



GameSpace: Methods for Design and Evaluation for Casual Mobile Multiplayer Games

Janne Paavilainen

Annakaisa Kultima

Jussi Kuittinen

Frans Mäyrä

Hannamari Saarenpää

Johannes Niemelä

Contents

1. Introduction	2
2. Design Space	4
2.1. Introduction	4
2.2. Key findings	5
2.3. Casuality	5
2.3.1. Casual Games Discussion	6
2.3.2. Different Meanings of Casual	8
2.3.3. Casual Games & Transformation of Digital Play.....	9
2.3.4. Changes in the Design Approaches	11
2.3.4. Casual Games Design Values	13
2.4. Mobility	15
2.4.1. Defining Mobility	15
2.4.2. Current Technological Restrictions and Problems	17
2.4.3. Possibilities	18
2.5. Multiplayer	20
2.5.1. Asynchronous Interaction	21
2.5.2. Sporadic Gameplay	23
2.5.3. The Spatio-Temporal Perspective	25
2.5.4. Player Composition and Game Mode	26
3. Design Research	28
3.1. Introduction	28
3.2. Key Findings	29
3.3. Idea Generation	30
3.3.1. Theoretical Background	30
3.3.2. Practices within the Industry	33
3.3.3. An Overview of the Workshops and Methods.....	37
3.3.4. The Workshop Findings	44
3.3.5. Results from User Testing	47
3.4. Prototyping	55
3.4.1. Basics of Prototyping	55
3.4.2. Low-Tech Prototyping Workshop	59
3.4.3. Mid-Tech Prototyping Workshop	61
3.4.4. Case Study: <i>Flosters</i>	62
3.4.5. Case Study: <i>Opportunity!</i>	65
3.5. Evaluation	67
3.5.1. Introduction	68
3.5.2. Expert Evaluation Methods	70
3.5.3. User Evaluation Methods	78
3.5.4. Heuristic Evaluation of the Mobile Games Workshop.....	82
3.5.5. Case Evaluation: <i>Pyramid Bloxx</i>	85
3.5.6. Case Evaluation: <i>Onnensanat Mobile</i>	87
3.5.7. Case Evaluation: <i>Mythical: the Mobile Awakening</i>	89
3.5.8. Case Evaluation: <i>No One Can Stop the Hamster</i>	92
4. Conclusions	93
References	94
GameSpace Publications	101

1. Introduction

GameSpace was a new kind of a research project: it involved close collaboration between academic researchers and the game industry, and it looked at the methodological issues involved in game creation rather than focusing on a single game product or technology. The project was funded by the Finnish Funding Agency for Technology and Innovation (Tekes) and five industry partners. The GameSpace industry partners were Nokia Research Center, Veikkaus, TeliaSonera Finland, Sulake Corporation and Digital Chocolate. The project ran for over two years, from August 1st 2006 to September 30th 2008.

GameSpace looked at the design and evaluation of games that are characterised by three main features: they are casual multiplayer games in a mobile use context. The goals for the project were threefold:

- To analyse the playability criteria of a successful mobile multiplayer game - especially in terms of casual gameplay.
- To develop and evaluate game design methodologies suited for the aforementioned games.
- To develop and test gameplay evaluation methods suited for mobile game development and research.

On a broader level, the project could be divided into two major themes. The first theme was design space, involving the study of casuality, mobility and mobile use context. The first phase of the project mostly consisted of conceptual analysis where a deeper and clearer understanding of the design space was sought. This phase mostly focused on the phenomenon of casual games. The aim was to understand the specific features that make a game casual. Casuality in games has not been studied rigorously before, which made it an interesting and important research topic. The second theme was methodological study on exploring and researching new approaches and methods for designing and evaluating casual mobile multiplayer games. The second theme was called design research.

The research project was executed by a series of workshops in which the industry partners and the research team worked in collaboration. The workshop themes followed the design space and the design research topics. The first three workshops focused on ideation methods for casual mobile multiplayer games. In these workshops, the GameSpace research team iteratively designed different ideation methods which would be used in the process of game

ideation. Later the ideation methods formed a complete package, which was tested by the industry partners during a three-month actual use period. The next two workshops focused on low and medium fidelity prototyping. The workshops focused on practical prototyping work with various casual mobile multiplayer concepts. The sixth workshop focused on using expert evaluation methods in mobile game evaluation. In addition to the evaluation workshop, the GameSpace research team was involved in various case evaluations for different games which were evaluated with both expert evaluation and user evaluation methods. The case evaluation work was done in close co-operation with the *IPerG*¹ -project (Integrated Project on Pervasive Gaming). The last workshop expanded the scope of GameSpace by focusing on the user experiences with different games and game related services. This last workshop acted as a stepping stone for upcoming research projects and it will be reported on elsewhere.

The project produced interesting new knowledge on all of the major research areas of the project. Especially the findings on the phenomenon of casual games and the exploratory work on methodological idea generation are leading edge in game research. The prototyping and the evaluation phases also produced new knowledge and the research team produced several conference articles from all these research areas. In addition to the conference articles, the project produced two master's theses. The project received good feedback from the industry partners and led to two continuation projects, *SoPlay*² and *Galn*³.

This final report contains the knowledge acquired from the GameSpace project. Like the project itself, this final report is divided into two main sections: design space and design research. The design space covers the special characteristics of casuality, mobility and the multiplayer aspects. The design research focuses on game ideation, game prototyping and game evaluation methods. In addition to this final report, the research team will produce a Flash-based application which reflects the content of this report on a broader level.

¹ Integrated Project on Pervasive Gaming, <http://www.iperg.org>

² Social Play among Casual, Cross-Media Contexts
<http://soplayproject.wordpress.com>

³ Games and Innovation, <http://gamesandinnovation.com>

2. Design Space

In this section, we present three aspects which make up the GameSpace design space. These aspects are casuality, mobility and multiplayer. Chapter 2.1 gives an introduction to design space and 2.2 presents the key findings from this research theme. The three following chapters present specific issues concerning casuality, mobility and multiplayer in greater detail.

2.1. Introduction

Design as an activity is often characterised as exploration within a space of possible design solutions constrained by the requirements of the design task, also known as the design space. Although the space itself is unique for each game design project, there are requirements and solutions that are common to a number of games and types of games. Identifying these general characteristics allows us to create an initial mapping of the design space for these games and consequently helps with the design and understanding of similar design projects.

In GameSpace, we explored the issue by looking at the dimensions of casual, mobile and multiplayer games. The centre of analysis is the concept of casual, i.e. how to design mobile multiplayer games that are casual, or rather, that support casual game experiences. Therefore, the core research problem is: what exactly is casual in games and how does it affect the design spaces of multiplayer and mobile games?

The decision to focus on understanding casuality was a conscious one. We noticed that research literature on casual games was clearly lacking studies on the factors that form a casual game experience and that there even was no coherent definition for casual games. As casuality was considered to be the most important aspect of the three, mobility and multiplayer issues were examined from the perspective of casuality.

2.2. Key findings

- Casual is not a simple list of properties of a game. The phenomenon is an answer to a specific transformation of game cultures, forming a set of design values that correspond to these changes.
- Mobility offers a vastly different platform for gaming from the traditional video game consoles or the PC. However, current mobile games do not emphasize the strengths and possibilities of the platform. The use of context information as a game element is especially interesting.
- Casual mobile multiplayer games should support asynchronous interaction and sporadic gameplay with the possibility for the players to enter and exit the game independently.
- Tick-based system behaviour in multiplayer games supports casuality as real-time solutions require constant attention and turn-based solutions make the game too dependant on the players' actions.

2.3. Casuality

The casual game industry is growing rapidly. In 2006, it was estimated that by 2008, the market would surpass \$2 billion in the USA alone (IGDA 2006). In the autumn of 2008, Casual Games Association published the 2007 market report stating that casual games are in fact a \$2.25 billion a year industry and that the market is growing at 20% a year. The consumer numbers are impressive and the demographical division is interesting: over 200 million people play casual games each month over the Internet, consisting of 48.3% men and 51.7% women. (Casual Games Association 2008) Furthermore, it is estimated that by 2012, casual gaming will account for over 46% of the industry's total sales on all platforms (Research and Markets 2008a).

The high numbers and the speed of the evolution of the industry are marking a remarkable phenomenon that should also evoke increasing academic interest. The interpretation and evaluation of casual games statistics is complicated since the notion of casual games is not unambiguous. Depending on the point of view, casual games and its derivative terms can acquire quite different meanings which influence what games are counted as "casual" or how players are counted as "casual".

2.3.1. Casual Games Discussion

Because of the newness of this phenomenon, there are several rather different characterizations of what 'casual' means in relation to digital games out there. The discussion on casual games examines different sides of the game cultures, development and the games themselves and the actors vary from the developers and game journalists to players. The topics discussed within the casual games phenomenon and varying characterizations are efficiently exposing the wide scope of the trend.

Casuality is defined by the properties of the game. The easiest way to understand casuality in games is to look at the properties of games that are called casual. The content of casual games is generally non-violent and the dominant genres are puzzle, card, word and arcade games. Other genres, such as system management games, have been found to be successful as well (e.g. *Cake Mania*⁴ and *Plantasia*⁵). However, referring to a certain genre of games does not capture the whole picture.

IGDA (International Game Developers Association) *Casual Games White Paper 2006* defines casual games as games that are easy to learn, utilize simple controls and aspire to forgiving gameplay. They are "games for all" (IGDA 2006). It is also common that casual games are not only said to be easy to learn but difficult to master⁶ but as Jason Kapalka points out at *Minna Magazine* summer 2006 edition: "no casual game has ever failed for being too easy" (Kapalka 2006). It could be said that any good game should be relatively easy to learn (so that you get into the action as fast as possible) and difficult to master (so that you get your money's worth by not mastering the whole game in one night). But since casuality in games is not solely a property of the game (intrinsic), making a game challenging is not the most important factor in making it serve its function as a casual game. Easy to learn can even be expressed as a more general requirement of easiness: a casual game should provide game experiences that are easily rewarding (error-forgiving gameplay) - there is no demand for excessive training or investment of time in order to acquire a pleasant game experience.

Casuality is found in the ways of play and groups of players. One of the motives for developing casual games is that they attract new gamer demographics. Even though it is difficult to

⁴ <http://sandlotgames.com/w4/cakemania.aspx>

⁵ <http://www.arcadetown.com/plantasia/game.asp>

⁶ For example, this description is found on the site of one of the largest casual game creators, PopCap games: "Our games are easy to learn, tough to master... and utterly addictive!"

define the typical casual game player⁷, the largest audience remains women aged thirty-five to fifty (IGDA 2006). Elderly people and lapsed gamers are also identified as interesting groups that casual games reach.

“Games for all”, or for the “widest possible audience” can be said to be an apt description even though this remark is more likely to function as a way to describe the intention of the designers rather than as a description of a certain game (or the existence for such a formula). It is possible that thinking in terms of traditional target groups in this sense is not applicable. The function of a game or the attitude towards a game can be said to differ from hardcore games. People playing casual games mostly do not regard themselves as gamers. The game itself is not a hobby and one is not ready to invest that much money or time to access the experience. One of the main motives for playing casual games is described as a “mental exercise”, “stress-relief” or “calming effect”. Casual games can be played during the work day, in transitional spaces (e.g. waiting for something to happen or sitting in the train) or in the late hours when one is rather tired of doing anything else, in short bursts as a “snack” or lengthy hours during the night. Casual games should be easy to access and playable on different platforms, also with older hardware. Getting, playing and re-using the game should be as easy as possible.

Even though the attitude is such that devotion to casual games is generally low, they can also create an audience of hardcore gamers. There are fanatics who eagerly play the newest casual games and invest lots of money and time into them, discuss the games passionately on forums or frequently write new entries to their casual games blogs about their casual game experiences.⁸ This strengthens the belief that casualness is not solely a property of a game. In this way, some hardcore games can be played in a casual manner. For example, one can create a relatively casual game experience of *World of Warcraft*⁹ by only playing the low levels. Casuality can also become evident in consumption habits: some consumers wait for the price of a game to fall and play older games which do not require the latest hardware.

Casuality as easy access. Even though a game was easy to learn and provided an easy gaming experience of a more instrumental sense (such as “stress-relief” as a motive for playing compared to “interesting narrative experience and cognitive challenge”), it would not explain everything relevant

⁷ Since there are so many different kinds of casual games and they are played by so many kinds of people all over the world

⁸ <http://www.casualgameblogs.com>

⁹ <http://www.worldofwarcraft.com/index.xml>

to casual in games. The comprehensive accessibility of the game experience is also relevant. Some of the most popular casual game experiences (such as *Minesweeper* or *Solitaire* provide) have been easy to access, since one does not even have to buy or install the games because they are included in the Windows operating system. At the moment, the main distribution channel for casual games is the web. Either the game is downloadable through a web portal or it is playable online in a web browser. Popular business models such as try-before-you-buy also imitate this need for easy access: they allow the user to get to the game experience as fast and easy as possible. The title of the game can also be relevant for providing easy access to casual players with minimal effort.

Hence, even though we speak about casual *games*, it could be more accurate to talk about casual game experience, where the intrinsic properties of a game and the way it is accessed enable certain kinds of playing habits and a role for the games in the everyday life of an audience that is as broad as possible.

2.3.2. Different Meanings of Casual

Although the discussion is about “casual games”, one word does not seem to be enough. The discussion concerns gamers, players, gaming and playing being somehow casual in addition to games that meet all these requirements and restrictions ending up labeled as casual.

In the next definition of “casual”, the casual games, those who play them; playing styles and attitudes and the non-gamers as casual gamers are separated at the level of meaning. Even though these terms are interrelated, they constitute a more refined terminology for the phenomenon of “casual” in games cultures (Figure 1).

Casual in games cultures. The phenomenon of the casual aspects of games cultures.

Casual game. Certain properties of games are called casual, e.g. a game has generally appealing content, simple controls, easy-to-learn gameplay, fast rewards, or support for short play sessions.

Casual gaming. The aspects of the present game cultures are characterized as casual: the attitude towards gaming may be casual, e.g. playing games may be perceived as just one leisure activity among others (e.g. TV, movies, sports) or present clearly instrumental motives other than leisure for the playing activity.

Casual playing. The way a game is used or played is characterized as casual, e.g. a game is played in short time

bursts or at a low cognitive state. This refers more to the play session than to the general attitude towards games.

Casual gamer. A person who plays games in a casual manner, not necessarily casual games, (casual playing) or who has a casual attitude towards gaming (casual gaming).

Casual game player. A person who plays games that are called or labeled casual (she is not necessarily playing them casually). Studies show that the demographic covers almost everybody (from teens to older people, from newbies to lapsed gamers) and the largest group seems to be “women over 35”.

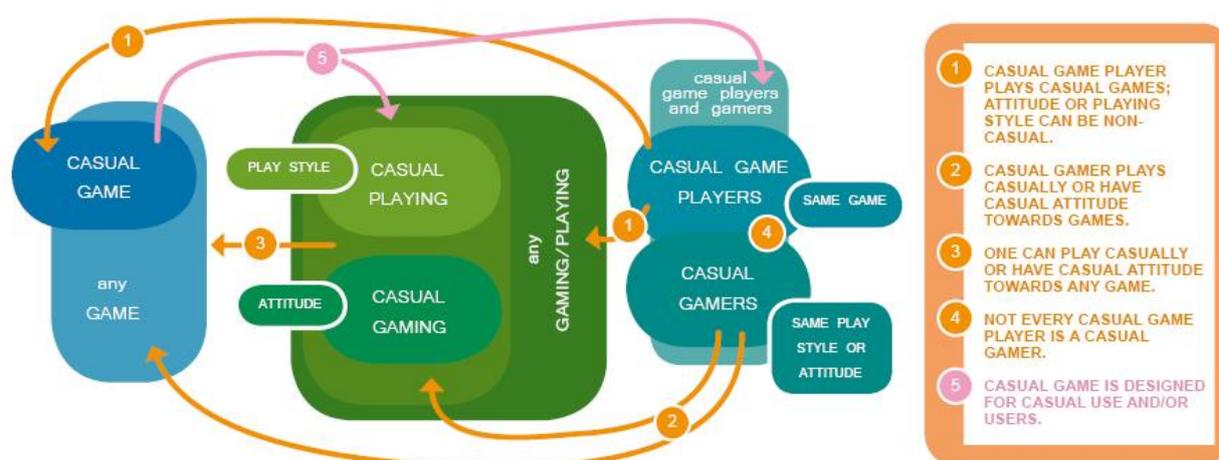


Figure 1. The relations of the meanings of casual in games cultures.

2.3.3. Casual Games & Transformation of Digital Play

What is interesting about the topic of casual games is not finding a perfect definition, but realizing that the discussions seem to point to certain transformations in digital games cultures. There appears to be a growing need to talk about new player groups and about the different and varying ways of them using, enjoying and thinking about games. It seems that we are quite used to the narrow view of the functions and pleasures of digital games, such as the enjoyment of highly immersive and challenging game experiences. The casual games phenomenon broadens the spectrum of game experiences beyond our clichés. The casual game phenomenon emphasizes that games can be secondary activities and work as instruments for different agendas, blended in the everyday lives of different people in different ways.

To put it shortly, the transformations can be divided into two different areas:

1. Entry of new and heterogenic user groups and
2. Games as secondary activity and instrumental uses of games

Entry of new and heterogenic user groups. Within the discussion of casual games, it is often pointed out that women, especially women over 30 years old, enjoy playing the games from the casual game sites. The division of the sexes is more uniform than in the areas of other digital games, even to the point that paying customers are dominantly women (Casual Games Association 2008). However, we are not facing the rise of "women's games" but rather games with heterogenic group of players with different backgrounds, skills and interests. Players may have different reasons for turning to casual games, which may include the lack of game literacy, skills, time, money and interest.

Games as secondary activity and instrumental uses of games. Playing games is usually treated as a highly immersive and engaging activity. For example, playing games is often compared to other media consumption, such as watching television. In general, playing games is regarded as highly active activity instead of passive watching when compared to TV. People are engaged and immersed in the interactive game world. In general, there is no particular reason why digital games should always have such a role. Sometimes games can provide a light interaction loop as a secondary activity. This may happen in the gameplay of Windows Solitaire. While playing the popular digitalised version of a solitaire card game, players may be actively thinking about other subjects, such as daily social problems, work tasks, the next day's dinner plans, future projects or anything whatsoever as the gameplay does not require deep attention. The play session may be easily suspended if a phone call is received, the laundry is ready, water is boiling, the boss enters the room, a colleague asks for lunch, or something else happens in whatever kind of a situation the player may be.

Games can be secondary activities in the sense of players doing something else simultaneously: thinking, eating, watching TV, talking on the phone, waiting for something and so on. The parallel activity may be prioritised, and the player may prioritise games that do not require high attention and/or use of resources. On the other hand, secondary play may also mean that the purpose of gameplay may be extraneous to the game itself. For example, one may play games only for their social functions or because of the mental exercise that they provide. The execution of the game story and fiction or other

qualities may then become secondary and the outcome of the experience and the way they utilise the game session may become more important. One may be interested in using games for learning, losing weight, changing one's mindset or perhaps even to fall asleep. This may also provide an excuse for engaging in playful activity, as otherwise useless activity can be explained to be connected to something vital.

The change of player groups and play habits continue transforming the field of digital games broadening the consumer base and play environments. However, it can be argued that in general there is nothing strikingly new or surprising about this phenomenon. Games have been used for different functions throughout their history by large numbers of different people if we look at games outside of the digital world. The transformation concerns the digital space of games: games, such as sports, children's games, tabletop games and card games are such common pieces of our living environments that we might not even recognize the fact that they are similar to their video game and computer game counterparts.

The transformation of digital play as broadening player groups and play habits go along with the rest of the transformations of digital environments. The gap between the digital world and the physical world is increasingly closing as many areas of everyday life; if not all, become ever more digitalized. Thus, it can be argued that the casual games phenomenon as a transformation of digital play is merely a "normalization of digital games cultures".

2.3.4. Changes in the Design Approaches

The relation between the design and the play behaviour is not rigid by its nature. Putting certain elements into the game system does not always cause the same effects. Design can support different play activities, but it is much more difficult to trigger specific reactions or restrict certain play patterns. By its nature, design has no logical outcome and therefore no sequence of operations will guarantee a result (Lawson 2006).

The solutions in design involve value judgements and the nature of the process is prescriptive instead of descriptive. Designers aim to deal with questions of what might be, could be and should be instead of what is and why it is so. In this sense, to design is to have an approach, which may be based on certain value assumptions and principles (Lawson 2006).

There are many different ways of supporting casual game related changes in games cultures. Some of the casual game design solutions may be targeted to solve only one part of the transformation, some may try to work with a larger area and there might be several design solutions for one design problem. Hence, there is more than one road to "casual design" and room for different kinds of casual games. The

shift in the design approaches may be unifying the solutions. Because some of our current design approaches may be founded on old assumptions of gamers and their play expectations, we should pay attention to the following:

1. Different affordances and user thresholds of play environments and
2. The significance of the context of the gameplay experience

Catering to broader and more heterogenic user groups requires paying attention to different affordances and user thresholds of play environments. As we are dealing with larger player domains motives and driving forces, skill levels and game literacy, game equipment, resources and even world views and beliefs can be radically different among the players. What we provide for the players and what we enable them to do should be rethought as well as the requirements of the play. Users make choices about whether they play at all, how much they invest in games in general, what they are willing to use their time on and what is necessary or takes priority in their lives. There might be obstacles that they are not willing to overcome, which may include buying new equipment, using their time on learning something new, waiting for the product to be shipped, or even adjusting the environment. Lowering the thresholds of use may be a critical factor in keeping the consumers interested.

But this is not enough; some of the obstacles may be due to the lack of affordances. The play environment may not afford anything interesting, meaningful or useful for the player or what is provided does not fit the norms, needs and situations of the users and thus appears irrelevant to the user. This is why the values of design should be rethought.

The secondary nature of play increases the significance of the context of play. In designing casual products, there is also a need to look beyond gameplay and design games as part of a larger experience field to support and serve the players in different steps of the experience. It is not enough to just put games "out there" with easy gameplay, instrumental play functions, mundane themes and general appeal. The adoption, preparations, use and management of game experiences should be supported in phases. The secondary nature of games makes playing even more vulnerable to changing situations. It may not be relevant to tailor games to suit a specific target group, but rather to suit changing situations and make it possible to blend games with the different contextual factors in various ways. To design casual game experiences is to design experiences in a larger experiential context.

2.3.4. Casual Games Design Values

In practice, a large number of different possible design solutions can be found in the midst of different opinions over casual games. Even though they may not provide any definite definitions or recipes for archetypal products or services; casual games are not touted to be games with short play sessions by accident, emphasizing certain genres, providing positive and “happy” game experiences, bringing about mental exercise and other advantages, providing possibilities for inexpensive game experiences with safe themes and topics, generally familiar user interfaces, low immersion levels and so on. The changes in game cultures are already catered with various different solutions.

Design is based on principles and certain approaches instead of exact engineering of experiences (Lawson 2006). Therefore, we are talking about value-based thinking. The changes in games cultures may force us to think again what is regarded as “good” in games. Changing the design approach may lead to a change of values when it comes to the design.

