

Generation of Gamified Mobile Experiences by DMOs

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Abstract Gamification, which uses game design elements in non-game contexts, has already proved to be successful in different domains. Within the tourism industry it offers several benefits to DMOs, such as encouraging engagement, enhancing experiences, improving loyalty, or increasing brand awareness of tourists. However, examples of DMOs applying gamification for the on-site phase of the trip and validation of its impact on destinations are still lacking. This could be caused due to the scarcity of tools to generate gamified mobile experiences. This paper focuses on these issues presenting hypotheses about the capacity of DMOs to generate these experiences; and the benefits of these experiences for DMOs. To validate these hypotheses, staff from three DMOs have generated gamified mobile experiences with an authoring tool designed and developed to target their needs and technological knowledge level.

Keywords Gamification • Mobile experience • Authoring tool • DMO

1 Introduction

The concept of gamification is defined as “the use of game design elements and game thinking in a non-game context” (Deterding, Dixon, Khaled, & Nacke, 2011). Gamification should be distinguished from games, as it only uses some of its elements. It has been applied with several objectives, ranging from increasing brand awareness to encouraging consumer engagement.

The tourism industry has already used game elements during all the trip phases (Negruşa, Toader, Sofică, Tutunea, & Rus, 2015), for example, in the frequent flyers programs, or pre-trip marketing campaigns of some destinations, such as Ski Jump from Visit Norway [www.visitnorway.com/holmenkollen (Aug. 23, 2015)], Jet off experience from Geneva [(www.jetofftogeneva.com (Aug. 23, 2015))] or the

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Serbian Convention Bureau (Kovačević, Zečević, & Veljković, 2014). However, as gamification is a relatively recent concept, only few Destination Management Organizations (DMOs) have developed gamified experiences for the on-site phase of the trip. Although several benefits of gamified experiences have been highlighted (Negruša et al., 2015; Xu, Weber, & Buhalis, 2014), such as the increase in the visiting duration or the balance in the distribution of tourists through the destination, there is a research gap analysing the impact of gamification in tourism, and a lack of user-friendly tools for DMOs to generate gamified mobile experiences.

To address these issues, this paper focuses on the validation of several hypotheses about gamified mobile experiences as tools for DMOs to promote their destinations in the on-site phase of the trip. One of the main challenges is to implement user-friendly tools for DMOs to be able to develop gamified experiences on their own to influence the behaviour of tourists or improve the brand image of the destination.

This paper has been organised as follows. Section 2 reviews the state of the art of gamification, authoring tools to generate gamified mobile experiences, and their application in the tourism domain. Section 3 presents the research objectives. Section 4 describes the authoring tool and Section 5 focuses on the validation on the previous hypotheses. Finally, Section 6 summarises the conclusions and proposes some future work.

2 State of the Art

2.1 Defining Gamification

The term gamification was defined by Deterding et al. (2011) as “the use of game design elements in non-game contexts”. Thus, gamification is differentiated from related concepts such as serious games (use of full-fledged games in non-game contexts) or pervasive games (extension of games to new environments). Moreover, gamification aims at changing behaviour of users for wanted and desirable activities through extrinsic and intrinsic motivation. The former refers to activities which are only performed in order to achieve some distinct outcome in forms of rewards, while the latter is defined as the performance of an activity for its inherent satisfaction rather than for some separable consequences (Ryan & Deci, 2000).

Five levels of game design elements, which should be considered in gamification, have been defined (Deterding et al., 2011): design patterns related to the interface of the game (badges, leaderboards. . .); patterns and mechanics for game design (time constraints, turns. . .); principles and heuristics for game design (clear goals, game styles. . .); game models (challenge, curiosity. . .); and methods to design the game (play testing, play-centric design. . .).

Although gamification has been applied in several contexts (Hamari, Koivisto, & Sarsa, 2014), this paper focuses on authoring tools to generate gamified mobile experiences and the application of gamification by DMOs.

2.2 Authoring Tools for Gamified Mobile Experiences

Bulterman and Hardman (1995) define an authoring system as “a program that assists the user in managing the creative task of specifying the placement and relative order of media object events”. Visual tools for multimedia authoring have been developed during the last decades for both programmers and non-programmers. Arndt and Katz (2010) have analysed the main differences among several tools focusing on the target platform; level of expertise assumed of the user; cost and other characteristics.

