Mobile Game Prototyping with the Wizard of Oz

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Abstract

This paper introduces a case study from the GameSpace project workshop where seven participants were part of a Wizard of Oz experiment to design a compelling casual mobile multiplayer quiz game through iterative prototyping. The goal of the experiment was to implement authentic mobile use context into iterative prototyping process in a cost-effective and flexible manner through the use of Wizard of Oz method. The experiment was considered a success and the method proved to be useful in iterative prototyping process. This paper expands the literature considering iterative prototyping, mobile game design and the Wizard of Oz method.

KEYWORDS: Wizard of Oz, mobile games, prototyping, iterative process.

Introduction

Mobile gaming has been growing rapidly during the recent years and it has been estimated that there are over three billion mobile subscribers in the world [18]. Mobile phone as a gaming platform has also seen a significant development in the past few years and it can be said that it is the most wide-spread gaming platform in the world. However, there are indications that the mobile game development will face the same challenges as the traditional digital game development in the form of rising production costs [14]. This challenge can be approached with design research, which aims to produce feasible practices to improve the mobile game development process.

Prototyping early and often has been proved to be an efficient method for improving game design in the early development phase [4, 5, 12]. Mobile game development is fast by its nature as the development life-cycle is counted in months. Fast development life-cycle requires prototyping methods that are cost-effective and support iterative design. One promising prototyping method is the Wizard of Oz where the game system is operated by a human instead of software code.

GameSpace[1] project studies the design and evaluation of casual mobile multiplayer games. GameSpace workshops brought together the research team and the industry partners who are professionals in the field of mobile gaming. The 5th GameSpace workshop on January 2008 focused on medium-fidelity prototyping where three prototype experiments were conducted. This paper presents one of the experiments where a casual mobile multiplayer game was iteratively prototyped with the Wizard of Oz method. The experiment had emphasis on the authentic mobile use context.

The paper has the following structure: first the basics of prototyping are introduced and the mobile use context is explained briefly, then the related works are presented along with our Wizard of Oz experiment which was conducted in the GameSpace workshop, and finally the results and findings are discussed.

Prototyping Games

Prototyping is considered to be an effective working method in a game design process [4, 5, 12]. The word prototype originates from the Greek word *prōtotypon*, which is a neuter from the word *prōtotypos*, meaning archetypal[2]. There are several glossary definitions available from the web:

> *"A sample of a part or product fabricated in advance of production to allow demonstration, evaluation, or testing of the product."* 3

> *"A less formal experimental and experiential development process of a proposed application for the purpose of demonstrating some or all of its functional capabilities."* 4

> *"A working model created to demonstrate crucial aspects of a program without creating a fully detailed program."* 5

[1] http://gamelab.uta.fi/GameSpace
[2] http://www.merriam-webster.com/dictionary/prototype
[3] http://www.csa.com/discoveryguides/rapidman/gloss_f.php
[4] http://www.csumb.edu/site/x7101.xml
[5] http://www.e-learningguru.com/gloss.htm

"A quickly developed version of software which is probably incomplete or inefficient." 6

From the definitions we can see that a prototype is a quickly developed less formal sample from the final product which demonstrates some or all of its functional capabilities. Prototype can be used to demonstrate, evaluate or test the crucial aspects of the final product, without creating the final product itself.

Game designers use prototyping for various reasons. Friedl [5] has summarized the advantages of rapid prototyping. Prototyping reduces development time and cost, presents clear requirements, works as a creativity tool, produces early feedback from the target audience and the community, enhances communication inside the development team, and allows early balancing with the creative vision and technological preconditions.

Rapid prototyping is connected to iterative design process. Iterative game design is a design methodology based on cyclic events where the game features are constantly planned, implemented, tested and evaluated [5]. Rather than trying to develop the game with a "single shot", the game is developed piece-by-piece while constantly monitoring the process through iterations. Iterative design process is a widely recommended methodology for game development [2, 4, 5, 17].

Eric Todd, Senior Development Director for Maxis has stated that "words are fundementally a terrible way of communicating interactivity" when discussing about communicating design concepts [20]. Chris Hecker, a developer in the same company stated that "You can't argue with a prototype, if it's cool, people shut up". Gingold and Hecker consider that a prototype is a more valuable asset in game development than the design document, which is not interactive but boring, tedious to create and parse and there is no science behind it as one cannot test if the game described in the design document is actually fun to play [6].

