
9. Better: Digital media can make tourism experiences at heritage destinations better

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9.1 INTRODUCTION

If one asks a tourist the main reason why they travel, they will probably answer that it is ‘to relax and get away from it all’ (Dann, 1976, p. 22). The function of a tourism product or service, indeed, is ‘the facilitation of travel and activity of individuals away from their usual home’ (Smith, 1994, p. 583). Tourism ‘products’ are experiential goods, but not in the sense of things that can be used or tried, such as a technological device or a foreign food, but rather in the sense that they are performances, experiences per se (De Ascaniis and Gretzel, 2013). Going for a trip is similar to participating in a concert or drama; there, though, people are spectators, while on a trip tourists co-create their experience. In fact, given the same artist and songs, the same plot and script, each person experiences a concert or a drama in a personal and unique way, but they cannot change (almost) anything in the performance. The role of the tourist on a trip, instead, is that of an agent who actively realizes the trip, making several decisions at different levels – that is, core, secondary, *en route* decisions (Vogt and Fesenmaier, 1998) – as well as at every stage of the experience: before, during and after the trip (Sirakaya and Woodside, 2005). A trip never follows a determined and fully predictable path and is the result of the interplay of several variables.

Tourism stakeholders are increasingly more aware that the goal of designing tourism products and services should be not only to increase the number of people visiting a destination or using these products and services, but also to enhance a visitor’s experience. When it comes to heritage destinations, then, visitors expect not only to have an overview of the site and a technical explanation of its characteristics, but also to understand it, to recognize what sets it apart from other sites, and to get a feeling of the people and culture who created it. Indicative of this ‘awareness’ trend are the efforts of several destination management organizations (DMOs) to integrate and implement tools and guidelines to help stakeholders in the sector to design tourism products that look at visitors both as the core and at the same time as co-creators of the experience. As an example of this trend we can mention the tourism toolkits (complete with exercises) published by Fáilte Ireland, Ireland’s National Tourism Development Authority, devoted to Ireland’s built heritage and Ireland’s cultural attractions. The toolkits are intended to provide people who own, manage and work at Ireland’s heritage sites, as well as those who work in the arts and culture sector, with resources to develop and promote heritage and cultural tourism offerings. The toolkits explicitly state that the goal of such offerings should be to enhance on-site experiences and increase awareness of the local culture, by helping visitors feel like explorers again, in a way that feels enlivening, full of heart, true to the site or attraction and its values (Fáilte Ireland National Tourism Development Authority, 2020a, 2020b).

Digital media offer incredible opportunities to enhance tourists’ experiences, supporting their decision-making and opening them up to the possibility of discovering more and more

places and attractions at any stage of their trip. In this chapter, we focus on the contribution of digital media to tourism at heritage sites. We present some recent technological improvements, arguing that such contributions can be intended either in terms of (additional) products and services that digital media can allow tourists to experience (for example, reconstruction of destroyed parts of a site, direct access to information about the site), or with respect to the modalities in which tourists can experience such products and services (for example, via audio-recordings downloadable on place, by playing a digital game about the site). First, smartphones, quick response (QR) codes and augmented reality are introduced as tools that can provide additional resources to be experienced during the visit at a site (that is, on-site applications) or even without being there in person (that is, off-site applications); also, the major types of augmented reality (AR) technology are presented. Second, gamification is outlined as a mode to make visitors' experiences more attractive and memorable. Finally, the phenomenon of smart destinations is introduced as an opportunity to implement economic, territorial and social measures through innovative technological infrastructure and big data elaboration, aimed at making the destination more accessible, sustainable and efficient, increasing the quality of visitors' experience and residents' life.

9.2 SMARTPHONES, SMARTPHONE CAMERAS, QR CODES AND AR TECHNOLOGIES

Smartphones have been the milestone technology of the first decades of the 21st century, by marking the year 2007 as a turn of events with the release of the first generation of iPhones. When looking back, it is easy to perceive how smartphone technology has advanced throughout the second decade of the century. From PDAs (personal digital assistants) to the app store era and to today's ubiquitous connectivity, smartphone use has expanded considerably. In 2014, smartphone sales surpassed 1 billion units per year (O'Dea, 2020). Given the advances in technology, smartphone cameras have attained a paradigm shift, where the definition of a camera, namely 'a device for capturing a photographic image or recording a video, using film or digital memory' (Dictionary.com, 2020) is no longer applicable to its increasing, almost essential, use in our daily context. Initially, as presented by Peters and Allan (2018), the use of smartphone cameras was mainly debated from a visual composition and a visual content perspective. In 2017, Statista (Richter, 2017) reported that of the 1.2 trillion digital photos taken, 85 per cent were shot with a smartphone. Furthermore, the camera's affordances and user experience started to play a key role, together with the importance of social presence and self-presentation, which has been highlighted by many researchers (see, e.g., Goggin, 2006; Gye, 2007; Rettberg, 2014; Frosh, 2015; Heyman, 2015). As a result, the image quality of the front-facing camera, commonly referred to as 'selfie camera', has gained priority over the years and achieved a superior image quality (Rehm, 2019), merging the aesthetics of photography together with the interpretations of implied meanings and cultural functions of the subject in each selfie taken (Tifentale, 2018).