With the evolution of technology, the complexity of emerging applications such as mobile Apps requires innovative authoring tools for non-expert users, so that they can generate and update their contents. Researchers have proposed different examples of authoring tools to generate mobile games or tourism guides that can be applied to generate gamified mobile tourism experiences. For example, Spadoni, Tariffi, and Sassolini (2011) have implemented an authoring tool to generate cultural mobile tourism applications in urban areas and archaeological sites of the Tuscany Region of Italy based on dynamic contents from documents semantically annotated and indexed by non-technical users. However, this tool does not include gamification elements and the annotation and indexation processes may be cumbersome for most DMOs.

Still focusing on mobile tourism applications, Rodriguez-Sanchez, Martinez-Romo, Borromeo, and Hernandez-Tamames (2013) have proposed the GAT platform to generate mobile wayfinding applications for indoor and outdoor environments. Points Of Interest (POIs) are retrieved from a worldwide tourism database loaded with contents inserted manually or using an automatic Web tourist crawler. Although they successfully validate it with contents about Spanish POIs retrieved from Wikipedia, these applications do not include gamification elements and do not allow including general tourism information or gathering information from tourists.

Within the examples with gamified elements, Kohen-Vacs, Ronen, and Cohen (2012) present an authoring tool for the generation of mobile treasure hunt games, primarily oriented to outdoor learning activities. In these activities, several locations are defined with at least one clue (text, image or Web page) leading to each of them, and with optional tasks attached (quizzes or information to gather). In this example, players cannot select the next location to visit. Moreover, tourism information cannot be included on these games, and there is no mechanism to collect information from tourists.

A more advanced example, oriented to the generation by tourists of city tours based on mobile games to be shared with other tourists as iOS applications, is described by Grüntjens, Groß, Arndt, and Müller (2013). Tours are based on three

types of locations: geo (basic type), story (where tourists have to solve questions defined for each location to follow the tour), and trigger (which enforce to follow a route but do not have any content to be shown to tourists). The authoring tool has been tested with 17 people, being 87.5 % of them able to generate a tour for the city of Koblenz. As this example is oriented to tourists, it does not allow tackling the needs from DMOs.

Following a more general approach, Holm and Laurila (2014) introduce ActionTrack, an authoring tool focused on general location-based games based on four main concepts: different activities (guided walk, interactive story, real-time competition. . .); checkpoints (locations to be reached); guiding and routing elements (clues, maps. . .); and tasks to be performed at checkpoints. Although these games could be useful for DMOs, some of their functionalities are useless for DMOs and they do not have specific options to include tourism information, as they are not designed for the tourism domain. Some commercial products, such as Locatify [locatify.com (Aug. 23, 2015)] or tripventure [sprylab.com (Aug. 23, 2015)], also allow the creation of similar experiences, presenting similar disadvantages.

Previous examples are not specifically targeting gamification requirements from DMOs. They either include functionalities useless to generate gamified mobile tourism experiences by DMOs; ignore gamification elements; do not include tourism information; or do not gather information from tourists. The authoring tool presented in this paper has been personalised with the requirements of DMOs, coping with these issues.

2.3 Gamification Applied to DMOs

Taking into account the potential benefits of gamification for the service industry, such as tourism, Huotari and Hamari (2012) have redefined gamification as the “process of enhancing a service with affordances for gameful experiences in order to support users’ overall value creation”. As Xu et al. (2014) outlined, there are several examples of the application of game design elements in tourism, but they might not have been recognised or named as gamification.

Analysing the use of full-fledged games in tourism, Xu, Tian, Buhalis, and Weber (2013) identify some insights of the motivation of tourists and DMOs, which could also be applied for gamified tourism experiences. The games to be played on-site should be simple, relaxed and not very challenging, providing useful information about the destination and allowing the interaction with other people.

Focusing on the use of gamification in tourism, Xu et al. (2014) conceptually identify four main potential benefits which could be useful for DMOs, such as encouraging tourist engagement; enhancing tourist experiences; improving tourism loyalty; and increasing tourism brand awareness. Moreover, after a theoretical analysis, Negruşa et al. (2015) also present several potential benefits of gamification not only for DMOs but also for other stakeholders (tourists, tourism

employees and local community) that could improve the economic, social and environmental sustainability of destinations.

