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IO1- A3: Digital Design Compendium Module: Adaptability vs. Adaptivity for Digital Heritage Tourist experience

KA2 - Cooperation for innovation and the exchange of good practices
Partnerships for creativity

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REFERENCED DOCUMENTS

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1	2020-1-UK01-KA227-YOU-094543		HerTour4Youth Proposal
2			

APPLICABLE Documents

ID	Reference		Title
1	Deliverable IO1.A2		Elaboration of Training Methodology
2			

Contents

1. Introduction

This module will explore what is digital heritage and the adaptation of the digital heritage tourism in the post-covid era, including the difference between adaptability and adaptivity and how both are complementary to each other. Also, will inspect how to apply adaptability and adaptivity when using the ICT in heritage tourism.

1.1. Learning Outcomes

After completing this module, you will be able to:

- **Have a basic knowledge of adaptability and adaptivity and how those apply in Tourism**
- **Recognize the different aspects of the two concepts**
- **ICT adaptation in Tourism industry**

1.2. Key words

Adaptive systems, Adaptability, ICT, Digital Heritage,

1.3. Estimated seat time

3 hours

1.4. Glossary of terms

Adaptability refers to users that can substantially customize the system through tailoring activities by themselves, or in other words, the ability to adjust to different conditions or circumstances[1].

[1] *Adaptation (computer science)*. (n.d.). Wikipedia. Retrieved 2021, from https://en.wikipedia.org/wiki/Adaptation_(computer_science)

Adaptivity indicates a system that adapts automatically to its users according to changing conditions, or in other words in a state that has a capacity for adaptation[1].

Building Information Modeling (BIM)[2] is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition.

Complex adaptive system[2] is a system that is complex in that it is a dynamic network of interactions, but the behavior of the ensemble may not be predictable according to the behavior of the components.

Digital heritage[1] is the use of digital media in the service of understanding and preserving cultural or natural heritage.

Digital media[3] means any communication media that operate with the use of any of various encoded machine-readable data formats. It can be created, viewed, distributed, modified, listened to, and preserved on a digital electronics device.

Heritage[4] is "our legacy from the past, what we live with today, and what we pass on to future generations." A heritage is something that is,

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[2] IT Dictionary for Computer Terms and Tech Definitions on. (n.d.). Techopedia. https://www.techopedia.com/dictionary

[3] *Digital media*. (n.d.). Https://En.Wikipedia.Org/Wiki/Digital_media. Retrieved 2021, from https://en.wikipedia.org/wiki/Digital_media

[4] UNESCO World Heritage Centre. (n.d.). World Heritage. Unesco. Retrieved December 4, 2021, from https://whc.unesco.org/en/about/#:%7E:text=Heritage%20is%20our%20legacy%20from,sources%20of%20life%20and%20inspiration.

or should be, passed from generation to generation because it is valued.

Mobile application[2], most commonly referred to as an app, is a type of application software designed to run on a mobile device, such as a smartphone or tablet computer. Mobile applications frequently serve to provide users with similar services to those accessed on PCs. Apps are generally small, individual software units with limited function.

Open System[2] is a computer system that combines portability and interoperability, and makes use of open software standards.

2. Adaptability vs. Adaptivity for Digital Heritage Tourist experience

2.1. Introduction

Historically, tourism has shown a strong ability to readjust, innovate and recover from adversity. A few years ago, heritage tourist sites tended to be monolithic and static without giving tourists the option of interact. Gradually, and especially due to the COVID-19 pandemic, we have seen how digital technologies have changed the form of visualization and are increasingly used in the interpretation and presentation process. Nowadays, heritage tourism places have a more diversified, experiential approach and allow interaction between the tourist and heritage.

Technological development has created a new way of travelling and interacting with the heritage. As we showed in the Module "The value of digitization in travelling: How tourism can survive the crisis"; the most important ones are the following: websites, 3D models, geolocation systems, generation and management of digital representations of physical and functional characteristics of buildings and areas (BIM models), social networks, podcasting, mobile phone apps, QR codes, augmented reality and multimedia guides.

