Harnessing Player Creativity to Broaden the Appeal of Location Based Games

Paul Coulton
Infolab21, Lancaster University,
Lancaster, UK, LA1 4WA.
p.coulton@lancaster.ac.uk

Kate Lund
Infolab21, Lancaster University,
Lancaster, UK, LA1 4WA
k.lund1@lancaster.ac.uk

Andrew Wilson
Blink Media, Fairfield Mills, Milford St,
Huddersfield, West Yorkshire
andrew@blinkmedia.org

Despite being the subject of considerable research effort location based games in general have failed to attain the popularity and longevity of similar activities such as geo-caching or orienteering. This leads us to the question are the games designed thus far taking too much inspiration in their design from console and pc games leading to games that are too inflexible and failing to support the types of player behaviour that have emerged in geocaching? Using a design inspired by the player engagement evident in geocaching we present the empirical study of the design and user experience from creating the Mobile Augmented Reality (MAR) game Free All Monsters. The results highlight that enabling user creativity and accommodating the varied motivations for playing such games can successfully be incorporated into the design and operation of location based game design and in particular provide a fun outdoor family activity.

Keywords Mobile games, location, augmented reality.

1. INTRODUCTION

Whilst games have always been at the vanguard of research in location based services [2, 13] their commercial counterparts have attained limited impact in the wider community and generally failed to achieve the critical mass of players required to support long-term use [13]. Although this can partly be attributed to hardware availability and potential costs to the players, even as such barriers diminish, with Global Positioning System (GPS) chips becoming a common sensor in a wide range of commercial mobile phones and the wide spread introduction flat rate data tariffs for mobile phone users, location based games are still failing to achieve the success of similar activities such as geo-caching¹ which has a large player base and is regarded as a popular family activity [4]. We believe that this is largely due to the inflexibility of the game play of many of these games and their failure to accommodate emergent behaviour and differentiated levels of participation which reflect the differing motivations players may have for playing a location based game [7] or any casually orientated game [8]. In order to address these motivations it is worthwhile using geo-caching as a source of design inspiration as it “presents one of the few examples of long term practice within a location based experience” [11].

One of the key motivations identified around geo-caching appears to be that of social walking with parents in particular using the prospect of finding a cache to encourage their children to take exercise [11]. In contrast many location based games have drawn inspiration from fast moving console games

and encourage running and chasing [13] which could be off putting for social groups needing to accommodate a range of physical abilities and hamper social inclusivity. It is apparent that the majority of geocachers organise their participation as a planned activity [4, 8, 10] which contrasts the approach of other games which have sought to integrate game play into players daily activities in a view to boost participation [1,7]. A further motivation is as a means of discovery and exploration of a particular place [11] which again is often lacking from many location based games as they are often effectively independent of the actual physical location and simply rely on player movement as the game play mechanic in order to simplify scalability issues [13]. This tethering of a game to the location is enhanced in geo-caching by the physical anchoring provided by the caches themselves which has also proved powerful in mixed reality games such as PAC-LAN [14] which provided physical anchors in the form of RFID enabled Frisbees. Geo-caching also facilitates both creation and consumption and enables user creativity not simply through the creation of new cache locations, which is often seen as seen as a means of informing others about a particular place [11], but also a degree of self expression through the treasure which may be left at the cache. User creativity is not new to computer games whose early

¹ Geocaching is an outdoor activity in which the participants use GPS enabled device to hide and seek containers (referred to as ‘geocaches’ or ‘caches’) anywhere in the world. A typical cache is a small waterproof container containing a logbook and in some cases souvenirs, usually toys or trinkets of little value [17].

evolution owes much to the amateur programmer [10] but is most often associated with Modding² and Machinima³ which first appeared in the 1980s. The most recent example of modding is the highly acclaimed and popular puzzle platform game LittleBigPlanet for the PlayStation 3 that allows players to create their own levels which can be shared with others. Whilst some location based games such as Gophers [3] have incorporated user creativity in the form of defining tasks they have either experienced difficulties when relating these to specific locations due the granularity of the positioning technology [13] or purposefully avoided the issue for ease of scalability as previously discussed. One motivation that many location based games do address is the notion of collecting items or objects which is also prevalent amongst many console games such as Pac-Man or Pokemon [10]. In the forthcoming discussion we will illustrate how these motivations have been addressed through the design and subsequent empirical study of the game Free All Monsters.

