Role of Computer Technology in Shaping Musuems in 21st Century

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Abstract— Technology and computer-based tools have changed the world as well as museum. If the goal is to connect with audiences then it's become normal to use digital platforms and spaces to do this. Museums have started to realize the potential of new technologies for the development of edutainment content and services for their visitors. Virtual reality technologies promise to offer a vivid, enjoyable experience to the museums guests, but the cost in time, effort and resources can prove to be overwhelming. In this paper, we explore the use of computer and information technologies for the purpose of changing museums for involvement with a wider and diverse audience thus maintaining their place within society. This review paper focuses on the need for digitsation of museum artifacts and use of virtual reality techniques.

Keywords— Digitisation, Museum, ICT, virtual reality

I. INTRODUCTION

While there are many technologies that support the Digital Museum, it is the computer that plays a central role. Computers are machines developed some decades back, to handle information, originally in the form of numerical data, text data, and today their scope has widened to voice, still images, moving images and other multimedia data. [1] Computer Technology has led to an increasing democratisation of museum processes, through the placing of collections on-line, the implementation of Web 2.0 technologies on museum websites, and the increasing role of visitor-generated content within museum practices. Broadly speaking, technology has allowed museums to express their missions to a wider audience, and to fulfill these missions in a variety of new ways. [18] In addition, the fusion of computer technology and telecommunications technology has made it possible to send data that has been input and processed instantaneously throughout the world, which has made it possible to eliminate geographical handicaps and made it possible to use digitalized data from anywhere in the world. Quite simply, the Digital Museum is supported by computer technology and telecommunications technology [1]. Museums have recently developed a strong interest in technology, as they are more than ever before in the orbit of leisure industries. They are faced with the challenge of designing appealing exhibitions, handling large volumes of visitors, and conserving precious artwork. They look at technology as a possible partner which can help archive a balance between leisure and learning as well as help them to be more effective in conveying story and meaning. This review paper focuses on the role of computer technologies in shaping the museums for 21st century.

II. WHY MUSEUM'S MATTER?

A Museum is a building, place or institution devoted to the acquisition, conservation, study, exhibition and educational interpretation of objects having scientific, historical or artistic value [19]. They collect and care for objects of scientific, artistic or historical importance and make them available for public viewing. They can be said to 'bring the past to life' and are fantastic representations of the different periods of our cultural history. They enable visitors to touch, feel, see, hear, experience and smell the past. The International Council of Museums defines museum as a "a non-profit making, permanent institution in the service of society and of its development, open to the public, which acquires, conserves, researches, communicates and exhibits, the tangible and intangible heritage of humanity and it's environment, for purposes of education, study and enjoyment"[2]. Museums have considerable social significance. Five social values in which museums play a major role can be listed as:

I. Collection value:- ' Treasure chests of objects and documents of national, international, regional and local relevance'. Managing and exhibiting objects and the stories behind them is a core responsibility with major social significance. The items contained in museums are important to us all, irrespective of whether they have local, regional, national or international significance. They embody our shared history and our identity, a core value that creates other social values.

II. Connecting value:- ' Meeting place and platform for the present, past and future'. Museums are ideal platforms for communication and debate, and they enter into partnerships with the private sector, educational institutions, the public, and professional and amateur artists. Museums serve as networkers and mediators between various groups in society; they provide current issues with a context, thereby facilitating debate. The thousands of people who join the museum as volunteers or friends are an extremely valuable assets.

III. Educational value:- 'A learning environment for all'. You always learn something new by visiting a museum, making it the perfect environment for learning, both for younger people to learn about culture and older people,

as part of life-long learning. Museums can serve as schools in a literal sense as well: for young people to complete work placements and for academicians to conduct research. Visiting a museum means learning, whether it's consciously or unconsciously, intentionally or unintentionally.

IV. Experience value:- 'Opportunities for enjoyment, experience and adventure'. Museums make us think, and sometimes they inspire us to take action. Museums provide the tranquility and freedom to reflect and think critically, as well as being an ideal environment for personal development and fulfillment. However, museums are also enjoyable places to visit: to relax, to enjoy beautiful objects and fascinating stories- even to experience happiness. Museums also provide freedom of movement and experience, both literally and figuratively.

