Mobile Apps Devoted to UNESCO World Heritage Sites: A Map

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Abstract   As of July 2013, 981 properties in 160 States were enlisted by UNESCO as World Heritage Sites (WHSs), according to its "Convention Concerning the Protection of the World Cultural and Natural Heritage", signed in 1972. While the main emphasis of the Convention is on protection and conservation of cultural and natural heritage of outstanding universal value, also its presentation is included among UNESCO's goals. Information and Communication Technologies (ICTs) may help in fulfilling the goal of presentation, on the one hand opening up such properties and their meaning also to people who are not able to visit them, on the other hand supporting responsible and sustainable tourism by those who can access them, so that visitors can better understand and enjoy WHSs, becoming aware of their importance and of their fragility, hence behaving in a way that does not hinder their transmission to future generations. To better understand the role of ICTs for WHSs' presentation, this paper provides an analysis of mobile apps concerning WHSs, mapping them according to several factors, including covered sites and areas, main contents and functionalities, intended publics, costs, and presence of UNESCO-related info.

Keywords Mobile apps · UNESCO world heritage sites · Sustainable tourism

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1 Introduction

In 1972, the General Conference of UNESCO adopted the Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO 1972), aiming at the "identification, protection, conservation, presentation and transmission to future generations" (UNESCO 1972, p. 3) of the world's cultural and natural heritage of outstanding universal value, and encouraging cooperation among nations to accomplish this goal. This goal statement immediately evidences a certain dilemma that UNESCO and its member States have to face: on the one hand, WHSs are to be protected and preserved for future generations, they should therefore remain as untouched as possible and not be exposed to the potentially detrimental influence of visitors; on the other hand, these sites by definition are the universally outstanding heritage of mankind, and should therefore be presented and made accessible to people. Tourists are therefore an "inevitable destiny" (Pedersen 2002, p. 3)—or even "necessary evil"? (Ashworth 2012, p. 278)—and have to be considered in the management and planning of these properties. UNESCO's main strategy to meet this challenge is responsible and sustainable tourism (Pedersen 2002). This concept is today frequently used, and often abused, to describe tourism practices that aim at mitigating the industry's negative social, ecological, and economic impacts on places, in order to preserve them for future generations. More recently, researchers have been investigating how Information and Communication Technologies (ICTs) could be used in order to encourage and improve sustainable tourism practices (Touray and Jung 2010; Scott and Few 2013; Ali and Frew 2013). In fact, ICTs seem capable of, on the one hand, presenting sites and their meaning to people who may not or not yet be able to actually visit them, and, on the other hand, of guiding and sensitizing on-site visitors, in order to make them aware of those properties' importance and fragility.

Considering that the penetration of mobile technologies represents today one of the most significant trends in the eTourism domain (Egger and Jooss 2010; Kennedy-Eden and Gretzel 2012; Wang and Xiang 2012; Dickinson et al. 2012), the authors wanted to look at whether and how such technologies, in particular mobile applications, are offered today by sites that have an interest in encouraging and promoting sustainable tourism behavior. The present study is therefore focused on UNESCO World Heritage Sites, and aimed at answering two main research questions:

- Which of the UNESCO World Heritage Sites do currently offer a mobile application?
- What are these applications' main contents and functionalities?

Moreover, the authors hypothesized that the world heritage character of the sites would have particular design, structure and content implications, and that the uniqueness of each WHS would be reflected in very diverse and individually adapted applications. It is important to emphasize at this point that this study merely focused on the identification of WHS applications' contents and

functionalities, with no claim to assess their quality and their degree of fulfillment of users' needs. In order to carry out such evaluations, a usability analysis in the form of a user testing should be performed in the future, to complement the present research.

The following chapter presents existing literature with regard to mTourism, as well as the potential usage of ICTs for sustainable tourism practices. This section is followed by a description of the methodology applied in the present study, and by the presentation of the most significant results. In the subsequent section, these results are discussed and conclusions are drawn, before stating some limitations and potential future research directions.

