SUPPLEMENTI

Cibo e vino: rappresentazioni, identità culturali e co-creazione di sviluppo sostenibile

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The role of ICTs and public-private cooperation for cultural heritage tourism. The case of Smart Marca

Concetta Ferrara, Roberto Pierdicca, Marina Paolanti, Chiara Aleffi, Sabrina Tomasi, Gigliola Paviotti, Paolo Passarini, Chiara Mignani, Annapia Ferrara, Alessio Cavicchi, Emanuele Frontoni*

* Concetta Ferrara, PhD student in Human sciences, University of Macerata, Department of Education, Cultural Heritage and Tourism, P.le Bertelli, 1, 62100, Macerata MC, e-mail: c.ferrara3@unimc.it; Roberto Pierdicca, Post-Doctoral Researcher in Geomatics, Polytechnic University of Marche, Department of Civil Engineering, Construction and Architecture, Via Brecce Bianche, 1, 60131 Ancona AN, e-mail: r.pierdicca@univpm.it; Marina Paolanti, Post-Doctoral Researcher in Information Engineering, Polytechnic University of Marche, Department of Information Engineering, Via Brecce Bianche, 1, 60131 Ancona AN, e-mail: m.paolanti@univpm.it; Chiara Aleffi, PhD in Human Sciences and lecturer in Territory and Food Economics and Marketing, University of Macerata, Department of Education, Cultural Heritage and Tourism, P.le Bertelli, 1, 62100, Macerata MC, e-mail: c.aleffi@unimc.it; Sabrina Tomasi, PhD in Human Sciences and lecturer in Territory and Food Economics and Marketing, University of Macerata, Department of Education, Cultural Heritage and Tourism, P.le Bertelli, 1, 62100, Macerata MC, e-mail: s.tomasi@unimc.it; Gigliola Paviotti, PhD in Human Sciences and lecturer in Territory and Food Economics and Marketing, University of Macerata, Department of Education, Cultural Heritage and Tourism, P.le Bertelli, 1, 62100, Macerata MC, e-mail: gigliola.paviotti@unimc.it; Paolo Passarini, Post-Doctoral Researcher in Agricultural economics and rural appraisal, University of Macerata, Department of Education, Cultural Heritage and Tourism, P.le Bertelli, 1, 62100, Macerata MC, e-mail: p.passarini2@unimc.it; Chiara Mignani, PhD in Human Sciences and lecturer in Territory and Food Economics and Marketing, University of Macerata, Department of Education, Cultural Heritage and Tourism. P.le Bertelli, 1, 62100, Macerata MC, e-mail: c.mignani@unimc.it, Annapia Ferrara, PhD student in Education, Cultural Heritage and Territories, University of Macerata, Department of Education, Cultural Heritage and Tourism, P.le Bertelli, 1, 62100, Macerata MC, e-mail: a.ferrara5@unimc.it; Alessio Cavicchi, Full Professor in Agricultural economics and rural appraisal, University of Macerata, Department of Education, Cultural Heritage and Tourism, P.le Bertelli, 1, 62100, Macerata MC, e-mail: a.cavicchi@unimc.it: Emanuele Frontoni, Associate professor in Information Engineering, Polytechnic University of Marche, Department of Information Engineering, Via Brecce Bianche, 1, 60131 Ancona AN, e-mail: e.frontoni@univpm.it.

Abstract

This paper analyzes the opportunities related to public-private cooperation for the implementation of information communication technologies (ICTs) to promote cultural heritage tourism. After a literature review on the role of cooperation between private and public sectors and the most relevant information communication technologies (ICTs) for the promotion of cultural heritage, the analysis moves to travel apps, by illustrating features, main trends and some applications of this technology to cultural heritage and tourism. In the second part, the connection between tourism, cultural heritage and digital technologies is analyzed through the description of Smart Marca app, which, starting from the cooperation between local public and private entities, exploited ICTs to promote cultural tourism in Fermo area (Marche Region, Italy).

