

Designing Location-based Augmented Reality Games for Urban Tourism: A Conceptual Framework

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Abstract

We have lately experienced a commercialisation of location-based augmented reality games (LBARGs). However, we have to acknowledge that games like Ingress are not primarily designed to enhance tourism experiences, but can be used as a test bed to improve the design of LBARGs to enrich tourist experiences. This study explores how LBARGs should be designed to enhance tourists' on-site experiences with these games by proposing a conceptual engagement framework to inform future location-based game design. The framework emphasises the relationship of players, game and the tourism context, which is based on six traits.

Keywords: location-based games, mobile game experience, tourism experience design, engagement, augmented reality, mobile game research

1 Introduction

The game design of LBARGs is currently experiencing a flourishing interest from game designers (Wetzel et al., 2011), tourism researchers (Zach and Tussyadiah 2017) as well as commercial companies outside the academic context. There are still opportunities for improving the design of these games for tourism to create more engaging experiences between tourists as players and the visited destination. With this study, we try to fill this gap by presenting a conceptual framework for location-based AR game design for tourism urban environments. The design framework is based on two analysed games from which one is presented in this paper in form of a case study. The study is exploring the design of LBARGs for the application in urban tourism environments with the aim to improve tourists' on-site experiences with location engagement and playful interactions. The paper first outlines recent developments in the design of LBARGs in tourism and focuses on the design components of these games to facilitate engaging experiences with the visited urban environment.

2 Literature Review

2.1 Playfulness to Enhance Engaging Tourist Experiences

Many tour-guiding apps (Dickinson et al., 2014) passively immerse tourists into information about the local history or other stories without allowing an active interaction with the environment. Often, tourists are passive consumers presented with information, which they can only partially impact. On the other side, tourist researchers (Falk, Ballantyne, Packer, & Benckendorff, 2012) claim that engagement through interactions and activities on-site benefit to the understanding of visited places. The engagement framework of O'Brien and Toms (2008) was found to be the most suitable to describe the engagement with LBARGs as successfully used by Bouvier, Lavoué, & Sehaba (2014) in online games and now expanded to games on a mobile platform. The framework characterises the concept of technology engagement by challenge, aesthetic and sensory appeal, feedback, novelty, interactivity, perceived control and time, awareness, motivation, interest and affect.

LBARGs are rooted in pervasive gaming research that takes gameplay outside into the real world. These games are played on mobile phones and use the players' physical location (GPS sensor) to generate game levels or location-specific information. The players have to be in physical vicinity to a virtual play location to trigger game interaction. As the application context of LBARGs expands, these games are also used during travels without being particularly designed for tourism purposes. In the context of LBARGs engagement is extended to the environment around the player and not limited to the mobile game. Walking and sensing the surrounding is a vital aspect in pervasive gameplay. Therefore engagement with LBARGs can be considered as a technology-mediated activity in which the tourist freely and actively dedicates mental and physical effort towards a game in order to attain a deeper connection with the environment through playful interactions (Weber, 2016). This requires that engagement be clearly directed from the player to the environment mediated through the game as a vehicle of playfulness connecting the virtual with the real world.

Despite some previous research focusing on LB and ARGs, designers have very little advice on how to design for engaging and meaningful experiences in mixed reality settings of urban tourism (Benyon, Quigley, O'Keefe, & Riva, 2013). Wetzel et al. (2011) created design guidelines for LBARGs that are rather general for these games and thus miss particularities that come with the urban tourism context. Tourists do not have much gameplay experience, but are generally interested in gameplay during their travels (Xu, Tian, Buhalis, & Weber, 2013). Those games offer a new opportunity to fill the gap between desired playfulness and mediated interaction in tourist destinations (Benyon et al., 2013). Rapidly, tourism decision makers will show interest on how to engage tourists in alternative activities such as gaming to increase tourists' interest for the visited location (Scott & Ding, 2013), engaging them to learn about the location and eventually create new meaning through travel (Falk et al., 2012).

3 Methodology

The study has an exploratory character and follows a qualitative method triangulation that allows reflecting on the mobile GX as a holistic concept supported by self-reported and observational methods. Play tests were conducted in Bournemouth city centre and the surrounding park areas during summer 2014 with a Google Nexus 4, Android 4.4. Version. The device run Ingress APK version 1.56.3 and a SCR screen recorder.

3.1 Applied Methods

Mobile interviews were used to evaluate altering player experiences. The method allows movement in space, prompts conversations to the context of gameplay and enables a co-creative and interactive data generation. Participants remember specific features at the game location and connect to their emotions during gameplay (Gracia, Eisenberg, Frerich, Lechner, & Lust, 2012). Mobile interviews were found to be more suitable than think-aloud technique, which interrupts the game experience and feels unnatural for the participants. Walking around stimulated participants' memory to particular emotions and game interactions. Additionally, contextual observations of the environment were conducted to understand the game context. Special attention was paid to social interactions between players, player and non-players and players and the contextual environment (McCall, Wetzel, Löschner, & Braun, 2011). Game logs were applied to capture the game progression and players' interaction on the mobile screen. Notes were taken of the interaction and inserted in the interview transcripts to support thematic analysis.