Source: https://pixabay.com/es/photos/aeropuerto-vuelo-terminal-6553696/

Nowadays, museums and cultural heritage institutions have invested and are investing significant resources to introduce cultural heritage in

the digital era. On the other hand, the professionals in the heritage sector strive to attract, engage and retain visitors to their sites (i.e. libraries, museums, archives and historical societies) using a range of digital technologies from relatively cheap interactive websites to expensive on-site 3D visualizations.

2.2. Heritage Tourism

Heritage in tourism is defined as those elements of our inherited past that we value and tourism refers to tourism markets and industry, which have evolved around heritage. There is a vital connection between heritage and tourism. Therefore heritage tourism represents tourism whose objective is to discover sites of cultural value. In this way, culture, heritage and tourism are interconnected.

2.2.1. Cultural Heritage

Cultural Heritage is the legacy that we receive from the past, experience in the present, and transmit to future generations.[4] We can distinguish between 3 types of cultural heritage :

1. Tangible culture refers to things that we can store or physically touch; such as buildings, monuments, books, works of art, and archaeological and historical artifacts.

Source: https://www.freepik.com/free-photo/beautiful-shot-famous-

roman-colosseum-amphitheater-breathtaking-sky-sunrise_8981252.htm#page=1&query=heritage&position=25&from_view=search

2. Intangible culture consists of nonphysical intellectual wealth; such as folklore, traditions, language, and knowledge, political and ideological beliefs, religious and scientific traditions.

Source: https://pixabay.com/photos/girl-kilt-dancer-highland-sword-431751/

3. **Natural heritage The concept of natural heritage is also very familiar: physical, biological, and geological features; habitats of plants or animal species and areas of value on scientific or aesthetic grounds or from the point of view of conservation. For example, we can include in this category culturally significant landscapes, countryside, natural environment including fauna and flora (more known as a biodiversity); and geological elements (more known as a geodiversity).**

Source: https://pixabay.com/photos/neist-point-sea-coast-horizon-540119/

2.2.2. Digital Heritage

In the last decades we have witnessed a digitization in heritage tourism. But what is exactly a digital heritage? There are different definitions:

- **"Digital heritage is the use of digital media in the service of understanding and preserving cultural or natural heritage"[5].**
- **Digital heritage is made up of computer-based materials of enduring value that should be kept for future generations. Digital heritage emanates from different communities, industries, sectors and regions. Not all digital materials are of enduring value, but those that do require active preservation approaches if continuity of digital heritage is to be maintained[6].**

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[5] Ann Marie Sullivan, Cultural Heritage & New Media: A Future for the Past, 15 J. MARSHALL REV. INTELL. PROP. L. 604 (2016) https://repository.jmls.edu/cgi/viewcontent.cgi?article=1392&context=ripl

[6] *Concept of Digital Heritage*. (2019, April 2). UNESCO. Retrieved December 2, 2021, from https://en.unesco.org/themes/information-preservation/digital-heritage/concept-digital-heritage

The website of UNESCO gives the opportunity to interact about intangible cultural heritage here:
https://ich.unesco.org/dive/constellation/
And the opportunity to interact about the living heritage and sustainable development here:
https://ich.unesco.org/dive/sdg/

2.3. Adaptation: adaptability and adaptivity in Tourism

The term adaptation decomposes into the two terms adaptivity and adaptability.
According to Oppermann "Systems that allow the user to change certain system parameters and adapt their behaviour accordingly are called adaptable. Systems that adapt to the users automatically based on the system's assumptions about user needs are called adaptive" [7].
Adaptive and adaptable systems are complementary to each other. Both methods increase the match between user needs and system behavior once the development of the system has been finished.
For example: booking site (app or a website) is adaptive and adaptable at the same time. Is adaptive because the user only need to put where wants to go (place) and when want's to go (date) automatically they appear all the options available in that place and in that moment. Is adaptable because it gives the option to interact with their site, and make the search more customized to the user, pet allowance, breakfast included and in the city center for example.

2.3.1. Recognizing the different aspects of the two concepts

[7] Oppermann R. (1994). Introduction. Adaptive User Support (Ed. Oppermann R.), Lawrence Erlbaum Associates, Hillsdale, New Jersey, pp1-13.

When travelling, tourists we are more and more focus in a personalized experience and we choose the options available around us according to our needs and preferences for our experience.
With the digitization of the tourism industry more a more are focused in how to give a customized experience to the tourist.

