

EVOLUTION IN THE MUSEUM NETWORK AND ITS USE IN THE COVID-19 PANDEMIC

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INTRODUCTION

The city of Burgos, in the north of Spain, is home of one of the few museums in the world dedicated to Human Evolution: The Human Evolution Museum (Museo de la Evolución Humana, MEH). It was originally created as an environment to show to the public the achievements of the archaeological research in the Atapuerca archaeological sites (town of the province of Burgos, 15 kilometers from the capital) but it has evolved to a landmark to the city, becoming also central to its international attractive and cultural life.

The numbers of fossils found was increasing, as was their research and their importance. Hence the need to create a museum and research center to investigate, conserve, inventory and expose the material found in the Atapuerca sites. Its objectives include accessibility, and promotion of awareness and knowledge transfer to all types of public, children, youth and adults, from schoolchildren to expert people, national and international or people with disabilities.

In a very schematic way, it can be equated to chain of knowledge, which begins in excavations, is studied in the research center, is exhibited in the museum and transcends the public (general public and/or scientific community), both fossils, as the results of the studies carried out. All this by different means, physical, face-to-face or virtual.

It's a great potential that is in the province of Burgos with the possibility of visiting the sites and the museum in the same province where then findings that are developed during the annual excavations have been found and where the investigations are carried out in the Research Center National Human Evolution (*Centro Nacional de Investigación sobre la Evolución Humana, CENIEH*) (Alonso Alcalde, 2018).

The international importance is demonstrated by some of its achievements and accolades. Some of them are the one obtained by the Atapuerca Research Team (Equipo de Investigación Atapuerca, EIA) in 1997, which received the Prince of Asturias Award for "Scientific and Technical Research" and in 2000, the Atapuerca archaeological sites received the qualification of "World Heritage Site" by UNESCO, as a consequence of the exceptional archaeological findings, which it houses inside, among which the fossils of four different species of hominids stand out. Becoming one of the most important sites in Europe, due to the amount of remains located in the same area, which makes it a unique place to meet our ancestors and an essential topic for any study on human evolution (Alonso Alcalde, 2018).

The work in common and the same direction, of different centers such as the MEH and CENIEH, with different private and governmental entities, where the Atapuerca Foundation and Atapuerca Culture of Evolution System (Sistema Atapuerca Cultura de la Evolución, SACE) carry out coordination tasks between them to administrative, management, and research level, although with different functions and manager each of them.

The objective of this paper is to observe the positive impact on society, for the acquisition and accessibility of information and data, through “Cultural Digitization” in museums and to the way of using New Technologies. Knowledge Management (KM) gives importance to the generation and transfer of knowledge as well as to technology (Correa Drummond de Alvarenga Neto & Gomes Vieira, 2011).

THEORETICAL FRAMEWORK

Although the theme of the Museum revolves around the evolution of man since prehistory, we find ourselves in the 21st century, in a relatively young museum -cutting edge in many aspects- and a reference scientific dissemination center, where digital technology, internet, and social networks are very present.

The digital media factor must now be considered, as they are increasingly used, in aspects such as online training and / or dissemination, and through different channels, such as social networks or digital platforms. Information technology-based knowledge strategy influences day-to-day work performance and scientific production in research centers and universities (Fernández-López et al., 2018).

From the point of view of the application of new technologies in museums, it can be considered in full process. Computer technologies are increasingly capable of understanding the real world, the traditional distinction between culture and technology has become obsolete. Different approaches to creating mixed reality applications for cultural preservation and also best practices. These systems are engaging and encourage intergenerational knowledge sharing, thus have the potential to aid in the cultural preservation of partner communities (Sieck & Zaman, 2017). The growing demand for technological facilities for museums, galleries and archives has led to the need to design practical and effective solutions in this area. These facilities are intended to help with challenges such as multilingualism, to eliminate the "language barrier" and make it accessible to the people concerned (Dragoni et al., 2017).