3.2 Ingress as Case Study

Ingress is a pervasive massively multiplayer online role-playing game (PMMORPG) that is played on a mobile device independently from any location. It uses players' GPS coordinates to detect virtual portals that are mainly assigned to physical landmarks. The aim of the game is to fight for one of two opponent factions by either defending or assisting the world to be conquered from an outer force. Players conquer virtual portals in the real world and link them to form control fields. The number of controlled portals and fields of each faction show the progress in the game.

The game was used as a case study example, as it was found to be the only commercially suitable LBARGs at the time data collection was conducted. By that

time, Ingress had a considerable impact on early adapters who travelled around to play the game in different locations. As the literature review has shown, not enough is known about the design of LBARGs for the tourism context, which justifies a case study approach in this context.

3.3 Sampling

It was aimed to incorporate a heterogeneous group of players into the sample to represent the diversity of tourists; among them six British and one Chinese, Dutch, Portuguese, German and Brazilian each between 12 and 36 years old. Participants were purposefully, but randomly recruited in Bournemouth city centre and university based on their interest in urban travels, smartphone owners and experiences with mobile apps/games. Eleven participants played the game in total, either alone or in pairs.

3.4 Data Analysis and Limitations

Data was captured in verbal and visual form and analysed by means of thematic analysis (Braun & Clarke, 2006). Researching experiences lead to a landscape of multiple realities due to individual participant perceptions. In order to ensure the credibility and trustworthiness of the study a triangulation of methods was applied. It can be argued that the conceptual framework is not transferable to other contexts, as a specific game has been evaluated. However, it was not the aim to produce a generalizable or validated outcome.

4 Results

The conceptual framework of technology engagement (Figure 1) that is divided into point of engagement, period of engagement, disengagement and re-engagement by O'Brien and Toms (2008) was used to analyse the stages of playful engagement in urban environments.

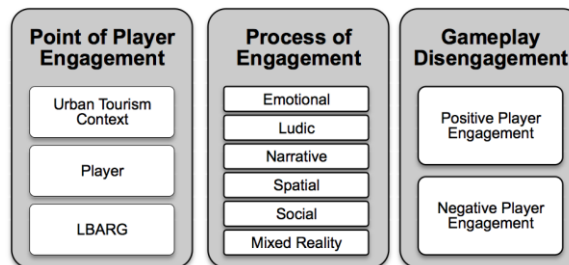


Fig. 1: Conceptual Framework on Designing Location-Based Augmented Reality Games in Tourism

4.1 Point of Player Engagement

Game engagement starts with the connection of the player with the game to the game environment. Play locations have a crucial part in designing the GX for tourists. Main critics from participants came in regards to the availability of space and the authenticity of places to support the game narrative. Game locations were randomly introduced in the game and did not support the narrative climax (Wetzel et al., 2011), which is less stimulating in wide-area games. *Ingress*' play locations are assigned to any physical landmark, often without any supporting information of the POI, which is in disadvantage for the game narrative. Tourists, however, require this association for meaning creation and identification of the place that turned out to be the most difficult aspect playing in unfamiliar environments. Tourists as mobile gamers have little to no previous mobile game experiences, although all participants were regular smartphone users. Their main motivations of playing a LBARG were to go on adventures, socialise, educational purposes and casual fun. Tourists enjoyed the playful activity and learned about places in the city, which they would normally not visit.

4.2 Gameplay as Engaging Experience

Six aspects contributing to player engagement with the tourism urban environment could be identified:

Emotional Engagement

GX showed a strong indication towards active and pleasant emotions; participants expressed a high level of excitement during the discovery of new landmarks and successful completion of challenges. Some players, however, felt occasionally stressed or nervous due to UI issues.

Ludic Engagement

Meaningful and engaging GXs result from the interaction of players with game mechanic based on meaningful choices. Participants were mainly focused on short-term tactical decisions such as to hacking portals, as opposed to engage in the game's long-term strategy and narrative. Providing feedback on tasks has been identified as the most essential game feature in LBARGs, which was found to be insufficiently implemented in *Ingress*. Most play interactions were hard to understand and to master. Cognitive overload from the game and play environment resulted mainly in stress and tense emotions.

Narrative Engagement

The use of storytelling techniques in LBARGs intrigued many participants to find out more about the cultural background of the visited sites: “[...] when this is a sculpture, there could be a little story about the artist of the Geological Terraces because it holds a lot of opportunities.” (Mary, age 35, Group Player). The statement implies that some participants were expecting a more informative and mediated approach as opposed to pure entertainment. Some participants found it difficult to associate with a fictive story and criticised the missing game authenticity.

