

## Technologies used in museums in Mexico

### Tecnologías utilizadas en museos de México

VARGAS-MUÑOZ, Emmanuel†\* & ESCAMILLA-REGIS, Daisy

*Tecnologico de Estudios Superiores de Cuautitlan Izcalli*

ID 1<sup>st</sup> Autor: *Emmanuel, Vargas-Muñoz* / ORC ID: 0000-0002-7038-4308

1<sup>st</sup> Co-author: *Daisy, Escamilla-Regis* / ORC ID: 0000-0003-4062-0514

DOI: 10.35429/JCT.2023.18.7.1.7

Received: January 10, 2023; Accepted June 30, 2023

#### Abstract

The following article is a product of research on the technologies used in museums, focusing on their historical evolution and their importance in the museum world, allowing us to understand the technological tools used in museums in Mexico. The use of intranets for internal processes will be analyzed, as well as their continuous improvement. The importance of uses of inventory control systems and their development used to control fixed assets, bibliographical heritage, collections, books and audios. Automation in exhibition halls with the use of multimedia. Immersive experiences in thematic exhibitions. As well as the use of digitalization technologies created by universities or private institutions. The importance of all these with a vision in the future is mentioned.

#### Museums, Platforms, Technology

#### Resumen

El siguiente artículo es un producto de una investigación sobre las tecnologías utilizadas en museos, centrándonos en la evolución histórica de las mismas y su importancia en el mundo museológico, permitiendo comprender las herramientas tecnológicas ocupadas en museos de México. Se analizará el uso de intranets para procesos internos, así como la mejora continua de los mismos. La importancia de usos de sistemas de control de inventarios y su desarrollo utilizado para control de activos fijos, acervos bibliográficos, colecciones, libros y audios. La automatización en salas de exhibición con uso de multimedia. Experiencias inmersivas en las exposiciones temáticas. Así como uso de tecnologías para la digitalización creadas por universidades o instituciones privadas. Se menciona la importancia de todas estas con una visión en el futuro.

#### Museos, Plataformas, Tecnología

**Citation:** VARGAS-MUÑOZ, Emmanuel & ESCAMILLA-REGIS, Daisy. Technologies used in museums in Mexico. Journal Computer Technology. 2023. 7-18:1-7.

\* Correspondence to the author (E-mail: 213101033@cuautitlan.tecnm.mx).

† Researcher contributing as first author.

## Introduction

According to the International Committee for Museology (ICOM), a museum is a non-profit, permanent institution at the service of society that researches, collects, conserves, interprets and exhibits tangible and intangible heritage. Open to the public, accessible and inclusive, museums foster diversity and sustainability. With the participation of communities, museums operate and communicate ethically and professionally, offering varied experiences for education, enjoyment, reflection and the exchange of knowledge (ICOM, 2010), in addition to this term in the case of Mexico there are many institutions that have created various museums of private collections with different themes, which greatly support the dissemination of their temporary and permanent exhibitions.

In Mexico there are two very important institutions responsible for cultural heritage that are in charge of public museums: the National Institute of Anthropology and History (INAH) and the National Institute of Fine Arts and Literature (INBAL), both governed by the Ministry of Culture, which have a great responsibility as they have the task of generating curatorships for their museums and preserving culture, thus competing with private institutions in attracting visitors.

With the above, we can deduce that there is a great variety of museums with different themes and a wide range of contents aimed at different audiences that visit these spaces, which create competition between these institutions, benefiting their audiences. This allows for the creation of exhibitions and/or quality content, resulting in content such as research articles, books, lectures or colloquiums.

All of the above is of vital importance to be supported with technological tools in order to improve their processes, managing resources in an adequate manner, control systems of their collections, dissemination media such as social networks, radio or television. The importance of exhibitions is to attract their audiences, both specialised and visitors, supported by multimedia materials in order to capture the attention and enjoyment of permanent or temporary exhibitions in museums, generating an image that encourages the viewer to revisit or recommend their visit.

It will address the importance and use of technologies in museums for the benefit of the general public and their vision for the future.

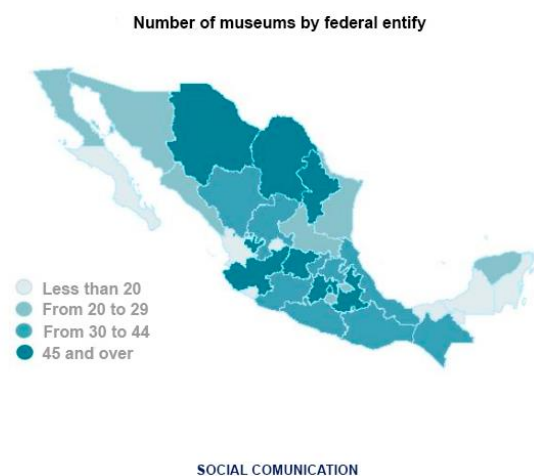
## Description of the method

In order to understand the importance of the implementation of technologies in museums in Mexico, these advances were analysed based on the criteria of their popularity in the implementation of these technologies, as well as their impact on visitors.