Personalization can be addressed by adaptability and adaptivity, which have different advantages and disadvantages[8].
When we are thinking in offering a personalized or customized service, we have to take in account what is our target group (to whom are we talking to) and their needs or expectations.
For example is not the same to customize a tour guide for a +65 group age tourists than a high school youngsters or families with kids.
In the research "Evaluation of a Personalized Digital Library based on Cognitive Styles: Adaptivity vs. Adaptability"[5] two research questions were examined in this study:

1. Whether users perform differently and/or showed different perception to adaptability and adaptivity;

2. Whether users' cognitive styles have effects on their responses to adaptability and adaptivity.

In the first one they observed that some users performed better in the adaptive version, but also they perceived more positively to the adaptive version. The answer to the second research question is that cognitive styles have great effects on users' responses to adaptability and adaptivity. Some users they react better to more adaptable version of an app or a digital tool and other users they react better to an adaptive version of the app or a digital tool.

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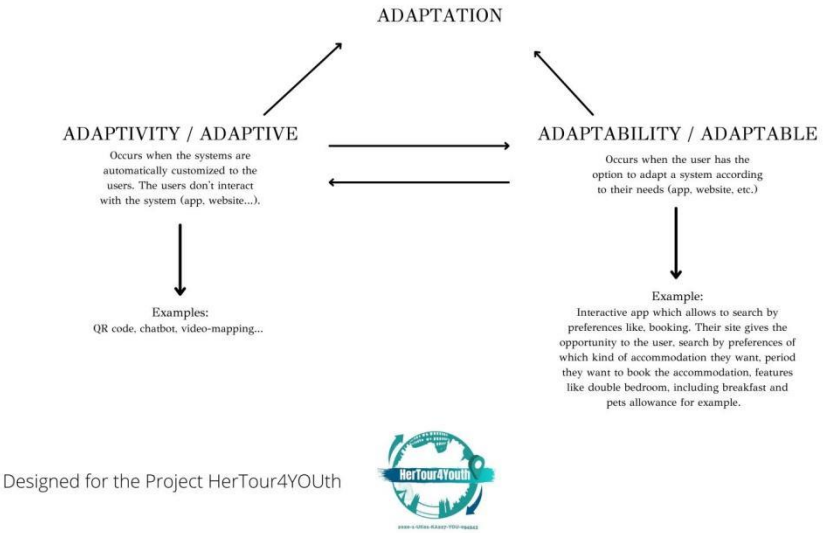
[8] Frias-Martinez, E., Chen, S. Y., & Liu, X. (2009). Evaluation of a personalized digital library based on cognitive styles: Adaptivity vs. adaptability. International Journal of Information Management, 29(1), 48–56. https://doi.org/10.1016/j.ijinfomgt.2008.01.012

2.3.2. Applying concepts to tourism

As we have seen in a previous example, both adaptability and adaptivity features can be incorporated in any digital tool at different levels of functioning. Most of the digital tools are adaptive, in the sense the users in this case tourist they only need to give a very few information to get results. Imagine, we are in the middle of London and we want to eat. You can open google maps, it will give you the information of where you are, and your goal is to find a restaurant to eat the lunch. Then searching restaurants around me, I will have the result of a lot of restaurants near by and the satisfaction of other customers.

Now, we are in the middle of London, and we want to have fish and chips for lunch, we want more than 4 stars in customer satisfaction and it has to be middle price. Then we need to add all this features, to get what we really want. The same if we are looking for a museum, activities, markets and so on.



2.4. The importance of adaptation in complex systems: culture and tourism

It is important here to understand that culture and tourism are both a complex system which are interconnected: culture is affected by the tourism and the tourism is affected by culture. In this part of the module we will bring you the picture of why adaptation (adaptivity and adaptability) are important elements in the tourism and culture.

2.4.1. A Complex adaptative system

A complex adaptive system (CAS)[9] is a special type of complex system: it is complex in the sense that it is diverse and made up of multiple interconnected elements; and adaptive, because it has the capacity to change and learn from experience.

A complex system is a system composed of many components which may interact with each other. Examples of complex systems are Earth's global climate, organisms, the human brain, infrastructure such as power grid, social and economic organizations (like cities), an ecosystem, a living cell, and ultimately the entire universe.

