

Smart Innovation, Systems and Technologies 293

António Abreu
Dália Liberato
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Advances in Tourism, Technology and Systems

Selected Papers from ICOTTS 2021,
Volume 1



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Juan Carlos Garcia Ojeda
Editors

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Preface

This book—*Advances in Tourism, Technology and Systems*, Volume 1—from the SIST Series is composed of the best selected papers accepted for presentation and discussion at the 2021 International Conference on Tourism, Technology and Systems (ICOTTS 21). ICOTTS is a multidisciplinary conference with a special focus on new technologies and systems in the tourism sector and was held between November 4 and 6, 2021. ICOTTS 21 was supported by the University of Cartagena, in Cartagena de Indias, Colombia, and by International Association for Digital Transformation and Technological Innovation (IADITI).

The International Conference on Tourism, Technologies and Systems is an international forum for researchers and professionals in the tourism sector, which enables the discussion of the latest innovations, trends and concerns in several areas, in the tourism sector, associated with information technologies and systems. It is an event for professionals in the sector, in search of technology solutions, where academics, IT experts and business managers meet to discuss new ideas that help them maximize the potential of tourism business through technology.

ICOTTS 21 scientific committee is composed of a multidisciplinary group of 137 experts who assessed some 245 papers from 22 countries, received for each of the main topics proposed for the conference: (a) tourism research in providing innovative solutions to social problems; (b) information and communication technologies in hospitality and tourism industry; (c) sustainable tourism; (d) tourism trends; (e) health and wellness tourism; (f) tourism management; (g) marketing strategies in hospitality and tourism industry; (h) hospitality, tourism and foodservice environment; (i) tourism in the different scientific areas; (j) eTourism and Tourism 2.0.

The papers accepted for presentation and discussion at the conference are published by Springer and will be submitted for indexing by ISI, Scopus, Ei Compendex, Google Scholar and SpringerLink.

We thank all those who contributed to ICOTTS 21 (authors, committees, workshop organizers and sponsors). We deeply appreciate your involvement and support, which were crucial to the success of the conference.

Porto, Portugal
November 2021

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Chapter 14

The Potential for ICT in New Museums—The Case of the Douro Museum



Isabel Vieira, Didiana Fernandes, Bárbara Amaro, and Aida Carvalho

Abstract The relationship between the exponential growth of Cultural Tourism and the multiplication, requalification, and diversification of Museums is widely accepted. The swift evolution and proliferation of Information and Communication Technologies have opened up new possibilities, both in the management of heritage assets and in the way they should be shared with the public, by providing new entertaining and educational ways to do so. The Douro Demarcated Region, unique from a historical, economic, social, cultural, and environmental point of view, received in 2008 Portugal's first Territory Museum, the Douro Museum, which has been exploring the resources made available by ICT to better fulfill its Mission of musealization of the territory. This process includes an online presence (to disseminate activities and share information about the Region), an exhibition space (which is equipped with tools and devices that convey a wide range of information), and digital access to the collections (focusing on a more specialized/academic public). These experiences have shown that the use of technologies broadens the museum ecosystem and multiplies the types of audience who take part in the various museological and cultural initiatives. This way, ICT is increasingly recognized as important tool used to broaden the museums' scope of influence across a given territory.

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14.1 Introduction

We live in the Information Age. However, to say that we live in the Age of Information and Communication Technologies would be more appropriate, given the omnipresence of devices through which that information reaches us. Their capacities and applications have developed in such a way that they became a major part of any sector of human life, including—or above all—those related to leisure and Tourism.

14.1.1 *The Tourist-Museum Binomial*

Tourism is an example of an economic activity with sustainability and accessibility concerns, in which the specialization of supply and the requalification of products are key elements to differentiation and success. 2019 was the sector's tenth consecutive year of worldwide economic growth [1]. Prior to the Pandemic, Tourism accounted for 10.6% of all jobs and 10.4% of global GDP [2]. Cultural Tourism—in which museums exert a powerful attraction—has been the fastest-growing segment of the tourist industry. On the other hand, funding, sustainability, and relevance needs have led museological institutions to explore their touristic potential. Thus, the Tourist-Museum binomial became an interdependence relationship [3].

Contemporary Museology. Long gone are the days when the word “Museum” was synonymous with exhibition or collection. Modern Museology, triggered by the scientific and Enlightenment enthusiasm of the eighteenth century, gave way to the principles introduced by the New Museology movement of the 1960s [4]. This movement was responsible for the birth of the “integral museum” that broke down the traditional boundaries of museological action (conservation and exhibition) to address people's needs and those of contemporary societies. From mere inert and hermetic institutions, Museums became a unique link between the social and cultural structures [5, 6].