Thanks to search engines, digital platforms for books and specialised magazines about museums, it was very helpful to learn about the beginnings of technologies implemented in museums, such as the magazine *Museos de México y del Mundo* (M Museos de México y del Mundo, 2004), as well as the digital library of UNESCO (UNESCO DOC, 2022) or INAH (Revistas INAH, 2022).

As well as visiting these museums, it was possible to learn more about the implementation of these technologies supporting the veracity of these cultural spaces.

The National Institute of Statistics and Geography (INEGI) reports that there are 849 museums in Mexico up to the year 2022, segmenting the areas of the national territory where the greatest number of museums exist. Analysing where the greatest number of cultural centres are located, which allowed us to analyse where technological advances have been implemented, mainly in the central zone where there is a greater concentration of these spaces.



**Graphic 1** Number of museums by state

Source: (INEGI)

The qualitative methodology is adapted to this type of research as the information obtained allows us to learn more about experiences in the implementation of different technologies in different museums.

### Internal process management platforms (intranet)

Since the use of the Internet as an essential element in our lives, many platforms have been created for control in different organisations. In 1995, Dr. Steven L. Tellen first used the term intranet, which functioned as a series of pages that could be consulted by a group of people. In the case of museums, they began to generate platforms that would allow them to control their internal processes.

In 1998 the Museo Nacional del Virreinato (MNV) was the first to create an intranet, in conjunction with IBM, INAH and the museum's IT staff created this platform, SIM Sistema de Información de Museos, later renamed SIGE (Sistema de Información, Gestión y Evaluación), which allowed them to view museum information, It allowed them to see information about the museum, temporary and permanent exhibitions and its organisational structure as well as its projects where the areas documented their processes, to have communication through a network of internal messages called agreements, as well as a section called opinions that allowed the staff to answer questions or congratulations from the public, as well as general indicators.

This intranet was one of the most complete in its time, allowing the evolution of the way of managing the resources of a museum in an integral way, thanks to the vision of Miguel Fernandez Felix, former director of this museum, who revolutionised the way of seeing a museum worldwide. (M Museos de México y del Mundo, 2004)



**Graphic 2** SIGE

Source: (Museo Nacional del Virreinato)

### Kiosks

Since the creation of the touch screen in 1971 by Dr. Sam Hurst, many interactive materials ranging from video games to interactive kiosks have been implemented in many places. In the case of museums they were and will be very useful for the visiting public to interact with an interface that will provide them with information.

This technology is implemented in most museums in Mexico because of its ease of installation and accessibility for the development of interfaces. To mention a few: Museo Nacional de Antropología, Museo Nacional del Virreinato, MIDE, MUNAL, Universum among many others. Its application in the case of virtualisation of books, zoom in maps and images.

Pintura en Internet (Rodriguez, 2005) was an exhibition that was based on a platform that allowed the consultation of more than 913 paintings of the MNV supported with kiosks that could be consulted in an interactive way, allowing to see in detail each piece with the help of a zoom and games allowing that all type of public could visit the exhibition in person or from their computer, impacting the way of seeing a pioneer museum in the creation of virtual exhibitions.

Interactive Screens and Touch Wall in the Museum of Memory, the implementation of this technology based on a wall with screens controlled by touch screens is an innovative application showing on these screens information such as cultural diversity, the power of the media, to mention a few topics, with which we can see the good use of this technology (Sordo Madaleno, et al., 2011).

## Bank digital collections

The importance of being able to digitise the pieces is of vital importance for their consultation and background of their conservation within museums, there are several platforms that allow the consultation of this material online in conjunction with different repositories.

Canon, together with the National Museum of Anthropology, has had a project since 2010 to digitise collections in a high-resolution format, with the aim of promoting archaeological research by means of a photographic record, embedding this information in a large database for consultation (Canon, 2010).

An image bank is the Mediateca INAH, a digital repository that can be accessed from its website to different collections of all museums and archaeological sites, as well as reference materials such as photographic collections, audios and videos that help visitors learn about everything the institute offers in order to learn about Mexico's cultural heritage.

