Smart Museums: The Digitalization of Art and Culture

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ABSTRACT

Smart Museums: The Digitalization of Art and Culture is an acute study investigating the nature of museums as institutions, exploring what the differences are between private and public museums in light of the digitization of information. It will compare various museums and their accompanying websites within the cultural zones of Belgium, New York City and Catalunya.

In accordance with an increasingly digitized society digital museum resources are growing exponentially on museum websites internationally. We must, however, consider the benefits and detriments to this technological advancement. Factors such as increased website traffic may lead to decreased traffic in physical museums. This calls to question what the ideal museum websites should replicate and therefore fueling the project's objective of what the ideal museum website should encompass.

The research will conclude with determining whether digitalization through the medium of website content would be beneficial or detrimental to museums. Survey results across Belgium, Catalonia and the United States will provide results that will help our research and aid in creating a website that enhances the museum experience without discouraging future visitors from going to physical museums. Identifying the appropriate role of digital development in the museum industry contributes to international education goals. Such research encourages efficient sharing of knowledge within the model of museum business structures and management.

Keywords: Art, Culture, Museums, Digitalization

1 THEORETICAL FRAMEWORK

The International Council of Museums defines a museum as an institution at the service of society which acquires, conserves, exposes and communicates the representatives' goods of nature and man to safeguard them, increase knowledge and promote the development of heritage, education and culture. The role described is the traditional role of a museum which was elitist, uninspiring and aloof as it only encouraged educated people to visit them, excluding the general public. Today, this focus has become too narrow and unacceptable in a changing world where there is sustained clamor for more openness, pragmatism and collective involvement in dealing with issues that impact people, communities and nations. Depending on funding received, both public and private museums exist. Public museums include state, municipal, national, ecclesiastical and many others. The majority of the European museum industry, unlike the counterpart American model, are public and generally share an economic deficit. Private museums are autonomous institutions of either the state or constituted by partial tutelage. These museums are the most common in the United States in accordance with the American tradition of nineteenth century philanthropists who created their own private museums to share acknowledgment in their community as a sample of gratefulness.

Belgium museums

Only 5% of the 405 museums, 2000 being national museums, are regional or local. Of these museums, they are public, semi-private or private. Private museums may be entitled to receive funding from public resources if requested and are eligible.

The law *Arrêté du Gouvernement de la Communauté française portant exécution du décret du 17 juillet 2002 relatif à la reconnaissance et au subventionnement des musées et autres institutions muséales*, last modified in January 2017, aids in regulating this matter.(Fédération Wallonie-Bruxelles, Patrimoine Culturel).

To receive money, museums must be categorized by *A* (top), *B* (middle) or *C* (bottom) according to specified criteria.

Category C must meet 16 requirements; Category B must meet 11 additional requirements; Category A must meet a final 8 requirements. The criterion ranges from conservation policy and opening times to pedagogical programs. The subsidies received may start as low as €5,000 and go as high as €500,000 annually.

When viewing museum websites, the museum's status, regardless of it being public or (semi) private, is difficult to find. Inquiring via phone calls with employees was inconclusive being that the employees of the museums are unaware of how their institution is financed.

In Brussels, museums may get funding from the Flemish Authority because their cultural institutions are bilingual (including the languages of France and Belgium). Comparing websites may be done on the basis of two examples. One of these examples are clearly identified as a national state owned *Musées royaux des Beaux-Arts de Belgique* and a very popular family owned *Musées François Duesberg*. The *Musées François Duesberg* is extremely popular and is rated number one on websites such as *TripAdvisor*. People fly internationally to visit the museum. Their accompanied website has a unique layout replicating a newspaper.

United States museums
Since the proliferation of Internet access during the late twentieth century, a shift in American museology marked a movement away from a focus on preserving cultural heritage toward public programming. With growing concern regarding the repatriation of historic pieces from other countries and rising logistic, procurement, and maintenance costs of exhibits, competition for private and public funding continued to heighten. American museums which are effectively addressing public programming needs have maintained social and cultural relevance, thus appealing to a wider range of contributing philanthropic foundations. Government funding for private and public museums are available under U.S. Statute 20 U.S.C. §97, which specifies that the institution must be categorized as not-for-profit to be eligible for such funding. The statute also emphasizes the role of the museum must service the "whole society", rather than a segmented fraction, thus encouraging institutions to invest in universally appealing content.

The museum industry in the United States operates as an economic engine, supporting over seven-hundred thousand careers and contributing $50 billion to the national economy annually. There are currently 35,000 active museums in the United States contributing to cultural and educational resources in art, history, science, technology, and the natural world. Such operations generate over $12 billion in annual tax revenues at federal, state, and local levels. As American museums are committed to offering highly accessible experiences to a diverse range of museum-goers, many institutions offer discounts or free admission days, with nearly forty-percent of all museums being free of charge. In efforts to effectively target the wide-ranging market

museums aim to attract and serve, it is imperative that American museums make advances toward initiatives to increase the accessibility of educational and artistic content to demographics often marginalized in these sectors such as low-income groups, rural populations, and disabled or impaired learners among others. Such accessibility could be enabled through the implementation of robust online resources.

