just a few clicks away instead of a few kilometers away, so they can concentrate on absorbing and analysing the content rather than be unnecessarily burdened by the means of getting it.

2.7 Drawbacks of Online Exhibitions

Despite the attractiveness and great potential of online exhibitions, there are a number of drawbacks in terms of visitor experience:¹² (i) It is not a real museum experience; (ii) online exhibitions do not allow truly hands-on manipulations, which is very important for the kinesthetic learner, who may not feel like he/she really knows what is going on; (iii) effective exhibits are strongly "experiential", i.e. when a visitor walks through them, he/she also

sees, hears, and sometimes touches the exhibits. When all these experiential senses are taken away in online exhibitions, the experience is not memorable anymore; (iv) poor representation of objects-textures, fine detail, mass and exact colour cannot be faithfully translated when displayed on the web; (v) electronic images of historical photographs are definitely inferior than the actual objects, due to the need for smaller sizes needed for online viewing. Image quality is still quite poor when compared to real art objects; (vi) expensive and time-consuming to produce (same as a physical exhibition); (vii) users must be connected to the Internet (for web-based exhibitions); and (viii) Internet connection speeds also affect the experience of the visitors (users with a slow connection will not have an enjoyable visit, especially if the site contains media-rich resources that take time to download and display).

Myers¹³ also found the following potential pitfalls of web-based exhibitions in education: (i) reduced critical thinking skills-the ease of downloading information from the Internet may result in thoughtless information harvesting without attention to the critical issues of bias, accuracy and quality control; (ii) reduced development in reading skills-especially among the impressionable young student population, since the web is primarily a image-based medium; (iii) diminished writing skills-students cut and paste information into impressive first drafts and resist the need to refine their work. Research skills will be neglected as students take the easy path, preferring to point and click rather than plan and think; (iv) distortion of teaching curricula-some teachers may change their curriculum to fit widely and readily available resources on the Internet, when faced with time schedule pressures; (v) lack of real life experience—most of what the students know or understand come as files downloaded from the web; and (vi) reduced direct interaction with society as a whole-due to the students' immersion in the virtual world of the web, they may not learn to build up the proper social skills for their adult working life.

2.8 Virtual Exhibitions

Virtual exhibition is the collection of digital replicas of real events or objects developed with the help of multimedia and virtual reality tools which produce a simulated environment in a computer, and delivered through web so that users will get the same satisfaction as they are seeing or using the physical objects in different areas. The difference between online and virtual exhibition is marginal. All virtual exhibitions are online exhibitions but not vice versa. Normally

all virtual exhibitions will provide a simulated real environment using virtual reality tools which is a bit more difficult, expensive and time consuming to develop than a simple online exhibition. Unlike traditional exhibitions, these exhibitions could be viewed free of cost, at own convenience and in own time zone. Hong Kong Observatory's Exhibition Hall is an example to virtual exhibition to tour the visitors around and inside to see various exhibitions in virtual mode (www.hko.gov.hk/education/cyber_exh_hall/exhibition.htm?flash=1). Other examples include Lithuania's Cultural Heritage (alka.mch.mii.lt/foje.en.htm), and Art virtual exhibitions (expositions.bnf.fr/usindex.htm, www.virex.dk).

2.9 Web-based Exhibitions as Educational Tools

The current trend shifts the focus of electronic exhibitions from static kiosks to the web. The web presents an active learning environment where users are empowered to make decisions about the tasks, content, navigation, presentation and assessment activities that they make in the course of learning¹⁴. Six active learning paradigms may be associated with web-based exhibitions:

- (i) As education meta-centres, web-based exhibitions are resources that allow students to explore, investigate, compare and evaluate textual and pictorial information from archive collections. The students develop learning outcomes built around their own interests, which result in deeper conceptual understanding and affinity with the subject.
- (ii) As creative play resources, web-based exhibitions cater to very young children. Creative play is important to this group of users' learning experience, as it encourages them to explore and test ideas through the process of learning. To them, drawing and painting activities are most effective, as these activities excite them into listening, talking, designing, constructing, asking questions, reading and writing. An example application is to provide them with a downloadable Java applet that acts as a digital palette, which can be used to draw portraits of a favourite animal.
- (iii) As electronic field trips, web-based exhibitions use audio-visual materials and interactive technologies (e.g. virtual reality) to transport the students through time, space or imagination to explore realistic but virtual historic or imaginary sites. They can be used with anchored instruction activities, which use sets of interconnected problems

to sharpen the students' reasoning, deductive and investigative faculties.

- (iv) Using video conferencing, web-based exhibitions connect students and teachers to the real exhibition in real time. Unlike electronic field trips, the micro-worlds created are not simulated, but make use of the 'scenery' of the real exhibit objects and the performances of the exhibit staff.
- (v) As learning networks, web-based exhibitions can be linked through their parent organisations to encourage international collaboration in learning or research projects. Such online communities can be facilitated via real meetings, chat rooms or listservs, within which the process of creating a joint product is negotiated.
- (vi) As expository teaching resources, web-based exhibitions provide highly-structured computer-directed activities, to present a set of principles, laws or theories. These are usually implemented in science and technology online exhibitions. They may make use of multimedia puzzles, activities and laboratories where students can conduct web-based experiments.