2. FREE ALL MONSTERS

The premise of Free All Monsters was defined by the project artist as described in the following paragraph.

"There haven't always been great towns and cities, full of people hurrying to and fro to school or work. Where now stand shops, factories and offices were once streams, woods and hillsides. And every one of those places, even the loneliest tree standing by itself on the moors, had a monster to guard it. The place belonged to the monster, and the monster belonged to the place. So when towns and cities were built, the monsters had to stay, trapped under the tall buildings made of brick and stone and concrete. And there they remained, for hundreds of years. Until now... FREE ALL MONSTERS!"

This is also how the game was introduced to the participants who played the game at the event discussed later in this article. This description emphasises the playful nature of the game and was deemed preferable to a more technical perspective as we felt this would be more appealing to a wider demographic and in particular a family audience who seem to be embracing geo-caching. The game currently offers two main ways of participation, via the Liber Monstrorum, or through the use of the

² Modding is a slang expression derived from the verb 'modify' and in gaming generally refers to user created levels or in some cases whole games for First-Person Shooters (FPS), Role Playing Games (RPG) and real-time strategy games. Modding does not create standalone software and require the user to have the original release in order to run [17].

³ Machinima is the use of real-time three-dimensional (3-D) graphics rendering engines (generally from computer games) to generate computer animation [17].

Monster Spotters Guide and the Magic Monstervision Machine mobile application.

2.1 The Liber Monstrorum

The first way of participating in the game is to encourage players to consider their environment and envisage what potential monsters may be lurking within it. Therefore at the game events the artist who conceived the original concept for the game armed with his trusty fluffy orange and yellow pencil cases encourages the creation of a Liber Monstrorum⁴ or book of monsters as shown in Figure 1. Currently the Liber Monstrorum resides on Flickr and these monsters are subsequently revealed to location based game players through the use of the Magic Monstervision Machine which is the name given to the mobile augmented reality application.

Figure 1. Additions to the Liber Monstrorum.

2.2 The Monster Spotters Guide

For each particular location based game a Monster Spotters Guide is created for a specific group of monsters selected from the Liber Monstrorum as shown in Figure 2 and is purely paper based. The guide a simple set of pictorial clues that are designed to aid finding the location of the monsters and a set of questions relating to each monster.

Although this might be considered a very 'low tech' aspect of the game it serves a number of purposes to ensure a social play experience. Firstly it aids the creation of social inclusivity within a group which

⁴ The Liber Monstrorum is a late seventh-or early eighth-century Anglo-Latin catalogue of marvelous creatures. It is contained within the same manuscript, the Nowell Codex, as the poem Beowulf.

is most likely to be sharing a Magic Monstervision Machine and provide the opportunity for player creativity through discussion of the answers. Secondly by providing the pictorial clues to the monsters locations, photographs deliberately taken at quirky angles, encourages all players in a group to look around their surroundings and discuss possible locations thus firmly anchoring the players in the physical space as with geocaching. Finally, it reduces the likelihood of players becoming over fixated on the device screen and sets the tone of the game of being about exploration rather than running and chasing. The Spotters Guides also contains questions about what the monsters spotted look like and some auxiliary questions that are solely aimed at stimulating the imagination of the players and instigating discussion within the group such as:

'Where does the monster go holiday and what does it do there?'

'What does the Monster dream about and why?'

Figure 2. Monster Spotters Guide.

2.3 The Magic Monstervision Machine

The Magic Monstervision Machine is a Mobile Augmented Reality (MAR) application developed for Nokia S60 phones which players use to locate and collect monsters as illustrated in Figure 3. The application is populated with images previously submitted to the Liber Monstrorum which then appear at predefined locations on a map. The rationale for utilizing marker-less MAR rather than marker based MAR [6] or indeed a simpler technology is that we believed the ability to remain aware of your surroundings through the lens of the phone helps players remain aware of their actual surrounding rather becoming overly fixated by an avatar representing their position moving around on a map. The main operating screen is the second of the sequence shown and provides a player information panel overlaid on a continuous video stream from the mobile phone camera. Whilst the augmented reality display places relatively high