Looking at the different existing design solutions, a higher abstract level can be found and such values become more explicit. Exposition of the design values can help in understanding the real scale and essence of the casual games phenomenon and to see new possibilities for further design solutions and new innovations. Casual design solutions seem to fall under four different value categories:

- Acceptability,
- Accessibility,
- Simplicity and
- Flexibility

Acceptability of the contents of a game is important in the choosing process of game products, accessibility in the enabling process, while simplicity and flexibility of the design become relevant in playing a game and in replay situations. Casual design targets, for example, select themes and mechanics that appeal to a larger population and are accepted by the norms, emphasize accessibility issues on the cognitive and physical levels, simplify the game elements and concentrate on the flexibility of the user experience. In following these values of design, the secondary nature of playing games and the possible differences among players can be supported.

Refining the design according to acceptability makes games suitable for larger groups. Digital games have suffered from an image of adolescence, perhaps even deviant media. Media

emphasis of games with excessive violence, explicit language, use of substances and destructive activities may push certain people away from games in general. Other popular game topics, such as zombies and sci-fi worlds may also be uncomfortable or irrelevant for some players. Casual games provide spaces with safe and familiar topics, emphasize positive mechanics such as nurturing, building, collecting and collaboration instead of killing, destruction or for example survival of the fittest. Titles with violence and explicit language or sexually biased depictions might not fit the worldviews or the norms of the social environment in which a large part of the population lives. Furthermore, providing immediate secondary utility for a game, such as mental exercise, learning or social interaction, may also enhance the general acceptability of the design and thus lower the threshold of adoption. The price of the product is also potentially relevant: if one spends only small amounts of money, or not at all, the activity is less binding.

It is notable, that acceptability, just like many of the design values, is relative by its nature. Norms differ according to social environments and general appeal may also vary. Thus, what is casual and harmless to one may be devious to others. There is no definite selection of casual themes and mechanics in this sense. Therefore, casual design becomes a selective set of design solutions.

Enhancing the accessibility of the games makes playing possible for people with varying limitations. The differences in the groups of potential players may include variation between skill levels and knowledge, resources such as time, money and attention and other relevant factors. This forces one to look at the adoption phase of games, providing lowered thresholds according to the smallest possible denominators. As some players may lack common game literacy that is trivial to many gamers, such as crushing boxes in order to find relevant aids in the game, such an element should be explained or made as obvious as possible to keep the player interested.

Some of the limitations are set by the players themselves. No matter how fine the design is, the player can be prepared to pay only a certain amount of money for the experience, only use a particular time slot, prefer not to learn anything new and so on. The design of the game service and the game should be targeted to lowering the access points by easing cognitive and physical requirements.

Simplifying the design enables lighter play experiences. Minimal elements and user interfaces make it easier to get into the game as fast as possible but also maintain a lower cognitive exertion. If a game has more complex features,

these can be gradually introduced and some of the activities, such as saving, can be automated or combined.

Flexibility in design enables the possibility to change situations. Playing a game can be preferred as a secondary activity. This means the prioritization of something parallel such as travelling, eating, housework, an upcoming phone call, etc. Therefore, game design needs to be increasingly flexible.

Based on these values, different sets of design solutions can be formed. In this sense, casual design may lead to radically different games serving different kinds of casual game experiences.

2.4. Mobility

Mobile technology is arguably the most successful and certainly the most rapidly adopted new technology in the world (Katz 2008). According to Research and Markets, there should be over 4 billion mobile subscribers at the end of 2008 and over 100% penetration in more mature markets (Research and Markets 2008b). Although mobile technology has been around for over 30 years, gaming with mobile phones started as late as 1997 when Nokia embedded the *Snake* into their 6110 model. *Snake* became an instant hit and in 2005 Nokia estimated that there are over 350 million mobile phones with the game *Snake* on them, making it the most widely distributed digital game ever made (Nokia 2005). Japan and South Korea have been the leading markets in mobile gaming adoption, followed by Europe, particularly Scandinavia, the United Kingdom and Italy (Chau 2006). Only 11 to 12 percent of U.S. mobile subscribers play games (Rainie & Keeter 2006), while in South Korea the number is 40 percent and even higher in Japan (M:Metrics 2006).

The mobile phone is a very different gaming platform when compared to table-top consoles or computer systems. The mobile phone resembles a portable gaming console but still has its own identity as it is primarily a communication device. In this section, we present the special characteristics that are related to mobile gaming. First, we define mobility and take a closer look at the use-context of the mobile phone. Secondly, we present the current technological restrictions and challenges and, thirdly, we discuss the possibilities of mobile gaming.

2.4.1. Defining Mobility

The simplest way to define mobile games is to view them as games that are played with a mobile platform such as mobile phones or handheld gaming devices. In this view, the

availability of the game at any given time during the normal course of the player's life is the distinguishing feature of mobility. One can take the game anywhere and it can be played whenever wanted. The availability of the game allows one to play the game to pass time in the interim moments of one's day, for example while waiting for a bus, during the lunch break, etc.

A better way of defining mobile games is to restrict the gaming platform to mobile phones only, thus emphasizing the social and technical characteristics of the mobile phone in addition to its availability. A large number of mobile phones nowadays come with a camera and internet connectivity in addition to text messaging and voice function, all of which can be used for creating interesting gaming experiences. The increasing availability of GPS-tracking capabilities in high- and mid-range phones also opens up new possibilities for mobile games. In terms of processing power, recent mobile phones are already offering quite good gaming performance.

However, as Järvinen (2002) points out, in order to understand mobile gaming, one should look at the contexts in which mobile devices are used. He argues that mobile games are true mobile games only when they support the normal contexts and use cultures of mobile devices. Järvinen defines the context of use as limited by time and place of use, and discusses some factors specific to mobile phones concerning these:

- Ephemerality: Mobile games seem to support short, spontaneous play sessions.
- Temporality: Mobile phones are available all the time, making it possible to use time of day as a part of the game concept.
- Personality: Mobile phones have become personalised media objects that identify their owner and often contain loads of the owner's personal history in the form of text messages, pictures, videos, contacts etc.
- Environment: Mobility allows the games to use the players' physical and social environments as elements in the game. These can be locations, people and other objects.

Mobility is probably best distinguished by its contexts of use. A thorough presentation of these is offered by Guarneri et al. (2004), which are summarised as follows:

- Environment context captures the entities that surround the user. For instance, things, persons, services, temperature, light, noise and information.
- Personal context consists of the physiological and mental contexts. The former contains pulse, blood

pressure and hair color, for instance. The latter contains mood, expertise and stress, for instance.

- Task context describes actions, activities and events that the user is currently doing.
- Social context describes the social aspects concerning the user such as the user's roles and information about friends, buddies, neutrals, enemies etc.
- Spatio-temporal context consists of the aspects related to the space and time of use. For instance, time, location, direction, speed, etc.
- Terminals context describe the characteristics of the device the user is using.
- Services context describe the service used by the user.
- Access networks context describes the characteristics of the network used by the user.

In terms of mobile games, these contexts present a huge number of possibilities compared to the non-mobile setting of console and computer gaming. Interestingly, in the field of mobile games, the possibilities opened up by these contexts are still rather unexplored in the segment of commercial games. From the point of view of casualness, mobile games should support the various use contexts and situations where playing a casual game may occur. To paint a more daring vision, a game should know the context of play and adjust accordingly. Modern mobile phones are filled with different sensor technology which can be used to understand the context of play and thereby support the casualness of play.

2.4.2. Current Technological Restrictions and Problems

The mobile phone as a gaming device has come a long way in the last ten years, but in terms of suitability for gaming, it is still hampered by a number of technical short-comings that greatly affect game design for the devices.

The interface of a typical mobile device is probably the most visible issue. Small screen resolution and the keypad are not designed for gaming and create a restriction that makes certain kinds of games very hard to play with a mobile phone.

Another restriction is the lack of processing power and a specialised graphics processor, which effectively limit the games to a considerably simpler form compared to contemporary gaming consoles. This situation is changing gradually and the newest high-end models already offer pretty good performance in this area.

In terms of Internet-connectivity, mobile phones are certainly getting better, but the currently widely used GPRS and 3G are not yet on the level of the fixed, digital subscriber line technologies typically used with console and PC gaming.

Although games do not necessarily require that much bandwidth for gameplay, mobile Internet-connectivity typically has problems when it comes to latency in the connection. Although 3G networks are becoming more widespread and used, they still suffer from latency issues which make it practically impossible to produce synchronous real-time (see 2.5 Multiplayer) multiplayer games for mobile phones. It must also be said that the current infrastructure is still very much based on the 2G technology, which suffers from much higher latency (Niemelä 2008).

In addition to device-specific restrictions, mobile phones are a challenging platform due to other issues, as well. In the interviews of mobile game developers conducted in the *MC2*¹⁰ project, fragmentation of mobile devices was seen to be very problematic as there is now a great mix of low-end and high-end mobile devices, which do not share any standardisation in the worst case. For each game developed, there is a need to make separate SKU¹¹ versions for almost every device on the market. J2ME¹² was the most popular programming language used but Java's slogan "write once, run everywhere" did not seem to be true at all in practice. Symbian developers were happy with the technology, but also realised that the market share with Symbian is lot smaller than the one with Java. However, Symbian allows better control over the device, giving more possibilities for the developers. One developer told us that for testing, they have a PC-based emulator that simulates almost every single mobile device on the market but the problem is that the emulator does not emulate the bugs that are found in these devices. Overall, technology in mobile gaming was thought to still be immature and in the process of taking its baby steps. Organisations such as *Open Mobile Alliance* (OMA)¹³ aim to reduce the problem with fragmentation of technology, which should help the developers considerably.

Although the restrictions and the problems of the mobile device limit development, at the same time, they force the designers to keep the games simple and come up with new ways of creating great player experiences.

2.4.3. Possibilities

Mobility offers great possibilities for casual games. As was pointed out earlier, instead of seeing casuality solely in terms

¹⁰ Mobile Content Communities

¹¹ Stock Keeping Unit, a single type of product which is kept in stock; it is one entry in the inventory.

¹² Java 2 Micro Edition, a version of Java used for developing applications that can run on a wireless consumer device platform like a PDA or a cellphone.

¹³ <http://www.openmobilealliance.org/>

of the properties of the game, we expanded the definition to the casual game experience, which also takes into account the way casual games are played. Understood in this way, mobile devices are ideal platforms for casual games. A study by Li & Counts (2007) supports this view.

First of all, one can carry mobile devices on oneself all the time allowing for easy access at all times. This allows for playing whenever one wants to play. For the game developer, it makes it possible to use the time of day as an element in the game.

Secondly, as pointed out by Järvinen (2002), mobile phones have become personalised media objects. Quite often people customise their mobile in some way to both distinguish it from others and to reflect their own personality, as well. This is still something that has been little utilised in game development.

Similarly, mobile phones contain lots of owner-specific information that can be used to create more personalised game experiences. For instance, people's contacts in the phone could quite easily be used as elements in the game. For example, one could generate the player's initial resources in a game from the list of people the player knows. Or the contacts could somehow be tied to the player's goals in the game, thus giving a more personal incentive for accomplishing them. The possibilities are numerous.

Especially when it comes to multiplayer games, the various possibilities for connectivity in a mobile phone allow new ways to enter into the people's contexts of use. As a short range connection, Bluetooth can for instance be used for meeting engagements like in the game *Hot Potato* (Niemi & Sawano 2006) or for harvesting resources like in the game *Insectopia* (Peitz 2006). Internet-connectivity offers the players even better and easier access to the game.

The ever increasing number of integrated GPS-tracking capabilities in mid- and high-end phones allows the game developers to create games that use real-world locations in the game. In a word, mobility allows game developers to reach the players in richer contexts than non-mobile games.

Interruptions are common in a mobile use context. Incoming calls and text messages often get top-priority and they are usually answered immediately, especially if the user is waiting for a call or a message (Korhonen & Koivisto 2006). These situations are challenging from the perspective of game design. In addition to finding a workable solution to deal with interruptions (automatic saving, for example), the interruptions should be treated as a resource and seen as a possibility in game design. For example, in *World of Warcraft* the player receives rest bonus while being offline. When the player returns to the game, she gains an experience boost because of the rest bonus.

Mobile games are still seen as simpler versions of console and computer games. Thus, their mobility is not advocated in any way. By emphasizing the strengths of the mobile phone instead of battling the restrictions, the mobile gaming industry might generate a whole new, truly mobile, casual gaming culture.

2.5. Multiplayer

Regardless of culture, games and play have traditionally been interactive activities between multiple players. Video games are no different as many of the early video games were already multiplayer games for two players. Games such as *SpaceWar!*, *Pong* and *Tank!* were all two player games, allowing the players to play head-to-head and compete against each other. Playing side by side, at the same time in the same place was basically the prominent multiplayer game mode until the breakthrough of the internet.

The internet multiplayer gaming era started in the 1990's with the launches of *Doom*¹⁴ and *Quake*¹⁵. Although there had been networked games before, such as *Neverwinter Nights*¹⁶ provided by America Online (AOL) and the early Multi-User Dungeons (MUDs) from the late 1970's, *Doom* and *Quake* were the ones that made the breakthrough of networked video gaming. *Doom* allowed four-player simultaneous play in Local Area Network (LAN) and *Quake*, with the QuakeWorld update, allowed 32 players to play over an Internet Protocol Suite (TCP/IP) connection. TCP/IP is still the prominent network technology in network gaming.

Nowadays, multiplayer games come in all shapes and sizes. There are play-by-email games, multiplayer shooter games, massively multiplayer online role playing games and many others. Multiplayer gaming has become a megatrend in gaming as there is a growing necessity to increase product lifespan (Luban 2008) and multiplayer gaming also allows business models, such as monthly subscriptions, which produce revenue at a continuous rate. Popular multiplayer games such as *Counter-Strike*¹⁷ and *World of Warcraft* have gained an enormous amount of media coverage and brought internet multiplayer gaming to the knowledge of the mainstream.

The first mobile game also featured a multiplayer mode. *Snake* had a two-player head-to-head mode via infrared link between two mobile phones. The idea behind the multiplayer mode was to demonstrate the infrared data transfer feature in

¹⁴ <http://www.idsoftware.com/games/doom/doom-ultimate/>

¹⁵ <http://www.idsoftware.com/games/quake/quake/>

¹⁶ <http://www.bladekeep.com/nwn/>

¹⁷ <http://www.counter-strike.net/>

the Nokia 6110 model. After *Snake* and infrared data transfer, mobile multiplayer gaming was mainly based on WAP (Wireless Application Protocol) and SMS (Short Message Service) technology, but due to high data transfer costs and the poor quality of games, these games did not gain sufficient popularity (Haukkamaa 2006). After the WAP/SMS era in mobile multiplayer gaming, mobile multiplayer games started to take advantage of Bluetooth, WLAN (Wireless LAN) and GPRS (General Packet Radio Service) technologies. The use of mobile internet opens up different possibilities of playing browser games with a mobile phone. Some popular browser games, such as *Travian*¹⁸, feature a separate mobile version.

In this section, we approach mobile multiplayer gaming from the casual perspective. We will examine asynchronous interaction and how it supports sporadic gameplay. We also take a look at spatio-temporal issues and different player compositions and game modes.

2.5.1. Asynchronous Interaction

Asynchronous interaction in general has been widely discussed in different articles concerning computer-supported cooperative work (CSCW) (e.g. Raybourn 1997, Chong et al 2001, Pinelle et al. 2003, Weng & Gennari 2004). Email is a classic example of an application that allows asynchronous interaction between the participants. In this case, asynchronicity means that the participants can interact (or to be more specific, their email clients can interact) even though the participants are not in the same place at the same time. Synchronous is the opposite of asynchronous. Continuing the analogy, face-to-face discussion is synchronous interaction, demanding that the participants are in the same place at the same time. Instant messaging software such as MSN Messenger, ICQ and IRC can be both synchronous and asynchronous. The users can either converse in real-time when both or all participants are present, or they can leave messages which will be picked up when the correspondent is online.

Although synchronicity has been discussed widely within the utility software domain, it has not gained similar interest among the scholars in game research. There are few references available, but the challenge is that they all define asynchronicity a bit differently. Synchronicity can mean various things when it refers to games. It refers to game programming (e.g. Baughman & Levine 2001, Walters 2005) or gameplay (e.g. Zagal et al. 2000, Bogost 2004). This chapter approaches the terms from the perspective of gameplay.

¹⁸ <http://www.travian.com/>

Bogost (2004) has suggested that asynchronous multiplayer is the future of casual multiplayer games. In an asynchronous multiplayer game the players do not have to play at the same time unlike in a synchronous multiplayer game. Bogost presents four traits which can be used to identify asynchronous gameplay. The first and the most interesting trait is that asynchronous play supports multiple players playing in sequence, not in tandem. This can be seen as a reference to turn-taking. The other traits which can be used to identify asynchronous gameplay are the requirement of some kind of a persistent state which all players affect and which in turn affects all the players; breaks between the turns are the organizing principle of asynchronous play and, lastly, asynchronous play does not have to be the defining characteristic of a game.

Zagal et al. (2004) use three different factors to define synchronicity in a multiplayer game. A game is defined to be *concurrent* if it requires that all the players participate and act simultaneously. *Counter-Strike* and soccer are examples of concurrent games. In synchronous games, all the players participate at the same time, but their actions are synchronized in such a manner that they do not act simultaneously. According to Zagal et al., most non-electronic multiplayer games, such as board games, are synchronous as they involve turn-taking. Zagal et al. continue that tennis is also a synchronous game, because each player takes turns hitting the ball to the other side of the court. The authors continue that some games blur the distinction and MUD games, for example, allow the entering and exiting the game independently. In these games, it is not necessary for all the players to be present at the same time.

Gemelli et al. (2006) present the concept of asynchronous chess (AChess). AChess is a two-player chess game with the exception that any player can move any piece at any given time, removing the turn-taking aspect from the game. The defining asynchronous feature in AChess is the absence of turns. This makes it possible for the players to make moves independently.

All these definitions vary when it comes to the question of what asynchronicity is. According to Zagal et al. asynchronicity is the possibility to enter and exit the game independently. Bogost suggests that asynchronicity is related to turn-taking and Gemelli et al. hold that it is the absence of turns and independence of actions that makes a game asynchronous. It can be seen that there is no consensus on the subject and the terms do not seem to work on the same level, not even within the statements of a single group of authors. For example, Zagal et al. define concurrent games based on simultaneous actions whereas synchronous games are based on turn-taking. This means that concurrency and synchronicity

are tied into the interaction between the players. Their definition of asynchronous, however, is based on the issue of entering and exiting the game independently, which is a different thing. The authors claim that tennis is a synchronous game since the players take turns in hitting the ball. This would be true if tennis was only about hitting the ball, but clearly it is not since the players play the game constantly whether or not the ball is on their side of the court. Movement, placement and predicting are all parts of the game for the player waiting for the return of the ball. By moving on the court, the player interacts with her opponent as the opponent has to decide the best location to return the ball according to the player's location. Bogost and Gemelli et al. have totally opposite views on asynchronicity. For Bogost, asynchronicity is playing in sequence, i.e. turn-taking, whereas for Gemelli et al. asynchronicity means the absence of turn-taking.

2.5.2. Sporadic Gameplay

The above definitions for asynchronous interaction can be considered to support sporadic gameplay. Sporadic gameplay means that the player logs into the game every now and then for a few minutes. Depending on the type of game, the player may be able to select a strategy or tactic while logged in and then log out when finished. The player's commands are then executed, not necessarily instantly, and when the player returns later, the game presents the outcomes of these actions taken while the player was offline. Based on this description, sporadic gameplay is well suited for the casual mobile multiplayer game context.

Based on the earlier definitions, we can see many interesting aspects that would benefit sporadic gameplay. Bogost suggests that asynchronous gameplay is not simultaneous play and that there is a persistent state which the players can affect and which can affect the players. Zagal et al. suggest that the independence of entering and exiting the game defines asynchronicity. On the other hand, Gemelli et al. discuss the independence of actions in gameplay. Based on these aspects, we can define four features that can be considered when designing a sporadic gameplay for a casual mobile multiplayer game.

1. Synchronicity of interaction between player characters, avatars or components
2. Persistence of the game world
3. Possibility to enter and exit the game
4. Temporality of gameplay

Synchronicity of interaction between player characters, avatars or components has two possible options. Synchronous

multiplayer games require the players to be in the game at the same time for interaction. Games such as *Counter-Strike* and soccer are examples of synchronous multiplayer games. Asynchronous multiplayer games do not require simultaneous presence and allow interaction between the characters of online and offline players. Games such as *Legend of Red Dragon*¹⁹ (a text-based MUD game) and *Mythical: The Mobile Awakening* (see 3.5.7) are examples of asynchronous games.

Persistence of the game world also has two different options. Either the game world lives on although the player goes offline or the game world is reset every time the player enters the game world. In *World of Warcraft*, the game world is persistent and continues to live on although the player goes offline from time to time. *Counter-Strike* does not have a persistent game world in the same sense. Usually one round lasts a maximum of five minutes and after that the game world is reset. Maintenance resets for games like *World of Warcraft* are not taken into account, as they happen for reasons outside of the game world.

Possibility to enter and exit the game defines whether the players can enter and exit the game independently or not. For example, in *Counter-Strike* or soccer, the teams must be present all the time for gameplay. *World of Warcraft*, on the other hand, makes it possible to exit the game without hindering the game experience for others. In *Mythical: The Mobile Awakening* the opponent may not even know if the player is online or offline. Sometimes players unintentionally get a timeout and exit the game due to latency issues. These are unwanted technical issues and players have no control over them. Similar "timeouts" can be seen in sports when a player gets injured.

Temporality of gameplay defines how the game is played in relation to time. There are real-time games, turn-based games and tick-based games available. In real-time games, all players act simultaneously. Turn-based games have two possible solutions, I-Go-You-Go or We-Go. I-Go-You-Go means "standard" turn-based gameplay like in chess. Player A moves her piece and then player B moves her piece, giving the turn over to player A again. We-Go means that both or all players declare their actions independently but the actions are executed simultaneously when everyone has declared their "move". Tick-based solution means that there is a global timer in the game and when it hits zero, all the declared actions of the players take place.

¹⁹ <http://lord.lordlegacy.com/>

We can study which combinations support sporadic play in a casual mobile multiplayer context based on these four aspects. Starting from synchronicity, it can be speculated that asynchronous interaction should be used as a basis for a casual mobile multiplayer game and this was also the consensus in the discussions in the second workshop with the industry partners. Recently, there have been clear expectations for asynchronous mobile games (Zachary 2008). The technical limitations of the mobile network discussed earlier also suggest the use of asynchronous interaction.

The persistence of the game world is not a critical aspect, but it is important to understand the issue nevertheless. There should be a persistent game world in the game for supporting a long-lasting, continuous game experiences, and also a reason for the player to get back into the game world. However, when casuality is considered, the design might also be just the opposite, supporting short-time play sessions which have no relevance to each other.

There should be a possibility to enter and exit the game independently, as different players may have different resources for each play session.

When temporality of gameplay is considered, the tick-based option is the best as it automatically drives the game forward whether the player is paying attention to the game or not. However, the player must be able to set up some automated strategy which takes over when the player is offline. Real-time solution requires constant attention from the player and turn-based options make gameplay dependent of other players. It can be speculated that neither of them support casuality particularly well.

2.5.3. The Spatio-Temporal Perspective

Multiplayer games can also be looked at from the spatio-temporal perspective. Multiplayer arcade games were traditionally played on a single system in the same place at the same time. These types of games are still very popular, especially as party games. *Singstar*²⁰ and *Mario Party*²¹ are good examples of such games and these games are usually played synchronously in real-time. Splitting the screen is a common method for sharing the game space in a digital game.