Il contributo analizza le potenzialità della cooperazione pubblico-privata nella progettazione e realizzazione di nuove tecnologie dell'informazione (ICT) per la promozione del turismo del patrimonio culturale. Dopo una rassegna della letteratura dedicata al ruolo della collaborazione tra pubblico e privato e delle ICT per la promozione del patrimonio culturale e lo sviluppo turistico di un territorio, l'articolo focalizza l'attenzione sulle applicazioni mobili di viaggio, illustrandone *trend* e caratteristiche, nonché alcuni esempi di applicazione di questa tecnologia al patrimonio culturale e al turismo. Nella seconda parte, la connessione tra turismo, patrimonio culturale e ICT viene analizzata attraverso la descrizione dell'app Smart Marca, che, a partire dalla cooperazione tra enti pubblici e attori privati, ha utilizzato le nuove tecnologie per promuovere il turismo culturale nel territorio fermano (Regione Marche, Italia).

Introduction

In the last decades, an extensive literature has been devoted to the role of tangible and intangible cultural heritage in boosting economic growth and local development through tourism[1]. Culture could be a "destination enhancer", able to make a destination appealing to a prospective tourist[2]. Cultural and heritage tourism can be a tool for economic development: growth is achieved by attracting visitors motivated by interest in the historical, artistic, scientific or lifestyle/heritage offerings of a community, region, group or institution[3]; it reinvigorates the interest in history and culture[4] in both tourists and local communities and satisfies a need for authenticity and return to the cultural roots of a territory[5].

In order to fully carry out the role of cultural heritage as an asset to foster local development and tourism, an important contribution can be provided by

1 Greffe 1989; Throsby 2001; Klamer 2004.
2 Kumar 2017.
3 Silberberg 1995; Csapo 2012; Smith, Richards 2013.
4 McKercher, Du Cros 2002; UNWTO 2006; Richards 2018.
5 Beverland & Farrekky 2010.

the network of private and public institutions in the tourism sector, through the exploitation of information and communication technologies (hereinafter ICTs). Public-private partnerships represent a sharing of knowledge, skills, capital, and other resources from different stakeholders. They can engage in an interactive process to decide on issues related to the problem being addressed and to address complex policies, projects, and public services' issues through joint development[6]. Since the 1960s, this type of collaboration has become important for the conservation and management of cultural heritage[7]. Digital technologies, which have progressively transformed the tourism sector[8], represent an important opportunity to satisfy the changing demand for cultural tourism, which increasingly asks for immersive and interactive experiences based on local and authentic tangible and intangible culture[9]. Several studies, in fact, demonstrate that the use of ICTs in the cultural experience enhances it in terms of number of accesses and quality of knowledge spreading[10].

This paper investigates the connections between tourism, cultural heritage, and digital technology, highlighting the potentials of public-private cooperation for the exploitation of some ICT tools for the promotion of cultural and heritage tourism. In the first part (§§ 1-3), a literature review on the role of public-private cooperation and current technologies for the promotion of cultural heritage tourism is outlined and travel apps potentials, trends and taxonomies are stressed. In the second part (§ 4), the main features of Smart Marca mobile app, designed to promote cultural tourism in Fermo area (Marche Region, Italy), are presented. Conclusions (§ 5) discuss the role that technologies and mobile applications like Smart Marca can play for the creation and promotion of a destination.

1. *Public-private cooperation in cultural heritage tourism*

Organizational partnerships between public and private spheres generally bring together actors from different governmental, commercial, and non-profit sectors with the aim of providing value, beyond the location of companies and customers, to broader groups of stakeholders[11]. There are many forms of public-private partnerships that seek to contribute to the achievement of social or public objectives. The benefits come from both partners, in proportion to their involvement in the tasks performed. This provides a more productive

6 Kim *et al.* 2005.
7 Jelinčić *et al.* 2017.
8 Shanker 2008; Buhalis, O'Connor 2015; Buhalis 2011.
9 Richards 2014.
10 Wang 2009; Arcese *et al.* 2011; Haydar *et al.* 2011; Bekele *et al.* 2018.
11 Quélin *et al.* 2017.

implementation of services that would not have been equally efficient if they had been managed independently[12]. Such collaborations could therefore lead to a win-win situation.