The Mexican platform created by the Ministry of Culture in 2017 is made up of different digital banks of different organisations, institutions and museums belonging to the Ministry, linked by different databases that are updated automatically, which allows for a robust system in terms of the variety of content that can be consulted, as it contains all the digitised collections, being a project that promotes the accessibility of digital content for the general population. (Secretaria de Cultura - Mexico, 2017).

## Videomapping

Videomapping is a visual technique that consists of projecting images with the support of lights, cinema projectors, video projectors on surfaces that with effects can create visual experiences for the viewer. For the implementation it is important to have many factors such as space, light, perspective as with it the projection will be positioned to square the reference points to improve a suitable vanishing point, sound is a plus that allows to involve the viewer in the projection in the case of video. (Maniello, 2015).

Architectural videomapping, which is currently used for the illumination of facades and of course the projection of videos, in the case of museums is used for historical recreations or with the idea of being able to bring the public closer.

There are many museums that have used the projection on facades, one of them is the palace of fine arts that in 2016 and 2017 during the festival of lights allowed to enhance the building as well as the series of projections and textures allowed the general public to contemplate the beauty of the building.

Another museum was the National Museum of Art, which projected digital and visual art called Mappa Mundi on its façade. This videomapping was on the occasion of Mondiacult, Unesco's international conference on cultural policies that paid homage to Mexican culture with projections and a show with free access. This shows the importance of the use of this technology for the dissemination of the museum (Puntodincontro, 2022).

## Robotics

This technology is used in different fields, in the case of industry or for the automation of manufacturing processes, to mention a few. In the case of the Museo del Virreinato in San Luis Potosi that implemented is the case of Royito a humanoid robot has an appearance very similar to a human being, characterised as a friar, is owned by the company Intelirobot S.C., temporarily was used to give guided tours as part of the international day of museums in 2018, which allowed children to interact with this character. (Bajo, El;, 2019).

## Virtual Tours

With the COVID 19 pandemic, many museums closed their doors, so an alternative was sought to show their spaces, achieving this with virtual tours that allowed them to simulate a real space as if they were in that space. In the case of some museums, they used 365° technologies and Google Street View, the latter being the most realistic as they used photographs of this space. Technologies such as people art factory (peopleartfactory, 2019) were used to simulate spaces that are created in a virtual way to mount exhibitions without having a room.

I will mention some museums that implemented this type of virtual tours; Bellas Artes, Museo de Arte Moderno, Museo Nacional de San Carlos, Museo Nacional del Virreinato, Museo de Arte Indígena Contemporáneo, Antiguo Colegio de San Ildefonso, Dolores Olmedo, MUNAL - Museo Nacional de Arte, Templo Mayor, El Tajín, Museo del Pueblo Maya (Yucatán), Museo de las Culturas del Norte (Paquimé), Monte Albán, Teotihuacán, Castillo de Chapultepec, Museo Cuauhnáhuac (Palacio de Cortés) Museo Frida Kahlo (Casa Azul) to name a few. (36 virtual museum tours, 2022).

### **Streaming**

During the covid-19 pandemic, museums suspended activities, affecting already scheduled activities such as academic activities like colloquiums and artistic activities like concerts or plays, so online transmission or streaming was used, helping to continue with different activities remotely. YouTube was one of the most widely used tools during this period, as it was able to broadcast all kinds of events and was a valuable tool, as it allowed to reach many more people in many parts of the world, not only in Mexico.

In the case of museums belonging to the Ministry of Culture, a website called "Contigo a la Distancia" was created to promote digital culture and free access, with tours of museums and archaeological sites, films, books, concerts, conferences, documentaries, plays, audios, applications and much more. With this, the use of digital tools was promoted for the development of many activities in pandemic, using technology to bring the public closer to the museums (Contigo en la distancia, 2019).

### **Summary of results**

This research work studied the different museums that use technology, and an exhaustive investigation was carried out in different media such as books, catalogues, research magazines and magazines specialising in museums, as well as the existing collection of the National Institute of Anthropology and History, the Media Library and the Mexican Platform. It can be concluded that the importance of technology in these museums is of vital importance, as it allows them to function well and attract visitors to these museums.

The use of technology and the advances made in recent years confirm the importance of the implementation of these technologies in order to control the collections, as well as the implementation of these technologies for dissemination purposes, attracting more visitors to these museums.

Without forgetting customer satisfaction as a business model, it can be observed that the vast majority of museums that have implemented technology and have evolved within this museographic environment have been able to have a more functional and advanced structure compared to other museums that have not dared to implement it.

