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1 INTRODUCTION

Social network games (SNG) have become increasingly popular as they attract millions of active users each month. Especially Facebook (FB) games are very popular. Games such as CityVille (1), FarmVille (2), FrontierVille (3) and Mafia Wars (4) to mention a few have especially attracted a lot of users. All games mentioned here are developed by Zynga (5) whose games seem to have particularly caught the eye of Facebook users (6).

Social games have been popular for a while especially with Massive multiplayer online role playing games (MMORPG's) such as World of Warcraft (7), Aion (8) and Rift (9), but it was not until the SNG's came into being that social gaming was able to acquire active players of the magnitude it is today.

Games on mobile phones have been popular for several years as well however, since Android Market (10) and App Store (11) came out and provided hundreds of thousands of games it has become even more popular to play on mobile phones. Games such as Angry Birds (12), Paper Toss (13) and Abduction (14) are some of the most popular ones. Using computers and consoles as an example it is a natural development that games on phones have become this popular. As with computers and consoles owning them was limited to a select number of people and playing games on them as well however, as computers and consoles grew more powerful it became a common household item. The same goes for mobile phones, when games came out for them it was limited to games such as Snake, Tetris or other simple games, but as phones grew more powerful it also became a common item and many users play games on them.

Additionally museums around the world have shown interest in all kinds of new technology to attract more visitors as it is not very popular to visit museums. PDA's, iPads and iPods as examples have been used to attract more visitors, but mostly without luck. One problem with these can be that they are often used as audio guides for visitors and thus they focus more on conveying information to the user rather than focus on creating a fun experience. Focusing more on giving the visitors a fun experience can potentially get visitors to keep coming back.

1.1 MOTIVATION

Museums are valuable as they teach people about our history, culture diversity, creativity through artwork and much more. It is important to have museums, but with a continuing decrease in visitor numbers museums get less funds and are in danger of getting closed down in time. The museums know this and a source at KUNSTEN, a Museum of Modern Art in Aalborg confirms that museums use much money to try and improve the experience of visits through different methods.

Art museums present modern and often technological exhibits to get attention, some even change the entire building in an attempt to make it unique and infamous. Museums try out many different solutions to get more visitors, but using the knowledge that SNG's and Smartphone games are so popular combining these with a museum experience have the potential of making the experience more fun and might attract more visitors.

Lars Ulrich at KUNSTEN has informed that when people visit the museum they almost always do it in a group, as a family, a couple, a class or other, it is not often that people visit individually. Thus sociality is a common factor in a museum visit. Using this information to create a more fun experience for the visitors might be a key factor in making it more popular to visits museums.

2 PROBLEM ANALYSIS

This section will give insight into the social FB games (FBG's) and why they are so popular, what intrigues users and how they work, based on concepts on designing FBG's explained by Järvinen (15). Smartphone games are analyzed as well, to find out what intrigues users about them and if there are certain guidelines to design such a game.

Analyzing why the museums are short of visitors as well as who visits is important in finding a target audience and is therefore covered. Furthermore, state of the art products at museums are covered to discover how museums are already attempting to get more visitors.

Based on all the information covered from the above a problem statement is expressed and the overall concept of the product is described in detail finishing with limitations for the prototype.

2.1 FACEBOOK GAMES

Online social networks (OSN's) have grown very popular over the last few years, for instance in UK by January 2011 social network sites were the most visited websites, exceeded only by search engines (16). Facebook, with its 500 million worldwide users, have had particular success and is the number one most used OSN. Ever since Facebook opened up to third party developers by releasing the Facebook API (17), companies such as Zynga, Electronic Arts(18) and Wooga(19) have developed numerous games, many with great success (6)(20).

Since the success of OSN's and also SNG's many have tried to offer explanations as to why they have received such great success. Bartle (21) for instance have identified that socializing is a reason as to why people play computer games and since SNG's by definition resides in preexisting social networks it is rational to assume that this is a factor.

One could assume that the popularity of a social network game depends on the genre of that game, however, they vary from turn-based games such as Texas HoldEm Poker (22) to asynchronous multiplayer games such as CityVille and FarmVille. As seen in figure 1 there are variations in UI design and graphics between some of the most popular Facebook games as well.

Figure 1 Four interfaces from four different Facebook games [1][2][3][4]

It is difficult to define SNG's based on styles or genres because of the variation these show, instead a common factor they all share is that they reside in Facebook's social network service (SNS). Compared to previous games both full-scale computer games and casual games the significant difference seems to be that SNG's resides in preexisting SNS's although SNG's might have more in common with casual games outside SNS's than they have with full-scale computer games.

A SNS such as Facebook offers unique services that have not been seen before in such magnitude. An example is viral marketing and publishing information about the game. Wohn et al (23) defined seven "types of uses" through testing the use patterns in SNG's. The seven types of uses are spending, avatar customization, publishing, space customization, mechanics, advancements and gifting.

Furthermore, they find through survey that there are four different types of reasons people play Facebook games, which are common ground, reciprocity, coping and passing time. Previously common ground and reciprocity was defined as one reason, "social expectations" by LaRose et al (24), however, Wohn et al (23) found that this was insufficient and split it into common ground and reciprocity.

The reciprocal reason to play SNG's fit the intent of the games well since most of the interaction in the games is based on asynchronous reciprocal interaction, helping your friends expecting them to help when one is in need of it, so basically it is based on an "I help you, you help me" principle. The common ground expectations for playing, however, is more based on the social expectation principle where one strives to build or increase shared experiences between friends and acquaintances.

Understanding those four reasons to playing SNG's give insight into how people play the games. Wohn et al (23) find correlations between the reasons that people play the games and which types of uses are common for those people. For instance people with reciprocal expectations spend time on customizing their space, do not spend much if any money on the game, they give gifts to other players expecting to receive some in return and they spend time publishing achievements and information about the game.

Publishing achievements and other information about game progress is one of the new additions provided by the SNS's that have not been used before, which might give a big contribution in terms of popularity of the games. It relates with word-of-mouth marketing, also known as viral marketing (25).

Publishing game status and achievements to ones "Wall" on FB are not only beneficial for the player in terms of showing status and requesting friends to join and help, but also beneficiary for game developers in terms of advertisement.

According to Wohn et al (23) publishing about one's game activity is closely related to how much time one spends on avatar- and space customization. This suggests that since the service of publishing is important in the games to request help and show game activity, that avatar and space customization are important factors to include in the games. This is backed up by most of the popular games such as CityVille, FarmVille and FrontierVille let the player customize.

Nevertheless, games in the top most played such as Texas HoldEm Poker and Mafia Wars do not let the user customize avatar and space, but are still very popular games. Moreover, other games such as Sims and numerous RPG's have previously let the users customize space, avatars or both without reaching the success rate of SNG's. This suggests that customizing and publishing might contribute a great deal as to why FBG's are so popular, but there are other factors at play as well.

Ellison et al (26) mention that during interviews with their test participants they discovered that the participants' in-game neighbors were very diverse, ranging from all ages, close family members and friends to complete strangers. User diversity might be a key factor in why FBG's have such success in terms of active daily users. Full-scale computer games on consoles, pc and mac are often targeted for a more narrow range of users, whereas FBG's potentially targets everyone already using FB.

Moreover, the FBG's are casual games which mean one does not have to spend hours at a time playing it, but can be limited to a few minutes. Limiting the time one needs to spend on playing the game each time makes it possible for more people to be able to play it, which makes the range of players more diverse across disciplines and age.

Järvinen (15) have analyzed and deconstructed FBG's and the game mechanics in order to create a framework one can use when designing FBG's. Before continuing game mechanics will be defined and used in accordance to this throughout the report. Järvinen bases his definition of game mechanics on Amy Jo Kim's definition (27) that "game mechanics are a collection of tools and systems that an interactive designer can use to make an experience more fun and compelling (27)". Kim goes on to talk about primary principles or "core mechanics" stating examples such as customization, feedback, points, collection and exchange. This corresponds somewhat with Salen's et al definition that "A core mechanic is the essential play activity players perform again and again in a game (28)" in essence, the actions players repeatedly perform.

Information about each of Kim's mentioned core mechanics is described here, for additional information and examples see Kim's slides (29)(30).

Examples of **Collecting** are items for inventories, friends and baseball cards. The example with friends as a collective can be seen in many FBG's, for instance in figure 2 a screenshot of FrontierVille is seen.

Figure 2 Screenshot from FrontierVille showing friends in marked area [5]

In the marked region of figure 2 the player's friends are seen, these are collected as a means of unlocking items, to get and to give help in order to earn more points, to give and receive gifts and earn virtual money. Thus friends become a collection and a sort of currency in the game.

Earning **Points** is an important game mechanic, but is not only limited to a simple scoring system, they can also be social. An example of social points is ratings, meaning that users can rate other users' profiles, pictures, videos and other. Earning points leads to leveling up which can unlock new items and actions and it leads to leaderboards which affect player behavior.

Feedback is important to help the user, but also "draws attention through movement & change (29)". In figure 2 there are numerous examples of feedback, arrows above animals to indicate that they need attending, "In Progress" sign indicate that task is a step closer to being solved and label above tree indicate the number of clicks remaining before tree is cut down. Each one of these feedbacks draws attention to them using change and movement. The label draws attention through change and "In Progress" draws attention by a moving sign next to the given task.

Exchange can be both explicit such as trading and implicit such as gifting or helping. Many FBG's use this core mechanic, in Zynga games for instance one can give gifts to friends or "Neighbors" either of good heart or by request. Helping Neighbors work in the same way, one can help them both with and without request from that person. Reciprocity is the conduct in most FBG's as one often expect Neighbors to return the favor one have provided.

Lastly **Customizing** is a core mechanic that is seen often in FBG's. In Zynga games one can often both customize ones avatar and environment. In FarmVille and FrontierVille one can customize ones placement of fields and buildings, but can also change colors and components of buildings and items.

These core mechanics will be taken into consideration in the design section

Based on Rao's (31) three qualities of playfulness, Physicality, Spontaneity and Inherent Sociability, Bogost's (32) game design feature, Asynchronicity and Järvinen's Narrativity, Järvinen define a design framework. Using this framework to analyze different SNG's Järvinen identifies some design patters that he states can be used to inspire design solutions (15). These design patterns can be seen in figure 3.

As mentioned these patterns are meant to inspire design solutions, it does not mean that one need to design all aspects, as it is not the individual aspects that are important, but the communication between them that make for a fun SNG (15).

Lastly Mayer (33) additionally says that "For users of these applications 'where am I at?' can be almost as important as 'what's next?' (33)" suggesting that self-expression, status and communication are just as crucial as the actual gameplay. Most if not all FBG's have these elements in common, supporting Mayer's statement.

