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A visual immersive participatory platform to foster dialogue between locals and tourists

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Abstract—The paper presents a participatory platform designed and implemented with the aim of fostering dialogue between locals and tourists. The platform exploits the crowdsourcing paradigm to collect the voice of the locals in order to provide tourists with authentic experiences. The system was designed as an immersive visual storytelling experience, to let the user discover the locals' story in an interactive rich environment. The insights that emerged during a preliminary evaluation with users point out that the system is able to deepen the relationship between locals and tourists while interacting with the platform.

Index Terms—Participatory platforms, crowdsourcing, storytelling, tourism

I. INTRODUCTION

The world is becoming ever more interconnected, and web platforms have a growing impact on economic activities. One of the sectors which is strongly affected by this situation is tourism [1]. In fact, an increasing number of web platforms are born to facilitate tourists to chose destinations, define itineraries and exchange experiences. In particular, the Web 2.0 paradigm, which refers to user-generated content, participatory culture, and interoperability, fostered the diffusion of web platforms concerning tourism, which are changing the way travel is planned and executed [2], [3]. In this context, tourism becomes an information-intensive industry [4].

Nowadays, Smart Travel (the reliance of the tourism industry on ICT) facilitates the creation of safe and personalised experience for tourists (e.g., [5], [6]). Moreover, people are confident and capable to plan and book a trip entirely by themselves, completely by passing travel agents and tourists operators. Through the use of technology, travelers seek not only convenience, but mainly new experiences and personalized services.

Today tourists increasingly look for authentic travel experiences which provide meaningful interactions with locals [7]. This concept has been studied since the 1970s, when MacCannell first emphasized the key role authenticity plays in tourism, arguing that the main tourist motivator is the quest for authenticity [8], [9]. Since then, different studies furthered the understand of this - very controversial - topic (e.g., [10], [11]).

As Smart Cities grow, leveraging on computational and sensing technologies, Smart Tourism is growing as well, arising from the combination of smart technologies and the

increase in world mobility. As a result, some technologies are employed to better cater for tourism industry sensing and understanding the flow of tourism in specific places [12], [13] others are used to better integrate the destination offer with the visitors demands, such as Airbnb¹, and, Couchsurfing². Such platforms base their success on the concept of sharing economy that has emerged in a response to consumers' needs, and visitors quest for authenticity [14], [15]. Moreover, in Al-waradieh's words: "tourists have the opportunity to experience other cultures, exchange their values and traditions with the local residents" [16]. However, establish points of dialogue that will bring benefits to both parties is a complex task. Thus, some efforts have been made to shorten the distance between local and visitors [17]–[19], we extend on these efforts by proposing a novel participatory platform that focuses on creating a direct exchange and focused dialogue on the city preferred and most authentic features, as seen by the locals.

In this article we present Share Portugal, a visual immersive participatory platform, harnessing the participatory potential and crowdsourcing power of web technologies [20]–[22]. Share Portugal, allows local inhabitants to share their profiles and preferences about what to see and do in their locale. Visitors can rely on authentic and unmediated information provided by locals and use the platform to initiate dialogues with them. To frame the platform design, we initially considered one specific location: Funchal, the capital city of Madeira, Portugal, a well-known touristic destination.

The rest of the paper is structured as follows: state of the art (Section 2), description of the design process (Section 3), platform implementation (Section 4), the evaluation process (Section 5), conclusions and suggestions for future research (Section 6).

II. RELATED WORKS

As the tourism industry is evolving and tourists are becoming more demanding, many inquiries have been conducted on supporting tourists during their travels and activities, as well as providing them with new exciting and authentic experiences, some of which in conjunction with local people [10], [23]–[25]. Our focus and inherent challenge was to cater for those

¹<https://www.airbnb.com/>

²<https://www.couchsurfing.com/>

visitors who wish to discover the location from an authentic perspective, and wish to engage with local inhabitants following their advice and eventually establishing a dialogue. We strove to develop a platform that could support such direct interactions, fostering curiosity and eventually the creation of authentic ties.

