Integrated Project on Pervasive Gaming

FP6 - 004457

WorkPackage WP5: *Design and Evaluation*

Deliverable D5.10: Design Kit: Massively Multiplayer Mobile Phone Games

Jussi Holopainen, NRC

Hannu Korhonen, NRC

Elina Ollila, NRC

Ville Nenonen, NRC

Staffan Björk, Interactive Institute

Johan Peitz, Interactive Institute

Ola Davidsson, Interactive Institute

Release date: March 19, 2008

Status: *Public*

Executive Summary

Massively multiplayer online games are played by millions of players all around the world with PCs and some game consoles. The most widespread platform for such games is the mobile phone. Copying PC or console online games is not feasible because of the characteristics of the mobile phone itself and there are different design problems to be tackled. The goal of this design kit is to outline the basic features of massively multiplayer mobile phone games looking especially at pervasiveness. The document has three main sections: the basic concepts describing characteristics present in such games, design guidelines covering some of the most salient design issues, and a collection of gameplay design patterns supporting the guidelines.

The intended audience for this report are game industry professionals looking into developing massively multiplayer mobile phone games. The concepts, guidelines, and patterns can be used both as stimulating innovation and concrete design tools.

Deliverable Identification Sheet

IST Project No.	***FP6 – 004457***
Acronym	**IPerG**
Full title	Integrated Project on Pervasive Gaming
Project URL	www.pervasive-gaming.org
EU Project Officer	Dirk van der Eecken

Deliverable	**D5.10 Design Kit: Massively Multiplayer Mobile Phone Games**
Work package	**WP5 Design and Evaluation**

Date of delivery	**Contractual**	M 42	**Actual**	19-3-2008
Status	Version 1.0		final ☑	
Nature	Prototype ☐ Report ☑ Dissemination ☐			
Dissemination Level	Public ☑ Consortium ☐			

Authors (Partner)	Staffan Björk (II), Johan Peitz (II), Ola Davidsson (II), Jussi Holopainen (NRC), Hannu Korhonen (NRC), Elina Ollila (NRC), Ville Nenonen (NRC)			
Responsible Author	Jussi Holopainen		**Email**	Jussi.holopainen@nokia.com
	Partner	NRC	**Phone**	+358 50 483 5483

Abstract (for dissemination)	This report describes guiding design principles and a supporting pattern collection for the gameplay design of massively multiplayer pervasive mobile phone games. The guidelines and the pattern collection focus on the temporal and social pervasive expansions.	
Keywords	Gameplay design; pervasive games; game design principles; socially adaptable games; mobile games	

Version Log			
Issue Date	**Rev No.**	**Author**	**Change**
01-2-2008	0.1	Jussi Holopainen	Draft for the structure based on SAG mobile phones design kit.
22-2-2008	0.5	Jussi Holopainen	Changed the structure and added things for context and other MMM relevant stuff.
28-2-2008	0.9	Jussi	Version sent for review

		Holopainen	
29-2-2008	0.91	Jussi Holopainen	Added references to virtual economies.
19-3-2008	1.0	Hannu Korhonen	Modification according to review comments

Table of Contents

1 INTRODUCTION

Pervasive mobile phone games can be roughly categorized into two different aspects: pervasive games played with mobile phones or mobile phone games with pervasive features. Pervasiveness means that a game has one or more salient features that expand the game socially, spatially or temporally (Montola et al 2006) The games belonging to the former category have core gameplay features close to other kinds of pervasive games, such as enhanced live action roleplaying. For this reason the focus of this design kit is on the latter: mobile phone games with pervasive features. Social interaction is, to some extent, in the heart of massively multiplayer game and we almost entirely leave single player games out from this discussion.

From the pervasive characteristics of temporal, social, and spatial expansion (Montola et al. 2006b) are all relevant for this design kit. The spatial expansion is further refined in this kit to include different kinds of environmental contexts. Much of the material does not directly address social *expansion* but rather focuses on the facilitators and enablers of social interaction in pervasive mobile phone games.