Public-private partnerships started to be applied initially for urban regeneration strategies until the preservation of cultural heritage, such as archaeological sites, buildings, landscapes, urban areas, collections, and natural areas of significative heritage[13]. In this kind of projects, it was considered important from the beginning to involve all those who live in a territory, as projects potentially impacting on people's daily life[14].

In fact, local tourism strategies should consider the needs and expectations of all stakeholders, such as the population, entrepreneurs and investors and all public and private actors[15]. Both sectors bring different components. The key role of the public sector is to provide a strategic planning framework for environmental protection and heritage management. Private companies, on the other hand, provide the infrastructure, the basic services and thus play an essential role in the development of the strategies identified[16]. Also, according to the World Tourism Organization[17], cooperation between the various actors involved in the public and private sectors in tourism is crucial for increasing competitiveness.

2. *Current technologies in cultural heritage tourism*

ICTs have been encouraging the definition of self-service consumption attitudes, offering the opportunity to identify, customize and purchase tourism products and reduce industry costs for their world-wide distribution[18]. Some scholars focused on ICT ability to create a competitive advantage for tourism destinations and organizations, by improving the interactivity with consumers[19], accessibility, visibility, and satisfaction[20].

Mobile communication devices have huge implications for the travel experience before, during, and after visiting a destination. First, they make the travel planning easier through ubiquitous access to online search engines, information, booking services, apps, social media platforms[21]. The availability of

12 Wojewnik-Filipkowska 2012.
13 MacDonald, Cheong 2014.
14 Jelinčić *et al*. 2017.
15 Franco, Estevão 2010.
16 Kim *et al*. 2005.
17 World Tourism Organization 2018.
18 Bethapudi 2013.
19 Buhalis, Jun 2011.
20 Bethapudi 2013.
21 Wang, Fesenmaier 2013.

interactive experiences about destinations can also influence decision-making[22]. Moreover, through the collection and analysis of digital footprints, tourism enterprises and organizations can obtain feedbacks about the performances of their offers and understand tourist behaviors in relation with a destination[23]. Public spaces can be better experienced through contextual tailored information and services responsive to current conditions and situations[24]: internet connection and tools like built-in cameras, GPS sensors and beacons enable a form of communication based on people geographical location[25]. Thanks to context-awareness services[26], places and destinations become "senseable spaces" and tourists can naturally access to interactive experiences even in unfamiliar places[27]. Users-generated contents can play a pivotal role also in terms of trusted information and about post-purchase behavior[28].

These devices and services can represent an important opportunity for the development of cultural heritage tourism, especially if integrated with immersive reality technology[29]. This term generally refers to technologies and applications supporting various kind of immersive experiences, bounded by real and virtual environments[30]. Among these experiences, augmented reality (AR) combines physical real world with virtual computer-generated information[31] and allows real time interaction between users and virtual objects[32]. It augments the sense of reality, by superimposing virtual objects and cues upon the real world in real time, instead of virtual reality (VR), which creates three-dimensional virtual environments. When fully exploited, AR completely immerses users in a computer-generated representation of the real environment[33]. The adoption of AR in the tourism sector may help reducing the need to translate abstract information, or switch gaze between information and physical space; it gives opportunity to cultural institutions, tourist professionals and destinations to differentiate themselves by superimposing images and organizing and transmitting information in layers, making them more appealing: AR can provide tailored contents and services since information can be targeted according to tourists' knowledge level, interests and specific needs[34]. AR applications in mobile devices easily increase tourists' awareness about surroundings and unknown destinations: they are useful tools for interactively accessing location-

22 Wang *et al.* 2016.
23 Zhang *et al.* 2010.
24 Pierdicca *et al.* 2019.
25 Hugues, Moscardo 2019.
26 Satoh 2008.
27 Osaba *et al.* 2018.
28 Rezaei *et al.* 2016.
29 Hugues, Moscardo 2019.
30 Milgram, Kishino 1994; Bekele *et al.* 2018; Bec *et al.* 2019; Bekele, Champion 2019.
31 Azuma *et al.* 2001.
32 Liarokapis 2007.
33 Carmigniani *et al.* 2011.
34 Kounavis *et al.* 2012.

based information about a point of interest and creating memorable and unique experiences[35].