V. Economic value:- 'Economic strength and tourist attraction'. Museums are full of activity, and life- places in the heart of the community that has economic significance as well. Just think of the large numbers of tourists that museums attract, the jobs they create directly and indirectly, the capital represented by the thousands of volunteers, museums' appeal to businesses and to families with high levels of education, as well as a museum and its building provides the character to a city or region [3].

III.   CHALLENGES FACED BY MUSEUMS

Applications of technology to museums have so far mainly focused in making extensive and attractive web sites with catalogues of exhibits. Presenting large bodies of information in the form of an electronic catalogue usually does not stimulate learning or curiosity. One of the main challenges that exhibit designers are faced with is that to give life to the objects on display by telling their story within the context determined by the other objects in the exhibit. Traditional storytelling aids for museums have been panels and labels with text placed along the visitors' path. Yet the majority of visitors express uneasiness with written information. Usually time spent reading labels interrupts the pace of the experience and requires a shift of attention from observing and contemplating to reading and understanding [4]. Successful labeling is sometimes hierarchical and allows the viewer to select the desired degree of information. Another challenge for museums is that of selecting the right subset of representative objects among the many belonging to the collections available. Usually, a large portion of interesting and relevant material never sees the light because of the physical limitations of the available display surfaces [5]. Storage is a critical component of preventive collections care because, with few expectations, it is the environment in which collections are held much of the time. Prominent cause of deterioration of collected items especially textiles is wear and tear. Historically there has been a move towards preventive conservation [6].

IV.   INFORMATON AND COMPUTER TECHNOLOGY IN SHAPING DIGITAL MUSEUMS

Museums have started to realize the potential of new technologies for the development of edutainment content and services for their visitors. Digitization, virtual reality technologies promise to offer a vivid, enjoyable experience to the museums guests, but the cost in time, effort and resources can prove to be overwhelming. Digital technologies have the potential to allow museums to achieve a step increase in the access of their collections and, in some cases, become major broadcasters of cultural content [7]. The President of the Bundesarchiv, Germany, believes future archival collecting will be of two types: critically important material will be preserved; other important material will simply be captured in digital form [8],[9].

DIGITISATION

Digitization is a process of capturing the digital reproduction of an object so that it can be made available through a variety of media. Flatbed scanners (stationary digital cameras), hand held digital cameras, planetary cameras, and a number of other devices can be used in conjunction with computers to digitize cultural heritage materials. Any material including stone tablets, textiles, parchment manuscripts, books, or paper photographs can be photographed by a digital camera or scanner, storing the resulting image into digital format [10]. Digitsation of museum collection activities within an organisation is a team work, where the task is divided between people of different departments. The curator registers the object, the conservator or an assistant takes the picture and the IT group makes it available on website [6].

a.   Access to collection

By digitizing collections, cultural heritage institutions (museum) can make information accessible that was previously only available to a selected group of researchers. Digitisation of cultural collections can strengthen the quality and quantity of available objects processes for distribution and licensing to both internal and external customers. This is likely to enhance museum image as well as improve traditional activities such as collection management, curatorial practices and scholarly research. Since, digital images are easy to reproduce, aggregate and transmit they have a high potential for use and reuse in the networked digital environment [1]. Soni et al, 2013 conducted a case study on government Museum Research Library, Mathura and on the basis of analysis of collected data, gave some suggestion/ recommendations regarding the existing services provided by the museum. One of the suggestions included the need of digitisation of available manuscripts and rare books, as well as the development of the website of the library & museum, to increase accessibility of rare collections to people all over the world. Caroline et al., 2014, listed the reasons to digitize museum collections which includes: to make collection accessible to those that cannot visit the museum; to provide content for an exhibition: to contribute to e-learning package or provide e-learning opportunities. Museums already know that there are many people not employed by them who have extensive knowledge of objects in their collections. Some museums like San Francisco Art Museum have instigated a "word soup" project, in which key terms to describe pictures were provided by non-specialist volunteers, thus providing better search results [20].

