

# White Paper

## Project SMART TOUR

## SMART Tour Study

Tourism is a dynamic industry; therefore, attraction promoters must constantly react to environmental changes to remain competitive (Lei, Suntikul, & Chen, 2023). In such a context, technology plays an important role. Consequently, promoters of cultural heritage attractions have begun to explore the possibilities of applying the latest technologies to enhance tourism experiences (tom Dieck, Jung, & Michopoulou, 2019). Recent studies have found wearable augmented reality, primarily via mobile phones, contributes to enhancing the learning experience at cultural heritage attractions (Dieck & Jung, 2017). By using such technologies, tourist visitors experience improved interaction with the attraction, which is considered much more significant after such a lived experience (Buhalis, & Amaranggana, 2015; Han et al., 2019).

Tourism has specific forms (so-called selective forms of tourism) that are oriented towards smaller segments of demand. One of the most prominent selective tourism forms is cultural tourism, which refers to the movements (visits) caused by cultural attractions beyond people's usual place of residence, intending to gather new information and experiences to meet their cultural needs (Smith, 2016). Although, over time cultural tourism significantly has been contributed to destination image upgrade (Govers et al., 2007), currently among few main challenges to cope on wider destination level become "how heritage and tourism goals integrate with marketing and management framework to produce sustainable cultural tourism" (du Cros et al., 2020). Referring to that, one of the most appropriate integrators seems just information and communication technology (ICT) which already contributed and improved numerous business performances worldwide, including cultural tourism (Tscheu et al., 2016; Jung et al., 2016, Tussyadiah et al., 2018). So many ICT solutions are used in an innovative way (i) to promote and sell cultural tourism products, (ii) to facilitate stakeholder participation for sustainable cultural tourism development (Chiabail et al., 2013), and (iii) assure better decisions on impacts on the economic, natural and socio-cultural environments with realistic scenarios available to engage all stakeholders including tourists, planners, and the local community" (Ali et al., 2014). Moreover within the complex process of establishing destination appeal (Mandić et al., 2019) ICT strengthen the subprocess of "material and socio-cultural revitalization of maturing destinations" (Marques et al., 2017).

### **What is experiential travel?**

Experiential travel is a form of tourism that implies an active and meaningful engagement with a destination's culture, people, and/or environment to create unique, memorable experiences. It's the story about visiting new destinations, keeping off the beaten path, encountering authentic local experiences, and just doing something extraordinary. And we not only mean actual activities here. Sometimes even staying in an unusual lodging such as a glamping cabin or a treehouse can be an experience of a lifetime. Experiential travel is often

confused with immersive and adventure travel (actually, Adventure Trade Travel Association or ATTA suggests adventure tourism as the main unifying term).



Figure. 1

However, we believe these concepts aren't interchangeable. In fact, experiential travel can be seen as an umbrella for the other two. Here's why.

**Immersive travel** implies, well, *immersing* in the culture which in most cases means mingling with the community at the place of destination, engaging in traditional activities, attending local events, and so on. Meanwhile, **adventure travel** is more about physical activities. It can be something safe (for the most part) and moderately active like camping or hiking – or more on a sports and even adrenaline-rush side, like skydiving, rafting, bungee jumping, mountain climbing, and so on.

So, as you can see, both of these groups are about getting vivid experiences, with the first one involving deep connection with the locals and getting to know the local culture, and the second one (that can even be done alone and in one's own country) involving an active outdoor pastime.

### Experiential travel ecosystem: business models, distribution, technologies, and representatives

If you run or plan to launch a travel business and want to capitalize on the experiential tourism trend, here are options on how to fit in.

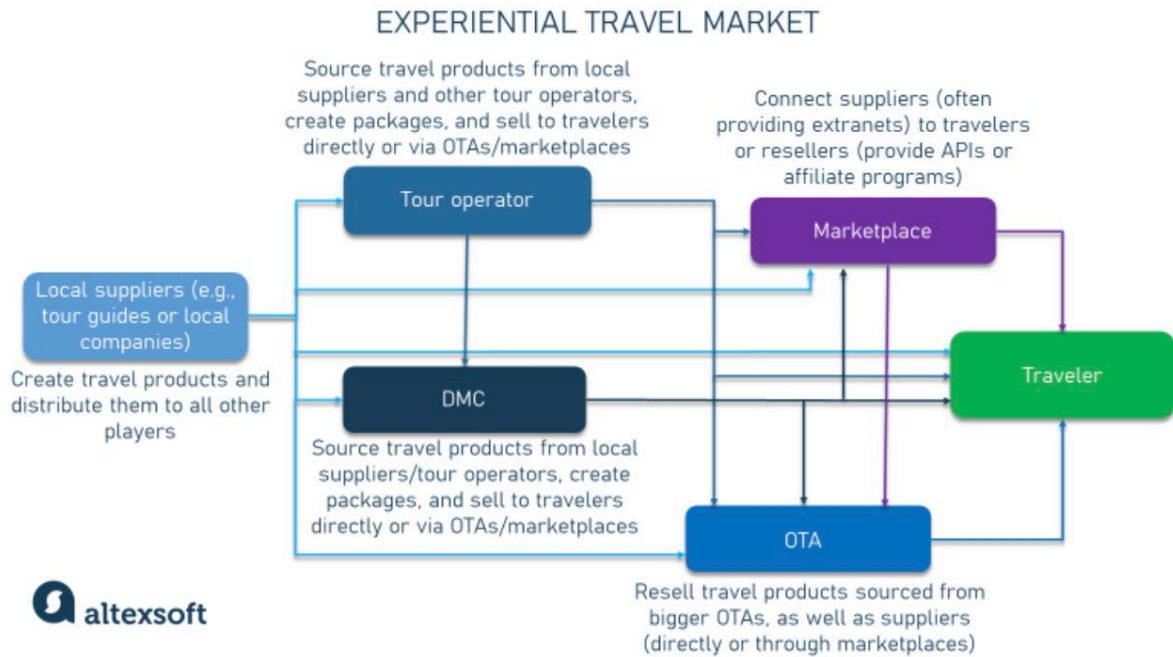


Figure. 2

#### Local service suppliers: building the base of the pyramid

Local suppliers are the ones that create the initial travel products. As we said, experiential travel is tightly connected to either traditional, authentic practices that only locals can demonstrate or unique, out-of-the-mainstream services provided by specialized, niche businesses. Real-world examples. Basically, any entity that offers the tours and attractions services can be placed in this category, be it a park, a nature resort, etc. Some of them can be called tour operators if what they do is showing tourists around or arranging guided tours.

Technologies. Typically, small companies are poorly digitized or not digitized at all, so they manage their operations with spreadsheets and often use distributors' extranets to create entries and update availability manually. Bigger businesses can adopt itinerary building software (e.g., TripCreator), a channel manager (e.g., TripAdmit), or even a focused, multi-featured tour operator platform (e.g., TrekkSoft) that can assist with scheduling, multi-channel distribution, partner relationships, analytics, and so on

#### Approaching Digital Transformation

Digital transformation is a global tendency in business to shift from physical operating models and value delivery to digital. Since the 1990s, when digitalization disrupted music and entertainment industries, up to the mobile and social media revolutions in 2010s, technology has been leading the world to the hyper digitalization era. Today there's no industry left immune to change. Businesses have to embrace transformation to stay on board. While the transformation happens inside businesses, the main driving force is customers. Brands can no longer dictate the rules of interaction as mere customer expectations have evolved. So there are two main paths to align with transformation.