Multiplayer games that are played in the same place but at a different time are often considered to be "hot seat" games where the players take turns on a single system. Naturally, these kinds of games are more than often turn-based games. Both same-place-same-time and same-place-different-time

²⁰ <http://www.singstargame.com>

²¹ <http://www.marioparty.com/>

games were popular multiplayer formats before the breakthrough of the internet.

The internet and networking make it possible to play multiplayer games at the same time but from different places. Basically all online games fall under this format and every player has their own system to access the game. The players might be totally unknown to each other and they never have to meet each other face-to-face to play the game.

Multiplayer games that are played at a different time in a different place usually feature asynchronicity in some form. Play-by-email games are examples of this category.

When casuality is considered, all these formats could be used. However, the most feasible solution would be the last one, featuring gameplay where the time and place are not relevant. By restricting the options by binding the player to a certain time or place to play the game, the casual nature of gameplay is also narrowed. However, there are exceptions like the abovementioned *SingStar* and *Mario Party* prove. They are often used as party games with a casual instrumental value - to have a good laugh and a great party.

2.5.4. Player Composition and Game Mode

The two major issues that set multiplayer games apart are the player composition and the game mode. Player composition defines whether the game is a solo or a team-based game. The game mode defines whether the game is based on versus play, co-operative play or collaborative play. In regard to casual mobile multiplayer games, these features present different challenges, which were discussed during the second workshop.

The opinion was that a multiplayer feature makes a game more complicated by itself, so complicated player compositions were ruled out from casual games and it came down to either having competitive or co-operative player versus environment play. The view was that competitive player versus player might not be very casual, but there are exceptions like the abovementioned *Mario Party*. *Mario Party* is a set of minigames which allow a wide range of player compositions. Like the name suggests, it is a game for parties where people want to have quick fun without being immersed too deeply into the game. This kind of a game does not overcome the social aspect of the party, but rather aims to stimulate the communication between the participants. One problem in casual competitive games, however, is the skill-base of players and player matching. If the skill level of the players becomes too great, the experience might not be very fun for the weaker player. This may depend on the player's attitude toward gaming in general as well, as some people do not care whether they win or lose. Different people look for different kinds of experiences from the games they play and

casual games are no exception to this. Games serve different purposes for different players.

The level of co-operation is closely related to player composition. Level of co-operation can be divided into three forms: no co-operation, co-operative or collaborative. No co-operation can be quickly judged as versus play between the players, but there is also a possibility that the players all play against the AI and there is no use, benefit or possibility to co-operate with others. There could be game mechanical or technical constraints that remove the necessity to interact or co-operate with the other players. Co-operative play is often seen in team games where two teams are formed to battle each others. However, there is no other bond between the players on the same team except that they just happened to join in the same play session. This is the difference between co-operative and collaborative play. In collaborative play, the players interact outside of the game with each other, planning strategies and so on. Basic example of co-operative play is when the player goes on a random public server to play a few rounds of *Counter-Strike*, whereas in collaborative play, the players form a clan and aim at mutual goals (being the top clan of the league, for example). Co-operative play supports short-time connection between the players (being on the same team in the same play session) whereas collaborative play supports long time connection between the players (playing on the same clan or guild with mutual goals). To put it shortly, co-operative play aims at short-term tactical goals while collaborative play aims at long-term strategic goals.

In casual games, versus play or co-operative play were considered to possibly be the most dominant as collaboration requires community activities and effort, which are something that might go against casuality. However, one example of collaborative casual play was raised up where a group of women played *Sims*²² in a casual collaborative manner by participating on community websites. Generally, it was noted that women especially enjoy co-operative games, even to the point that the idea of the game is turned upside down. There was an example of *Minebombers*²³ where players try to gather gold and other valuable artefacts while trying to kill the other players. However, the example group of women found it much more fun to just gather the valuables so that everyone gets her fair share, totally dismissing the violent interaction between the players. This emphasizes the fact that games serve different purposes for different people.

²² <http://thesims.ea.com/>

²³ <http://minebombers.urli.net/>

3. Design Research

The design research was focused on three different areas in the game development process. These areas were ideation, prototyping and evaluation, which can be seen as a continuum, where the designer starts with the ideation, creates a prototype based on the ideation and finally evaluates the prototype. This process can be examined on an individual level, a project level or even on a company level. On the individual level, a single designer may do all these tasks in one single day, coming up with an idea, sketching it and finally deciding if the sketch will be developed further. This kind of a process is very personal and there are as many ways to do it as there are designers. The GameSpace project approached these issues on the project level, where the designers work with ideation, prototyping and evaluation as a group.

In this section, we present the results from six GameSpace workshops and numerous case studies which were the core of this research project. After the introduction chapter, a summary of key findings from the design research are presented. Going further, the upcoming three chapters focus on ideation, prototyping and evaluation respectively.

3.1. Introduction

Game design knowledge can be represented and communicated in many ways. There exist, for example, industry guidelines for designing and developing games for mobile devices (Nokia 2004). There are also many books written by experienced game designers that aim to convey their understanding of what is a good game, how it operates and how to aim at creating new ones (e.g. Bates 2001; Crawford 2003; Rouse 2001; Salen & Zimmerman 2004). However, from our perspective, such written works do not provide data for research that would be as rich as observing actual design practices. Furthermore, since our aim is to experiment with design and develop new kinds of approaches for game design, finding a way to combine research with design was important.

The field of design research is very diverse, as work collected by Laurel (2003) points out. We were not only interested in doing research with design, and through design, but also research *into* design, meaning looking at the various issues involved with alternative game design approaches and processes on a more general meta-level. One of the most popular ways of working with game design is organising a game design workshop (Fullerton et al. 2004). A design

workshop is an intense meeting that typically lasts a few hours, where participants use one or several methods to create and discuss alternative designs for games. Workshops are utilised in design industry, design education and design research alike.

The benefits of using a workshop approach in GameSpace are threefold; firstly, design workshops are a focused, cost-effective way for the industry partners to interface with academic research. Secondly, a workshop can serve the dual aims of the project by both engaging in the creation of new game concepts, and operating as a research experiment for investigation that compares different means of creating them. Thirdly, workshops can be documented in multiple ways, providing opportunities for both free interaction and dialogue on issues relevant for multiple areas of research, and rich data for analysis afterwards.

Our workshops concentrated on three distinct phases in a game design process. As outlined in the project plan, the first three focused on producing new knowledge and methodologies concerning conceptualisation and idea generation. The next two concentrated on prototyping methods and the final two on evaluation and game experience. On average, each workshop lasted for one day and typically consisted of few hours of presentations, 3-5 hours of small group work on issues such as game design, prototyping and evaluation. At the end of the workshop, the results and findings were presented and discussed in detail.

3.2. Key Findings

- Stimuli matter in idea generation.
- Game specific idea generation methods work and provide a fun and playful atmosphere, which improves the mental quality of the session.
- Game specific idea generation methods allow the session to start immediately without the need of a session moderator.
- Documentation can be seen to be tedious when working with idea generation methods. Further research is required in this area.
- Wizard of Oz prototyping is a feasible method of prototyping asynchronous casual mobile multiplayer games, which support sporadic, slow-update gameplay.
- Although expert evaluation heuristics for games cover usability and gameplay issues pretty well, they lack features concerning casuality and mobility.

- Expert evaluation heuristics for games should contain fewer items and they should be presented in a more usable format, as color-coded cards for example.

3.3. Idea Generation

Idea generation is one of the least studied subjects in game research. This is particularly interesting as game design can be seen as a content creation business where good ideas can produce massive profits. Along with casualness, idea generation was another subject that was closely looked at in GameSpace. In this section, we cover theoretical background for idea generation and reveal the present industry practices on the subject. The three ideation workshops will be presented with relevant findings, along with the methods used in the workshops. GameSpace also commenced a pilot study where the GameSpace industry partners used an idea generation package for about three months in an actual use setting. The results of this study are presented at the end of this section.

3.3.1. Theoretical Background

The game industry as a “creative industry” is seeking ways and means to enhance and develop its creative processes (Tschang 2003). The ability to generate ideas is shown to be one of the characteristics of successful business ventures (Gabler et al. 2005). The game industry holds vast resources of highly talented and creative people, but this does not mean that creativity is an automated process. The task of getting the most out of the staff can be difficult: it is always balancing between freedom and restrictions, order and chaos. Even the most creative person can find herself struggling to fight against repetition.

Creativity can mean various things in our ordinary language. The most common thing is to connect creativity with different ways of self-expression or artistic skills, such as drawing. The modern notion of creativity usually refers to a certain kind of thinking.

Creative thinking involves processes of thinking towards the wide variety of different solutions rather than targeting a single one in order to break the patterns of the mind (de Bono 1970). We talk about “thinking differently” or “thinking outside of the box”. The latter expression is derived from a puzzle with nine dots and the task of drawing four connecting lines between them without lifting the pen (Figure 2). The brain is efficient in creating patterns (de Bono 1970). Therefore it is usual to struggle with the task, interpreting the formation of the dots as a box that cannot be stepped out of.

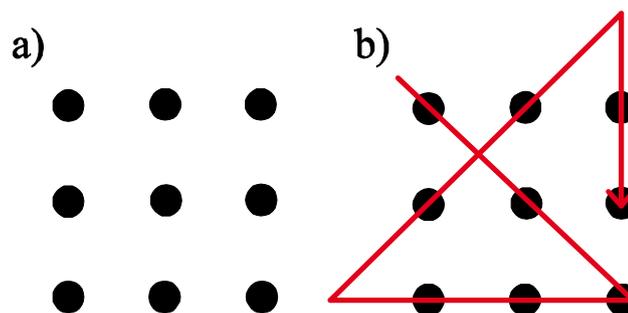


Figure 2. The puzzle (a) and one of its solutions (b). The task of the puzzle is to connect dots with four lines without lifting the pen. A relatively easy puzzle becomes complicated when we interpret the formation of dots as a frame that cannot be crossed.

In some sense, creativity can be seen as a combination of insight and special thinking skills, which de Bono calls lateral thinking skills. Lateral thinking involves processes of thinking towards the wide variety of different solutions rather than targeting a single one in order to break the patterns of the mind. In a more general sense, creativity can be seen as a complex phenomenon involving the operation of multiple influences as we move from an initial generation of an idea to the delivery of an innovative product (Mumford & Gustafson 1988). Designers are required to be creative on demand, yet the procedures and methods for breaking the common approaches are often based on intuitive belief systems rather than on an empirically validated theory (Perttula 2006).

The study of game design post mortems indicates that many of the difficulties with certain game productions were due to the lack of systematic approaches while others gained advantage by rationalizing their design processes (Tschang 2007). Game design should be seen as an organic process despite the possibilities to systematize its design processes. In order to follow the needs and practices of game designers, one must understand the current practices - what kind of situations game designers are faced with and more importantly: what they are already doing.

Although the processes of coming up with new ideas may seem mysterious, idea generation can be seen as a relatively structured and explainable process (Perttula 2006). This enables systematic approaches for enhancing creative processes of coming up with new ideas. Generating new ideas may also seem to be an easy task. One might feel that there is simply no need to enhance the process. However, creative skills and tools matter. Studies show that creativity training has the highest impact on the originality of ideas (Clapham 2003) and the amount of techniques for creating new ideas correlates with the amount of successful products (Parnes 1961, Sowrey 1989).

Studies also show that creative processes can be systematically improved by using specific techniques. In a successful ideating session, the generation of ideas is separated from idea evaluation and early criticism may be considered harmful to the overall process (Mumford & Gustafson 1988). Vertical thinking targets the one and only solution, whereas lateral thinking targets quantity (de Bono 1970) as a tool for quality (Mumford & Gustafson 1988). It should also be kept in mind that no single creativity technique can provide the ultimate solution for innovation in general: different techniques are needed (Sowrey 1989).

Since idea generation is not a random process governed solely by an individual's personal traits, but a relatively structured process that can be explained (Parnes 1961), a methodological approach is indeed possible.

Much of the research is concentrated on psychological or managerial factors of creativity. Relatively few studies have been conducted on a specificity of creative processes within game design, not to mention development of tools that especially improve such practices. One of the best-known and most researched techniques is brainstorming and it is also used among game designers.

Brainstorming was first formalised by an advertising executive Alex F. Osborn in the late 1930's. Throughout the years, lots of studies on the effects of this technique have been conducted. The problems of brainstorming are also well known by creativity researchers. The most common difficulties have been identified to be production blocking, social loafing, and fear of evaluation - phenomena problematic to any kind of group work. However, various versions, including Brainwriting, where instead of speaking out loud, participants concentrate on writing their ideas on a piece of paper, have been developed.

Throughout the years, the instructions of the technique have also been revised. It is recommended that brainstorming sessions have a strong facilitator that guides the session and keeps it together, and one of the most important guidelines for a brainstorming session is to aim for quantity and not quality, letting the mind explore a wide variety of possibilities. Despite the known problems in brainstorming, pivotal virtues of the idea generation have been expressed and also transferred to other techniques: equality among the participants and a relaxed and playful atmosphere. Furthermore, it is advised that instead of rejecting brainstorming or similar techniques, one should look for a versatile range of different approaches.

Creativity is also said to be domain specific (Baer 1994, Clapham 2003, Harkins & Macrosson 1990). Creativity performance in any domain requires domain-relevant skills, creativity-relevant skills and task motivation (Amabile 1990).

The notion of creativity as a domain specific phenomenon is rather intuitive: it is easy to understand that there is a difference between producing ideas for new car engines and ideas for new fashion creations. When it comes to the game industry, all game development projects and companies can be seen to be unique. Yet, we can see certain parts of the process that are consistent in nature across the board (Todd 2007).

3.3.2. Practices within the Industry

As a part of the MC2 -project finished earlier, eight Finnish game developers were interviewed during the autumn of 2005. All interviewees were in a leading role in their respective studios and held titles such as game producer, senior game designer, chief creative officer and so on.

The analysis of the interviews showed that there was very little formality or methodological approach when it came to generating ideas. Typically, ideas were just brought up by someone and then discussed with the rest of the design team. There was no clear answer to how the ideas were initially created. Brainstorming was mentioned several times with or without the support of post-it notes. One developer said that he uses mind-mapping for generating ideas. The most common idea generation method was plain brainstorming with a certain topic and a possible leader who guides the process.

Developers said that after coming up with a promising game idea, it is developed further into a game concept and presented to a board of people who decide whether the idea has potential or not. The board is usually formed of several people from various departments such as game design, marketing, quality & assurance, etc. Concept templates were used by every studio and all studios had a board of some sort to decide whether the ideas are turned into actual games or not. The concept templates hold all the crucial information about the game idea, sometimes accompanied by concept art or similar media to give better understanding. Getting ideas through to the board was thought to be difficult and sometimes, if not most of the time, people had to take a few steps back, tweak the idea and try selling it again.

In the GameSpace workshops (discussed later) an interest in the deeper understanding of game idea generation processes was born. Extensive interviews were executed on the practices and attitudes towards game ideas and methods used in game design processes as an addition to the MC2 -project interviews. We interviewed game designers and other game professionals within the consortium. The interviews were to function as a pre-study for the user study of the GameSpace game idea generation tools. Main topics, which were inquired, included questions about creativity, the form

and origin of game ideas and the informal and formal methods that were used to enhance the creative processes.

In a combination of these two samples, a total of 23 game professionals from 8 Finnish game companies were interviewed about their ideation practices. The interviews were semi-structured, thematic interviews, in which the interviewees could freely describe their perspectives on the subject matter. In the MC2 -project interviews, idea generation practices were discussed only as one side topic, whereas the latter interviews mainly concentrated on this topic.

In general, explicating the details of the game design process seemed challenging for game designers and other professionals. Game design is an organic process, where one moves according to the situation utilizing insight, skills and experience to end up with quality products. It is difficult to put it in words, especially when so many factors are dependent of the game in hand or the people involved. Despite this, many interviewees were able to designate some activities and approaches related to their creative processes, either situational factors, or purposeful acts.

Even though it is easy to come up with game ideas, it is not very easy to come up with good ideas, or ideas that others like or would approve. This became very evident, even though most of the respondents designated that coming up with ideas was easy for them. Some even expressed that this is very natural, pleasurable and a constant process for them. The ones who hesitated to answer positively, expressed that coming up with new ideas is difficult, since, even though the ideas are flowing, they may not be good or applicable. In these cases, interviewees reported that they were often hindered by their self-criticism, which slowed down the flow. Others reported that help was needed, meaning different techniques and group sessions.

Informal Approaches

The fact that game ideas may be inspired by many different sources does not mean that they do not have any sources. Interviewees were able to explicate some of their approaches, while some similarities occurred and individual differences were also expressed. Most probably, not all approaches used were mentioned.

Ideas were seen to be born from various inspirations. The most commonly expressed inspirations were reading, watching television shows and movies, or playing other games. Interviewees also mentioned that it was about a certain attitude towards life: keeping your eyes open, since almost anything could inspire a new game idea.

Some interviewees talked about activities that they did purposefully to evoke new ideas, which they found effective

or working for them. Walking in nature, taking long showers or simply giving up and getting into other tasks and letting ideas mature were mentioned by game idea creators. One interviewee mentioned that he orders a certain magazine to keep himself inspired.

Initial game ideas were reported to be born mostly in solitude. Many interviewees seemed to prefer this, even though some had faith in small group sessions. After gaining the initial game idea, bouncing the idea off someone else was seen to be very important by almost all of the interviewees. Although brainstorming and other group techniques were also devised for initial game idea generation, this was mainly reported to be used for developing the idea and further ideation - sometimes even to evaluate existing ideas.

Formal Techniques

Explicating what formal techniques were utilized was especially difficult for the interviewees. Either such techniques had been used once or twice, or they just did not remember the names of the techniques. Generally speaking, the interviewees responded positively to explicit inquiries about brainstorming and mind mapping activities. Either they used them regularly or they had some experiences of them. Other techniques that were mentioned included techniques with Post-it tags, Six thinking hats, Double Team, idea trees and different slip techniques. Other techniques were also mentioned, such as browsing Wikipedia before the actual brainstorming session, coming up with ideas by looking at some particular photographs in the group meeting and prototyping.

Brainstorming was identified as one of the most used techniques. However, many interviewees indicated that the process was not very systematized, or that they were not sure whether it was conducted professionally. Mainly, brainstorming sessions seemed to indicate different kinds of group gatherings. Others had opinions about successful brainstorming sessions: for example, it was stated that in order to have a successful session, the facilitator has to be experienced and talented with the technique.

Some of the interviewees had very positive experiences with brainstorming, even though most of them would still prioritize creation of initial ideas as an individual effort. In this sense, problems of formal techniques were also designated. Some expressed the need for training. Some interviewees commented that sometimes people did not know how to act in the situations in order to actually benefit from them or not to spoil the meeting for others. It was also felt that some kind of formal techniques could guide thoughts to a specific direction and thus not result in truly original ideas. One interviewee also expressed that the group situation may

go too fast and one cannot express one's idea, which will then come out wrongly and be suppressed. This could lead to a situation in which one could abandon an otherwise good idea because of the lack of motivation. The presence of critique was also expressed by others: too much critique put them down.

The number of participants was one of the problems discussed with formal techniques, as some felt that there were sometimes too many people involved. Sessions ended up with blunt and bad ideas. In relation to this, some of the interviewees expressed a concern that even though idea generation sessions may be fun, it is not certain that applicable ideas come out of the sessions. Sometimes ideas that were too far in the future and did not satisfy the current idea needs were created. This could create frustration about "ideating for the sake of ideating".

The Nature of Game Ideas

As difficult as it is to explain what games are, it is also difficult to clearly express what a game idea actually means. In general, game ideas were seen in many forms and appearances, varying from one-liners to 8 pages documents. The initial form was not limited. On the other hand, some priorities on the emphasis of the thematic or mechanic aspects of the idea were expressed. Interestingly, mechanics as a key point for the idea was expressed more often than thematic aspects.

In general, interviewees described the game idea work as a starting point for the game production, rather than a foundation for the product. However, some of the interviewees expressed that sometimes good ideas survived all through the production phase, giving an impression that they had a solid foundation that was kept untouched. Although, in general, interviewees expressed that game ideas may vary according to the games that are being designed, they also expressed some other interesting or preferred starting points apart from theme and mechanics, such as a particular emotional state of the player, a hook that keeps the player playing, the goal of the game or the form of interaction.

One of the most difficult questions posed to the interviewees concerned the selection processes of good ideas over bad ideas. For some, there were simply no bad ideas, since the execution was the key to the quality of a game, for others this was a matter of experience. It was difficult to turn experience into principles.

However, some interesting issues rose that were not directly related to the content of the idea, but rather to the reactions that a good idea could produce. A good idea was seen to be one that inspires you to immediately build more on top of it. This is related to the fact that the presentation of

ideas also becomes a key point: a good game idea is simple and easy to grasp, includes fresh breadth but is connected to something familiar. It was thought to be beneficial if the description gave enough information in order for one to imagine the idea, but enough space to develop it further.

Analyzing the ideas was also mentioned as a tool for selection. By looking at the components of a game, it can be predicted whether it will work or not. This is possible especially in cases in which the idea is based on an existing genre or game-type. It was seen to be more difficult with completely new game ideas. It was also stated that developing ideas further made evaluation easier.

Game ideas are prone to be altered in one way or another during the design process. This was emphasized virtually by all of the interviewees. However, while drastic changes were seen to be bad by others, some emphasized that the only thing that mattered was the quality of the end product. On the other hand, from the practical perspective, change was not very welcome. Some things were seen as good to be fixed before the game was going into production. Because of the nature of games as complicated experiential products, change was also seen to be inevitable. Some said that it is difficult to know whether an idea works or not before the first playables. In this sense, changing an idea was sometimes described to be something that "should be accepted". Despite change, it was expressed that it is not good to go into development with a rough idea and then change it during the process. Some also indicated that an idea might be changed because of the issues concerning marketing or target groups. One interviewee also mentioned that "in many cases, change is about translation, making it fit the target device".

A conclusion can be made based on the interviews that even though the processes of coming up with new ideas are not easy to explicate and describe, game ideas have their origin and the process can be purposefully affected. Game ideas also have their special nature, as has also been stated elsewhere (see Tschang 2003). Game designers acknowledge this by their experience and methods based on their intuition. Idea generation is enhanced, ignited, structured and guided with formal and more informal ways by various approaches. In order to further enhance the processes, the approaches should be further developed and systematized.

3.3.3. An Overview of the Workshops and Methods

The possibilities for game specific idea generation tools were examined in three GameSpace workshops. The experimental workshops were placed in the beginning of the project. The goal was two-fold: firstly, to examine the design space of casual, mobile and multiplayer games and to gather

preliminary experiences of the tools to support the generation of such ideas. During 2006 and 2007, over 240 new game ideas were documented successfully in our workshops with the help of our tools. The workshops were themed according to the dimensions of the design space outlined in the project plan - each workshop added a new dimension under inspection. The first workshop focused on casual games, the second on casual multiplayer games and finally, the third on casual mobile multiplayer games. This allowed us to concentrate especially on casual gameplay but also to compare the effects of the gradual broadening of the design space.

Workshop on Casual Games

In terms of idea generation methods, the goal of the workshop was to reach a better understanding of how idea generation could be enhanced and supported by means of more formal approaches. We were interested in how our industry partners experienced the different methods and what kind of questions or problems arose during the ideation and conceptualisation process.