The current ICOM (International Council of Museums) definition of “Museum” places them “at the service of society and its development” [7] since development cannot be conceived without upstream cultural action [8].

14.1.2 *ICT and Museology*

The possibilities that ICT opens up for Museology are vast and focus on two essential aspects: (1) the creation of products and experiences for the visiting/tourist public and (2) the construction of widely accessible documentary archives [9]. Their great potential is closely related to the digitization and the access to collections and data [9, 10, [11], but they are also closely related to the museums' educational nature, shaping the way these use technology to deepen their educational practices [9, 12, 13].

That way, ICT infinitely broadens the number and types of museum users. They offer a wide range of solutions to enrich the physical visits by opening a window to a number of possibilities and specializations, enlarging the exhibition ecosystem [11, 12]. Simultaneously, they make cultural consumption available when and where users want to hear or view it, turning “digital culture” into a synonym of “accessible culture” [10, 14].

ICT are channels of dialog between the Museum and its public, however, it is true that technologies can become a mere trend and that the proliferation of apps, QR codes, and interactivity is often used as an end in itself and adds no real value to the experience [10, 12, 14]. Despite the warnings that technology would devalue the communication between people who are moving physically around the museum space, their attention being absorbed by the electronic device and away from the central museological object [13], experiences have shown that, when used correctly, it keeps visitors mindfully in contact with the objects and the time spent in the exhibition is longer than without any technological devices [10].

However, the application of ICT to the museological environment carries some problems, namely the costs associated with their design and installation, the need for specialized maintenance, and frequent content updating. Another complex issue is related to the way museum collections can be made available to the public, and the need to create normative, scientific, and methodological frameworks that regulate the use of information outside the museum environment [9, 10, 13].

Overall, we can say that the use of ICT is not a panacea for contemporary museums, but it can highlight the work done and provide the public with a visit that does not end when they leave the museum, as they can carry it (literally) in their pocket [15]. This is because, in addition to the use of technology in the exhibition space, social media have introduced a shift in the power balance and given visitors a greater control. The museum is responsible for choosing the way it will deal with this new paradigm: will it consider it a threat or an opportunity. Listening to the messages or comments left on social media lets the museum know what matters to the public. At the same time, sharing behind-the-scenes images of an exhibition set-up, rather than just showing the final result, gives the public a sense of being part of an exciting “secret”. Instead of waiting for the public to show at the end of such process, the museum is calling and building its audience through social media, which is a better marketing tool than other forms of promotion, since it requires little financial and human resources [10, 15].

To illustrate these concepts, we will look at the use the Douro Museum—a Territory Museum—makes of different types of media and technologies to carry out its mission of being a reference in the preservation of the memory and in the dissemination of the heritage of the Douro Demarcated Region. After exposing the methodology that conducted our research (Sect. 14.2), we will demonstrate the unique case that is this first Territory Museum in Portugal (Sect. 14.3) as we highlight the ways in which technology enriches the user’s experience, whether online, in the exhibition spaces or digitally accessing the collections (Sect. 14.3.1). The choice of this Museum stems from the need to understand how ICT can serve the mission of an institution that has its focus of action outside its four walls, spread across an area of 250,000 hectares.

14.2 Methodology

In order to investigate how ICT can be adjuvants in the processes developed by Cultural Tourism institutions, such as museums—more specifically those whose typology spawned from the New Museology Movement—we analyzed the case of the Douro Museum. We aim to learn which technologies are being used by that institution and how, and understand the potentialities and limitations of such use.

This article is a case study since it provides a unique example of a real entity in a real situation to illustrate themes and concepts that otherwise would be just abstract principles [16]. Taking into account the research objectives, a qualitative approach was followed—the most suitable for understanding social phenomena in the environment in which they occur [17]. The data collection methods of choice were direct observation and documentary analysis.

The sources selected were mostly official institutional documents (Activity and Accounts Reports of the Fundação Museu do Douro), information and communications available online through the institution's own channels (website or social networks), internal documents (activity reports prepared by each Service), and quantitative data from the entities that were responsible for managing the programs or products available. In addition to the analysis of these sources, which provided a detailed account of the actions carried out by the various services of the Douro Museum, some informal conversations with collaborators were useful to clarify some details regarding the information collected.