2 Literature Review

Information and Communication Technologies (ICTs) have had and are having a profound impact on the tourism and leisure industry, giving rise to the multi-faceted phenomenon of eTourism (Buhalis 2003; Lassnig and Reich 2009). Tourism has always been at the forefront in embracing technological innovations (Poon 1993; Sheldon 1997), and it seems that after the Internet, mobile technologies are today most pervasively influencing the industry (Egger and Jooss 2010).

The growing field of mTourism (Egger and Jooss 2010) is closely linked to the increasing worldwide penetration of smartphones and related mobile applications (comScore 2013; Berg Insight 2013). Several classifications of the mTourism landscape (Kennedy-Eden and Gretzel 2012; Wang and Xiang 2012; Dickinson et al. 2012) reveal the complexity and variety of the phenomenon. In addition to more conventional mobile tourist guides (Rasinger et al. 2007; Kenteris et al. 2011), the main focuses of mTourism-related studies are today location-based, context-aware and personalization services (Höpken et al. 2010; Barragáns-Martinez and Costa-Montenegro 2013; Lamsfus et al. 2013), Augmented Reality (AR) (Yovcheva et al. 2013), as well as how mobile applications are used or could be used effectively and efficiently by various tourism suppliers such as airlines (Liu and Law 2013), theme and amusement parks (Brown et al. 2013), or hotels (Kim and Adler 2011).

Furthermore, recent studies (Lamsfus et al. 2013; Dickinson et al. 2012; Wang and Fesenmaier 2013; Kramer et al. 2007) have also shed light on how mobile technologies, in particular mobile applications, are actually mediating or impact-ing the tourist experience and behavior. Apart from significantly easing travelers' planning behavior, providing them with more flexibility and spontaneity during the on-trip phase, augmenting their contextual temporal and spatial awareness, and thus enriching the overall travel experience, smartphones and apps have also been found by the just cited authors to direct tourists' behavior by fundamentally influencing their choices and movements. These findings are of particular interest for the emerging field of ICTs and sustainable tourism (Touray and Jung 2010; Scott and Frew 2013; Ali and Frew 2013). In fact, mobile technologies could assist

in making tourists valorize more a specific place, and in simultaneously triggering more responsible and sustainable on-site behavior (Dickinson et al. 2012).

This significant potential of smartphone (or tablet) and mobile app usage in tourism could be of great value also for the management of UNESCO World Heritage Sites (WHSs). Representing unique properties of outstanding universal value, these sites face a considerable dilemma of reconciling the aims of "protection" and "presentation" (UNESCO 1972) by means of sustainable tourism (Pedersen 2002). However, no extensive research has been carried out so far to analyze if and how UNESCO WHSs use ICTs to tackle this challenge. The present study can therefore be seen as the first step of a research that aims at exploring whether UNESCO WHSs currently make use of mobile technologies, especially apps, for promotion, communication, and management of tourism.

3 Methodology

The main objectives of the present study were to find out which UNESCO WHSs already had a mobile application, and what were these apps' main functionalities and contents. The methodology applied for this purpose consisted of three main steps. Firstly, on July 21st, 2013, a list of all WHSs was created, indicating the name of the site, the respective continent and country, and whether it is a cultural, natural, or mixed heritage.

In the second step, on July 22nd and 23rd, 2013, a research in the Swiss iTunes Store was carried out to identify which WHSs already had a mobile application for iPhone and/or iPad. For this purpose, the names of the sites were entered into the search form in English as well as in German, Italian and French, three of the four official languages in Switzerland. Applications in any language were taken into consideration, but only those that were specifically dedicated to the respective WHS. Each application's link, its cost and related comments (if available) were considered. If several apps were available for one property, they were all listed but only one of them was selected for the subsequent analysis. In this selection, priority was given to apps with higher ratings (if available), apps that had received an award, apps from official sources (e.g. a Destination Management Organization), or apps whose description in the iTunes Store contained explicit references to UNESCO or to world heritage. If an app contained several WHSs in a region, it was also considered in the analysis. If a developing company, for instance eGate, iTourism, or VoyagerItS, offered identically structured applications for several properties, they were all listed, but only one of them was later analyzed exemplarily. In order to analyze one application per each of these providers, in three cases two applications for one site had to be analyzed. If several applications were offered by the same company, but had different, explicitly mentioned authors, they were all analyzed.