The four methods used in the workshop were not designed according to a strict research question - instead we wanted to explore some of the possibilities of methodological idea generation. We were especially interested in four issues we saw as possibly affecting the effectiveness of a method:

1. Group procedures. What would be the best combination of collaborative, co-operative and individual processes for the ideating phase?
2. Intuitive vs. analytical thought process. Is it better to start with an analysis of something that is already working or will a more intuitive approach produce better results?
3. Domain-specificity. Should the method be tailored to casual game purposes or will a general method be a sufficient solution?
4. Strictness of procedure. Will a more specifically instructed method provide better support for creativity than a method that allows its users more freedom to decide what to do?

Emo (Figure 3) was the only method²⁴ that had an actual individual working phase written inside, even though it was otherwise entirely co-operative. The idea was to let the individuals clear their "creative heads" first in solitude by working with a computer program that gave random inputs of four words (emotional state + three stimuli words). The list of

²⁴ With *method* we mean a systematic process with a certain goal. This process is supported by instructions and possibly by accessories.

words used as stimuli consisted of words that supported casual games.



Figure 3. Screenshot from Emo.

MorF (Morphological Forced Connections Casual Game Idea Generation, Figure 4) mainly used *analytical thinking*. The main idea was to analyze one casual game according to the main attributes, find alternatives to these and make random combinations to trigger the idea of a new casual game.

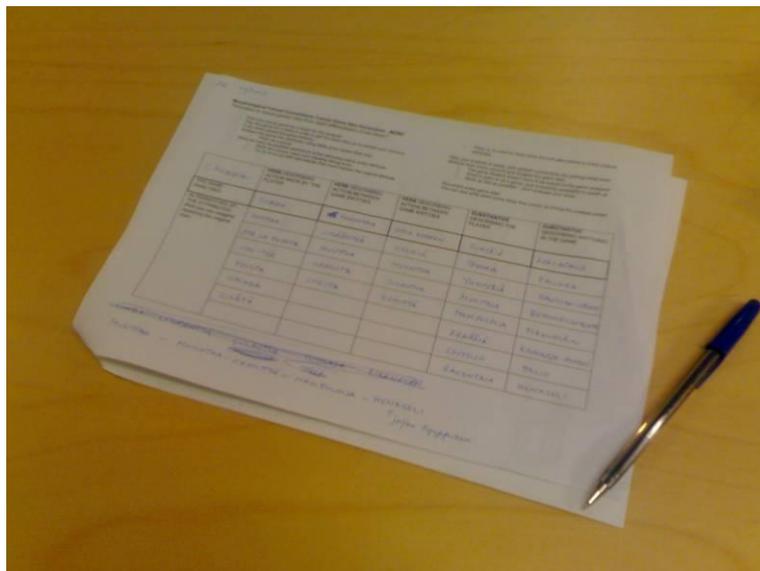


Figure 4. MorF was executed with the help of a pre-structured paper sheet.

PlayFirst utilized an idea to use a board game as a starting point or inspiration for generating casual game ideas. By picking a board game that is casual but not familiar to all, we supposed that it could trigger other casual ideas after a socially shared play experience. Playing in a group would also give a person a pleasant way of getting to know others and help build a fruitful atmosphere for ideating.

The VNA (Verbs, Nouns and Adjectives, Figure 5) idea generation method was based on three decks of cards: verbs, nouns and adjectives. The main idea was to generate game ideas which answer three questions: 1) what is done in the game? (Verb), 2) what things are in the game? (Noun) and 3) what kind of a distinct feature does the game have? (Adjective).



Figure 5. VNA had three decks of cards: verbs, nouns and adjectives.

Workshop on Casual Multiplayer Games

The results of the workshop on casual games led us to a more controlled research setting. We wanted to further explore the question of stimuli, which had been only implicitly present in the research issues of the previous workshop. By eliminating the group and other procedural factors, we could focus on reviewing the effects of various kinds of stimuli.

Again, we used four methods. However, this time they were simpler than the previous ones. All were turn-based and collaborative, sharing the formal features of instructions, group dynamics instructed, time used and rule-based style of the session. Distinctive features were thus on the level of stimuli. The specific research questions were as follows:

1. Will the methods have differing outputs in terms of idea quantity?
2. How will the nature of stimuli affect ideation? Will the more game-specific, structured approach give room for creativity and will the non-game-specific stimuli produce games at all?

In the BrainStorm -method the group was exposed to nothing but the other members of the group (Figure 6). Ideation proceeded in turns where each collaborated on a game idea. Main emphasis was on listening to others, recapping their ideas and putting one's own effort into the idea. The group decided when the idea was ready and documented it on the document sheet. The goal of the session was to produce as many ideas as possible and not evaluate their applicability during the ideating session.



Figure 6. BrainStorm -session.

GameBrain was almost identical to BrainStorm, except that every participant had a game to use as an inspiration for the ideating session (Figure 7). A game or any piece of a game could be used strictly (combining) or loosely (associatively) for the idea at hand.



Figure 7. GameBrain -session.

GameSeekers was a card-based ideation method with cards that had pictures, words, sentences and abstract forms on them (Figure 8). The stimuli consisted of non-game content such as pictures from magazines, random sentences and words in addition to abstract forms and formations.



Figure 8. GameSeekers -session.

It's a Game! was another card-based method with a special emphasis on game vocabulary that would support the ideation of multiplayer games (Figure 9). The stimuli consisted of clearly defined structural game elements such as goals, social roles and other formal structures of games on an abstract level.



Figure 9. It's a Game -session.

Workshop on Casual Mobile Multiplayer Games

The final workshop on idea generation methods also built on the previous ones, but this time the purpose was not so much to research specific issues, but mainly to gather more user experiences concerning the various approaches to ideation.

A total of eight methods were used, one of which, MorF 2.0, was an upgrade of a previously used method. As a continuation of the workshop on casual multiplayer games, the two methods It's a Game and GameSeekers were combined into one.

A special emphasis of the workshop was to try and find optimal stimuli for the methods in view of the experiences gained in the previous workshop.

PieceBox was very similar to GameBrain in the previous workshop except for the content used as stimuli. Instead of real games, the method used generic types of game elements such as various kinds of tokens from board games.

Out-of-the-Office forced the participants out of their normal surroundings by making them go out to places where they would not normally end up during a workday.

As mentioned earlier, It's a GameSeeker was the result of two previous methods, using game-specific, structural stimuli combined with challenging and inspirational stimuli consisting of pictures, random words and sentences.

SwopBook was a method of capturing the ideas that were born outside of the sessions during the two-day workshop. Each participant was given a notebook on which to write ideas. Participants were instructed to swap their books with other people after 3-5 ideas and further develop the ideas of others.

MorF 2.0 was a slightly modified software version of the MorF used in the first workshop.

GameBoard combined game-like, competitive elements with structural game design. The users played a game in which each added card (i.e. a new idea component) would reward the player with some number of tokens. The winner of the game was the one with the most tokens when the game idea was ready. The cards, i.e. the structural elements, contained goals, themes and mechanics. Solo and co-operative versions of the method were tested. GameBoard was inspired by the GameGame concept (Järvinen 2006).

Call Your Mama! used the gaming habits of potential target audiences as stimuli for creating game ideas. Each participant was to call their mother or some other close relative and ask a series of questions about the games they had played or would be willing to play.

Mechano was designed for producing game ideas with new game mechanics using stimuli consisting of everyday artefacts such as stapling machines, scissors etc. The method started with an individual analysis phase at the beginning of the session where each participant was to write down as many game mechanics as they could think of and then swap their list with another participant. These lists would then act as stimuli in an otherwise ordinary brainstorming session.

We also experimented with a couple of different ways of documenting ideas during the sessions. In the first workshop, we utilized a simple form including a couple of pre-set tables (such as "punch line", "references" etc.), in the second, we only used blank papers in order to reduce the guidance in the form of ideas, and for the last workshop, we experimented with two different and parallel ways of documentation: method of four papers and personal books. In the 4P (Four

Papers) method, the goal was to circle four document papers in parallel, where one stimuli could ignite up to four different variations of the idea or to supplement the previous ideas.

3.3.4. The Workshop Findings

The workshop settings and the tools utilized in them were designed in a fast-paced schedule. Despite such practicalities, we gained surprisingly rich data of experiences from different approaches. However, we found that the comparison of the specific methods and the ideas produced was not very fruitful and the main findings concentrated on the more general level of the role of such approaches and the directions of the development of game specific idea generation methods. The main findings of the workshop concerned the importance of the stimuli, the role of the designer and user experience.

The Importance of Stimuli

The results of the workshop on casual multiplayer games offered strong indications that creating ideas requires at least some stimuli. In BrainStorm, when no separate stimuli were provided, it was either taken from the surroundings or participants used an old idea of theirs to work on. Game ideas created in BrainStorm quite clearly reflected the things around the participants. As an example, a group ideating in a room with nothing else distinctive than the coffee mugs they had brought with them produced two game ideas about coffee mugs. Another group in a room with a poster as part of the furniture created a game idea based on the poster.

The nature of the stimuli and the ways in which they were presented to the users appeared to be critically important in the ideation process. When possible, users tended to use the stimuli as literally as possible. Methods that used random words often resulted in ideas that were simply combinations of the words given. Methods that used descriptions of structural game elements led to situations where users tried to force all of the elements into the same idea even though there were clear difficulties in doing so. Therefore, instead of using the stimuli to get inspired, the users saw them as building blocks.

We tried to counter this by using more abstract and complex stimuli. However, this caused other problems. When using complex stimuli such as games, users either became fixated with a single aspect of the game or were otherwise dominated by the game.

Our experiences indicate very strongly that stimuli matter greatly and that they can even be used to guide the ideation process to produce ideas with certain desired qualities. However, the mechanisms behind this appear to be quite complex and require further research.

The Role of the Designer

Analysing the ideas from the workshop on casual games led us to an interesting finding. We had hypothesised before the workshop, and similar views had been present in the closing discussion, that certain kinds of methods would produce game mechanics more clearly whereas others would be more suited for theme-based idea generation. Although this may still be correct, our analyses of the ideas from all workshops suggest that the properties of the method do not correlate with the completeness of the idea.

Out of the hundreds of ideas created during our idea generation workshops a great majority had a theme and a mechanic attached to a goal. Additionally, our tentative content analyses of the ideas showed no significant differences between the quality of the themes or mechanics that could be somehow attributed to a particular method.

Our view is that, regardless of the method and stimuli used, in the end it is the designer's expertise that creates the idea. Even if the method supports or is better suited only for the creation of a specific game element, the designer will turn the result into a complete game idea or fill in the gaps, so to speak. Virtually all of our workshop participants were professionals in the game development industry and a number of them were actual game designers so we cannot say what the situation would be with amateurs. From this point of view, we became more interested in the user experience of the idea generation methods as tools.

User Experience

During the workshops, we noticed that one can really generate ideas for quite a limited amount of time before it gets tiresome. Although no exact figure can be given, a rough estimate might be one to two hours per day as a maximum. The relatively short time of use makes it imperative that the method supports effective functioning for the whole time. Therefore one crucial aspect of a good method is its usability especially in terms of *learnability*, *efficiency* and *satisfaction*.

Although we could not find any significant differences between the ideas generated regarding the better suitability of certain methods for creating thematic ideas and others better suited for mechanics, our users often reported such an inclination. In those cases, it was also typical for the user to like the method and be able to use it *effectively*. Similarly, the methods that were either games or had significant game-like qualities were clearly perceived to be *easy to learn* and *easy to use*. These ways of understanding the action possibilities of the methods could be considered to be examples of perceived affordance and conventions in this context that could be further explored and utilized.

As a case of perceived affordances, some properties of the methods seemed to naturally incline participants towards a particular way of producing ideas. For instance, when using the GameSeekers method, the users almost instantly started to tell a story with their cards. Similarly, in It's a Game! the users created ideas in terms of interactions and relations between the players and the game elements.

A game-like format seems natural for a game idea generation method, but, more importantly, it allows the designers of the method to utilize the conventions of playing games to make the method more accessible to its users. For instance, the users of GameBoard, which is essentially a board game, were able to start the game in a matter of minutes and they explored the rules from a standpoint of typical card games. Likewise, as discussed below, the conventions of competition guide and give the users incentive to use the method.

We hypothesised that adding a competitive element to a method could improve its efficiency as it makes the goal of creating ideas more explicit to the users and gives them better incentive to try to accomplish it. At the same time, it might also improve the level of satisfaction gained from using the method.

For the designer of the method, competitive elements could open up new possibilities for controlling the execution of the method. We noticed especially during the second workshop that when using a turn-based card game -like method, users were prone to keep adding new cards (i.e. new idea components) until the idea became too complex. Using winning conditions would allow us to add a mechanism to influence users to keep the ideas simpler.

We could only test this during the last workshop and with a single method, GameBoard, so we can hardly say anything concrete on the issue. However, observations from the workshop did not really support our hypothesis. The users did not pay much attention to winning the game or gathering the tokens.

A major factor observed from using the methods and from discussions with the users was that not having fun while generating ideas clearly lessened the usability of a method. Most users commented that such methods were too much "like working". Methods that created and supported a more relaxed atmosphere seemed to suppress the users' self-criticism and evaluation of the ideas during the session, thus fostering a more creative atmosphere.

A number of things contributed to a method's level of fun, but some things seemed to be more important than others. Firstly, methods that had complex rules of procedure or unclear content led to confusion which in turn caused some of

the participants to think too much about the method instead of concentrating on creating ideas. Secondly, methods such as BrainStorm that made users work with minimal or non-existent stimuli, thus not actively supporting the users, had a clearly negative effect on some people.

3.3.5. Results from User Testing

Due to the limits of the workshop settings, we constructed a pilot study on the user experiences in real game development environments within our consortium. Six of our idea generation tools were finalized into product-like research prototypes and compiled into a study package. The package included six different methods, an instruction book and feedback cards (Figure 10). The packages were dealt out to the consortium partners with a short introduction about the tools. The duration of the test period was set to three months, starting from November 2007 and ending in the beginning of February 2008, in which time the companies used the techniques independently according to their needs.



Figure 10. The GameSpace Idea generation study material package.

The experiences from the test period were collected through three different channels. After the trial period, data of the use experiences was collected through an online survey and by interviewing 2-4 participants per company face to face or by

phone in a semi-structured manner. Feedback was also collected about the methods via feedback cards that were handed out along with the packages to fill in after any session.

About half of the interviewees had tried the tool set 2-5 times after three months. The test period was relatively short and was cut even shorter because of the Christmas holidays. Other reasons for not trying the set included lack of time and lack of allocation of time for idea generation sessions or the specificity of our tools not suiting the idea needs of one of the companies. Four companies successfully utilized the tools in their internal sessions during the period. The sessions had anything from a couple of participants to more than 20 and the duration of the trial sessions could be as short as 30 minutes or as long as one-day idea workshops.

Feedback of the trial period was mainly positive. All of the participants who answered the survey would continue to use the tools as well as recommend the set to others. Ideas produced during the sessions were considered to be interesting and inspiring, and despite the short duration of the test period, approximately two-thirds of the participants of the survey thought that some of the ideas produced during the sessions might lead to new products. Interestingly, the most popular tools were games themselves.

User Experiences of VNA

VNA was one of the tools selected for the study package. The workshop results indicated that the method worked, but the words in the cards could be revised. Initially, the word set was created ad hoc, aiming roughly at game-related vocabulary. In order for it to be more appropriate for casual game idea generation, the word set was revised by analyzing 40 casual and children's games and building a 240 word set (80 words per category) from the findings. Casual game ideas seemed to be easy to produce with the new word set, even though more hard core ideas were not excluded from the sessions. The study package version of the VNA also had a more polished layout (Figure 11).



Figure 11. The new layout of VNA.

From among all the methods in the study package, VNA was considered to be one of the most favourite techniques of

the set by more than a half of the users participating in the pilot study. VNA was rarely disfavoured. Only one of the interviewees expressed that this method in particular did not suite him. The rules of the other idea generation tools that were game-based were reported to be slightly varied, but with VNA the variations for the instructed action was reported less than in the others (see Figure 12). When it comes to positive feedback, VNA was reported to be a fast, easy and fun tool for coming up with new ideas. Other game-based methods had similarities to VNA, but some users considered VNA to be the most efficient one.

Even the word set of VNA gained interest in two of the testing companies. The assembly of the words was perceived to work well towards an easy flow of game ideas. Potential was also seen in possible variation of the word set. For example, money games could be supported with related words such as “jackpot” or “bet”. However, the word set was not thought to force ideas in one direction only: ideas varied from casual to hardcore and VNA was also reported along with another idea generation game, GameBoard, to produce a lot of crazy ideas as well as applicable ones.

The reasons that led one designer to discard the VNA game as not fitting him could be potential reasons for others not to choose to continue using this tool, as well. Some saw the production of small and high-level ideas as a virtue, but the same feature can be seen as a downside of the VNA: ideas produced with it are “too small and too abstract to deliver cohesive ideas”, as the user with negative experiences expressed it. One other user was also worried about whether the word set could become too repetitive in the long run.

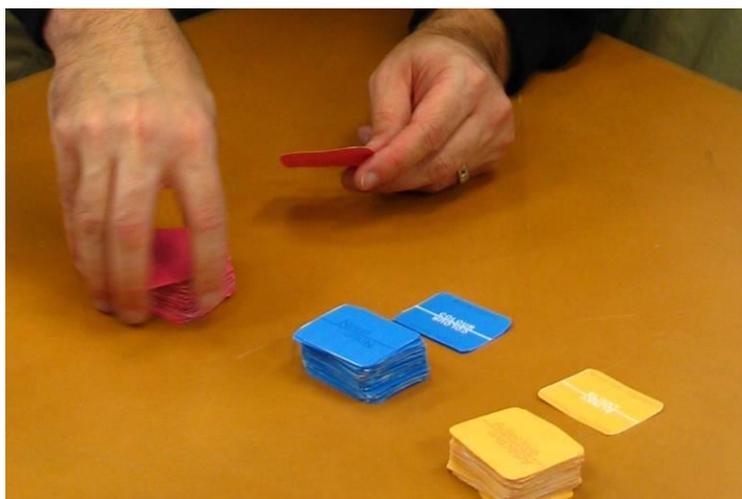


Figure 12. A game designer drawing a verb from a VNA deck while testing the opposite direction of the words: first drawing an adjective, then a noun and lastly a verb.

User Experiences of GameSeekers

It's a GameSeeker! was selected as the second game-based tool in the study package. It was a combination of two previous tools from the second workshop It's a Game! and GameSeekers. The tool was renamed GameSeekers to keep the name simple and the design of the game went through several iterations.

The GameSeekers study package version targeted collaborative gameplay with four different types of cards: red cards with photos of objects, people or abstract themes, purple cards with different black and white patterns, green cards with description of casual game genres or social aspects and blue cards with possible operations that can be done during the game (Figure 13).



Figure 13. GameSeekers has cards with abstract patterns, pictures, genre and social features as well as cards that operate the game play, such as a card that can be played if one wants to simplify one element of the game idea.

The test version of GameSeekers is played in a similar manner to UNO® by dealing a certain number of cards to each player and placing one card on the table by taking turns. There is no winner in the game, but one can try to reach the status of “idea dictator” who can decide to finalize the idea without the content of the others by being the first one to lay the last card on the table. Otherwise, the idea is finished after every player has passed their turn without taking any action.

The idea generated is build on associations that the players make with the cards in their hand at the same time creating connections with the existing cards on the table. The operative cards of the game can be used to remove an existing card, refine the whole game idea or simplify elements of the idea. During game play, one shared game idea is visually developed on the table like in a mindmapping process.

GameSeekers, along with VNA and GameBoard, was one of the tools that was tried most eagerly. One of the reasons for this may be that game designers thought that game-based tools were the most interesting ones based on their professional interests. On the other hand, some of the other

tools were reported to be slightly inefficient or a bit more difficult to approach. Out of the three idea generation games, GameSeekers was the one that did not gain any first places as a favorite. However, the tool gained some second places and got supportive feedback. It was said to produce interesting combinations of ideas and give inspiration for other ideas or features to be used in on-going productions. As a negative side, testers complained that the rules of the game were too complicated and the ideas were often too scattered and expanded (see Figure 14) which could also be seen as a difficulty for the documentation of ideas.

As for some of the users for whom VNA ideas were too small, this method gave more to chew on. Proponents of the VNA felt that GameSeekers was doing the same thing as VNA, but more slowly and some of the cards, such as genre cards, were considered to “carry too much into the idea”. However, some users felt that the pattern cards and picture cards had high potential and could be used in a similar manner to VNA.



Figure 14. Game designers playing GameSeekers.

User Experiences of GameBoard

Like GameSeekers, GameBoard went through several iteration rounds as well before gaining the final study package form. The last version (Figure 15) concluded as a competitive idea generation game for two to five players with two possible play modes; co-op play or solo play. In co-op play, all the players are working for one mutual game idea. In solo play, every player is working with their own game idea. The co-op version gained slightly more popularity.

The game is turn-based and the players allocate different cards from their hand onto the game board, filling up slots that represent different aspects of the game idea. From the perspective of idea generation, the goal of the game is to produce applicable and well-structured game ideas. From a game experience perspective, the goal of the player is to win

by collecting most score tokens by allocating cards onto the game board.



Figure 15. GameBoard included two sets of cards, co-op and solo boards and tokens to mark the cards that have been played as well as the amount of points received.

GameBoard gained only slightly fewer first places than VNA when we asked interviewees for their favourite methods. Thus, it ended up to be the second most favourite method of the set (of all the methods in the set). Interestingly, this method was expressed to be the least preferred method most frequently, as well.

The fans of GameBoard reported most emphatically about the up-sides of the tool even though they felt that there was need to tweak the rules of the game. The point system and the player tokens were seen to be an unnecessary feature of the game by most of the users, but some users still reported that the point system motivated them to participate in the action slightly more. Others were irritated about how some players played solely for the points and not for a good idea (see Figure 16).

The game was praised for its structured form alongside the fact that it made the players think outside of the box and expand their scope of games. Some users reported that GameBoard generated the most enjoyable idea generation sessions, for which many agreed also under the other games. In general, games were seen as a fun approach to idea generation when compared to traditional approaches.

For some of the users the long list of rules was an obstacle for the use of the game and made the session too long and slow to start. For others, the board felt intuitive and they made a game of their own by changing or simplifying the rules. Moreover, negative feedback also included comments about balance issues of the gameplay, such as the number of some particular cards or the effect of others.



Figure 16. GameSpace team members demonstrating the adding of a card on a co-op version of GameBoard and removing a card from another player's solo board.

Other Tools in the Set: PieceBox, MorF, Mechano and ThinkPak

Alongside the three game-based idea generation tools, the study package consisted of three other approaches. PieceBox featured a set of game-related toys to bring inspiration and devices for idea communication as well as a more playful atmosphere. Interestingly, the toy box was generally reported to be inefficient as an individual tool, but the emotional responses varied drastically: some expressed fondness for the box despite its inefficiency and others felt the use of the toys at the workplace to be slightly embarrassing. More seriously, the box was thought to be useful as a complimentary tool used with the other tools.

MorF was further developed into a fine-tuned computer program aiming to guide idea generation sessions. However, some of the users reported that even though this tool seemed effective and they had heard about the positive experiences of others, it was not prioritised over the game-based tools. One of the explanations for this prioritizing was that the designers already used a lot of computers in their daily work and they sought change to their working methods.

Mechano was the only one of the methods that had no hands-on pieces, since it was based on everyday objects, such as staplers and scissors, or anything that one can find in one's work environment. The use of the method required light preparations and this seemed to become an obstacle for use. Virtually none of the users tried the approach during the test period.