For data collection, we resorted to the use of reading sheets (for analysis and synthesis of information) and content analysis, with the purpose of observing changes and innovations in ICT. The quantitative analysis focused on the frequency of the characterizing elements, while the qualitative focused on the value of novelties and interests. Strategically mutually exclusive analytical categories were defined—Online presence, Exhibition space, and Digital access to collections—so that, later, relationships and associations could be established and then combined to draw conclusions.

14.3 The Case of the Douro Museum

One of the most prominent New Museology experiences in Portugal is the Douro Museum (DM), the first Territory Museum in the country, dedicated to the Douro Demarcated Region, the wine-growing area for the Port and Douro Appellations of Origin. Its 250,000 hectares reveal a striking landscape contrast to the surrounding regions and an identity cohesion rooted in its wine-growing vocation [18].

As a Territory Museum, its mission revolves around two main spheres: (1) approaching the various manifestations of the region's heritage and (2) maintaining a constant communion with the routines of the region, its people, and its institutions [19]. It is to be hoped that the pursuit of these objectives could be compatible with

the creation of exhibitions and cultural programming aimed at the visiting public, attracting flows of people and capital to the territory.

Created by a Decree-Law issued by the Portuguese Parliament, it is managed by the Fundação Museu do Douro, F.P., which guarantees the territorial representativeness and institutional diversity of its founders. Conceived as a polynuclear structure that spreads across the region, its headquarters was inaugurated in December 2008, in Peso da Régua, the historical and institutional capital of the Demarcated Region. In 2019, 56,767 visitors visited the DM headquarters. In 2020, given the pandemic context, that number dropped to 14,602 [20].

14.3.1 *ICT in the Douro Museum*

Nowadays, museums favor a close communication with their different audiences (institutions, partners, locals, and tourists). The recent context of the Covid-19 pandemic has naturally reinforced the power of digital communication, so there was a focus on sharing information online and a significant investment was made to provide their staff with the training to make the best possible use of these resources and allow a greater dissemination through social networks, newsletter, and mailing.

A large part of the DM publications and exhibitions has already been available in digital format thanks to the work carried out by the museum's Educational Services. They have also been responsible for exploring audio-visual resources to create products like the IMATERIAL project, which was designed to create a vast database that includes a collection of video and audio recordings of places in the Douro landscape (*Apeadeiros* project), of unique stories told by the inhabitants of the region (*First Person Stories* project) and of experiences linked to the cultures of the region and the families that work its lands (*Cultures and People* project).

As for the contact with the public, ICT provides the DM with several possibilities that are explored according to three main spheres:

Online presence. The DM's primary digital tool is undoubtedly the institution's website—www.museudodouro.pt. Launched in 2008, it was awarded an Honorable Mention by APOM (Portuguese Museology Association) and was renewed in 2015. It was given a more attractive image and new features that include tabs related to the different services offered by the Museum (Educational Service, the Douro Museums Network, and collections databases). A detailed analysis of the website shows that it provides a wide range of contents (informational, emotional, interactive, and transaction-oriented), as shown in Table 14.1.

Since August 2019 the result of a partnership with the Regional Directorate of Culture of the North, carried out by DETALHAR, is available: the 360° virtual tour of the Museum. More recently, the result of the partnership with Google Arts & Culture platform was also presented, offering a virtual visit to two exhibitions and access to a catalog of 86 objects from the Museum's collection. The use of these two different tools is shown in Table 14.2.

Table 14.1 Content available on the website

1—Informational content		4—Interactive elements	
1.1—Information about present collections	✓	4.1—Audio-guides	
1.2—Information about old collections	✓	4.2—Catalogs	
1.3—Information about future collections	✓	4.3—Virtual tour	✓
1.4—Exhibition calendar	✓	4.4—Educational Platform	✓
1.5—Timetable	✓	4.5—Podcasting	✓
1.6—Ticket price	✓	4.6—Videocasting	✓
1.7—Information about concerts		4.7—Blog	
1.8—Information about cinemas		4.8—RSS subscription	
1.9—Information about presentations	✓	4.9—Mailing list (bulletin news/e-news)	
1.10—Workshops	✓	4.10—Word finder	
1.11—Meet the artist		4.11—E-mail address	✓
1.12—Lectures (Conferences)	✓	5—Presence on Social Media	
1.13—Group activities	✓	5.1—Facebook	✓
1.14—Restaurant/cafeteria	✓	5.2—Twitter	✓
1.15—Training/Research/Restoration		5.3—Google +	
2—Information about Institutional Content		5.4—Youtube	
2.1—Information about the museum	✓	5.5—Pinterest	
2.2—Activity plan		5.6—Flickr	
2.3—Annual report/activities	✓	5.7—Foursquare	
2.4—Museum's publications	✓	5.8—Linkedin	
2.5—Job offers		5.9—Museum Own Social Network	
2.6—Sponsors/patrons	✓	5.10—Google Art Project	✓
2.7—Newsroom		5.11—Other Social Networks: Instagram	
3—Emotional Content		6—Transaction orientation	
3.1—Picture Slideshow	✓	6.1—Online ticket office	
3.2—Video Slideshow	✓	6.2—Virtual shop	✓
3.3—Zoom		6.3—Online reservation	✓
3.4—Download games/Games		6.4—Friends of the Museum Membership	