3. DESIGN AND DEVELOPMENT OF USER INTERFACES

Kalfatovic¹⁵ emphasises three main issues in mounting a physical exhibition online. While a gallery offers visitors passive absorption of the contents of the exhibition, the visitor to the online exhibition has to actively participate by clicking and scrolling on the computer screen. Furthermore, while the designer of the gallery can be certain that all visitors will see the artifacts in the same presentation format, the same does not apply to online exhibitions, since different types of computers can be used by online visitors, which correspondingly affects their individual experience of the same exhibition site. Most importantly, in a gallery, there are curators and security staff to assist visitors who are lost, but visitors who lost themselves in an online exhibition often end their journey by simply clicking to leave the site.

The user interface of online exhibitions is the web browser, so interface considerations for online exhibitions are similar to those of a website. Kalfatovic stressed on the need to prevent horizontal scrolling of the screen layout¹⁵. Horizontal scrolling is caused by monitor resolution, the size of images used on the site, the tiling of images and tables; these can be minimised with the use of style sheets and the careful choice of image sizes.

Colour, an important design element, is another major consideration. The colours that can be displayed on a computer screen depend on the video display card, the monitor and the processor of the computer. Though millions of colours are available for design, only 216 "browser-safe" colours have been identified by Weinman that would be displayed accurately by most browsers on various types of computers¹⁶. While this limitation does not seriously affect photographs, it is recommended that these 216 colours be used for simple graphics such as decorative titles and backgrounds, so as to achieve a consistent design across browsers.

When displaying text on-screen, the two main factors are typeface and size. Boumphrey¹⁷ notes that due to the landscape orientation and the lower resolution of computer screens, reading web pages is 30 per cent slower than reading printed pages. Hence, finely detailed fonts are not practical for use in online exhibitions. Also, readers tend to scan rather than read, and the retention is about half that of reading the printed page, so text should be of appropriate length to avoid fatigue. Kalfatovic recommends the use of style sheets to achieve consistency in typeface and size¹⁵. Sans serif fonts are preferred over serif fonts for accessibility reasons, while bold formatting should be used appropriately and italics formatting should be used sparingly as it is difficult to read on screen. Underlining text is not commonly used on web pages to avoid confusion with hyperlinks which are displayed by browsers as underlined text. Colours can be used creatively for text, with proper contrast with the background colour for readability.

Online exhibitions are often designed around a narrative theme that provides visitors with interesting information and images from archival collections. To prevent the visitor from leaving the site due to scrolling of lengthy text pages, Kalfatovic suggests the division of the theme into smaller sub-themes with shorter sections¹⁵. With the help of hyperlinks, navigational structures that are used in gallery exhibitions can be replicated in online exhibitions, e.g. the arterial pattern, whereby visitors browse the collections in a linear fashion. Despite the myriad of navigation strategies available, it is important to keep the narrative of the online exhibition in mind so that the theme fits the design of the exhibition. To the visitor, their first experience with an online exhibition is that it tells a story. Hence, unless absolutely necessary, hyperlinks that bring the visitor to another site should be placed in the list of suggested links for further study at the end of the exhibition, the misuse of

hyperlinks may cause confusion as the visitor wanders away to visit the other site.

4. METADATA IN ONLINE EXHIBITIONS

Online exhibitions are used by museums or archives to showcase their collections on the World Wide Web. There is a need to classify the works or artifacts using structured information that describe their attributes¹⁸. This is where metadata is useful in annotating artifacts or collections so that they can be accessed to gain more information and re-purposed to produce new knowledge.

Besides generic metadata frameworks such as the Dublin Core, there are also metadata standards that are designed for museums and archives-CDWA (Categories for the Description of Works of Art), CIMI (Consortium for the Computer Interchange of Museum Information), CIDOC Information Categories, Open Archives Initiative Protocol for Metadata Harvesting, etc. Metadata such as Dublin Core are often embedded in the home pages of online exhibitions to make them more visible to Internet search engines.

A major challenge is the development of metadata to describe multimedia content (images, audio, video, virtual reality, etc.). Glushko highlights two potential problems in the form of sensory gaps and semantic gaps¹⁹. There is a limit in the computer's ability to sense and describe the object, as an object to generate infinite representations-this is the sensory gap. The semantic gap arises due to the fact that instruments (e.g. digital cameras) tend to capture and encode data in a way that is optimised for automated processing, but results in semantically opaque content cannot be easily processed to understand the meaning of the object. Hence there is a need to develop metadata to describe multimedia content.

Besides the traditional metadata standards, Trant has carried out an experiment that allows social tagging of resources by visitors to an online museum, i.e. when browsing the online exhibitions, visitors have the facility to input words that reflect their interpretation of the artifacts viewed²⁰. The study found that such "social" metadata improve upon the existing museum documentation by providing unique access points not found in traditional cataloguing. These "folksonomic" terms represent the actual interests, perspectives and passions of visitors, further narrowing the semantic gap between the curators and the public.