With this increasing quality and use of the camera, we see a further evolution: from a mere photographic input device, a phone camera has nowadays become an interactive medium to connect the physical world with the digital world. This connection has been established, on the one hand, with the introduction of QR codes (Shin et al., 2012; Tiwari, 2017). A QR code is scanned and decoded using a smartphone camera via a relevant QR code reader application

(nowadays, this application is directly built into the phone camera). This encoded message is used to embed hyperlinks that redirect the users to webpages or other platforms, such as mobile payment applications (Lou et al., 2017). In the tourism industry, there have been numerous popular use cases of QR codes from marketing to entertainment applications (Canadi et al., 2010), as well as site-specific information communication, such as guided tours, nearby shops and parking locations (Shin et al., 2012). Most recent QR code use cases have been featured in the media due to Covid-19 pandemic measures, such as restaurant menus (Miller, 2020) and location check-in for contact tracing (Swissinfo, 2020).

Another technology that plays a role in connecting directly experienced reality with the digital world is augmented reality (AR). Azuma (1997) has coined one of the most-used definitions of AR, as a technology that layers virtual objects atop an existing reality in order to make it more meaningful through the ability to interact with it. During the 2010s, AR technology was studied extensively in academic research, featured in early industry-specific cases, and towards the end of the decade it became more accessible for the end-consumers thanks to the widespread use of smartphones. This familiarization process was made possible by broad marketing campaigns as well as by advanced hardware in terms of portability, graphics quality and computational power. The continuous use of smartphones together with affordable high-speed mobile Internet connection has enabled AR to become a candidate for mainstream adoption in promising concepts from glasses (for example, Snapchat) (Spectacles, 2020) to cars (for example, WayRay) (WayRay, 2020) in the decade to come.

The tourism sector has been one of the early adopters of AR technology, which has enabled access to digitally enriched travel experiences (Jung and tom Dieck, 2017). AR synchronizes digital content or other value-added services with the physical world, addressing language barriers, educational and enjoyable experiences (Yagol et al., 2018). Moreover, it offers immersive visitor experiences, promotes the attractiveness of a place and provides additional detailed information about a site or tourism activity. For instance, Vlahakis et al. (2001) have published one of the first AR applications in cultural tourism, called Archeoguide, which was designed as a personalized guide to discover archaeological sites with reconstruction of artefacts in AR. Subsequently, AR technology has provided an opportunity to DMOs to deliver information in a more straightforward and immersive way. Instead of gathering sparsely distributed information among online and offline sources (Yovcheva et al., 2013), users can reach the content at the immediate surrounding of the place they are visiting (through a smartphone display) and in its intended context. Although these are some of the suggested key benefits of using AR, the technology has not yet been used to its full potential. AR technology is particularly suitable for sustainable data analysis on visitor engagement with real-time data on where users look, for how long they look, how they interact, and so forth. DMOs with a proactive strategy towards data-driven analytics, so-called smart destinations, will recognize the possibilities of AR and analyse user-generated data created by such applications. This will allow destinations and stakeholders to create better tourism experiences.

Whether through glasses, car windshields or smartphones, AR experiences mainly rely on tracking technology. This is achieved through the continuous flow of visual sequence (for example, via camera lens) and inertial sensors, which are then contextualized with complex algorithms for simultaneous localization of the viewfinder, mapping of the environment and, lastly, positioning of virtual objects (Durrant-Whyte and Bailey, 2006). There are three major types of tracking technologies used in AR experiences: location-based systems, marker-based

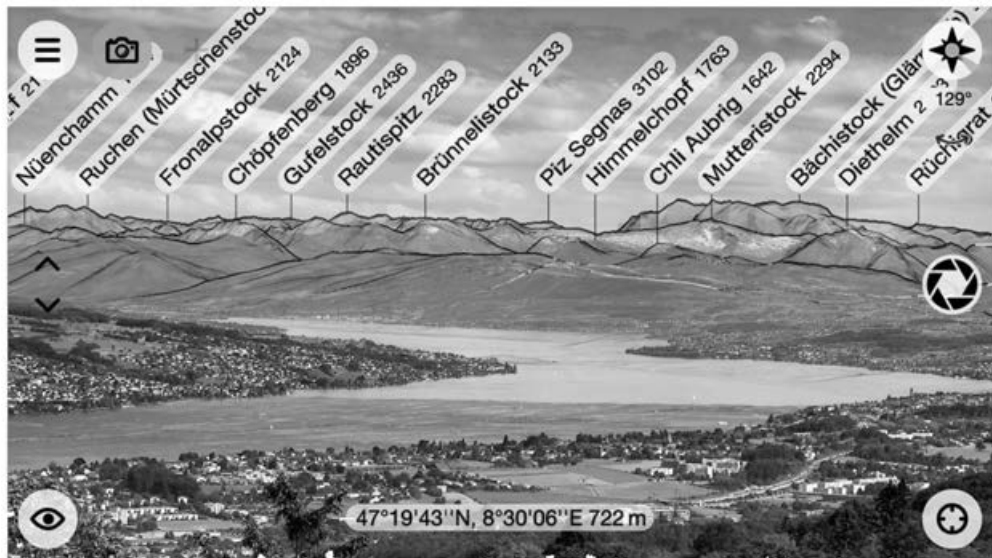
systems, and markerless or vision-based systems. They are presented in the following subsections.