Exemplifications of the private and public sectors of the American museum industry are demonstrated through the private *Newseum* in Washington D.C. and the public *9/11 Memorial Museum* in New York City.

As a not-for-profit private institution, *Newseum* has long faced financial struggles, with heavily reliance on a single annual donor to continue financing operations. In the highly saturated market of free museums available in the geographic context of Washington D.C., it can be difficult to present the value proposition of a ticket over $20 USD, (€16).

Following a $700 million construction project financed by government agencies and private donors, the *9/11 Memorial Museum* receives millions in federal funding annually, though this government aid only finances about twenty-percent of annual operating costs, a typical proportion of funding for American public museums. Additional revenues are earned through public admission fees of $24, (€19.49).

Catalan museums
Eighty-seven percent of Catalan museums are public; the most common museum being The Local Museum of Direct Management. Of these museums, six are personified. There are some correlations between museum's ownership and its characteristics. The main correlation is that there are very few private museums that don't belong to the church but they have a strong impact. Some examples are the FC Barcelona Museum or Dalí Museum which have a large volume of visitors and incomes each year well above the standard. Another characteristic is the relation between the territorial distribution and the museum's size. Barcelona city has big museums constituted by partial tutelage or diverse ownership compared to the rest of the country dominated by municipal tutelage museums. Public museums commonly have public tutelage to guarantee its survival. These museums have income equivalent to 20% of the expenses. It is evident that most museums, except those located in territories with a large population and in tourist areas, are not supported without public participation.

In order to understand what characteristics Catalan museum websites have, the national state owned MNAC (Museu Nacional d'Art de Catalunya) and the private museum, Salvador Dalí museum, will be analyzed.

Every day, Catalan museums are more committed to digital world. *Gencat* has studied the evolution of museum websites and social networking from 2015 to 2016. Through the research, it may be observed that there has been an increase

of visitors and increase of museums that have a website and social networks, specifically Facebook and Twitter.

Existing studies

In modern society, computer science and new technologies have a great influence in people's' everyday lives. This advancement has led to the digitalization of museums in the form of online galleries, forums, exhibitions, social networks, etc. One must, however, consider at what point this advancement becomes detrimental to the museums. If visitors can access digital collections using the Internet, they may be less likely to visit the museum in-person. In theory, the effortless accessibility to virtual museum resources online should attracts potential museum-goers to visit the physical installation. This theory provides us with the knowledge that there are features within museums websites to make the ideal website. This may be found by studying the influence of these websites on people during their daily activities.

Before visiting a museum, visitors have agreed that the website must offer them information regarding schedules, location and virtual tours. Seventy percent of website visitors use websites to decide if they are going to visit physical museums (Marty, 2007). Because of this, it is very important to know what the potential visitors of a website value most. Surveys and numerous studies have found that these elements are quality, performance and ease. When visitors attend physical museums, they seek a website that includes images and information about upcoming exhibitions and events. It is important to design websites that specifically helps the visitors who are looking for museums to visit while on vacation or are visiting locations unfamiliar to them. These websites are especially important to those who are visiting museums where the exhibits change frequently. While a crucial factor to incorporate into an ideal museum website is the ability to search the museum's collections, it is not as important as the overall quality of the information available. Additionally, those visiting a museum website does so to obtain images, materials and resources for educational purposes (Marty, 2007).

Creating a website may be done a plethora of different ways. First, understanding what the important aspects of a website are before its creation is essential for obtaining optimal results. It has been determined that a website which is characterized by its simplicity, clarity and interactivity would help achieve such results. Simplicity allows the user to navigate with ease to find the appropriate information. This will impact the user's image of website fluidity. Clarity is essential in that it will not over saturate the website's information unnecessarily.

However, a website that does not incorporate interactive components is one that is extremely flawed. Modern websites have become so expansive that their listing all its components would be unfathomable. The ability for a user to be able to communicate with the website is critical.

While one may think that these parameters are enough to attract the eye of a user, it is not possible without counting the relevance of information in regards to the website. For example, a website build to provide information about aquariums should be themed with the colors of the ocean. While website themes and colors may be considered a minor detail, factors as minimal as font style and size may also be the determent in creating an ideal website.

As the museum industry shifts focus toward public programming of culture and education in efforts to remain relevant in a society reliant on publicly available information, development of an effective museum website could work toward promoting inclusive and accessible educational resources in accordance with global educational goals. Such goals are based upon integration into the United Nations calculated sustainable development initiative to ensure inclusive and quality education for all.