VR offers many opportunities to both tourism researchers and professionals, in terms of planning and management, marketing, entertainment, education, accessibility and cultural heritage preservation[36]. VR can provide opportunities for destination marketing organizations to communicate with targeted markets and potential visitors, creating destination awareness[37]. Through VR, heritage tourism can offer experiences that involve visiting places and engaging with them, with artefacts and activities that authentically represent the past[38], even if they cannot replace real and authentical corporal and sensorial tourism experiences[39].

3. *Travel apps trends and taxonomies*

Since the use of mobile communication devices, mainly smartphones, continues to grow, the mobile app market may become one of the fastest growing media outlets in the history of consumer technology[40]. According to Blair[41], the 57% of all digital media usage comes from mobile apps. Globally, travel category represents the 5% of all online apps, with 61,600 applications available on Apple Store and 64,100 on Play Store[42]. This "mobile apps revolution" can significantly transform the travel experience. Mobile applications for travel activities can influence consumers' behavior, choices and travel planning, reconfiguring the relationships among tourists, places, and other people[43]: they can make the trip more spontaneous[44], through the adoption of context-aware mobile services and mobile tour guides' recommendations about the surroundings that can influence and direct tourists[45]. It can also enable a better sense of the place and a new idea of sociality[46]: mobile apps can facilitate tourists' interactions with other people (local community, other tourists, hosts, friends, etc.) and influence tourists' activities and emotions during the trip[47]. Moreover, location-based services can

35 *Ibidem*
36 Guttentag 2010.
37 Huang *et al.* 2016.
38 Bec *et al.* 2019.
39 Mura *et al.* 2017.
40 Kennedy-Eden, Gretzel 2012.
41 Blair 2019.
42 Sommer 2015.
43 O'Brien, Burmeister 2003.
44 Wang, Fesenmaier 2013.
45 Höpken *et al.* 2010.
46 Jansson 2007.
47 Wang 2013.

provide geo-referenced information, thus inviting tourists to visit the closest attractions and then creating an after-the-trip relationship to stimulate repeated visits. Thanks to mobile applications, cultural attractions have the chance to find new ways to get the attention of tourists. Location-based services can provide geo-referenced information, which can invite tourists to visit the closest attraction and maintain the relation after the trip, thus getting more chances of repeated visits[48]. Moreover, virtual and augmented reality tools can enhance the way users interact with the physical world, adding more information about people, buildings and places[49]. In this way, these tools have two main potentials: creating engaging experiences for on-site tourists and inviting them to really visit the places they experienced virtually. Table 1 provides some examples of apps and technologies applying AR and VR for cultural heritage.

App	AR	VR	Description
Aurasma	X		App providing additional multimedia contents (video, link, website, 3D animation) when pointing an object (newspapers; picture; image, etc.) with a smartphone or a tablet.
Virtuoso[50]	X		Educational game which allows to put in a chronological order a collection of artworks.
Explore![51]	X		Mobile augmented reality game supporting middle school students in visiting Italian archaeological sites.
Google Expeditions[52]		X	App providing 360° virtual visits to popular cultural attractions (e.g. Great Wall of China) through a smartphone and a Google Cardboard viewer.
Vatican app[53]		X	App providing 360° virtual tours to Vatican rooms in Rome and information about the site.
CAVE[54]		X	Acronyms for *Cave Automatic Virtual Environments*, app transforming surfaces (walls and floors) in projection screens enabling immersive experiences usually applied to cultural heritage education. Users need to wear 3D glasses.

Tab. 1. Main apps and technologies applying AR and VR for cultural heritage (source: own elaboration)

As shown in table 2, mobile travel apps can be categorized considering three main criteria: the nature of information provided[55], technical functions embedded within the apps[56] and the level of customization offered to users[57]. The integration of these three taxonomies can represent a useful tool for providers,

48 *Ibidem*.
49 Matrimon *et al*. 2010; Bonacini 2014.
50 Wagner *et al*. 2006.
51 Ardito *et al*. 2009.
52 <https://edu.google.com/products/vr-ar/expeditions/?modal_active=none>, 15.05.2020.
53 <http://www.vatican.va/content/vatican/it/apps.html>, 15.05.2020.
54 Christou 2010.
55 Wang *et al*. 2011.
56 Dickinson *et al*. 2014.
57 Kennedy-Eden, Gretzel 2012.

tourist operators and destination manager to define the profile of a travel app, identify its features and functionalities, measure the level of effectiveness and efficiency and plan any improvements and/or implementations.