### **Conclusions**

The results of this research allow us to understand the importance of implementing technology in museums for the dissemination and preservation of cultural goods in Mexico. This is reflected in the quality of temporary or permanent exhibitions, as they help the evolution of internal museum processes. As well as the products that derive from them, such as papers, colloquiums, digital platforms that allow the good development and control of the pieces that are analysed for research purposes, with which the collections are exhibited in the exhibition rooms or published on digital platforms. Interactivity is essential as the visiting public can learn more about the piece and generate experiences that encourage them to return or recommend the cultural space.

Looking to the future, museums can implement many technologies such as multimedia, virtual reality, augmented reality, photogrammetry, architectural reconstructions, simulated spaces and holograms, which will allow visitors to have an experience that they can enjoy during a visit to a museum.

### **Recommendations**

Museums that are implementing new technologies should rely on the experiences of other museums so that they can analyse the pros and cons, determine the alternatives in their implementation and analyse the resources that can be used in development and implementation.

Furthermore, it is essential to have a development team or an IT area, and it is important that this team will be able to generate new content and technologies, as they will know the needs and scope of the museum.

## Conclusions

It is necessary to invest and implement new technologies for the research and dissemination of culture in Mexico, especially in exhibitions where visitors can have better experiences when visiting a museum and have a pleasant experience, as well as being accessible to all citizens.

## References

- 36 recorridos virtuales por museos . (2022). 36 recorridos virtuales por museos . Obtenido de Canva: Canva.com
- Agustí Canals, I. H. (2020). Plataformas digitales: fundamentos y una propuesta de clasificación. Catalunya, España: Oikonomics.
- Bajo, El;. (15 de mayo de 2019). Conoce a Royito, el robot guía que estará en el Museo del Virreinato. Obtenido de aorquesta.mx: <https://laorquesta.mx/conoce-a-royito-el-robot-guia-que-estara-en-el-museo-del-virreinato/>
- BRENNEN, J. S. (2016). The International Encyclopedia of Communication Theory and Philosophy. Estados Unidos: Wiley Blackwell.
- Cabrera, E. M. (2001). estrategia y organización en la vinculación universidad-empresa. ALTEC.
- Campos, R. M. (2005). Diseño de páginas web y diseño gráfico. España: Ideaspropias Editorial, S.L.
- Canon. (2010). El Museo Nacional de Antropología en el Siglo XXI. Obtenido de CANON: <https://www.canon.com.mx/registrofotografico-mna-canon/>
- Contigo en la distancia. (2019). Contigo en la distancia. Obtenido de Contigo en la distancia: <https://contigoenladistancia.cultura.gob.mx/>
- Corcoles Tendero, J. E. (2015). Diseño de interfaces web. España: RA-MA Editorial.
- Few, S. (2007). Pervasive Hurdles to Effective Dashboard Design. Newsletter: Visual Business Intelligence.
- HubSpot. (2020). Experiencia de usuario. Estados Unidos: Portal Web.
- ICOM International Committee for Museology (ICOFOM). (2010). Conceptos claves de museología. Paris : ICOM.
- M Museos de México y del Mundo. (2004). El sistema de información y gestión (SIM) del Museo Nacional del Virreinato. Gestión, público y nuevas tecnologías en un museo mexicano. M Museos de México y del Mundo, 89.
- Maniello, D. (2015). Augmented Reality in public spaces. Basic Techniques for video mapping. Le Penseur.
- Marqués, M. (2009). Bases de datos. España: Castelló de la Plana.
- peopleartfactory. (2019). New digital experiences for art. Obtenido de peopleartfactory: <https://peopleartfactory.com/>
- Puntodincontro. (26 de septiembre de 2022). Mappa Mundi: in Messico videomapping italiano sulla facciata del MUNAL. Obtenido de <https://puntodincontro.mx/es/2022/09/26/mappa-a-mundi-en-mexico-videomapping-italiano-en-la-fachada-del-munal/>
- Raya Cabrera, J. L. (2015). Sistemas informáticos. Madrid, España: RA-MA Editorial.
- Regino, O. (2015). Lógica de programación orientada a objetos. Bogotá, Colombia: Ecoe.
- Revistas INAH. (2022). Revistas INAH.
- Rodriguez, A. M. (11 de 12 de 2005). En Internet, colección pictórica del Museo Nacional del Virreinato - La Jornada. La jornada.
- Secretaria de Cultura - México. (2017). Mexicana. Obtenido de Mexicana: <https://mexicana.cultura.gob.mx/es/repositorio/home>

Sordo Madaleno, J., Leatherbarrow, D., Adria, M., Arditti, A., Arditti, J., & Ollae-Laprune, P. (2011). mty. Obtenido de Memoria y tolerancia: <https://www.myt.org.mx/sala-tolerancia>

UNESCO DOC. (2022). Biblioteca Digital UNESCO. Obtenido de <https://unesdoc.unesco.org/inicio>.