Implications of Ideal Site on Access to Education

The incorporation of technology by museums raises new questions about how museums are considering the notion of what comprises their community and how they are serving that community. Incorporation of improved technologies better services visitors, with websites offering games, extensive image databases, social network connections, online shopping, videos, and calendars that often overshadow the more scholarly hardware of traditional museum content. Interpretive tools including digital and multimedia demonstrate a widening reach of the museum target market, encouraging an increasingly participatory educational culture. Integrated museum web-based content contributes to international increased accessibility to education goals, in alignment with the United Nations goals for sustainable universal development. Now more than ever, museums are equipped to contribute to universal education through offering remote information available internationally through publicly available information. Museums have successfully managed a balance between upholding their traditional, scholarly standards of collection, research, conservation, and exhibition, while at the same time trying to meet the needs of a much wider and diverse public. The significance of a holistic vision of museology that incorporates the local and global, virtual and physical, fixed and mobile, becomes more manifest in the digital age where technology has contributed to a distributed museum experience. The museum industry is redefining its social role as it responds and adapts to a changing society.

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2 INTERNET WEBSITES, DIGITIZATION OF CULTURAL ASSETS

Well-known public and private museum in Belgium, Catalonia and New York City have been analyzed to compare the content of their websites. The websites were studied to gain additional knowledge to design the ideal museum website. All websites studied contained a high volume of available information, which is an essential characteristic for an ideal museum website. However, many websites were flawed in their ease of performance and efficiently.

Private and public museum websites
The study of the different websites of the museums analyzed aids in determination of the tendencies of each kind of museum depending on its funding.

Belgian museum websites
The Duesberg Museum is a private museum in Belgium. Its website has a design that resembles a blog: white background with stripes, horizontal menu at the top and horizontal submenu of the museum's basic data. Each page of the museum has the same format and header. The sections on the submenu contain the following pages: home, agenda, history, permanent exhibition and gallery. It is a very static website in that each tab leads to an article. The only exception is the gallery tab in which there is a very basic presentation of images from the museum's collections. There are links to the museum's Facebook, Twitter and Instagram at the bottom of the page.
The public museum selected is Belgium's Fine Arts museum. Their website has its own style very different from the public museum since it does not have the format of a blog. At the top is the main menu where one may choose the language, get contact addresses or buy tickets. The second horizontal menu contains the following tabs: practical information, exhibitions, activities, the collection, museums, the institution, education and research. Within each tab there is a section with several sub-sections in images. The

exhibitions tab shows, with a very intuitive calendar, all the collections with the option of clicking on them for more information. The works of the museum may not be seen on the web but each collection is represented on the website. While there is more written information than images, the website is organized in a very visual way. The educational zone is not an online zone; there are only programs for physically visiting the museum for educational groups.

United States museum websites
The selected private United States museum is the Newseum in Washington D.C. The website is extremely visual with a small horizontal menu with the basic information of the museum such as the contact, the store and basic information. Below this menu follows a second interactive menu with the tabs: visit, exhibitions, events & programs, education, support, and about. The dynamic header of the website informs all the upcoming exhibitions in the museum in which one may select "institute, membership and buy tickets". The remainder of the main page consists of images with titles about new exhibitions, events and a calendar arranged on a grid. Like the Belgian public museum, there are no online galleries but may multiple photographs of each exhibition.
The public museum of the United States chosen is the 9-11 Memorial. Surprisingly, the main page is very similar to the private museum despite highly different organizational goals and content. It is comprised of two horizontal menus, the top one with the most basic information and the main one with the following tabs: visit, memorial, museum, teach + learn, get involved and donate. The header is also dynamic and shows the activities and tours that take place in the museum. The main difference with the website of the private museum is the content of the tabs. When entering a tab, there is no dynamic header and the website resembles a blog: written articles, information and photographs. However, it is the only museum that has an interactive virtual tour. There is a tab dedicated to the museum's spaces and a map. A highlight is that there is a private area for each user and an educational area.

Catalan museum websites
Finally, the Catalan private museum chosen is the Salvador Dalí Museum. At first glance, this museum website looks like a digital newspaper. It includes a horizontal top menu that displays a vertical left side menu. The top menu consists of the language selection and the following tabs: museums, Dalí, artwork, research, educa dalí services and Dalí foundation. In the subsection, one may find the links to the online store, activities, press and friends. Within each section there is generally written information about the museum. It is not a very dynamic website but unlike other websites, the direct links to the social networks (Facebook, Instagram, Twitter and YouTube) of the museum stand out. There is also a wide online collection in which there is the possibility of looking for works of art with their accompanied

characteristics. Online educational games offer users an opportunity to learn about Dalí's work. This website contains more information about the author, his work and activities. However, this abundance of information may hinder the ease of searching on the website due to its lack of aesthetic.

The public museum chosen is MNAC. The main page is very different from the ones we've seen so far with a black background and a totally dynamic page. There is a horizontal main menu in the upper left where the following tabs are displayed: visit, collection, exhibitions, what's on, learning, participate and about it. In the upper right corner, one may choose the language and enter the personal area. When entering each tab the dynamic and visual design remains the same and users can easily reach to find content of interest. Once users have arrived at the desired information, there is a short description. One may visit works of art online and read the information of each one. As in the website of Salvador Dalí, it contains a variety of information but is more pleasant and intuitive. There is no information about social networks on this website.