This design kit is structured into three layers: the first layer, *basic concepts*, lists some important points of view into the design of massively multiplayer pervasive mobile phone games (Chapter 2). The second layer, *what,* formulates, and to certain extent, validates high level design guidelines and heuristics that should guide the design of socially adaptable mobile phone games (Chapter 3). The *what* layer is based on the research done for the previous socially adaptable game design guidelines (Björk et al. 2004), multiplayer and mobile playability evaluation heuristics developed in NRC by Hannu Korhonen and Elina Koivisto (2007) and the lessons learned from the IPerG showcases. The layer consists of a small set of principles and design goals which should be in place in the final product. For example, the design principle “There are reasons for the players to communicate” means that the game should provide meaningful issues for the players to discuss about and the partial validation for this principle is that without meaningful communication the presence of other players is very weak, making the multiplayer game to feel like a single player game in the end. The third layer, *how,* gives a structured overview of design choices and game mechanics expressed as gameplay design patterns of how to achieve the design principles (Chapter 4). This layer consists of a list of game design patterns that support the design principles of the first layer (*basic concepts*). The patterns in this document follow the basic principles of game design patterns as defined by Björk and Holopainen (2005) and adhere to their structure. Many of the patterns included in this design kit are based on the patterns described in *Game Design Patterns for Mobile Phones* report (Davidson et al. 2004).

The design characteristics of all kinds of mobile phone games are outside the scope of this report as there already are guidelines available for these purposes. See, for example, game design and evaluation guidelines at Forum Nokia http://www.forum.nokia.com/main/resources/documentation/games/general.html.

1.1 How to use the design kit

This report contains a lot of material and can be difficult to grasp in its entirety, especially since the pattern approach is used in describing design choices. The preferred way to use this design kit in a concrete game project is to use design principles outlined in Chapter 3 to aid in formulating the design requirements for the game. It is important

to not that a Massively Multiplayer Mobile (MMM) game does not have to comply with all principles. For example, a mobile Alternate Reality Game does not necessarily have to provide the players consistent updates of the game state as finding out what the game is all about is part of the gameplay. The design principles also include a list of supporting gameplay design patterns which give guidance how to achieve the principles in concrete designs. The basic concepts described in Chapter 2 assist understanding the social, temporal, and spatial expansions constraints and opportunities and also aid in the real design work.

The Chapter 4 contains several gameplay design patterns that can be used to inspire in the concept creation, help in concrete design problems, and finally to analyze intended gameplay. The pattern collection is somewhat useful as such but it is advised to be used together with the pattern collections from book *Patterns in Game Design* (Björk & Holopainen 2005). The usual way to use any pattern collection is first to browse just the names and the core descriptions to get an initial grasp of their extent and later, if need be, go into details of individual patterns.

There are also two other design kits that are useful when designing pervasive games (Montola and Stenros, 2008, Lindt et al. 2007)

2 BASIC CONCEPTS

The following basic concepts were identified as important ones to consider when designing any Massively Multiplayer Online Game. The focus of this section is to uncover facets of these concepts particular to massively multiplayer pervasive mobile phone games.

The first two concepts, player to player interaction and player to game interaction, are adapted from Markus Friedl's *Online Game Interactivity Theory* (2003). Friedl also defines a third important category, that of player to computer interaction, but as this is more or less related to the user interface and usability issues, it was left out.

The spatial, and to some extent social, expansion of pervasive games (Montola et al. 2006) can also be characterized as design features where different kinds of *contexts* have an effect in the gameplay. The contexts can range from simple "I am online" to elaborate physical contexts such as players' physical location and the current weather in the location. The holistic components from the analytical component framework described in Björk & Holopainen (2005) are used to illuminate the temporal expansion. The holistic components are used to demarcate game activities from non-game activities. For example, the concept of play session can be used to describe the mechanics of how experiencing the game world can be manipulated by the game and by the players themselves.

2.1 Player to player interaction

Player to player interaction (Friedl 2003) is something that can be used to define multiplayer games in general; a game where the players cannot interact with each other in any meaningful way is a single player game. This interaction, however, can range from simple comparison of highscores to elaborate synchronous and asynchronous online collaboration mechanisms.

Player to player interaction does not only happen when the players are actively playing the game but it can also happen as an extra-game activity, e.g. the case of highscore comparisons. In general player to player interaction can be classified into: interaction through game mechanics (e.g. combat and trading in World of Warcraft), communication with other players and participants through means provided by the game itself (e.g. chat and emotes in WoW), communication with other players and participants outside the game itself (e.g. various WoW chat forums). The player to player interaction has the following important features, some of which are discussed in more detail later:

- Communication channels
- Reasons for interaction
- Communication situations
- Pacing, including synchronicity and asynchronicity, of interaction
- In-game and extra-game communications
- Knowledge about other players, i.e. player presence
- Groups and communities

2.2 Player to game interaction

Player to game interaction is how the player is interacting with the game as a system. Many principles of single player game(Fullerton et al. 2004; Rollings&Adams 2006) and normal online game (Alexander 2003; Mulligan&Patrovsky 2003; Bartle 2006; Friedl 2003) design apply here. The small screen and limited input mechanics (excluding novel uses of camera, accelerometers and other mobile accessories) make the user interaction design different, but, as we have already pointed this out, these issues are outside the scope of this report.