Furthermore, it is important to note that clearly distinguishable travel or city guides were not considered for the analysis, since the aim was to find applications

devoted to specific WHSs, not to entire cities or regions. Also apps consisting exclusively of maps, pictures, or videos were not accounted for in the analysis, even if they were dedicated to a specific WHS. The same goes for applications that were mere electronic versions of booklets or books, allowing only to swipe through pages of texts and pictures. Audio guides were considered instead, if they were dedicated to a specific WHS.

On July 24th and 25th, 2013, a research on the online platform Google Play was performed, with the exclusive aim to identify for which WHSs an Android application was available. Even if more applications were offered for one site, only one was chosen based on the above mentioned criteria, i. e. ratings, awards, official sources, and reference to UNESCO. If the only available Android application was identical to the/an iOS one, this was recorded for the following analysis. Since this research revealed that the number of WHSs with an iOS app was almost double the number of those having Android apps—140 versus 77—and that in fact about 65 % of the latter were identical to those retrieved in the iTunes store, the authors decided not to consider Android applications in the following analysis. An Android application was found for 77 properties, which in 50 cases was identical to the iOS app.

In the third step, the retrieved English, German, Italian, Spanish, Portuguese, and Czech iOS applications for iPhone and iPad were investigated with the help of an analysis grid designed to identify and rank the applications' contents and functionalities (Lizzi et al. 2013). This grid is based on indicators, i.e. pieces of content or functionality that should be relevant both for the domain and for the users (Cantoni et al. 2007). "Content" refers to information presented in the form of text, pictures, audio, or video; a "functionality" represents an action that can be performed by the user, such as searching or sharing (Lizzi et al. 2013). The list of relevant indicators for the domain of UNESCO WHS applications was determined by means of an explorative analysis, in which the inspectors browsed through a series of sample applications and identified their features with regard to contents and functionalities. These indicators were then bundled into categories and sub-categories. Following this, the authors inspected the identified applications' contents and functionalities by means of the created grid, indicating the presence or absence of an indicator in an application with the values 1 and 0 respectively. It is important to emphasize that the chosen approach being purely quantitative, it does not yield any information on the quality of the investigated apps. Due to a lack of language competencies, ten Japanese applications of one provider, and one Korean application could not be taken into consideration in this analysis.

4 Results

As of July 21st, 2013, the list of WHSs comprised 981 properties in 160 States Parties, 759 cultural, 193 natural, and 29 mixed sites. 29 properties were trans-national, and consequently appeared at least twice in the list. The research in the

iTunes store revealed that mobile applications for iPhone and/or iPad existed for 140 of the 981 WHSs, 70 of them were situated in Europe, 41 in Asia, 13 in North America, 6 in South America, 5 in Africa, 3 in Oceania, and 2 in Central America. 99 of the properties with apps were cultural, 36 were natural heritage sites, and 5 were mixed. For 47 sites, more than one iOS application was available and 23 providers offered iOS applications for more than one heritage site.

Out of the 140 retrieved iOS applications 115 were analyzed. The remaining 25 applications were not considered due to language barriers, or due to the fact that another, identically structured app of the same provider had already been inspected. Of the 115 analyzed apps, 66 could be downloaded for free, 49 were for payment, with an average cost of CHF 2.65 (approx. €2.15). 72 of the analyzed apps had a version only for iPhone, 38 had one for iPhone and one for iPad, and 5 apps where only available for iPad.

Indicators have been inductively defined through an analysis of the types of contents and functionalities offered by selected apps, making sure that they could collectively cover all main aspects. Once the indicators (49) were identified, they were grouped into 7 categories (Table 1). These 7 major categories referred to the fields "General Information" (7 indicators), "UNESCO World Heritage Sites" (7), "Multimedia" (6), "Place" (6), "Tourism" (9), "Entertainment" (9), and "General Features/Settings" (5). In addition, data about the description available on the App Store and about intended audiences have been collected.

Looking at the presence of related indicators throughout analyzed apps, the most represented categories were "General Information" (49.9 %), "Place" (41.5 %), "General Features/Settings" (29.4 %) and "Tourism" (28.8 %). "Multimedia" (24.4 %), "UNESCO WHS" (19.0 %) and "Entertainment" (11.9 %) on average were the less present categories in the analyzed applications (Fig. 1).