Content and nature of information provided	
Flights information manager	Searching and tracking flights apps
Destination guides	Apps providing specific information about a place/destination
Online travel agency	Apps for searching and booking various travel services
Facilitator	Apps providing quick facts (Wi-Fi spot, gas stations, local time, etc.)
Attractions guides	Apps providing travel tips
Entertainment	Apps providing suggestions for fun
Language assistant	Apps providing practical information related to every-day life at a destination
Local transportation	
Currency converter	
Tips calculator	
Augmented reality	Apps for viewing live situations in other places through webcams
Technical functions	
Information	Apps providing information or information plus search functions
Two-way sharing capabilities	Apps providing information from users (e.g. about their location, preferences, etc.) to service providers, through the app itself, blogs and social media
Context awareness	Apps based on contextual sensors (e.g. temporal and spatial location sensors)
Internet of things	Apps able to communicate with other people and everyday objects (e.g. vehicles, parcels etc.)
Tagging	Apps able to leave messages on places and objects for future visitors
Level of customization	
Personal preferences	Apps satisfying various personal preferences
Location sensitive	Apps providing interaction through location information systems
Security	Apps allowing the control of personal information
Control through the web	Apps providing frequent flier programs, e-books, itinerary compilation
Content addition	Apps that can change with contents added by users
Aesthetic changes	Apps that can change their appearance to fit users 'preferences
The same for everyone	Apps that do not provide any interaction

Tab. 2. Travel apps' categories (source: own elaboration on Wang *et al.* 2011; Dickinson *et al.* 2014; Kennedy-Eden, Gretzel 2012)

4. *Smart Marca app*

SmartMarca is the name of a project designed to create a smartphone mobile application with the purpose to promote Marche Region, focusing on Marca Fermana cultural heritage and natural sites[58]. The project was

[58] Marca Fermana was the ancient administrative sub-division of central Italy, corresponding to the territory which was under the jurisdiction of the town of Fermo. Today Marca Fermana is also the name of a non-profit association, promoting the territory's culture and tourism (<https://www.marcafermana.it/>, 16.05.2020).

funded by the Leading Local Action Group of Fermo (GAL Fermano Leader), within the 2014-2020 Rural Development Programme. The project team involved professionals from scientific, technological, and territorial marketing world. Thanks to the collaboration among different actors, such as the University of Macerata, the Polytechnic University of Marche, Marca Fermana Association and two start-ups operating in the field of multimedia and virtual and augmented reality, Smart Marca project represents an example of public-private partnership. This public-private cooperation was implemented through participatory processes, aimed at actively involving the main local actors (mayors, pro loco, cultural associations, tourist and cultural operators) in the design of operational tools for the enhancement of cultural heritage. The aim of the project was promoting the area as a tourism destination, and aligning it to national tourism trends, by highlighting its cultural heritage and tourism attractions and introducing digital and avant-garde systems as a support for managers and users.

Benefits related to the digitization of Marca Fermana cultural heritage are many. On the one hand, cultural institutions can better promote themselves and increase the visibility of the known and unknown, tangible and intangible local cultural heritage, thus increasing the number of visitors, both in digital and real platforms, by differentiating the cultural offer according to the type of user. On the other hand, the creative industries can use specialized figures to exploit the digital cultural heritage and create innovative services for tourism. Moreover, territories and territorial aggregators can more specifically respond to tourists' needs, by improving the quality of information on digital cultural heritage; create stronger relationships with the chain of actors involved; make digital cultural heritage the basis of market strategies in tourism. From a tourism operators' perspective, small and medium companies can present themselves in the market in a more suggestive and effective way, by providing more suitable cultural contents. Finally, tourists can discover less-known places, by taking advantage of virtual instruments; use technology, especially on mobile devices to plan cultural experiences and travels.