With metadata, the casual visitor will be able to appreciate better the artifacts, while information

interchange standards that facilitate exchange of information between cultural institutions will help to foster research and collaborations in the study of their respective collections.

5. AUTHORING TOOLS

Since online exhibitions are essentially multimedia websites, the authoring tools used for creating websites can also be used to create online exhibition sites. However, digital archive collections have special information management and delivery requirements, which have resulted in the development of specialist tools. Generally, these tools have features that streamline the creation of metadata for the collections, search engines with flexible options, support for the standard digital file formats, and integration with other systems via information storage and interchange standards.

CONTENT^{dm} is a digital collection management software used by archival organisations to develop, manage and deliver their digital items through web browsers²¹. It supports most common file types like images, audio, video, portable document format (PDF) and web links, and can store and index efficiently. Adding an item and its metadata is simplified through the use of wizards, templates and batch processes. Metadata is stored in XML format using Dublin Core fields, which can be mapped for searching by other systems, e.g. digital libraries. Items can be searched with a text-based search engine with advanced options, and interoperability with other archival information systems is supported via standards such as Open Archives Initiative Protocol for Metadata Harvesting, XML, etc. The metadata collection is extensive and pertinent keywords can be added to provide more access points to the collection. Customised interfaces can be designed for online exhibition sites, with good user interface features such as cool colours and a comfortable layout.

Multi MIMSY 2000 is a museum management system. The interface is based on item catalogue cards, which have detailed activity history and expanded content, and can be linked to form a knowledge management system. A master catalogue provides standard data entry templates to simplify data creation and accuracy. The items in several collections can be linked to form a theme for an exhibition. The integrated Internet interface provides the capability to quickly publish collections to the web as online exhibitions. Compliance with standards such as Dublin Core and MDA's SPECTRUM allows the interchange of metadata with other compatible museum information systems.

Re:discovery Proficio is a system for the management of archival collections implemented on a relational database. It has tools to simplify data entry, management and retrieval, create forms and generate reports, export data for use by other applications, and provide user access to its collections. A web interface called Re:discovery for Internet (RFI) allows visitors to browse and view the collections stored in the Re:discovery Proficio system through the Internet. Standard template forms with style sheet support help users to easily enter their search terms and retrieve the information needed, via the use of the search engine provided by the Re:discovery Proficio system²².

6. TYPES OF ONLINE EXHIBITIONS

Kalfatovic has classified online exhibitions into five major types¹⁵:

- (i) Notable events: Major events are perfect topics for online exhibitions. Libraries and archives often hold substantial materials related to significant, interesting, or entertaining events. An event-centric exhibition allows the library or archives to draw on a range of materials and collaborate with other institutions such as historical societies, museums, or businesses to develop this type of exhibition. One such example is The Great Chicago Fire that is put up by the Chicago Historical Society with the Northwestern University.
- (ii) Anniversaries: Centennials, bicentennials, and jubilees can be the impetus for an online exhibition. An exhibition created around an anniversary will allow visitors to revisit the past, highlight current collections or programs, and look forward to the next few years. From Smithsonian to Smithsonian: The Birth of an Institution an exhibition by the Smithsonian Institution Libraries, is a prime example.
- (iii) Themes: Perhaps the most common exhibition idea is a theme. Themes can include individuals, professions, poetry, social movements or phenomena, collections, and media. Dr Seuss Went to War: A Catalogue of Political Cartoons by Dr Seuss from the Mandeville Special Collections Library, University of California, San Diego, is a very specific theme-based exhibition.
- (iv) Treasures: Texas A&M's Cushing Library took a unique approach to the "treasures" concept. In its exhibition Fruits of a Research Collection, the uses of a special collection for non-traditional research are highlighted. Steven E. Smith, special collections librarian, noted that the "collections...have also been used by many people for many other

purposes, for example, journalists writing articles for national magazines, film producers creating documentaries, student groups making T-shirts, and book editors in search of cover art."

- (v) Special Collections: Though all of the above types make wonderful topics for online exhibitions, sometimes it is the odd and the unusual that will both educate and entertain visitors. For examples, Los Vegas could come the exhibition "Dino at the Sands: Dean Martin, 1917-1995" an exploration of the life and career of Martin from the Sands Hotel Collection in the Special Collections of the University of Nevada, Las Vegas Libraries.

7. REVIEW OF ONLINE EXHIBITIONS

The following is a review of online exhibitions that are available on the Internet. They cover a wide range of topics, ranging from art, geography, history, literature and science in general. Most of them were created by libraries, archives and historical societies to commemorate notable events, celebrate anniversaries, feature periodic themes, or to showcase treasures or special collections. The online exhibitions reviewed in this study cover many different areas in the fields of art, geography, history, literature and science.