Within the category "General Information" the most frequently present indicators were "Selected POIs/highlights/proposals" (80.0 %), "General description of the site" (70.4 %) and "History of the site" (70.4 %). For the section "Place", "Map" (80.9 %) and "POIs on Map" (60.0 %) were most frequent. Also, 58.3 % of apps provided location-based services or features. In the category "General Features/Settings" the indicators "Information on app provider" (66.1 %) and "Contact Information (Report Error/Suggestions)" (31.3 %) were most frequent. In the "Tourism" section, "Information on Transportation" (43.5 %) and "Information on Gastronomy/Restaurants" (39.1 %) were the most observed indicators. In the category "Multimedia", "Photo gallery/slide show" (67.0 %) and "Audio Guide" (26.1 %) were dominant, but only 11.3 % of apps offered virtual tours, 5.2 % AR features. This is rather surprising considering that especially AR is regarded as one of the major current trends in the mTourism domain (Yovcheva et al. 2013). As for the category "UNESCO WHS", "Information on WHS" (56.5 %) and "Year of Inscription" (31.3 %) could be found most often. Finally, within the least represented category "Entertainment", "Sharing by User: Other (Email, SMS, etc.)" (20.0 %) and "Sharing by User: Facebook" (18.3 %) were most frequent.

Table 1 List of categories and indicators used for the analysis

Categories	Indicators	
General information	General description of the site	
	General description of the broader area/region	
	History of the site	
	Geography of the site	
	Opening hours of the site	
	Selected POIs/highlights/proposals	
	Suggested tour(s)	
UNESCO world heritage sites	Logo WHS	
	Logo UNESCO	
	Information on WHS	
	Information UNESCO/UNESCO convention 1972	
	Year of inscription	
	Explicit reason of inscription	
	Sustainability hints	
Multimedia	Photo gallery/slide show	
	Audio material	
	Audio guide	
	Video material/Youtube channel	
	Virtual tour	
	Augmented reality	
Place	Map	
	POIs on map	
	GPS/Show me on the map	
	LBS ("would like to use your current location")	
	Push messages/pop-ups	
	Trip planner	
Tourism	Information on transportation	
	Information on accommodation	
	Information on attractions	
	Information on activities	
	Information on events	
	Information on gastronomy/restaurants	
	Practical tourist information (e.g. ancillary services, weather, parking, shopping, security etc.)	
	Buy/Reserve (i.e. book a hotel room, tickets, etc.)	
	DMO/WHS contact info	
Entertainment	Games	
	Sharing by user (e.g. photos, videos, location)	Facebook
		Twitter
		Other (Email, SMS, etc.)
	Social media channel	Facebook
		Twitter
		Youtube
		Instagram
		Other (Google+ , Pinterest, vimeo, Flickr, Foursquare, blog, etc.)

(continued)

Table 1 (continued)

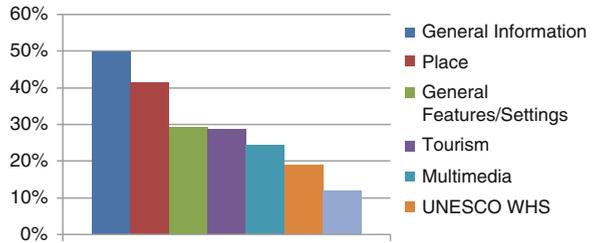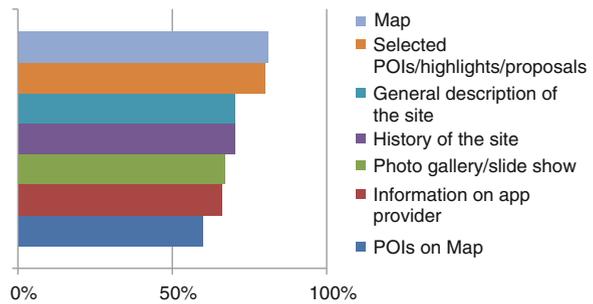| Categories	Indicators
General features/Settings	Language choice
	Search
	Information on app provider/developer
	Call useful numbers
	Contact information (Report error/Suggestions)

Fig. 1 Average presence of categories

Fig. 2 Most frequently present indicators

Overall, the most frequently present single indicators were "Map" (80.9 %, category "Place"), "Selected POIs/highlights/proposals" (80.0 %, category "General information"), "General description of the site" (70.4 %, idem), "History of the site" (70.4 %, idem) and "Photo gallery/slide show" (67.0 %, category "Multimedia") (Fig. 2). The least represented indicators were "Buy/Reserve" (1.7 %, category "Tourism"), "Social media channel: Instagram" (0.9 %, category "Entertainment"), and "Trip Planner" (0.9 %, category "Place").