THE INFLUENCE ON THE DIFFUSION OF NEW TECNOLOGIES

Scientific Digital Social Networks (*Redes Sociales Digitales Científicas*, RSDC) have been an important advance in the dissemination of knowledge in the scientific community, where more and more researchers agree on the need to be added to some RSDC due to the significant advantages of visibility and impact that they offer (Rodríguez-Fernández et al., 2018). The change and evolution constant of information requires an update of knowledge, as well as the filtering of it, is also favored by the use of these media (de Benito Crosetti, 2013).

Specific social networking platforms for experts, the exchange occurs between very different disciplines and areas, accelerates the dissemination of knowledge and enhances multidisciplinary collaborations, but it can also produce an overflow of knowledge. Therefore, the usefulness of social networking platforms, highlighting the importance of adopting new tools, strategies and methodologies designed to promote transversal or cross-disciplinary engagement (Jerome, 2013).

The analyzes in this study generate many potential lines such as communication, education, accessibility, trust, equality, inclusion or, thanks to the digitization of museums, eliminate “knowledge gaps” such as the “Generation gap”, adapting to the new media and the “physical gap” due to the impossibility of geographical displacement, mobility or the Covid-19 pandemic (Fuentes Morales,

2009) Knowledge Gaps or Knowledge Barriers are increasingly being considered, in fact, after the emergence of the global pandemic, many of them have come to light or have been accentuated.

Barriers in Knowledge Management were reduced in 2012 when the European Research Area (ERA) was created, for the sake of a supposed universal democratization of culture, not exempt in many cases of ethical conflicts. Thanks to digitalization, information and its extension through cultural connectivity networks based on research, creation, innovation and services are shared in terms of culture (Carrasco Garrido, 2012).

The benefits provided by the Museum when interacting with users through digital media and social networks, being open and accessible to all citizens, is to contribute to the growth of a "Cultural Society", eliminating "knowledge barriers" has been corroborated with the event of the World Health Pandemic, it's a fascinating and very interesting topic to describe in this contribution.

Currently, the management of communication for an interconnected and plural society requires public relations policies for its visibility, users actively participate in the knowledge society and museum professionals must adapt to this new situation, both for the internal and external communication in the museum, with the interaction of the public in a virtual environment (Martínez Peláez, et al., 2012). This situation has repercussions for Cultural Organizations, such as archives, libraries, cultural exhibitions, as well as museums. The use of digital media and Social Networks by museums, contributes to the creation of on-line value, in terms of efficiency, novelties, blocking, complementarities, it even favors some performance measurements such as knowing the position of the museum from the point of view of visitors, followers on their social networks or the interest it generates, so museum professionals should think critically about the information that is exposed on the web or social networks, from the perspective of museum visitors before and after the visit. It not only favors researchers or the public interested in these topics, but also other institutions, curators and museum administrators, to give an example, which facilitates decision-making by being better informed or allocating of resources. The use of Social Networks as a means of communication requires an adequate strategy, because it can have negative consequences (Águila-Obra, 2013).

Normally social networks create sporadic interactions, with acquaintances or strangers, unilaterally or bilaterally, that do not manage to involve people in the contents or resources in their physical environment. Depending on the platform being used, there are enabled functions such as "recommend", which is interesting to make known to a greater number of people know about the achievements in research, publications or to promote a new temporary exhibition in the museum (Bravo-Torres et al., 2014).

In social networks, strong and weak interactions are created on-line, which favors creativity due to this diversity. Strong interactions often lead to offline interactions and improve the quality of knowledge received (Park et al., 2017).

It is true that more interest is shown in the information shared by users belonging to each individual's social network than in the recommendations or sharing of a third party (Kosonen, 2009).