The following table synthesizes the characteristics of each website:

Table 1: Synthesis of the Characteristics of Analyzed Museum Websites

	Blog/ hybrid/ visual	Online Galeries / Tours	Educational zone	Social Networks	Good calendar	Detailed descriptions	Design
Belgium private	Blog	Galeries	No	Yes	No	No	Good
Belgium public	Visual	Galeries	No	Yes	Yes	Yes	Very good
US Private	Visual	Galeries	Yes	Yes	Yes	Yes	Very good
US Public	Hybrid	Tour	Yes	Yes	Yes	Yes	Very good
Catalan Private	Blog	Galeries	Yes	Yes	Yes	Yes	Good
Catalan Public	Visual	Galeries	Yes	Yes	Yes	Yes	Very good

Websites similarities and differences

The websites of museums that have many links within others may be detrimental to the efficiency of that website in the way it interferes with targeting specific information. Based on this concept, the two websites of Belgian museums are simpler than those of the United States or Catalonia. Although, this simplicity makes the Duesberg website possess bare characteristics that would be vital to the creation of an ideal website. All the websites have the schedules and the location but not all of them have online tours. The seventy percent of visitors that decide to go may reconsider being that the online tours retracts from the experience of those who have yet to visit the museum.

The 9/11 Memorial is the only museum that possessed the convenience of an online tour within their website. Because of this, indecisive visitors may be inspired to visit it physically.

All the websites that contain an interactive calendar have information about the future exhibitions and events, a feature that interests visitors after visiting the museum physically.

Regarding the evaluation of the design, comparing designs of the private and public websites by each country is critical. At first glance, Catalan national museum's website seems to be more worked than Dalí Museum's website. The US selected museums have a similar visual design; both have similar structure but the 9-11 Memorial & Museum are more intuitive and easier to navigate. In the case of the Belgian websites, in our analysed cases there exists a situation very similar to the Catalan websites; public museums have a more visual and dynamic design while private museums have a blog design with a less satisfying aesthetic.

Nonetheless, there is a similar trend between the three countries in the museum webpages we have analyzed; the websites of public museums are more attractive and dynamic than the private ones.

3 EMPIRICAL STUDY

Our society is changing very fast. To know what people is demanding to a museum webpage we have conducted a survey to students of the universities of Belgium, New York and Catalonia. The survey was answered by 98 people and questions were based on the studies of Paul F. Marty's articles about museum digitization.

Survey construction

The survey consists of 10 questions which provides insight to an idea of the relationship between museum websites and its visitors. The first question helps to understand whether university students visit museums regularly. The more museum visits the survey received, the better the results. The second question asks which kind of museums people tend to visit. The answer options included "Art, history, religious, sports or other".

The following questions discuss visiting the website before and after visiting the museum in person. People are more likely to visit the museum's website before visiting the museum compared to after. If the majority visit the museums website before, then the website must have different information than if the majority visit the website after. For example, if a visitor lacks ample time to travel throughout the museum, they may be inclined to visit its website for more about information about the exhibits they were not able to see and hours of operation. However, for the counter situation where one is not interested in a specific exhibit, he or she may visit the website to better understand future listings for exhibits that are more enticing to their interests. Shown through various surveys, people want a wide range of different components within a website to appeal to their interest.

To better understand what university students, consider to be an ideal website, the exact contents of the website (i.e. basic information, upcoming exhibits, description of the different collections, museum career opportunities, museum map, mobile app, store forum and/or detailed information of the museum pieces) were asked to be ranked in order of importance. The following question inquires about the design and desired aesthetic of the website (i.e. organized sections, high quality materials, ease of use and online galleries). The survey concludes with a question about the

respondents country of origin and if they are a student or academic.

4 THE IDEAL MUSEUM WEBSITE

This section provides an analysis of the results from the survey, thus allowing for the applied development of the ideal museum website based upon the sample of respondents. Following, there is a comparison between the results obtained and web pages used as a reference for each country to understand which websites meet the proper requirements.

Survey results

The online survey was administered from March 28th to April 4th. There were 98 responses from Belgium, Catalonia and the United States. The respondents answered of the ten questions.

First, they were asked how many times they visited museums last year. Approximately 79% answered between 0 and 5 times, 19% between 6 and 10 times and only approximately 1% answered between 11 and 20 times.

Figure 4.1. Number of times people visit a museum during a year
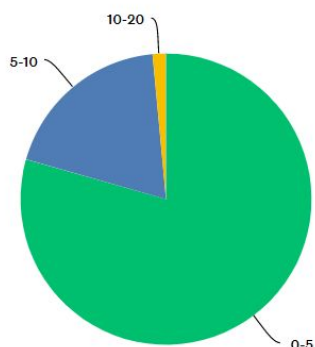
People surveyed visited art (67%) and history (64%) museums but only few (8%) visited religious and sports (8%) museums. The remainder (14%) visited other museums which included thematic areas such as science, cinema and photography (Figure 4.2).