9.2.1 Location-Based AR

Location-based tracking proposes the use of inertial sensors, which are generally used for navigation systems (such as Google Maps), in combination with Global Positioning System (GPS) receivers. This tracking method is inexpensive, efficient in performance and has low latency (Bekele et al., 2018). The modern examples of location-based tracking are often paired with camera feed to overlay relevant virtual objects in AR. AR applications have the capability to automatically access the users' smartphone camera, then display holograms or icons about the points of interest (POIs) with details and directions in augmented view. In such a case, the smartphone sensors feed is utilized to function as a compass in combination with the camera view, which can highlight the direction of the POIs relative to the user.

DMOs can benefit from and effectively implement location-based AR in location marketing and communication campaigns (Nayyar et al., 2018). More personalized concierge services have always been within the scope of destinations as they offer long-term engagement for prospective visitors and a magnet effect for local businesses, such as smart recommendations (Kourouthanassis et al., 2014). The impact of AR experiences would help tourists to be better informed thanks to dynamically updated information on POIs (Yovcheva et al., 2012; Chung et al., 2015). The novelty effect and usage intentions (that is, using a localized AR recommendation service versus a global navigation application with integrated recommendation features) have a strong influence on AR acceptance and should be the focus for an effective implementation (tom Dieck and Jung, 2018).

One successful example of location-based AR is PeakFinder¹ developed by Fabio Soldati (PeakFinder, 2020; Soldati, 2010). The app allows visualizing the names of the mountains and peaks with a 360-degree panorama display (Figure 9.1). The first version of PeakFinder relied only on the GPS data of the user. Further versions of Soldati's application use smartphone camera and AR technology to display names on top of the actual panorama view, through the smartphone screen. PeakFinder provides value-added service to outdoor tourism destinations. Swiss Squares² is another location-based application that provides historical and contemporary information for major Swiss cities and sites (Swiss Society of Engineers and Architects, 2013). The AR feature provides images or views of the POIs, which are displayed on the exact location surrounding the user based on the actual point of view. The application gives a visual comparison of the past and current situation, showing key changes and alternative or future design plans. The architectural assets of a city play a leading role in attracting tourists, by addressing tangible and intangible values; architecture is recognized as a supporting element of the cultural urban tourism, and this includes heritage buildings and modern buildings as the sites of experience (Scerri et al., 2019; Edwards et al., 2008). In order to establish a more complete experience of the architectural texture in situ, AR applications such as Swiss Squares allow a holistic perspective, by showing photographs and communicating cultural values from the past to the present.



Source: PeakFinder (2020, <https://peakfinder.org/>, accessed on 12 October 2020). Adapted with permission.

Figure 9.1 Image from PeakFinder AR application

9.2.2 Marker-Based AR

Marker-based tracking uses the smartphone camera, vision algorithms and a unique identifier as a marker to trigger a smartphone application that initiates an AR experience (Bekele et al., 2018). The marker is recognized through the camera of the smartphone and the digital augmentation is anchored on the marker as long as it is positioned in the field of view of the camera. This tracking method is easy to implement through native apps (Camera app) or via custom-build applications using AR development toolkits (Basori et al., 2019). Marker-based AR has high accuracy compared to other types of AR technology, particularly for indoor environments. Location-based AR might lack accuracy indoors, while surface recognition in low-lit areas might be problematic for markerless AR (Kapoor et al., 2013). However, marker-based AR is limiting as it allows only for restricted movements by the users. The camera has to always keep the marker in view in order to continuously visualize the AR experience.

In terms of tourism applications of marker-based AR, Lee et al. (2015) showed that AR has the potential to enhance the visitor experience. Museums can profit from building immersive and enjoyable experiences, while combining them with the educational aspects of a visit. Furthermore, using marker-based AR in connection to exhibits can provide additional on-demand information and may help overcome spatial limitations in situ, or display archived or on-loan exhibits. Moreover, it may reduce hardware investments by the institutions as the AR application can be installed on visitors' own devices (Neuburger and Egger, 2017).

For example, Making Visible the Invisible³ is a marker-based AR application in the archaeological site of Augusta Raurica located in Kaiseraugst, Switzerland. The application visualizes the invisible and publicly inaccessible artifacts in situ (Armingeon et al., 2019). Markers

are included on the information boards in different POIs. When the markers are scanned using the accompanying application, interactive three-dimensional (3D) models of the ancient site digitally pop up on top of the information board. The main AR feature provides visitors with a self-paced audio guide and on-demand information, with a 3D model of the ancient site on top of the scanned marker.

An example that works *ex situ* is Aleppo AR.⁴ The AR application has been developed to explore in AR the 3D model of the Citadel of the Ancient city of Aleppo, a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site. The printable marker is available on the developer's website. Once scanned, a 3D model of the site appears over the marker with annotations on the damaged areas (Figure 9.2). Since 2011, tourism at the site is not recommended due to a civil war, therefore, an AR application with 3D models constitutes a valuable way to provide a certain access to it and to communicate its outstanding universal value.

9.2.3 Markerless AR

In markerless AR (also called vision-based tracking), the AR application tracks the position of the camera by detecting well-lit flat surfaces and following recognizable geometric features in the real environment to establish a 3D representation of the world as seen through a smartphone display (Bekele et al., 2018). This augmentation approach provides real-time camera position tracking and can position an augmented object on the scene realistically. The flexibility of the positioning of the augmented objects offers multiple opportunities for visualizations indoors, outdoors, *in situ*, as well as *ex situ*. Unlike marker-based techniques, which are dependent on previously positioned recognizable markers, markerless AR supports free movement and has less limitations: this improves users' flexibility (Sato et al., 2016).