7.1 Commercial Online Exhibitions

Commercial art is celebrated with the exhibitions, for example, Salmon Label Art (<http://www.library.ubc.ca/spcoll/displays/salmon.html>) is an exhibition of salmon can labels originally mounted in the 5th floor display case (outside Ridington Room) of the main library of the University of British Columbia (during 1 February 1996 and 30 April 1996). This is the simplest online exhibition in this review. It consists of just a central picture, which shows a selection of assorted British Columbia salmon cans on and around an old gill net.



Figure 1. British Columbia salmon can labels online exhibition.

This is actually an image map with clickable areas representing the various types of can labels (Fig.1).

7.2 Geographic Online Exhibitions

Geographic online exhibitions cover both regional cultures including Quilts and Quiltmaking in America and Scottish Cultural Resources Access Network, and geographic regions such as The Illustrating Traveller: Adventure and Illustration in North America and the Caribbean 1760-1895 and the Old Fort Lowell Neighborhood, and Traders: Voices from the Trading Post.

Quilts and Quiltmaking in America (<http://memory.loc.gov/ammem/qlthtml/qlthome.html>) provides a glimpse into America's diverse quilting traditions. It showcases materials from two American Folklife Center collections, the Blue Ridge Parkway Folklife Project Collection (1978) and the "All-American Quilt Contest" sponsored by Coming Home, a division of Lands' End and Good Housekeeping. These materials document quilts and quilting within the context of daily life and reflect a range of backgrounds, motivations, and aesthetic sensibilities. This site is more like a directory site for browsing rather than an exhibition site. Users can browse by quiltmaker names, by quiltmaking subjects, or by sound recordings of oral interviews. (Fig. 2)

Scottish Cultural Resources Access Network (<http://www.scran.ac.uk>) is an online multimedia resource base for the teaching and celebration of the history and culture of Scotland²³. SCRAN has a summary feature called PathFinders—short introductions to five categories of Scottish culture and heritage (people, places, things, events and ideas). Each section has links to more detailed resources. There are two types of educational resources-Resource Packs and Teaching Packs. Resource Packs are compilations

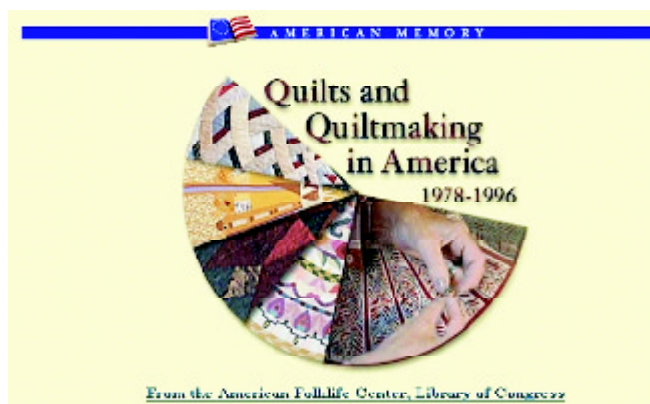


Figure 2. Quilts and quiltmaking in America 1978-96 online exhibition.

of records packaged for a subject area that is downloadable by licensed users to create new information resources (i.e. resource re-usability). Teaching Packs contain teacher guides, background notes and student worksheets. SCRAN is a good site to visit for finding information on Scottish culture and heritage. However, despite the use of Internet technology, access to SCRAN is limited to Scottish schools and companies only (Fig. 3).

The Illustrating Traveller: Adventure and Illustration in North America and the Caribbean 1760-1895 (<http://www.library.yale.edu/beinecke/illus.htm>) is a rare book and manuscript library exhibition organised by William S. Reese and George Miles in 1996. The story of travellers and migrants in North America and the Caribbean in the 17th century is told through the books and illustrations of the collections. This exhibition provides a convenient resource for students doing research on migration and travelling in North and Latin America in the 17th century.

The Old Fort Lowell Neighbourhood (<http://parentseyes.arizona.edu/ftlowell/>) examines the history of the Old Fort Lowell Neighbourhood in terms of the various ethnic groups that have lived in the district since 300 A.D. The exhibition covers the Hohokam Indians, the Settlers between the years 1500-1850, the establishment of the Fort Lowell Military Camp, the Mexican settlers of El Fuerte (the Fort), the Anglo families who moved to the area after the 1920s, and Fort Lowell as it is today. This site would be useful for those visitors who need great amounts of text information; although the lack of suitable graphics may mean that the visitor would have to go to the host library for picture resources.

Traders: Voices from the Trading Post (<http://www.nau.edu/library/speccoll/exhibits/traders>) is an online exhibition organised by the Northern Arizona University Cline Library, in co-operation with the United Indian Traders Association (UITA). It focuses on late nineteenth-century and twentieth-century trading posts in the Four Corners region, encompassing the Navajo and Hopi Reservations, and is the web companion to the CD-ROM version of the same name. This site contains a good mix of multimedia and text elements, although some of the paragraphs are too long for easy on-screen reading. The inclusion of text transcripts for the oral interviews is a thoughtful gesture for visitors who are aurally handicapped (Fig. 4).