The first path imposes the holistic replacement the physical value with the digital. But digital transformation doesn't necessarily mean the replacement of a physical proposition. The second path is to preserve physical value but digitalize processes. Here, the change impacts the ways brands connect with the digital audience, automate internal operations, and cooperate with partners. This should be applied for less disrupted industries like food retail. To make the first step you are always bound to choose the path.

With time, in addition to the websites of tourist boards, social networks, or mobile guides, the promotion of cultural tourism has been increasingly contributed by AR/VR technologies as innovative tools for storytelling and experiencing the story as real (Guerra et al., 2015; Yung et al., 2019). Through virtual and augmented reality, the user gets vivid destinations inside view and the feeling as to be "within" the destination itself, which consequently may increase the wider interest for cultural tourism (Guttentag, 2010). Moreover, AR/VR applications designed to support cultural tourism, actually change the tourism perspective regarding approaching, not only attractive products and services but the complete destination history, its present and past moments, to the visitors worldwide (Go et al., 2002; Jung et al., 2016; Tussyadiah et al., 2018).

Evidently, in last more than 20 years, virtual reality technologies such as virtual reality (VR) and augmented reality (AR) have enabled tourism managers to significantly increase the satisfaction of tourists by providing them with unforgettable experiences (Loureiro, Guerreiro, & Ali, 2020). It seems to be the commercialization of smartphones and online virtual environments have also encouraged service providers to engage tourists as active participants through virtual reality applications, allowing them to experience products and different destinations from the comfort of their homes (Bogičević et al., 2019). Additionally, the advances in sensor technologies have also led to increased availability and use in the tourism sector (tom Dieck, & Jung, 2017.) Such virtual environments based on new and upcoming technologies are changing how travel operators stimulate their customers' experiences before, during, and after their stay in the destination (Loureiro et al., 2020; Neuhofer, Buhalis, & Ladkin, 2012).

More specifically, VR/AR technologies are used to promote a destination or place, to enhance the experience of reality at the destination, or to "immerse" consumers in a new and completely challenging tourist experience (Han et al., 2019). On the other side, over time, the use of AR and VR in cultural tourism, besides opportunities like enhanced engagement, accessibility, storytelling, accessibility, cost-effective replication, etc., also highlighted challenges like inclusivity, content quality, cultural and ethical concerns, dependency on technology, privacy and data concerns etc. In light of the stated research problem, this study aims to answer the following research questions, going into different aspects of the application of virtual and augmented reality technology in cultural tourism:

- 1) What are the advantages of using VR/AR technologies in cultural tourism?
- 2) What disadvantages or limitations arise from implementing VR/AR reality technology in cultural tourism?
- 3) What potential opportunities exist for using VR/AR technology to enhance cultural tourism experiences?

4) What are the challenges or risks of applying VR/AR technology in cultural tourism? These questions will serve as the guiding framework for exploration and analysis in this research endeavor. The paper finished with a conclusion and related implications for future research on forthcoming challenges of VR/AR technology usage in cultural tourism.

In this context, there are still numerous cultural applications customized to precisely in 3D form inform tourists about cultural events, cultural institutions, and heritage, but also serve as a virtual tour guide (Lee et al., 2013) and “full or partial substitute for destinations that have exceeded their carrying capacity” (Ali et al., 2014). Detailed AR/VR specifies as well as its benefits to cultural tourism stakeholders supplemented with the empirical findings are enclosed in paragraphs below.

### Technologies used for VR and AR

Virtual meaning implies “not physically exist in the real world”. VR technology is replacing the real world with the digital. It is completely immersive i.e. the user is isolated from the real world and is completely immersed in the virtual world (e.g. Google Cardboard-Google VR). Virtual reality (VR) is an apparent environment simulated with the support of special computer programs, providing users the illusion of being, moving, and perceiving (Tussyadiah et al., 2018). This three-dimensional multimedia environment is realized by visualizing the real or imagined environment presented on a computer screen or special stereoscopic devices (the most common device are glasses/goggles or a helmet with two built-in liquid crystal displays that enable insight in the virtual world only). The experience is complemented by sounds (with the support of headphones or speakers), vibrations, and the possibilities of arousing tactile and olfactory sensations. Applications of virtual reality are designed to support many areas like entertainment (e.g. video games), tourism (virtual tours), etc. education (e.g. trainings), business (e.g. virtual meetings), etc.

On the other side, “extended” means imply trios of the user, technology, and the real world, or in detail, a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects (Nayyar et al., 2018). As such, it allows the user to see elements that do not exist in real life through the application through the screen of a device, usually a mobile phone. These elements expand reality when viewed through a screen. The AR application allows viewing without the possibility of any interaction with the observed elements. Augmented reality adds elements of the virtual environment to the real world in a way that seems as they belong to the real world (Barnes, 2011), and serves as a technology for delivering attractive multimedia content tailored to different guest/visitors profiles. Since AR technology connects the digital and the real world, it is a partially immersive option i.e. the user stays in touch with the real world, and at the same time interacts with virtual objects created within the real world (e.g. Snapchat filters, Pokemon Go...).

Given the complexity of the concept of virtual and augmented reality, there are different classifications of virtual/augmented reality systems according to different specifications and purposes (Edwards-Stewart et al., 2016; Flavian et al., 2019). The most commonly used one is by immersion level which refers to the credibility of physical inputs (e.g. light patterns and

sound waves) and the way they are transmitted by different sensory modalities (sight, hearing, and touch) to create the illusion of reality (Mandal, 2013).

Virtual reality (VR) is a multifaceted concept with varying definitions, encompassing the creation of computer-generated 3D environments, referred to as virtual environments, that users can actively control and interact with, thereby simulating real-time sensory experiences (Guttentag, 2010; Mandal, 2023). The managerial aspect of VR involves the user's ability to navigate and explore this virtual space, while the communicative dimension focuses on selecting and manipulating objects within it (Guttentag, 2010; Beck et al., 2019). The devices facilitating the VR experience are central to it, enabling users to seamlessly become part of the virtual environment. These VR devices dynamically adjust in response to user reactions and movements, fostering a profound sense of interaction and immersion (Tussyadiah et al., 2017). This immersive quality is a key feature of the VR encounter (Doumanoglou et al., 2018), characterized by both physical and psychological elements. The physical aspect relates to the user's isolation from the real world, encapsulating the user within the digitally generated environment (Guttentag, 2010). Simultaneously, psychological presence is cultivated, transcending the visual and auditory components to create a holistic perception of being present within the virtual realm. VR encapsulates a transformative blend of cutting-edge technology and human experience. By allowing users to actively shape and engage with computergenerated environments, VR redefines the boundaries of traditional interaction and beckons the exploration of novel dimensions where the virtual and the real seamlessly coalesce. The evolving definitions of VR underscore its dynamic nature and the ongoing quest to push the boundaries of what is possible in creating immersive and interactive digital experiences.