Figure 4.2. Type of Museums Visited
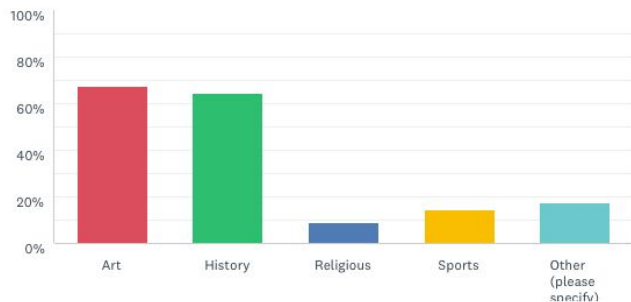
When asked whether they visited the museum's website before and/or after visiting the museum in person, results showed that they are more likely to visit before than after. Alternatively, the results of visiting the website before are as follows: 24% always, 47% sometimes and 27% never. The results of visiting the website after are as follows: 7% always, 29% sometimes and 63% never.

Figure 4.3. Number of people who says visit museum website before visiting the museum physically
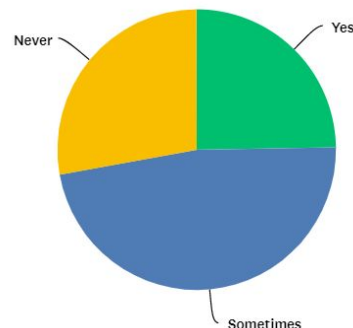
Figure 4.4. Number of people who says visit museum website after visiting the museum
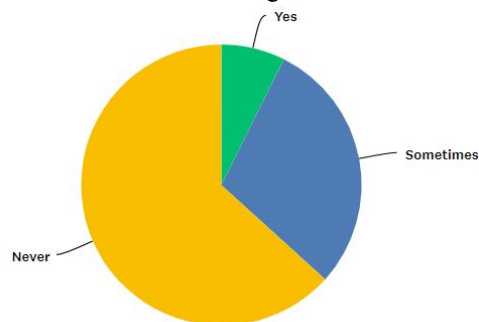
Per the results by order of importance (Figure 4.5.) the components that are needed in a museum website are:

1. Basic information such as hours, location, admission prices, etc.
2. Upcoming exhibits, events and tours
3. Description of different collections
4. Museum map
5. Mobile app
6. Museum career opportunities
7. Forum
8. Store

Figure 4.5. Importance of the Components of Museum Website
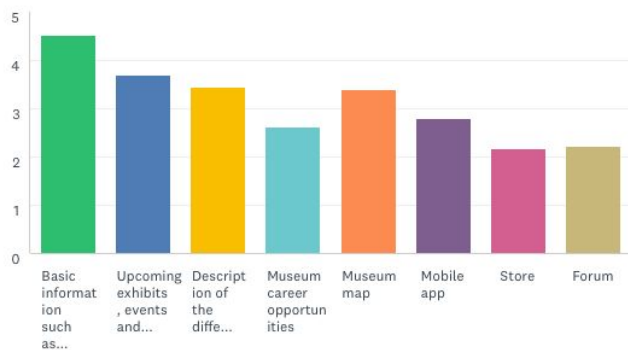
A respondent suggested that they would like to find a section for feedback about their experience.

The social networking that respondents consider more appropriate that a museum needs to have is Facebook (69%), Instagram (45%), Twitter (32%), YouTube (30%) and others like Snapchat and Google. Only 2 of the respondents surveyed do not believe a museum need social networks.

Figure 4.6. Social media platforms are essential for museums
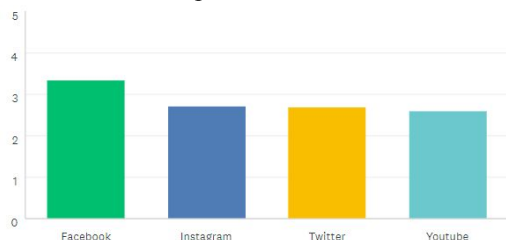
Of the survey respondents, 42% are sometimes influenced to visit a museum based on their experience with the museum website. Only 23% are not influenced; the other respondents (33%) are influenced by the website when they visit museums.

Figure 4.7. Influence of museum website on the decision of visiting physically the museum
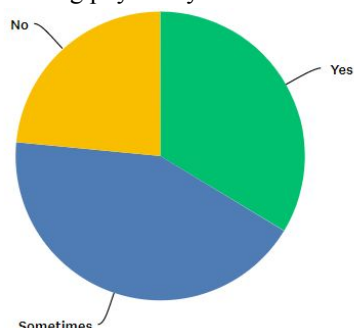
The respondents ranked the importance of the following components on a website listed as follows:
1. Ease of use and accessibility
2. Organization of the pages and sectors.