Source: Iconem/DGAM; Annotations & Analysis by UNITAR-UNOSAT. https://play.google.com/store/apps/details?id=com.iconem.aleppo_ar (accessed on 12 October 2020). Reprinted with permission.

Figure 9.2 Image from Aleppo AR application, Citadel of Aleppo 3D representation, 3D Image

Markerless AR can effectively enhance travel experiences with interactive visualizations and reconstructions. An AR reconstruction can accurately recreate historical buildings with their essential details to scale (Kolivand et al., 2018). AR layers can feature historic media such as drawings, paintings and photographs or recreations of historic scenes superimposed on the real environment experienced through a smartphone display (Kolivand et al., 2019).

An example of markerless AR application is LHistory,⁵ a heritage-focused mobile application developed to inaugurate the 300th anniversary of the principality of Liechtenstein. LHistory features more than one hundred POIs, from historical and cultural sites to other attractions in Liechtenstein. Ten of the POIs offer AR features to create an immersive experience. AR content, including iconic castles, topographic visualizations and interactive stories, is presented as a markerless experience and without a location limitation, allowing users to experience the historical sites through their smartphone display. 3D models of the castles and topographic maps feature scalable models of the POIs. Each model offers several points with extra information, such as 360-degree panoramic photographs of the rooms in a castle. The interactive stories depict 3D characters giving information about their work or life. The stories have interactive features, such as the character's head following the user's position, and extra information available when clicking on the items in their surroundings (Figure 9.3). Lastly, an AR game feature allows users to build their own castles in AR, which enhances the user engagement and interactive experience. LHistory provides a valuable digital travel experience through narrative, immersive, playful interactions in the context of cultural heritage; this is important, especially in years such as 2020 when tourism activities have been dramatically reduced due to the Covid-19 pandemic.

A further example of markerless AR for heritage sites is a historical and narrative mobile AR application, MauAR,⁶ sharing the physical and ideological history of the Berlin Wall, developed for the 30th anniversary of the fall of the Iron Curtain. The application provides narrated visualizations of several periods of the wall and the history observed from both sides.



Source: Liechtenstein Tourism, <https://bitforge.ch/portfolio/lhistory/> (accessed on 12 October 2020). Reprinted with permission.

Figure 9.3 *Image from 'LHistory' AR application*

The AR experience features a realistic 3D model of the wall that is observable *in situ*, as well as *ex situ*. The wall model provides the missing parts of the wall, as well as the narrative experience. MauAR features one of the most visited tourist attractions in Germany, which can be experienced anywhere in the world. However, some elements in the narrative can only be accessed *in situ*. Hence, this may enable an opportunity for DMOs to promote self-guided tourism activities in Berlin.

9.2.4 Advantages of AR Technology for Tourism at Heritage Sites

AR is widely used in heritage and cultural tourism, as it offers many advantages in terms of improving tourism experiences and co-creation (Tscheu and Buhalis, 2016; Graziano and Privitera, 2020) and is a ‘powerful tool for contextualizing, disclos[ing] and disseminating the heritage, as well as to make the created resources more accessible’ (Arroyo et al., 2018, p. 37). Simply by pointing a smartphone camera towards a monument or a marker, by being at a specified location while using the application or by scanning a surface, AR experiences can be activated, allowing users to access richer digital content. Recognized mobile AR tourism experiences include features such as on-demand additional information at the POIs, wayfinding and navigation, self-paced guided tours with dynamic content, to name a few.

Furthermore, thanks to AR technology, destinations can implement storytelling and visualization so that visitors can learn about the heritage of the place they are visiting. This creates value as it increases users’ engagement and excitement, as well as their knowledge and awareness about the importance of preservation of this heritage (Tscheu and Buhalis, 2016; Arroyo et al., 2018). AR is an accessible technology and allows the development of applications. In addition, if properly implemented, it can create a competitive advantage for the heritage site and the destination (Tscheu and Buhalis, 2016).

Lastly, AR applications provide users’ data, which are a very precious resource for smart destinations. The following requirements for stakeholders were listed by Tscheu and Buhalis (2016): AR applications should be designed to preserve the environment, should be easy to use, and functioning for large audiences, easy to maintain by the destination and/or heritage site, and should not be too costly in terms of development and management. Moreover, further theoretical and empirical studies are needed on AR in tourism, since this technology is still in its infancy. Destinations should reflect on topics such as user benefits and affordances for the tourism activity (Chung et al., 2015), as well as concerns over security and data privacy (Roesner et al., 2014).