We also included a commercial idea generation tool, ThinkPak, in the package. ThinkPak aims at aiding general brainstorming session by suggesting relevant questions that could direct thinking outside of the common patterns in an idea generation session. The tool was mainly utilized by consortium partners who thought that the scope of our game

specific idea generation tools was too narrow. In general, ThinkPak was reported to be slightly difficult to utilize and it seemed to need quite a lot of familiarizing before use. The abstract level of the tool also led to the interpretation of the tool as "posterlike", presenting general rules for creative thinking that the users already knew.

The Power of Game-Based Tools

In general, GameSpace idea generation tools got positive feedback: users were eager to see improved version of the set. The sessions were considered fun and inspiring as well as useful. Some users felt that ideas produced during the sessions were not ready to take into production, but interesting and valuable features or initial ideas that they would not come up with otherwise were formed. Some users reported ideas that were already on their way to production.

The success of game-based techniques can be partially explored by the features that game play can bring to creative processes. While designers are required to be creative on demand, successful creative processes require a relaxed and playful atmosphere (Mumford & Gustafson 1988). Such an atmosphere can be difficult to create in busy and oppressive situations. This challenge is acknowledged in several studies of brainstorming; despite the original idea of a free and fluent atmosphere, the sessions are disturbed for example by fear of evaluation (Furnham & Yazdanpanahi 1994). While the right atmosphere is facilitated mentally in the minds of the participants in classical forms of brainstorming, idea generation games succeed in building a favourable atmosphere immediately and automatically when the players start to play.

Compared to similar setting of Brainstorming - VNA, GameSeekers and Gameboard create an easily facilitated idea generation session that gets ideas flowing immediately after the cards are dealt to the players. Typical brainstorming requires someone to shake up the participants in the beginning to loose them up and to guide the session in order to keep the focus. A playful atmosphere for the session is easy to achieve by idea generation games since they refer to the playful conventions familiar to anybody who has experiences of any card games, whereas typical brainstorming sessions seem formally more like serious business meetings. We are used to play card games by taking turns in an equal setting, usually in a non-serious mode. Business meetings usually have a chairman who directs the activity through hierarchy and division of labour. Creativity is found in the settings familiar to the former, not the latter.

A large part of the negative feedback consisted of issues to do with unbalanced game play, which indicates that issues with GameSeekers and GameBoard could be solved. This could be seen as the challenge of game-based tools: as the idea

generation games become more complicated, it becomes more difficult to polish the game play. However, based on our experiences, GameSpace games have already become immersive enough for the players to free their thinking and let the game facilitate the process and keep the focus. The structure of these games is strong enough to support certain kinds of ideas, such as casual games. Designers can temporarily forget the focus and play these games even though other specific restrictions for game ideas are explicated in the beginning of the session.

The test period was relatively short in duration, possibly covering only one chapter of the production cycle. One interviewee expressed that he did not have any need for new ideas at the moment, since the cycle was at its other half - in a phase in which he worked on a ready set of ideas. We also conducted this study with selected companies, which may not represent a broader view on game idea generation. Already based on this study, one can see that opinions vary strongly according to individual ideation manners and customs. Because of this, the pilot nature of this study should be emphasized. This study sets directions for future work. The results of this experiment indicate that even though the participants' opinions about the tools varied, game-based techniques rose as the most popular and favorite of the designers, resulting also as an interesting field of study. Even though the games also received some negative opinions from the users and these tools are still in need of tweaking, the overall opinion of the whole package was positive and encouraging: all of the users would continue to utilize the tools. Even the ones that were, and may still be, slightly skeptic about the approach, are interested in seeing what more tools like this can do.

3.4. Prototyping

Prototyping was the second focus point in the GameSpace project. The goal was to study different prototyping methods, which would be suitable for prototyping casual mobile multiplayer games. There were two prototyping workshops that involved the use of low- and medium-fidelity methods to build prototypes.

The first sub-chapter gives an introduction to prototyping in general. The following two chapters introduce the two prototyping workshops with their findings and the last two sub-chapters present two case studies in greater detail.

3.4.1. Basics of Prototyping

Prototyping is considered to be an effective working method in a game design process (Friedl 2003, Fullerton et al. 2004,

Ollila et al. 2008). The word prototype is originated from the Greek word *prōtotypōn*, which is a neuter of the word *prōtotypos*, meaning archetypal²⁵. There are several glossary definitions available on the web:

"A sample of a part or product fabricated in advance of production to allow demonstration, evaluation, or testing of the product." 26

"A less formal experimental and experiential development process of a proposed application for the purpose of demonstrating some or all of its functional capabilities." 27

"A working model created to demonstrate crucial aspects of a program without creating a fully detailed program." 28

"A quickly developed version of software which is probably incomplete or inefficient." 29

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

Game designers use prototyping for various reasons. Friedl (2003) recognizes three different types of prototyping:

1. Experimental prototyping, which determines how adequate and efficient a proposed solution to a given problem may be.
2. Investigational prototyping, the primary goal of which is to achieve an early clarification of specific requirements and explore the problem space from multiple directions.
3. Evolutionary prototyping, which means adapting a new system or simulation to meet new or changed requirements and conditions.

Friedl continues to summarize the advantages of rapid prototyping. Prototyping reduces development time and cost, presents clear requirements, works as a creativity tool, produces early feedback from the target audience and the community, enhances communication inside the development team, and allows early balancing of creative vision and technological preconditions.

²⁵ <http://www.merriam-webster.com/dictionary/prototype>

²⁶ http://www.csa.com/discoveryguides/rapidman/gloss_f.php

²⁷ <http://www.csUMB.edu/site/x7101.xml>

²⁸ <http://www.e-learningguru.com/gloss.htm>

²⁹ <http://www.comsci.us/compiler/notes/ch09.html>

Rapid prototyping is connected to the iterative design process. Iterative game design is a design methodology based on cyclic events in which the game features are constantly planned, implemented, tested and evaluated (Friedl 2003). Rather than trying to develop the game with a “single shot”, the game is developed piece-by-piece while constantly monitoring the process through iterations. The iterative design process is a widely recommended methodology for game development (Onder 2002, Friedl 2003, Fullerton et al. 2004, Barry 2005).

Eric Todd, Senior Development Director for Maxis, has stated that “words are fundamentally a terrible way of communicating interactivity” in reference to communicating design concepts (Waugh 2006). Chris Hecker, a developer in the same company, stated that “You can’t argue with a prototype, if it’s cool, people shut up”. Gingold and Hecker consider a prototype to be a more valuable asset in game development than the design document, which is not interactive but boring, tedious to create and parse and there is no science behind it as one cannot test whether the game described in the design document is actually fun to play or not (Gingold & Hecker 2006).

Choosing the right prototyping method is crucial in game development (Ollila et al. 2008). Traditionally, the different prototyping methods have been divided into two categories, low-fidelity and high-fidelity prototypes (Jones & Marsden 2006) or physical and software prototypes (Fullerton et al. 2004). Friedl provides an image explaining the different methods (Figure 17).

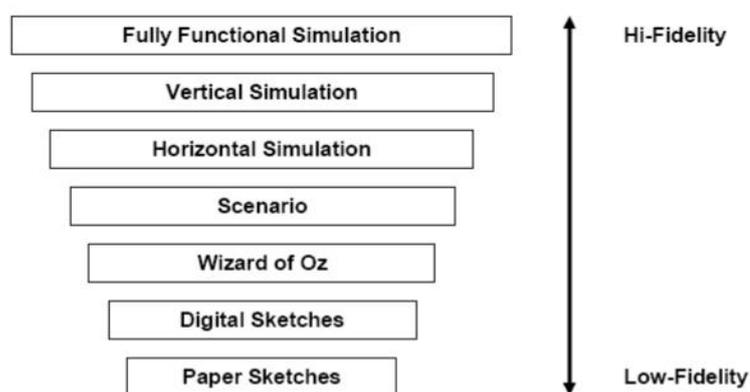


Figure 17. Prototyping methods according to Friedl (2003).

Sketches can be used to quickly illustrate the core features of the game interface, for example. Scenarios can be either physical (story boards etc.) or software demonstrations of an isolated feature or instance of the game. Horizontal simulations cover several or all of the features of a game in low detail whereas vertical simulation focuses on modeling

one feature in higher detail. Wizard of Oz prototyping is discussed further on in this paper.

McCurdy et al. (2006) present a different approach with five different dimensions of prototyping where each dimension can have a high or low fidelity equivalent. The five dimensions are:

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

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

A prototype should be a falsifiable system that makes a claim that can be tested. There must be a design question to be answered or a feature to be validated or disproved because otherwise the prototype is gratuitous (Gingold & Hecker 2006). Prototyping can be thought of as a system with input and output, design questions and answers. Rapid prototyping allows one to see the faults in game design early, when it is still inexpensive to fix them.

Special interest in the project was placed on the Wizard of Oz method. The term (originally Oz paradigm) was created by Kelley (1983) but the approach was first used by Gould et al. (1983). The term refers to the fantasy book *The Wonderful Wizard of Oz* written by Lyman Frank Baum in 1900. The book features a character known as the Wizard, who is actually an ordinary man working behind the curtains and pretending to be a powerful wizard. In the Wizard of Oz method, the user is made to believe that they are interacting with a system, when in reality the system is actually operated by a human being - the wizard - who observes the user and interprets her commands. Wizard of Oz can be seen as a medium fidelity method (Friedl 2003) and it has been traditionally used in natural language interface experiments and intelligent agent design (Anderson et al. 2002). Friedl recognizes that the method's strengths are in evaluation without detailed programming, getting feedback about the interactivity processes and that it is independent of the technologies

available. For the weaknesses, Friedl (2003) lists the difficulty in setting up the experiment and that the method may require additional training for the wizard.

3.4.2. Low-Tech Prototyping Workshop

The first prototyping workshop focused on low-level paper prototyping was held in the fall of 2007 at the University of Tampere. The workshop featured 10 participants with a wide array of different materials to work with. In the workshop, the participants created three different paper prototypes of casual mobile multiplayer games.

Introduction

The workshop was a one-day (13.9.2007) session running from 9:00 to 16:00. The day started with Janne Paavilainen's introduction of the *GameSpace* project. Following this, workshop details were introduced along with the timetable. Johannes Niemelä continued with a presentation about low-tech prototyping in general. The agenda of the workshop was to study different approaches to prototyping game mechanics with low-tech tools and to get feasible prototypes of casual mobile multiplayer game concepts.

Three prototyping teams were formed containing three members each. Each team picked one game concept to prototype. The concepts to choose from were:

- Fame the Game: WLAN based social networking game for clubbers and others who enjoy spending time in bars & nightclubs while socializing with friends.
- MobileQuiz: A mobile trivia game that uses Bluetooth connection for multiplayer. One player starts the game and others join in. A client package can be send to other players.
- Builders & Scavengers: A more traditional strategy game in a medieval world where players take the roles of being either builders or scavengers while collecting game resources via Bluetooth.
- Match-3-Multiplayer: A tried and true puzzle concept for a mobile platform with a multiplayer twist.
- Mobile Betting: A money-based game where players create the content and challenge others to bet via an SMS-based system.
- The Running Men: A one-button action game with synchronous real-time play for multiple players.

The games represented different approaches to the temporal multiplayer interaction theory (see 2.5 Multiplayer). The three concepts selected were Fame the Game, Builders & Scavengers and The Running Men. The first two represent asynchronous real-time games and the last one represents synchronous real-time games. The groups were instructed to focus on game mechanics and how to communicate the game idea through a low-tech prototype.

The work on the prototypes lasted for several hours, including iterations. Towards the end, the groups were given interruption cards which represented different interruptions common to the mobile platform. The 14 interruption cards represented events such as incoming calls, latency issues and real world distractions, for example. The groups were also given four different sets of expert evaluation heuristics which could be used as guidelines to validate the prototype where applicable.

After the prototypes were finished, each group presented their prototypes (videos are available on the GameSpace extranet) which were reflected on together with GameSpace research team prototypes which had been made earlier. Each prototype pair was discussed briefly and after all the prototypes were presented and discussed, the workshop ended with a closing discussion.

Findings

The four major findings of the workshop are related to the validity of the game concepts, challenge of representing multiplayer games, possibilities of low-tech prototyping with casual games and the use the appropriate materials.

The issue of the validity of game concepts was raised by the group that prototyped Builders & Scavengers. According to the group, prototyping was a challenging process since the game concept documentation was not as accurate as was hoped. This issue led to a feature brainstorming that reduced the time for an efficient prototyping process. Because game mechanics were not clear enough, it was hard to prototype the game. This underlines the importance of a proper research question which is to be answered with the prototype.

The challenge of representing multiplayer games was an issue for the two teams that prototyped Fame the Game and Builders & Scavengers. Each concept had a feature which involved a multiplayer interaction with either WLAN or Bluetooth radios. However, it was very difficult to predict actual player behaviour in such a context which made prototyping difficult. The answer would have been some sort of a simulation run with a computer perhaps, but as this was a low-tech prototyping workshop, such resources were not allowed to be used. This issue underlines the restrictions of low-tech game mechanic prototyping with multiplayer games.

The Fame the Game group was not able to prototype further as they would have needed a computer simulation model for modeling social networking and the emergent dependencies.

Low-tech prototyping methods and casual games were seen as a promising mix. Casual games rely on simple game mechanics that are easy to understand and the low-tech approach seemed to support this design aspect. With low-tech methods, it was not possible to come up with complicated game mechanics and features. Thus, the whole design session worked towards understandable and simple game mechanics that support the casual domain. It was stated that the casual aspect was forgotten as a design goal during the work but the low-tech materials kept things simple automatically.

The issue of the use of appropriate materials came up in the Fame the Game team. The team decided to use Legos for representing the characters in the game. Later in the discussion, participants wondered if miniature characters would have been better and the resulting discussion revealed that Legos were a good choice after all, as the team was able to represent character attributes by using Legos of different sizes and colors. Legos are stackable, so it was easy to build different kinds of characters with different attributes, which were visualized by the size and color patterns of different Legos.

The objectivity in prototyping was also considered to be an important issue. Designers may fall in love with their prototypes, making them biased when the prototypes are evaluated critically. This emphasizes the importance of prototype playtesting by co-workers or other trustees who can give an objective opinion of the design. This also means that the prototype must be able to communicate its objective clearly.

The interruption cards used in the workshop were considered useful, although most of them could be tackled with certain development platform solutions. The expert evaluation heuristics were also considered useful when validating the prototypes, but lack of time and the poor presentation in the form of numerous listed items gathered into a piece of paper made the use of heuristics awkward and cumbersome.

3.4.3. Mid-Tech Prototyping Workshop

The second prototyping workshop held in the winter of 2008 focused on mid-tech (or medium-fidelity) prototyping. Mid-tech prototyping means the use of existing software infrastructures which are not necessarily originally intended to be used as prototyping tools. In this workshop, the participants worked with three different mid-tech prototyping cases and the workshop featured a start-up day, a remote work period and a wrap-up day.

Introduction

The workshop started on 29th January 2008. The goal of the workshop was to find out how SMS messaging and social media websites can be used as aids in prototyping. Unlike previous workshops, this workshop featured separate start-up and wrap-up days with remote work days in between. The wrap-up date was 7th February 2008, so there was about a week for remote working with the workshop concepts. The GameSpace research team had prepared three different cases for the participants. There were two prototype games and one web application tool produced in the IPerG project. The participants were divided into teams, which would be working with the cases during the remote work period.

The first workshop case focused on using a social media website as a tool for mid-tech prototyping. The GameSpace research team designed a cross-platform word game, which was a Facebook application played by mobile phones. The second workshop case was based on using SMS as a game interaction tool. The case featured a mobile quiz prototype game, which was iteratively re-designed during the remote work period. The third and final case was a web application tool used for creating scenarios in a massively multiplayer mobile game. The idea was to encourage participants to distribute remote prototyping with the web application. The first two cases are presented separately in chapters 3.4.4 and 3.4.5; the last case did not produce any findings as it was not used due to both technical difficulties and difficulties in understanding the tool and its capabilities.

The general findings concerning the workshop are presented below. The findings from the two case studies can be found in their respective chapters 3.4.4 and 3.4.5 after the general workshop findings.

Findings

The idea of a distributed remote workshop, or "a shadow workshop" worked well and the concept was liked by the participants. It was considered to work well if the participants had clear goals in the study cases. This was an apparent difference between the cases of *Opportunity!* and *Flosters*. In *Opportunity!*, the participants had clear goals and they were obligated to participate through daily interviews. In *Flosters*, the goals were vaguer and the participants were not obligated and therefore the experiment was not as successful as with *Opportunity!* The remote workshop concept allowed time to consider things at a slow pace but also gave an opportunity to not contribute at all.

3.4.4. Case Study: *Flosters*

Friends Lost in Letters or *Flosters* (Figure 18) is a cross-media prototype game which runs on the web and is playable with a

mobile phone. The web application was embedded as a Facebook application which can be installed into the user's Facebook account.

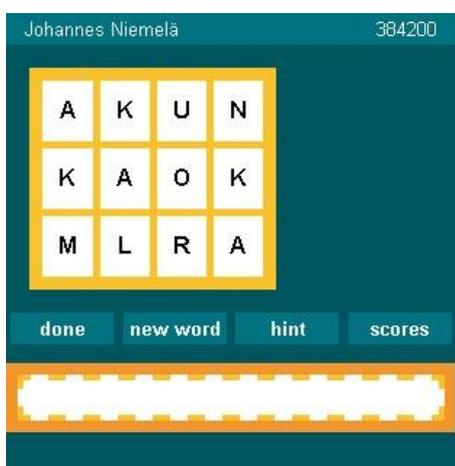


Figure 18. *Flosters* Game Screen.

Introduction

The goal of the *Flosters* experiment was to study the possibilities of using a social media website as a prototyping tool. In this case, the game was embedded into a popular social media website and took advantage of a player's social network. We selected Facebook as the platform as it was considered to be the most feasible platform at the time.

Flosters is a word game where the player receives random letters based on her Facebook contacts' names. The player can use the letters to create standard words, which are checked from an online dictionary library. The player can also try to create the name of her contact from which the letters are drawn from, which scores more points.

The game was accessed with a mobile phone by opening the <http://gamelab.uta.fi/flosters> website with the mobile phone's browser. From there, the player logs in to her Facebook account and starts the game. The game was developed for any S60 3rd edition mobile phones but due to time limits, it was only tested with the Nokia E70 mobile phone which was used by the research team. The game requires JavaScript to work properly.

During the remote work period, the workshop participants were asked to play and experience the prototype and give comments in the *Flosters* discussion forums which were set up in Facebook. The participants were instructed to discuss the use of social information in the game and the advantages and disadvantages of the Facebook platform. The participants were also encouraged to distribute the prototype URL to their friends.

Findings

The prototype was considered more fun as it was about the user's own friends. Using celebrity names could have worked also. There was a hint system which helped to identify the name of the friend in question by giving small details about the friend. However, there was no extended interest to get back into the game, which is a crucial feature in a social media game. For example, in the Facebook game *Parking Wars*³⁰ the core idea is to wait for an optimal amount of time so the player can ticket her friend with as big a parking fine as possible. Giving the fine too soon gives less points and waiting too long might end up in getting no points at all as the friend might leave the fineable parking lot.

The *Flosters* group had 16 members in Facebook and 15 of them scored points in *Flosters*. Six members were from the *GameSpace* research team, four members were from the industry partners and six members were outsiders, who were not directly involved in the *GameSpace* project. There were five discussion topics; all of them were initiated by a *GameSpace* researcher. The topics held 33 posts and 17 of them were written by the researcher. The *GameSpace* researcher received about 15 emails, which were mostly about how to access the game or other accessibility issues. Unfortunately, there were no comments about using a social media website as a prototyping tool. Participants played the game but rarely commented and comments received did not produce knowledge or information that was not known beforehand. The prototype was viewed as an interesting experiment in a social media setting but there were basic usability problems concerning accessibility and lack of proper instructions. Facebook users with many friends also felt that the game was difficult, as the contact database to randomize the letters was rather large, and it was hard to guess whose name was used for creating the letters.

The discussions were considered fragmented and the Facebook discussion board system was not liked. There was a critical mass problem as people seemed to be reluctant to participate in the discussions. The speculation was that if there had been a real social game going on between the participants, there would have been more discussions also.

The prototype showed that implementing social information in game mechanics makes a game more interesting, but other than that, the findings from using a social media website for prototyping are vague. It can be speculated that a social media website such as Facebook could be used in viral distribution for gaining a number of playtesters quickly. However, the game must contain proper

³⁰ http://www.facebook.com/applications/Parking_Wars/31435010008

instructions and clear game mechanics to make the prototype as accessible as possible.

3.4.5. Case Study: *Opportunity!*

Opportunity! was an SMS (Short Message Service, i.e. mobile phone text message) based casual mobile multiplayer quiz game prototype. The goal of the *Opportunity!* experiment was to evaluate if it is possible to implement authentic mobile use context in an iterative prototyping process in a cost-effective and flexible manner through the use of the Wizard of Oz method. The experiment ran for three days and there were seven participants, excluding the wizard. The participants knew that the game was operated by a wizard, as the experiment was artificially labeled an in-house game design process with the goal of creating a compelling casual mobile multiplayer game for the Nordic markets. The theme of *Opportunity!* was a quiz game in which SMS technology was used for asking and answering questions. The quiz game theme was selected due to its casual nature. The wizard sent three to five quiz questions per day, which were to be answered by the participants. In addition, the participants could call for special features, which were designed through an iterative process. These special features were activated via SMS, as well. The game was played during the business hours and the participants were consulted for feedback after each day. The participants were asked to give feedback on the game and on the prototyping method. Based on the feedback, the game was iterated twice, resulting in new features and more complex gameplay. The participants gave feedback via phone call interviews, which were recorded for further analysis. Each participant was called in the evening of each day, resulting in 21 interviews, each lasting from 4 to 15 minutes. The technological infrastructure of the game was very simple. The players used their own mobile phones and did not need any additional equipment. The wizard used a Nokia E70 mobile phone for the SMS communication which was attached to a desktop computer for fast and easy mass messaging. Fast and easy mass messaging was made possible with the Nokia PC Suite software. The game data (messages, scores etc.) was gathered into an Excel spreadsheet, which also worked as a game event log. For the interviews, Symbian-based phone call recording software was installed on the wizard's mobile phone so all the interviews were available for later analysis.

The First Day

The first day of the experiment introduced the game system to the players. The game had two features during the first day, the multiple choice questions and the leaderboard. The game featured three simple multiple choice questions with an answer time limit from 2 to 10 minutes. Every participant had

an equal chance to receive points by answering correctly by choosing from four possible options and the wizard announced the result of the answer to each participant individually. The participants answered the questions with their username and the answer option (a, b, c and d). The point prize for the questions varied depending on the difficulty of the question. At the end of the day, a leaderboard featuring everyone's score was sent to each participant. The first day ended with the interview phone calls. The interviews revealed that the participants liked the game concept and latency was not an issue. The participants said that the game fit into their daily activities at work well and the short play sessions supported the mobile use context. There were not many suggestions on how to make the game better, but one of them led to a new feature for the second day (see Sacrifice below). The participants were aware of the fact that the answers could be easily acquired from Google or Wikipedia and hoped for harder questions because of this. The prototyping method did not receive specific feedback yet but it was thought to be an interesting experience. Two new features were implemented based on the first day interviews, Duel and Sacrifice. The participants would be able to steal another participant's score by dueling one-on-one and also sacrifice their own points in the hope of reducing more points from the participant of their choosing. Each of these features could be called for once during the second day. However, a participant could be targeted for these new features for multiple times during the second day. Gaming history was selected as the theme for the quiz and the questions were designed more carefully in hopes of harder questions which would lead to minimal abuse of Google or Wikipedia.