7.3 Historical Online Exhibitions

Online exhibition sites are often designed as history narratives, covering symbolic events, such as The Great Chicago Fire; maritime history such as Life Along the Manitou Passage and Voyage of the St Louis; nation building such as Forging The Nation and Hearts at Home: Southern Women in the Civil War; oral history such as JUKEBOX; public infrastructure such as Down the Drain, Chicago's Sewers: The Historic Development of an Urban Infrastructure and Make the Dirt Fly; public services, such as Putting Out Fires; and sports events, such as 1956 Melbourne Olympics.

The Great Chicago Fire and the Web of Memory (<http://www.chicagohs.org/fire>) is organised by the Chicago Historical Society. Through the use of journalistic essays of that period, this exhibition provides a vivid description of the historic fire at Chicago.



Figure 3. SCRAN—an online learning resource exhibition.

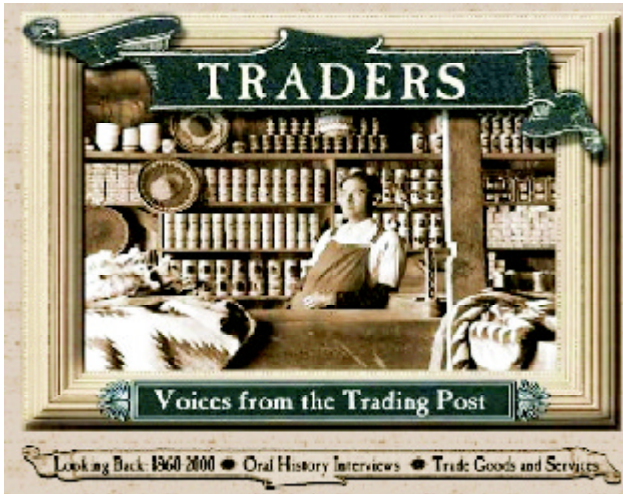


Figure 4. Traders: Voices from the trading post online exhibition.

Life Along the Manitou Passage (<http://www.schoolship.org/maritime/>) is about the history of the Great Lakes in Michigan in the era of schooners. The website was created using a National Maritime Heritage Grant provided by the Michigan Department of State and the State Historic Preservation Office. This is a good site to visit for students doing research on maritime history during the age of schooners. In particular, the detailed glossary in which terms are cross-linked to where they were used in the main text is a valuable hypertext resource in its own right (Fig. 5).

Voyage of the St Louis (<http://www.ushmm.org/stlouis/index.htm>) is an online exhibition of the United States Holocaust Memorial Museum to commemorate the journey of the ill-fated refugee ship, the St Louis, during the Second World War. Various information sources have been provided to help users to reach their conclusions. The Teacher Resources section contains tips and steps and pointers to resources on the website and how to incorporate them into their teaching syllabus. This is a hands-on site

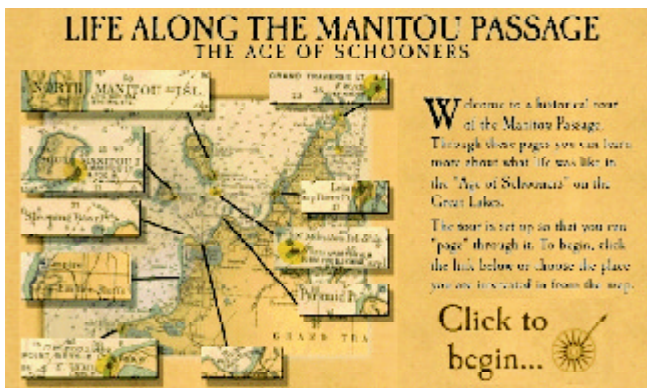


Figure 5. Life along the Manitou passage online exhibition.

where the visitor can do something, e.g. trace the steps of particular passengers, and learn about the subject background at the same time, possibly without being aware that learning is taking place (Fig. 6).

Forging the Nation (<http://www.awm.gov.au/forging>) is an online exhibition set up by the Australian War Memorial to celebrate the first twenty years of Australia's independence. This site is helpful for studies in Australian nationhood with interesting resources, e.g. cartoon illustrations from early Australian newspapers (Fig. 7).

Hearts at Home: Southern Women in the Civil War (<http://www.lib.virginia.edu/exhibits/hearts/>) is an exhibition held in the Tracy W. McGregor Room from 2 August 1997 to 15 October 1997. The story is told through archival papers, and personal and special collections. However, the pictures appear to be more for illustrating the social life of the period rather than for reinforcing the text. For a better view of the books and other manuscripts, visitors would still have to visit the physical exhibition.

Fønss-Jørgensen²⁴ described an online audio archive prototype system code-named Jukebox (which was active between 1993 and 1996). Project Jukebox allowed public library users to gain online access to historical sound recordings held in European national archives. The test libraries were located in Denmark, Italy and the United Kingdom, with technological support from Norway. Streaming audio technology was used to prevent downloading of the digitised sounds in public access computer terminals in the test libraries. Some rather extreme precautionary measures were also taken, e.g. the soldering of audio plugs to the sound card connectors to prevent illegal recording via Walkmans. Jukebox demonstrated aptly that with technological advances, audio recordings can be delivered from the dusty corners of archives to reach a wider audience. This applies to other historical materials too.