demands in terms of phone capabilities it was felt to be highly desirable in that players are still able to focus on their surroundings using the phone as a lens and diminishes the player overly concentrating on purely virtual game representation on the phone screen which is evident in many location based games. To aid players exploration we introduced a hot, warm, cold metaphor reminiscent of playground games which is indicated by snowflake, sun, and flame icons which are triggered by measuring the players current distance from the nearest monster (warm is 30m and hot 15m). As the photographs on the Monster Spotters Guide aid the players to the actual location of the monster once they are in close proximity the program tolerances mean that the inevitable GPS positional errors don't manifest as difficult to locate monsters. In recognition that non-visual feedback can greatly improve player experience [14] when the Monstervision Machine is hot the phone vibrates and shouts "MONSTER", which means the players can vary the focus of their attention within the game. When a particular monster has been spotted it can be placed in the holding trap by pressing the centre key of the phones joypad and the corresponding bar in the trap turns from red to green. The monsters location is also indicated on the map and the time of capture indicated in the holding trap inventory as shown in Figure 3. Note the Magic Monstervision Machine can be used to spot up to ten monsters and can be adjusted for each game and consequently vary the length of time taken to complete the game.

Figure 3. Screenshots of Magic Monstervision Machine.

Players can switch between screens by simply pressing left and right on the joypad. In the first prototype an interactive marker showed the players

current position every second but this was removed as some of the early testers found they tended towards watching the dot move as they walked. Therefore the player's position is only updated when the map is selected and indicated by a red dot as shown in the third screen of Figure 3. Finally rather than display a GPS bar we indicated this as changing amounts of 'Captoplasm'⁵ in a beaker as we wanted to relay the importance of having a signal but didn't want to detract from the game concept. The final game information provided is the game time elapsed, which is derived from the GPS to ensure consistency across devices, and the name of the last monster spotted.

⁵ The weight of a molecule of Captoplasm being estimated as eight gravitational integers divided by pies.

3. MONSTER SPOTTING

The following discussion relates to the first public presentation of the game between 11:00am to 5:00pm on Sunday 2nd August 2009 as part of the Hide and Seek Weekender which took place in and around Royal Festival Hall, part of London's Southbank Centre, from July 31st to 2nd August. This followed on from a public trial at a Sandpit #13 event, a monthly pervasive gaming night, held at the same venue on the 22nd June; the monsters from which were used to create those for the Weekender. The locations chosen for each monster (shown in Figure 4) were derived from the geotagged photographs taken prior to the event, when creating the Monsters Spotters Guide by simply walking round the venue looking for interesting landmarks. The geocaching inspired design of Free All Monsters meant that we were aiming to attract a family audience to engage in a casual playful experience which differed from the majority of other location games at the event which could be considered as more hardcore gaming experience [16] being alternate reality inspired designs that encouraged collective performance and were a large part of the attraction which appears to be through the collaborative suspension of belief amongst the players [12].

Figure 4. Monsters and their locations defined for Hide and Seek Festival 2009.

The creation of monsters for the Liber Monstrorum attracted a large number of contributors, principally

children, either waiting to play the game, waiting to play some of the other games at the event or in some cases simply killing time as they were having lunch with their parents in the Southbank centre. Figure 1 shows the volume of monsters produced and a number of families who went on to play the location based game entered the activity through their children's initial interest in drawing a monster.

To evaluate the location based game we provided seven mobile phones with the Magic Monstervision Machine installed and simply asked for the players to leave their own mobile phone as security as none of the player groups had been preselected. Thirteen groups played the game all of which were families with one or both parents playing with their children. The evaluation of the game is derived from the data retrieved from the phone (consisting of the number of monsters collected and the time taken), the feedback from our discussions when the groups returned the phones and marked their results (with points being awarded in the form of chocolate eclairs), and the observation of one of the groups as they played the game shown in Figure 5.