A. Crowdsourcing In Tourism

The crowdsourcing paradigm, refers to an online community where members participate for a wide range of purposes including fun, enjoyment, and amusement [26], [27]. In this way, members can build relationships with others without geographical restrictions. Digital technologies already impact the tourism sector and in particular, the concept of crowdsourcing or sharing is benefiting immensely the tourism industry. Digital tools and online travel communities can play a role in bridging the gap between locals and tourists [27], [28]. Compared to traditional tourism, this type of tourism involves a special kind of consumption known as emotional tourism [29]. Emotional tourism happens when the travel experiences are not strictly limited to sensory “touchables” (such as a hotel room, a local dish, or a busy street) but provide various emotions linked to the closeness achieved with another human being. Despite the ritual of visiting must-see sights and tourist attractions, this kind of tourist consider their mode of travel as an experience of learning and self-discovery [30], [31]. Crowdsourcing in Tourism, connects people and places, educates about places visited, increases collective awareness, spread tolerance and facilitates cultural understanding. Consequently, its meaning allows practitioners to share experiences, origins and values. Tourists are more likely to engage on activities “off the beaten track” in their search for new experiences, and residents share their local knowledge while highlighting the importance of responsible tourism.

B. Relationship Between Tourists and Locals

In 1977 Smith argued that tourism generally accompanies contacts between hosts and guests, and thus the interactions between the parties may result in some issues, including economic or cultural differences between hosts and guests [32], [33]. Since the introduction of the hosts-guests association, the literature has focused on the relationship between tourists and locals, the impact of tourism on local communities, and residents’ attitudes toward tourism development [34]. However, the role of online communication technologies in bringing geographically dispersed social networks together has rarely been discussed [35]. This gap presents itself as an opportunity as information technologies are progressively important in the relationships between local communities and tourists. Online travel communities play an important role in connecting tourists and locals and further research is required in order to explain the types and characteristics of online networks of locals and tourists [28]. An increasing number of studies indicate that residents play important roles in providing on-line information regarding accommodations and restaurants, while

experienced travelers are more influential in providing general destination information [34].

C. Summary of Tourism Communication Platforms

In this section we present the analysis of several tourism-related crowdsourcing systems, in order to pin point their strengths, weaknesses and identify our area of opportunity. Table I shows a synthesis the platforms we analyzed:

- Ha-Vita³, a web platform that is designed to enrich the tourists’ knowledge about local heritage while encouraging and supporting contact with the locals;
- Loqal⁴, a mobile app that enables the user to ask questions about a place to local people;
- SnapCity⁵, a mobile app and a meeting point where people that visit a city can connect with the others through a chat platform and enjoy insiders’ knowledge and experience the real city, off the beaten track;
- Vayable⁶, a platform that offers the possibility to buy an “insider guide” for different destinations, or to book an experience offered by local people (with the payment of a fee);
- Cool Cousin⁷, a web platform and a mobile app that helps tourists receive recommendations from locals (“cousins”) in different cities;
- Local Travel Movement⁸, a web platform that aims connecting independent travelers with local people;
- Spotted by Locals⁹, a mobile app and a web platform that allow finding recommendations and information about different cities, written by local people;
- Urban Buddy, a mobile app that helps travelers exploring the cities with the help of residents, in real-time.

In (Table I), we report the analysis of each system in terms of: (a) having a direct chat between participants; (b) exploiting questions and comments (in blog style); (c) employing questions and comments organized by subject; (d) possibility to directly ask questions to a certain participant based on their profile; (e) possibility to reward the user for the time spent in participating.

From the analysis results there is no apparent pattern between platforms or features. The features studied seem completely independent of each other. However, the possibility to directly chat with participants (a) and addressing the questions of tourists through their profile (c) are the two most prevalent one, making those possibly the most popular or used.

III. DESIGNING THE PLATFORM

Based on the findings presented above, we organised a preliminary focused group, inviting several locals and visitors known to the first author, and simply asking them what feature

³<https://havita.m-iti.org/>

⁴www.loqal-app.com

⁵<https://appsnapcity.com/>

⁶<https://www.vayable.com/>

⁷<https://www.coolcousin.com/>

⁸<http://www.localtravelmovement.com/>

⁹<http://www.spottedbylocals.com/>

Studied Approaches	(a)	(b)	(c)	(d)	(e)
Há-Vita	✓	✗	✓	✓	✗
Loqal	✗	✓	✗	✗	✗
SnapCity	✓	✗	✗	✓	✓
Vayable	✓	✗	✓	✓	✓
Cool Cousin	✓	✓	✗	✓	✓
Local Travel Movement	✗	✓	✓	✗	✗
Spotted by Locals	✗	✓	✓	✓	✓
Urban Buddy	✓	✗	✗	✗	✗