Figure 1 shows the ICT architecture of the project. Smart Marca applies both AR and VR. Furthermore, beacons and geolocation systems are used to support users during their travel experience. In particular, the AR systems were developed to facilitate customers in the analysis of two paintings[59]: the app allows to identify augmented reality contents, by framing the painting with the smartphone (or tablet) camera. The augmentation consists in the provision of several tags that highlight its content and provide specific details and characteristics for a complete view of the artwork.

[59] The *Adoration of the shepherd* by Peter Paul Rubens, located in Fermo's Civic Art Gallery and *Landscape*, by Osvaldo Licini, located in the artist's house museum, in the village of Monte Vidon Corrado.

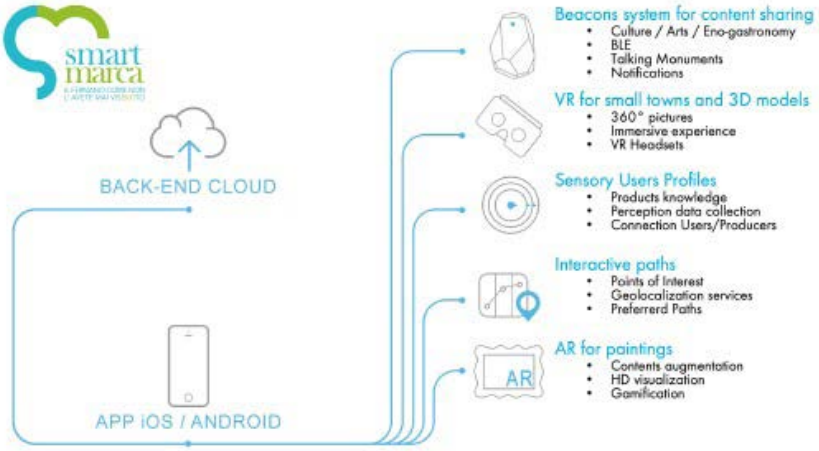


Fig. 1. ICT architecture of Smart Marca application

The VR systems, on the other hand, aim at giving visibility to the most significant places and municipalities of Marca Fermana: particular attention has been given to Falerone, a Roman city formerly called *Falerio Picenus*, where we can still find a Roman amphitheater. Through VR, Smart Marca app enhances the historical value of the area, thanks to the 3D reconstruction of the amphitheater; details and building blocks of the amphitheater and its surroundings can also be observed.

Moreover, a section about typical products is presented: it provides the sensory profile of some of them that achieved DOC, DOCG and IGP certifications. Users can interact with the app by expressing their own perceptions about the products, by creating a personal profile and then checking the correspondence with the official sensory profile and by expressing their level of appreciation about the product.

To sum up, taking into account the taxonomies discussed in table 2, Smart Marca app provides various information and travel tips about Marca Fermana, such as accessibility and mobility, art and culture, gastronomy, shopping, sport and relax (*destination guide*; *attraction guide*; *travel transportation*), but also fun opportunities (*entertainment*, through immersive experiences related to local cultural heritage: sensory profiles, 360° panoramic guided tours, 3d reconstruction and AR – *augmented reality*). From a technology perspective, Smart Marca includes many levels of description and interpretation of Fermo area (through texts, pictures, maps, virtual tours, etc) and its cultural attractions (*information*); moreover, it allows data mining by app provider to research visitor catchment, travel routes, frequently viewed elements of attractions (*two-*