Choosing the right prototyping method is crucial in game development [12]. Traditionally the different prototyping methods have been divided into two categories, low-fidelity and high-fidelity prototypes [9] or physical and software prototypes [4]. Friedl provides an explaining picture from the different methods [FIGURE 1].

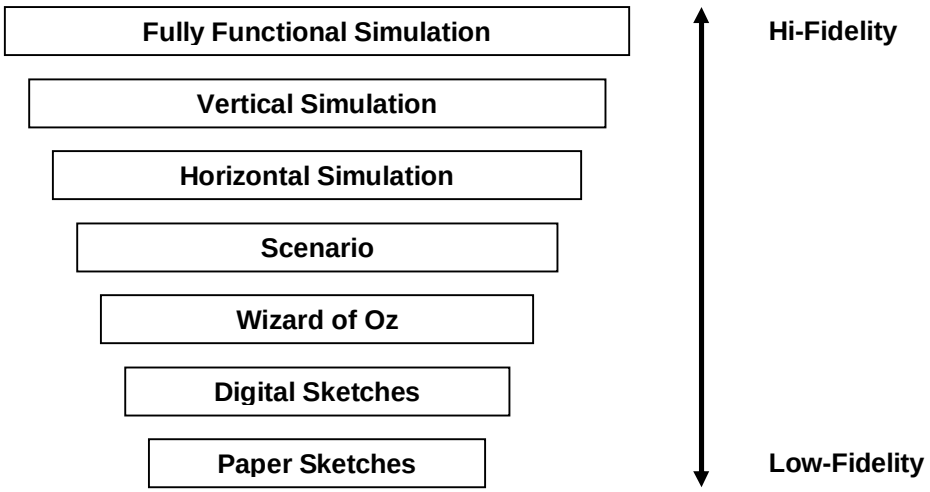

FIGURE 1. Prototyping methods according to Friedl [5].

[6] http://www.comsci.us/compiler/notes/ch09.html

Sketches can be used to quickly illustrate the core features of the game interface for example. Scenarios can be either physical (story boards etc.) or software demonstrations from an isolated feature or instance of the game. Horizontal simulations cover several or all game features in a low detail where as vertical simulation focuses on modelling one feature in higher detail. Wizard of Oz prototyping will be discussed later in this paper.

McCurdy et al. [15] present a different approach with five different dimensions of prototyping where each dimension can have a high or low fidelity equivalent. The five dimensions are:

1. Level of Visual Refinement
2. Breadth of Functionality
3. Depth of Functionality
4. Richness of Interactivity
5. Richness of Data Model

Level of visual refinement means how well the prototype mimics the visual stimuli of the game. This can vary from quickly drawn paper sketches to pixel-accurate digital representations from the game. Breadth and depth of functionality are the same as horizontal and vertical simulation explained above. Richness of interactivity refers to the level of interactivity between the player and the game. Sketches allow little or no interactivity where as software prototypes allow higher interactivity. Richness of data model means how much of the actual game data (levels, items, characters, weapons etc.) is portrayed by the prototype.

Prototype should be a falsiable system that makes a claim that can be tested. There must be a design question to be answered or a feature to be validated or disproved because otherwise the prototype is gratuitous [6]. Prototyping can be seen as a system with input and output, the design questions and the answers. Rapid prototyping allows seeing the failures in game design early, when it is still inexpensive to fix them.

This paper focuses on the Wizard of Oz method. The term (originally Oz paradigm) was created by Kelley [11] but the approach was first used by Gould et al. [7]. The term refers to the fantasy book *The Wonderful Wizard of Oz* written by Lyman Frank Baum in 1900. The book features a character known as the Wizard, who is actually an ordinary man working behind the curtains and pretending to be a powerful wizard. In the Wizard of Oz method, the user is made to believe that they are interacting with a system, while in reality the system is actually operated by a human – the wizard – who observes the user and interprets her commands. Wizard of Oz can be seen as a medium fidelity method [5] and it has been traditionally used in natural language interface experiments and intelligent agent design [1]. Friedl recognizes that the method's strengths are in evaluation without detailed programming, getting feedback about interactivity processes and that it is independent from the available technologies. For the weaknesses, Friedl lists the difficulty in setting up the experiment and that the method may require additional training for the wizard [5].