Virtual Reality (VR) redefines user engagement by transcending physical boundaries, with key elements being immersion, interaction, and imagination, which form the basis of VR's defining characteristics. Advancements in technology promise increasingly immersive and authentic digital worlds, blurring the line between reality and the virtual realm (Sheriran, 2000). The term "augmented reality" (AR) denotes the integration of technologies that seamlessly blend realtime computer-generated content with live video displays (Mekni & Lemieux, 2014). Derived from virtual reality techniques, AR interacts with the virtual world and exhibits a degree of interdependence with the real world. In essence, AR offers a direct or indirect representation of the physical environment in real-time, enhanced by the addition of virtual computer-generated data. By bringing digital information and virtual objects into physical space, AR animates the captured image on devices like phones or tablets. The primary AR objective is to enhance the user's life by introducing virtual information into their immediate environment and any indirect view of the real environment, such as live video (Carmigniani et al., 2010). While some definitions of AR stipulate the use of head-mounted display (HMD) screens (Mekni & Lemieux, 2014), a more inclusive definition involves a system with the following characteristics:

1. a combination of real and virtual elements,
2. real-time interactivity, and (iii) content registered in 3D format (Attila & Edit, 2012). This broader definition accommodates various technologies, including mobile devices, while preserving the essential components of AR. Moreover, AR enables users to perceive the real world with virtual objects seamlessly integrated or superimposed

onto their surroundings. Consequently, AR complements reality rather than a replacement (Edwards-Stewart, Hoyt, & Reger, 2016, Bouziss, & Poulaki, 2022). In summary, while AR/VR shares similarities, they represent distinct technologies with unique capabilities, contributing varied user experiences.

Similarities	Differences
Fundamentally, AR and VR share a common goal: enhancing user experiences.	Augmented reality overlays digital information onto real-life images and contexts. In contrast, virtual reality immerses users in an entirely new computer-generated world, allowing experiences like virtual city flyovers without physically leaving the ground.
Once deemed futuristic, both AR and VR have become tangible technologies, finding widespread application across various fields, with a particular emphasis on entertainment.	Virtual reality replaces the real world with a simulated environment, providing an immersive experience, whereas augmented reality enhances the existing environment without replacing it.
Both technologies play integral roles in education, business logistics, and healthcare, offering transformative possibilities, such as enabling remote surgery in the medical field.	Virtual reality typically constructs an entirely computer-generated world, while augmented reality integrates virtual components into the real world, creating a new interaction layer.
	Augmented reality is versatile, and compatible with various digital devices like laptops, tablets, and smartphones, requiring only a camera. In contrast, virtual reality demands specialized systems designed explicitly for its use.

Figure. 3

### AR & VR Appliance in Cultural Tourism and related benefits: Swot Approach

From a general standpoint, SWOT analysis comprehensively examines the internal and external factors shaping an organizational environment. This strategic evaluation method involves meticulously reviewing key characteristics within and outside an entity to pinpoint critical elements influencing the company's future trajectory (Helms and Nixon, 2012).

The outcomes of this analysis, which encompasses both the environmental and strategic factors, serve as invaluable decision-support tools during formulating a chosen strategy. In essence, SWOT analysis as a foundational approach to environmental analysis, providing a structured framework for organizations to assess their competitive landscape. The acronym SWOT encapsulates the four critical dimensions under scrutiny: Strengths (S), Weaknesses (W), Opportunities (O), and Threats (T). Each element corresponds to a distinct aspect of the internal and external business environment, offering a comprehensive perspective that facilitates informed decision-making and strategic planning. By delineating a company's strengths and weaknesses, SWOT analysis enables a precise understanding of its internal landscape, aiding in identifying areas for improvement and optimization. Simultaneously, exploring external opportunities and threats equips decision-makers with insights into potential avenues for growth and the challenges that may impede progress. To sum up, SWOT analysis emerges as a fundamental tool for organizations seeking a systematic and holistic assessment of their environment. By elucidating the interplay between internal and external factors, SWOT analysis not only enhances strategic decision-making but also serves as a



foundational step toward ensuring the sustained success and adaptability of a business in a dynamic and everevolving landscape. Based on relevant literature (Kulakoğlu-Dilek, Kizilirmak, & Dilek, 2018; Han et al., 2019; Garbin Praničević, 2021; Siddiqui, et.al, 2022), the SWOT analyses in the context of AR/VR appliance in cultural tourism results with quite challengeable items. According a/m literature the main AR/VR strength in cultural tourism are derived due to AR/VR: (i) enhance and expand cultural tourism offerings, fostering industry growth, (ii) its related tools simplify the promotion of cultural tourism, reaching a broader audience and increasing the visibility of cultural destinations, (iii) rejuvenate travel agencies and tour operators, countering the trend of tourists organizing their own trips, (iv) empower tourists to explore attractions remotely, evaluate preferences, and make informed travel decisions, (v) transport users to the past, providing sensory experiences in historical settings that were previously inaccessible, (vi) offer a comprehensive tourist experience while minimizing the negative effects of mass tourism on cultural heritage, (vii) serve as supplementary attractions, enhancing existing tourist offerings, and (viii) AR and VR serve as powerful tools for educating and entertaining tourists while minimizing negative impacts on attractions and the environment. According to a/m literature, the main AR/VR weaknesses in cultural tourism are derived due to AR/VR:

- a. are still evolving, with issues like high costs, large software sizes, heavy devices, and graphic limitations,
- b. some individuals, especially the older generation, may have reservations about information technologies, making it challenging to introduce advanced tech solutions to them,
- c. can't fully replace physical authenticity, as tourists do not physically exist within the historical context,
- d. reduce personal contact and human connection,
- e. is expensive due to limited technology accessibility and thus unaffordable for many potential users,
- f. produce discomforts such as nausea and dizziness due to the immersive effects, and (vii) prioritize the overall experience over souvenir shopping.

According to a/m literature the main AR/VR opportunities in cultural tourism are derived due to AR/VR:

1. help minimize the impact on cultural heritage sites, ensuring their long-term preservation,
2. contribute to the better preservation of natural attractions and environmental sustainability,
3. enhance accessibility for individuals with disabilities and older visitors, even in remote locations,
4. provide a visual glimpse of the past, making historical and cultural sites more engaging,
5. make it possible to present historical events in a realistic and real-time manner,
6. rapidly growing trend in tourism, catering to increasing demand,
7. allow limitless creative possibilities, and
8. eliminate bureaucratic, security, and language barriers, making them accessible to a wide range of visitors.

Finally, according to a/m literature, the main AR/VR threats in cultural tourism derived from AR/VR may:

1. limit interactions between tourists and local communities, affecting the effective communication of cultural specifics,
2. lead to a decrease in the appeal of in-person visits to museums
3. push developing countries potentially falling behind more developed nations,
4. had undefined tax framework,
5. lead to social isolation and reduced face-to-face interactions,
6. not stimulate other sectors in the destination, lacking the multiplier effect seen in traditional tourism,
7. result in job losses, changing the employment landscape in the tourism sector
8. lead to monopolies, reducing the variety and quality of offerings by other providers.