In this way, the tourism is a complex system because is componed of many elements that interact to each other constantly.

Theories of complex adaptive systems adopt a perspective of systems that are open and adaptive. Open means that systems are continually exposed to relatively autonomous pressures that stem from its dynamic environment. For tourism areas, these pressures include natural disasters, global warming, economic crises, political transformations

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[9] von Bertalanffy, L. (1969). *General System Theory: Foundations, Development, Applications (Revised Edition) (Penguin University Books)* (Revised ed.). George Braziller Inc.

and more recently pressures related to phenomena such as over-tourism and COVID-19.

Systems are always "out-of-equilibrium", caught up in a continual process of adaptation to respond and anticipate to ongoing pressures (e.g. rise of sharing economy, climate change, over-tourism, COVID-19 'coronavirus') that challenge a systems' their structures, functions, identities and practices of agents within those systems[10].

2.4.2. Culture as a complex system

Human beings we are one of the main elements in the tourism industry. So from this premise, we are also part of the culture, so we can say culture is as well a complex system and it is adaptive and adaptable system itself, since it serves so that human beings can live in the natural and social environments that they occupy and we interact through it. Each generation tries to improve the adaptive conditions, preserving all the elements of the past that have a minimum of efficiency, and even many others for reasons of identity. For this reason, historical aspects have a very important weight in cultures.

Culture is as well adaptable, because we are able to adapt the culture to the time we are living now. It is more clear with the traditions.

For example, in Spain there is a large tradition of bullfighting. Some years ago an animal rights activists started a movement in order to stop this tradition where real animals where suffering for the entertainment of humans, now in many places in Spain they are not doing anything with real bulls anymore and they create an adaptable " fake bullfighting" with big puppets driven by humans.

2.4.3. Tourism as a complex system

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[10] *What is Adaptive Technology? //*. (2022). ACT Center. https://actcenter.missouri.edu/about-the-act-center/what-is-adaptive-technology/

Leiper in 1979[11] defined the tourism as "the system involving the discretionary travel and temporary stay of persons away from their usual place of residence for one or more nights, excepting tours made for the primary purpose of earning remuneration from points en route.
The elements of the system are tourists, generating regions, transit routes, destination regions and a tourist industry. These five elements are arranged in spatial and functional connections. Having the characteristics of an open system, the organization of five elements operates within broader environments: physical, cultural, social, economic, political, technological with which it interacts.'
Since 1979 the concept of tourism system has evolved including new areas. The main areas or environments who are interconnected in the tourism system are: economical, socio-cultural, health / ecological, political (legal) and technological areas.

Using the terminology of the General Systems Theory[12], "tourism is an open, dynamic, non-linear, adaptive and complex system. It is an open system, so that it exchanges energy, matter and information with its environment, which allows its survival." In the tourism system of a municipality or a community, for example, the environment is determined by the social, political, economic and natural environmental conditions (or supra-systems) that affect tourism - sometimes strongly, for example in the case of economic crisis, natural disasters or a pandemic like COVID19— but not a direct part of the activity.

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[11] The Framework of Tourism: Towards a Definition of Tourism, Tourist and the Tourist Industry. Neil Leiper. Annals of Tourism Research, vol. 6, no. 4, October/December 1979, pp. 390–407. Department of Habitational Resources, University of Wisconsin-Stout, Menomonie, Wisconsin 54751. $6. (1980). *Journal of Travel Research*, *19*(1), 38. https://doi.org/10.1177/004728758001900184

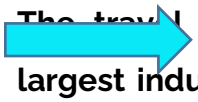
[12] G. de Roo, J. Hillier, J. van Wezemael, Complexity and Spatial Planning: Systems, Assemblages and Simulations 2012. pag 153

The World Economic Forum[13] has created a feature which allows to explore and monitor issues an forces driving transformational change across economies, industries and global issues. For example: In the aviation, travel and tourism we will find 8 main topics related to it. One of them for example, is travel security and risk resilience. At the same time this element of the tourism industry is affected by a diverse topics such as; health and healthcare, global health, water, international security, blockchain, risk and resilience, Covid-19 and internet governance. If we are intrigued about the elements that Covid-19 is related to, we just need to click in the covid-19 button and will bring us to another feature, where COVID-19 is the main element.