9.3 GAMIFIED EXPERIENCES FOR TOURISM AT HERITAGE SITES

Another technological development that allows enhancing visitors’ experiences by making them more attractive and memorable is gamification. For some years now, tourism companies have introduced gamified applications in their strategies as a marketing tool and as a facilitator of a deeper engagement with tourists. Gamification is defined as the selective integration of various game elements in a system that is not intended to be a fully fledged game and is to be used in non-entertainment environments (Deterding et al., 2011; Deterding, 2012). Digital gaming elements can support dynamic interactions with users and offer opportunities for

co-creation of personalized services and experiences. Game mechanics and game thinking have been applied in different industries: healthcare, government, education, transportation, among others. The question of why gamification works should find its answer primarily in two connected game features, which are related to motivational drivers of human behaviour: reinforcement/reward and emotions. An extrinsic reinforcement such as money or fame, or an intrinsic reinforcement such as a positive or pleasant emotion, leads to the repetition of the activity or behaviour that granted that reinforcement. Games are able to evoke strong emotions because they foster immersion and engagement into the game world and story. Successful gamification, indeed, can produce a behavioural change through the formation of habits thanks to the dynamics of reinforcement and the emotional response of the people participating in the experience (Robson et al., 2015). Depending on the context and the goal, gamification interventions can borrow several other typical features of games that contribute to engaging users, such as competition, storytelling, characters, setting and defined times.

In the tourism domain, gamification can have several benefits: tourist engagement, experience enhancement, loyalty building and brand awareness (Xu et al., 2017). There are two main types of tourism-related gaming:

1. Social games, which are based on social media and are usually played before the trip. They are proposed by tourism companies to generate attractive images of a destination, and to stimulate the emergence of online communities that can facilitate the reinforcement of positive destination images, increase brand awareness and even counteract negative word-of-mouth (Fong and Forster, 2009).
2. Location-based mobile games, which are usually played on-site. Their goal is to engage visitors by making their experience more informative and fun (Waltz and Ballagas, 2007). A recent trend is to incorporate augmented reality features in mobile games, so to blend real and virtual environments (Yovcheva et al., 2014).

A recent example of a gamified service that proved to be able to engage and build customers' loyalty comes from the airline sector. The Australian company Qantas has acknowledged its customers' complaints that the frequent flyer programme had become obsolete and has partnered with a health insurance company to develop a new programme. Through a mobile app, members can earn points to be used for flying or for buying the airline's services, by progressing in lifestyle and physical activity challenges such as walking or running.⁷

Several attempts have also been made at applying gamification to heritage destinations. The goal of enhancing the visit experience overlaps here with the goals of raising awareness and fostering informal learning about heritage. The development of gamified applications for heritage destinations has followed different models. Some of them are similar to treasure hunts – such as *The Amazing City Game* (Wu and Wang, 2011) and *H-Treasure Hunt* (Kim et al., 2015) – where players or groups of players have to solve tasks at different locations of the site by collecting clues, and find the treasure in the least amount of time. *H-Treasure Hunt*, in particular, integrates a location-based service with object-based sensors to find the location of artifacts at a historic site. Players participate in a treasure hunt where they have to explore a historic site interacting with artifacts to complete missions, following the indications of the app:

Exploring the site with *H-Treasure Hunt*, students will be able to discover and learn many interesting facts about history. The game will help them to have an immersive and realistic reconstruction of

a real location. As a result, they will be able to appreciate and learn the historical values of the site. It also engages mechanisms to motivate students into a real experience. (Kim et al., 2015, p. 563)

Another recent example of a treasure hunt-like gamified application is Grand Master Challenge (Papathanasiou-Zuhrt et al., 2017), which adds to the challenge an engaging, well-contextualized story. Here, players are assisted by an avatar who gives them hints to solve a mysterious theft. The story is set in the Medieval City of Rhodes, during the period of the Knights Hospitallers (1306–1522). To solve the mystery, players have to wander around the Medieval City and collect clues, which also reveal meaningful aspects of the heritage site. The winner is awarded the title of Grand Master. To develop the game, local stakeholders such as shops, museums and restaurants have been involved. The main goal of the game is to support visitors in the Medieval City and inspire them to co-create content, experiencing heritage in a playful way while considering the socio-historical context.⁸

Other gamification projects – such as Geist (Kretschmer et al., 2001), Oakland Cemetery (Dow et al., 2005) and Carletto the Spider (Damiano et al., 2008; Lombardo and Damiano, 2012) – have tried to digitize the familiar character of the tour guide by placing virtual storytellers in cultural heritage sites. Carletto the Spider, for instance, is based on the DramaTour methodology used to give information about heritage items, a methodology that incorporates principles of drama in character-based presentations. Carletto is a spider with an anthropomorphic aspect, who engages in a dramatized presentation of a historic building, following the visitor in the rooms and providing them with information. Visitors can stroll freely in the building, while content items are delivered in a location-aware fashion, relying on a wireless network infrastructure (Damiano et al., 2008).

It has been argued, though, that character-based gamified applications do not meet the demands of ‘modern’ players, who want to explore and discover a site themselves without being forced to follow a predefined path or the indications of a tour guide, and desire a high degree of interactivity at multiple levels (Lombardo and Damiano, 2012). Therefore, more sophisticated projects have been developed using locative media and techniques borrowed from modern games such as environmental storytelling for cultural heritage projects based on gamification. Examples are REXplorer (Ballagas et al., 2008) and Viking Ghost Hunt (Carrigy et al., 2010). Here, the applications present the narrative as a puzzle to be explored or solved depending on the players’ preferences. The advantage is that players can delve into the heritage site to a degree that is proportional to their interest and knowledge level (Haahr, 2017). In REXplorer, players encounter spirits – representing historical figures – that are associated with significant buildings in the German city of Regensburg. The game works on the basis of a mobile interaction mechanism of ‘casting a spell’, which means making a gesture by waving a mobile phone through the air; in this way, the player can awaken and communicate with a spirit to continue playing the game.