A more concise overview of a/m explained SWOT items is enclosed in Table 2

<b>Strengths</b>	<b>Weakness</b>	<b>Opportunities</b>	<b>Threats</b>
i. Advancement of cultural tourism	i. Technological limitations	i. preservation of cultural heritage sites	i. reduced cultural interaction
ii. promoting cultural heritage	ii. negative initial impressions	ii. sustainable tourism and environmental protection	ii. impact on physical tourism
iii. marketing aid for agencies	iii. distancing from real experiences	iii. accessibility for diverse visitors	iii. economic challenges for developing nations
iv. pre-visit cultural assessment	iv. lack of tourist interaction with locals	iv. time travel	iv. unclear taxation policies
v. sensory immersion	v. high costs for users	v. achieving the impossible	v. contribution to antisocial behavior
vi. minimizing tourism impact	vi. physical and psychological discomfort	vi. development potential	vi. effects on other tourism sectors
vii. creating additional destination attractions	vii. inability to purchase souvenirs	vii. limitless design	vii. employment impact
viii. enhancing user knowledge		viii. elimination of barriers	viii. monopolization and competition

## SWOT Analysis for virtual and augmented reality

From the technical perspective, AR/VR “add a layer of guidance, content, and entertainment” to preferred physical points of interest making them more informative and interactive for visitors. In the cultural tourism context, maps, wall maps, historical and other multilingual guides and serve as a kind of tourist information tool. One of the up-to-date and growing use of AR relates to beacon technology that operates via Bluetooth in destinations (Shahriar, 2018), namely cultural institutions for sending push notifications or enabling certain functions when visitors enter a particular place.

The systematic review of numerous related studies (Yung et al., 2019) indicates that AR/VR technologies become an innovative and entertaining tool that, *inter alia*, enable visitors:

- (i) immersion in important historical moments
- (ii) attractive education about the destination but also
- (iii) innovative option of how to experience the tourism product offerings. Following, but no less important AR/VR contributions in cultural tourism account:
  - a. initiating the positive word of mouth,
  - b. rising visitor attendance and cultural heritage awareness, and
  - c. providing direct feedback on the exhibition/museum/gallery impact and reach.

Therefore, not surprising that a highly respective number of destinations and the travel industry in general (Shah, 2019, Marr, 2021) are already using rich media on their websites to seek to reduce the intangibility aspect of the tourism product. The same trend is growing and is also perceived as growing (Transparency Market Research, 2021).

With advancement in technology and more interactive nature of the available technology, the use of applied technologies such as Virtual Reality (VR) is increasing at exponential rates in both academic and applied settings (Düking et al., 2018; Faure et al., 2020). VR is defined as simulations of a real or imaginary environment, where a participant can both perceive and interact with the environment (Craig, 2013).

Consequently, it is to be expected that as many countries in the EU as possible, as well as others in the world, have been recognized the importance of AR and VR for the development of their cultural tourism, and accordingly start to implement them.

### *Strengths:*

- Increase in competitive ability.
- Increase in efficiency (reduce time and costs) and productivity (reduce errors, facilitate work processes).
- Enable fast remote support for repairing systems weaknesses.
- Enable fast and remote collaboration.
- Involve innovation support.
- Facilitate understanding of large amounts of data.
- Facilitate decision making problems solving (visualization of information).
- Facilitate monitoring of projects.
- Reduce project validation risks.

### *Weaknesses*

- Initial costs for adopting could be significant.
- Adopting AR/VR technologies could require time for administration procedures.
- Once when a platform is chosen, it could not be quite simple to change it for future projects.
- Possible fast device aging because of the rapid technology development.
- Lack of PM experts who mastered these technologies.

## ***SWOT analysis of implementation of AR/VR technologies in PM***

### *Opportunities*

- Possibility of usage in different types of projects.
- Positive future trends.
- Formation and education of professional staff.
- Large scope of learning opportunities.
- Possibilities for creative improvement of end-user experiences.
- Governments, industries and specialized organizations increasingly invest large resources in AR/VR projects.

### *Threats*

- Possible rejection of AR/VR technologies by some PM experts.
- Possible skepticism of some customers.
- Risk factors related to choosing of technology.
- Increase of the amount of data emerging from these technologies and the corpus of knowledge they produce.
- Risks related to the necessary change of existing curricula.

## **Strengths**

Virtual reality technology and augmented reality provides these benefits:

- **Complete immersion:** Due to the closed-off nature of current virtual reality executions, users will be fully focused on the content of your application, undistracted by email, phone messages, or any other outside events. This complete immersion is perfect for apps that need a user's undivided attention, such as videos, storytelling, gaming, and educational applications.
- **Transporting the user:** Virtual reality can do just what its name implies — create a virtual environment that feels like reality to the end user. A user in an augmented reality app is generally still aware of his current real-world surroundings, but a user in virtual reality can be completely unaware of his surroundings. Sharing a small, one-bedroom apartment in New York with five friends? Strap on a virtual reality headset

and you can feel as if you live in a vast mansion. Flying on a transatlantic flight in cramped coach seating? Put on a virtual reality headset and you'll feel like you're in your own empty movie theater, viewing content on a 70-foot screen.

- **Creating empathy:** Virtual reality can place users in situations they never would've imagined, including in the shoes of others. This ability to create a shared experience between users is unique to virtual reality and one of its greatest strengths.
- **Technological maturation:** Virtual reality as a technology has been on the rise since the introduction of consumer-grade virtual reality with the Oculus Rift DK1 in 2013. Many of the big names in tech, including Facebook, Google, Microsoft, and Samsung, have released one or more virtual reality headsets and have plans to release more. Augmented reality interest has seen an uptick with the introduction of ARKit from Apple and ARCore from Google, but virtual reality still leads in this category for consumer devices.
- **Social and real-world interaction:** The ability to interact with people or objects in the real world is the core concept of augmented reality. Augmenting the real world with digital artifacts expands on what the real world can do. And because augmented reality doesn't close the user off from the rest of the world, it can more readily be used socially. When using an augmented reality headset, glasses, or a mobile device, a user isn't closed off from the world, which allows for much smoother social interaction with those around you.
- **Mostly frictionless:** Due in part to augmented reality's openness to the real world, experiencing augmented reality can be more frictionless to use than virtual reality, especially the lower-end, mobile executions. Because current augmented reality experiences don't close the user off from the real world, it can feel nearly as frictionless as opening an app on a mobile device, which is already familiar for millions of users. The higher-end experiences such as Meta 2 and HoloLens can require a bit more investment of a user's time and may require a specific location (because Meta 2 is tethered to a computer). Overall however, augmented reality experiences seem to generate less friction for a user than most current virtual reality experiences.
- **Limited extra hardware required for mobile executions:** With the mobile versions of Google's ARCore and Apple's ARKit, millions of users are walking around with an augmented reality-capable device in their pockets. The augmented reality executions these technologies allow are fairly simple, but they open up a massive user base of potential consumers for your application.