Spatial Engagement

The freedom to explore the urban environment was identified as a central game mechanic of touristic LBARGs. *Ingress* players gained renewed stimuli from the game-map: “[...] probably you get quite carried away when you play it and you end up playing it somewhere where you've never been before.” (Ethan, age 12, Group Player). This challenged-based immersion (Ermi & Mäyrä, 2005) resulting from players' ability to master the game, led into losing the sense of time and can be seen as an intense level of engagement. Many players reported that the game raised their awareness of locations and made them more conscious about the visited places, however the game did not provide deep knowledge about the visited places.

Social Engagement

Participants preferred real over virtual communication. Although, mobile players meet face-to-face and have more possibilities to network outside gameplay (social media, events), tourists would rather engage with people they already know. Thus, it is advised that gameplay in the tourist context should be approached from a multi-player perspective. The majority of tourists travel in social groups and want to interact with each other.

Mixed Reality Engagement

One of the main barriers for participants was to identify play locations. *Ingress* does not make use of technologies such as AR that contribute to the identification of places and draw a stronger connection between the real and virtual play world. It was also not in the nature of participants to hold the smartphone upfront, thus they were much immersed on the screen. Participants criticised this and did not want to withdraw from reality but engage with the surrounding and its stories, history and artefacts.

4.3 Gameplay Disengagement

There were two main reasons for disengagement. Some participants ended the gameplay due to disappointment with the technology and stressful play location. The majority of participants had positive GXs sharing experiences with co-travellers, creating meaning through gameful interactions and discovering new places. Players had an increased sense of orientation and spend more time at the locations.

5 Conclusion

This study contributes to tourism experience design by identifying aspects of location-based gameplay. The study demonstrates applicability of game design theory to

tourism research by focusing on tourist engagement through playful interactions. The analysed game, Ingress, although not being designed for tourism purposes provides many opportunities to be applied in the tourism context such as increased spatial and emotional engagement. However, to be most suitable for tourism LBARGs need to be improved in the ludic engagement by providing enough player feedback as well as mixed reality engagement using the game as a lens through which mediation and playful interactions are enhanced. More research is needed to test the proposed engagement framework for ARGs in the urban tourism context.

References

- Benyon, D., Quigley, A., O'Keefe, B., & Riva, G. (2013). Presence and Digital Tourism. *AI & Society*. doi:10.1007/s00146-013-0493-8
- Bouvier, P., Lavoué, E., & Sehaba, K. (2014). Defining Engagement and Characterizing Engaged-Behaviors in Digital Gaming. *Simulation and Gaming*, 45(4-5).
- Braun, V., & Clarke, V. (2006). Using thematic analysis in Psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Dickinson, J. E., Ghali, K., Cherrett, T., Speed, C., Davies, N., & Norgate, S. (2014). Tourism and the smartphone app: capabilities, emerging practice and scope in the travel domain. *Current Issues in Tourism*, 17(1), 84-101. doi:10.1080/13683500.2012.718323
- Ermí, L., & Mäyrä, F. (2005). Fundamental Components of the Gameplay Experience: Analysing Immersion. In S. de Castell & J. Jenson (Eds.), *Changing Views: Worlds in Play. Selected Papers of the 2005 Digital Games Research Association's Second International Conference* (pp. 15-27): DiGRA.
- Falk, J. H., Ballantyne, R., Packer, J., & Benckendorff, P. (2012). Travel and Learning: A Neglected Tourism Research Area. *Annals of Tourism Research*, 39(2), 908-927. doi:http://dx.doi.org/10.1016/j.annals.2011.11.016
- Gracia, C. M., Eisenberg, M. E., Frerich, E. A., Lechner, K. E., & Lust, K. (2012). Conducting Go-Along Interviews to Understand Context and Promote Health. *Qualitative Health Research*, 22(10), 1395-1403.
- O'Brien, H. L., & Toms, E. G. (2008). What is User Engagement? A Conceptual Framework for Defining User Engagement with Technology. *Journal of the American Society for Information Science and Technology*, 59(6).
- Scott, N., & Ding, P. (2013). Tourism Experience Design: Some Recent Research. *Special Issue of Tourism Tribune*, 28(1), 9-13.
- Weber, J. (2016). *Designing engaging experiences with location-based augmented reality games for tourism urban environments*. (PhD), Bournemouth University, Bournemouth. Retrieved from <http://eprints.bournemouth.ac.uk/27176/>
- Wetzel, R., Blum, L., Broll, W., & Oppermann, L. (2011). Designing Mobile Augmented Reality Games. In B. Furht (Ed.), *Handbook of Augmented Reality* (pp. pp.513-539): Springer New York.
- Xu, F., Tian, F., Buhalis, D., & Weber, J. (2013). *Marketing Tourism Via Electronic Games: Understanding the Motivation of Tourist Players*. Paper presented at the VS Games. 5th International Conference on Games and Virtual Worlds for Serious Applications. 11-13 September 2013, Bournemouth, UK.
- Zach, F., & Tussyadiah, I. P. (2017). *To catch them all - The (un)intended consequences of Pokémon GO on mobility, consumption, and wellbeing*. Paper presented at the Information & Communication Technologies in Tourism 2017.