3. High quality of materials (videos, images and graphics)
4. Online galleries.

Figure 4.8. Characteristics people look for when using an efficient website
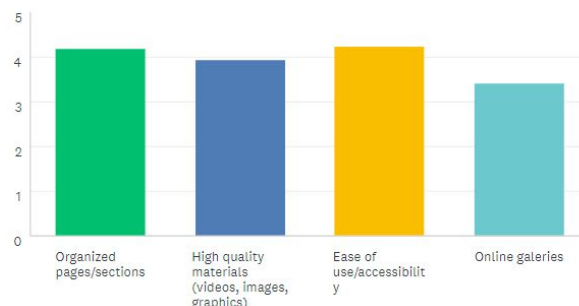
Characteristics of the ideal museum website

Aside from the basic information such as schedules and pricing, it is important that websites are well organized and have high resolution images for each collection accompanied by explanations and descriptions of the works. Generally, it is necessary for a museum website to facilitate navigation and access, as well as possess good organization of pages and sectors.

Social networks play an important role as they are also a digital resource that can be complemented with the website. Respondents agreed that the most important social networks a museum must have are Facebook and Instagram.

With all these features, the components and ideas of an ideal website may be gathered. If utilized properly, the experience of the visitor to the museum may be optimal.

After analyzing the results, it is understood that the websites chosen contain all important characteristics and components that the respondents think are relevant.

Table 2: Synthesis of Characteristics of Analyzed Museum Websites

	Basic information	Good organization	Quality images	Good descriptions	Facebook
Belgium private	Yes	Yes	Yes	Yes	Yes
Belgium public	Yes	Yes	Yes	Yes	Yes
US Private	Yes	Yes	Yes	Yes	Yes
USPublic	Yes	Yes	Yes	Yes	Yes
Catalan Private	Yes	Yes	Yes	Yes	Yes
Catalan Public	Yes	Yes	Yes	Yes	Yes

These websites have ideal features such as design, appeal and the ease of finding sections making them better than other websites. Comparatively, in our study public websites are perceived better than private because of the visual, ease and complements they encompass. On the other hand, depending of the type of museum being discussed and what the institution wants to share, the website should have some compliments more visualized or inclusive than others. For

example, when a museum has several exhibitions or events, having an attractive calendar represented is ideal. Maintaining an updated website with new expositions and technology such as a virtual tour is important for a successful interactive website.

5 CREATING THE HEART OF A WEBSITE

A practical application of the prior stated research findings sets the framework for development of the most effective website for the benefit of museum profitability and public engagement goals.
Features, web-pages, and site subsections of particular importance have been developed in accordance with our research results and analysis of correlations.

The website with HTML and CSS
The website model has been developed primarily with HTML and CSS static integration, enabling more universal applicability of the prototype within a multinational framework. HTML enables a standardized system to create the structural components of the website while CSS is a style sheet format language defining graphic formatting content.
Of primary importance, a clear, easy-to-read landing Home page must immediately behold the attention of online users with no superfluous information. An interactive drop-down menu allows access to all other parts of the website and a scrolling banner informs visitors about upcoming exhibitions or events.
The home page contains basic information such as museum news, contacts and live information. Our research indicated that a daily highlight on a particular museum piece could market toward returning visitors, as could be implemented through a "Work of the Day" section updated daily.

Figure 5.1: Home Page, Prototype-Original

The landing page format is demonstrated in Figure 5.1. This will be the page on which the visitor will come looking for the museum in his browser. To navigate between pages users can simply mouse over the "Menu" tab and a drop-down

menu containing all the links will appear upon scroll (Figure 5.2).

Figure 5.2: Functional Drop-Down Menu. Prototype-Original.

The source code for the development of such a menu can be easily integrated across multinational server models, as the code can be programmed simply as demonstrated in Figure 5.3.

Figure 5.3. Drop-Down Source Code
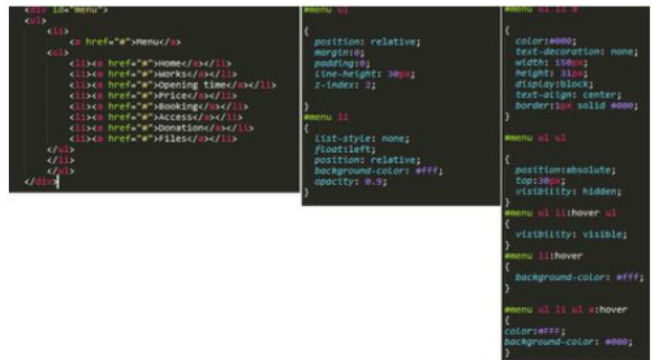
Interaction with Node.js
The interactive structure of the website prototype model is constructed through Node.js, an open-source cross-platform. It is a very powerful model environment currently used for web interactions, proving reliable since 2010. The appearance of V8 runtime engine on browsers enabled high-speed JavaScript reading. JavaScript works in event-driven mode: as soon as an event is going to be triggered there will be instantly an action linked to this event.
Node.js allows JavaScript programming on the server side to switch to a non-blocking model. This services several for goals for our ideal website model to be executed simultaneously. As depicted in Figures 5.4 and 5.5, when traditional PHP language is utilized, continuous refreshing of

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the page slows content and development while Node.js implementation allows for much faster integration and connection with client visitors to the museum server, thus resulting in faster reach to the target market of potential visitors.