When designing gamified experiences for tourism at heritage sites, all the parties involved need to be taken into account: players, who are the real performers who compete in the experience; designers, who design, develop, often manage and maintain the game; spectators, who are not part of the experience but whose presence influences how the gamified experience works, such as fellow travellers, tourism or heritage accompanying/supervising personnel/facilitators (Robson et al., 2015). Moreover, specific game design principles have to be followed, namely: mechanics, which refer to decisions about goals, rules, setting, context, types of interactions and boundaries of the situation to be gamified; dynamics, which are the types

of player behaviour emerging during the game experience such as betting or cheating; and (positive or negative) emotions, which refer to the mental affective states and reactions evoked in the participants while playing the game, such as excitement, surprise, wonder, but also disappointment at losing or sadness at not achieving a reward (Robson et al., 2015).

Having presented specific technologies (smartphones, QR codes and AR) and modes (gamification) that can enhance tourism experiences at heritage sites, in terms of products and services offered as well as the access modalities of these products and services, it is time now to introduce the concept of ‘smart destination’. This concept allows broadening the view and illustrating how these different technological improvements, together with big data elaboration, can favour the implementation of economic, territorial and social measures to enhance the tourism experience at the destination level.

9.4 SMART DESTINATIONS

The technological developments in the past decades, such as the Internet of Things (IoT) and big data, have been challenging the notions of destination, tourism, tourists and experiences, making us think about new concepts and models (Femenia-Serra et al., 2019; Buhalis, 2019). As a response to this, the concept of smartness (smart city, smart destination, smart tourism) emerged in the 1990s, but has become increasingly used and popular since 2008 (Boes et al., 2016). It finds its origins in the eTourism construct (Gretzel et al., 2015a; Xiang and Fesenmaier, 2017; Femenia-Serra et al., 2019), which expresses ‘the digitalization of all processes and value chains in the tourism, travel, hospitality and catering industries’, where digital media are implemented to boost efficiency and effectiveness of tourism stakeholders at a destination (Buhalis and Jun, 2011, p. 6). After eTourism, the first concept to appear expressing the idea of smartness is that of a ‘smart city’, mainly referring to and focused on residents (Boes et al., 2015). Caragliu et al. (2011) provide an operational definition of a smart city, drawing from the literature, according to which a city is smart ‘when investments in human and social capital and traditional (transport) and modern (ICT [information and communication technology]) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance’ (p. 50). In time, this term has evolved into ‘smart destination’, where the same principles of a smart city are also applied to visitors, and ‘smart tourism’. Differently from eTourism, a construct focused on processes, smart tourism delineates a destination’s whole ecosystem where a connection of the digital world with the physical world (that is, stakeholders and tourists) occurs through technology, more precisely thanks to the Internet of Things and the increasing availability of big data, where the aims are efficiency, sustainability and transformed tourism experience (Gretzel et al., 2015a; Gretzel et al., 2015b; Femenia-Serra et al., 2019).

Smart destination is a complex concept, for which a clear definition has not yet been agreed upon univocally and unanimously. One of the most common and widely used definitions is the one provided by SEGITTUR (Sociedad Mercantil Estatal para la Gestión de la Innovación y las Tecnologías Turísticas), a Spanish society dependent from the Ministry of Industry, Trade and Tourism and affiliated to the Secretary of State for Tourism that is responsible for promoting innovation in the Spanish public and private tourism sectors, especially in the topics of digital transformation, smart destinations and sustainability. The society is known internationally

for sharing knowledge, best practices and innovations from Spain with other tourism markets (SEGITTUR, 2020). According to them, a smart destination is ‘an innovative tourist space, accessible to all, consolidated on a state-of-the-art technological infrastructure that guarantees the sustainable development of the territory, facilitates the interaction and integration of the visitor with the environment and increases the quality of the experience and the quality of the residents’ life’ (SEGITTUR, 2015, p. 32, own translation). The ultimate objectives of a smart destination, as summarized by Shafiee et al. (2019), are: improving tourism experiences, boosting business and increasing the competitiveness of the destination, implementing a single real-time platform for managing data, increasing effectiveness and efficiency of tourism resources allocation, connecting and involving tourism providers in a sustainable way.

A smart destination is an ecosystem in which all the stakeholders are interconnected through technology. In order for it to work, this ecosystem needs its life-blood: big data (Gretzel et al., 2015a). Big data come into the smart destination through new technologies such as smart devices, mobile applications, location-based services, virtual reality (VR), augmented reality (AR) and social media (Ye et al., 2020). There are several sources for big data in a destination: users (UGC – user-generated content – data), devices (device data) and operations (transaction data) (Li et al., 2018). The creation of value for a destination lies in the ability of the stakeholders to collect, store, process and interpret these data (Buhalis and Amaranggana, 2014; Xiang and Fesenmaier, 2017; Femenia-Serra and Neuhofer, 2018).

A smart destination, nonetheless, is not only about technology and data. These have to be considered in a bigger picture, together with four fundamental constructs that build up the smartness of a destination: (1) leadership, important to foster innovation and development of the destination; (2) entrepreneurship and innovation; (3) social capital and the idea of co-opetition, a combination between collaboration and competition; and (4) human capital, where stakeholders’ education plays a crucial role (Boes et al., 2015).