The average time spent playing the game was approximately 35 minutes with the time taken to spot all six monsters approximately 35 minutes although one team took considerably longer by having a lunch break part way through. Although it is important reiterating once again that speed is deliberately not a factor designed into the game play. The average number of monsters detected was >4 of the maximum 6 available and Figure 6 indicates the number spotted by each team. The time taken to play obviously affected the number of teams we could allow to play as we also had to recharge the phones at certain points during the afternoon although the creation of the monsters proved a useful activity for those who had to wait.

Figure 5. Monsters capture and record in action

To evaluate the relative merits of the pictorial clues and the locations chosen for the monsters Figure

7 presents the number of times each monster was spotted during the event.

The two monsters spotted least were 'Monferno' and 'Jeremy of Doom' which were in fact the two at the extremities of the game space perhaps indicating we hadn't created a natural flow of movement in the game. The next least spotted monster 'Alicious Liquorice' was due to the pictorial clue as defined by the following player quote:

"The fish clue is bit hard all the lampposts along the river have the same one"

The returned Monsters Spotters Guides provided some interesting examples of the creative thinking that emerged around the auxiliary questions and certainly seemed to engage the players.

The following represent a small sample for the monster 'Angel' where we asked

What is the Monster scared of and why?

"Small boys cos they say she is ugly"

"Soap operas because they make your brain go numb"

"hat snakes cos they hide in her hat"

"Its scared of the rain because it ruins her hair!"

An interesting and unexpected behaviour emerged around the question of what the monster spotted looks like with a number of players sketching the monsters rather than writing a description. Figure 8 shows the description provided by one group and the remarkably accurate sketch of another for 'Jeremy of Doom'.

Figure 6. Monsters capture and record in action

Figure 7. Sighting distribution of monsters selected for Hide and Seek Festival 2009.

Of the thirteen teams only one reported technical issues and this was a battery problem which meant they could only spot two monsters. Despite our slight concern we weren't able to use the assisted GPS available on the device to improve acquisition, as we didn't fit SIM cards in the phones, no GPS issues were reported.

Figure 8. Player descriptions of Jeremy of Doom

The observation of a group which consisted of a mother with her twelve year old daughter and eight year old son and their behaviour is largely exemplified by the sequence of images shown in Figure 5. The boy took charge of holding the Magic Monstervision Machine whilst the mother and daughter took turns in writing the answers to the questions. For each pictorial clue they tended to gather as a group and look around them to assess the likely position of a monster before setting off walking, invariably with the boy leading the search for the monster. The son provided a verbal commentary of the current state of the proximity detector and usually gave a large shout when it changed state. Once a monster was detected they tended to group around the phone screen to see the monster and then the daughter shared the task with the son of obtaining the monster name and coming up with the description. The auxiliary questions were either done between the mother and daughter as they followed the son with the others completed as a group after they have captured all the monsters. The discussion of pictorial clues generally created the most interaction between the whole group whilst the auxiliary questions provided interaction principally between those not interacting directly with the technology which suggests that

the design is largely achieving many of our aims although this needs to be ratified by further trial. Overall the feedback for the game, collected from informal interviews when players returned the phones, was extremely positive with many players requesting copies of the game and asking whether it would be available at other locations. In particular players liked being able to view the monsters in their immediate surrounding using MAR and many also mentioned how much fun they had experienced by simply coming up with the answers to the monsterology questions.

The game was such a success it lead to a request from one of the organisers of IGFEST who was attending Hide and Seek to bring Free All Monsters to Bristol.

3.1 More Monster Spotting

The second trial of Free All Monsters was as part of the Interesting Games Festival (IGFEST) 2009 held in Bristol with the main events over the weekend 12-13th September 2009. The location based game was scheduled to run on Sunday the 13th between 11:00 - 13:00 and the 12th was used as the creation day for the monsters we would use within the location based game. It is worth noting that as with Hide and Seek the game was one of a small number of family orientated experiences with many of the rest aimed at young adults. The game creation was simply a table set-up with pens and paper in the main 'IGlounge' of the event which was located in the new harbor complex at Bristol. The monster creation proved to be incredibly popular with children and families to the extent the windows of the venue quickly became festooned with hundreds of monster pictures as shown in Figure 9. This approach also proved an extremely successful way of recruiting volunteers and many of parents left mobile numbers and asked to be texted if their child's monster was selected for the game. At the end of monster creation on the 12th six monster drawings were selected and their homes defined as shown in Figure 10.