It is such a current topic that no specialized literature has been found on this topic and the one that has been found has been at the informative level. Although there were many digital tools, there are many novelties, both in dissemination and communication, connecting public and private organizations and society, which is why there is a need for the development of ethical policies and practices in the use of ICTs, which is the technology of the future and of the present. For this, communication between research communities and professionals in ethics, information, informatics and ICTs is essential.

The value of digitization adds to that information and in its extension through cultural connectivity networks based on research, creation, innovation and shared services in the field of culture, making this a sustainable resource both economically and socially (Carrasco Garrido, 2012). In the dissemination, such as an article, a conference or publication, aspects such as confidentiality, data protection or copyright will be taken into account, aspects that are currently regulated. However, due to the increase in the use of new technologies, new situations arise that would be interesting to regulate as well. One of the points in where conflict may appear is in the comments of the users regarding a publication. User comments can bring more light to a publication, make inquiries, or receive congratulations, avoid interrupting in the case of an oral presentation or give immediacy when reflecting an idea avoiding its forgetfulness.

One of the factors that determine this behavior are the cognitive aspects of a person, so that the same publication is received by each individual in a different way. Cognitive aspects are those acquired by a person throughout his life, due to multiple factors such as his training, experience, the culture that surrounds him/her or the fact of living in one or another geographical location, they are complementary to training and work experience. In this way, even if two people have been classmates at university, the cognitive aspects will always be individual.

This is very favorable to have different points of view of the same information and occurs with all professionals from different subject, areas and levels, who work to carry out a common work.

But, on the other hand, inappropriate comments may appear due to the substance or form of the same, and in some cases protected by the anonymity of the name of the profile shown.

This is a complex circumstance that to date for large companies is being difficult to find the situation.

To avoid these situations, for example, there are different "semantic filters" to avoid displaying certain terms, although inappropriate comments can be made without swear words thanks to the use of a rich language that the systems do not detect. Another example is the creation of "closed groups" of people or entities, interested in the same topic, where users are identified, but dissemination is reduced to that area.

Currently, knowledge is sometimes favored by collaboration and documentation, facilitated in social networks, the creation of networks in a certain area, where users exchange and create knowledge, favoring the development of studies and research (Nascimbeni, 2014).

In these situations, ethics must be present, in order to continue with the processes of dissemination to both experts and citizens, but technical and legal issues also have an influence.

The world in 2020 has undergone a drastic change, due to the global pandemic of the Covid-19. It has affected all areas, there have been changes in regulations issued by the governments, and restrictions of health administrations, which directly affect the functioning of every public administration and service, as well as in the world of museums and research.

But there have also been changes devised to continue with daily activities, where creativity, imagination, illusion and initiative, among other things, which human beings have developed in this crisis, that have also been exceptional. Many of these contributions have been made in digital media, using the internet, social networks, digital platforms, etc, in order to be able to follow communications without the strict need of on site presence.

Citizen E-Science (eCC) or cyber science, is the term used for the participation of citizens in scientific projects, the use of information and communication technologies (ICT) has exploded in recent years due to the contribution of new scientific approaches, the increase in ICT devices, and even more so after the global pandemic due to Covid-19 (Finquelievich y Fischnaller, 2014).

Seeing that the use of technology inside and outside the classroom is increasingly used, it must be accepted that the way of learning and accessing knowledge is changing (Piquer, 2014, pp. 207-229).

EMPIRICAL STUDY

An empirical study has been carried out in two routes, on the one hand, a "case study" with interviews to experts and on the other hand, a study by questionnaires at state level, where the great use of new technologies and the possibility of improvement if workers are trained in it is detected.

The questionnaires have been developed considering into numerous articles for their elaboration (Medina, et al., 2019) and audit processes (Carmona-Osorio, et al., 2017).

This is a general study to ascertain the current situation of all the museums surveyed, since a more in-depth study would require a personalized study of each one of them, given their particular characteristics, such as size, subject matter, management or number of employees.