Down the Drain, Chicago's Sewers: The Historic Development of an Urban Infrastructure (<http://www.chipublib.org/digital/sewers/sewers.html>) describes the history of the Chicago sewer system, and is maintained by the Chicago Public Library. This exhibition has managed to turn a mundane and socially disagreeable (but very essential) part of public service into an interesting presentation by its innovative use of multimedia, especially in the use of QuickTime movies for the sewer cam clip (Fig. 8).

Make the Dirt Fly (<http://www.sil.si.edu/Exhibitions/make-the-Dirt-Fly/>) is a Smithsonian Institution Libraries

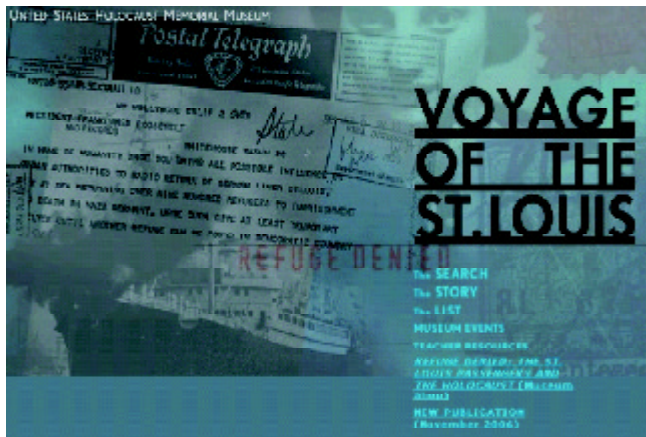


Figure 6. Voyage of the St Louis online exhibition.

exhibition on the building of the Panama Canal that links the Pacific and Atlantic Oceans. The exhibition starts with a series of stylised photographs with fade filters and descriptive text incorporated into the corners of the feathered images, which subsequently move on to the more conventional main exhibition pages.

This exhibition shows the experience of the Smithsonian Institution in putting up engaging exhibitions (whether virtual or physical). The design and content (e.g. the trivial pursuit section) of the site appeal to both scholarly research as well as casual browsing (Fig. 9).

Putting Out Fires (http://www.saskatoon.ca/org/clerks_office/archives/gallery/exhibit/fire/fireintro.htm) is an online exhibition put up by the City of Saskatoon Archives to commemorate the city's fire fighting service. The history section showcases the history of the major fire fighting equipment companies in Saskatoon. This exhibition is a good site to visit, especially for students doing research in the history of fire fighting equipment, since there is a fairly large collection of photographs of vintage fire engines.

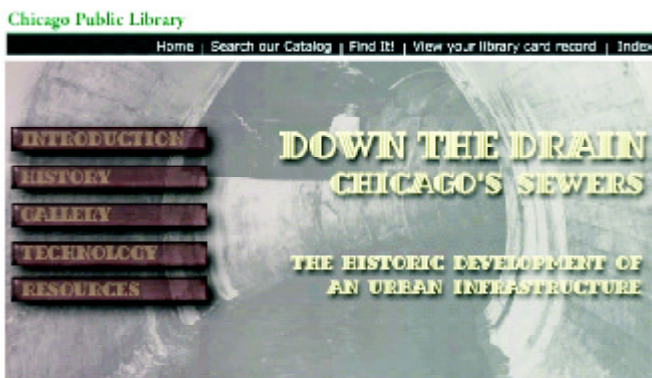


Figure 8. Down the drain, Chicago's sewers online exhibition.



Figure 7. Forging the nation online exhibition.

1956 Melbourne Olympics (<http://pandora.nla.gov.au/pan/42638/20040611-0000/www.statelibrary.vic.gov.au/slv/exhibitions/olympics/index.html>) is the State Library of Victoria's exhibition site on the 1956 Melbourne Olympic Games. This site explores the history of Australia's first experience of hosting the Olympic Games in 1956, and the impact it had on Australia as a nation. This exhibition would be very useful for students doing projects about the 1956 Melbourne Olympics because of the copious amount of textual information available. Moreover, it has a well-annotated bibliography with links to more detailed information.

7.4 Literary Online Exhibitions

Literature is another area where online exhibitions can be used to reach out to the public. Some examples are Anthem for Doomed Youth: Writers and Literature of the Great War 1914-1918 covering period literature, and social commentaries such as Elderberry Wine: Selected Radio Commentaries by Peter Wotton.