Despite these potential benefits, the level of adoption of gamification among DMOs is very limited (Buhalis, Wagner, & Kingdom, 2013). Focusing on the on-site phase of the trip, the first examples were mainly related to gamified location-based marketing applications such as Foursquare (Cramer, Ahmet, Rost, & Holmquist, 2011). A recent study analysing 44 European destinations found that only seven DMOs have mobile applications integrating gamification techniques (Peretta, 2014).

Some real examples include gamified travel tours for urban and rural environments and initiatives such as the Stockholm Sound project promoted by the Visitors Board [thinkdigital.travel (Aug. 3 2015)]. This project consists of an innovative travel guide for mobile phones combining music with gamification, geolocation and Augmented Reality elements. A successful example that has evolved over time is the mobile application Epic Mix (Nunes & Mayer, 2014), launched by Vail Resorts in 2010 (USA), and developed to enhance the experience of skiers and snowboarders. It provides interactive maps, integrates social networks and offers badges to tourists as they explore the ski slopes.

However, even if there are studies about the benefits of gamification in different domains (Hamari et al., 2014), and despite the previous potential benefits of gamification in tourism, there is still a research gap about its real impact (Sigala, 2015). Recently, Nunes and Mayer (2014) analyse the acceptance of tourists of a Brazilian nature area of a gamified mobile experience, identifying the potential of such experiences to enhance the visiting experience. Lim, Taylor, and Gallacher (2015) present a gamified application for walkers and bikers to generate benefits for local communities of rural tourism areas, validating its benefits both for tourists, who become aware of local resources, and for local suppliers, who gain a new advertisement channel.

Although previous examples show the potential benefits of gamification for the on-site phase of the trip, more research and best practices are required to better analyse its impact for DMOs. However, in order to have more experiences to validate this impact, DMOs require more tools to generate them, as the one presented in this paper.

3 Research Objectives

As highlighted previously, on-site gamified experiences may include several potential benefits for DMOs. However, there are only few examples about tools for DMOs to generate gamified mobile experiences, and about the real impact of these experiences. To address this research gap, this paper focuses on the validation of the following hypotheses:

H1: Gamified mobile experiences can be implemented with user-friendly tools by DMOs to promote their destinations

DMOs, especially small and medium sized ones, heavily depend on technology providers to define and implement ICT-based experiences. This dependency does not allow staff from the DMOs to generate or update the content of experiences themselves, losing control over the associated deadlines, contents and updates. The availability of user-friendly tools may reduce the technology dependence, increasing the available examples of gamified mobile tourism experiences.

H2: Gamified mobile experiences are valuable tools for DMOs for the on-site phase of the trip

These experiences present benefits for DMOs during this phase of the trip. DMOs can provide tourists with more extended information, giving tourists the chance to discover more deeply the destination. Thus, DMOs may influence the behaviour of tourists, such as choosing POIs to visit or the time spent visiting them, and improve their image of the destination.

H3: The more game elements included by a gamified mobile experience, the more valuable it is for DMOs

Gamified experiences can include game design elements of the five levels defined by Deterding et al. (2011). All these elements add value for DMOs when generating the experiences.

4 Tools to Generate Gamified Mobile Experiences

4.1 Requirements of the Authoring Tool

The main requirement of the authoring tool is to allow DMOs to autonomously generate gamified mobile experiences, avoiding depending on a technology provider. The tool must be easy to use and minimise the efforts required to perform this task.

Moreover, the authoring tool also should have some requirements related to functionalities of the gamified mobile experiences. Firstly, the mobile experiences must be available offline, so that their main functionalities must work without Internet connection. Secondly, the experiences must be multilingual to be available in the more relevant languages for each DMO, and connected to social networks. Thirdly, the experiences must integrate surveys to gain knowledge about tourists by DMOs, and include practical and contact information about the destinations.

4.2 Workflow of the Authoring Tool

The workflow of the authoring process has been divided in several steps that will be further explained in the following sections (Fig. 1). The first step of the authoring tool (load) not only allows DMOs generating new experiences, but also loading, previewing and copying existing ones. In the second step (start), the type of experience (basic, advanced. . .), its name and the desired mobile output platforms (iOS, Android. . .) are selected. The third step (design) is related to the customization of the key points of the visual appearance of the graphical interface of the mobile experiences, including primary and secondary colours, and main fonts of the texts (Fig. 2a). The main content of the experience is defined in the fourth step (define), which includes several tasks such as the definition of the categories for POIs (Fig. 2b); the POIs of the experience (Fig. 2c) and the phases which can optionally further group POIs; mini-games which can be attached to POIs and challenges to group those mini-games; rewards obtained by tourists during the experience; and a story which can enforce the order or conditions in which POIs can be visited (Fig. 2d).