During the testing we had a issue with the number of phones available for players to utilise as the majority had been left back at the research laboratory by one of the team. However, we had sufficient devices to allow eight groups representing a total of 15 adults and 21 children. The time spent playing the game was between 40 minutes and 2 hours which was greater than at Hide and Seek no doubt due to the slightly larger game area and the gloriously sunny conditions on the day. Great care was taken in selecting monster locations for IGFEST, as there was some location ambiguity caused by confusing photographic clues at Hide and Seek, which resulted in the locating of monsters away from a natural 'desire path'. As a result of this planning, all groups successfully located and identified all of the monsters featured in the game.

Figure 9. *Liber Monstrorum* creation at IGFEST09

In terms of monster descriptions again we saw two of the groups choosing to draw the monsters rather than write descriptions. As with Hide and Seek the answers to the questions on the monster spotting guides seemed to inspire a great deal of thought and creativity. For instance when asked

Where does the Monster go on holiday and what does it do there?

"Devon –so he could live in a field and eat grass. White bits on his skin means he's not eaten enough grass. Needs grass to turn green"

"to the beach to do handstands and play volleyball"

Figure 10. *Monsters and their locations defined IGFEST 2009.*

The feedback we received from the game was again

extremely positive particularly from a large group containing members from four families totalling five adults and eight children shown in Figure 11. This group had taken over two hours to complete the course and were extremely enthusiastic about both the MAR technology but also the overall design of the game which had provided them with such an enjoyable experience.

“this was so much fun for us as well as the kids and mixing the technology with paper based activities meant we could all get involved really easily”

4. MONSTER EVOLUTION

Whilst we are continuing to trial the game with the general public at events such as Hide and Seek and IGFest we are also in the process of developing a set of online tools which will allow users to upload their own monster drawing and then define attributes for the monster which will be used in conjunction with a new mobile game client. This will allow us to perform a longitudinal ethnographically inspired study of the everyday online community aspects of the game and evaluate whether these would be similar to those seen in geo-caching [10]. Whilst the current version of the Magic Monstervision Machine could be modified to use new monsters in new locations by simply changing the set of files it uses, this would require a degree of technical competence which may be too difficult for general use and we are designing a newer more versatile client that will allow new games to be downloaded Over The Air (OTA). Other improvements could be in taking advantage of the API's appearing for online social networks such as Twitter, Facebook, Bebo, etc. to transfer the social capital generated through the games into players wider social networks

[5] which could provide insights into how this affects community evolution around a particular activity.

5. CONCLUSIONS

Figure 11. Players at IGFEST 2009.

Our original motivation for this research was to investigate whether increasing the creative role of the player within a game through user generated content would attract the casual and socially orientated players who utilise services such as geocaching. Further its is aimed at specifically supporting exploration and discovery by encouraging players to examine their environment. This motivation resulted in the family orientated location based game Free All Monsters which incorporates characteristics such as social inclusivity, exploration and discovery, and user creativity within a flexible structure which could lead to the long term sustainability of these games.

In regard to the appeal of user creativity, the activity to generate the Liber Monstorum was extremely successful and proved an extremely effective way of recruiting a random selection of our intended audience to play the game. Given the volume of monsters actually created compared to the number used in the game; one of the components for the next iteration of Free All Monsters must be a game structure that will allow us to utilize all the pictures generated. The user trials of the game conducted thus far have also shown that it was able to readily attract the family audience it was designed for and that it can provide a fun and engaging outdoor experience without relying simply on running and chasing which may not be appropriate for all members of a playing group or indeed the location. In terms of exploring the environment ensuring that the game was anchored in the physical space by using the Monsters Spotters Guide and MAR seemed to be very effective and

reduce screen only dependency. The one question which remains is whether the game can achieve longevity and create a community of users and driven by the success of the game thus far its next iteration will be based on a structure that will provide the infrastructure where such a community can be developed.

Overall we believe that it is important to continue research into location based gaming beyond the largely technologically motivated designs of many of the early examples and seek inspiration from other outdoor pursuits as well as more causally orientated gaming activities if they are ever to become the truly widespread everyday activities envisaged by many researchers.