Anthem for Doomed Youth: Writers and Literature of the Great War, 1914-1918 (<http://net.lib.byu.edu/english/WWI/main.html>) is an exhibit commemorating

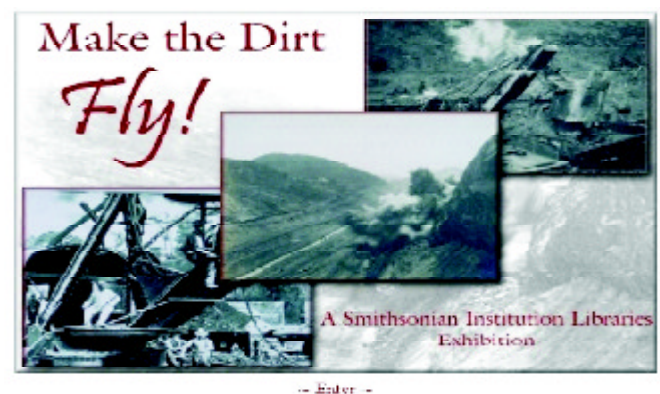


Figure 9. Make the dirt fly online exhibition.

the 80th anniversary of the Armistice (11 November 1918), which signaled the end of World War I. This website complements the physical exhibit held at the Special Collections Reading Room, Harold B. Lee Library, Brigham Young University from 1 September 1998 to 31 December 1998. This exhibition is great for doing research in the literature of the First World War period. The social mood of that turbulent period is captured succinctly in the words of the featured poets and writers (Fig. 10).

Elderberry Wine: Selected Radio Commentaries by Peter Wotton (<http://www.lanecc.edu/archives/Wotton.html>) is a tribute to Peter Wotton, who broadcast over 700 weekly commentaries on KLCC-FM radio in Eugene, Oregon, from 1982 until his death in 1996. His commentaries focused on different issues of interest to older people, such as health and recreation, as well as national political, environmental, and social issues. This exhibition offers Wotton's philosophical views on general social issues, which is useful for social science research but may not attract junior students due to its heavily textual layout.

7.5 Scientific Online Exhibitions

Science is one of the most popular topics for online exhibitions. There are online exhibitions about general science, such as The Virtual Smithsonian and The Year 1000; information science, such as Keeping Our Word: Preserving Information Across the Ages and ZYX: An Exhibition of Selected ABC Books from the Jean Trebbi Collection; medicine, such as Needles in Medical History; and naval science, such as Fast Attacks and Boomers: Submarines in the Cold War.

The Virtual Smithsonian (<http://2k.si.edu>) is an online exhibition that displays more than 360 artifacts from 14 of the 16 Smithsonian museums²⁵. The website is based on the travelling exhibit, Celebrating

150 Years, America's Smithsonian. Some of the exhibition features are images, digital video, sound clips, and objects which can be manipulated and transformed into other objects. Most of the exhibits are based on web multimedia technologies that are designed for visitors with high connection speeds. There is also a version for low bandwidth users, with less of the digital bells and whistles. This site is good for students doing research in general history (e.g. human inventions) and natural history (e.g. dinosaurs). The exhibits are very engaging if the visitor has the bandwidth to access them.

The Year 1000 (http://www.lindahall.org/events_exhib/exhibit/exhibits/y1k/) is an online exhibition organised by the Linda Hall Library of Science and Technology. It traces the development of selected scientific inventions from 1000 A.D. to the present day, e.g. the use of the horse collar from early applications in agriculture to industrial uses today. This is a simple exhibition that can be useful for students researching on the history of selected human inventions since 1000 A.D.

Keeping Our Word: Preserving Information Across the Ages (<http://www.lib.uiowa.edu/exhibits/keeping/contents.htm>) is the virtual version of the University Libraries', University of Iowa exhibition, "Keeping our Word: Preserving Information Across the Ages" (from October 1998 to January 1999). The virtual exhibit forms a continuing research page for the study of library preservation. This exhibition is a good resource not only for information studies students (from the point of view of library preservation) but also for the general public, because it provides interesting snippets on the history of writing methods and instruments.

ZYX: An Exhibition of Selected ABC Books from the Jean Trebbi Collection (<http://www.broward.org/library/bienes/lii03700.htm>) brings to the public's attention an area of book collecting that is seldom seen and infrequently appreciated: alphabet books. It begins by briefly exploring the history of the alphabet, moves on to children's ABC books, shifts to alphabet books for adults, and concludes with pop-up and movable titles. This exhibition provides an alternative glimpse into alphabet books; some visitors may be surprised to learn that alphabet books are not just for children alone there are versions for adults too.

Needles in Medical History (<http://www.wellcome.ac.uk/en/old/MISexhHOMnee.html>) takes an eclectic look at the role of needles in medicine and at their psychological and cultural contexts. The information provided in this exhibition may be too short for

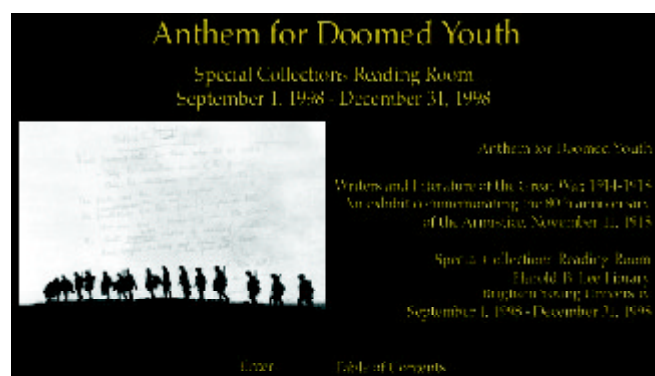


Figure 10. Anthem for doomed youth online exhibition.

student school project work, although the still images are still useful. Nevertheless, the designer has managed to present an intimidating medical instrument in ways that may not be directly apparent to the visitor, such as the use of needles in acupuncture.