Source Adapted from Camarero et al. [21]

Table 14.2 Use of the DM virtual visits

Dates	Users	Nr. of visits
360° Virtual tour		
2019 (From Aug. to Dec)	466	605
2020	1668	2068
2021 (Until June 11th)	588	679
Google arts and culture		
From Feb 19th to May 31st	836	2193*

*365 to virtual exhibitions and 1828 to collections catalog

Social networks have proven to be a valuable tool for maintaining the museum's communication with the outside world during the lockdown caused by the pandemic. Twitter, Instagram and, most of all, Facebook were vehicles used for sharing experiences, encouraging people's participation, and sharing results. Live videos managed to draw people's attention to the opening of Leni Van Lopik or Rui Pires's exhibitions, among others, and to the International Photography Awards. In addition to these live events, Facebook was also used to disseminate the work carried out by the Educational Service and the Conservation and Restoration Service, to showcase projects in progress (such as the preparation of the Armanda Passos Room and the rehabilitation of the Panificadora building) and promote training activities, such as the History of Photography Course webinars hosted by José Pessoa. The quantitative data on the scope of these initiatives, which took place until May 20th, 2021, are presented in Table 14.3.

The number of followers for each Social Network, until May 20th, 2021, is shown in Table 14.4.

The Douro Museum is also on TripAdvisor with an overall rating of four out of five points (March 14th, 2021). As for the ratings, 172 (40%) of them were excellent, 185 (43%) were very good, 58 were reasonable and 12 were bad.

Exhibition space. The resources that the museum offers its visitors are designed to provide a representation of the heritage assets—both tangible and intangible—that

Table 14.3 Scope of the events transmitted via Facebook

Service/Activity	Publication date	Pageviews
Leni Van Lopik's exhibition opening	3/05/2021	2.5 thousand
Rui Pires's exhibition opening	14/12/2020	4.8 thousand
International Photography Awards 2020	14/12/2020	4.6 thousand
Educational service, Docum. MALHAS, by Paula Preto	5/03/2021	5 thousand
Conservation and restoration, RIJOMAX Watch	4/10/2020	2.5 thousand
Presentation of the Armanda Passos room	17/02/2021	3.5 thousand
Rehabilitation works of the Panificadora building	24/02/2021	919
3rd History of Photography Training Course—José Pessoa	3/03/2021	667

Table 14.4 Social networks followers

Social network	Nr. of followers
Facebook Douro Museum	15,485
Twitter Douro Museum	615
Instagram Douro Museum	2551
Facebook DM Educational Service	829
Facebook Douro Museums Network	1849
Twitter Douro Museums Network	19
Instagram Rede de Museus do Douro	331
Facebook Sounds of Douro	4310

are scattered across the territory. This is the case of the Video Wall that displays images of the Winescape—the central topic of the museographic survey conducted in a UNESCO Cultural Landscape. The size and definition offered by such equipment allow for a more immersive and detailed viewing of the traditional aspects that make up the Douro landscape mosaic.

The screens are a constant presence around the exhibition space, providing videos and photographs meant to illustrate the concepts described in the panels and the objects on display. As an example, let us consider the complex task of grafting: in addition to a text alluding to the process and the presence of the tools used to perform such task, a video shows what the process is all about. This simplifies and shows a number of complex tasks related to traditional know-how that would otherwise be difficult for the tourist to understand.

A collection of great visual and historical interest is that of the Port Wine Labels and Posters. This vast database is displayed on two screens placed next to some real labels, thus allowing the contact with a much larger number of specimens.