Within the fifth step (inform), the DMO can introduce additional information to be shown to tourists or to be gathered from them. Regarding the former, it includes customizable information about the destination (transportation, gastronomy. . .); information from external providers (weather, news. . .); information about the DMO (description, contact information, social networks. . .); and a tutorial about the mobile application. Regarding the latter, a survey to gather information from tourists can be defined (Fig. 2e).

Once all the content has been inserted, the sixth step (translate) is related to the translation of the experience. In order to efficiently cope with multilingualism, the DMOs has to select the languages of the experience (Fig. 2f). Among them, one has to be marked as the main language. During previous steps, data about the

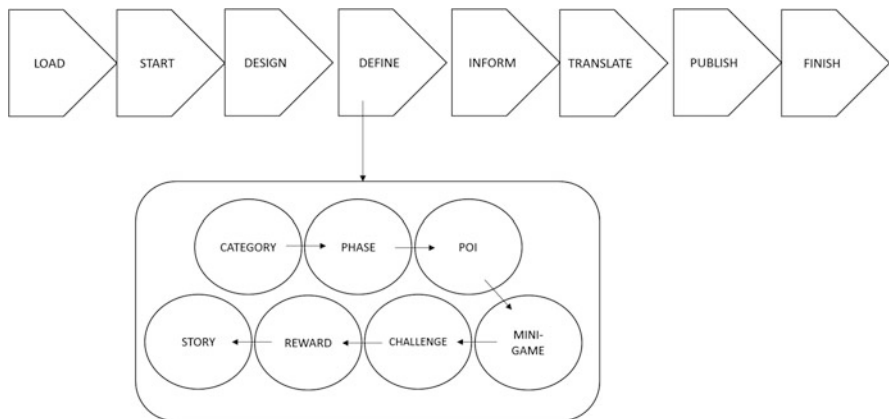


Fig. 1 Workflow of the authoring tool

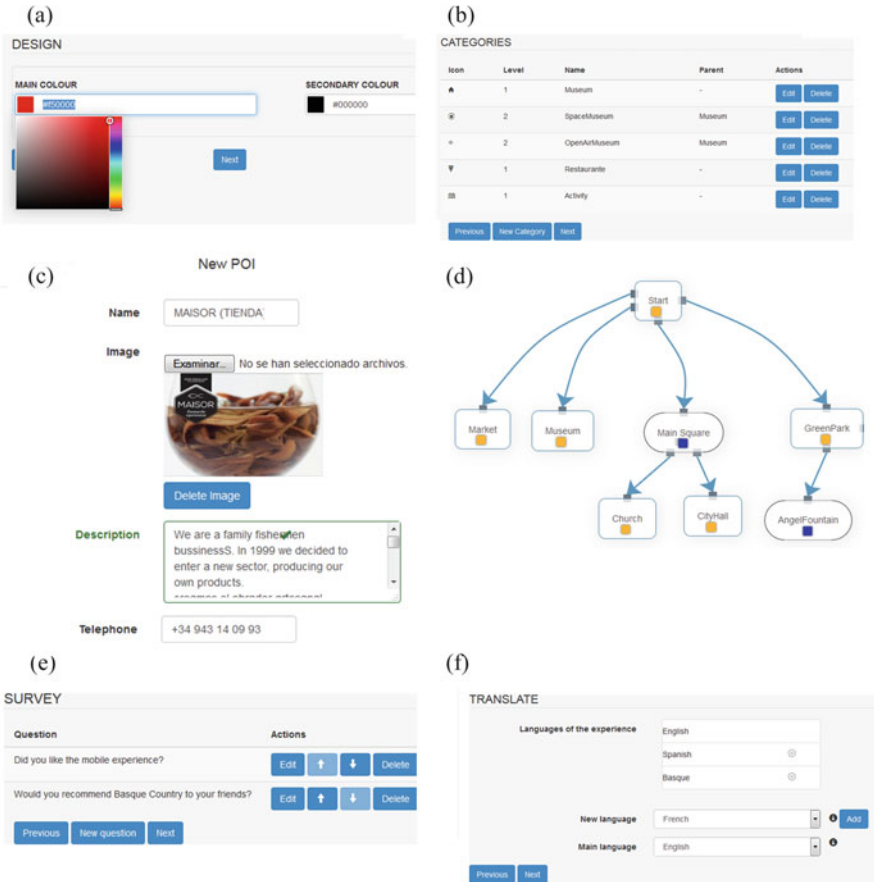


Fig. 2 Screenshots of the authoring tool

experience (names, descriptions. . .) is introduced only in this main language. Then, in this step a CSV file is generated automatically with all the elements to be translated. These elements are mainly texts, but different images and audio files can be defined for each language as well. Once this file has been translated to the rest of the languages of the experience, the DMO can upload the new CSV file to the authoring tool. Translations are automatically persisted and can be generated and uploaded as many times as required.

The final two steps are related to the publication of the generated mobile tourism experience. On the one hand, on the seventh step (publish) the information to be shown on the App stores where the mobile experience is going to be published, such as a description, its category, or the image to represent it, should be defined. On the other hand, although within the eighth step (finish) the mobile experience is automatically generated, it should be manually deployed at the App stores. The deployment has only to be done the first time an experience is published. Each time an

application is launched by a tourist, it automatically checks whether contents of the experience have been updated. Thus, when a new version of an experience is generated, previously installed mobile applications will automatically update their contents.

This general workflow can be adapted to individual needs of each DMO, for example skipping the challenge task when mini-games are not going to be grouped or the design step when both main colours and texts are predefined for a DMO. Different types of experiences can be defined, assigning programmatically to each type a different array that will customize the workflow. Once an experience type is selected, only the steps and tasks included in the array are presented on the authoring tool.

4.3 Architecture of the Authoring Tool