Some of the major problem areas in mobile online games are *player and game world identification.* These problems are, of course, evident in other kinds of online games but the cumbersome UI and the tendency for short, spontaneous play sessions accentuates these problems in mobile games.

2.2.1Player identification

Player identification[1] in the context of this discussion is defined as the way how the player grasps the role, including the associated potential game world manipulation abilities and the main progression goals, offered by the game to the player. The role in this sense is not necessarily similar to a character role assumed, for example, in roleplaying games, but can also be as simple as rotating and moving blocks in Tetris.

Having a single focus of involvement/action with intuitive associated actions seems to help in player identification. An anthropomorphic avatar, especially with player preferred qualities (audio-visual and behavioural), is a well known technique for increasing player identification and empathy for the game character (Morrison & Ziemke 2006; Cohen 2005).

[1] We will refrain from discussing the concept of identification in Freudian psychoanalysis and its following use in, for example, media psychology (Zillmann 1994; Zillmann 2006; Cohen 2005).

Mythical Mobile (Holopainen et al. 2008) tried a different approach to player identification. The game interface did not offer the player a representational focus in the game world but rather the game implied that the physical players themselves were the characters in the game. This approach is somewhat similar to the one adopted in some Location Based Mobile phone games such as *BotFighters*; the players are constantly negotiating whether they are assuming the person, the player, or the character frame of behaviour (Fine 1983; Sotamaa 2002). Many *Mythical Mobile* players felt that the weak representation of the player was problematic (Korhonen & Saarenpää 2008).

2.2.2Game world identification

Identification with game world[2] is closely related to player identification. In one sense the game world identification provides the background knowledge for allowing deeper player identification. Game world identification is the process through which the players gain knowledge and form their assumptions how the game world behaves, i.e. what kinds of events and actions are possible, what is expected behaviour from the players and so on.

In the case of *Mythical Mobile*, as in many other pervasive games, the game world was supposed to be the transfiguration of the real, mundane world, where the fantasy of the game world was immersed and overlapping with the reality. The game itself was just an interface for accessing the mythical aspects of the real world. As in for the player identification in *Mythical Mobile* the game world identification was also considered problematic. Some of the players did grasp and enjoy the "interface to the mythical world" metaphor, especially when dealing with the context-aware elements in the game ((Korhonen & Saarenpää 2008).

2.3 Context

The term context is versatile and can mean many things. Dey (2000) defines context as follows: "Context is any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves". In addition, context elements can be categorized in many different ways and sometimes the same context element can belong to a different category depending on the case and who has defined the categories. In this report we use the categorization defined by Guarneri et al. (2004). They have divided contexts into the following categories (Table 1).

Table 1 Description of Context Categories

Context category	Description
Environment Context	Captures entities that surround the user. They can be things, services, temperature, light, humidity, noise, persons, and information.
Personal context	Includes two parts: physiological context (pulse, blood pressure, glucose level, retina pattern, and hair color) and

[2] Also relationship between identification and immersion is an interesting one but requires separate treatment. See, for example, the immersive fallacy discussion in Salen & Zimmerman (2004) and immersion discussion in Ermi & Mäyrä (2007). We decided to use game world identification instead of immersion in this report because it highlights the process rather than the experience.

	mental context (mood, expertise, and stress).
Task context	Describes tasks, actions, activities, or events that the user is currently doing. It can also include other persons' tasks that are within the situation.
Social context	Describes social aspects like information about friends, buddies, neutrals, enemies, neighbors, co-workers, and relatives. It should also describe the role that the user plays in the context.
Spatio-temporal context	Describes aspects of the user context relating to the time and spatial extent for the user context. It can contain attributes like time, location, direction, speed, shape, track, and place.
Terminals context	Describes characteristics of the device that the user is using.
Services context	Describes the service that is used by the user.
Access networks context	Describes the characteristics of the network that connects the user's device to the network.

Pervasive games break the traditional notion, the so called magic circle of playing a game in certain places, at certain times by certain players (Salen & Zimmerman 2004). Montola et al. (2006) describe that expansions in social and spatio-temporal context make pervasive games different from other kinds of games. We expanded this definition of pervasive games even further and included some aspects of environment context to the game design. We found these three context categories to fit best with current mobile devices for games.