Given that the Museum has several thousand pieces of fossil remains, when creating multimedia and virtual content, it was easier to choose attractive objects for presentation to visitors within the museum's display. When using objects in a virtual sense, you get an attractive "product".

The use of VR glasses in tourism allows users to see what, until now, they could only hear and imagine based on the story told. The user is in a 3D world, content is displayed around him, and he feels as if he is part of the story, as if he is participating.

The main strength in our case is that it is a new and unique product on the market (USP - unique selling point). This form of technology represents a new medium and is still not sufficiently developed, but certainly, the demand is still greater than the supply, which ensures the further development of this product

As VR uses real-world footage rather than virtual scenarios, decision-making is more realistic than VR. Research has demonstrated a higher level of perceived game-likeness in decision-making processes of VR than more common screen-based approaches (e.g., match broadcast video) (Kittel et al., 2019a). This infers greater ecological validity of 360°VR as the perceptual information is more similar to the competitive environment (Araujo et al., 2007). The strengths of 360°VR technology overcome significant weaknesses of VR technologies such as creating realistic environments and the financial development costs.

## Weaknesses

As compelling as its benefits are, virtual reality isn't a perfect platform on which to execute your project. Here are some of its drawbacks:

- **Limited interaction with the outside world:** Users in virtual reality are completely closed off from the rest of the world, which can be impractical for certain types of projects. It isn't uncommon for users in room-scale virtual reality to need a fairly open space for their experience. Otherwise, they run the danger of knocking into other people or objects.
- **Lack of strong social interaction:** The experiences offered by virtual reality can be incredible, but they also can seem isolating. The environments virtual reality can create feel so real that users expect the social interactions to be realistic, too. However, the technology for making social interactivity in virtual reality seem real isn't quite there yet. The lack of eye contact and the inability to see a user's true facial expression in most social virtual reality apps can leave the social experience of virtual reality wallowing in the awkward uncanny valley between no social interaction and true personal connection.
- **Cost and hardware:** Some applications can be run both inside and outside a headset, such as YouTube's 360 videos. However, without the headset you've effectively removed the "reality" from virtual reality and you're just looking at another 2D application. Regardless of the flavor of virtual reality you choose, users need some sort of hardware to truly experience your application as virtual reality. Low-cost hardware such as Google Cardboard is widely available, but it can't support high-performance virtual reality applications. For higher-end virtual reality experiences, the cost of the virtual reality hardware (and the computer to run these experiences) can be enough of a barrier that even those with a strong interest in virtual reality may be put off until the price comes down or, perhaps worse, experience a lower-end virtual reality experience and think that's all virtual reality has to offer.
- **Not a frictionless experience:** In marketing terminology, a *frictionless* experience is one that doesn't require a consumer to go through any extra trouble to use. As it currently stands, virtual reality technology is far from frictionless. Many virtual reality experiences (especially on the higher end) require a specific location for your virtual reality setup consisting of plenty of room to move about in real-world space and powerful external hardware for running virtual reality. All this can lead to users being less likely to use their virtual reality setup, if only due to the friction of having to set aside a time and place to get their virtual reality fix. The second generation of headsets, featuring inside-out tracking and often fully self-contained, tetherless

headsets, will hopefully take steps toward making the virtual reality experience more frictionless.

- **Mass market share:** Although virtual reality is making strides to gain widespread consumer adoption, it hasn't achieved critical mass yet at the same level as the computer or the mobile phone. So far, virtual reality headsets, especially high-end headsets, have still been mainly a plaything of early adopters. However, if massive user adoption at the level of, say, mobile devices, is a requirement for your project or product, keep in mind that you probably won't get it with current virtual reality execution.
- **Technological maturation:** Even with Google and Apple pushing augmented reality capability to the forefront with their mobile releases, augmented reality is still far behind virtual reality in terms of technological maturity. This lack of technical maturity can reveal itself through a number of other deficiencies (for example, device access, lack of content, potential unknowns, and so on).
- **Mass market share:** Outside of mobile augmented reality, the consumer market for augmented reality devices is virtually nonexistent. Only a handful of companies currently are producing devices at close to consumer scale, and none of these devices is currently marketed toward consumers, only toward developers, businesses, and enterprise.
- **Device access:** Augmented reality has only a handful of companies competing in the low-, mid-, and high-end price ranges, with most of those augmented reality devices still in beta or targeted toward enterprise and not consumers directly. Most users won't have access to an augmented reality device (outside of mobile augmented reality) for some time. For some projects, this may not be an issue. You may be able to control and provide access to hardware as the project requires. For a great many projects, however, this could be a nonstarter.
- **Lack of content:** Augmented reality is still in its very early stages. There is a noticeable lack of content, especially high-end content, for users to experience. This lack of content goes hand-in-hand with augmented reality's technical maturation and device access. As augmented reality matures technically and as content creators begin to get their hands on augmented reality devices, more and better content will begin to roll out much as it has for virtual reality. However, we have yet to reach that point. It will likely take a mass consumer release of an augmented reality device to truly jumpstart the content creation race.
- **Limited immersion:** Augmented reality's strength can also be a weakness, especially augmented reality within the mobile device form factor. The fundamental basis of augmented reality is rooted in the ability to interact with the real world. That offers many benefits, but at the cost of potential interruptions to the users' experience. If your project will require any sort of fully realized artificial reality, or require a user to stay fully immersed within your reality without distraction, augmented reality probably isn't the choice for you.
- **The unknown:** The relative immaturity of augmented reality comes at a price of the unknown. Virtual reality is still be in its infancy as a technology as well, but there is a generally agreed-upon road map pointing to where things seem to be headed. It's still possible for a startup to come along and shake up the virtual reality industry with a new hardware/software, but the general direction virtual reality is headed is seemingly established.

Multimedia (installations) is extremely expensive, maintenance is very expensive and delicate. Often, experts for individual installations are not located in Croatia, so it is very difficult to work remotely. Also, it would be best to have an expert employed at the Museum who would always be your first aid. When such virtual installations are installed, it is important to keep in mind their maintenance. After a few years, it is difficult to find a replacement or spare parts or they no longer exist.

People who are not familiar with the technology of VR glasses, who have not used VR glasses and do not know how they work, have a harder time deciding to use VR glasses and conclude that they are not interested in using them until they are persuaded to try them - then everyone is delighted with the content and the result they see.

The weaknesses are that our project is still in its infancy, the whole VR technology is in development, and there is much room for improvement. VR technology is like computer games ten years ago, which were not yet developed enough. Although the technology has developed a lot, it is still nowhere near its peak, and it will take a lot of investment and effort to realize that potential.

## Opportunities

1. Innovation in the presentation of the museum theme. Something that is not common in other museums, and multimedia is something that visitors do not expect in museums. Unfortunately, even today, the common opinion is that museums are dusty and boring places... So, something new, attractive, and unusual, a prehistoric theme told in a modern way, is a winning combination.
2. By displaying content through VR glasses, you can show a past event, buildings that no longer exist, people, clothing styles... there are a lot of possibilities, you just have to be creative. Also, VR glasses have speakers, so you can hear stories, interesting facts, and facts about everything you see through the glasses. A complete experience can be provided to the user.
3. The opportunities of VR technologies are great, and as the most important, I would point out the combination of modern technologies with significant cultural heritage and history. I think it is the most effective thing that can be done, and people love it when some things from history that would otherwise be forgotten or insufficiently understood come to life.