The concept of smart destination is not only discussed in the literature and the academic world. In 2018, the European Commission launched a competition for European cities to become the European Capital of Smart Tourism. The destinations that are awarded with this recognition have the chance to share their best practices as smart tourism destinations (European Union, 2019a). The first two cities selected as European Capitals of Smart Tourism in 2019 were Helsinki and Lyon, while the two European Capitals of Smart Tourism 2020 were Malaga and Gothenburg. More details on these capitals of smart tourism are elaborated further on in this chapter. For the scope of this competition, a definition of smart tourism destination was given by the European Union. According to this definition, a smart tourism destination is:

1. a destination that uses digital media and ICT-based tools to offer more accessible and enhanced tourism experiences, create innovative products and services and intelligent solutions;
2. a destination that focuses on and involves territorial, social and human capital to ensure growth in its tourism sector and improvement of quality of life for local people, by promoting the development of entrepreneurial businesses and their interconnectedness (European Union, 2019b).

Starting from this definition, the initiative European Capital of Smart Tourism wants to recognize the accomplishments by tourism destinations in Europe in the areas of:

1. sustainability: meant as economic, social, cultural and ecological sustainability;
2. digitalization: both in their tourism offer and in the development of local business's digital skills and tools;
3. cultural heritage and creativity: as a mean to enhance the tourism offer and at the same time to give recognition to the destination's heritage; and
4. accessibility: meant as physical, language and digital accessibility (European Union 2019b).

9.4.1 Understanding Requirements and Benefits of Digital Media and Technologies in Smart Destinations

In order to identify the competitive advantage that new technologies and applications can provide, destinations and their stakeholders need, on the one hand, to understand these technologies and their requirements for successful implementation and management; and on the other hand, to know what their benefits are (Dorcic et al., 2019). As Buhalis and Amaranggana (2014) illustrate, there are three forms of ICTs that are fundamental in a smart destination. Firstly, cloud computing, together with data analysis technologies, helps facilitate information sharing at a destination and accessing this information stored on web platforms and databases. Secondly, the Internet of Things (IoT) fosters information collection and analysis (for example, tracking visitor flows and behaviours through chip-fitted entrance tickets), and automation and control of processes. Thirdly, end-user Internet service system comprises all those applications that combine cloud computing and IoT. These different forms of technologies can be implemented at different levels by smart destinations, influencing the travellers' experience in different ways. Neuhofer et al. (2014) proposed four levels of tourism experiences, depending on the degree of technology integration and intensity (going from low to high): conventional experience, technology-assisted experience, technology-enhanced experience and technology-empowered experience. This hierarchy is an effective framework for smart destinations to evaluate their current position and future strategies (Dorcic et al., 2019).

In addition to the requirements for their implementation and management, researchers have also extensively explored the benefits that digital media, ICTs and mobile technologies bring to destinations, which are several. They can help to solve issues at the destination such as managing flows and, consequently, overtourism (Brown et al., 2013; Baggio and Scaglione, 2018). They can also support crisis management by facilitating communication between the stakeholders at the destination and the tourists as well as the monitoring of the situation (Kasahara et al., 2014). New technologies can also improve the communication between a destination and the tourists, by preventing the latter from having to deal with an overload of information. In fact, recommender systems and personalization (both of communication and of services) provide tourists, in exchange for data, only with the relevant information and services, filtering out all those that might be misleading, redundant or useless, in this way easing their visit-related decision-making process and helping them build unique experiences; in other words, smart experiences (Buhalis and Amaranggana, 2015; Gretzel et al., 2015a; Dorcic et al., 2019). Another field in which the implementation of technologies plays an important role is heritage management.

9.4.2 Tourists in Smart Destinations

So far, the provider perspective in the context of smart destinations has been discussed. It is now important to look at the customer perspective, namely, what it means to be a tourist in a smart destination; a perspective that has also been deeply influenced by the digital transformation in tourism. The introduction of new technologies has shaped not only the transformation of destinations into smart destinations, but also tourists' attitudes and the way in which they behave, as they are now more and more actively participating in the experience creation (Gretzel et al., 2015a). This has raised the need for a new construct: that of the 'smart tourist' (Femenia-Serra et al., 2019). Three main attitudes and related characteristic behaviours define the smart tourist: openness to sharing data, propensity to adopt smart technologies and disposition to interact or co-create using these smart technologies (Femenia-Serra et al., 2019). However, to ensure that these attitudes become actual behaviours, and hence to guarantee that the smart technologies offered at a smart destination are successfully received and used by smart tourists, it is important to analyse and consider what factors influence tourists to use mobile technologies and applications during their travels, how visitors use these technologies and applications, and what the benefits for them are. The following factors were found to have the highest impact: concerns about privacy and security, travellers' attitudes and intentions in adopting mobile technologies and applications, travellers' usage and preferences of mobile technologies while travelling, and the impact of these technologies on travellers' experience and co-creation (Dorcic et al., 2019; Femenia-Serra et al., 2019). Let us elaborate more on these factors: quality, usefulness and ease of use are important characteristics that affect travellers' tendency to adopt a certain mobile technology or application, together with compatibility with location (for example, in the case of mobile games and AR applications) and enjoyment in using the app (Dorcic et al., 2019). Furthermore, these applications should facilitate searching for travel information, purchasing travel-related services (for example, hotel reservations) and should enhance the experience at the destination (Morosan and DeFranco, 2014; No and Kim, 2014; Lee et al., 2015; Dorcic et al., 2019). Central, though, is the fact that these technologies and applications should allow travellers to save time, be more efficient and effective (Bader et al., 2012). Other important aspects to consider are the level of technology-related skills of the travellers and their general attitude towards applications and mobile technologies in everyday life (Wang et al., 2014; Rivera et al., 2015). Availability of infrastructures at the destination also plays a role (Mang et al., 2016). On the contrary, travellers might not be willing to download an app in case it collects personal data, if the app is not perceived as trustworthy and providing valuable information (Morosan and DeFranco, 2015); travellers need to see enough benefits for them in downloading the application, more so if the application comes with a cost (Dorcic et al., 2019). In terms of tourism experience, by using mobile technologies and applications such as smartphone, AR applications and virtual reality (VR), travellers are actively involved in the creation of their own experience; in other words, they co-create their experience together with service providers and digital media (Morosan and DeFranco, 2016). They are inspired by these applications and find themselves more confident while travelling, provided that the application is a good source of information. As for mobile technologies and applications in general, AR and VR applications and games bring many opportunities for the destination, in terms of increased duration of the attraction visit and better management of tourism flows (Dorcic et al., 2019). These opportunities arise only if the application is adopted