ACKNOWLEDGMENTS

The authors would like to thank Nokia for the provision of the mobile phones used during development and user trials. Alex and Holly from Hide and Seek 09, Simon Games at IGFest09 for inviting us to participate in the various associated events and to monsterize the cities of London and Bristol but most of all the many unsung artists who have contributed to the Liber Monstrorum.

6. REFERENCES

- [1] Bell, M., Chalmers, M., Barkhuus, L., Hall, M., Sherwood, S., Tennent, P., Brown, B., Rowland, D., Benford, S., Capra, M., and Hampshire, A. . Interweaving mobile games with everyday life. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Montréal, Québec, Canada, April 22 - 27, 2006. pp 417-426
- [2] Benford, S., Magerkurth, C., and Ljungstrand, P. Bridging the physical and digital in pervasive gaming. *Commun. ACM* 48, 3 (Mar. 2005), 54-57.
- [3] Casey, S., Kirman, B., and Rowland, D. 2007. The gopher game: a social, mobile, locative game with user generated content and peer review. In Proceedings of the international Conference on Advances in Computer Entertainment Technology, Salzburg, Austria, June 13 - 15, 2007.
- [4] Chavez, D.J., Schneider, I., and Powell, T. The social-psychology of a technology driven outdoor trend: Geocaching in the USA. Hawaii International Conference on Social Sciences, 2004 June 16-19, Honolulu, pp. 583-594.
- [5] Coulton P. How do we socialise mobile games? ,Game Developers Conference, San Francisco, USA, 23rd to 27th March 2009.
- [6] T. H'ollerer and S. Feiner. Mobile Augmented Reality. In H. Karimi and A. Hammad, editors, *Tele-geoinformatics: Location-Based Computing and Services*. Taylor and Francis Books Ltd., London, UK, 2004.
- [7] Jegers, K. Wiberg, M. Pervasive Gaming in the Everyday World, *IEEE Pervasive Computing*, vol. 5, no. 1, pp. 78-85, Jan.-Mar. 2006
- [8] Juul, J. *A Casual Revolution: Reinventing Video Games and Their Players*. Cambridge: MIT Press 2009.
- [9] Kelly, M. *Local Treasures: Geocaching across America*, Center for American Places, February 15, 2006.
- [10] Kent, S.L. *The Ultimate History of Video Games: From Pong to Pokemon-The Story Behind the Craze That Touched Our Lives and Changed the World*. Three Rivers Press, September 2001.
- [11] O'Hara, K. Understanding geocaching practices and motivations. In *Proceeding of the Twenty-Sixth Annual SIGCHI Conference on Human Factors in Computing Systems* (Florence, Italy, April 05 - 10, 2008). CHI '08. ACM, New York, NY, 1177-1186.
- [12] O'Hara, K., Grian, H., and Williams, J. 2008. Participation, collaboration and spectatorship in an alternate reality game. In *Proceedings of the 20th Australasian Conference on Computer-Human interaction: Designing For Habitus and Habitat* (Cairns, Australia, December 08 - 12, 2008). OZCHI '08, vol. 287.
- [13] Rashid, O., Mullins, I., Coulton, P., and Edwards, R. Extending cyberspace: location based games using cellular phones. *Comput. Entertain.* 4, 1 (Jan. 2006), 4.
- [14] Rashid, O., Bamford, W., Coulton, P., Edwards, R., and Scheible, J. PAC-LAN: mixed-reality gaming with RFID-enabled mobile phones. *Comput. Entertain.* 4, 4 Oct. 2006, 4.
- [15] Reitmayr, G. and Schmalstieg, D. Location based applications for mobile augmented reality. In *Proceedings of the Fourth Australasian User interface Conference on User interfaces 2003 - Volume 18* (Adelaide, Australia). R. Biddle and B. Thomas, Eds. ACM International Conference Proceeding Series, vol. 36. Australian Computer Society, Darlinghurst, Australia, 65-73.
- [16] Salen, K and Zimmerman, E. *Rules of Play: Game Design Fundamentals*, The MIT Press, October 2003. Ding, W. and Marchionini, G. 1997 *A Study on Video Browsing Strategies*. Technical Report. University of Maryland at College Park.
- [17] Terms derived from Wikipedia definitions