As highlighted above, one of the limitations of 360°VR is that it is “read-only” (Fadde and Zaichkowsky, 2018), where this technology may limit the perception-action loop. This presents an opportunity for a considerable market around the globe. Finally, 360°VR may include haptic and movement information such as vibrations and noise, similar to VR approaches (Düking et al., 2018). This would strengthen the representativeness of this technology.



## Threats

1. Threats in such a way of presenting museum materials are hacker attacks and viruses (Internet).
2. Technology is advancing rapidly, and new models of VR glasses are coming to the market. Also, programs that create animations and 3D content are constantly updated. Creators and authors must constantly follow trends, invest in improvements, and improve content and devices, and this costs.
3. Technology is constantly advancing, and each upgrade requires large financial costs. Also, one of the threats is the possibility of product copying by competitors.

Future studies may consider whether there is a similar effect in 360°VR. Further refinement of VR approaches may lead to virtual simulations being more realistic, which is a current limitation of VR (Düking et al., 2018). With technological advancements potentially making VR more realistic, 360°VR may no longer be considered an effective option. Therefore, 360°VR should continue to progress to allow movement and include features to increase realism such as noise feedback.

AR and VR have the potential to greatly enrich the cultural tourism experience by making it more interactive and accessible. However, they also come with various challenges, including accessibility, cost, content quality, and ethical considerations. Integrating these technologies into cultural tourism requires careful planning, investment, and consideration of tourists' and cultural institutions' unique needs and expectations.

## **SWOT Analysis for Cloud Technologies**

Cloud Computing is a mainstream in the Digital world defined as a collection of services that helps developers focus on their project rather than on the infrastructure that powers it. Individuals and Organization are heavily dependent on cloud on either storing and sharing their files or either watching movies online. The very first question that comes to mind is why Cloud at all and the answer is simple where need is to kick start the activities in quick time with minimal IT infrastructure setup, As it is known cloud hosting offers a lot of flexibility which is a great fit where it is not known at the inception of the need of computation power and storage needed. However at the same time one has to be careful of why not want to use cloud hosting rather than hosting your own data centers where there is a steady long-term needs to manage data at a large scale (E.g.: Most of the social media companies use their own data centers rather than hosting them using 3rd party cloud).

Performed an independent SWOT analysis and try to envisage the future around the same.

Strengths: characteristics of the business or project that give it an advantage over others. Cloud in above context has top strengths of the Cloud Computing are

- Scalable Storage and on-demand computing power.
- Develop a business model as Everything as a service.
- Reduced Capital Expenditures and lower staff cost in Infra setup.
- Flexible and resilient disaster recovery.
- Pricing Transparency by the service providers

Weaknesses: characteristics of the business that place the business or project at a disadvantage relative to others. Top weakness of the Cloud Computing are

- Challenge in migrating from one Cloud service provided to another.
- Lack of interoperability between the different cloud service providers.
- Application & Service access is highly dependent on Network Bandwidth.
- Different Global compliance in different regions.
- Open Standard Implementation.

Opportunities: elements in the environment that the business or project could exploit to its advantage. Top Opportunities of the Cloud Computing are

- Onboarding of application deployment and entry to market is cheaper, and higher return on investment in short time.
- Adaptive to future needs.
- Cloud provides an excellent back-bone for Mobile & Web based applications.
- Easy, Quick & Low-effective mitigation of identity, privacy, security, reliability, and manageability risks in cloud-based environments.
- The cloud computing approach speeds the deployment while preserving dynamic flexibility.

Threats: elements in the environment that could cause trouble for the business or project. Top Threats of the Cloud Computing are

- Cloud service provider had addressed Security issues at the large extend, however financial and health care institutes still consider as a challenge in adopting the cloud.
- Physical location of hardware is unidentified, therefore Governments consider the storage of their data out of their land and beyond their regulation boundaries.
- Opaque cost is too high in long run as the scope of the services increases which impact the TCO.
- Business is highly dependent on the 3rd party Cloud service provider, if CSP is out of business will made your business out as well.

Summarized that though there are few threats and weaknesses in cloud computing, but on the contrary, there are more strengths and opportunities in the technology and that is getting more and more popular in the adoption of cloud for micro, small & Medium Enterprises in the future.

In **open source software development**, **open standards act as guidelines** to keep technologies "open," especially for open source developers. Unfortunately, debate about what qualifies as *open* and who gets to pick what becomes a *standard* makes defining what *open standards* are a little more complicated. Before diving into what open standards are, let's take a closer look at *standards*.

Open Standards play a key role in ICT technologies. Standards enable industry to provide software and services that meet customer requirements today and in the future. They ensure interoperability and allow technologies to be connected or integrated and work together. Standards contribute to innovation by providing an agreed and trusted basis on top of which innovation can flourish. In a networked ecosystem there is the need for end-to-end solutions

with pieces of software from different vendors working seamlessly together. Open Standards help prevent lock-in and are key to foster a level playing field between all suppliers of ICT services, whether OSS or proprietary. OFE strongly believes that standards in the area of software interoperability should be available royalty-free allowing for easy implementation in all development models including open source.

OFE has been involved in the debates on the EU Regulation 1025/2012 supporting the introduction of a specific process for making global ICT standards available for use in Europe. OFE is also an active participant in the European Commission-led Multi-Stakeholder Platform for ICT Standardisation where it chairs the task force developing the Rolling Plan. OFE also contributed to the discussions around the development of the European Interoperability Framework version 1 & 2. In the EU, OFE has contributed directly throughout the consultation leading to the adoption of the Open Standards Principles, globally recognised as one of the best and most comprehensive amongst such initiative in the world. OFE has fully endorsed these Principles including the definition of an Open Standard contained within them.

Amongst the network of OFA Fellows are some of the world's leading experts on the subject and who participate directly in OFE discussions. This policy explains how to select open standards for software interoperability, data and document formats in government IT. It also guides departments on how to implement open standards. These principles describe how the government will specify and select open standards and how these standards can be implemented in open source and proprietary software.

The principles how to evaluate specific open standards and the requirements to use where relevant will ensure that the selected standards will enable:

- software to interoperate through open protocols
- data exchange to occur between software and data stores

Open standards give users permission to copy, distribute and use technology freely or at low cost. The EU only selects open standards for software interoperability, data and document formats that have:

- collaboration between all interested subjects, not just individual suppliers
- a transparent and published feedback and ratification process to ensure quality

Open standards must also be:

- well documented, publicly available and free to use to provide fair access
- mature, unless they are in the context of creating innovative solutions
- supported by the market to demonstrate the independence of platforms, applications and vendors

A **Wireframe in Software Development** was originally used as a term standing for a manikin made of wire, with help of which garments can be designed according to given shapes and sizes. It's similar with today's software and web design: A wireframe is the basic framework in software development and web design. In history designing wireframe doesn't play important role in design elements. At early stage, the aim is to determine the structure of a planned software and to test its functionality. This step has particular significance in the design process. The term mockup is often used as a synonym of wireframe. Actually, however, this expression means an optically refined model, which already shows a version of desired design.