Related Work

There are several studies available concerning the use of Wizard of Oz method in both game design and evaluation. Anderson et al. [1] used the Wizard of Oz method to study an affective control interface. The experiment was used in early game design to study the relationship between user movements with various dolls and the movements of on-screen avatar. In their case, the users did not know that the avatar was actually controlled by a wizard, who intrepreted the user movements with the doll. Building several dolls with the necessary movement recognition sensors was considered to be waste of time; hence the Wizard of Oz method was used. The experiment was conducted with eight testees who were asked to perform several tasks such as gestures and movements with the dolls to control the on-screen avatar. The experiment was considered to be a success and the Wizard of Oz method was praised for its cost-efficiency. Setting up the experiment, performing the study and analysing the results took approximately two weeks [1].

Höysniemi et al. [8] extended the previous Wizard of Oz studies by showing that the method is feasible for prototyping perceptive action games despite the response delay caused by the wizard. The experiment consisted from a game utilizing computer vision where the on-screen avatar is controlled by the player's body movements. The Wizard of Oz experiment was carried out to study if the method is suitable for prototyping and evaluating perceptive action games and to discover what movements and gesture patterns the players use to control the game. Although producing game prototypes is rather easy with commercial multimedia authoring tools, building up an actual computer vision technology to interpret the body movements was considered to be too time consuming and laborious. With the Wizard of Oz method, the authors were able to create a movement corpus based on the players' actions and therefore getting a solid base for working with the actual computer vision software. The results of the experiment show that the tests were easy to set up and the method proved to be an invaluable tool for designing computer vision based perceptive action games [8].

Bernhaupt et al. [3] used the Wizard of Oz method to evaluate a location based pervasive mobile game. The game theme was capture the flag where the player's goal is to conquer and retain virtual flags which only exist on a digital map which represents the real world game area. As a high fidelity prototype was not possible due technical constraits, the in-game tracking was implemented with the Wizard of Oz method instead of actual GPS tracking. The game area consisted from a courtyard and a building with large glass windows and doors, thus allowing the wizard to track the players and feeding the players' tablet PC's with the necessary location information. 10 participants were attending the experiment and none of them realised that the tracking for the tablet PC's digital map was done by the wizard instead of actual software. The experiment was considered to be succesful and the method was praised to be a great solution to bypass the diffuculties of a complex technical implementation in an inexpensive and easy way [3].

Ollila et al. [12] explain several prototyping methods for pervasive games and present guidelines for selecting a right prototyping method which is depended on the purpose of the prototype, the type of the game, the type of the project and the phase of the project. Authors present several prototyping cases and one of them resembles closely to the Wizard of Oz method. Web forum was used to prototype an asynchronous slow update mobile multiplayer game. The game master (wizard)

updated the forum messages according to the players' actions which were sent via email. Unlike in traditional Wizard of Oz method, the players were aware that the system was controlled by a human. This is understandable as the focus was in in-house game design rather than user based evaluation. The particular game featured "WeGo" system where all the players decide their actions in parallel, which are then executed at the same time. The opposite system is "IGoYouGo" where the player's actions are executed in turns, like in chess for example. The authors do not present the results from the prototyping session, but address the need of several iterations to polish the gameplay [12].

The cases above show that the Wizard of Oz method is flexible as it has been used in various cases, both for evaluation and prototyping games. The method is considered to be cost-effective and it can be used to bypass technical constraits. It can also be used in iterative design process to polish the game design.

Mobile Game Use Context

Mobile phones and their use context set special requirements for gaming, which are not apparent with the traditional gaming platforms such as stationary personal computers or gaming consoles. Unlike stationary personal computers and gaming consoles, the mobile phone is a personal device that is usually carried along and accessible anywhere and anytime. Also, unlike portable gaming devices, the mobile phone's primary function is to act as a social tool and gaming is seen as a secondary function [10]. Mobile phones have also technical limitations considering their multimedia capabilities and physical interface, making them challenging platforms to develop games.

Mobile games can be played in very different contexts. Context in this case refers to the personal situation of the player, which includes but is not limited to time and space, available mental, physical, technological and social resources. As there are many variables considering the context, the situational context while playing can be anything from laying on softa at home, sitting in a bus, waiting in a queue or being bored at the workplace. According to Järvinen [10], mobile phones are used in spontaneous manner to kill time in short bursts and mobile games are designed from this perspective, supporting short play sessions through game design. It can be arqued that mobile gaming has close relevancy to casual gaming, which manifests itself as effortless, easy play [13]. Player enjoyment has been stated to be the single most important goal for a game [19] and it was seen beneficial to try to interweave the iterative prototyping process into authentic mobile use context, which would hopefully result into real gaming experiences.