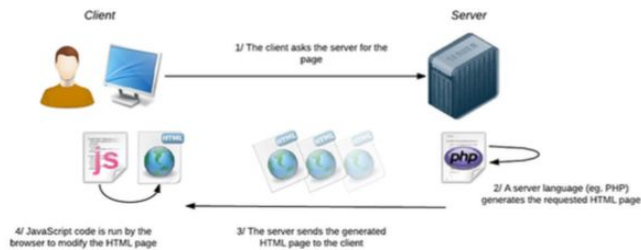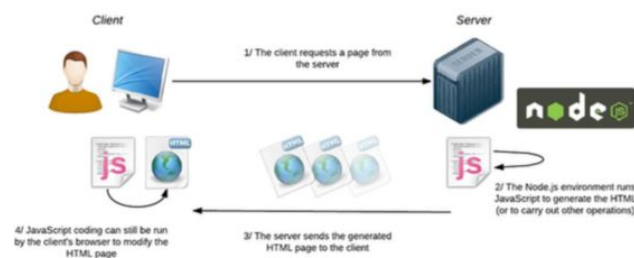Figure 5.4. Client-Server Model PHP. Openclassrooms

Figure 5.5. Client-Server with Node.js. Openclassrooms

Node.js is strengthen by the platform's community and modules. This community allows access to existing modules necessary for the development of ideal museum webpages, which can be utilized and easily implemented.

The utilization of Node.js module technology is essential in providing a dynamic and fluid communication and feedback link between users and the server through the form of comment and contact sections. Such data can be collected for analysis and integration into museum strategic planning, along with collection of live visitor information such as site visitor population and API management, (as discussed in the section upcoming).

Node.js is a strong and broad enough platform to offer the opportunity for future website development and enhancements, including interactive games and high-speed photo and file sharing uploads and networks integrated onto the site. Any museum, therefore, forecasting toward adapting and shifting toward a smart museum digital museology should integrate such an adaptive program.

APIs (Application Programing Interface)
APIs are programming interfaces that allow certain software applications that would be essential to driving visitor traffic to physical museum locations. APIs enable linkage with the Google Maps associated location of museums compared to potential visitors, number displays of available spaces in the museum's car park, and even relevant weather effects. Additional data such as exhibit wait time could also encourage visitor traffic.

Google Maps V3 API is integrated into the ideal digital museum site, allowing the display of Google maps and the location of the museum to facilitate its location. Installing an API requires use of JavaScript. This is a two-step coding process first requiring display of the map with the correct longitude and latitude followed by selection of an appropriate default geographic zoom.

A marker must then be integrated to allow for easy locating of the museum on the interactive map.

Figure 5.6. Source Code for Google Maps

Figure 5.7. Google maps

Future Site Evolution
A fully-functional and effective website is never entirely finished. Constant updates are vital to maintaining a strong focus on marketing toward visitor targets. Software and programs, graphic design and visual content, and security measures must consistently be reviewed and analyzed to ensure efficiency.

Ideally, interactive game developments could ensure steady traffic to the site, encouraging smartphone and tablet integration across various visitor demographics. Gaming development could be integrated into future museum sites internationally to sustain the relevance of the industry, transforming each museum site into a unique and engaging mini application.

6 CONCLUSION

Since the revolutionary integration of the Internet into international society, the relationship between the different stakeholders have modified, leading to new models of business. Growing integration of digital technologies into society requires businesses and non-profit organizations

alike to incorporate their models into such technologies and adjust operational structures accordingly.

Digitization in the wake of the survival of museums serves to improve and service a wider-range of society as these institutions stand for cultural and educational resources.

The main goal of this project has been to know what the ideal museum website should encompass to attract people to visit a museum physically. Through modeling the ideal museum website based upon market preferences, this research serves as a model in attracting physical visitor traffic to museums in the wake of digitally available information.

Such a model has been structured in accordance with acute attention to the legal framework of museums in the United States, Belgium and Catalonia. Guiding academic literature and studies surrounding museum website strategic development and target market research surveys have guided the model's development.

It is vital to the survival of the modern museum that these institutions maintain strong website presences to develop strengthened relationships between visitors and the museum organization. This research sets a model for formatting and content universally imperative to achieving such goals.

The results and pre-research indicate some data correlations and comparisons. Such data finds that people visit more museum websites before physical visits to the museum than after and that the basic information such as the location, timetables and prices are among the most important data of a museum website to drive visitor traffic. Standards for strong organization and ease of use within the website formatting were also developed based upon user preferences. The role of social networking was also examined, finding that popular networks, especially Facebook, encourage a strengthened relationship between visitors and the museum and to upload the important content about the museum and share the different sections of the website. Such interaction increases probabilities of physical visits.