A wireframe is a schematic or blueprint that is useful for helping programmers and designers think and communicate about the structure of the software or website you're building. The same screen can be built in a lot of different ways, but only a few of them will get your message across correctly and result in an easy-to-use software or website. Nailing down a good interface structure is possibly the most important part of designing software. Doing this work now, before any code is written and before the visual design is finalized, will save us lots of time and painful adjustment work later.

First we should know the importance of information architecture. How well the user perceives contents or understands the function of an element depends mostly on their arrangement. For example, it is usual to position the navigation button to the left or the top. Important contents are placed “above the fold”, namely in the visible area of an app or website without scrolling. A deviation from these standards will irritate site visitors and possibly even make the use of the site more difficult. This balancing act between mature patterns and a unique & distinctive architecture can be performed with wireframe with relatively little effort. The design, which is reduced to the essentials, quickly reveals possible weaknesses in the sequence and structure of content. This framework will later form the basis for the individual face of a software.

### **1. Wireframes make it clear that this is *not* the final design**

No one could mistake a wireframe for the final look and feel of your application. Low fidelity and few colors force you to focus on structure over details. There will be lots of time for visual design once the structure is finalized.

### **2. Wireframes convey that "this is all up for discussion"**

The rough feel encourages discussion.. Wireframes are *really* quick to make, so don't be shy with giving feedback! Each screen probably only took a few minutes to make. What matters the most at this point is the final ease of use, so going through a few iterations is normal and expected.

### **3. Wireframes make it clear that no code has been written yet**

If your stakeholder received some screens that looked like screenshots of the final app, instead of a wireframe, they might assume that all the code behind those screenshots had already been written. This is most often not the case. Wireframes don't have this danger.

To verify the above-stated expectations, the author use desk research and secondary data accessed online to find out the presence of AR/VR solution in cultural tourism. The research domain covers 27 EU countries (EU-27) only.

Upon web research several related applications were detected per each country, however, only one application per observed EU country is chosen and presented in Table 1 (bellow). The choice “per country” is arisen from discussion in the classroom as highly ranked by tourism students - attendees the of 3rd-year undergraduate study program at University of Split Faculty of Economics, Business and Tourism in the academic year 2020/2021.

## Results

For each country from the sample, the desktop research resulted in at least one cultural tourism AR/VR application. Table 1 is, as methodologically explained above, presented one per country:

Table. AR / VR application in EU-27 countries

<b>Finland</b>	Virtual Helsinki	virtual city (tour) experience that allows visitors to "wander" with the digital twin of Helsinki using 3D modelling <a href="https://zoan.fi/work/virtual-helsinki/">https://zoan.fi/work/virtual-helsinki/</a>
<b>France</b>	Complete France	AR/VR exploring France: Château de Versailles, fragrant lavender fields of Provence, Mont Blanc, Chauvet Cave, Montmartre, gardens of Villa Ephrussi de Rothschild <a href="https://www.completefrance.com/travel/holiday-ideas/9-virtual-tours-of-france-1-6590936">https://www.completefrance.com/travel/holiday-ideas/9-virtual-tours-of-france-1-6590936</a>
<b>Germany</b>	Museum Städel, Frankfurt	virtual tour through reconstructed museum rooms from the 19th century <a href="https://www.staedelmuseum.de/en/offerings/time-machine">https://www.staedelmuseum.de/en/offerings/time-machine</a>
<b>Greece</b>	Kotinos AR	audio tour of the place and interactive quizzes about the Olympics and life in ancient Olympia <a href="https://www.youtube.com/watch?v=uCKxT5yeCr4">https://www.youtube.com/watch?v=uCKxT5yeCr4</a>
<b>Hungary</b>	Hungarian National Museum	virtual tour through the Google Arts & Culture platform. The permanent collection of the National Museum contains more than a million archaeological objects from the Hungarian cultural heritage. <a href="https://mnm.hu/en">https://mnm.hu/en</a>
<b>Ireland</b>	EPIC Museum The Irish emigration museum	virtual tour of the museum with educational videos and audio descriptions of galleries and historical paintings. <a href="https://dublin.epicchq.com/virtual-tour-epic-the-irish-emigration-museum?_ga=2.24790073.228964947.1608207040-629808867.1608207040">https://dublin.epicchq.com/virtual-tour-epic-the-irish-emigration-museum?_ga=2.24790073.228964947.1608207040-629808867.1608207040</a>
<b>Italy</b>	Vatican Museums	virtual tours of the Vatican Museums. <a href="http://www.museivaticani.va/content/museivaticani/it/collezioni/musei/tour-virtuali-elenco.1.html">http://www.museivaticani.va/content/museivaticani/it/collezioni/musei/tour-virtuali-elenco.1.html</a>
<b>Latvia</b>	Latvia inside	VR platform for the promotion of tourism and cities of Latvia <a href="https://latviainside.com/vr/">https://latviainside.com/vr/</a>
<b>Lithuania</b>	Gluk media	the digital story of the palace of Lithuanian dukes from the 13th to the 15th century, restored on a virtual reality tour. <a href="http://glukmedia.com/">http://glukmedia.com/</a>
<b>Luxemburg</b>	VR Timetravel	the part of "Smart City" concept of the Luxembourg city including 7 locations such as Place Guillaume II or Place d'Armes; users can access old photographs, historical films or 3D maps. <a href="https://www.youtube.com/watch?reload=9&amp;v=WTIuNFTUSBY">https://www.youtube.com/watch?reload=9&amp;v=WTIuNFTUSBY</a>
<b>Malta</b>	St.Paul's Catacombs, Il-Rabat	a catacomb virtualization application developed in 2107 at the Hamrun Institute <a href="https://www.youtube.com/watch?v=NvBwLOjha04">https://www.youtube.com/watch?v=NvBwLOjha04</a>
<b>Netherlands</b>	Amsterdam Area virtual reality tour	4 videos supported by virtual reality enable the Amsterdam sightseeing <a href="https://www.iamsterdam.com/en/blog/places/take-a-virtual-reality-tour-of-the-amsterdam-area">https://www.iamsterdam.com/en/blog/places/take-a-virtual-reality-tour-of-the-amsterdam-area</a>
<b>Poland</b>	Visit Poland	virtual insight into the offer Poland as a tourist destination <a href="https://visitpoland.online/en/">https://visitpoland.online/en/</a>
<b>Portugal</b>	Photojpl.com	virtual tour of Pena National Palace, and other locations in Portugal (Moors Castle, Belem Tower, Alcobaca Monastery, ...) <a href="http://photojpl.com/cities/portugal-cities/">http://photojpl.com/cities/portugal-cities/</a>