by tourists, and this depends on its functionality, the practical information provided about the destination, ease of use and possibility of personalisation of the apps (Han et al., 2013).

9.4.3 Examples of Smart Destinations

As examples of smart destinations we briefly present here the 2019 and 2020 European Capitals of Smart Tourism. Helsinki, Lyon, Gothenburg and Malaga won this recognition for the following main reasons (European Commission, 2019a, 2019b, 2019c, 2019d). Firstly, their accessibility, as the cities' public transport system and attractions are accessible to travellers with disabilities and limited mobility. Helsinki and Lyon offer city cards with free or discounted access to transportation and attractions, while Gothenburg puts its focus on its digital accessibility, by making information about the destination available on all digital channels to improve the visitor experience. Secondly, their sustainability plans, which are focused on managing flows to avoid overtourism, supporting local business, offering sustainable modes of transportation and environmentally certified facilities and reducing their carbon footprint. In particular, Gothenburg has implemented an Event Impact Calculator that helps organizers evaluate the economic, social and environmental impact of their events, while Malaga has installed public LED lighting and smart watering systems for green areas, has established an Air Quality Sectoral Plan, has improved its waste separation and street cleaning system and has worked on the revitalization of its natural spaces. Thirdly, their innovative and creative digital services that provide information and recommendations to tourists. In particular, thanks to an open approach to public data, Helsinki has created an ad-free service platform called My Helsinki, where locals give recommendations to tourists; Lyon is planning a recommender system to give live geolocated information directly on visitors' smartphones. Last but not least, their cultural and artistic initiatives, especially Malaga and Lyon, whose historic district is a UNESCO World Heritage Site. Digitalization and technology give tourists better access to the history of this part (and others) of the city.

9.4.4 Some Concerns about Smart Destinations

To conclude, some concerns regarding the use of digital media and ICTs in tourism and the shift towards smart destinations that have arisen in the literature have to be mentioned. First of all, as mentioned earlier, the topic of privacy is of the utmost importance and has an influence on travellers' attitudes towards technology (Gretzel et al., 2015a; Femenia-Serra et al., 2019): no applications or mobile technologies should violate the privacy of the travellers; all of them should be compliant with privacy regulations and laws (Dorcic et al., 2019). Secondly, merely implementing digital media and ICTs (and here we include the technologies mentioned in this chapter) at a destination is not enough to make it smart (Dorcic et al., 2019). As previously highlighted, there are four pillars that constitute a smart destination: human capital, leadership, social capital and innovation (Boes et al., 2015). Technological innovations need to be integrated in every pillar and have to be sustainable in the long term: tourism stakeholders need to be educated and collaborate in the creation and implementation of digital media and ICT-enhanced innovations (McCabe et al., 2012), and the local population must be involved (Graziano and Privitera, 2020). Thirdly, technology issues and failures might undermine users' experiences (Townsend, 2017), hence, stakeholders need to ensure that the application's functionalities are available and work well (Tscheu and Buhalis, 2016). Fourthly, smart des-

tinations have to take into consideration that not every tourist might be connected and hence, they might feel digitally excluded in a destination where everything is based on technology (Townsend, 2017). Considering all this, it is of the utmost importance to remember that in tourism, the human touch is still important: digital technologies should be designed to support human interaction and not to substitute it.

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NOTES

1. <https://peakfinder.org/> (accessed on 12 October 2020).
2. <https://www.sia.ch/index.php?id=876&L=1> (accessed on 12 October 2020).
3. <https://www.augustaurica.ch/en/visit/app-making-visible-the-invisible/> (accessed on 12 October 2020).
4. https://play.google.com/store/apps/details?id=com.iconem.aleppo_ar (accessed on 12 October 2020).
5. <https://bitforge.ch/portfolio/listory/> (accessed on 12 October 2020).
6. <https://mauar.berlin/> (accessed on 12 October 2020).
7. Information about the Qantas frequent flyer programme can be found at the following link: <http://www.airlinetrends.com/tag/gamification/>.
8. More information about the game Grand Master Challenge can be found at the following link: <https://www.artifactory.eu/grand-master-challenge-the-game>.

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