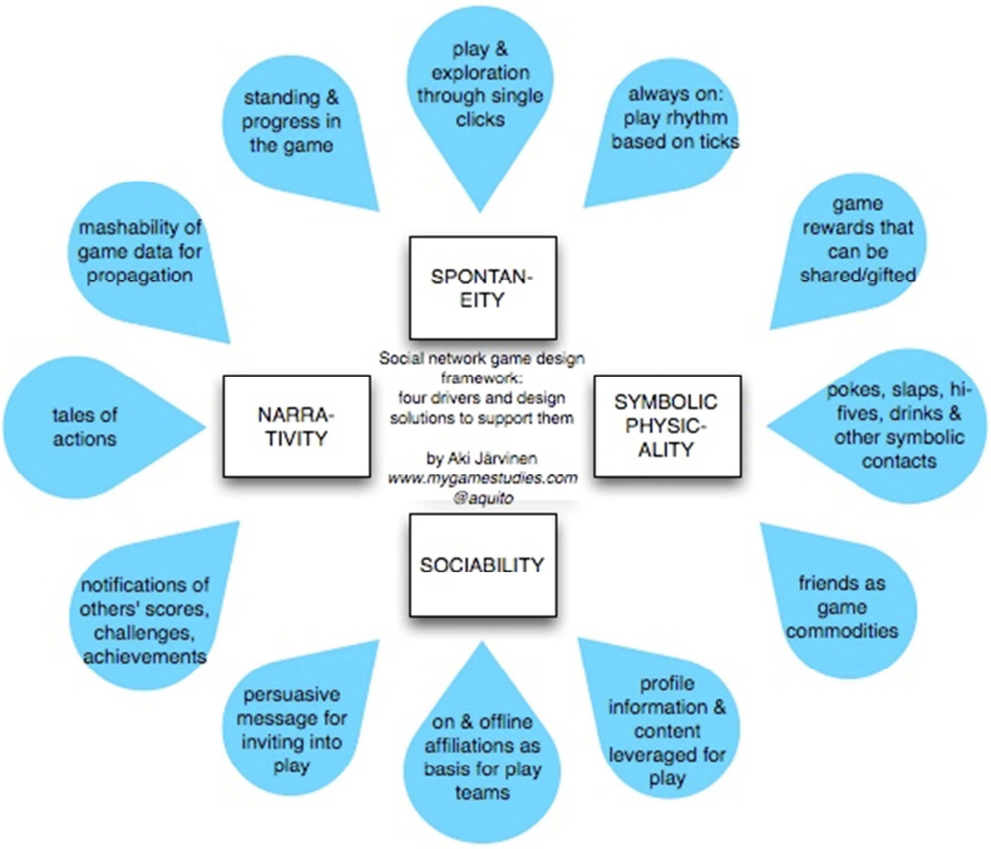

Figure 3 The design patterns from analyzed FBG's by Järvinen [6]

2.2 SMARTPHONE GAMES

A natural transition from FBG's to smartphone games is to examine the games on FB that have been made into smartphone apps as well. So far the only FBG's to smartphone games that have been found are a few of Zynga's titles (34). There are only two titles for Android and five for iPhone, however, the "Street Racing" game (35) for iPhone has been removed from FB.

Two titles are to some degree common for Android and iPhone, which are Mafia Wars and Zynga Poker. Yet the Mafia Wars titles are not exactly the same, not including the diversity in graphics, but the setting of the game. The Android Mafia Wars title (36) also has a subtitle "Atlantic City" which has exclusive tasks, rewards and other content. In Mafia Wars on FB one can travel to various cities and perform tasks specific to those cities and that is what the Android Mafia Wars is supposed to be, a new location one can travel to only on a smartphone. The iOS version however, is not a new city but a general translation of the game from FB to smartphone.

In general the games transformed to smartphone apps work the same way as on FB, for instance, the games are free to download and play both on Android and iOS smartphones. As on FB Zynga earns money by users paying for virtual currency or in case of Zynga poker, chips.

2.3 EXISTING PRODUCTS AT MUSEUMS

It is not very popular for young people to visit museums, based on visitor statistics gathered by Kulturarvsstyrelsen, a government agency for culture legacy (GACL), in Denmark (37). Young people being defined as in GACL's study, which is the 14 to 29yearolds. As the study shows it is the young people that visit museums the least, as can also be seen in figure 4. Especially art museums have a low number of visitors compared to other types of museums. This might be connected with the statements visitors gave to the two categories "suitability for children" and "possibility of participating actively", as these were given lowest grades in particular for art museums. One can argue that there might be a correlation between a low active participation at art museums and having a low number of young visitors.

Nevertheless, art museums include interactive art from time to time, likely to engage people more in the experience of visits. Examples of these interactive exhibitions are the Media Art Platform (MAP) experiment consisting of two elements "Hørbar" by Mogens Jacobsen, "Metasyn" by Carl Emil Carlsen and thirdly the Mariko Mori exhibition (38).

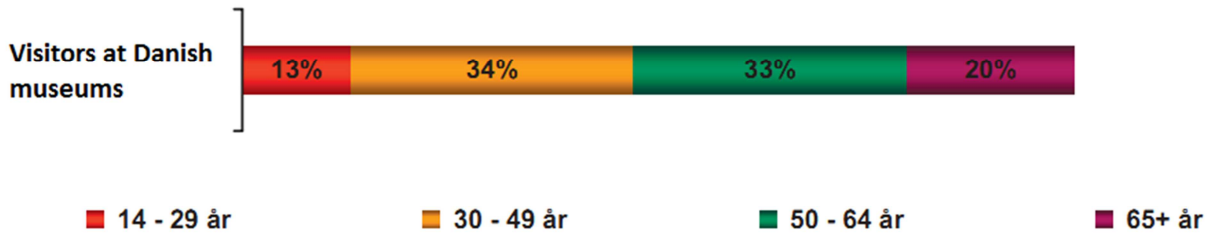

Figure 4 The age distribution of visitors at Danish museums [7]

Hørbar is soundart where sound has been “poured” into bottles and visitors can mix their own sound “drinks”. Metasyn is art that relies on metadata and represents the collection of artwork as a universe that gives the user an overview of the information about artwork. The Mariko Mori exhibition consisted of three rooms with different interaction methods, for instance, one consisted of a few stair steps and a screen. Pictures on the screen would change depending on movement on the stair steps and number of people on the stairs. From these examples it is clear that art museums are already including interactive artwork to make the experience more fun for visitors, however, they still need to show much of the more traditional art such as paintings and sculptures, therefore an interaction method one can perform with traditional artwork is needed as well. This way visitors can actively participate in every aspect of the museum instead of only the exhibitions made to be interacted with.

Visiting a museum is to a great extent a social event as most visit as part of a group and nearly half visits with family, friends or acquaintances (37). Hence letting the visitors participate actively during their visit through social interaction might make the experience more fun for the young people, and as a result might increase the number of visitors in that age group.

A project that already combines a museum with a social factor is myMuseum by Goins, which is a resource management game (39). An FB application let you create your own gallery consisting of paintings and decorations (40). The idea is that players each have a small room, an amount of virtual money and their friends or specifically “neighbors”, as they are also called in Zynga’s games. The players are able to buy art either in the form of paintings or “décor’s”, meaning everything from frames to sculptures. Players need to buy artwork and put out exhibitions to attract visitors to one’s gallery. The success rate in terms of visitor number and satisfaction among them is determined by the correlation of the exhibitions, from color similarities and artists to history. Goins also state that it is especially the learning principle that is in focus, as many museums have a very passive approach to this, meaning that the learning process is mostly visitors reading text about artwork. By using myMuseum players need to know about the artwork in order to create a better gallery, attracting more visitors and ultimately more points.

For myMuseum a supporting website has been made that is an important addition as this website contains information about all the artwork available in myMuseum. Through this website one can learn about the artwork and learn about how to create a better gallery. When a piece of art have been selected one can not only read more about it, but see related paintings and the degree of which these match the selected painting, thereby aiding the player in acquiring matching artwork.

Goins mention that museums are already using SNS’s such as FB, however, mostly to create their own page to give updates on events and upload images in an attempt to reach FB users, especially teenagers and young adults (39).

Some museums have audio guides on mp3 players or similar devices which they can deal out to visitors. These devices have some advantages for both the museums and the visitors, as the museums does not have to use an employee as guide and the visitors can appreciate the exhibitions in their own pace. However, there are some disadvantages using audio guides as well. Often it isolates the visitors individually as they have to walk with earplugs and it deprives the visitors of the possibility of asking a guide questions regarding the art.

Shelley Bernstein at the Brooklyn Museum have taken the guides a step further and made a personalized tour of the museum using smartphones (41). When visitors start the smartphone app they first have to enter their preferences regarding art and the app will suggest art they might want to see. Bernstein says that her hope is that visitors will use it as a treasure hunt and that "I want it to become an aid, literally a guide to go find stuff, not a multimedia tour that's just television-watching (41)". One of the key ideas that make this product different from the other guides is also that each tour is different from the rest as it depends entirely on the preferences of the individual visitor. Furthermore, it have the possibility of making each visit different as one may not enter the exact same data every time one visit the museum, and therefore each visit feels personalized.

Although this improves on the experience compared to regular audio guides the focus is still on the individual and not tailored for group visits.

Klopfer et al (42) attempted to make museum visits more fun and engaging by creating a product that encouraged sociality and collaboration between visitors. Specifically they targeted families or children from 5 to 16yearolds and their parents. When a family enters the museum they are handed a PDA with a game on it and then they have to participate in a scavenger hunt. Each member of the group needs to assume a role such as for instance a detective and try to find clues and interview virtual characters that appear on the device each time they enter a new room at the museum. An example of the interface as well as a family collaborating to collect clues can be seen in figure 5.

Klopfer et al find out that their test participants were pleased that the interaction engaged them in the exhibits and made the experience of learning more fun. Furthermore, the participants were pleased that they were encouraged to interact with each other as well.

As seen from these examples the museums are already proposing different solutions, not only to make the experience more fun, but also attract more visitors to the museums. The products at museums discussed here were mostly targeted for teenagers and young adults, which correlates with the Danish GACL study (37) mentioned earlier, that the 14 to 29yearolds are least likely to visit art museums in particular. Additionally, if one could attract more young visitors it would automatically attract older audiences, such as parents, as well. From GACL's study it was also deducted that visitors primarily come as groups therefore it would be natural to include this in a concept for museums to attract more visitors. Especially in the case of Klopfer et al (42) the sociality factor was included in the concept design whereas in case of the Brooklyn Museum personalized tour it was not a key factor (41).

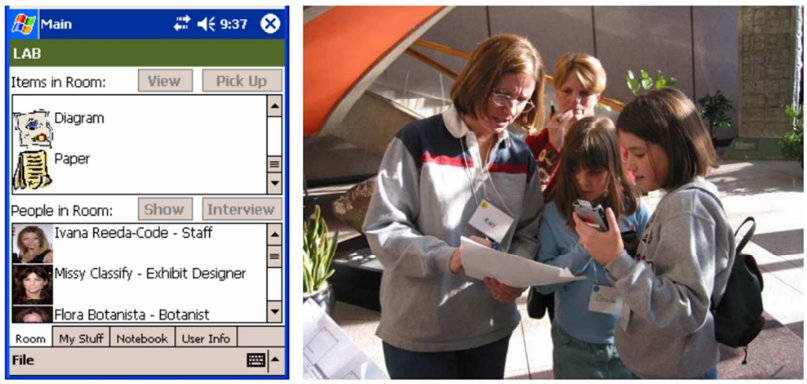

Figure 5 Interface from Mystery at the museum and a family using the product [8]

2.4 TARGET AUDIENCE

Museums in general are not very popular as kulturministeriet or “the ministry of culture” in Denmark have published in a study of habits called “kulturvaneundersøgelsen” (43) from 2004. According to the study it is particularly art museums that cannot attract many visitors as 31% of all adults and 34% of the 7 – 15year olds never visits art museums or art galleries. Although numbers such as this exist there are not many studies on why people do not visit museums, mainly studies concentrate on why people do visit. Nevertheless, according to (44) a focus group study was made in 1997 by the national museum concentrating on the non-users’ needs and wishes.