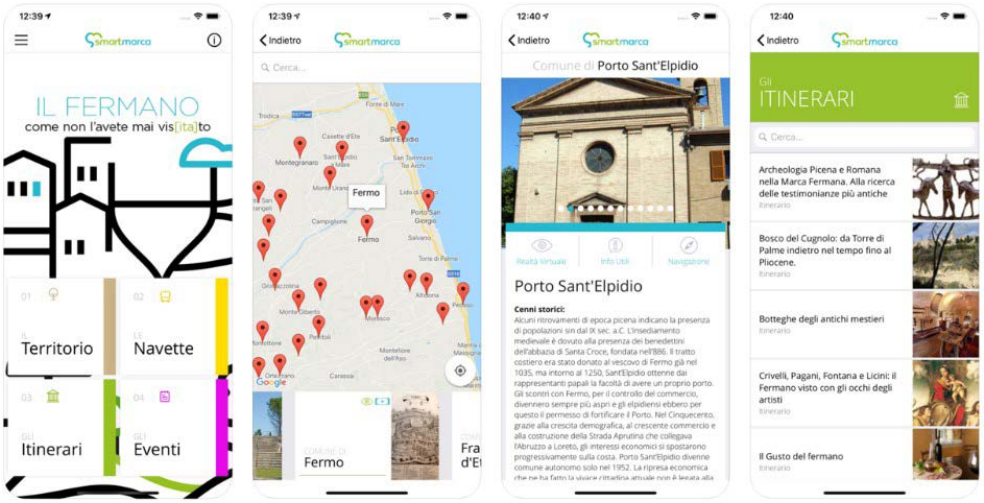


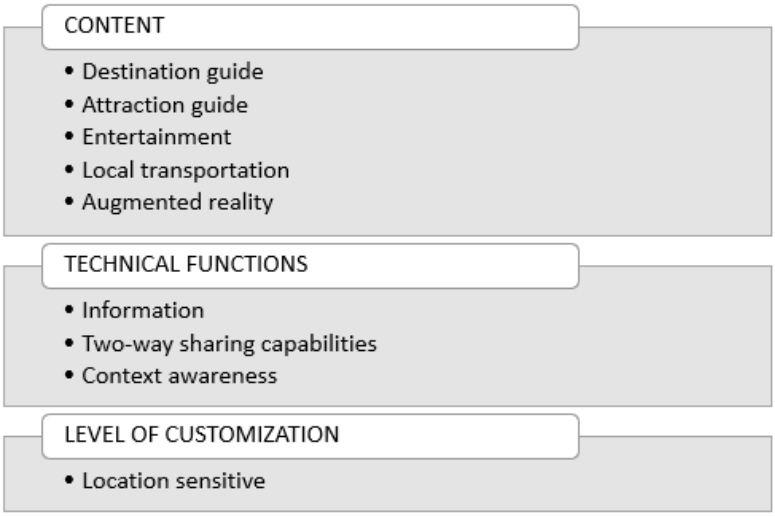
Fig. 2. Smart Marca mobile application (available for Android and IoS)

way sharing capabilities); thanks to beacons technology, the app can also send alerts relative to visitor proximity to users and can provide live travel information about events, currently open attractions, changes to attraction timetable (*context awareness*). Considering the level of customization, Smart Marca app is a *locations sensitive* app since it provides augmented reality experiences and local texts alerts (tab. 3).

5. *Conclusions*

This paper shows how traditional forms of tourism are progressively integrating new technologies, to provide tourists with additional services and allow a more complete and satisfying experience. This is especially so given the increasing pivotal role played by local public and private actors in the creation of new technologies, the importance of the latter in every step of tourism experience, the level of immediacy of user generated content and trends related to the use of tourist and travel apps.

Smartphones through many kinds of new technologies, such as beacons, AR and VR can customize information and make tourist experiences more immersive. In this constantly evolving context, it is important to understand that the relationship between all stakeholders in a territory, which involves sharing power, work, support and/or information, can achieve common goals and mutual benefits. According to this, tourism providers and all public and



Tab. 3. Smart Marca app profile (source: own elaboration)

private actors operating on a destination, need to re-invent their approach and become agile to deliver contents and services in a mobile context.

Starting from these premises, this paper highlighted the opportunities offered by ICTs for cultural heritage tourism and for the promotion of a cultural destination. The case of Smart Marca app has been presented as an example of how new technologies can promote and make virtually accessible even distant places and activate tourist flows that otherwise could not be possible. This achievement has been possible thanks to the definition of a cooperation model based on an interdisciplinary approach, that integrated different research areas, such as history of art, cultural heritage communication, software engineering and sensory analysis and thanks to the collaboration between public and private stakeholders.

Future research could refer to the analysis of users' satisfaction with the app, about the intention to visit Fermo area after using Smart Marca app and about the collection and analysis of Smart Marca users' digital footprints, in order to obtain feedbacks about the app performance and analyze the tourists behavior in relation with Marca Fermana destination.

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