The authoring tool is a Single Page Web Application based on HTML5, Backbone and Bootstrap. The server is composed of REST services implemented in PHP on the basis of a MySQL relational database. The archetypes of the mobile experiences are based on the Ionic Framework and they are converted to native applications using Apache Cordova. Certain secondary actions of the mobile experiences (surveys, suggestions, codes for collecting prizes) connect to the server to load and save data.

The authoring tool stores all the information related to the experience on the server. Then, during the publication process, auto-contained experiences are generated with their definition (POIs, mini-games...) included in a JSON file loaded with the information stored by the authoring tool. For each language of the experience, a JSON file is also generated with the language dependent values. The multimedia files are also bundled with the rest of the experience during this process. Finally, all these files are combined with generic archetypes of hybrid mobile applications. After this process, the final result can be downloaded and transformed into a mobile native application to be manually uploaded to App stores.

5 Validation of the User-Friendliness of the Authoring Tool

The validation of the user-friendliness of the authoring tool has been based on the generation of gamified mobile tourism experiences by the staff from three DMOs, one person from the Regional Basque DMO, Basquetour; and two from Local Tourism Offices (LTO) of sea villages, Getaria and Zarautz in Gipuzkoa (Basque Country).

In order to simplify the evaluation process, three types of gamified experiences have been defined. The first type (basic) is a basic gamified tourism experience where several POIs of the destination, which can be visited in any order, will be

presented to tourists. Mini-games can be linked to these POIs (quizzes, check-in, QR code discovering), while tourists are rewarded once they have achieved them. If the score is above a threshold, tourists win a prize established by the DMO to be collected at its headquarters. Finally, practical information about the destination (weather forecast, transportation. . .) and a short tutorial about the application can also be included.

The second type (advanced) includes more options, such as the possibility of assigning categories to POIs and grouping them into phases. Moreover, mini-games of different POIs can be combined to create challenges to gain more rewards. Furthermore, there are more types of rewards than can be linked to mini-games and challenges, such as badges or extra points. Finally, the third type (professional) allows customizing the order in which POIs have to be visited. Three main options have been defined: POIs can be visited in any order (free mode), in a certain order (navigation mode), or conditionally (conditional mode), where some POIs will be hidden or shown according to the actions of tourists (amount of points, visited POIs, solved mini-games. . .).

The interface of the authoring tool is customized according to each type of experience, hiding some tasks of the definition step: category, phase, challenge and story tasks for basic type; and story task for advanced type.