In general the non-users expressed their expectations of museums as being bleak/dreary, “school-ish”, a place with long halls, lots of old items without association to each other, that you should be quiet and that you cannot touch anything. Moreover, the participants expressed that in order for a visit to interest them was that they should be able to “bring something back home”, “tell about the visit to acquaintances” and more vivid exhibits. Using a social network such as Facebook can give the visitors the possibility to tell about their visits both while they are there and afterwards. Using FB can be a good tool to reach teenagers, young adults and even preteens. FB have an older than 13yearold policy before one can create a profile, however, a survey performed by EU Kids Online (45) in April 2011 show that many have a profile even though they are below the permitted age. In Denmark alone a little over 40% of the 9 to 12yearolds have their own FB profile and more than 80% of the 13 to 16yearolds have a profile. Based on this the target audience is not restricted to 13yearolds or above. Since almost half of the preteens are also using FB it is important to design for them as well.

The source at KUNSTEN confirms that it is this audience in particular that do not visit museums unless as part of a school-, family trip or other. He also states that most often people will not visit museums after they have turned 18yearsold if they have not become interested in museums before this age. Although this last statement might be correct it is not to say that they will not visit as part of a family trip after they have turned 18, therefore it would be a good idea to include this age group in the target audience as well, since a fun experience at a museum might get them interested from that point on.

Previously it was mentioned that from statistics gathered by GACL , it is the 14 to 29yearolds who visit art museums the least . This age group is the lowest age group in the gathered data, but it is assumed that lower age groups only visit museums as part of a school- or family trip and therefore rarely visits as well. Based on the popularity of FB and smartphones and that many preteens have FB profiles as well the target audience for this product is the 11 to 29yearolds. The target audience does not go below 11yearolds because it is assumed that the lower age the children have the lesser profiles they have on FB. Unfortunately there are no statistics on the number of children on FB on a year to year basis, so this is only an assumption.

2.5 PROBLEM STATEMENT

Based on the information gathered in the problem analysis it seems that social games are very popular but that museums are not. Both FBG’s and games on smartphones are played by many and combining these two platforms has potential to be a great game as well. Furthermore, having such a game at a

museum might make the experience much more fun and enjoyable, which could ultimately lead to more visitors. Therefore the problem state for this project is the following.

“Using underlying concepts of social games on Facebook in a smartphone game, how can the experience of a visit at KUNSTEN Museum of Modern Art be improved through social interaction between 11 to 29yearold visitors?”

In order to develop a product that can give a solution to this problem a concept has to be developed.

2.6 CONCEPT

This section will describe the concept developed for this project and will end with some limitations for a prototype.

In short the concept is to have museum visitors find and answer questions about artwork to acquire points in a social game on a smartphone, using the same mechanics used in FB games. The mechanics are the ones mentioned by Kim and Järvinen. When visitors arrive at the museum they will either be handed a smartphone or use their own to play the game on.

The game on the smartphone is called “Neighbor Wars”. The title Neighbor Wars is inspired by the neighbors one can add in Zynga games and the “Wars” is a reference to those games developed by Zynga. The idea of the game is that one has an environment, such as a lawn, a house, some trees and an avatar and one has to irritate one’s fictive neighbor as much as possible. This will sometimes require the aid of a friend, especially if the neighbor attacks back. As briefly mentioned the neighbor one has to irritate is a fictive one, as sociality should be encouraged. To irritate the neighbor one need new ideas on how this can be achieved and this is the link to the museum. In order to get creative ideas to irritate ones neighbor, one has to look for new ideas at the museum. These ideas will from this point on be referred to as idea-items to not cause confusion when referencing to ideas. An example of an idea-item is a loudspeaker that lets the user play loud music and irritates the neighbor, which earns points.

This Neighbor Wars concept has the potential of being fun for the visitors as irritating others in cartoons and movies have been popular for many years. Examples are the Home Alone movies, still aired every Christmas, as people still find them funny.

In order to find idea-items at the museum one has to search for them by paintings and other artwork and answer questions related to the piece of art at hand. Including this in the concept also has the advantage of conveying information to the visitors.

Additionally an issue that has been mentioned is that when visitors use devices for audio guides or other it tends to isolate them and have them look at the device more than the museum exhibits. Therefore the users will have to physically interact with one another to for instance help each other. It has become popular to mix physical interaction with games, as seen with Nintendo Wii and Microsoft Kinect. For the physical interaction Bump (46) is used in this concept for general interaction between visitors. In other cases specific physical interactions is used if it has to mimic certain real world interaction.

The game is connected to FB and one can add FB friends to the game, send gifts and can post progress onto one's Wall on FB. This can arouse interest for one's friends and ultimately get them to visit the museum.

2.6.1 PROTOTYPE LIMITATION

As mentioned there are some limitations for the prototype. For one the link between FB and the application will not be implemented in the prototype. Furthermore, the game will be developed for android only because of licenses needed for iOS development. A more thorough review of this can be read in the hi-fi prototype chapter.

Lastly not all the design drivers and core mechanics is designed for, which is more thoroughly described in the design chapter.

3 PROTOTYPE DESIGN

The design section has been divided into two main headlines, which are the first- and second iteration of design. The first iteration concerns most of the design as it describes the core mechanics included in Neighbor Wars, the interface design and ends up with a low-fidelity prototype evaluation. Based on the results from the lo-fi evaluation the design will undergo its second iteration and the changes in design will be described in that section. After the second design iteration the high-fidelity prototype is implemented and evaluation in the next chapter.

FIRST ITERATION

The first design iteration concerns the basis of the design and will end with a lo-fi evaluation based on the design created here.

CORE MECHANICS

As previously mentioned Kim (27) defined five core mechanics based on interaction design, which Järvinen (15) brought further and defined five design drivers in creating SNG's which were Rao's (31) symbolic physicality, spontaneity, inherent sociability, Bogost's (32) asynchronicity and finally narrativity. For the prototype not all the drivers are present equally as some require more work than others. Furthermore, the first design iteration will be evaluated using a paper-based lo-fi prototype, thus some of the design drivers cannot be implemented however, they can be designed.

Rao says that FBG's often use symbolic ways to add physical depth to interactions and uses examples such as "poke", "drink beer" and "hug". As Järvinen describes "these features essentially try to add 'human warmth' of actual physicality to the non-physical online space (15)". Symbolic physicality correlates with a question answered by Amitt Mahajan, the lead developer of FarmVille, that to design FBG's that have a wide appeal and good retention, you need to pick themes and concepts people can relate to (47). Mahajan uses the example from FarmVille that how one grows plants is common knowledge.

SYMBOLIC PHYSICALITY

Symbolic physicality will be present in Neighbor Wars in two ways, which is using idea-items and physical interaction with the device. One can argue that the physical interactions such as hammering are not a symbolic physicality as it involves of an actual physical interaction. Nevertheless, it is being treated as such since the physical interaction in this case is to hit non-physical existing virtual objects and therefore is a symbolic gesture. Using idea-items are symbolic physical gestures as one can relate to the physical interaction when for instance shooting marbles at the neighbor with a slingshot. All the different idea-items are designed in a way that have a symbolic physicality and can be seen in [appendix: lofi/prototype/ideaItems]. Lastly physicality will be present by players being able to help their friends and send them gifts.

SPONTANEITY

Spontaneity works by simplifying actions into one-click solutions, which encourages using functions more often. Symbolic physicality often use spontaneity as well, an example is the one-click poke functionality. As Järvinen mention spontaneity is closely related to accessibility and familiarity by using themes users are familiar with, which Mahajan also stated was an important factor in their games. It eliminates the need for explanation of elements when the themes are familiar. In Neighbor Wars the theme is familiar both from the everyday life as many have neighbors and it is directly familiar from especially cartoons and books. In the concept spontaneity will be encouraged for inviting friends, sharing bonuses and gifting friends, however, these will not be present in the prototype.

INHERENT SOCIABILITY

Inherent sociability improves gameplay, creates playfulness and encourages actions through social situations. Rao lists examples such as fast rewards for player actions, abundance of positive feedback and there should not be negative consequences for experimentation. As helping one another is essential in Neighbor Wars, it is important to design sociability for these interactions. Social context to create a social game is an essential part of sociability as well, which is part of Neighbor Wars by having access to ones friends and by sharing information with ones friends.

NARRATIVITY

Regarding narrativity Järvinen states that it is essential that player actions and play results not only are communicated by also stylized into a certain narrative throughout the social network (15). For instance using FarmVille as an example when one asks another player for help it is posted on their Wall using the theme of FarmVille as a basis. On FB many of the games regularly give notifications or news feeds about the games which both let the users keep playing and awakes curiosity of those who are not yet playing. Also Järvinen states that it is important to make a distinction between communicating the player progress and player results. Narrativity will be very much present in the concept much in the same way as the examples used for narrativity, however, it will not be present in the prototype outside of the game.

ASYNCHRONICITY

Asynchronicity concerns how multiple users play the game, which in case of FBG's are most often in sequences as opposed to synchronous (15). For instance when one help a neighbor in FarmVille, that neighbor cannot see one even though he or she is playing at the same time. Updating the site however, let the neighbor see one helping. Asynchronicity is important for FBG's as they are casual games and is often being played in coffee breaks and pauses, which does not necessarily fit everyone else's breaks. In case of Neighbor Wars though, it does not make sense to make it asynchronous as users visit the museums together and help one another at the museum and thus asynchronicity will not be designed for.

INTERFACE DESIGN

When designing interfaces there are many principles to be followed and thought through during the development. Many are designed for by default from experiencing design of similar products, some are analyzed for and some have to follow specific guidelines for those products. For instance if one is to design an application for android or iOS devices there are specific guidelines that need to be followed (48)(49), however, concerning games there does not seem to be any certain rules as to how it should be structured or look like. There are some suggestions such as not placing banners and advertisement in a way that ruins the gameplay, however, not specific guidelines.

Despite not having specific guidelines the same games are different depending on the platform. Previously in the smartphone games section Mafia Wars was mentioned, and the design of these games are very different from each other and the version on FB as can be seen in figure 6.

The android and FB version are much more alike in terms of color and general look, whereas the iOS and FB version are much more alike in terms of detail, but does not have similar colors at all. Zynga Poker is much more comparable across platforms, nevertheless it shows that the game developers do not follow official patterns provided by either Apple nor Google.

In the iOS developer library Apple states that it is important how well the appearance of the application integrates with its function (49). They go on to write that “A user interface that is unattractive, convoluted, or illogical can make even a great application seem like a chore to use. But a beautiful, intuitive, compelling user interface enhances an application’s functionality and inspires a positive emotional attachment in users (49)”. Basically the quote states that one should attempt to make the app aesthetically pleasing, however, still have its appearance fit with its function.

This quote correlates with Donald A. Norman’s book “Emotional Design” which discusses that attractive products are better than unattractive (50). As Norman writes it is not only that people prefer attractive products, but it is also that they actually work better. Therefore the aesthetical attractiveness of the interface is very important and hereby also the graphic appearance.