Two other databases are available thanks to the presence of two interactive screens: (1) one about the Quintas located in the Region allows visitors to deepen their knowledge about the properties and eventually helps them define a circuit that meets their personal preferences; (2) the other focuses on the genetic heritage of the vine, i.e., the grape varieties authorized in the Region. The information is available in Portuguese and English and includes illustrative photographs.

In the center of the exhibition, there is a 3D model that reproduces the topography of the region, while a vertical light projection provides data and figures on demography, heritage, and the agricultural crops that can be found in the different geographical locations. This way, a large amount of statistical data becomes available, and the visual component makes it easier for the visitor to understand the information conveyed.

Audio-visual resources are also used to share museological processes the public is not normally familiar with. The Conservation and Restoration Service makes extensive use of this resource and some of their interventions are displayed on two screens placed around the exhibition space. One of those screens shows the process of disinfecting objects in an anoxic atmosphere and is placed next to a display case

containing objects that are undergoing this specific intervention. The other screen shows the different restoration processes of several objects under the “Identify to Conserve” project. In addition to raising the visitors’ awareness about the importance of preserving these assets, these videos share the scientific knowledge and good practices that guide each intervention.

The Educational Service has its own screen, in the public area of the Museum to disseminate the cooperation projects developed with schools, associations, and the local population.

Audio-visual resources are also frequently used in temporary exhibitions. In Georges Dussaud photo exhibition, for instance, videos were used to reproduce the words of some of the people who were photographed 20 years before. Similarly, videos were also shown in different art exhibitions to share the creative process of artists such as Antoni Tàpies or Bartolomeu Cid dos Santos.

The DM also provides, in the public access areas, an interactive screen that provides information about the exhibitions currently on tour and the products that can be purchased in the shop. This device also includes the digital Visitors’ Book, where visitors can take a picture that documents their visit to the Museum and leave a message. This postcard is stored in the Guest Book and can also be sent to an e-mail address provided by the visitor. An interactive table provides information about the heritage and cultural programming that is being offered in the 21 municipalities of the Region. These two devices illustrate one of the ICT weaknesses previously mentioned: the need for a continuous update of the contents.

In 2018, the museum tour was enriched with audio guides. This resource was part of the Douro INclusive Program and made the contents accessible to different types of audiences. It received, in 2019, the APOM Award in the Management and Multimedia Application Category. Those devices can be rented at the Museum, but the application can be downloaded for free to mobile phones and provides text, audio, and video information. Information is available in Portuguese, English, French, Spanish, German, Portuguese Sign Language, International Sign Language, and in audio description. To make this experience even more stimulating, the visitor is given the opportunity to answer a questionnaire on the topics covered and can get a gift from the Museum Shop when he/she answers correctly to more than 50% of the questions.

Digital access to collections. One of the highest expectations for the first Territory Museum in Portugal was for it to organize itself as a center of resources and data that would be widely available. The museological collections, archives, bibliographical and photographic collections of the DM have been available online for quite some time now and a new portal is currently being prepared, thanks to the ProMuseum program developed by the Portuguese Museums Network/Ministry of Culture. This portal combines the museum’s collections and archive, has a simpler and more user-friendly layout than the old interfaces, and already has 20,503 entries.

14.4 Conclusion

This article lists the different applications of ICT by the Douro Museum that worked as vehicles information for and with its audiences. The online access to the collections is mainly aimed at an academic audience, whereas the exhibition space is designed to provide visitors with an interesting and enriching experience. The analysis of the messages left on the visitors' book and online comments proves that the presence of technological devices is as important as the quality of the personal attention offered to the visitors, both being equally crucial to provide a positive experience.

Social networks proved to be, in the context of the pandemic, the most complete resource for communication, by allowing information to be conveyed and contact to be maintained with the different audience segments. They were able to reach, for the many initiatives developed and offered by the DM, a share of audience that exceeded the number of physical visits that would be expected under normal circumstances, so they established themselves as indispensable tools to maintaining the work and Mission of the Douro Museum. This descriptive analysis and the values obtained prove that these tools should continue to be explored and innovated once the current lockdown context is overcome.

During the course of our study, we understood that the technological assets we found cannot be considered comprehensive of all the options ICT supply. The fact that we observed these technologies and the use made of them in a very specific type of museum, means that other institutions may have different opportunities, potentialities, and results. We also understood that without a proper study of the museum publics it is very difficult to understand in what way the existence of those resources is appreciated by each public segment. Such surveys constitute a valuable tool for the process of designing and building new technological resources in the future.

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