The Second Day

The second day started with the explanation of the new features via SMS. Four multiple choice questions were asked during the day and four participants missed a question due to various reasons like meeting at the workplace or forgetting the mobile phone into a silent mode. The new features were used, but not as much as was expected. Like on the first day, the day ended with a leaderboard update and interview phone calls. Feedback revealed that although the new features were liked, they were not used due to tactical reasons. Either the participant was in a comfortable position on the leaderboard and did not want to risk losing points or the participant felt that she might not have a chance in a duel if the other participant had Google or Wikipedia open. All of the participants agreed that the game got better due to the new features and only one participant hoped for another theme for the questions. This time there were several suggestions on how to improve the game. The participants wanted more

conflict between the participants, ability to catch-up to the top participants and a mini-game was also suggested. The participants were now confident that the prototyping method worked and the direct phone call interviews at the end of the day were considered to be a good way to collect feedback. Three new features were implemented based on the interviews. A mini-game was added. In it, the participants guessed the final top three participants of the game and correct guessing would result in bonus points. The participants could also request a personal joker question which worked as a catch-up method for those who had been left behind on the leaderboard. Finally, there was a special free-for-all question which would either double the participant's score or result in a high penalty.

The Third Day

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

Findings

The interviews revealed that the game was considered a success and the method produced real gaming experiences in an authentic mobile use context. The game was considered to be better than during the first two days due to the new features. One participant gave a negative comment about the in-game status updates, which were not always relevant to her. Overall, the participants felt that the experiment was a success as the mobile use context and real gaming experiences were achieved, and the iterative prototyping method proved itself to be useful. It was considered that Wizard of Oz prototyping would be especially well suited for prototyping mobile asynchronous multiplayer games which feature sporadic gameplay.

3.5. Evaluation

Evaluation was the third area of interest in the GameSpace research project. The research was based on a practical approach and the research team was involved in five different game evaluations varying from single player mobile games to

pervasive mobile multiplayer games. One workshop was also dedicated to the study of expert evaluation methods.

One of the goals in *GameSpace* was to develop evaluation methods for casual mobile multiplayer games. Current evaluation methods, such as expert evaluation heuristics for example, cover the aspects of mobility and multiplayer but casuality is something that has not been approached yet by the evaluation methodology. The work on casual game heuristics started in *GameSpace* and it will be continued in the *Galn* project. Casual game heuristics were discussed in the sixth *GameSpace* workshop with new ideas on how to present the heuristics to the user.

In this section, we present an introduction to game evaluation and focus on two different evaluation approaches: expert evaluation and user evaluation. The section continues with a chapter presenting the sixth *GameSpace* workshop. The final four chapters present different case evaluations in which the *GameSpace* research team participated.

3.5.1. Introduction

The purpose of evaluation is to improve the quality of the developed product. For utility software, usability is one of the key criteria to ensure product quality (e.g. Barendregt et al. 2003). The attributes for usability are effectiveness, efficiency and satisfaction (ISO 1998). For digital games, one must go beyond this definition as attributes such as challenge and fun become important, as well (Pagulayan & Steury 2004). The goal for utility software is to be “easy to learn, easy to master”; whereas for digital games it would be “easy to learn, difficult to master” (Malone 1982). When evaluating digital games, the term usability is often replaced with the term playability, which not only covers the usability of the game or its interface, but also focuses on game specific properties such as game mechanics and game experience (Desurvire et al. 2004).

Although utility software evaluation has a long-standing history, the systematic use of game evaluation methods in game development started to appear as late as the late 1990's. *Microsoft Game Studios* was one of the first game development studios to address user evaluation for their products (Amaya et al. 2008). Quality assurance (QA) has been done in game development before but the role and purpose of QA is different from user or expert evaluation. QA is commenced in a late phase of the development cycle and it focuses on the technical integrity of the product. Game evaluation focuses on the experiential factor of playability. Playability can be considered to be a merge of usability and gameplay, which ultimately defines whether the game has the potential to be a fun and exciting experience or not. Game evaluation methods can be used from the very beginning of

the game development life-cycle and it is encouraged as modifications to the game are easier and inexpensive to make in the early phases. The evaluation methods can be divided into two different groups, expert evaluation and user evaluation.

Expert Evaluation

Expert evaluation is described as follows: "In an expert evaluation, a group of evaluators review the game; they look for potential usability and gameplay problems that may hinder playing the game. After the review, the evaluators create a report in which they present the findings, discuss the reasons behind them, and suggest solutions how the problems can be addressed" (Laitinen 2008). Expert evaluation is a fast and cost-effective method for finding playability problems in game designs. It is well suited for development projects that have tight schedules and budgets. Laitinen suggests using several evaluators who are preferably double-experts (Laitinen 2008) i.e experts in evaluation methods and also experts in the evaluated domain which could be a specific game genre, for example. According to Laitinen, practice has shown that three evaluators are enough and adding more evaluators does not increase the efficiency of the method (Laitinen 2008).

One common expert evaluation method is heuristic evaluation. Heuristics are a set of rules, guides or suggestions that help researchers to find usability problems. In short, heuristic can be seen as a rule of thumb. Heuristics in computer science have been traditionally focused on usability evaluation in internet and software design (Desurvire et al. 2004). Game related heuristics have been appearing since 1980 when Malone introduced heuristics for instructional games (Malone 1980). Currently, there are many different heuristics available for game evaluation, which will be discussed in chapter 3.5.2.

Expert evaluation is interesting from the point of view of casual games due to its cost-effectiveness. Fast production life-cycles require fast methods which are flexible and quick to use. Due to these reasons, the GameSpace research team focused more on the expert evaluation methods than on the user evaluation methods.

User Evaluation

User evaluation means the use of game testers who are recruited to play the game and give feedback. Unlike expert evaluation, user evaluation requires more resources in the form of time and money. User-centred design has been seen as an effective way to design products (Mao et al. 2001) and there are various ways of taking advantage of the end users during the development life-cycle. The most obvious advantage over expert evaluation is that the testers in user

evaluation represent the actual target group of the game. This user-centred approach is important as the developers cannot anticipate user experience.

Nielsen has suggested that five users are enough in utility software usability testing (Nielsen 2000). The low number of users is explained by cost-efficiency, as adding more users to usability testing does not necessarily lead to better results since the additional testers above five will hardly find new usability problems. Instead, the same basic problems will be found over and over again (Figure 19).

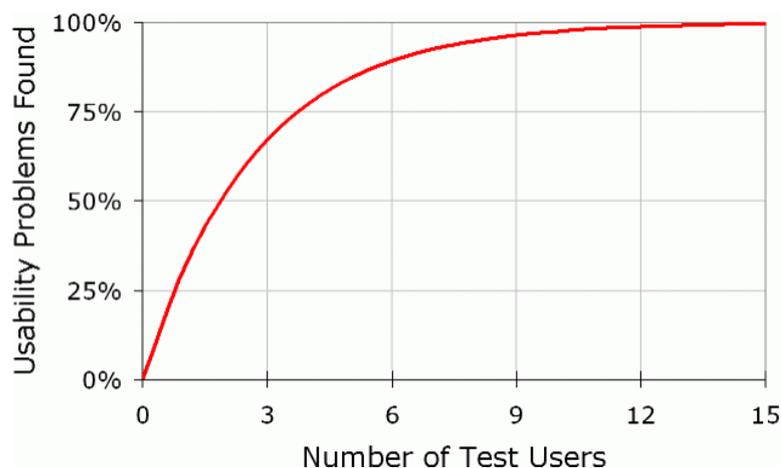


Figure 19. The number of test users and the percentage of usability problems found in utility software (Nielsen 2000).

The figure estimates that 100% of problems would be found with 15 users. However, rather than testing the software with one user test featuring 15 testers, Nielsen suggest three separate tests with five users. This method supports the iterative development process better because the designers get user feedback on how well they have fixed the usability problems after the test iterations. Nielsen recommends using additional testers only if there are distinctive differences between different target groups (Nielsen 2000). Nielsen's approach has been criticized by stating that five users are nowhere near enough (Spool & Schroeder 2001) or that even eight users are not near enough (Perfetti & Landesman 2001). The debate about the optimal number of testers is likely to continue and the issue is probably highly dependant on the product to be tested. Currently, there is no data available on how many users should be used in game testing to get optimal results.

3.5.2. Expert Evaluation Methods

This chapter presents different methods for expert evaluation. In addition, the chapter presents some models and frameworks which can be used as bases for expert

evaluations. The methods, frameworks and models are presented in chronological order by their year of appearance.

Heuristics for Designing Instructional Computer Games (Malone 1980)

Malone introduced heuristics for designing instructional computer games in 1980 (Malone 1980). Although Malone discusses his heuristics from the point of view of design, they can also be used as a basis for evaluation. Malone stated that although he emphasizes games with educational uses, he focuses on what makes games fun, not what makes them educational. According to Malone, the essential characteristics of good computer games and other intrinsically enjoyable situations can be organized into three categories: *challenge*, *fantasy*, and *curiosity*.

Challenge is present through the presence of a goal and uncertainty of achieving that goal. *Fantasy* is used to make computer games more interesting which, according to Malone, almost certainly derive some of their appeal from the emotional needs they help to satisfy in the people who play them. An obvious consequence is that different people will find different fantasies appealing. *Curiosity* is built from an optimal level of informational complexity and a capitalisation of the users' desire to have "well formed" knowledge structures. Curiosity can be further divided into sensory and cognitive curiosity.

Malone's heuristics are not as easy to follow as the more recent ones with clear lists of guidelines and rules of thumb. However, although his work is over 25 years old, his findings are still considered to be valid and useful in game evaluation (Salisbury 2004).

From the perspective of GameSpace, Malone's heuristics are abstract when the trinity of casual mobile and multiplayer elements is considered, but they offer an interesting point of view nevertheless. During the second workshop, one game designer commented that he found Malone's heuristics very useful as the heuristics seem to recognize the essential elements of game design on a high level.

Heuristics and Usability Guidelines for the Creation and Evaluation of Fun in Video Games (Federoff 2002)

Federoff's Master's Thesis "Heuristics and Usability Guidelines for the Creation and Evaluation of Fun in Video Games" (Federoff 2002) can be considered to be the first modern (post-millennium) heuristic model for games. Federoff's model was created when she was studying what the implicit and explicit heuristics applied in a game development company are and what usability evaluation methods are used in practice.

Federoff's study consisted of reviewing usability literature and executing a field study in a game development company. For the literature review, she studied whether Nielsen's 10

usability heuristics (Nielsen 1994) for utility software could be applied in evaluating games, as well. The result of the review was that the Nielsen's heuristics are good for interface evaluation, but they do not cover game play issues very well. Heuristics for games should especially cover game play, which is the most important part according to Federoff. The field study was executed by following and interviewing five different people during five work days in the game company observed. A heuristic list was compiled based on the findings from the literature and from the observations of the field study. The result was a heuristic list of 40 items divided into categories of Game Interface, Game Mechanics and Game Play.

Federoff has written a pioneer work in the field of game evaluation heuristics and the newer evaluation models have taken much influence from the author's work. However there are several issues that need to be criticized. First of all, there are no clear distinctions between usability and playability, as the author refers to usability when playability would be more appropriate. The concrete difference between the categories of Game Mechanics and Game Play is also left unknown. Applicability of Nielsen's heuristics for game evaluation was not verified in any way, as the applicability was judged only by the author's subjective review. The result of Federoff's study, the heuristics evaluation model for games, was not verified in any way either, as this task was left up to future research or other scholars.

The main concern with the model is that the heuristics are not explained thoroughly, which makes some of them ambiguous or overlapping. Some of the heuristics are presented on a very general level, which makes them not very useful. Examples of ambiguous heuristics are heuristics #15 and #40. It is not very clear what the author means by them. There are at least two overlapping heuristics, #24 and #33, which refer to the same basic issue. There are many examples of heuristics that are presented on a too general level to be actually useful; #21, #23, #25 and #32 for example.

Although Federoff's list of heuristics has its shortcomings her work is considered to be important and it is much cited in the academia. The heuristics do not refer to specific interests of GameSpace in the form of casual mobile multiplayer games, but they can be considered to be useful as general guidelines for games in general, at least on applicable parts.

Heuristic Evaluation of Playability (Desurvire et al. 2004)

Heuristics for Evaluating Playability (HEP) is a heuristic model by Desurvire et al. (2004), which was created by combining the literature of the earlier studies and getting feedback from playability experts and game designers. The model was verified by evaluating a Flash game prototype and comparing

the evaluation results against the results from a standard user study. The result from the comparison of methods showed that the HEP model was able to identify more playability issues than a standard user study.

The HEP model consists of 43 heuristic statements divided into four different categories: Game Play (16), Game Story (8), Game Mechanics (7) and Game Usability (12). In the HEP model, Game Play consists of the set of problems and challenges a player must face to win a game. Game Story includes all plot and character development, and Game Mechanics is the programmed interaction between the units in the game. Game Usability refers to the user interface and the elements the player utilizes to interact with the game (mouse, keyboard, game shell, heads-up display etc).

The HEP model was verified by evaluating a Flash game prototype which did not allow any actual game play, but consisted of screen shots that allowed the players to navigate through the shell of the game. The results of the evaluation were compared against the results of a traditional user study. The playability evaluator evaluated the prototype with a HEP model by focusing on each heuristic while measuring whether the prototype supported or violated a given heuristic. Violation of a heuristic created a playability issue.

A user study was executed to benchmark the HEP model and validate its usefulness. The study featured four testers and every tester used two hours to test the prototype Flash game. The results of the studies showed that the HEP model was able to find more playability issues than a user study. There was much overlapping, but both methods were also able to find unique issues. The HEP model was especially effective in finding playability issues in the Game Story and Game Usability categories. For the Game Play and Game Mechanics categories, approximately half of the HEP issues were found. This was because the prototype did not have fully implemented game play and game mechanic features available. For the Game Usability, HEP was able to find general issues whereas the user study revealed more specific issues. HEP was also able to find issues that would have been otherwise implemented in the game causing problems later.

The authors state that HEP ensured general game principles and it is an efficient model to find playability issues especially in an early development phase. HEP also facilitates thinking about the design from the user's point of view. However, the user study found specific problems which can be found only by observing testers. Especially emotional issues like frustration or boredom can only be revealed in user studies. The authors conclude by stating that although the HEP model is an efficient tool for finding playability problems, traditional user studies are still needed because of the

unpredictable behaviour of real players (Desurvire et al. 2004).

The HEP model is a first attempt to create a comprehensive list of verified playability heuristics. The categorization seems to be clear and the model seems to work, at least for evaluating prototype games. According to the authors, the heuristic statements in the Game Story and Game Usability categories seemed to be the most useful during the evaluation.

Although the verification was a success according to the authors, there are some issues that need to be considered. The first issue is that the model is intended for evaluating playability in games, but the verification process involved a non-playable prototype, which only allowed user interface interaction. From the point of view of playability, it would have been crucial that the evaluated game would have had a fully implemented game play and game mechanics. There is no clear verification that the model would be effective in evaluating the Game Play and Game Mechanics categories. The second issue is that the authors admit that some of the heuristics in the model can only be found by the use of a user study (heuristics #1 & #5). This contradicts the idea of an expert evaluation model, which should act as a stand-alone tool for expert evaluators, not requiring user studies. The third issue is the low number of testers in the user study. There were only four testers and the user study was only executed once.

Like with Federoff's model, HEP suffers from the fact that heuristics are not explained in depth. The descriptions are better than in Federoff's model, but some heuristics need further clarification (e.g. heuristics #9, #11 and #16). There are also some very broad heuristics the usefulness of which is questionable (e.g. heuristics #5 and #22). Some of the heuristics are very closely related to player experiences which are not necessarily game-related at all (e.g. heuristics #18, #19 and #24). It might be very hard to evaluate these issues without a user study. The HEP model was tested in *GameSpace* workshop V where HEP was compared to heuristics from Nokia (Korhonen & Koivisto 2006). The results of the workshop can be seen in chapter 3.5.5.

Like Federoff's list, the work of Desurvire et al. also has its shortcomings. The large number of heuristics and their rather complex (and somewhat illogical) arrangement into four categories require a lot of mental resources during evaluation. The usefulness of some heuristics is also questionable as was presented above. HEP, however, serves as a sort of a basis for the work of designing heuristic lists and, like Federoff's list, it can be seen to be useful on applicable parts.

Mobile Game Playability Evaluation (Karvonen 2005)

In his master's thesis "Mobiilipelin pelattavuuden arviointi" (trans. Mobile game playability evaluation) Karvonen (2005) presents the playability evaluation framework for mobile games. This is naturally interesting from the GameSpace perspective, as mobility is one of the main themes. Karvonen's framework for playability holds up to seven top level categories (Gameness, Interface, Audiovisuality, Story, Concept, Other Factors and Mobility). These top level categories hold sub-level categories and, for example, the Gameness category holds eight sub-categories which hold a total of 26 elements (Karvonen 2005). This framework is heavy in the sense of method usability as it contains numerous elements in three to four different layers, depending on the top level category.

Karvonen's framework has some interesting categories which reflect on casuality, mobility and multiplaying. The *Other factors* category holds such elements as *Installing the game*, *Hardware requirements* and *Price* (of the game) which can be seen as criteria for casuality. *Mobility* also holds several interesting elements but multiplaying is only presented as a single element under *Gameness'* sub-category *Longevity of the game*. Karvonen's work is important from the perspective of *GameSpace* and the layer model could be used as an example of a multi-level, detailed heuristic model, which would contain high and low level components. The framework does not provide specific guidelines. Instead, it brings up themes which should be taken into consideration when designing and evaluating mobile games.

Playability Heuristics for Mobile Games & Playability Heuristics for Mobile Multi-player Games (Korhonen & Koivisto 2006, 2007)

Koivisto & Korhonen (2006) present a heuristic model for evaluating mobile games. The authors review earlier works in the field, and present critique for three reasons. First, none of the earlier heuristic models cover issues related to mobile phone games, which is the authors' focal point. Second, the earlier heuristics are not described in such detail that they could be well applicable. Thirdly, some of the earlier heuristics overlap, which makes them ambiguous. This was the rationale to create a new set of playability heuristics for evaluating mobile games. The new model consists of three categories; Usability, Mobility and Gameplay. These categories, or modules, as the authors refer to them, can be either used separately or together for evaluating games. The model was updated later with a Multiplayer module, which makes it possible to also evaluate multiplayer games (Korhonen & Koivisto 2007). The modular structure makes the model flexible, as new modules can be added when needed. The model is intended to be used in the pre-production or

production phases of the game development life-cycle, but it can also be used in the post-production phase.

The initial set of playability heuristics were created based on Nielsen's usability heuristics and game design guidelines. Mobile devices and the mobile use context were also studied. As a result, 11 general heuristics were created and they were validated by having an early version of a mobile game examined by four evaluators. 61 playability problems were found but 16 of them did not have a proper heuristic. There were also four playability problems related to the multiplayer features of the game. The 16 non-commissioned playability problems were analysed and it was discovered that they were mainly gameplay issues. Some issues concerned the user interface and general usability. As a result, 18 new heuristics were designed, so the total number of heuristics was increased to 29. The 29 heuristics were divided into three categories (see Table 4 on p. 30); Usability (12), Mobility (3) and Gameplay (14). Usability covers the user interface, game controls and other general usability issues like getting feedback and help in the game. The Mobility category contains heuristics about how well the game supports the mobile context, which means interruption handling (incoming phone calls and messages) and use in diverse and unexpected environments. Gameplay incorporates the game mechanics, which are the rules for how the game world operates.

The updated model was validated by having two to four evaluators evaluate five different mobile games. In every case, one of the evaluators was a usability expert and another was a game designer with basic knowledge on usability issues and the evaluation method. The games evaluated were all mobile games (smartphone or mobile gaming device) but had differences in game style (combat, adventure, simulation, puzzle), player modes (single player or multiplayer) and target audience (10+ neutral, 12+ male, 18+ male, 20+ male). The games were developed by different companies and they had not been published at the time of the study. The version evaluated was usually the first so-called alpha version of the game with almost all features already implemented. The evaluators found a total of 161 playability problems from the Usability module, 10 playability problems from the Mobility module and 64 issues from the Gameplay module. This makes a total of 235 playability problems found from five different games.

According to the authors, playability problems concerning usability and mobility were the easiest to identify; information visualization and navigational problems were especially easy to spot. Evaluating these issues in game context was very similar to evaluating utility software. Gameplay issues were much harder to identify and one of the reasons is that some gameplay issues may be revealed only

after playing the game for several hours. The overall result, however, was that the heuristics were useful in finding playability problems.

The model was later updated with a Multiplayer module so it could be used to evaluate multiplayer games, as well. Some multiplayer heuristics were already found in the first study (see page 26), but at the time there were no further studies made into this domain. The creation of multiplayer heuristics started with a literature review, which produced six initial heuristics. These six heuristics were validated by examining three mobile multiplayer games. The evaluations suffered a bit from a lack of players, but on the other hand, the lack of players highlighted some playability problems which are apparent when there are not many players to play with. Based on the examinations of three mobile multiplayer games, two new heuristics were added to the module, increasing the total number of multiplayer heuristics to eight (see Table 4 on page 30). Lastly, the eight heuristics were used in a brief, informal, study of six non-mobile multiplayer games. The results of the studies showed that multiplayer playability heuristics are useful when evaluating mobile or non-mobile multiplayer games. The study of mobile multiplayer games showed that the games are less enjoyable if the multiplayer aspects are not implemented properly.

This model has avoided the two shortcomings seen in the earlier works of Federoff (2002) and Desurvire et al. (2004). First, there are no ambiguous or non-useful heuristics that are presented in a too broad or general manner. The heuristics are clear and they do not overlap with each other, nor do they have ambiguity. Second, the heuristics are explained thoroughly in a separate white paper (Nokia 2006), which helps to understand all the heuristics, thus making sure that the knowledge is passed from the authors to the users of the model. The only thing that this model is lacking in verification is a formal comparison with a standard user study.

There seems to be very little to criticize in the work of Korhonen & Koivisto. However, there is one interesting issue to be found. The authors state that the model was built from the perspective of mobile phone games, yet, however, there are only three heuristics in the Mobility module. The expectation would be that the mobile phone use context, which presumably differs greatly from the use context of a standard computer or a gaming console, would have created more heuristics for this specific module. Some of the mobile use context issues are considered in the other heuristics too, as can be seen from the paper that explains the heuristics in more detail (Nokia 2006).

This model covers the aspects of mobile gaming well and should be taken as a basis when designing new evaluation heuristics for games. The work of Korhonen & Koivisto has the

most valid scientific foundation from the perspective of verification and validity. However, further research and development is still needed as the Mobility module only contains three heuristics which consider the mobile platform and the mobile use context. These heuristics were used during the evaluation of *PyramidBloxx*³¹ mobile game (see chapter 3.5.5) and in the sixth workshop of GameSpace (see chapter 3.5.4).

The 400 Project (Barwood & Falstein 2008)

Since 2001, Barwood and Falstein have gathered game design guidelines from different sources for The 400 Project.³² The goal of the project is to gather "The 400 Rules of Game Design". Currently (as of 22.11.2008) the "Current Rules Master List" holds 112 rules. The list has not been updated lately and the status of the project is unknown. Although the rule list is especially intended for game design, it can also be used in game evaluation. Although the project seems to be on hold and some of the items on the list are rather vague and ill-fitting for evaluation works, the project is interesting and is mentioned here as a curiosity. See http://www.theinspiracy.com/Current_Rules_Master_List.htm for more information.