It's a simple questionnaire in understanding and to carry out, in order to facilitate its execution. We have been considered the variables that we want to carried out in this study, and always bearing in mind that new technologies are a factor to be taken into account in many aspects, from registration, cataloging, but also communication between museum workers, as well as with experts or the general public, considering different ways, social networks, digital platforms or online training.

The answers to the questionnaires are evaluations on a scale of 1 to 5, with 5 being the highest or best valued assessment and 1 the worst valued, and NS/NC when for different reasons they cannot be assessed, due to being an external job or due to the peculiarities of each museum.

We work with the data obtained from the surveys and very visual graphs are made, with traffic light colors, in red NS/NC, does not provide information or would require a more detailed study, in dark green and light the best ratings, 5 and 4, in yellow the intermediate value 3, and in cold blue those but valued 1 and 2.

RESULTS

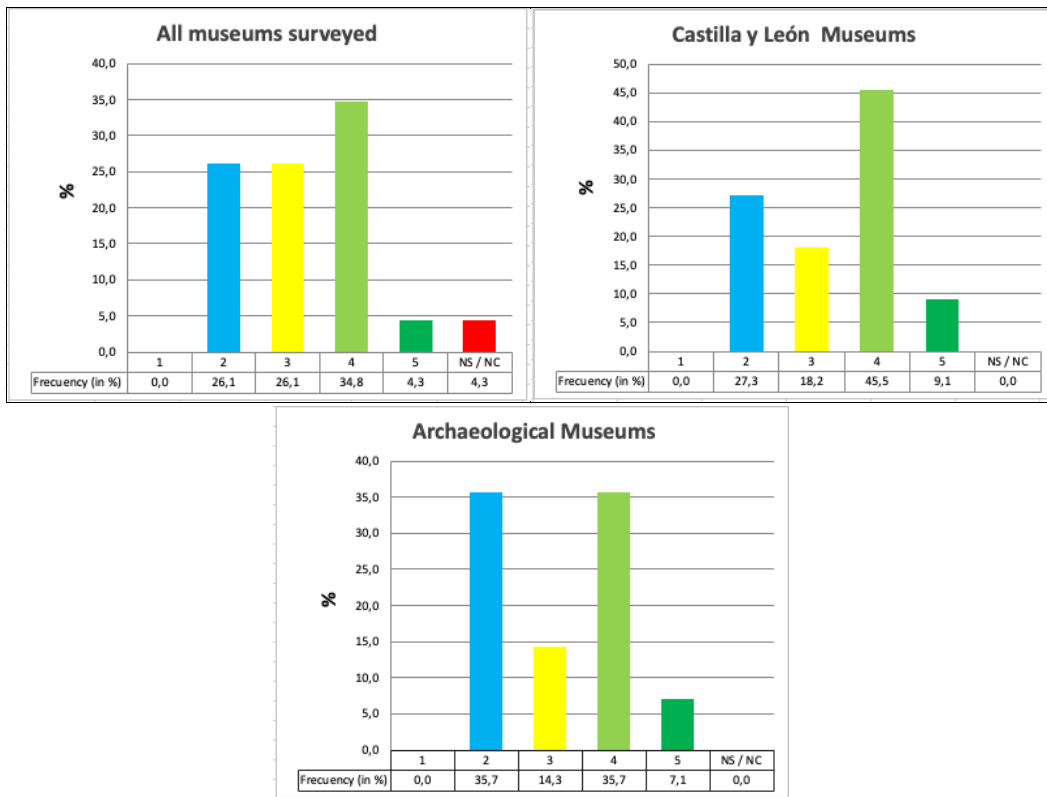
The results obtained from the questionnaires to experts, have been classified into three scenarios, the first is that of all the results obtained at the state level, the second at the regional level of Castilla y León and finally the museums of archaeological theme.