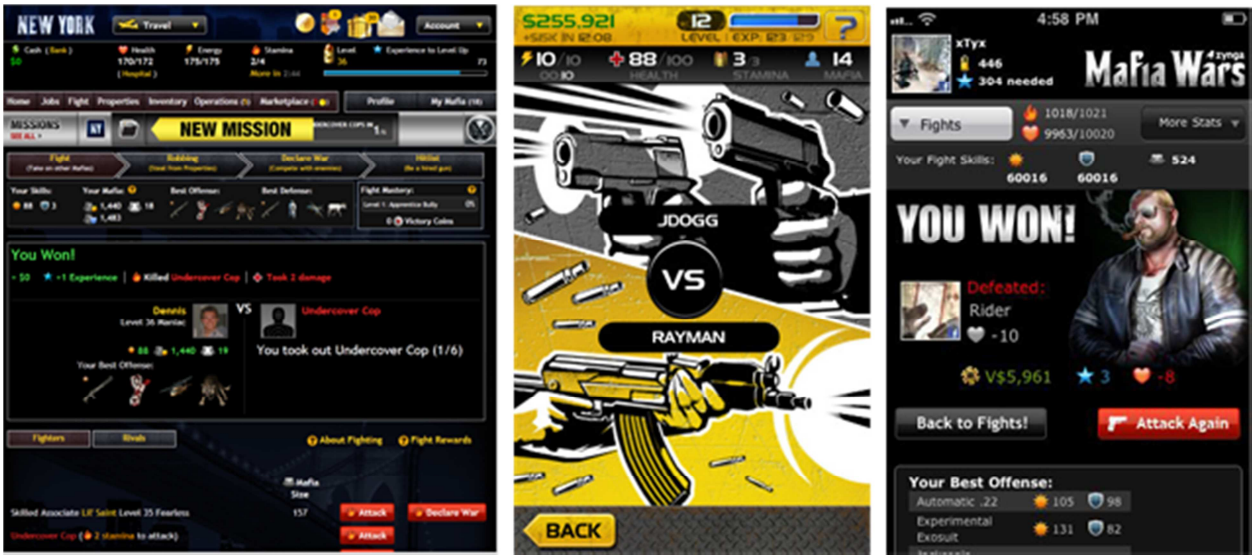

Figure 6 Mafia Wars interfaces on different platforms. From left to right the platform is Facebook, iOS and Android [4][9][10]

From Apple's and Norman's statements one can deduce that the graphic appearance is important not only in terms of the impression of the product, but also of perceived usability. In the lo-fi prototype this is not as crucial as in the hi-fi prototype as the lo-fi prototype is paper-based and therefore users can see that it is an early prototype and therefore does not focus much on the graphics. However, in the hi-fi prototype a possibility is that they focus too much on the graphics if it is not aesthetically pleasing. Attempting to combine sketching with a hi-fi prototype might resolve this problem though. Hence the graphics for the hi-fi prototype is displaying a sketch-like appearance as can be seen in the appendix [appendix: hifi].

An element that is common in the FBG's is their ongoing tasks, as one never run out of tasks to do and many of them take days to finish. One always have several tasks at a time to perform, which is an important factor in terms of getting users to keep coming back as one always have tasks in progress. Using the Zynga games as an example these tasks are often shown in the left side of the screen as seen in figure 2. Having tasks such as this might get the users to keep coming back and visit the museum, and hence this is considered in the design as well.

The idea-items that users find at the museum are randomly distributed when users answer a question correctly. All the idea-items in the first iteration can be found in the appendix [appendix: lofi]. They are randomly distributed as art museums change their artwork often as they do not have the space for all their pieces art and have to shift between them from time to time. Therefore if one wants to let the users receive idea-items that are somehow connected with the artwork a database with all the artwork and the idea-item for that piece of art is needed.

As seen in figure 7 the menus have been placed at the bottom of the screen. This is because this is often seen in games both on smartphones and FBG's. Normally in full-scale computer- and casual games the menu buttons are placed at the bottom of the screen and status such as energy level is placed at the top. However, as has already been mentioned there are not such guidelines when it comes to smartphone games. For instance in the smartphone game Armored Strike (51) the menu is at the top of the screen and nothing is placed at the bottom. Energy levels are showed by a bar above ones vehicle. In Angry Birds there is almost no HUD at all, only a pause button in the top left corner and a score in the top right corner. Lastly in Jewels (52) the score is showed in the bottom left part of the screen. This all adds to the statement by Apple that one should design the interface as it best fit the function. In case of Neighbor Wars this means placing the menu at the bottom which also reference the FBG's.

There are many considerations to be made when one has to design an interface, some of which will be examined here and how these have been used on Neighbor Wars. Lidwell et al (53) describe many design principles one need to consider when designing. Some of these principles are more important than others some of which will be examined in this section.

ICONIC REPRESENTATION

In general icons are hard to design as it can vary from person to person how an icon is understood. There are different categories of icons, some are only recognizable in certain cultures whereas others

depict real world examples one can relate to no matter which culture one is from. Only the category used is examined here which is the “example” category. The example category use images that are commonly associated with an action, for instance the icon for an airport is not an image of an airport, but of a plane and the icon for restaurant is a fork and a knife.

Similarly in Neighbor Wars the icons used are exemplified versions of an action as seen in figure 7. There are four different kinds of icons. The meaning from left to right is “buy traps and items”, “searched and found artwork”, “friend” and “add friend”.

The “buy traps and items” icon is depicted as crossing swords to convey that one uses this button to enter a menu where one can buy protective items against an attacking neighbor. This menu was inspired by the customizing factor, as one can buy items both as decorations and for functional use in many FBG’s.

The magnifying glass is widely used indicating that one is searching and therefore it correlates with the search and find function it has in Neighbor Wars.

The two friend icons are depicted as a person recognizable from other places. Examples are the Messenger logo, Skype friend icon and Facebook friends icon, as they all depict either one or several outlines of people.

The last icon used is a box, just like the friend icons, but with a question mark in the middle, which depicts that one can add more friends. This icon does not follow the example category, but follow the convention from FBG’s such as CityVille instead.

MIMICRY

Mimicry is “the act of copying properties of familiar objects (53)”. For instance “surface mimicry” is often used when design software icons, with examples such as “recycle bin”, “documents” and “folder”. When mimicking familiar objects it also implies how that object is to be used otherwise the icon will lose its purpose. In case of the folder, its purpose is both in reality and in software to contain files, whereas the function of the recycle bin is to contain trash one has no use for anymore.

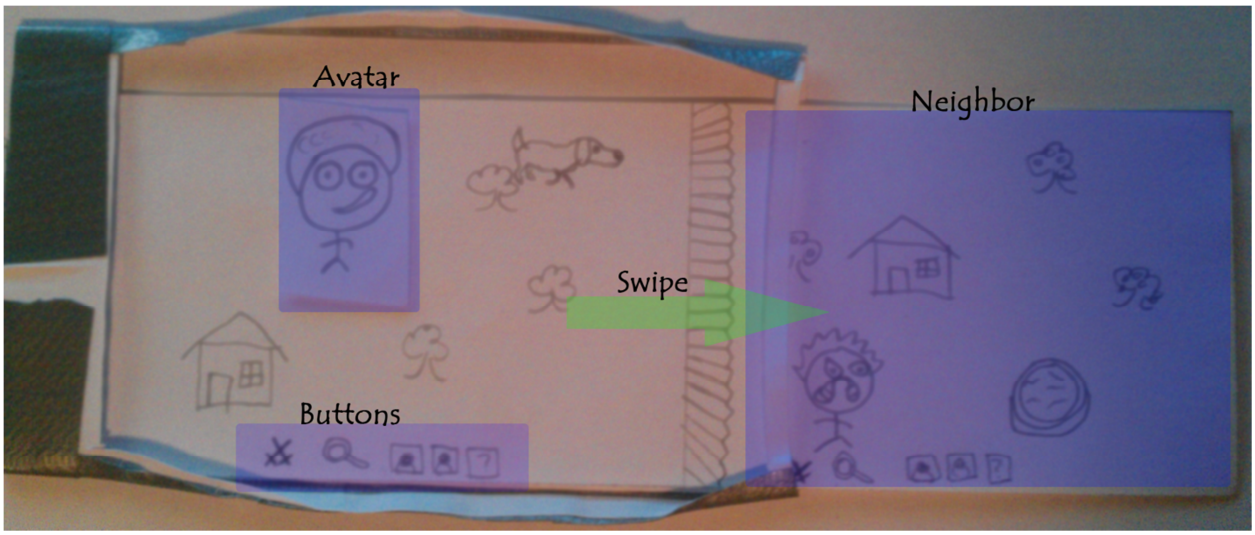

Figure 7 The paper-based lo-fi depiction of the interface with added graphics to show Buttons, Avatar, Neighbor and the swipe functionality

In case of Neighbor Wars the apple trees are good examples of mimicry. The purpose of apple trees is to grow apples, thus one expect that interacting with the apple tree means either plucking the apples or tending the tree. The magnifying glass can also be used as an example, as a magnifying glass is used to look closer at an object, to look for clues, in this case the clues are in the form of finding idea-items and answer a question in order to receive and use an idea-item.

CONSISTENCY

Consistency is when similar elements are communicated in similar ways. It helps users learn new things quickly as the application use previously known metaphors, functions or is consistent with its own depiction throughout the application. Examples are the universal “close” button depicted by an “x” in the corner of a window and the “save” button being an old floppy disc.

The floppy disc is a good example as this icon was used because it illustrated one making a backup on a portable storing device. However, this icon is no longer recognizable for the younger generation as they have neither used nor seen one in many cases. It would make much more sense to use an icon for an external hard drive or a USB stick to depict a “save” action. Nonetheless, the floppy disc icon is still widely used because too many people have grown accustomed to this icon. Consistency is used in Neighbor Wars by using the universal close button and the friend buttons explained in icon representation.

CONFIRMATION

Confirmation is almost always used in various programs and games to prevent involuntary actions such as pressing a wrong button. This design principle is particularly crucial to have in mind when designing applications for devices such as smartphones as some buttons on them will close an application. Many smartphones have a “back” or “home” button which will normally close an application immediately

unless a confirmation of this action is issued. A user might involuntarily press the back button and if no confirmation is issued, this will eventually irritate the user. Confirmations can also be overused, which will also irritate the user to some degree, a confirmation needs to be unexpected and uncommon. Examples of confirmation overuse that have been used many times are the notifications in Windows Vista and Windows 7 that are issued every time a program is being installed, uninstalled, updated or other. These are no longer unexpected or uncommon as they are issued too often.

In Neighbor Wars confirmation should be issued as well, when for instance a user involuntarily presses the back or home button on the smartphones. However, due to an issue during implementation this was not realized for the hi-fi prototype which is described in the hi-fi prototype chapter.

PHYSICAL INTERFACE

In the concept there are several different kinds of physical interactions based on which task is at hand. As mentioned in the concept section Bump is used as a basis for general help to and from friends. Additionally there will be other physical interactions that are more directly related to the task at hand. For instance, one can irritate one's neighbor by playing loud music, using drums. The physical interaction for this task is to shake the device as if one is holding a drumstick. Furthermore, when one have to fend off a rat infestation brought on by the neighbor one have to do the same gesture, but its meaning is to convey hammering in this context.