The prototype modelling considered the needs and wants of the target visitor market based upon applications of market research.

This development of a model through research provides added value by obtaining information of interest on the need for the digitization of museum collections and resources, servicing this industry of education and culture.

Production of intelligent cultural services is at the forefront of launching modern society into future socio-economic waves, guiding societal interaction with cultural content. Museums are traditional institutions but they are changing and adapting in efforts to enter into the digital age. A shift in museology toward the digitalization of culture and information will enable museums to sustain and fulfill their universal mission of preserving and spreading culture and education in society. The digital world opens new perspectives, bringing current and future generations greater and universal access to culture and information, a revolution that museums can survive within in accordance with a shift in focus and content-delivery. This can be enabled through the development of fully-functional web content that drives visitor traffic.

REFERENCES

9-11 Memorial & Museum of New York website
https://www.911memorial.org/museum

Arinze, Emmanuel N. (1999). The Role of the Museum in Society. Recovered from:
http://www.aam-us.org/about-museums/museum-facts

Bautista, Susana Smith. Museums in the Digital Age : Changing Meanings of Place, Community, and Culture, AltaMira Press, 2013.

Departament de Cultura - Estadístiques de públic de museus
http://cultura.gencat.cat/ca/departament/estructura_i_adreces/organismes/dgpc/temes/museus/Dades-de-museus-i-col_leccions/estadistiques_de_museus_70_pdf/

"Exhibiting Public Value: Government Funding for Museums in the United States " *Institute of Museum and Library Services*. December 2008

Fédération Wallonie-Bruxelles, Patrimoine Culturel (2017). Arrêté du Gouvernement de la Communauté française portant exécution du décret du 17 juillet 2002 relatif à la reconnaissance et au subventionnement des musées et autres institutions muséales. Recovered from:
http://www.patrimoineculturel.cfwb.be/index.php?eID=tx_nawsecuredl&u=0&g=0&hash=8cf5fd01b9810b4a89b8f5d29a394f6d54afee1b&file=fileadmin/sites/colpat/upload/colpat_super_editor/colpat_editor/documents/Arretes/Arr%C3%AAt%C3%A9Musees221206.pdf

Openclassrooms. Des applications ultra-rapides avec Node.Js
https://openclassrooms.com/courses/des-applications-ultra-rapides-avec-node-js

Paul F. Marty (2007) Museum Websites and Museum Visitors: Before and After the Museum Visit .

Paul F. Marty (2008) Museum Websites and Museum Visitors.

United Nations Sustainable Development Goals: Education
https://www.un.org/sustainabledevelopment/education/

OTHER RESOURCES

Google Maps. Musée des sciences Naturelles
https://www.google.com/maps/@50.8356351,4.36625,15z

Musée des Beaux-Arts de Bruxelles website
https://www.bozar.be/fr

Museé François Duesberg of Belgium website
http://en.duesberg.mons.be/

Museu Nacional d'Art de Catalunya website
1http://www.museunacional.cat/en

Newseum Museum Washington D.C. website
http://www.newseum.org/events-programs/

Royal Museum of Fine Arts of Belgium website
https://www.fine-arts-museum.be/en

Salvador Dalí Museum of Figueres website
https://www.salvador-dali.org/en/museums/

APPENDIX

BELGIUM PRIVATE DUESBERG

BELGIUM PUBLIC FINE ARTS

US PRIVATE NEWSEUM

US PUBLIC 9-11 MEMORIAL

CATALAN PRIVATE SALVADOR DALÍ

CATALAN PUBLIC MNAC

SURVEY

How many times did you visit a museum last year?
- 0 - 5
- 5 - 10
- 10 - 20
- 20 +

What type of museums do you visit? (Select all that apply)
- Art
- History
- Religious
- Sports
- Other (please specify)

Did you visit a museum website before visiting the museum in person?
- Yes
- Sometimes
- Never

Do you visit a museum website after visiting the museum in person?
- Yes
- Sometimes
- Never

Please, value the following museum website components in order of importance (1 being not important, 5 being essential: Not at all important, Not so important, Somewhat important, Very important, Extremely important)
- Basic information such as hours, location and admission prices
- Upcoming exhibits, events and tours
- Description of the different collections
- Museum career opportunities
- Museum map
- Mobile app
- Store
- Forum

How important is having detailed information (artist, origin, date) on specific pieces on a museum website?
- Extremely important
- Very important
- Somewhat important
- Not so important
- Not at all important

Which of the following social media platforms are essential for museums to have? (1 being not important, 5 being essential)
- Facebook
- Instagram
- Twitter
- Youtube

Do museum websites influence your decision to visit a museum?
- Yes
- Sometimes
- Never

What do you look for when using an efficient website? (1 being not important, 5 being essential)
- Organized pages/sections
- High quality materials (videos, images, graphics)
- Ease of use/accessibility
- Online galleries