TABLE I
PLATFORMS ANALYZED AND THEIR CHARACTERISTICS.

would they consider useful in a web platform aiming at sharing information and creating a dialogue between locals and tour sites. Two concrete requirements emerged: the importance of bringing tourists closer to locals because tourists are increasingly interested in local residents, their routines, habits and culture, rather than just embarking in the sight-seeings tours that the tourism agencies have to offer. Accordingly, our platform would have to support a direct relationship between tourists and local people. The second identified requirement was to engage the tourists with the city by promoting new and unconventional experiences.

In order to address these main issues our first concern was to create a metaphor that could simply represent all the information and ideas that we want to convey, but at the same time creating a strong visual impact on the users. In addition, the platform should render a personalised view of the hosts, what they like and their different personalities. As people are at the centre of the application, designing the hosts profile structure was an important task, as through this feature, the tourists would recognise and eventually empathise (or not) with the local person.

Our second design task was to find a way for local people to show their interests and some aspects of their personalities. To achieve this, we decided to engage the visitor in visiting an intimate space of their lives, without feeling too intrusive; we opted for a VR version of the hosts living room, which the hosts had certain freedom in decorating. Usually, the colors, the objects and furniture, and wall decorations people choose for their space, is related to their interests and personality. Given this, the living room virtual space was highly customizable by each of the locals, according to what defines them, as well as to the activities recommended or offered by the hosts. Finally, we designed the home page of the platform as a city skyline made of iconic buildings of the city in question. Each window of these buildings would consist of the pictures of a local registered on the platform. By clicking on the picture, the user would enter their (virtual) living rooms. Advertising the iconic buildings of the city on the home page, provides a first overview of its main architectonic features.

The process of designing the system evolved through several stages, following the research by design approach [36], where users are periodically involved in validating the prototype until reaching a satisfactory stage. We first validated the concepts through a low-fidelity paper prototypes following an incremental and iterative approach. All the feedback raised

during the user testing of the prototypes were applied to the following iteration. We conducted a total of two validation session with low-fi prototypes. After the second evaluation was performed, all suggestions and feedback were kept into account to develop the interactive application.

IV. THE SHARE PORTUGAL PLATFORM

A. The architecture

The platform was developed following a layered architecture for two main motivations: it supports the incremental development of the system; it is changeable so an equivalent layer can replace the removed one, without compromising the other layers. In fact, when a layer is changed or updated, only the adjacent layer is affected. Also, every layer of the Share Portugal application can be used individually with other similar applications. The three main layers that compose our system are the Presentation, the Business and the Database Layer, as can be seen in Figure 1.

The front-end is a single-page application that requests data to the back-end and displays them using some visualization techniques. The communication between both sides is made through a web Application Programming Interface (API) with standard Hypertext Transfer Protocol (HTTP) requests. The API defines a set of paths, accessible through these HTTP requests in order to exchange data in the JavaScript Object Notation (JSON) format. Therefore, the back-end is responsible for handling requests incoming from the front-end, which may involve data processing and delivering it in a known format, such as JSON. After a certain user interaction with the application is performed on the front-end, a corresponding data request will be sent to the back-end. Once the response from the back-end reaches the front-end, it will manipulate the data to form the visualizations, corresponding to the user request. This kind of architecture is flexible enough to be scalable if new features or methods need to be added later. The separation between data processing logic on the back-end and visualization or application logic on the front-end facilitates the project organization and future additions.

The technologies used at this stage of development were: Vue.js¹⁰, an open-source JavaScript framework for building user interfaces and single-page applications which uses HyperText Markup Language (HTML) for the pages structure, Cascading Style Sheets (CSS) for their styling and JavaScript for overall interactivity across the page.