DESIGN EVALUATION

The lo-fi test was performed on groups of three. Each participant was given a hand-drawn paper-based smartphone mockup as seen in figure 7. One of the big strengths of a hand-drawn prototype is that it allows for quick altering, if needed, during a test. Two tests were performed on the lo-fi prototype, a user test and an expert test. According to Sharp et al (54) user- and expert tests complements each other greatly. This section will divided into these two test categories. Lastly an outline of the most important results from both tests are summarized and taken further to the second iteration section.

USER TEST

The user test consisted of a circa 15minute test at KUNSTEN, Museum of Modern Art in Aalborg followed by a 15minute focus group meeting. Participants got a short introduction to Neighbor Wars and its rules and were given information about how the test was to be performed. The participants were not given a structured amount of tasks they needed to perform, instead they were given an overall task of finding idea-items at KUNSTEN and use them to irritate their virtual neighbor.

PURPOSE OF USER TEST

The purpose of user test is to see how users react to the concept of playing a game on a smartphone at a museum and to see if it intrigues users in a way that makes the experience of a museum visit more fun. Furthermore, before the test begins the participants will be given the choice of performing the test

separate or as a group, which can add to the statement that museum visits are prone to be social events.

Metaphors used for icons, buttons and the likes had to be understandable for the test participants and not disrupt their flow when using the prototype and will therefore be observed for.

When participants searched for and found idea-items it was interesting to see how they used these idea-items. Thus the interaction of this was observed and was not specified beforehand. When participants for instance used the loudspeaker idea-item, to play loud music, to aggravate the neighbor it was interesting to observe how exactly this was used against the neighbor. Letting the test participants use the interaction that is natural to them, can help designing the interaction for the hi-fi prototype.

When participants had tried the physical interaction between each other a couple of times it should not disrupt the flow of the game, but contribute to it from that point on. The participants' opinions on the physical interaction were addressed during an interview after the test.

TEST PARTICIPANTS

The user test was to be performed on two groups of three participants however, one participant did not show up and thus one group consisted only of two participants, whereas the test leader acted as a third friend when needed during the test.

In all the lo-fi user test was performed on five participants, four of these were within the age limit the fifth participant was in his mid-thirties. The reason for this was that two test participants were each asked to bring two friends for testing. Since sociality was a crucial factor in the test, as it seems that museum visits are social event, test participant had to be acquainted beforehand. The problem with this approach is as that it is not controlled completely who are going to participate. They were asked to bring two friends each within the parameters given such as age and one of each gender. Although each asked participant tried to meet those criteria one group consisted only of two participants of each gender and one exceeded the age limit. There can be some issues with having a participant that does not represent the target audience correctly as the interactions performed by this participant might not fit the interactions by a participant inside the age limit. Additionally this participant might not perceive the experience in the same matter as the rest of the participants, therefore this is kept in mind when discussing the results.

The other group consisted entirely of women, meaning that the test was performed on four women and 1 man. This can also have an effect on the results also in terms of experience and the interactions performed by the participants. Even though the gender ratio fits with the statistics performed by GACL stating that women visit art museums more often than men (37), it still has to be considered in the results.

Lastly the age distribution does not depict the target audience completely as the test participants are all above 20. For instance, the questions the participants need to answer might be fun for one age group but not to another. Therefore the results gained from this might not be accurate as to the representation of the entire target audience.

DATA GATHERING

A video camera recorded both the test and the focus group interview afterwards. The camera was handled by one person and another acted as the test leader. The focus group interviews were very small and only the participants in each group were present during the interviews.

The reason for interviewing the test participants in a group was to get discussions going, in order to get as much information as possible and attempt to get information that might not have been thought of prior to the interview. There were questions for the interviews, but they were simple and had to be elaborated through discussion. As mentioned by Sharp et al (54) one of the benefits of using focus group interviews is that it allows for diverse issues to be raised, which might have been missed otherwise. At this point in the development of the product it is important that as many aspects of the prototype as possible, are covered. Thus a focus group interview is ideal to use to gather this type of information. All the tasks, interview questions, pictures of lo-fi prototype and video recordings for the lo-fi test can be found in [appendix: lofi].

RESULTS FROM USER TEST

The interaction with the interface was different not from participant to participant, but from group to group, suggesting that the “natural” interaction of the individual depends on the interaction of the group, or maybe decided by the first participant in that group. To specify the interaction examined here is when an idea-item have been found and it is to be used against the neighbor. The first group, consisting of two participants, interacted first by selecting the idea-item and then selecting the object of which the idea-item was to be applied. It is consistent with many games as one often selects the desired object and then selects the area one wants the object to be placed.

Nonetheless, the second group of three participants did not interact this way. During the test they would select the idea-item and then verbally tell the test leader the action they wanted to do, but did not physically do it. Being more persistent in telling them this during the test could have solved this issue. Still, the interaction from the first two participants is consistent with similar interactions in similar situations. Thus it is arguable that using such interaction will likely be recognizable for most users.

One of the icons was in general misunderstood, which was the crossed swords icon. As mentioned in the design this icon is shaped like two crossing swords as it should symbolize protection from the neighbor. However, when one of the participants was attacked, with an idea-item, by the neighbor and she needed to dispose of this threat she pressed the crossing sword icon, suggesting that this icon meant something else to her. Since this did not solve the problem she then selected the idea-item she was attacked with. The last interaction, by pressing the idea-item, consisted with the interactions performed by the rest of the participants, when put in similar situations.

The Friend icons were used without much hesitation by all the participants. This is not surprising since the icons are highly recognizable from Messenger and Skype as is mentioned in the design section. When participants needed the help of a friend they pressed one of the icons, and when they needed the help of two they pressed two of them.

A third button they could press was the magnifying glass icon. The idea was that they should press this button whenever they found idea-items at the museum, however, it was not used by the participants. Several reasons can have influenced this. First the idea-items were physically available by the paintings, which suggested that they should pick these up whenever they found them, which they did. However, the idea of it was that they should press the magnifying glass button to tell the app they had found idea-items. In the concept the idea is that a QR tag will be by each artwork that has idea-items. Thus using them in the lo-fi test might have made the participants use the magnifying glass button more. In this scenario the test leader could have carried all idea-items, and QR tags could have been by each painting, and whenever participants found QR tags they could pretend to scan these and test leader would provide questions and idea-items. This solution would have required the participants to use the button and thereby show if they found the icon to be accurate. Therefore it cannot be said with certainty if this icon was accurate to their understanding of the found idea-item action.

After the first focus group interview it was discovered that after the camera had been turned off the participants began a much more natural discussion. Therefore after the official question in the second focus group interview was discussed the cameraman simulated shutting down the video camera. The discussion occurring after the simulated shutdown was however, mostly revolved around discussing the overall concept and ideas to further development provided by the participants. For instance they suggested that it need not only be limited to museums, but can be applied in other environments as well, especially since the theme of the game is not directly linked to the museum. One of the participants also asked if one was able to get help from a friend at another time, suggesting asynchronicity, which indicates that asynchronicity might have to be taken into consideration after all.

During the interview after simulated shutdown the test leader asks if a game such as this fit their age, to which one replies “I don’t think you can ever get too old to play something like this”. One of the participants adds to this, that a fun element might be the necessary factor to get her to visit a museum, but it should be a solution that would make her laugh, such as Neighbor Wars.

A purpose of this test was to see if the test participants were able to use help combined with physical interaction, without disrupting their flow. Realizing that this interaction is not a usual interaction in such a product it was not required that the interaction should be flawless the first couple of times. It was, however, a criteria that after trying the physical interaction a couple of times that it would not disrupt flow, but seem as a natural part of the game, measured through ease of use and reaction. For instance, if the participant need to stop and think what to do each time a physical interaction is needed, the flow is disrupted every time, but if the participant reacts without hesitation the participant is still in flow.

This did not seem to be a problem for the participants, after a few physical interactions the participants began to perform without hesitation. Sometimes the participants would begin an interaction before the test leader could introduce them to another physical interaction, such as for instance the shake gesture for drumming and hammering. This suggests that it did not disrupt their flow once they learned how to interact. One element that is not clear from this test is if they would understand this from the device itself, as the test leader gestured the action when informing the participants about the physical interactions. When designing the hi-fi prototype different icons should be tested for bump and shake to see if they understand these. It was observed that a participant in one of the groups did not hold the smartphone properly, as she did not hold the device in an upright position when bumping phones, this

might be because she did not understand what to do, or simply it could be that she did not want to drop any of the pieces of paper from the lo-fi prototype.

After the participants had tested long enough to try all the kinds of idea-items the test leader asked both groups if they wanted to stop or continue finding the rest of the idea-items, both groups continued. This suggests that they either found the game or the art exhibition interesting. The participants in the first group replied both that they could see more of the exhibition and try more idea-items, which indicate that they found both interesting, however, afterwards they both said that art exhibitions are not very interesting to them. The other group also mentioned that art exhibitions are not interesting to them unless there are special exhibitions. Hence, it implies that they found the game interesting or fun and therefore wanted to continue. The issue whether participants found it fun is supported by observing the groups as they were testing. Often when participants found idea-items they would laugh and talk to each other about what they got. During the interviews the participants mentioned that they found it fun, however, this can be to make please the test leader and may not be completely honest, although it seems to be supported through observing their actions during the test.

An additional observation was that participants were social during the test. Each group had the opportunity to test individually, but all chose to test in groups, which adds to the statement that it is a social event to visit museums. Although museums visits might be social events it seems that it is somewhat restricted to social interaction between visiting friends. This is based on asking the participants afterwards if they would have interacted with other visitors at the museum, as only one participant stated that interacting with other visitors is a desired possibility.

During the focus group interviews it became clear that the questions asked were too easy and should be more related to the actual painting and not what can be read on the labels. Even though there were not test participants below 20yearsold it can be assumed that this might also be more fun for a younger age group. Additionally it forces the visitors to look at the actual artwork as opposed to just read the labels beside the artwork. Having users answer questions about the actual artwork both make the questions harder to answer and might also make it more fun.

In the beginning of the test one of the users asked if they neighbor one should irritate was one of the friends one came to the museum with. However, since the concept was supposed to encourage sociality it would not be a good idea to have them irritate each other with idea-items as this would not encourage sociality and helping one another, as it would mostly encourage competition. It would make the experience a lot more individual, which is not wanted. However, one of the participants was still in doubt of the neighbor being fictional or an actual friend, which suggests that it should be more obvious that the neighbor is fictional. One way of solving this is through graphics, as is done in for instance FrontierVille. One starts with a fictional friend depicted in the menu as a cartoon character whereas friends have their FB profile picture and moving the cursor on top of their avatar display their names. In the same way graphics can help solve this problem by using the FB profile pictures.

EXPERT TEST

The expert test was performed for as long as the participants deemed fit, and were allowed to comment on as much as they wanted both good and bad. The expert lo-fi test was not performed at KUNSTEN as

the lo-fi prototype is, at this point, more about the interface and the apparent usability of it that is important than it is the experience, as the prototype is lo-fi the real experience cannot be tested for yet. In the expert test the participants sat down and tried the prototype and commented on the design. They were given

It should be noted that according to Sharp et al one should remember to use pointers and feedback from experts with care (54). Specifically Sharp et al states “Care is needed in using experts because designers are sometimes led astray by findings from expert evaluations that turn out not to be as accurate as they seemed at first (54)”. Therefore the results gathered from the expert test have to be handled with care and should if possible be compared with the findings from the user test to cross reference results.