Case Study: Opportunity!

Opportunity! is a SMS (Short Message Service, i.e mobile phone text message) based casual mobile multiplayer quiz game prototype which was studied in the 5th GameSpace workshop in January and February 2008. The workshop agenda was medium-fidelity prototyping with existing and easily accessible tools. *Opportunity!* was one of the three experiments featured in the workshop. The other two experiments included the use of Facebook in casual game prototyping and the use of web-based content creation software for a more complex mobile multiplayer game prototype. The workshop started in 29th January and the wrap-up session was held on 7th February. The experiments were executed between these dates, and the participants

were contributing to the workshop while doing their daily routines at work or at home.

The goal of the *Opportunity!* experiment was to evaluate if it is possible to implement authentic mobile use context into iterative prototyping process in a cost-effective and flexible manner through the use of Wizard of Oz method. The experiment ran for three days and there were seven participants, excluding the wizard. The participants knew that the game was operated by a wizard, as the experiment was artificially labeled as in-house game design process with the goal of creating a compelling casual mobile multiplayer game for the Nordic markets. The seven participants were professionals in the field of mobile gaming, representing the fields of game research, mobile game development and mobile operators.

Theme of *Opportunity!* was a quiz game where SMS technology were used for asking and answering the questions. Quiz game theme was selected due its casual nature. The wizard sent three to five quiz questions per day, which were to be answered by the participants. Additionally the participants could call for special features, which were designed through iterative process. These special features were activated via SMS as well. The game was played during business hours and the participants were consulted for feedback after each day. The participants were asked to give feedback for the game and for the prototyping method. Based on the feedback, the game was iterated twice, resulting into new features and more complex gameplay. The participants gave feedback via phone call interview, which was recorded for further analysis. Each participant was called at the evening of each day, resulting to 21 interviews and each lasting from 4 to 15 minutes.

The technological infrastructure of the game was very simple. The players used their own mobile phones and no additional equipment was needed on their behalf. The wizard used Nokia E70 mobile phone for the SMS communication which was attached to a desktop computer for fast and easy mass messaging. Fast and easy mass messaging was made possible with the Nokia PC Suite software. The game data (messages, scores etc.) was gathered into Excel spreadsheet, which worked also as a game event log. For the interviews, Symbian based phone call recording software was installed on the wizard's mobile phone so all the interviews were available for later analysis.

DAY 1

First day of the experiment introduced the game system to the players. The game had two features in the first day, the multiple choice questions and the leaderboard. The game featured three simple multiple choice questions with an answer timelimit from 2 to 10 minutes. Every participant had an equal chance to receive points by answering correctly from four possible options and the wizard announced the result from the answer to each participant individually. The participants answered the questions with their username and the answer option (a, b, c and d). The point prize for the questions varied depending on the difficulty of the question. At the end of the day, a leaderboard featuring everyone's score was sent to each participant. The first day ended with the interview phone calls.

The interviews revealed that the participants liked the game concept and the latency was not an issue. The participants told that game fit well into their daily actitivies at work and the short play sessions supported the mobile use context. There were not many suggestions how to make the game better, but one of them led to a new feature for the second day (see Sacrifice below). The participants were aware that the

answers could be easily acquired from Google or Wikipedia and hoped for harder questions because of this. The prototyping method did not receive spesific feedback yet but it was seen as an interesting experience.

Two new features were implemented based on the first day interviews, Duel and Sacrifice. The participants would be able to steal other participant score by dueling one-on-one and also sacrifice their own points in the hope of reducing more points from the participant of their choosing. Each of these features could be called for once during the second day. However, the participant could be targeted for these new features for multiple times during the second day. Gaming history was selected as the theme for the quiz and the questions were designed more carefully in hoping for harder questions which would lead to minimal abuse of Google or Wikipedia.

DAY 2

The second day started by explaining the new features via SMS. Four multiple choice questions were asked during the day and four participants missed a question due various reasons like meeting at the workplace or forgetting the mobile phone into a silent mode. The new features were used, but not as much as expected. Like on the first day, the day ended with a leaderboard update and interview phone calls.