The results obtained from the questions posed are shown graphically. In the first case, the responses of museums workers perceive how the museum has elements to Share, Organize and / or Disseminate Technological Knowledge (database, web, mail, social networks, ...) and in the second case, they show their perception about the courses or training in new technologies offered by the museum to employees. Each of the two issues is shown in the three scenarios.

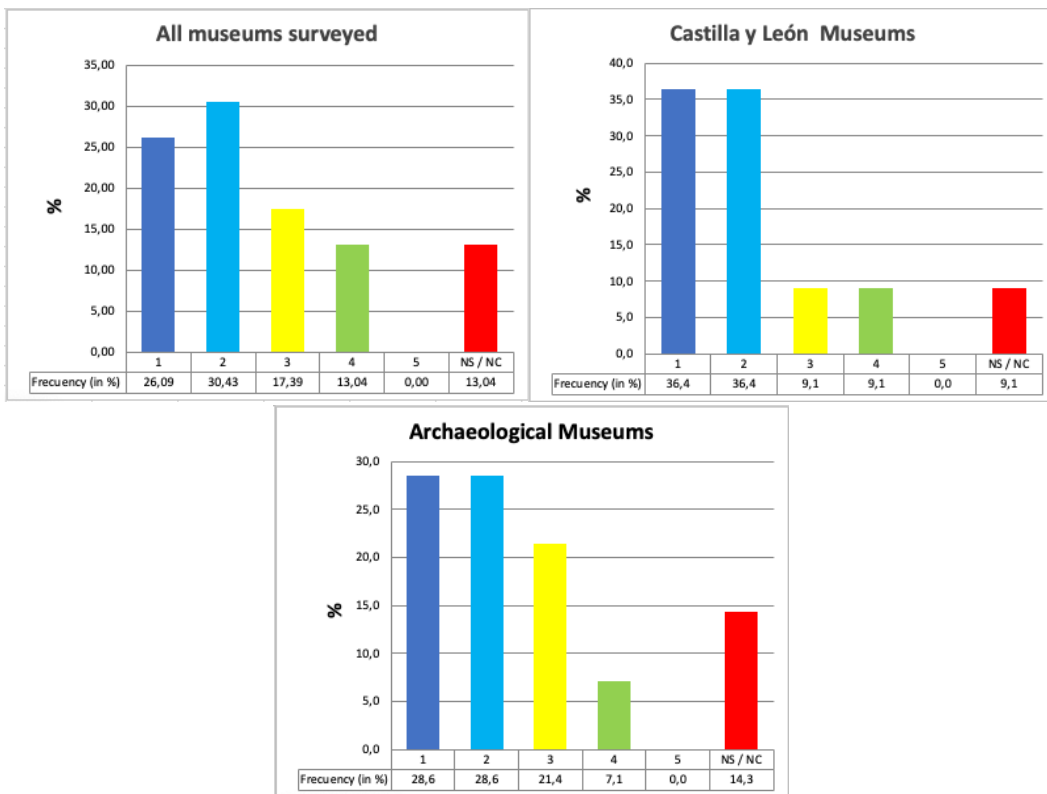
6. Open Track

Figure 1. Graphs of the data obtained by the questionnaires made to experts (2020).

The workers consider that the Museum has elements to Share, Organize and / or Disseminate Technological Knowledge (database, web, mail, social networks...).



Courses on new technologies offered by the Museum workers to develop Knowledge.



Source: self-elaboration based on questionnaires (2020)

Museum workers positively perceive that they have technological means, such as databases, web or social networks to share, organize and/or disseminate knowledge in 39,1%, 54,6% y 42,8%, (All museums surveyed, Castilla y León Museums and Archaeological Museums, respectively) but they denote a lack of offer by the museum in courses of new technologies to develop its knowledge to improve the performance of its functions in 56,52%, 72.8% y 57,2% (All museums surveyed, Castilla y León Museums and Archaeological Museums, respectively).