PURPOSE OF EXPERT TEST

The purpose of the expert test was to get feedback on the interface design and especially the icons were tested for. It was needed to get direct information about the icons and whether or not they understood them and if they did not, did they have any suggestions for changes. In general information about the interface and the physical interaction had to be tested with the experts.

The advantage of using experts for testing is that they can provide not only changes by using their expert knowledge, but also automatically act as users during testing and thereby discover further usability issues.

TEST PARTICIPANTS

In the expert test the participants were experts with five years of experience in interactive interfaces, specifically 10th semester Medialogy students. This test was performed on three participants. This was deemed fit due to the amount of information gathered from the user test. The participants had not prior knowledge of the application.

DATA GATHERING

During the expert test data was gathered by recording audio. The participants had to speak aloud during the test to record the information, which they were asked beforehand. Unlike the user test the expert test was not divided into a test and an interview as questions was asked during the test. This is because experts are often good at speaking aloud during tests as they know this method to be valuable.

RESULTS FROM EXPERT TEST

Based on the results from the expert test the icons need another iteration of design. Previously the icon design was based how similar icon shave been used in other software solutions, however, it seems that they do not fit this solution well enough. The problem icons can be two things, a) that the icon does not depict its action well enough and b) the hand-drawn icon sketch has not been sketched well enough and is hard to recognize. Either can be the problem or both, although it seems that the crossing sword icon in particular is not understood correctly. All participants in the expert test misunderstood this icon,

therefore especially this icon need to be further designed. From the test it was also learned that there might be too many icons at the screen as it is now or at least there should not have to be anymore. This can be solved by removing two of the friend icons leaving only one button for friends. This solution has been done by Zynga for their FarmVille solution as well, as can be seen on app store (55).

One of the participants mentioned that it is obvious in the lo-fi test that one can move the screen to the side, to visit the fictive neighbor because one can swipe the paper from side to side as seen in figure 7. Other than that there are no indicators to show that one can swipe the screen to the side. The participant suggests that in the hi-fi version one should be able to see that there is something behind the picket fence.

Bumping the phones together was not an interaction that the participants wanted to do with their phones. Two of the participants did not have prior knowledge to this app and therefore their natural response to the bump action was to shake their phone close to the other instead of actually bumping. The first participant was concerned for the phone and did not want to break it. The second participant thought that technically it was the same to the phone either way, and he would just give it a short shake instead of bumping, Nintendo Wii was used as an example. In the beginning of using a Wii controller one uses big arm movements when for instance bowling, but as the game gets familiar one make the simplest gesture to achieve the same goal and does not concern oneself with making the gesture look as if one is playing real bowling. The third participant was already familiar with the bump application and did not have a problem with bumping the phones. In case of the bump interaction it is not crucial that one is doing the exact right interaction, but it is crucial for the product that users help each other, which is by physical interaction.

In the lo-fi prototype there is no inventory to store the idea-items in as they need to be used immediately, which the participants commented on. Two participants mentioned directly that they would have liked an inventory to store the idea-items. This implies that participants would like to collect idea-items and store them for further use, either to be able to use the idea-items multiple times or chose the time they want to use them. Either way it might be a good idea to include an inventory.

Lastly one of the participants recommended that the misunderstood icons could be tested by creating a number of different icons for each function and asking users to pick the one they find best. This approach will be used in the second iteration of design.

SUMMARY OF RESULTS

Some of the results from both tests overlap which makes these design changes crucial, for instance the icons need to be redesigned and made more logical to the users. An approach was recommended in the expert test to create a number of icons for one function and test which one people would use.

It is especially the crossing sword icon, but also the magnifying glass icon caused some trouble, hence these two icons will be redesigned. The friend icons were generally understood, however, one of the friend icons and the “add friend” icon should be removed to have lesser buttons in the interface.

Lastly there were especially some issues with the bump interaction, some did not understand how to perform this interaction, which suggests that explanation of this is very important by use of pictures, text or both. Therefore this is considered in the second iteration of design.

SECOND ITERATION

The second iteration section describes the revised design based on the results from the lo-fi test.

It was especially the icons that needed further designing. For that six different icons was created for the found idea-item button, which can be seen in figure 8.

Figure 8 was put on FB with a short explanation of the concept and were asked to press the button they thought fit the function best which, in short, is that one have found an idea to irritate ones neighbor with. Additionally the experts from the lo-fi test were asked to press an icon and comment on their choice. In general there was a big difference in the answers provided by the FB friends and the experts. From the 20 answers from FB, 17 of them answered C the light bulb, whereas the experts all answered D the QR tag. The FB people might not all have known what a QR tag is and therefore not recognized the image even though the part of scanning barcodes was included in the explanation of the concept. The FB answers seem to put weight on the items being ideas. The reason for the expert answers were all that with a QR tag as an icon it will be highly logical for participants to press this button when a QR tag have been found next to a piece of art, however, as they stated it is not a very pretty icon. The best solution to this distinction might be to combine the icons and create one with both the QR tag and a light bulb on it, risking the icon to be too complex and confusing.

The menu button with the former crossing sword icon needed to be changed as well. However, another menu item that needed to be included was an inventory. The reason as to why the buy traps and items menu was present in the lo-fi was to accommodate that customization is popular. Nonetheless, this menu might not make much sense in this product as one is already collecting items around the museum. Therefore the buy items menu is substituted for an inventory menu where one can store the idea-items collected at the museum. Then an icon needs to be made for an inventory menu. The same approach as before was taken, where five different icons were made for an inventory menu, see the appendix for reference [appendix: design]. This was put on FB at a different time and therefore the participants were mostly ones who did not answer the first icon test. Additionally the 19 participants who answered this test did not agree as much as with the former test. Eight participants answered C, six answered E and

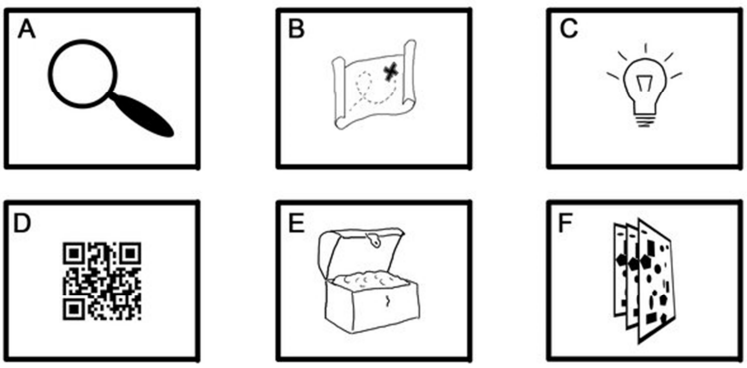

Figure 8 Different suggestions for the same icon "found an idea"

five answered A. One can argue that C and E are closely related as C show a chest of drawers and E depicts a single drawer. Since the majority answered C and that it is closely related to E the chest of drawers is chosen as the icon for inventory.

Before the idea-items were randomly given when a question was correctly answered, however, it might be more user friendly and fun to have the idea-items fit with the artwork. For instance, a painting of a chicken might give the idea-item that one can throw eggs at the neighbor's house. In addition the questions should be more related to the actual painting that it should be read at the labels beside the artworks. Thus questions will be tailored to the artworks themselves, which also encourage users to look at and think about the paintings. It might also be more fun for the users if they can try to guess which idea-items they will get from the motif of a certain painting.

In the user test it was added that asynchronicity might be a factor as well, however, it will not be considered until the further development section as it is not relevant to testing the hi-fi prototype at this point in the project.

Lastly it was stated in the expert test that there should be some sort of indicator that one can visit the neighbor. This indicator could simply be to show some graphics beyond the picket fence such as for instance half a tree.

4 HI-FI PROTOTYPE

Having completed the lo-fi test and revised the design based on those results the hi-fi prototype was developed and tested. The hi-fi prototype was developed in Google's App Inventor (AI) (56) described further in the development section. When selecting a development tool such as AI there are bound to be some workarounds, which are discussed before the evaluation of the hi-fi prototype. Project files for App Inventor, Neighbor_Wars.apk for a smartphone and all hi-fi test material can be found in the appendix [appendix: hifi].

4.1 PROTOTYPE DEVELOPMENT

When developing an early hi-fi prototype it is important to focus on the essentials of the prototype. Therefore the development tool used to create the prototype has to be selected with care, as the wrong tool might have the developer use too much time on workarounds and programming everything from the bottom. The lower level the programming language is the more time it will often take to develop, but it has the big advantage of letting the developer be in control. Contrary a high level development tool can be used to quickly make prototypes, but they are generally more closed and the developer is not as much in control.

In terms of developing a Neighbor Wars prototype developing for android was chosen as the smartphones using this are used by many, are generally cheaper than iOS devices and it does not require a license to develop for android. Four development tools were considered for the android prototype which were android's native language Java (57), Flash (58), Corona (59) and AI. Without getting into too much detail about each tool the four are narrowed into one. They all had each of their advantages and disadvantages. Flash is easy to create graphics in quickly, but it runs heavy on the devices and risks lagging. Corona can compile to both android and iOS from the same code, however, this is not relevant at this stage of the development and that will most likely require some workarounds. AI is easy to use, extremely quick to create a prototype in, but is closed and is only out in beta, which can cause errors. Java is easy to use, has a lot of support for android development, but it still requires some time to develop prototypes and apply graphics. Weighing the advantages and disadvantages of the development tools AI was chosen because development is very fast. When developing the final product one would, however, chose to do it in its native Java language to have more control. Furthermore, it allows for quick implementation of a QR reader, which would have taken much more time to create in the other development tools, but in AI one can implement a QR reader in minutes. However, since AI is a beta version and is closed some workarounds occurred.