b. Preservation

The purpose of digitalization is not solely to view data placed in a virtual space. This digital archive technology is also important for the permanent preservation of exhibits which are vulnerable to deterioration. For example, movie films are said not to last 100 years in principle, and there is great significance in digitally archiving silver chloride films created in the past[1]. Storage is a critical component of preventive collections care because, with few expectations, it is the environment in which collections are held much of the time. Prominent cause of deterioration of collected items especially textiles is wear and tear. Historically there has been a move towards preventive conservation. Digitizing a collection would seem to support this ethic. Once photographed the object can be achieved and not handled unnecessarily [6]. The Joseph E. Hotung Gallery is the British Museum's main gallery devoted to the Asian collections explains however, as there are large windows on either side of the Hotung Gallery; light sensitive materials, such as textiles, woodblock prints and paintings which are among the rarest finds from Dunhuang, cannot be displayed. Project to digitize the collection of light sensitive material for public by British museum was considered beneficial for many institutions of learning including departments of history, art history, history of religion, history of medicine, Central Asian studies, Chinese studies, archeology and conservation[12]. Anderson and Nilsson, 2006 carried out interviews at two Swedish Museums and identified the following reasons for digitisation: To reduce wear on the materials such as clothing; To support collection inventory; To make the collection searchable for museum staff; To generate information through people external to the museum; To give easier access to often requested material; To give a better overview of a large collection, increasing public awareness of the holdings.

VIRTUAL REALITY

A virtual museum is a digital entity that draws on the characteristics of a museum, in order to complement, enhance, or augment the museum experience through personalization, interactivity and richness of content. As with a traditional museum, a virtual museum can be designed around specific objects (akin to an art museum, natural history museum), or can consist of new exhibitions created from scratch. Moreover, a virtual museum can refer to the mobile or World Wide Web offerings of traditional museums (e.g., displaying digital representations of its collections or exhibits); or can be born digital content such as net art, virtual reality and digital art [21]. Virtual reality technology can help museums overcome a number of limitations they face [13]. Virtual reality can help display exhibits the museum cannot present either due to lack of space or due to their fragility and their need for special handling. It can also help in cases when there is a need for visualising and simulating environments, constructions or objects that no longer exist, be partially preserved or cannot be easily visited [14]. In a virtual environment exhibits can be observed from different viewpoints or even manipulated. Technologies such as haptic feedback may enable visitors to touch and feel valuable objects, or it may allow people with vision problems to sense an exhibit. Especially in the case of museums that offer education through entertainment, otherwise known as edutainment [15], virtual reality can help create an environment where users will be able to learn by exploring, to get acquainted with the use of objects, guided by virtual agents through an exhibit's history or even assemble and disassemble it to pieces. [16] Furthermore, the creation of a huge virtual museum within a computer is not something that can be done by one museum in isolation. Items are distributed throughout the world, so the concept was born of inputting the data in respective locations, linking the data via networks, and logically creating one museum. This concept will make it possible to view digitalized museum data from throughout the world as if one were accessing one huge museum. It is possible not only to view digitalized data, but also actual museums in remote locations over the Internet in real time. The technology used to do this is called Video Streaming. This technology makes it possible, for example, to bring in a video camera to an excavation site, and to view the site in real time by controlling the camera from a remote location. Other applications also become possible, such as placing a large number of moving images on a database then using video on-demand technology to access the moving pictures required when necessary[1] .

V. CONCLUSION

The essence of the traditional museum as – classifier, authoritative holder and producer of knowledge and as a source of the "right" interpretation and view of the society through place based exhibitions- is a building. By contrast the museum of the future will be more of a process or an experience, moving out into the spaces of the communities that it serves. Museums are uniquely well placed to take advantage of digital possibilities, which offer a natural extension of the means to pursue their central purposes. However, going digital will affect the way museum curator conceive their work and the ways in which the museum allocates its resources. Sophisticated databases require specialist staff. Electronic capability must be fostered in professionals in all museum areas, who will form cooperative teams just as they do in publishing and exhibition creation now.

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