Click here to interact with the World Economic Forum feature:

https://intelligence.weforum.org/topics/a1Gb0000000LHVLEA4

2.5. How the ICT adaptation applies in tourism to conform to new realities



The travel and tourism industry is widely recognised as being the largest industry in the world. As we have seen before and if we check the world economic forum feature, the structure of the tourism industry is complex and involves many components and that's why the need of adaption is so important in this field. The tourism system has shown a great capacity and ability to adapt (adaptive and adaptability) in the last decades.

The tourism industry has been affected by different crises: natural disasters like floods, rains, earthquakes, volcano eruptions; wars and terrorist attacks, political instability, financial crises and infectious

[13] World Economic Forum. (n.d.). *Strategic Intelligence | World Economic Forum*. Stategic Intelligence. https://intelligence.weforum.org/

diseases, like poliomyelitis, H1N1, Ebola, Zika, etc. So, what is the main difference among the crisis produced by covid-19 pandemic and those examples? The difference with the COVID-19 pandemic it, that the crisis generated by the Covid-19 pandemic is not linked to any territory and is not an isolated event in time. This crisis has been global and extended in time.

The travel and tourism industry has been affected by the mobility restrictions, limited capacity in buildings and lockdown, the use of masks and sanitizers, social distancing, etc.

That's why Digitization has became in one of the most useful tool to adapt to the new challenges produced by Covid-19, helping many companies to adapt and overcome the current situation. Furthermore, the growth in the use of technology in the daily lives of people and companies to face this exceptional situation is evidence of the digital acceleration process.

2.5.1. Digital revolution, tourism and cultural heritage

Cultural heritage is evolving rapidly thanks to digital technologies. The momentum is now to preserve the cultural heritage and bring it to this digital decade. Nowadays we can not imagine travel without digital technologies[14].

A large number of people has an smartphone, which connects them in a virtual way, with the rest of the planet. In this virtual world the social status of a person no longer matters to connect with someone who lives in another city, even in another continent.

The mobile channel has become an important sales channel for the tourism sector. The mobile also allows travelers to reserve or hire products and services on the go and according to their specific needs at

[14] Cultural heritage. (2021, November 10). Shaping Europe's Digital Future. https://digital-strategy.ec.europa.eu/en/policies/cultural-heritage

that particular time. The purchase process lasts throughout the entire trip.

According to European Commission "Unprecedented opportunities brought by technologies, such as Data, AI, 3D and XR brings cultural heritage sites back to life. Virtual museums offer visitors the possibility to see art works in context and experience objects or sites inaccessible to the public. The transformation of the sector is resulting in easier online access to cultural material for everybody"[15].

The tourism industry and tourism companies have been able to better adapt to the current situation and to the future challenges thanks to the development of different technological tools.

It was estimated in 2020, 7.000 million people and companies were going to be connected to internet through 30.000 millions of devices[11]. We will present you here the tech tools that are developing the most in the last years due to the corona crisis in the tourism sector:

1. Mobile applications

As we already have seen, one of the most important elements in tourism is the usage of the mobile phones and the huge amount of them.

We can say at first, mobile applications were designed to facilitate and optimize the work time of managers and senior professions. After that, in the evolution of mobile applications, the leisure and entertainment sector began to take center stage and they were mainly used were aimed at listening to music, playing video games, accessing social networks, etc..

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[15] Gracia Raúl, Las 10 tendencias tecnológicas que están transformando el turismo (2016) https://www.aprendedeturismo.org/10-tendencias-tecnologicas-que-estan-transformando-el-turismo/

Nowadays, as a result of the exponential growth of mobile devices, the number of Mobile Applications (Apps) have increased and developed to meet all kind of daily life needs.

In the tourism sector, we also can find a huge grown, and currently airlines, hotels, travel agencies and other tourism providers must to evolve and to have this type of mobile applications if they don't want to be out of the market and to offer a competitive service.
The apps allow tourism providers:

- **To be in direct and real-time contact with their customers.**
- **To get to know better their preferences and needs.**
- **To be able to offer them new tourism products and services, customized to their profile and preferences.**
- **To generate an emotional relationship, which will help in the process of building loyalty.**

If we digitally interconnect objects and devices, we can apply an intelligent management of our business, measuring at all times, for example, consumption, stocks, needs, etc. Example: The Hilton chain has a digital app Hilton Honors. With this app we can choose the bedroom we want, have a digital room key in our phone, and we can even control all aspects of our room: light, heating, etc.