The use of new technologies in the cultural sector is demonstrated, in line with the data obtained, that it increases the use of digital and technological training by 31%, enhances scientific dissemination by 26% and requires improvements in implementation and usability of data base algorithm by 35%.

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As shown in these graphs, the museum experts surveyed perceive the current importance of the use of new technologies, but also a need for training and updating on this subject. The knowledge of a good use for communication and dissemination by these experts in digital tools and social networks, is one of the aspects that favors the performance of functions and ethics in this process.

Figure 2. The Human Evolution Museum (Burgos).



Source: self-elaboration Raquel García -Martín (2021)

At the state level, museums are indicated during the pandemic, the different measures and restrictions that must be adapted, as well as at the regional level, but the MEH also leads different initiatives to continue with its objectives in pandemic conditions.

During the time that the Museum, as well as the Atapuerca Foundation and the Research Center, with which the museum collaborates, remained closed due to the Covid-19 health alert, they continued to interact with their users and followers through all digital platforms and social networks, promote debates and scientific dissemination, book presentations and interviews and different activities, among others with different hashtags (#eIMEHdesdecasa, #Quedateencasa y #CENIEHencasa). Promoted their website and content, and provided free content downloads, therefore resuming their scientific and cultural activities and encouraging users to continue getting to know the Museum virtually.

This way, the museum has been able to continue to offer "the product" to all visitors, even in a non-physical way.

The museum became a meeting place with citizens through its programming, providing science and culture encounter, albeit virtually, which favour the dissemination of knowledge to the expert and the general public, as well as contact between researchers for research collaboration and to proposing future work.

Different technological options that the museum uses to achieve one of its objectives, to bring culture, science and knowledge to the widest possible audience are described here:

1. Websites and Newspaper: Offering information of the MEH, the Archaeological Sites, the excavation campaigns and their investigations, virtual visits, activities, offering free downloads and from the dissemination point of view, various publications, educational resources, documentaries, videos, the Atapuerca Newspaper (monthly frequency, mainly in digital format, with a didactic vocation, but scientifically rigorous, it has a page in English and texts adapted for easy reading), among others.

2. App: Free application, with three routes of guided visits (MEH, Archaeological Sites and "Atapuerca Experimental Archaeology Center"), in Spanish and English. This is extremely interesting to receive explanations during the visit. It greatly favours accessibility for people with visual, hearing and mobility disabilities, and groups with functional diversity; since it has images and audios adapted to people with visual or hearing disabilities, including subtitles and video in Spanish sign language, and for those who cannot come to the museum in person.

Table 1. Annual Memories MEH. Social Networks MEH.

	2014	2015	2016	2017	2018	2019	2021 March
TOTAL	45.000	45.000	67.189	92.078	101.623	105.738	181.322
Facebook	13.000	24.010	24.010	24.010	38.227	39.618	41.898
Twitter total	32.139	40.839	40.839	52.458	58.398	59.569	63.496
<i>Twitter MEH</i>	<i>17.400</i>	<i>23.800</i>	<i>23.800</i>	<i>32.158</i>	<i>34.600</i>	<i>36.320</i>	<i>38.005</i>
<i>Twitter Miguelón</i>	<i>9.000</i>	<i>11.300</i>	<i>11.300</i>	<i>13.500</i>	<i>15.325</i>	<i>16.200</i>	<i>16.842</i>
<i>Twitter Lucy</i>	<i>5.739</i>	<i>5.739</i>	<i>5.739</i>	<i>6.800</i>	<i>7.598</i>	<i>7.924</i>	<i>8.649</i>
Google		727	727	727			
Instagram		483	483	1.600	2.475	3.367	6.092
YouTube		939	939	1.264	2.160	2.840	5.950
Pinterest		215	215	270	305	318	361
Issuu		21	21	24	26	26	29

Source: <https://www.museoevolucionhumana.com/es/memoria-2019>

Table 2. Annual Memories MEH Visits MEH and Archaeological Sites.