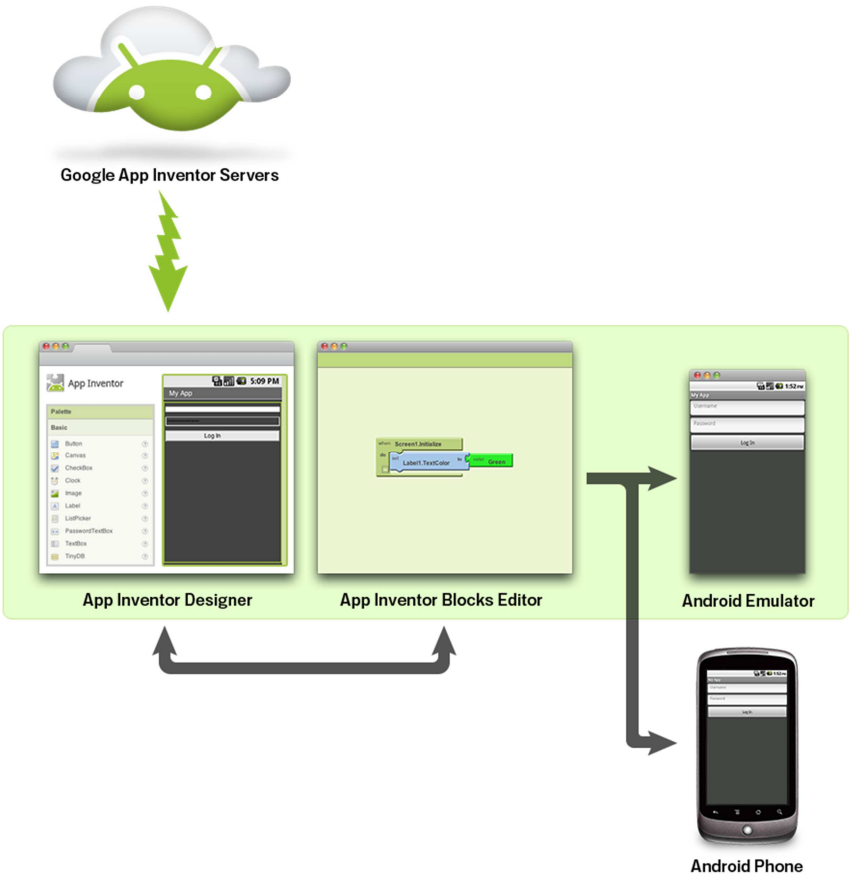

Figure 9 An overview of the elements in App Inventor such as App Designer and Blocks Editor [11]

4.1.1 APP INVENTOR

AI is described here to give insight into how it is built and how one works with it, but if you the reader are already familiar with App Inventor it is not necessary to read this section. When developing in AI one does not develop on local files, but on the cloud. In order to develop one needs to sign in to one's Google account and access AI through that and develop on servers. An advantage of this is that one's project is constantly being backed up. A disadvantage is that one cannot develop offline, however, if the computer goes offline during development, one can save a local .zip project file which can be uploaded to one's account when one is online again.

Another unorthodox element of AI is that developing is not based on writing code, but instead through a blocks editor. Basically it is for android programming, what EyesWeb (60) is for OpenCV (61). AI is being marketed as a development tool for non-programmers, and simple but still powerful. In addition, developing prototypes often use a certain pattern, which is create a hi-fi prototype so that it works, test it and now that it is known how the product should be built delete all the old code and start developing. This means that hi-fi prototypes are often used for gaining knowledge about the code structure of the product, and if this is the case then AI is a good development tool for a hi-fi prototype, as the blocks editor one uses gives a graphic overview of the program. An example of the blocks editor can be seen in figure 9.

As seen in figure 9 the blocks are simple and can only fit into specific elements, for instance, the color block can be fitted into a variable, but cannot stand by its own. When using the blocks editor one can connect an android phone to it and whenever one changes the code, through blocks, it is updated live on the device. This makes developing even easier as one does not need to compile after changes.

Figure 9 also show that the blocks editor is just one part of it, the other is the AI designer where one can add components to one's app such as for instance the QR reader, and then one can specify the component behavior in the blocks editor.

Although one does not have local files and that AI is not able to export source code that can be important into Java, one can export project source files, which can be imported by another user into his or her Google account. These project source files along with a Readme file and a Neighbor_Wars.apk file, installable on smartphone devices with android 2.2 or higher can be found in the appendix [appendix: hifi].

4.1.2 WORKAROUNDS

Although it is quick and easy to create android apps in AI it is also closed and therefore workarounds will occur from time to time. Some of the issues that occurred and the workarounds of these issues will be described here.

The first issue that was encountered was that AI does not support multiple screens as default, meaning that one only have a single screen to fit an app into. This is one of the problems with using a beta version, as this is currently being developed by Google. When designing an app such as Neighbor Wars, there are almost always multiple screens, such as menus and feedback screens, one can either swipe between or shift by using buttons. Since AI does not support sliding, as they do not support multiple screens the solution had to include pressing of buttons. The solution to this issue was simple, however, time consuming, still it was not so time consuming that it made the choice to use AI a bad one. The solution was to change the screens' visibility parameter to true or false.

Every time the "CanvasFalseProcedure" is called it sets all screens' visibility parameter to false. When using it in the close button for instance, it calls the procedure and then sets the desired screen to true visibility. In the way that AI works this has to be done for all the close buttons for the different screens, as the close buttons are specific for each screen. Specifically they are not buttons but sprites as button cannot be inserted into a canvas, but only in its own row and column. Issues such as this are workable, but illustrate the problems of developing with a closed tool.

Another workaround had to do with helping friends, which was a crucial part of the social element. The initial idea was that a request was sent to a database every time a user needed help from a friend. When a user had found and received an idea-item and selected it to use it, a notification should popup at a friend's device. In order for this to be happen the friend's device needs to listen for requests continuously. This was done by adding a timer that listened for a tag on the database every 5seconds, if there was no request with the correct tag it would not return any value. When a matching tag was

found the friend had to help by shaking the smartphone for several seconds, getting a vibration when done. When a friend had helped by shaking the device it would send a new tag to the database which was listened for by the friend who needed help, and if this person had been shaking as well, he would be able to use the idea-item.

Although this was the desired solution, it did not work in AI because of the way it is structured, some blocks are locked and cannot be inserted into for instance if sentences which was required for this to work. One can implement controls such as if, but not in the way needed here. Therefore a workaround had to be performed, which ended with a Wizard of Oz (WoZ) approach. The WoZ approach worked by still letting some of the idea-items be unusable unless they get “help” which in this case is determined by how much time they shake their own device. An example can be that is shown when an idea-item is selected which one needs help for. Really what happens is that a feedback screen is given where it says that in order to use this idea-item one need to ask a friend nearby for help and they have to shake their devices simultaneously for 5 to 10seconds, but actually only the one trying to use the idea-item needs to shake his phone. However, this WoZ solution can make them think that they need the help, even though they do not. Despite it not working technically the overall idea of the interaction, the sociality element, is still in focus. It did however, add to the amount of text needed, which can affect the usability.

The last workaround mentioned concerns answering questions. For every question there is a multiple choice answer, which was the idea from the beginning. Normally when a multiple choice question is asked one would typically answer by using radio buttons. Nevertheless, radio buttons are not available in AI, only checkboxes are available or simply writing the answer. Both introduces design issues as checkboxes are always recognized as being able to check more than one option and writing the answer is not as seamless as pressing a button. Since there were problems with both solutions one was chosen, but was kept in mind during testing. The solution that was chosen was that users had to write either “a”, “b” or “c” to answer the questions. In addition problems with this solution would be changed during the next iteration nonetheless, when developing the final product in Java.

Furthermore, another issue that has to be taken into account is that the default buttons on smartphones are not available for handling in AI. Examples are the home and back buttons on smartphones, which means that if the home button is pressed the application will minimize and if the back button is pressed the application will close with giving confirmation beforehand. This is a problem that might occur during the physical interactions and might cause irritation for the participants, which as to be taken into account.

There may have been many workarounds in AI, but still the development of the hi-fi prototype was done faster than it would have been in one of the other choices. Furthermore, there are always workarounds no matter which development tool one chooses to use.

4.2 PROJECT EVALUATION

As with the Design Evaluation the Project Evaluation is in two categories, a user test and a expert test. The user test was performed on four groups of two as there were two android smartphones available for testing, additionally no more is need to evaluate the degree of sociality implemented in the hi-fi

prototype. Screenshot examples are used in this chapter to evaluate some of the issues discussed, but for a complete look at the hi-fi prototype see the appendix [appendix: hifi].

Additionally it is noteworthy that all the language in the prototype is in Danish as the test participants might not all understand English.

Both in the user- and expert test two HTC smartphones were used, specifically one HTC Wildfire and one HTC Desire HD. During the test one was running android version 2.2 and the other 2.3.

4.2.1 USER TEST

The user tests were about 20 to 30minutes of testing followed by an AttrakDiff (62) questionnaire. Before testing began each test participant was handed an information sheet that informed him or her briefly of the concept and the test process in order to give every participant the same amount of information beforehand.

4.2.1.1 PURPOSE OF USER TEST

The purpose of this test is essentially to find out if the participants found the experience enjoyable and in continuation of this an enjoyable visit to the museum. Additionally as it was attempted to use some of the core mechanics from FBG's in the game the degree to which these are present in the game should be examined as well. However, one cannot ask users directly to which degree they thought symbolic physicality was present in the game. It needs to be more subtle than that in attempt to prevent misunderstandings and confusion. Thus AttrakDiff is used to evaluate both the attractiveness of the product and to which degree the core mechanics are present in the game. For instance, if the product is highly attractive and the core mechanics are very much present it can be argued that it correlates.

The benefit of using AttrakDiff is that it gives an anonymous evaluation of one's product based on users' answers. From the evaluation data one can measure how attractive one's product is in terms of usability and appearance. However, the most interesting part is the way AttrakDiff uses word-pairs to evaluate a product. Word-pairs consist of two words in each their respective extreme and one have to rate according to these two extremes.

4.2.1.2 TEST PARTICIPANTS

The test participants were all in their early twenties and were eight participants in all, consisting of five men and three women. When evaluating on the results it has to be taken into consideration that neither the gender nor age distribution is representing the target audience completely. In terms of the distribution of men and women it is close to half of each, however, as previously mentioned in the lo-fi section, more women than men visit museums, about 60/40 which means that five women and three men would have been a better representation of the gender distribution.

4.2.1.3 DATA GATHERING

During the hi-fi prototype a video camera recording the process and afterwards they had to answer the AttrakDiff questionnaire. Both of these as well as the information sheet provided for the test participants can be found in the appendix [appendix: hifi].

4.2.1.4 RESULTS FROM USER TEST

During the test it was observed that even though the participants encountered issues it did not seem to irritate them much. Several reasons can be ascribed to this. For instance the social element might have had an effect on this in order to not make a fuss about it. One might be more prone to irritation when testing a product individually.

One of the biggest issues encountered during the test was the answering of questions, which was predicted earlier. This caused many issues, not only because they had to write in the answer in a separate screen meaning they could no longer look at choices, but also because they had to press the back button on the smartphones to exit the keyboard and press answer, a button that is associated with closing the application when pressed.

Additionally it was found that participants would sometimes write the answer in text or write numbers instead of the multiple choice options a, b and c even though it was deemed that it was clearly illustrated. A hint has even been given just above the textbox specifying what one has to do. Still this problem occurred often.

As already mentioned this should be changed to radio buttons in further development. Furthermore, one of the participants suggested that the multiple choice answers was simply three different buttons one could just press. This solution would have been much better than either the check boxes or the self-written solution used here, but in further development radio buttons would still be the best solution.

During the test there was supposed to be three idea-items one needed to interact with a friend to use, however, the exhibits had been moved and one of them was no longer on the walls. Additionally one of the QR tags was on the floor, by some pieces of art, and it was removed from people stepping on it, which meant that the last group only had to interact physically once, which did not give them the possibility of learning the interaction.

Regarding the physical interaction some major issues occurred as they did not understand how to help one another. The concept was that one would pick the idea-item one wanted to use and the other participant would select the “help a friend” button in the menu. However, this interaction confused almost all the participants, especially the first time they tried it. Some participants needed help from the test leader in order to continue. Many of them thought they both had to press the “help a friend” button and then shake the device for 5 to 10seconds. Optimally this would work by one needing help from a friend, select a friend and a notification would appear on that friend’s device. Nevertheless, in case of the test the WoZ approach was used, and none of the participants uttered anything that would suggest that they saw through this. The interaction issues might have been caused by the WoZ approach though, because of the missing notifications and feedback. This goes to show how important feedback

can be, as in this case they were confused by the physical interaction. The reason why the interface was designed so that they had to press a button to help was because it was a WoZ test as they had to active the shaking timer for the helping friend's device as well. Otherwise the timer would have to be constantly turned on, which could have led to involuntary shaking and then they would not understand why the device would vibrate from time to time and give them points. This might have broken the illusion of the WoZ.