Feedback revealed that although the new features were liked, they were not used due tactical reasons. Either the participant was in comfortable position on the leaderboard and did not want to risk losing point or the participant felt that she might not have a chance in a duel if the other participant has Google or Wikipedia open. All the participants agreed that the game got better due new features and only one participant hoped for another theme for the questions. This time there were several suggestions how to improve the game. The participants wanted more conflict between the participants, ability to catch-up with the top participants and also a mini-game was suggested. The participants were now confident that the prototyping method works and the direct phone call interviews at the end of the day were considered to be a good way to collect feedback.

Three new features were implemented based on the interviews. Mini-game was added where the participants guessed the final top three participants of the game and correct guessing would result into bonus points. The participants could also request a personal joker question which worked as a catch-up method for those who had left behind in the leaderboard. Lastly there was a special free-for-all question which would either double the participant’s score or result into a high penalty.

DAY 3

The third day started by introducing the new features. Due other work related reasons, there was a downtime in the game but the mini-game was online during this time. Five out of seven participants participated in the mini-game. One participant missed the whole day due having his mobile phone in a silent mode and the other missed the mini-game as she accidentaly deleted the instructions message. The other features were used as well, also the ones that were introduced on day two. During the day, all the participants received more status information from the game.

The interviews revealed that the game was considered a success and the method produced real gaming experiences in authentic mobile use context. The game was considered to be better than in the first two days due the new features. One participant gave a negative comment about the in-game status updates, which were

not always relevant to her. Overall the participants felt that the experiment was a success as the mobile use context and real gaming experiences were achieved, and the iterative prototyping method proved itself to be useful.

Discussion

Next we will discuss the findings and experiences considering the goal of the study which was to implement authentic mobile use context into iterative prototyping process in a cost-effective and flexible manner through the use of Wizard of Oz method.

The interviews revealed that all the participants considered the prototyping method to be useful and the experiment was considered as success. According to the participants, the authentic mobile use context was achieved as the participants played the game while doing their daily routines at work or home. The participants stated that the game got better after each iteration and they felt their feedback was taken into account when the new features were implemented into the game. The feedback interviews were considered to be fruitful, as everyone had an equal chance to give feedback before and after each iteration. As the prototyping session lasted three days, it gave time to think about different ideas on the background, while doing the daily routines. Negative comments were related to the game mechanics regarding the amount of informative text messages on the last experiment day and on the abuse of Google and Wikipedia when answering to the questions.

This experiment failed to reach the saturation point for the game design and for the burden of the wizard. It was speculated by the participants, that the game would have gone worse after few more days as there would have been too many features. Interestingly the number of different features at the end of the experiment was seven, following the classical cognitive memory rule of 7±2 [16]. It was expected that the wizard would have been overburdened with the task of managing the game system when more features were implemented as they were usually request type features where the initiative comes from the participant, not from the server. However, this was not the case and although the wizard's burden grew after the iterations, the game was still manageable by the wizard at the end and the participants stated that the lag was not an issue at any point of the game. There were few technical problems relating to the SMS delivery during the experiment, which was surprising when considering that the technological infrastructure was tried and true.

The advantage over physical low-fidelity prototyping is that the used method thrives towards authentic mobile use context and real game experience, which are not possible with a physical low-fidelity prototype. It can be arqued that ultimately game design is the design of experience and it is an advantage if the prototyping method takes this into account. Compared to high-fidelity software prototyping, the introduced method competes in cost-effectiveness and in flexibility. It is both easy and inexpensive to make alterations into the game design according to the received feedback from the users. Of course, this is also dependant on the game being developed. This Wizard of Oz experiment did not face the possible problems recognized by Friedl in the form of set up difficulties or extra training requirement for the wizard [5]. The experiment was rather easy to set up due low technological requirements and the base for the game was designed in two days. The wizard did not need any additional training except the knowledge on how the game system works.

The Wizard of Oz method proved to be useful approach in this medium-fidelity prototyping experiment. The method was able to capture the actual mobile use

context and provide authentic game experience. The method also proved to be cost-effective and flexible in iterative design process. As the usage of the method is also dependant from the game concept, further studies are needed to find out the characteristics for games that can be successfully prototyped with this method.

Conclusion

In this paper I presented a prototyping experiment conducted in the GameSpace project workshop. The goal of the experiment was to implement authentic mobile use context into iterative prototyping process in a cost-effective and flexible manner through the use of Wizard of Oz method. The experiment was considered a success and this paper expands the literature considering iterative prototyping, mobile game design and the Wizard of Oz method.

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