	2014	2015	2016	2017	2018	2019
MEH Permanent Exhibition	151.941	147.634	148.921	150.430	150.817	151.877
National			129.691	131.128	133.451	134.319
<i>% National</i>			<i>88.92%</i>	<i>88.70%</i>	<i>88.49%</i>	<i>88.44%</i>

Foreign			16.155	16.711	17.366	17.558
% Foreign			11.08%	11.30%	11.51%	11.56%
TOTAL Visits MEH	-	59.003	195.400	197.143	195.923	194.957
Archaeological Sites	73.423	72.506	71.279	80.601	76.963	77.567

Source: <https://www.museoevolucionhumana.com/es/memoria-2019>

These tables highlight the increase over the years in both the use of technological means and the number of visits.

3. Social Networks (RRSS): The Museum has more than 180,000 followers adding all its Social Networks. (Table 1) and increase of visits (Table 2).

4. Sustainable Development Goals of the “2030 Agenda”: To join the Sustainable Development goals of the 2030 Agenda, the Museum aims to develop a high quality, inclusive and equitable education program, and promote learning opportunities for all people. Promoting and supporting the ethical teaching of ICT applied to professionals (Museo de la Evolución Humana & Junta de Castilla y León, 2021). The Museum implements innovative solutions, offering educational resources and Use of streaming to broadcast face-to-face activities and workshops under the idea of “Safe culture”.

The monitoring of the data that the MEH disseminates by digitization is truthful and demanding, showing its transparency portal, while it does not harm the institution and benefits. In social networks there is what the MEH wants to teach or show, what is said about it, but also the comments of users, which can sometimes be classified as anonymous and which are a representation of society, these comments have also to be ethical.

It is necessary to place in the vanguard the technological Ethical point of view (set of moral norms that govern the conduct of the person in the field of technology) in society, organizations and governments.

CONCLUSIONS

The range of possibilities offered by new technologies is very wide, it favors the accessibility of a greater number of users. The fact that it reaches a larger number of the population generates a greater number of culture seekers due to the interest generated, and the access to the general child public a "pool of culture seekers" and enhances the vocation of future researchers, but it is important Knowing the source of information to be accessed, here also appears the need to evaluate the ethics of what that source offers. Therefore, as mentioned, the collaboration of institutions, informative entities and professionals in the digital world is becoming increasingly necessary.

As a conclusion: New technologies have come to stay. Its use can facilitate Knowledge Management in all areas, which also include museums and similar meeting places for culture and science dissemination among society. A good KM, can facilitate its management and thus obtain numerous and varied benefits, help cooperation, teamwork, efficiency and leadership, and the people and research to come. It reflects the importance of the use of new technologies, common platforms that facilitate work, updating, searching and communication (García-Martín, et al., 2021) but keeping in mind the need for a Technological Ethics in its use.

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KEYWORDS: Dissemination of knowledge, New technologies, Museum, health crisis Covid-19, Safe Culture, Generation Gap.

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Oficial webs

- Museo de la Evolución Humana de Burgos (MEH) <https://www.museoevolucionhumana.com/>
- Fundación Atapuerca <https://www.atapuerca.org/>.
- Centro Nacional de Investigación sobre la Evolución Humana (CENIEH) <https://www.cenieh.es/>.
- Fundación Siglo para el Turismo y las Artes de la Junta de Castilla y León
<http://www.fundacionsiglo.es/web/es/fundacion-siglo.html>
- Junta de Castilla y León <https://museoscastillayleon.jcyl.es/web/es/museos-castilla-leon.html>.
- Ministerio de Cultura y Deporte <http://www.culturaydeporte.gob.es/cultura/museos/portada.html>.
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<http://www.culturaydeporte.gob.es/observatorio-museos-espana/el-observatorio-de-museos-de-espana.html>.
- Consejo Internacional de Museos (ICOM) <https://icom.museum/es/>.