During the validation session, the staff has been asked to generate a simplified gamified mobile experience (no more than five POIs) for each type of experience using the authoring tool, as the main focus on the validation was related to the workflow and the usability of the Graphical User Interface (GUI) of the authoring tool. After this process, they have been asked questions about gamification related to the hypotheses.

The validation has taken around 45 min for each person. The knowledge level about technology and gamification of the staff participating on the validation was low. None of them knew about the main characteristics or elements of gamification, nor had previously used gamified mobile tourism experiences.

After a short explanation introducing the three types of experiences, the generation of the different elements (POIs, mini-games. . .) caused no major problems to the staff. The workflow was considered very intuitive, and everybody was able to generate a gamified mobile experience of each type. The feedback obtained during this part of the validation confirms the first hypothesis of the paper, when the workflow and the GUI of the authoring tools are tailored to the needs and technological level of the staff. However, the translation process of the experience was not so obvious, with the selection of the main language of the experience and the process to translate and update the content as the main bottlenecks detected. A further more detailed explanation was needed also to implement conditional POIs. All of them agreed on these experiences to be valuable for DMOs, validating the second hypothesis. Firstly, DMOs recognized the capacity of the experiences to influence the behaviour of tourists on the destination. The main changes on the behaviour identified by them were aligned with the ones presented by previous researchers (Negruşa et al., 2015; Xu et al., 2014): increase visiting durations to POIs and balance the distribution of tourists over the destination. Secondly, DMOs

found the experiences could improve the brand image of the destination, increasing the knowledge of tourists about it (history, culture. . .), and offering a better service to niche tourism market (family tourism, active tourism. . .).

Regarding the utility of the different game elements, only basic gamification elements were considered as useful, including scores, simple mini-games, leader boards, progression levels, and rewards. More advanced elements, such as Augmented Reality or mini-games enhancing the information about a POI, were considered less useful. The utility of badges was perceived to have low impact on tourists. Moreover, the generation of stories for an itinerary was perceived useful for closed spaces, but not for their destinations. This feedback rejects the third hypothesis, DMOs found basic gamification elements more valuable. Thus, the inclusion of new gamification elements should be carefully analysed, as it increases the complexity of the authoring process not providing a perceived added-value for DMOs.

6 Conclusions

Gamification, defined as the use of game design elements in non-game contexts, has been successfully applied to several domains to change the behaviour of users. However, few examples of DMOs using gamified mobile experiences for the on-site phase of the trip exist. This can be due to DMOs not having the required tools to generate gamified mobile tourism experiences.

To address these issues, several hypotheses have been defined about the capacity of DMOs to generate gamified mobile experiences when they have user-friendly tools available, the benefits these experiences offer to DMOs, and the complexity of the experiences. In order to validate these hypotheses, an authoring tool has been designed and developed based on a customizable workflow and an intuitive GUI.

Staff from three DMOs has taken part on the validation. They have been able to generate three types of experiences (basic, advanced and professional), confirming the first hypothesis of the paper and validating the acceptance and usability of the authoring tool. Moreover, they have also confirmed these experiences being valuable for DMOs (second hypothesis), identifying the main behaviours of tourists that could be influenced, and how these experiences could improve the brand image of the destination. The final hypothesis, linking the number of game elements of the experiences to the value perceived by DMOs, has been rejected on the validation.

Thus, although the application of gamification by DMOs for the on-site phase of the trip is still at an early stage of development, the results of the validation show that there are opportunities to grow both for gamified mobile tourism experiences and for authoring tools empowering DMOs to generate these experiences. Thus, both researchers and industry players are encouraged to further work on these authoring tools tackling the requirements of DMOs; and on gamified mobile experiences providing new services to tourists and allowing DMOs to influence the behaviour of tourists and improving the brand image of the destination.

The main line of future work is related to the validation of gamified mobile experiences generated by DMOs by real tourists. A pilot project devoted to this validation is being defined on the Basque Country. Key indicators of the success of the validation of this pilot will be the opinion of tourists; the number of downloaded experiences; the number of tourists getting enough points to win a prize; the number of POIs visited (globally and per tourist); and the impact and the increase of the number of physical visits to POIs included on the experience. The conclusions obtained in this validation will determine if the gamification pilot is extended to more DMOs of the Basque Country.

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