Having a closer look at the category "UNESCO World Heritage Sites", the analysis showed that the WHS logo and the UNESCO logo were present only in 12.2 % and 11.3 % of apps respectively. 56.5 % of the analyzed applications contained explicit information about the fact that the respective site was actually a world heritage; the year of inscription was mentioned by 31.3 %, the actual reason of inscription by 7.8 %. Rather rarely, specific sustainability hints (9.6 %) or information on UNESCO and its Convention of 1972 (4.4 %) were provided.

Fig. 3 Screenshots of the applications dedicated to Zollverein, Rhaetian Railway, and Cornwall (from *left* to *right*)

On average, 14 of the 49 indicators were found in an application. The highest number of present indicators was 25 in the application dedicated to the Yellowstone National Park (USA), followed by 24 indicators in the application for Ha Long Bay (Vietnam), 23 indicators in those on the Rhaetian Railway (Italy/Switzerland), Syracuse and the Rocky Necropolis of Pantalica and Villa Romana del Casale (Italy), Cornwall and the West Devon Mining Landscape (UK), the Royal Palace at Caserta (Italy), and the Olympic National Park (USA), and finally 22 indicators for the Zollverein Coal Mine Industrial Complex in Essen (Germany), the Historic Center of Macao (China), and the Hawaii Volcanoes National Park (USA). Among these most complete applications, Fig. 3 exemplarily illustrates those dedicated to the Zollverein, which has integrated social media, to the Rhaetian Railway, featuring a map with various POIs, and to Cornwall, that provides information on the world heritage character of the site as well as the WHS logo. The number of indicators that are included in an application is of course a purely quantitative score, and the chosen approach does therefore not provide information on the analyzed apps' quality.

Regarding the applications' description on the iTunes Store, 45.2 % contained information about the respective property being a WHS; 7.0 % indicated also the year of inscription. In 19.1 % of iTunes descriptions, the availability of offline features was mentioned explicitly. As a matter of fact, some applications were fully functional offline, some offered online and offline modes, others provided some offline contents and functionalities, such as maps, location-based navigation, or multimedia, but required online connection for all other functionalities. This information might be of particular interest for tourists coming from abroad to visit a site, since they are interested in avoiding high data roaming fees.

Based on the contents and functionalities, as well as on design and navigation features, the authors made a qualitative assessment of the main publics each

application most probably was directed to. A vast majority of the apps clearly aimed at addressing tourists (96.5 %) and offered at least some contents that might be relevant for visitors, such as, for instance, information on transportation, accommodation, gastronomy, events, activities, POIs, or a site's history, as well as maps, pictures, audio or video material. 31.3 % of the applications appeared suitable also for educational purposes, for instance in the context of a school excursion. Such usage was almost never mentioned explicitly within an app or in its iTunes description, but was concluded by the authors if illustrative multimedia, such as audio or video material, were available, as well as quizzes, extensive background information, and comprehensive, scientifically founded, but still easily understandable and clearly structured site-related information. Such features would allow a teacher, for example, to show the application on an iPad in front of the class and to use it as a supportive, educational tool. Several applications contained quite complex and scientific site-related contents that may be useful for researchers or scholars (22.6 %), whereas rather little material seemed to be dedicated to locals (13.0 %) or children/adolescents (8.7 %). Again, these figures are the outcome of the researchers' interpretation, who supposed that locals might be more interested in recent site-related information and news, in local events, and in app features that could further enhance their knowledge about a place, such as AR; children or adolescents, instead, were assumed to favor very colorful and fancy designs, advanced multimedia functions such as virtual tours and AR, games and challenges, social media features, and any kind of interactive application functions. Also, if an application contained very little to no scientific information and used a rather simple text and syntax style, children and adolescents were considered a potential desired audience.