B. The visual immersive interfaces

In the next section we describe the users interactions with the immersive platform. When tourists enter the Share Portugal platform they are presented with a 2D visualization of the city they intend or are already visiting. Several of its iconic buildings are presented as a scrollable line up (see Figure 2). Each building features several clickable windows that enable the user to enter the locals' living room. Through this interface, tourists are first invited to navigate the city by scrolling

¹⁰<https://vuejs.org/>

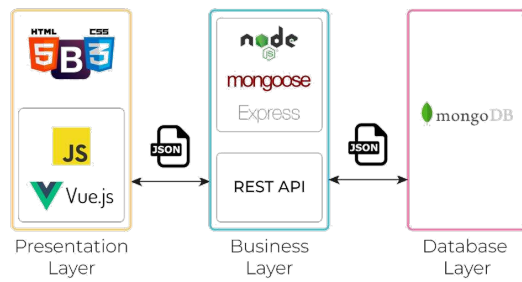


Fig. 1. Share Portugal Architecture

down the one line street featuring iconic buildings of the city presented in 2D. Secondly, the visitors encounter the locals (who registered on the site), presented through their profile picture that feature on display on the buildings' windows. Thirdly by clicking on the hosts images, the visitors enters the hosts virtual living room. Finally the visitors can explore the living room space in search of one (or more) initiatives that the locals advertised there, which may spark their interest and motivate them to explore the city. For example, if the tourist is passionate about photography and the host's living room is decorated to convey an interest in photography, the tourist will possibly have some affinity with the activities presented by this host and curiosity in initiating a dialogue with him/her. In fact, besides being able to create and promote activities in the city, hosts can personalize their rooms according to their own interests, in order to better illustrate their personality and highlight elements of their lives that can suggest possible affinities with visitors. In addition, the tourist can also contact the hosts via email and, eventually, participate in activities that they are proposing, such as workshops, social events, or just meet up for a drink, for instance.

Based on the above considerations, the implementation focused on two specific features: i) the exploration of the 2D city features in search of the host that the visitors are feeling most affinity with; ii) the exploration of the hosts' living rooms in search of activities and suggestions.

Development of the platform started from the 2D city scrolling feature (home page), where the user explores the city buildings and encounters the hosts. Following the results from the validated prototypes, the home page was split into three main features (as visible in Figure 2): i) navigating the city by scrolling the horizontal bar (on the bottom of the homepage, Figure 2). ii) Loading and positioning the photos of the hosts on the windows of the buildings. The photographs of the locals registered in our application appear on the windows of the city buildings. When users visit the platform, by clicking on the respective hosts' photo, the user enters the living room of that host. Finally, iii) the 2D city view and atmosphere changes according to the day or the night time. The idea behind this feature came from the testing, where some users suggested to select the activities proposed to visitors, according to daytime (daytime mode) or night-time (night-time mode). To toggle the day-night views, we used a button that toggles between

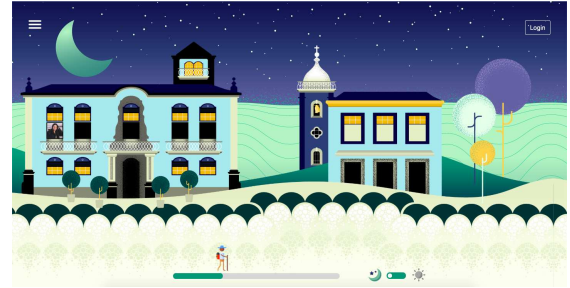


Fig. 2. The "Exploring the city" homepage



Fig. 3. Homepage views by day (left) and night (right)

these two states (see Figure 3).

After implementing the home page, the virtual living rooms design was deployed. Following the user validated prototypes, we split the development of the living room into three main issues: i) the "personal information" menu, where local hosts upload the photo to appear in the building's window, name, email address and a short biography; ii) the "room customization" menu, where hosts can visually customize their room according to their likes, interests, and personality. Hosts will be able to choose the living room furniture arrangement, the color of the wall, the wall paper pattern, and an image they want to display on a wall, as a poster, see Figure 4 and 5; and, iii) the "create activity" menu, where locals can propose activities and suggestions as well as entering information about themselves.

V. THE EVALUATION

After finishing the last cycle of development, a set of users tested the Share Portugal application in order to gather quantitative and qualitative usability metrics and inform refinements so to ensure that the platform meets users' needs. The evaluation consisted of usability tests with users who



Fig. 4. Room customization - Items that can be customized



Fig. 5. Room customization - Posters customization

evaluated the system regarding interactivity and usability. This evaluation aimed to test the Share Portugal from the perspective of tourists and local residents, so two different tests were performed, one for each user group.