Idea-items could be placed in particular places such as on the house, on the neighbor or on the neighbor's lawn. Whenever one receive an idea-item a feedback screen shows congratulating the participant on the new acquired idea-items and says how one can apply the idea-item. Often test participants did not know how to use the idea-items because they had not read this text. In general it is not surprising that people do not read text if there is a lot of it, this is a well-known design issue, however what was surprising was that such few words was used, but they still did not read it. An example of a congratulate screen can be seen in figure 10.

When they did not read this information they, naturally, thought that they could not use the idea-items at the neighbor's place as they did not place them at the right locations. Icons should be used more frequently to prevent this from happening. For instance, when one got the "frogs" idea-item an icon could show the neighbor's house filled with frogs in the congratulate screen as an addition to the text. Furthermore, the same icon could be used in the inventory, and then when it is used it can be just the frogs one has to place, but in the inventory it shows in the icon where to apply it.

As was discussed beforehand the back and home buttons could have caused issues especially during the physical interactions, which they did, but not as often as expected, and it was often by the same participants. Some experienced the issue several times whereas others did not experience it at all. It can be speculated that the participant experiencing this issue often might be infrequent users of smartphones in general. When using smartphones often, one tends to learn how to hold the device without accidentally touching the screen over time. As mentioned this issue has to be corrected using confirmations as is used by most application as a safety element.

An issue that was not thought of or experienced before the test was slow scores update. When participants would shake continuously or use idea-items rapidly after each other the score would not update for several seconds. This became an issue especially in one of the groups where he did not think he did the action right because the score was not updated, even though the action was in fact

Figure 10 A screenshot of a congratulate screen in Neighbor Wars

performed correctly. The participant noticed that the score updated a little later, but it could have resulted in a much larger issue if the participant had not discovered that it was due to a slow updating score and not a faulty action. In terms of score it would additionally be a good design option to give the user a congratulatory feedback screen, stating how many points the user earned helping a friend or using an idea-item.

In the lo-fi evaluation it was discovered that in order for users to be aware that they can go to their neighbor there need to be indicators of this. In the implementation an arrow at the end of the word neighbor was added in the right side of the screen, moving from side to side an often seen animation indicating one can go in the arrows direction. Despite this animation one participant did not seem to understand this at first, as the participant kept trying to swipe sideways. This participant did not have much prior experience in using smartphones and might have been biased by this, as smartphone actions are often shown using the swipe functionality, and therefore she might not have understood this. Furthermore, in further development the swipe function might be a better solution and then graphically show that there is an environment beyond the picket fence as suggested in the lo-fi evaluation.

Lastly the QR reader on the HTC Wildfire sometimes caused problems as it took many tries to recognize the QR tags. The walls might have been the issues here as they were rough walls, and it looked like the QR reader was mistaking the dark areas of the walls as dark areas in a QR tag. This was not, however, a problem on the HTC Desire HD, but that might be because the Desire has a camera with a better resolution and therefore was able to tell the difference between the QR tags and the wall with greater ease.

4.2.1.4.1 ATTRAKDIFF

The AttrakDiff evaluation show different types of information based on the answers given by the participants. For instance, the hi-fi prototype have been placed on a diagram with average values of the pragmatic qualities (PQ) or usability and the hedonic qualities (HQ-S) or stimulation, as can be seen in figure 11.

On the diagram in figure 11 two orange squares can be seen, the small one is the medium values of the dimensions and the large is the confidence rectangle, showing the disparity in the answers. A large confidence rectangle means either that the too few participants were used or that their answers are very disperse. According to Neighbor Wars the product has been rated as “fairly self-oriented”. This suits the usability issues from the observations that there are some issues that have to be addressed before this product can be properly used. In terms of the HQ-S AttrakDiff does not give any concluding answers as the medium values are placed right between two classifications. A larger amount of participants could have narrowed down the confidence rectangle and given a more concluding result in terms of HQ-S.

Figure 11 Prototype according to user answers based on HQ & PQ [12]

AttrakDiff also provide mean values for two additional which are hedonic quality in terms of identity or (HQ-I) and Attractiveness (ATT). Given the mean values from the all the qualities the findings are unusual. As mentioned the usability and stimuli should aim for further improvement, which the identity quality, that bind the user more strongly to the product, should also aim for. However, when considering the ATT quality the product is rated as “very attractive”. This compares to the observations of the participants not getting irritated by the usability issues. It can be argued that it might be the concept that people find attractive, meaning that users has to irritate a fictive neighbor in fun ways. The high attractiveness score might indicate that it is because people find the game fun, but that it has some usability issues for it to be highly desirable.

Lastly the word-pairs are evaluated in accordance with the core mechanics in an attempt to ultimately discuss if the use of these core mechanics or underlying concepts has improved the experience of a museum visit. For a complete look at all the word-pairs, see the appendix [appendix: hifi/attrakdiff].

The three core mechanics that were described in the Core Mechanics section, as present in the prototype was symbolic physicality, spontaneity and sociability. Narrativity and asynchronicity were treated as well, however in terms of how these would be included in the concept.

Symbolic physicality will not be compared to a specific word-pair, but instead to the classification of HQ-I, that users are able to identify themselves with the product. To recapitulate symbolic physicality is used to make themes, objects and other relatable, the example used was FarmVille, as most people can relate to the act of growing plants. HQ-I evaluates much on the same quality as it evaluates on the users’ ability to identify themselves with the product. That is a very literal understanding of the HQ-I values as it is generally understood as how one feel the product represent oneself. For instance, having an iPhone radiates one is interesting in having the right brand of products. Although this is meant with HQ-I it can still be compared to symbolic physicality as applications and the themes and looks of those applications, can be representative of ones character as well as a physical product can. For instance many are still

using Windows XP which show that those people are loyal and traditional. As HQ-I and symbolic physicality can be compared, based on the mean values from HQ-I, the symbolic physicality is placed above average meeting ordinary standards, but still needs improvement.

Furthermore, since physicality includes the idea-items it can be argued that this core mechanic is highly present in the product as the whole game of finding items at the museum revolves around the idea-items.

Spontaneity is being compared to several word-pairs. To summarize the spontaneity mechanic is the design encouraging spontaneous acts, examples used in the Core Mechanic section was poke and hug and in case of Neighbor Wars examples were familiarity meaning that many elements are self-explanatory as users recognizes it from other situations. The word-pairs used to compare with spontaneity are “complicated vs. simple” and “cumbersome vs. straightforward”. Simplicity and straightforwardness are closely related and often depend on each other and they fit with spontaneity in the sense that a straightforward and simple action encourages one to perform a spontaneous act, the example used in the description of spontaneity in the Core Mechanic section is the one-click solution, a simple and straightforward action. Both these word-pairs are in the above average section suggesting that this needs improvement and therefore is not highly present.

The third core mechanic is Sociability which is meant to encourage actions through social situations such as helping a friend in Neighbor Wars. This core mechanic is compared to the word-pair isolating vs. connective, which is rated “very connective”. According to this participants found sociability to be highly present in the prototype. As this is among the highest rated word-pairs this could also mean that the sociability is the reason why participants found the prototype to be as attractive as the findings from AttrakDiff suggests.

4.2.2 EXPERT TEST

The expert test was a small test compared to the user test, performed in a small setup at Aalborg University. The test was conducted with QR tags placed on a blackboard with small sketches of the real artwork from KUNSTEN. Even though this test was mostly focused on the core mechanics and the degree to which they were present in the game, the experience not being at the museum might affect the findings. Only four QR tags was placed on the blackboard, which included two idea-items that could be used without the help of a friend and two idea-items one needed help from a friend to use.

4.2.2.1 PURPOSE OF EXPERT TEST

This test was not focused on the usability of the interface as this was in focus in the user test.

The purpose of this test was in most part to back up the results from the user test. Since users are not familiar with technical terms such as the core mechanics, asking them to which degree they find symbolic physicality within the game is questionable. The experts were shortly introduced to the core mechanics, by reading Järvinen’s definitions (15), which arguably the participants in the user test could have been given as well, however, the concepts are easier understood by experts with year of interface

and interaction design, than they are to the average person. The level of misunderstanding the core mechanic is higher for a person with no experience in interface and interaction design.

4.2.2.2 TEST PARTICIPANTS

The expert test was performed on four experts with five years of experience in interface and interaction design. The participants were all 10th semester Medialogy students with no prior knowledge to this product. The participants were not the same as used in the lo-fi expert test. To test the sociality the test was performed on two participants at a time.

4.2.2.3 DATA GATHERING

Data was gathered from this test by taking notes during the test, and the comments they might have afterwards. Additionally they had to answer to which degrees they found each core mechanic within the game using a five-level Likert scale.

4.2.2.4 RESULTS FROM EXPERT TEST

The results from the expert test can be seen in table 1.

Table 1 Results on expert reviews of core mechanics in Neighbor Wars measured in Likert scale

Participant	Symbolic Physicality	Sociability	Spontaneity
A	Agree	Agree	Disagree
B	Agree	Agree	Neither nor
C	Highly Agree	Agree	Disagree
D	Agree	Agree	Highly Disagree

The results do not correlate completely with the results from the user test. Reasons for this can both be that participants in the user test was not directly asked to what degree they found the core mechanics to be present, and that participants in the expert test did not try the prototype at KUNSTEN and therefore not the whole experience. The experts found the presence of physicality and sociability to be high, but the presence of spontaneity to be low. In the sense of encouraging spontaneity it is not surprising that they did not find this to be highly present as there are not yet that many functions. For instance sending gifts to one another is a good example of spontaneity which is not yet present, but is in the concept.

4.2.3 SUMMARY OF RESULTS

The results from the user- and expert test do not correlate completely, however, can be somewhat compared. For instance sociability is deemed highly present in both the user- and expert test, whereas spontaneity was deemed very low in expert but average in the user test. Also the symbolic physicality is above average in both tests, but was deemed more present by the experts than from the AttrakDiff data.

The problem statement for this project was as seen below.

“Using underlying concepts of social games on Facebook in a smartphone game, how can the experience of a visit at KUNSTEN Museum of Modern Art be improved through social interaction between 11 to 29yearold visitors?”

Based on the results from the user test the participants found the prototype to be attractive despite several usability issues, which proposes that the concept is likeable. In terms of this is based on the degree to which the core mechanics from FBG’s have been successfully implemented within the prototype cannot be concluded, however, results from both the user- and expert test finds that a couple of the core mechanics are more than averagely present within the prototype. Nevertheless, there are several usability issues that need improvements for Neighbor Wars to become “desirable” in accordance with the AttrakDiff definition. Lastly there are still functions that need to be implemented in order to truly use the core mechanics of FBG’s such as gifting, posting results on one’s Wall, inviting friends and more.

5 LIST OF FIGURES

[1] http://apps.facebook.com/cityville/?ref=bookmarks&count=0

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