3.5.3. User Evaluation Methods

This chapter presents different methods for user evaluation. First, we describe "standard" user evaluation which is commonly known as play testing with the target audience. The other two examples are more specific methods of their own.

User Evaluation (Playtesting)

User evaluation is the opposite of expert evaluation. User evaluation is one form of a play testing process where people outside of the company, preferably from the target audience, are recruited to test a game and give feedback. Before conducting playtesting with the target audience, playtesting should be conducted within the development team and with trustees such as colleagues and friends (Fullerton et al. 2004). The development phase determines whether playtesting should be conducted within the team, with the trustees or with the target audience. Early prototypes are tested within the team, later and more finished prototypes with the target audience. The goal is to get useful feedback in order to improve a game (Fullerton et al. 2004).

Recruiting playtesters should be done carefully. One should recruit testers who represent the target audience as their feedback is naturally more useful than the feedback of those

³¹ <http://www.digitalchocolate.com/games/pc/pyramid-bloxx.html>

³² http://www.theinspiracy.com/400_project.htm

who do not belong to the target audience. However, recruiting testers too narrowly is not recommended either. Thus, the aim is to find diversity within the target audience and recruit people accordingly (Fullerton et al. 2004).

Testing various isolated situations in the game is recommended. Fullerton et al. list a few examples, such as the end of the game, a random event that rarely takes place, a special situation within the game, a particular level in the game or specific features. Testing may include tweaking gameplay on the fly by altering the dynamics of the game by changing the variables, which can be used to figure out the correct balance in the game (Fullerton et al. 2004).

The suggestion is that group dynamics are good for generating ideas but bad for evaluating them (Fullerton et al. 2004). However, playtesting with a group produces richer data when quantitative research methods such as interview forms and game log data are used. Individual testing, on the other hand, gives a greater understanding of the possible issues raised during playtesting. When a single tester is being observed, telling the recruit to "think aloud" creates a window into the game for the test moderator. The downside of "think aloud" is that the testers tend to forget to speak (Jones & Marsden 2006) so the moderator has to remind the players or ask probing questions every now and then. These questions can also appear as dialog windows within the game prototype. However, Laitinen warns against interrupting the testers too often as they might not be able to concentrate on the game (Laitinen 2006).

GameFlow (Sweetser & Wyeth 2005)

GameFlow (Sweetser & Wyeth 2005) is a model for evaluating player enjoyment in games. GameFlow is based on Mihail Csikszentmihalyi's flow theory (Csikszentmihalyi 1990) and it contains eight categories (*Concentration, Challenge, Player skills, Control, Clear goals, Feedback, Immersion and Social interaction*) which all contain a set of heuristics. A researcher or a tester plays a game and reviews it against the heuristics and allocates points from one to five for each heuristic. One means that the game does not meet the heuristic at all and five means that the game meets the heuristic completely. When all of the heuristics are checked, the average value of each category is calculated from the score of each heuristic. Then the total GameFlow score is calculated. This is the average value of the categories. GameFlow was verified by reviewing two real-time strategy games, *Warcraft 3* and *Lords of EverQuest*. *Warcraft 3* scored 4.8 out of 5 and *Lords of EverQuest* scored 2.4 out of 5. These results are in line with

the ratings of professional reviews available from Metacritic³³ and Game Rankings³⁴. The authors note that GameFlow needs further development. Currently, it can be used as a tool for expert review or a basis for constructing other types of evaluations like user testing. However, as the nature of the heuristics is to measure player enjoyment, we present the model under user evaluation methods as it might be difficult for an expert to evaluate his or her own enjoyment. Karvonen notes that except for the Social interaction category, other categories in GameFlow go almost hand-in-hand with the original Flow theory (Karvonen 2005). There has been critique about the suitability of Flow theory in games as some authors believe that in gaming, frustration, for example, is a more positive state of mind than the Flow theory generally suggests (Klimmt 2003, Juul 2004).

The GameFlow model is best suited for finished or almost-finished (beta stage) products. A faster method is required for early prototypes. GameFlow was partly used during the evaluation of the *PyramidBloxx* mobile game (see chapter 3.5.5 for more details).

Rapid Iterative Testing and Evaluation (Medlock et al. 2002)

Rapid Iterative Testing and Evaluation (RITE) is a method that is based on an iterative design process. What makes RITE different from a standard usability testing is that RITE emphasizes making rapid changes to game design through a high ratio of problems found along with verification of the effectiveness of the changes that are made. The RITE method has been used before in software development but Microsoft was the first company to document it within the game design domain (Medlock et al. 2002).

The core idea of RITE is that a change is made to the game design as soon as a tester comes up with a problem and a potential solution is clear. The changed design is then tested on subsequent users. Figure 20 demonstrates the difference between standard usability testing and RITE.

³³ <http://www.metacritic.com>

³⁴ <http://www.gamerankings.com>

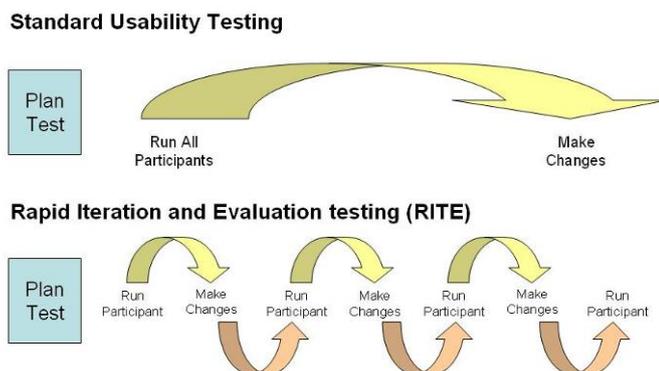


Figure 20. The difference between standard usability testing and RITE (Microsoft).

The RITE method was used successfully in evaluating the tutorial mode of *Age of Empires II*³⁵ which received an “Excellence” award from the Society of Technical Communication in 1999. During the evaluation of the *Age of Empires II* tutorial with RITE, the first change was made right after the first tester. The tester’s task was to gather resources in the form of wood by chopping trees. However, in the initial version, there were no trees visible on the screen and the tester was confused about what to do. Both the problem and the solution were clear and more trees were added to the first visible area along with teaching the technique of finding more trees from the off-screen area. After these fixes, the issue never showed up again during the evaluation.

The authors divided the issues discovered by the testers into four categories:

1. Issues that have an obvious cause along with an obvious solution which can be implemented quickly.
2. Issues that have an obvious cause along with an obvious solution which cannot be implemented quickly.
3. Issues which have no obvious cause and therefore no obvious solution.
4. Issues that may be due to other factors such as test script, interaction with the tester, etc.

For each category 1 issue the fix is implemented immediately and it is tested by the next tester. For each category 2 issue the work on the fix is started and as soon as the fix is implemented, the fix is tested. For category 3 and 4 issues, more data is collected to see if they can be upgraded to category 1 or 2 issues, or if they can be classified as “non-problems”.

Due to its rapid nature, RITE sets some requirements as a design method. First, there must be an agreement prior to the

³⁵ <http://www.microsoft.com/games/age2/>

test on the tasks that every user of the system must be able to perform without exception when using the product. This is critical as it sets the importance of issues found during the test. Second, it must be possible to make changes very rapidly, e.g. in two hours before the next tester or before the next testing day. Third, time must be set aside before the end of each day for discussing the design solutions. Fourth, there must be enough testers to verify that the implemented fixes have not caused new unforeseen issues within the game.

RITE sets requirements for the development team, as well. The designer who runs the tests must have experience of the domain and of the problems that the testers typically experience in this domain. Without the experience, it will be hard to tell if the problems uncovered are likely to be found by other people, as well. The decision makers must commit themselves to the process and be able to react quickly on the issues found. The development team must also be able to interpret the results quickly to make quick and effective decisions regarding the changes in the game.

3.5.4. Heuristic Evaluation of the Mobile Games Workshop

The sixth GameSpace workshop “Heuristic Evaluation of Mobile Games” was commenced in the spring of 2008. During the workshop, two groups of four evaluators used two different heuristic evaluation models for evaluating *The Simpsons: Minute to Meltdown* -mobile game.

Introduction

The workshop was held at Nokia’s facilities in Ruoholahti, Helsinki. The workshop was moderated by Janne Paavilainen and Hannu Korhonen and there were seven additional participants. In the Beginning, Janne Paavilainen and Hannu Korhonen presented an introduction to usability and playability expert evaluation. After the introduction, the mobile game evaluation begun and the participants formed four two-member groups. Two groups used the heuristic evaluation model from Desurvire et al. (2004) and the other two groups used the heuristic model from Korhonen & Koivisto (2006). The model from Desurvire et al. was known as the violet list and the model from Korhonen & Koivisto was known as the orange list. These two models were selected because they are rather new and contain many differences in regard to the heuristics. The game evaluated was *The Simpsons: Minutes to Meltdown*. It was selected on the basis that it would be rather easy to spot several usability and playability issues in the game and it was simple enough to play. The four groups played the game and used one heuristic model for evaluation. The major findings from the game were discussed briefly as the focus was in the end discussion which was more concerned about the methods than the game. Several

questions were asked during the end discussion to probe possible challenges in the models used and in the expert evaluation method in general.

Workshop Findings

The playability problems were easy to find and some of them were not written down as there were so many of them. One participant stated that he had played the game before, and was surprised to see how many playability issues were present when the game was played in an "evaluation mode". There were many playability issues that would not have been found if the play session had been an everyday play session in a normal environment and not an analytical evaluative workshop setting. Another participant noted that this might be a problem since the game should be played like an end user would play it, aiming for a good game experience, and not so much as a witch hunt for issues. Nevertheless, it is important to play the game normally with an eye for possible playability issues, which are then studied further to see if they violate some heuristic or another.

It was said that immersion was hindering the evaluation from time to time as the evaluative attitude was forgotten. However, one group stated that the game evaluated was so poor that immersion was not an issue for them. This raised discussion about expert evaluation and play testing. In play testing, it might be hard for the moderator to make a difference between the real playability issues and the simply challenging parts of the game, keeping the game experience immersive for the player. In expert evaluation, the play session is seen as an analytical task which is expected to uncover playability issues, drifting away from the idea of having fun and being immersed while playing the game.

There are many expert evaluation methods for game evaluations but there is no standard de facto method for doing expert evaluation for games. The opinion was that evaluation heuristics reflect the gaming culture of their time and when the gaming culture changes, the evaluation methods also change as the ideals of a good feature and a good game change. Nowadays, there are emergent games which offer wide open worlds and lots of possibilities. On the other end there are closed games, like puzzles, which can be played only one way. This means that an expert evaluation method should be versatile or customized accordingly. It must also be understood that the heuristics are not be-all-end-all type of ultimate truths that cannot be broken from time to time. It is important to understand the essence of heuristics since following them without raising questions might be unfruitful.

There was a clear consensus that gameplay issues were easier to find than user interface (UI) issues. This was a rather surprising finding as two usability professionals stated that

usually UI issues are easier to find in games. One explanation is that the game featured pretty good UI design and some of the participants were very experienced with games, so understanding the UI was very easy for them, although it might not be as easy to understand for a casual gamer, for example. There were also issues which could have been either gameplay issues or UI issues. Sometimes it was not clear whether the issue was related to UI or gameplay as the two are ultimately very close to each other in game design.

The models were considered helpful in the expert evaluation process. However, the model from Desurvire et al., which was referred to as the violet model, received a lot of criticism. The biggest issue was the number of heuristics on the violet list. There were four categories and 43 heuristics, which was considered too much. The heuristics were also written poorly and some of them were high-level general heuristics and some of them were low-level specific heuristics. The categorisation was also poor, and it was hard to find the appropriate heuristics for the playability issues found. The violet list was easier to use "backwards", meaning that the evaluator referred to the list, going through the heuristics one by one and considered if the game had any issues at any point related to the given heuristic. This is not a wrong way to do expert evaluation, but the heuristics should be simple enough so they are easy to remember when playing the game. It was also thought that game evaluation heuristics in general should be simple, aiming for Nielsen's 10 usability heuristics in quantity and not be too specific. The orange list featured 29 heuristics, which was considered bearable but less would be better. Especially since one of the groups reported that they found some ambiguity in the orange list, as well.

It was thought that in actual game development it is important for the evaluators and designers to work in close collaboration and it is important to evaluate games with the appropriate tools. From this perspective, versatile models which are customizable are considered efficient.

Positive issues in the game were not as easy to spot as negative issues. It was speculated that this was due to the evaluative attitude of the workshop setting, i.e. the prime task was to find playability issues which are considered negative rather than to find positive issues which enhance gameplay. As a solution, it was suggested that the heuristics be presented in question form, which will then guide the analysis to either negative or positive aspects.

It was generally considered that heuristic models are good tools to aid design and they would be of use in many phases except in ideation and conception. In these phases, structured heuristics might narrow the design space and leave no room for experimental innovation.

The workshop ended in a discussion about the usability of the heuristic models themselves. The following ideas came up in relation to the better presentation of heuristics:

- Heuristic cards instead of a boring list
- Simple one-word description with a picture
- Color-coded for visual clearance
- Backside containing detailed information
- Heuristics ranked by their relevance

The heuristics used should always be in balance in the given design situation. For example, in an early phase of a game design project there is no need for detailed heuristics which cover some specific issues. It must also be considered that although mobility heuristics are (only) covered in the model by Korhonen & Koivisto (2006), there are only three heuristics in the mobility module. This is a rather low number and only covers the very basics of the mobile use context. If mobile games become "truly mobile" (see Mobility 2.4), the aspect of mobility must be taken into more careful consideration as the new "truly mobile" gaming culture may generate a whole new use culture, which must be taken into consideration when designing mobile games.

3.5.5. Case Evaluation: *Pyramid Bloxx*

The first case evaluation in *GameSpace* was the expert evaluation of the *Pyramid Bloxx* casual mobile game. One evaluator did the evaluation with three different evaluation methods. The goal of the evaluation was to test various expert evaluation methods in practice and see how well they support the evaluation of casual games.

Introduction

Pyramid Bloxx (Figure 21) is a one-button mobile game in which the goal is to create pyramids by throwing blocks onto the topmost floor from the mines. Pressing the Navikey or 5 on the keypad causes the block to be flung up to the next floor where a man (or a monkey or a donkey on the upper floors) catches the block. A perfect catch starts a score multiplier and the block starts to shine. A successful catch fills up a magic bar at the top of the screen which dictates how many of the block's edges will be polished. A badly aimed throw starts the stone swaying from side to side or the stone may even be dropped. In the Building Pyramids mode a player can drop the stone three times.



Figure 21. Screenshots of the *Pyramid Bloxx* game.

There are two play modes in this game: Quick Game and Building Pyramids. In the Quick Game mode a player plays the game until she drops the block and then she gets to see her scores. In the Building Pyramids mode the player has to build three different size pyramids. The player also has more blocks to choose from now and certain blocks are more valuable than others but they are also harder to get onto the top floor.

Evaluation Heuristics Used

The evaluation was commenced with three different methods. The first two methods were expert evaluation heuristics from Desurvire et al. (Heuristic Evaluation of Playability) and Korhonen & Koivisto (Playability Heuristics for Mobile Games). The third method, GameFlow from Sweetser & Wyeth, is not a pure expert evaluation method but it can be applied as such on applicable parts. All these methods differ from each other and only the heuristics from Korhonen & Koivisto are intended for evaluating mobile games. None of the methods emphasize causality per se, which made the evaluation even more interesting.

The heuristics, or design issues, in these methods were mainly the same but there were differences in categorization and choice of words. The easiest to use were the heuristics of Korhonen & Koivisto. The structure was simple and the fact that they had been divided into different modules helped leave some aspects (multiplayer) out as they were not applicable to the game evaluated.

Conclusion

What became obvious through this evaluation was the unsuitability of these methods for casual mobile game evaluation. Methods that were used in this evaluation were unnecessarily heavy and they tackled issues that were not applicable for this kind of a game. The heuristic set from Korhonen & Koivisto performed best in this case study - probably because it was the only method that was aimed explicitly for the evaluation of mobile games. This evaluation

suggests that there is a need for shorter and easier methods that especially tackle issues that are characteristic for casual mobile games.

3.5.6. Case Evaluation: *Onnensanat Mobile*

This case evaluation introduces the *Onnensanat Mobile* scratch-card game with the user study that was conducted by 20 testers. The user study had two goals. First, the user study probed the general attitude towards a mobile scratch-card game concept. Second, the user study probed the general attitude for sharing content in a mobile money game context. The *Onnensanat Mobile* concept was designed by the *GameSpace* research team at the University of Tampere in co-operation with Veikkaus, the Finnish national lottery.

Introduction

Onnensanat Mobile (Figure 22) is a conversion of the physical *Onnensanat* scratch-card game. The mobile version features both a smaller grid and fewer words. The grid-size is five by five featuring four to five Finnish words. The player's task is to open six letters behind the star symbols, hoping that the letters revealed match the ones on the grid, thus creating a whole set of words. The player wins if she can match one, two or three words in the game. The winnings are one euro, ten euros and one thousand euros respectively.



Figure 22. Screenshots from *Onnensanat Mobile*.

The game starts when the player consents to pay the prize of one euro for a game. A short animation sequence randomizes the words into the grid and help text on the top instructs the player to open the first letter with the Navi key on her mobile phone. As the player reveals the letters, the matched letters are automatically highlighted on the grid. When all six letters

have been revealed the game ends and the winnings or the loss is announced based on the results.

The player is also able to send one game instance to his friend with the send-as-a-gift feature. The player selects the option from the menu which leads to a sub-menu with contacts and their mobile phone numbers. The player then confirms her selection and the game instance is sent to another player. This feature was not implemented as a working feature, only as a static mock-up.

User Evaluation

A test site was set up in the main hall of the University of Tampere main building and the testers were picked from the passers-by. Each test session lasted from five to ten minutes. Preliminary questions were used to gather background information and attitudes towards money games. The testers were also asked if they had any thoughts about the mobile scratch-card game concept. After the preliminary questions, the testers played *Onnensanat Mobile* with a Nokia E70 mobile phone. Each tester tried the game twice and after the second time they were asked to send a free game instance to their friend. After these two gameplay instances, feedback questions were asked from the testers.

Conclusion

A majority of the testers were not interested in *Onnensanat Mobile*. The dominant negative issue was that the *Onnensanat Mobile* was too simple, which made it boring. The concept was often compared to the traditional physical scratch-card games, which were considered to be more exciting mainly because they feature physical scratching. Seven testers were neutral towards the concept and four testers were interested to the extent that they could choose the mobile scratch-card game instead of a traditional physical one.

Onnensanat Mobile features a mock-up of a send-as-a-gift option to buy and send one game instance to a friend as a gift. This type of content sharing has not been featured in a mobile money game before. This study was not able to explicitly reveal whether the feature was liked or not. Many testers were frustrated by the game concept itself. Thus, they were reluctant to share their poor gaming experience with others. However, the sharing feature did not receive any negative feedback for its own sake. Thus, it can be cautiously concluded that the feature can be considered to be promising and requires more studies for any definite claims about its nature.

The findings about the prototype were very similar to the ones discovered in an earlier study with web-based scratch-card games (Paavilainen 2008). However, despite the negative feedback from the testers, the concept of a mobile scratch-

card game is still interesting and further studies are needed, especially in the area of use context and content sharing. This requires new game prototypes, preferably ones with better gameplay and working content sharing. A longer study is needed in which the testers install the software on their own mobile sets and use them for a week, for example. The testers should be able to use the send-as-a-gift feature, so the content sharing and the actual use context can be studied.

3.5.7. Case Evaluation: *Mythical: the Mobile Awakening*

Mythical: The Mobile Awakening was one of the showcases in the IPerG -project³⁶. The GameSpace research team took part in the evaluation process which consisted of a pilot study and a user study. The case was relevant to GameSpace as *Mythical* is a mobile multiplayer game with some casual elements. Complete description of the design, the user study and the evaluation can be found from the IPerG deliverables, series 13³⁷.

Introduction

Mythical: The Mobile Awakening (Figure 23) is an asynchronous slow-update multiplayer game in which players access a magical world through their mobile phone. The players gain experience and learn spells by completing rituals either alone or together with other players. The spells are then used in encounters to battle AI opponents or other players. The game content is based on folklore mysteries and local history to create an exciting atmosphere.



Figure 23. *Mythical: The Mobile Awakening*.

The game features context-aware gameplay where real world phenomena have an effect in the game world. Context information is used in the rituals where the reward of the

³⁶ http://iperq.sics.se/iperq_games10.php

³⁷ <http://iperq.sics.se/press1.php>

ritual depends on how well the player has met the context conditions initially set. There are three types of context information used: spatiotemporal, environmental and proximity. Spatio-temporal context is used in two ways: players select a home base from a predefined list and the game content and some environmental context information is then validated against information about that location. Time of day is frequently used context information that defines when some rituals can be completed. Environmental context information is based on temperature, cloudiness and astronomy. Temperature is used in a breakpoint manner; some rituals require that the temperature is either above or below 0 degrees Celsius. Cloudiness has three possible options: clear, partly cloudy and cloudy. Astronomy information is related to the positions of the Moon and the Sun over the horizon and to the phases of the Moon. The proximity context is based on scanning Bluetooth devices. Rituals require either scanning a specific or a given number of Bluetooth devices. Asynchronous gameplay favors a casual play style and Bogost has suggested that such a feature could be the future of casual multiplayer gaming (Bogost 2004). Slow update gameplay means that game events are not continuous. Instead, they happen at predefined intervals (Korhonen et al. 2008).

User Evaluation

User evaluation was used for getting answers to several research questions which are presented here with the findings. The text is summarized from the IPerG deliverable "Mythical Mobile evaluation report" (Korhonen & Saarenpää 2008).

1. What are the main context elements that can be included in the game concept?

Mythical features many different context elements in the gameplay. Both the participants of the pilot study (n=6) and the questionnaire respondents (n=9) said that the time of day was the most interesting context element in the game. Six questionnaire respondents did not specify their favorite context element. It was speculated that all of the participants did not experience all of the context elements in the game.

2. How do players perceive context elements in the game?

The participants of the pilot study found the game appealing due to the use of context elements in gameplay. 73% of the questionnaire respondents stated that the use of context information made the game more interesting.

3. How do players feel about connecting game elements to the real world?

There was no clear data available about this issue, but some participants felt that the game was too connected to the real world and it was not safe to try out different things, like in an ordinary game.

4. What are the players' attitudes towards offline communication from the game world?

The questionnaire respondents were not able to answer this question as none of them had activated the SMS notification service from the game options. The participants of the pilot study commented that the SMS notifications are an important source of game state information.

5. How do players feel about the asynchronous gaming mode?

Some participants stated that the asynchronous gaming mode where you can leave the game to play on its own required some getting used to. This was not a problem for everyone, however. The participants felt that the best wavelengths were either short, so it feels almost like real-time gameplay, or long enough so that you can leave the game to the background.

6. Is it feasible to utilize both a mobile and the web for social interaction?

Combining the web and a mobile game did not work in this experiment. None of the participants took part in the web community activities and many of them did not even know that there was a website dedicated to this game.