Country	AR/VR app	App short description & web access
<b>Austria</b>	Vars AR & VR	virtual walks around the Austria cities <a href="https://www.vars.at/augmented-reality-tour/">https://www.vars.at/augmented-reality-tour/</a>
<b>Belgium</b>	Historium VR Brugge	interactive tour of the medieval city of Bruges in virtual reality by the support of Oculus - a designed display of virtual reality <a href="https://www.historium.be/en/discover-historium/vr">https://www.historium.be/en/discover-historium/vr</a>
<b>Bulgaria</b>	VR City Sofia Independent Film Festival	"So Independent" - festival of experimental short and AR and VR films with a focus on art and innovation <a href="https://www.vrcity.bg/en/">https://www.vrcity.bg/en/</a>
<b>Croatia</b>	Barone Fortress	virtual tour through historic fortress with the buildings, graphic markings and additional information about the marked building enhanced with the animated narrator <a href="https://www.tvrdjava-kulture.hr/hr/tvr dava-barone/prosirena-stvarnost/">https://www.tvrdjava-kulture.hr/hr/tvr dava-barone/prosirena-stvarnost/</a>
<b>Czech Republic</b>	Virtual Czech Sights	virtual tour through attractive destination in the Czech Republic <a href="https://www.visitczechrepublic.com/en-US/News/2020/04/n-virtual-czech-sights">https://www.visitczechrepublic.com/en-US/News/2020/04/n-virtual-czech-sights</a>
<b>Cyprus</b>	TopGuide Cyprus	the application interface is similar to Google Maps, it locates the device geolocation positions <a href="http://myguide-ar.com/#ar">http://myguide-ar.com/#ar</a>
<b>Denmark</b>	Khora	AR/VR support to various tours and insights into the historical appearance of the abbey in Esrum, visit to the city of Holstebro, virtual tours of Copenhagen National Museum of Denmark, Christiansborg Palace, etc. <a href="https://khora.com/museums-tourism/">https://khora.com/museums-tourism/</a>
<b>Estonia</b>	Historical Tartu	virtual tour based on the history of Tartu, cultural and social sights, e.g. Kivisild Bridge, Raatuse Street with Hotel Bellevue, Illusioon - the first cinema in Estonia, etc. <a href="https://www.visitestonia.com/en/virtual-reality-tour-vr-tartu-1913">https://www.visitestonia.com/en/virtual-reality-tour-vr-tartu-1913</a>
<b>Romania</b>	Projekt Tango i ARCore Software Development Kit	AR/VR view a number of locations such as the Church of the Biserica Neagra and the Hotel Acasa la Dracula <a href="https://vr4holiday.com/estate_property/360-vr-palace-of-the-parliament-casa-poporului-bucharest-romania-5k-hd-4k-virtual-reality-travel/">https://vr4holiday.com/estate_property/360-vr-palace-of-the-parliament-casa-poporului-bucharest-romania-5k-hd-4k-virtual-reality-travel/</a>
<b>Slovakia</b>	Virtual Tour IN Orava Castle	virtual tour in Orava Castle based on the film perspective "Nosferatu" <a href="https://www.youtube.com/watch?v=N4vzjD400EY">https://www.youtube.com/watch?v=N4vzjD400EY</a>
<b>Slovenia</b>	travel Slovenia	innovative AR project focused on preserving cultural heritage and strengthening local tourism in Slovenia <a href="http://www.travel-ar.si/en/">http://www.travel-ar.si/en/</a>
<b>Spain</b>	Spain Headout from home	virtual visit to the cities of Barcelona, Madrid, Cordoba, Bilbao, Granada and Seville. Locations in cities are displayed using images, audio and video <a href="https://www.headout.com/blog/virtual-travel-to-spain/">https://www.headout.com/blog/virtual-travel-to-spain/</a>
<b>Sweden</b>	Visit Sweden	Swedish nature in Virtual reality <a href="https://visitsweden.com/what-to-do/nature-outdoors/nature/sweden-vr-films/">https://visitsweden.com/what-to-do/nature-outdoors/nature/sweden-vr-films/</a>

*Note: Each web sites in Table 1 was accessed and approved "as active" on June 15th 2021 Source: Author's research*

According to research findings the observed countries recognized the potential of AR/VR technologies, and successfully uses them. It means that visitors due to AR / VR offered apps enjoy opportunities to view the eminent EU-27 historical events and get cultural experiences of related destinations. Moreover, along with attractive sightseeing, the app based on AR technologies promotes more of its interesting cultural details as long as the visitors interact with their apps. Those visitors are invited to simply use their smartphone or tablet to experience an augmented version of their view in a museum or any other cultural heritage location.

The enclosed results indicate that cultural tourism in EU-27 countries enjoys, besides previously mentioned AR/VR technology benefits, and some more. Particularly, due to their potential, AR/VR contributes to their cultural tourism by preventing the decay of the sites/attractions by reducing tourist numbers and related traffic impacts. This item seems to be quite important for those in EU-27 concerned about the long-term. Namely, the respective management of sustainable cultural tourism is defined by principles of tourism but also by the principles of cultural heritage. From that point of view, just AR/VR based cultural tourism products are those developed within a preferred framework of sustainable development. By enabling presenting intangible cultural heritage without compromising its values, AR/VR solutions systematically enhance the sustainable use of cultural assets.

Furthermore, in the COVID-19 pandemic era, VR almost replaced physical travel what in (Guttentag, 2010) was already predicted. In addition, as climate change raises more concerns, the forthcoming period may result in air travel reduction with the purpose to protect and preserve the environment. These and similar travel limitations are consequently assumed as a trigger for more people to use virtual tourism offerings to experience cultural attractions they are not able to visit in a specific period.

## Conclusion

Following these paper findings, applying AR/VR technologies produce added value for the cultural tourism domain. With the support of technology, visitors can “digitally meet” cultural heritage in its original appearance.

This technology offers many benefits and reflects the value to visitors to learn about history while having fun. Well-known world destinations such as EU countries have already integrated modern technologies into their offer, and this trend will continue to spread and those other destinations will embrace modern technologies as an additional product. With the benefits of VR/AR technologies, the implementations of VR/AR technologies continue to attract visitors and investors (Transparency market research (2021)).

Although, the practice alert some shortcomings and threats referring to AR/VR app in cultural tourism, such as:

- limitations in technology due to underdeveloped hardware in particular cases,
- lack of cultural interaction
- negative effects on employment in tourism and related sectors or
- financial problems appearing when buying/replacing/upgrading virtual and augmented reality equipment, the AR/VR opportunities (Dilek, 2018) are prevailed for now.

Having in mind that the AR/VR based technology is used as well in other tourism segments such as (Tussyadiah et al., 2018): accommodation, restaurants, experience creation, transportation, and translation VR postcards, the EU-27 (but also other countries worldwide)

the related AR/VR added value are presumptive too. However, as an extension of this research, the future ones will be focused on the following: (i) detailed SWOT analysis of the AR/VR in cultural tourism in general, and (ii) appliance of AR/VR technologies in the cultural tourism of other both, European and transcontinental, countries. Such comparison results, but also individual ones, are perceived as useful input for developing cultural tourism strategies worldwide.