2. Internet of Things: the Internet of Things has been possible thanks to Wearables, by which elements of our clothing will be connected to the Internet. This is the case of the now famous Apple watch, but soon we will see clothes, glasses or shoes, also connected to the network. We can also think in the TripAdvisor App for the Apple Watch, for example, can now send you notifications of the best-rated restaurants near you. In the future, these notifications will be personalized according to the type of gastronomy that you like or what you feel like at the time.

Google Now also wants to offer consumers information, even before they want to consult something, based on their past behavior and current location. For example, if in recent months you have searched for Thai food, the search engine will offer you restaurants with that cuisine, which are close to you.

 Check this video here:

https://www.youtube.com/watch?v=LlhmzVL5bm8

3. Big Data In the near future, all elements of the city will be perfectly connected, allowing interaction, in real time, between the local government itself, street furniture, traffic signs, shops, buildings, cars, mobile devices, and even the watches or glasses of citizens and tourists. The system will allow the exchange of information in real time between them and automatically archive all the data in the cloud, being available to the rest of the users of the system.

With the collection and crossing of certain relevant information, it will be possible to draw important conclusions about the behavior and consumption habits of our customers .

The potential of Big Data will become more evident with the use of Self-learning of computer equipment, artificial intelligence and what is called Natural Language Processing, which studies the interactions between computers and human language.

The correct use of the data about our clients will allow tourism companies and tour guides to offer travelers richer and more satisfactory travel experiences, designed and adapted according to

their personal preferences and needs.

Source: https://www.freepik.com/vectors/background">Background vector created by GarryKillian

Check this video:
https://www.youtube.com/watch?v=TzxmjbL-i4Y&t=43s

4. Drones: the revolution in the cost and autonomy of these devices, is allowing the generation of spectacular promotional videos of destinations and tourist companies, at a much lower price than before. Also, during the pandemic in 2020, a lot of countries around the world used drones at the beaches in order to control the social distancing.

Example of this:
https://www.youtube.com/watch?v=wWbfGtzmyjA

Source: https://www.freepik.com/photos/background'>Background photo created by kjpargeter

5. Robotic technology is rapidly gaining in popularity within the travel industry and this is partly motivated by changing consumer habits with regards to tourism in general. Increasingly, customers are seeking self-service methods and this makes the automation provided by robots appealing to hotels, travel agents and other businesses.

Click here to see the different usage of robotics in the tourism: https://www.revfine.com/robots-travel-industry/

6. Augmented Reality in the very idea of it is meant to change what we see around. It is meant to enhance our experience and increase our joy while exploring the world. So AR is a perfect tool for tourism. It adds new value and opens new opportunities for both the tourist and the tourism industry.

Example: https://www.youtube.com/watch?v=ZdWeYBBtxZA

7. Virtual Reality continues to advance and will be a common thing in a few years. This new technology can have great implications in the world of travel, by allowing tourists to "experiment" before the trip, viewing virtual images of the destinations they want to visit or the hotels where they plan to stay.

Example: https://www.youtube.com/watch?v=E1W1r_ypgOg

8. Artificial intelligence: It allows technology to learn from the use made by users and therefore offer personalized services and even behavior predictions. A great application in tourism are chatbots and guidebots. Example KLM applies the App Meet BB.

Example: https://www.youtube.com/watch?v=dyu75CNYxow

9. Gamification: introduces game dynamics in the activities carried out by tourists in order to influence, motivate and enrich the experience. Example: In summer 2019, the Louvre (Paris, France) proposed the free outdoor adventure game "Mysteries at the Tuileries". In small teams, visitors could explore around the museum's scenic garden and try to unveil its secrets. Various levels of difficulty allowed visitors of all ages to enjoy and solve enigmas in their search for a mysterious treasure.