5 Discussion and Conclusion

The research in the iTunes store showed that 50 % of all available WHS mobile applications were for properties in Europe. This can partially be explained by the fact that Europe is the continent with the highest share of world heritage properties (around 41 %). Around 4 % of retrieved apps were for African sites, which is below Africa's share of WHSs (around 13 %); for Asia, the respective rounded percentages are 29 and 26 %, for Central America 1 and 1 %, for North America 10 and 4 %, for Oceania 2 and 3 %, and for South America 4 and 12 %. These figures show that apparently European, Asian and North American WHSs—or other relevant stakeholders—are investing more into mobile technologies for communication and marketing purposes.

Regarding the contents and functionalities, it was striking that the majority of analyzed applications did not differ significantly from rather conventional city or tourist guides. This shows that so far, the world heritage character of a place does not seem to have a considerable impact on the content, design and other features of the application. In fact, 43.5 % of the apps did not even mention the fact that the

respective site was a world heritage. Also, only in few cases the application tried to educate and inform the user about the need for sustainable and responsible behavior (9.6 %), or about UNESCO, its mission and its values (4.4 %). In the authors' opinion, the potential of mobile ICTs for these purposes is currently not exploited sufficiently by the WHSs. The fact that only few applications showed the WHS (12.2 %) or UNESCO (11.3 %) logo, may be explained by the fact that UNESCO applies rather strict policies to the use of their visuals, so that either publishers did not think they could comply with them, or they did not want to undergo a quite long procedure. However, the display of these emblems would without doubt increase the authenticity and credibility of an app for the user.

Looking at the main desired audiences of the apps, it was already stated that almost all of them seemed to address tourists (96.5 %). Since UNESCO WHSs represent historically meaningful, unique natural and cultural treasures of the world, a visit to such sites could, however, also have educational and scientific purposes. Among the analyzed mobile apps, only 31.3 and 22.6 % respectively catered for such usages: integrating more educational and scientific contents could make such applications an innovative and useful tool for professors or teachers both to inform themselves and to teach their students.

Finally, it was surprising to the authors that "Entertainment" was the least present category in the analyzed applications (11.9 %). Only very rarely, sharing by the user (18.6 %), gamification (10.4 %) or integration with social media channels (8.2 %) was used in order to make an application more appealing especially to younger audiences. It goes without saying that particularly the integration of sharing and social media features would be indispensable in order to engage users and to create word-of-mouth about the application and the site.

6 Limitations and Future Work

Regarding limitations of the applied methodology, it has to be mentioned that, the researchers being located in Switzerland could access only the Swiss iTunes Store, which may have limited the number of retrieved applications and of available ratings. In addition, the presence and functioning of location-based and AR features was difficult to identify, given that the authors were not physically present at the respective sites. Furthermore, only iOS applications were taken into consideration for the analysis of contents and functionalities. Also, in the indicator-based analysis some applications could not be considered due to language barriers. Finally, the indicator-based analysis is fundamentally quantitative, and does therefore not allow for direct qualitative judgments.

Future studies could investigate the mobile applications provided for Android. Moreover, more research should be dedicated to the questions of how mobile applications for UNESCO WHSs should be structured and designed, what contents and functionalities they should contain, as well as whether and how mobile technologies can assist WHS managers in promoting responsible and sustainable

tourism. To do so, the analysis presented in this paper, whose scope was limited to the applications' contents and functionalities, can be significantly enriched and complemented by including an analysis of usages of such apps by travelers and a measurement of their satisfaction. For instance, a usability study in the form of an on-site user testing and/or in-depth interviews with users could yield interesting findings regarding the visitors' interaction with the applications, as well as concerning the actual quality of the analyzed apps and their correspondence to users' needs. Another type of user testing could also be carried out to provide answers to the question of whether mobile applications can offer to people who are unable to travel to the respective site the same or similar experience compared to those who actually visit it. Moreover, WHS managers should be included in such types of usability studies, in order to provide an evaluation of the applications' alignment with UNESCO goals.

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