Conclusion

There were many technical challenges in the game which were fixed on the run during the evaluation. These technical problems affected the evaluations and the following issues were recognized by the evaluators (Korhonen & Saarenpää 2008):

- The website was not used or known about by the participants
- The questionnaire was available only on the website
- Participants were not stressed to give feedback
- The game was unfinished when the evaluation started
- Players should have been recruited in the beginning

The objective of *Mythical: The Mobile Awakening* was to demonstrate and evaluate the pervasive features used in a mobile multiplayer game. The experiment was a partial success as some of the research questions were left unanswered and there were not enough players to reach critical mass. However, the game will be used as a research platform to continue research on mobile games at the Nokia Research Center (Holopainen 2008).

3.5.8. Case Evaluation: *No One Can Stop the Hamster*

No One Can Stop the Hamster (NOCSH) was an experimental augmented reality pervasive multiplayer mobile game which was tested in the FinnCon/AnimeCon³⁸ 2008 conventions in Tampere. The game features the use of spatial resources in the form of fiducial markers (Figure 24) which are scattered around the real world. The players tag the markers with their mobile phone cameras and receive points from the markers in their possession. The recognition software in the mobile phone understands the markers as game elements and shows additional information on the user's mobile phone screen. The players can steal markers from other players and the basic gameplay revolves around finding new markers, stealing markers from other players and protecting one's own markers by getting them back if they get stolen.

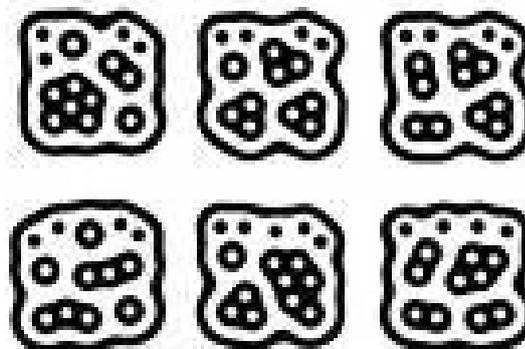


Figure 24. Six fiducial markers.

The game was designed at the Nokia Research Center and *GameSpace* took part in the evaluation process. Tentative results from the on-site evaluations showed that the participants considered the game concept to be very interesting but there have not yet been public reports about the evaluation results and the *GameSpace* project ended before the analysis of the data was completed.

³⁸ <http://www.finncon.org/>

4. Conclusions

The GameSpace project has successfully presented interesting and new results from the field of game research. The project was based on many practically oriented workshops and case studies, which emphasized the practical nature of the project. We have received a lot of positive feedback about the workshops and about the methods designed in the project from our industry partners. The findings of the project have a clear commercial value and there have already been discussions about commercializing the ideation methods developed in the project. GameSpace results have also gained international interest and the project has been visible in many conferences and publications.

The first GameSpace publication concerning casual games was published in the Future Play 2007 conference. This was a starting point for several other publications and presentations, which gave international visibility to the project. The GDC 2008 presentation was certainly a milestone in the project and the creativity techniques made headlines of GamaSutra³⁹. GameSpace also visited such notable actors as Microsoft in Seattle and Nokia in Vancouver. Nationally, GameSpace was involved in the traditional working paper spring seminars held at the University of Tampere. The legacy of GameSpace will continue, as there are several papers either being written or in the review process to be published in conferences.

From the joint perspectives of industry collaboration and academic games research, GameSpace can thus be considered to be a success. It is clear that digital games are maintaining and expanding their role in the society, and new approaches to design are required to properly understand and exploit these possibilities. Innovative research that empirically tests methods for game design is helpful for an industry that seeks to expand and evolve its practices. Game design research in general is needed for questioning and expanding the societal and cultural roles that games will serve in the future. Addressing the preferences of groups of people or taking into account the use contexts that have not traditionally figured at the centre of game industry's attention. This is where academic–industry partnerships like GameSpace can have an expanding role in the future.

³⁹ http://www.gamasutra.com/php-bin/news_index.php?story=17456

References

- Amabile, T. M. (1990) Within You, Without You: The Social Psychology of Creativity, and Beyond. In M. A. Runco & R. S. Albert (Eds), *Theories of Creativity*. Sage: London, UK. 61-91.
- Amaya, G., Davis, J. P., Gunn, D. V., Harrison, C., Pagulayan, R. J., Philips, B. & Wixon, D. (2008) Games User Research (GUR): Our Experience with and Evolution of Four Methods. In Isbister, K. & Schaffer, N. (Eds.) *Game Usability: Advice From the Experts for Advancing the Player Experience*. Morgan Kaufmann: Burlington, MA, USA. 42.
- Anderson, G., Höök, K., Mourao, D., Paiva, A. & Costa, M. (2002) Using a Wizard of Oz Study to Inform the Design of SenToy. *Proceedings of the DIS2002*, June 25-28, London, UK.
- Barendregt, W, Bekker, M.M. & Speerstra, M. (2003) Empirical Evaluation of Usability and Fun in Computer Games for Children. In *proceedings of Interact 2003*, September 1-5. Zürich, Switzerland. 705-708.
- Barwood, H., & Falstein, N. (2006). The 400 Project, Online: http://www.theinspiracy.com/400_project.htm.
- Baer, J. (1994). Generality of creativity across performance domains. *Creativity Research Journal*, 4. 23-39.
- Barry, I. (2005). Game Design. In Rabin, S. (ed.) *Introduction to Game Development*. Charles River Media: Hingham, MA, USA. 144-145.
- Bates, B. (2001). *Game Design: The Art & Business of Creating Games*. Prima: Roseville, CA, USA.
- Baughman, N.E & Levine, B. N. (2001) Cheat-Proof Payout for Centralized and Distributed Online Games. In *proceedings of IEEE INFOCOM 2001*. 104-113.
- Bogost, I. (2004) Asynchronous Multiplay: Future for Casual Multiplayer Experience. Other Players conference on Multiplayer Phenomena, The IT University of Copenhagen. Online: <http://www.bogost.com/downloads/I.%20Bogost%20-%20Asynchronous%20Multiplay.pdf>
- de Bono, E. (1970) *Lateral Thinking. Creativity Step by Step*. Harper and Row: New York, NY, USA.
- Clapham, M. (2003) The Development of Innovative Ideas Through Creativity Training. In Shavinina, L.V (Ed.) *The International Handbook on Innovation*. Elsevier Science Ltd.
- Casual Games Association. (2008) *Casual Games Market Report 2007*. Online: <http://www.casualconnect.org/newscontent/11-2007/casualgamesmarketreport2007.html>

- Chau, F. (2006). Mobile Gaming Aims for Mass Market. *Wireless Asia*. Online: http://www.telecomasia.net/article.php?id_article=1744
- Chong, N.S.T & Sakauchi, M. (2001) Creating and Sharing Web Notes via a Standard Browser. *ACM SIGCUE Outlook* 27 (3). ACM Press. 4-15.
- Crawford, C. (2003). *Chris Crawford on Game Design*. New Riders: Indianapolis, IN, USA.
- Csikzentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. Harper Perennial: New York, NY, USA.
- Desurvire, H., Caplan, M., & Toth, J.A. (2004). Using Heuristics to Evaluate the Playability of Games. CHI 2004, Vienna, Austria.
- Federoff, M. (2002). *Heuristics and Usability Guidelines for the Creation and Evaluation of FUN in Video Games*. Master's Thesis. University Graduate School of Indiana University.
- Friedl, M. (2003) *Online Game Interactivity Theory*. Charles River Media: Hingham, MA, USA.
- Fullerton, T., Swain, C., & Hoffman, S. (2004). *Game Design Workshop: Designing, Prototyping, and Playtesting Games*. CMP Books: San Francisco, CA, USA.
- Furnham, A. & Yazdanpanahi T. (1994) *Personality Differences and Group versus Individual Brainstorming*. Elsevier Science Ltd.
- Gabler K. et al. (2005) *How to Prototype a Game in Under 7 Days: Tips and Tricks from 4 Grad Students Who Made Over 50 Games in 1 Semester*. Gamasutra. Online: http://www.gamasutra.com/features/20051026/gabler_01.shtml
- Gemelli, N., Wright, R., Lawton, J. & Boes, A. (2006) *Asynchronous Chess Competition*. In proceedings of *Autonomous Agents and Multiagent Systems*. ACM press. 1445-1446.
- Gingold, C. & Hecker, C. 2006. *Advanced Prototyping*. Presentation at the 2006 Game Developers Conference. Online: <http://www.slackworks.com/~cog/presentations/gdc06-AdvancedPrototyping.ppt>
- Gould, J. D., Conti, J. & Hovanyecz, T. (1983) *Composing Letters with a Simulated Listening Typewriter*. *Communications of the ACM*, 26 (4). 295-308.
- Guarneri R. (ed.), Sollund A.M., Marston D., Fosbak E., Berntsen B., Nygreen G., Gylterud G., Bars R., Kerdraone A. (2004). *PerSpace - IST integrated project. Report of State of the Art in Personalisation. Common Framework*. Online: <http://www.ist-eperspace.org/deliverables/D5.1.pdf>
- Harkins, J. D. & Macrosson, W.D.K. (1990) *Creativity Training: An assessment of a novel approach*. *Journal of Business and Psychology*, 5 (1). 143-148.

- Haukkamaa, J. (2006) Mobiilipelin arvoverkosto. Case Minikarting Mobile. In Inkinen, S., Karkulehto, S., Mäenpää, M. & Timonen, E. (Eds.) *Minne menet luova talous?* Kustannus Oy Rajalla.
- Holopainen, J. (2008) Deliverable D13.6: Final Report: Massively Multiplayer Mobile. IPerG deliverable D13.6. Online: <http://iperq.sics.se/Deliverables/D13.6.pdf>
- IGDA. (2006) 2006 Casual Games White Paper. IGDA Casual Games SIG. Online: http://www.igda.org/casual/IGDA_CasualGames_Whitepaper_2006.pdf
- ISO 1998. (1998) ISO 9241-11 Ergonomic Requirements for Office Work with Visual Terminals (VDTs), Part 11: Guidance on Usability. ISO International Standard.
- Jones, M. & Marsden, G. (2006) *Mobile Interaction Design*. John Wiley & Sons Ltd: Chichester, England.
- Juul, J. (2004). Introduction to Game Time. In Wardrip-Fruin, N., & Harrigan, P. (eds.) *First Person: New Media as Story, Performance, and Game*. MIT Press: Cambridge, MA, USA. 131-142.
- Järvinen, A. (2006). GameGame, Online: http://gamegame.blogs.com/gamegame/2006/02/gamegame_20_rel.html.
- Järvinen, A. (2002). Million pelistä tulee mobiili? Mediumi. Online: <http://www.m-cult.net/mediumi/article.html?articleId=29&print=1&lang=fi>
- Karvonen, J. (2005). *Mobiilipelin pelattavuuden arviointi*. Master's Thesis. University of Jyväskylä, Finland.
- Kapalka, J. (2006) 10 Ways to Make a BAD Casual Game. In Tams, J (ed.) *Minna Magazine*, 1 (1). 9.
- Katz, J. E. (2008) *Handbook of Mobile Communication Studies*. MIT Press: Cambridge, MA, USA.
- Kelley, J.F. 1983. An Empirical Methodology for Writing User-Friendly Natural Language Computer Applications. *Proceedings of the CHI'83*, December 12-15. Boston, MA, USA.
- Klimmt, C. (2003) Dimensions and Determinants of the Enjoyment of Playing Digital Games: A Three-level Model. In Copier, M., & Raessens, J. (Eds.) *Level Up: Digital Games Research Conference Proceedings*. The Netherlands. November 4-6. Utrecht University: Utrecht. 246-257.
- Korhonen, H. & Koivisto E.M.I (2006). Playability Heuristics for Mobile Games. In proceedings of the 8th conference on Human-computer interaction with mobile devices and services, *MobileHCI'06*. ACM Press. 9-16.
- Korhonen, H. & Koivisto, E.M.I. (2007). Playability Heuristics for Mobile Multi-Player Games. In proceedings of the 2nd

- international conference on Digital interactive media in entertainment and arts (DIMEA'07). Perth, Australia. 28-35.
- Korhonen, H. & Saarenpää, H. (2008) Mythical Mobile Evaluation Report. IPerG deliverable D13.5. Available online: <http://iperg.sics.se/Deliverables/D13.5.pdf>
- Korhonen, H., Saarenpää, H. & Paavilainen, J. (2008) Pervasive Mobile Games - A New Mindset for Players and Developers. Presented in Fun'n'Games Conference, Eindhoven, Netherlands.
- Laurel, B. (Ed.) (2003) Design Research: Methods and Perspectives. MIT Press: Cambridge, MA, USA.
- Lawson, B. (2006). How Designers Think. The Design Process Demystified. 4th Edition. Architectural Press.
- Laitinen, S. (2006) Do Usability Expert Evaluation and Test Provide Novel and Useful Data for Game Development? *Journal of Usability Studies*, 1, (2). 64-75. Online http://www.upassoc.org/upa_publications/jus/2006_february/usability_game_development.pdf
- Laitinen, S. (2008) Usability and Playability Expert Evaluation. In Isbister, K. & Schaffer, N. (Eds.) *Game Usability: Advice From the Experts for Advancing the Player Experience*. Morgan Kaufmann. Burlington, MA, USA. 91-112.
- Li, K. A. & Counts, S. (2007) Exploring Social Interactions and Attributes of Casual Multiplayer Mobile Gaming. In proceedings of Mobility'07 conference. ACM. New York, NY, USA. 696-703.
- Luban, P. (2008) The Megatrends of Game Design, Part 1. Gamasutra. Online: http://www.gamasutra.com/view/feature/3772/the_mega_trends_of_game_design_.php
- Malone, W.T. (1980) What Makes Things Fun to Learn? Heuristics for Designing Instructional Computer Games. In proceedings of the 3rd ACM SIGSMALL symposium and the first SIGPC symposium on Small systems. Palo Alto, CA, USA. 162-169. Online: <http://portal.acm.org/citation.cfm?doid=800088.802839>
- Malone, W.T. (1982) Heuristics for Designing Enjoyable User Interfaces: Lessons from Computer Games. Proceedings of the 1982 conference on Human factors in computing systems. Gaithersburg, MD, USA.
- Mao, J., Vradenburg, K., Smith, P. W. & Carey, T. User-Centered Design Methods in Practice: A Survey of the State of the Art. In Proceedings of the 2001 conference of the Centre for Advanced Studies on Collaborative research. Toronto, Ontario, Canada.
- McCurdy, M., Connors, C., Pyrzak, G., Kenefsky, B. & Vera, A. 2006. Breaking the Fidelity Barrier: An Examination of Our Current Characterization of Prototypes and an Example of a Mixed-Fidelity Success. In proceedings of the CHI 2006, Usability Methods, April 22-27. Montréal, Québec, Canada.

- Medlock, M. C., Wixon D., Terrano, M., Romero R., Fulton B. (2002). Using the RITE Method to Improve Products: A Definition and a Case Study. Usability Professionals Association. Orlando, FL, USA.
- M:Metrics. (2006) What Ails the Mobile Game Industry? Online: <http://www.mmetrics.com/press/PressRelease.aspx?article=20060502-ailsgaming>
- Mumford, M.D., & Gustafson, S.B. (1988). Creativity syndrome: Integration, application, and innovation. *Psychological Bulletin*, 103. 27-43.
- Nielsen, J. (1994). Heuristic evaluation. In Nielsen, J. and Molich, R.L. (Eds.) *Usability inspection methods*. John Wiley & Sons: New York, NY, USA.
- Nielsen, J. (2000) Why You Only Need to Test With 5 Users. Jakob Nielsen's Alertbox. Online: <http://www.useit.com/alertbox/20000319.html>
- Niemelä, J. (2008) Mobiilien moninpelien reaaliaikaisuuden tavoittelemisen matkapuhelinverkoissa. Master's Thesis. University of Tampere, Finland. Online: <http://tutkielmat.uta.fi/pdf/gradu03158.pdf>
- Niemi, J. & Sawano, S. (2006). Frog Race - Social Implications of Involving Non-Players in Pervasive Games. Master's Thesis. Stockholm University, Royal Institute of Technology. Online: <http://www.sics.se/hotpotato/frograce.zip>
- Nokia. (2004) Overview of Mobile Multiplayer Game Design, v.1.1. Online: http://sw.nokia.com/id/fc4dc5e2-0f4e-4c92-a89a-a86ad721d519/Multi_play_Mobi_v1_1_en.pdf
- Nokia. (2005) Snake Creator Receives Special Recognition From Mobile Entertainment Forum. Nokia Press Release. Online: <http://www.nokia.com/A4136002?newsid=998877>
- Nokia. (2006) Mobile Game Playability Heuristics, v.1.0. Online: http://sw.nokia.com/id/5ed5c7a3-73f3-48ab-8e1e-631286fd26bf/Mobile_Game_Playability_Heuristics_v1_0_en.pdf
- Ollila, E.M.I., Suomela, R. & Holopainen, J. (2008) Using Prototype in Early Pervasive Game Development. *ACM Computers in Entertainment*, 6, (2).
- Onder, B. (2002) Writing the Adventure Game. In Laramée, F.D. (ed.) *Game Design Perspectives*. Charles River Media. Hingham, MA, USA. 28.
- Paavilainen, J. (2008) Design Implications for Digital Scratch-Card Games. Master's Thesis. University of Jyväskylä, Finland.
- Pagulayan, R. & Steury, K. (2004) Beyond Usability in Games. *ACM Interactions*, 11, (5). 70-71. Online: <http://portal.acm.org/citation.cfm?doid=1015530.1015566>
- Parnes, S. (1961) Effects of extended effort in creative problem solving. *Journal of Educational psychology*, 52.

- Perfetti, C. & Landesman, L. (2001) Eight is Not Enough. Article on User Interface Engineering. Online: http://www.uie.com/articles/eight_is_not_enough/
- Peitz, J. (2006) Game Design Document - Insectopia. IPerG deliverable D9.8B. Online: <http://iperg.sics.se/Deliverables/D9.8B-Game-Design-Document-Insectopia.pdf>
- Perttula, M.K. (2006) Idea Generation in Engineering Design: Application of a Memory Search Perspective and Some Experimental Studies. Doctoral Dissertation. Helsinki University of Technology, Department of Mechanical Engineering, Machine Design. Otamedia Oy: Espoo, Finland.
- Pinelle, D. & Gutwin, C. (2003) Designing for Loose Coupling in Mobile Groups. In proceedings of ACM SIGGROUP conference on supporting group work. ACM Press. 75-84. Online: <http://portal.acm.org/citation.cfm?doid=958160.958173>
- Rainie, L. & Keeter, S. (2006) Cell Phone Use. Pew Internet Project Data Memo. Online: http://www.pewinternet.org/PPF/r/179/report_display.asp
- Raybourn, E.M. (1997) Computer Game Design: New Directions for Intercultural Simulation Game Designers. Developments in Business Simulation and Experiential Exercises, 24. <http://www.cs.unm.edu/~raybourn/games.html>.
- Research and Markets. (2008a) Casual Gaming - Games for Everyone. Online: http://www.researchandmarkets.com/reports/659480/casual_gaming_games_for_everyone
- Research and Markets. (2008b) Global - Mobile - Subscriber Statistics. Online: http://www.researchandmarkets.com/reportinfo.asp?report_id=328567&t=d&cat_id=
- Rouse, R. (2001). Game Design Theory & Practice. Wordware: Plano, TX, USA.
- Salen, K., & Zimmerman, E. (2004). Rules of Play: Game Design Fundamentals. MIT Press: Cambridge, MA, USA.
- Salisbury J. (2004) All a Question of Fun: How Can Primary Research Into How Videogame Engage Support Design Practice? Presentation in game design research symposium and workshop, Copenhagen, Denmark, May 7-8.
- Sowrey, T. (1989) Idea Generation: Identifying the Most Useful Techniques. European Journal of Marketing 24 (5). 20-29.
- Spool, J. & Schroeder, W. (2001) Testing Web Sites: Five Users is Nowhere Near Enough. Conference on Human Factors in Computing Systems. CHI'01 extended abstracts on Human Factors in Computing Systems. Seattle, WA, USA. 285-286.
- Sweetser, P., & Wyeth, P. (2005). GameFlow: A Model for Evaluating Player Enjoyment in Games. ACM Computers in Entertainment 3 (3).

- Todd, Deborah (2007) Game Design. From Blue Sky to Green Light. A K Peter, Ltd.
- Tschang F. T. (2003) When Does an Idea Become an Innovation? The Role of Individual and Group Creativity in Videogame Design. DRUID Summer Conference 2003 on Creating, Sharing and Transferring Knowledge. The Role of Geography, Institutions and Organizations.
- Tschang, F. T. (2007) Balancing the Tensions Between Rationalization and Creativity in the Video Games Industry. Organization Science 18, (6). 989-1005.
- Walters, C. (2005) Network and Multiplayer. In Rabin, S. (Ed.) Introduction to Game Development. Charles River Media: Hingham, MA, USA. 621-658.
- Waugh, E. (2006) GDC: Spore: Pre-Production Through Prototyping. Gamasutra Features. Online: http://www.gamasutra.com/features/20060329/waugh_01.shtml
- Weng, C., Gennari, J.H., Asynchronous Collaborative Writing Through Annotations. In proceedings of ACM CSCW 2004, ACM Press. 578-581.
- Zachary, R. (2008). Asynchronous Multiplayer Mobile Gaming. O'Reilly Radar. Online: <http://radar.oreilly.com/2008/11/asynchronous-multiplayer-mobil.html>
- Zagal, J. P., Nussbaum, M. & Rosas, R. (2000). A Model to Support the Design of Multiplayer Games. Presence 9, (5). MIT Press Journals. 448-462.

GameSpace Publications

Here is a list of the GameSpace publications, that have either been published or are about to be published. There are still several upcoming articles, which are either being written or in the review process for various conferences.

Conference Articles

- Korhonen, H., Saarenpää, H. & Paavilainen, J. (2008) Pervasive Mobile Games - A New Mindset for Players and Developers. Presented in Fun'n'Games Conference, Eindhoven, Netherlands.⁴⁰
- Kuittinen, J., Kultima, A., Niemelä, J. & Paavilainen, J. (2007) Casual Games Discussion. In proceedings of the Future Play 2007 conference. Toronto, Ontario, Canada. Algoma University.
- Kultima, A., Niemelä, J., Paavilainen, J. & Saarenpää, H. (2008) User Experiences of Game Idea Generation Games. Presented in Meaningful Play conference. Michigan State University, East Lansing, Michigan, USA.
- Kultima, A., Niemelä, J., Paavilainen, J. & Saarenpää, H. Designing Game Idea Generation Games. In proceedings of the Future Play 2008 conference. Toronto, Ontario, Canada. Algoma University.
- Paavilainen, J. (forthcoming) Mobile Game Prototyping with the Wizard of Oz. In Simantee, S. (Ed.) Mobile Games: The Expanding Scope. ICFAI University Press, India.⁴¹

Presentations

- Kultima, A. & Paavilainen, J. Creativity Techniques in Game Design. Presented in GDC Mobile 2008. San Fransisco, CA, USA.

Posters

- Kultima, A. & Paavilainen, J. (2007) Creativity Techniques in Game Design. Future Play 2007 Conference. Toronto, Ontario, Canada. Algoma University.

⁴⁰ In co-operation with the IPerG project.

⁴¹ Presented in the DREAM 2008 conference, <http://www.dreamconference.dk>

Master's Theses

Niemelä, J. (2008) Mobiilien moninpelien reaaliaikaisuuden tavoittelemisen matkapuhelinverkoissa. Master's Thesis. University of Tampere, Finland.

Paavilainen, J. (2008) Design Implications for Digital Scratch-Card Games. Master's Thesis. University of Jyväskylä, Finland.