Example here:
https://www.sortiraparis.com/arts-culture/walks/articles/171159-mysteries-at-the-tuileries-the-free-and-outdoor-adventure-game/lang/en

10. Video Mapping: It is the use of video projectors to display animations on real surfaces to create an innovative artistic effect. For example, in a restaurant, animations can be offered on the table while customers wait for their food.

Click here to see the animations in restaurants: https://www.youtube.com/watch?v=9xviFgPZaDY

3. Assessment

3.1. Knowledge assessment

Question 1 *(multiple choice or true/**false**): Cultural heritage includes only tangible culture (such as buildings, monuments, landscapes, books, works of art, and artifacts) and intangible culture (such as folklore, traditions, language, and knowledge)*

Question 2 *(multiple choice or **true**/false): Historically, tourism has shown a strong ability to adapt, innovate and recover from adversity.*

Question 3 (multiple choice or true/false): The tourism industry is a system which interacts with: the social, economical, ecological, cultural, political and technological environments.

Question 4 (multiple answers correct): *Digital tools make industrial heritage an intelligent heritage. Some important ones are:*

geolocation systems

Tourist Guides

mobile phone apps

Info brochure

Question 5 (multiple answers correct): The potential of Big Data will become more evident with the use of:
[Artificial intelligence] [Neuro-Linguistic Programming] [Virtual reality] [Self-learning]

Question 6 (multiple answers correct): Tourism system is:
[open] [linear] [simple system] [adaptive]

Question 7 (multiple answers correct): Which are the tools the tourism can use in order to be adapt to the current situation? [traditional operators] [transport services] [Internet of Things] [Gamification]

Question 8 (matching): Match the terms with their definitions.

Term 1 Adaptive: Systems that adapt to the users automatically based on the system's assumptions about user needs

Term 2 Adaptable: Systems that allow the user to change certain system parameters and adapt their behaviour accordingly
Term 3 Drone is an aircraft without any human pilot, crew or passengers on board.
Term 4 Mobile Application is a type of application software designed to run on a mobile device, such as a smartphone or tablet.
Term 5 Digital Cultural Heritage is the maintenance or preservation of cultural objects through digitization

Question 9 (matching): Match the concepts with their explanations.

Concept 1 Complex adaptive systems : are all around us from financial markets to ecosystems to the human immune system and even civilization itself, they consist of many agents that are acting and reacting to each other's behavior.

Concept 2 Adaptive technology refers to special versions of already existing tools and/or techniques that provide enhancements.

Concept 3 Internet of Things: Nearly any physical object can become a part of tit if it's connected to the internet to communicate, be controlled, or exchange information.

Concept 4 adaptation refers to the process of adjusting in behavior, physiology, or structure to become more suited to an environment.

Concept 5 gamification incorporates a higher level of game design, including giving message board and social media users a "trusted source" or "top contributor" badge, displaying points for activities, achievement-based discounts and so on

Question 10 (matching): Match the problems with their solutions.

Problem 1 face to face customer service in pandemic times, make the situation risky for the health of the workers. Solution: Robots (they have the ability to function in dangerous or treacherous environments, where people could not work safely)

Problem 2: Lack of quality of the experiences for visitors and the quality life for locals Solution: Smart Destinations

Problem 3: Control of the changing influx of visitors. Solution Videomapping (Instead of using signage on the ground, with an expiration date, the 'videomapping' with projectors on the ceiling adapts to the changing needs of the allowed capacity or the influx of visitors)

Problem 4 : manage tourist flows to maintain social distance, avoid overcrowded places and limit capacity Solution: usage of big data

Problem 5: Which kind of app would be better if the users are more interested in interacting with the device and customize their preferences and needs? Solution an adaptable app, so the users can interact more with the app and customize their preferences and needs.

3.2. Skills assessment

As we have seen in this module, the technology is having a high impact in the tourism system and they are mainly two types of technological tools: adaptative and adaptable. For this assessment, you are going to design elements for your future tour guide app or a website following the next points:

1. **Define your target group.**
2. **Think and design what elements (features) will you include in the app/website.**

   a) **As an adaptive app/website which elements are important or needed for your target group? (Generals options that you can offer).**

   b) **As an adaptable app/website which are the elements that are important in order to give more customized experience to the tourists? (Specifics options that you can offer).**

3. REFERENCES

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