A. The methodology

When the final version of the platform was completed, a group of fifteen travelers and fifteen locals tested our system. This evaluation was done to assess the success of the final prototype and to check that a standard was upheld, a process known as summative evaluation [37]. Users were presented with a list of tasks and their performance was evaluated through quantitative measures: the time it takes the user to do the task, the number of errors made (if any), and the level of satisfaction while doing such tasks. The evaluation degrees were as follows: a preparation stage where all necessary materials were designed and created; the actual testing following a well-defined protocol; and, after, the analysis and discussion of the gathered results was done.

Before the tests were carried out, a preparation activity was needed to ensure that everyone followed the same protocol. For this, it was necessary to develop a test script with the order and description of everything users had to do, and questionnaires to be filled out by them. As a requirement for the evaluation process, it was established that it should be done with at least 30 users (fifteen tourists and fifteen locals). We used a sampling technique called Convenience Sampling, which means that our users were selected because of their convenient accessibility and proximity to us, no restrictions were made on the basis of gender or educational background. Although, as we established that all subjects should have the same conditions of evaluation, we used a controlled and typical use context environment and also the same tools to perform the tests.

All our users pursued the following tasks in this order: 1) A profiling survey was used to collect key demographic information about our users, such as gender, the range of age, education, and origin country. 2) A contextualization about what is Share Portugal and the current evaluation goals was given to users. This consisted of following a prepared script to ensure that we did not forget to explain anything and to ensure every user knew the same. 3) A set of five questions was made. To answer to each question, the user had to perform

the corresponding task in our system, always highlighting that what was being tested was the Share Portugal system, rather the participants, to give more confidence and comfort to explore the system. We asked them to inform us when they were ready to do the task so that we could collect the time duration and number of errors made. 4) A debriefing about the previous stage. 5) A second survey, to understand their level of users satisfaction while doing the tasks was performed. For this we used the System Usability Scale (SUS) - a ten-item scale giving a global view of subjective assessments of usability [38]. We followed the guidelines established by Brooke [38]: each question had a degree of disagreement or agreement, with a range from Strongly Disagree (1) to Strongly Agree (5) respectively, from which the user could choose. Users were asked to answer each question with their unbiased opinion; we recommend them to not think too much about it, and if undecided to pick the middle score of the presented scale.

B. Discussion

From the results of the usability tests, we can observe that Share Portugal obtained a good acceptance and usability rate. This indicates that both travelers and locals can easily use the system, and consequently we can infer that an easy-to-use system would facilitate contact among them. It is important to note that this was the first evaluation of the system fully functioning prototype and that our users covered various levels of education, ages, and nationalities. Taking this into account, the test results can be considered very positive.

Furthermore, many tourists told us that the decoration of the hosts' living rooms had a major impact in creating empathy between the two entities, making them feel more comfortable to start a conversation, in comparison to when using a simple chat platform. Additionally, tourists also mentioned that the way the navigation of the city is handled (by scrolling iconic buildings of the city) made them familiarize with it. Hosts told us they felt close with locals from the initial steps of registering with the application, thanks to the task of volunteering information about themselves, through the room decorating task, personalising the various elements of the room, which acts as an ice breaker and creates empathy by establishing an open attitude and intention to dialogue with tourists.

VI. CONCLUSIONS AND FUTURE WORK

In a context where technology strongly impacts tourism, and travelers increasing value authentic experiences when visiting a country, the authors propose Share Portugal, a visual immersive participatory platform which objective is to shorten the distance between the travelers and locals, allowing direct and personalised contact between them. The platform opens up the possibilities for tourists to learn about the cities they are visiting directly from the locals, making them feel closer to the residents, hence more engaged with the city itself, more curious about understanding its values and cultural background; On the other hand, it allows hosts to present their city and activities to travelers from a very personal standpoint, a point of view that tourists guides or

travel agents do not always provide. Through an iterative and incremental design approach the prototypes were evaluated by users at several stages, providing the basis for the requirements analysis and validation before deploying the final functional prototype. Share Portugal has been structured following a layered architecture maintaining a separation between the data, the server, and the presentation, and where each of these layers can be used and upgraded independently. After completion of the final working prototype we evaluated Share Portugal, performing Usability Tests with fifteen tourists and fifteen locals. From the analysis of the SUS scale data, we can report the system displays very good acceptance and usability rate.

Regarding future work, we plan to scale our system to more cities beyond Funchal and to evaluate it in a real world context.

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