Fast Attacks and Boomers: Submarines in the Cold War (<http://americanhistory.si.edu/subs/>) is the companion website of the fast attacks and boomers exhibition at the National Museum of American History. It showcases the development of the nuclear submarine in the US Navy. This exhibition has something appealing for every visitor: for the technically inclined, there are details of how submarines work; for casual visitors, there is information on life aboard the submarines and life onshore (Fig. 11).

8. FUTURE TRENDS IN ONLINE EXHIBITIONS

As technology becomes ubiquitous, reliable, cheap and easier to maintain, more museums are expected to exploit them to provide information to provide a better service and content especially for researchers, academics and museums information seekers.

Multi-modal and multimedia systems integrate a number of modes and media such as hypertext, audio, video etc., into higher-bandwidth communication interfaces. These are used for virtual reality, interfaces for users with special needs, etc. Virtual reality is an example of non-command based interface, which can immerse the user in a simulated highly interactive world in which the user can move about in the same way as in the physical world. Visitors are immersed in a virtual environment through the use of 3-D real-time computer graphics and advanced display devices such as head mounted displays. Visitors (particularly young students) can learn by active participation in performing some tasks with the system, such as manipulating objects in a scene. In this way, the

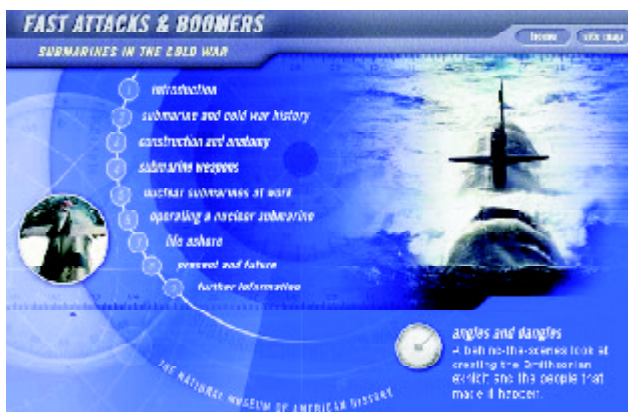


Figure 11. Fast attacks and boomers.

subject being taught will be better absorbed by the learners since they have played an active role in acquiring it¹³.

Speech-based interfaces that apply non-speech objects (such as auditory icons, ear icons), gesture recognition, and eye tracking technology are some of the scientific advances that may be also used by museums to focus on users with special needs²⁶. Eye tracking has traditionally been considered an esoteric and very expensive technique, but is now becoming more affordable and practical. Embedded help is another area that next generation interfaces are focusing on that may provide true embedded help via the use of animated and auditory icons, making the computer interface easier to use.

Wireless computing and handheld devices are other technologies that have penetrated into the museum galleries space. Tools such as electronic guidebooks (portable devices that use a wireless web-based network) help to extend the museum experience. As these devices become smaller, more affordable and more capable, museums will soon be able to count on them to facilitate the delivery of complex multimedia information to their visitors.

9. CONCLUSION

With the convergence of multimedia computing and broadband digital telecommunications, the two major barriers to the accessibility of archival collections have eliminated-physical distance and the walls (i.e. opening hours) of the archival institution⁷.

Museums viewers may be less likely to make a special trip to museum to see the original object when facilities are available to see a quite reasonable facsimile at their homework station. But Anderson feels that the demand for the original work will increase rather than decrease, following repeated exposure at an institutionally authorised site on the worldwide web. And "the growth of wired museums of all kinds may provide a younger generation steeped in this technology with more reasons to connect to us. It seems likely that it will contribute less to our eclipse as institutions than our transformation"⁵.

Galani, *et al.*²⁷ observed that the number of digital visitors is steadily growing and in some cases, outstripping the number of visitors to the corresponding physical museums. This helps to encourage a geographically distant digital visitor to become a physical visitor, and encourage physical visitors to maintain a relationship with the museums after they walk out of its doors.

The rise of community-oriented web-based tools that promote information sharing, such as blogs, wikis and photo-sharing services will be of interest to museums. These so-called 'Web 2.0' tools²⁸ can help to broaden the communication channels for online exhibitions. For example, the museum can put up an online version of an existing physical exhibition quickly as a wiki website, with multimedia resources such as videos, pictures and links to other sites with additional information. Online visitors will be able to share their experiences with others by writing about their visits in their personal weblogs (blogs), e.g. as a class assignment if the visitors are school children, highlighting to other visitors which are the more interesting exhibits. Physical exhibition visitors who visit the actual exhibition may also share their experiences with the online exhibition visitors through the use of online photo-sharing services such as Flickr. These tools will open up more exciting communication opportunities for the museum and bring its collections closer to its visitors, making their visits more personal and memorable.

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