2.3.1Spatio-Temporal context

Montola et al. (2006) separate physical and conceptual space in their discussion of spatial context. The physical space in the game is where the game is physically played. In Tennis this is the tennis court with clear boundaries and in computer games this is the physical environment including and surrounding the screen, keyboard, and the mouse.

The players construct the conceptual space by semiotic means (Dolezel 2000) from the game content. In games like *World of Warcraft* it is a massive virtual world with thousands of players or it can be as simple as arrangement of a deck of cards in a computer version of Solitaire. The spatial context can cover both of these spaces separately or they can cross the boundaries between the physical and conceptual space. For example, some city wide games (or Big Games) (McGonigal 2007) can blur the boundaries where the game is played, even extending it to a global scale. The spatial context in this paper is focused on how to expand both the physical space conceptually and conceptual space physically. The result is a game style where the real world is expanded or "enchanted" by the conceptual space of the game world and the game uses real locations, history, local folklore, and local events to create a rich background for constructing the conceptual game world.

Temporal context break the notion of playing the game at a certain time. This can mean that the player is, in one sense, playing the game all the time, i.e. the game system or other players can reach the player and pull him or her back to the game at any time,

even though the player would not be actively playing the game. In games such as Killer all activities of the player, including buying milk in the grocery shop, during a game instance lasting for several days or even weeks, can be regarded as game actions. The temporal context, if carefully designed, is very close to how people use their mobile phones in the first place: your mobile is always on and other people, and network services, can reach you via voice calls or text messages. In the more advanced smart phones the situation is even more interesting as the phones are also online all the time, potentially allowing the game system to contact the game client on the phone over the network at any time.

2.3.2Social Context and Social Expansion

The normal social contexts in massively multiplayer pervasive games are similar to social contexts in other massively multiplayer games, see for example (Friedl 2003) and (Mulligan & Patrovsky 2003). Pervasive games expand the notion of social context also outside the game itself in so called socially expanded games. The socially expanded games challenge the notion that in order to be a player in a game you have to know that you are playing the game and also recognize other players as players.

2.3.3Environment Context

Environment context takes separation from the spatial context further, the space where the game is played is not just space for the game but everything in the game environment is potential context for the game. Environment context means that there is possibility to take everything around the player into account. This could be, for example, other people, devices, weather, or the amount of natural light just to name a few possibilities.

2.4 Holistic components

For understanding the pervasive aspect of temporal expansion, or blending into the daily life of the player, it is important to define concepts for demarcating play from not play. In their component framework Björk & Holopainen (2005) define *holistic* components to tackle this issue:

> *The holistic components deal with the aspects of a game that are relevant when one looks upon the activity of playing games as an undividable activity. This view is most relevant when one is interested in the relations between the activity of playing a game and other activities.*
>
> *A game instance defines the complete collection of all components, actions, and events that take place during the playing of a single game. A game session is the whole activity of one player participating in such a game. A play session is the uninterrupted stretch of time when one player is actively playing a game. All these components may have specific set-up and set-down sessions, the administrative actions players need to do before or after actual gameplay. Further, some games have interesting activities surrounding the actual playing of the game and these are covered in the extra-game activities component.*

2.4.1Game Instance

A game instance describes the components, actions and events that describe the specific play of a single game. Thus, the game instance describes the whole life time of the

playing of a game including the set-up of the game, all the actions of the participating players, ending the game, the determination of the final outcome, and any activities required to restore the game state before the next set-up. Although the fundamental rules stay the same between each time a game is played (otherwise it would be two different games that were played), the same pieces or game controls are not always used, the players, and especially the player actions differ, making all game instances different. Even if the same players would play a game directly after playing it once, and even performing exactly the same actions, the players would have different gameplay experiences than they had from the previous game.

Example: A game instance of a Massively Multiplayer Online Roleplaying Game (MMORPG) such as *Ultima Online*, is the whole history of that persistent world, beginning from the initiation of the server to the final server shut down. Some pervasive games, such as *BotFighter*, have a similar game instance structure.

Example: A game instance of *Momentum*, a pervasive LARP created in the IPerG project, lasted for a predefined 5-week during which the players completed the story line of the game. The playing of the game itself, as a pervasive game, was mostly blended into the players normal daily life.

2.4.2Game Session

A game session is the complete activity of one player playing a game, from the start of the actual gameplay to the end of playing the game. The game session is player specific, so one game instance of *Chess* consists of two game sessions: one for the black player and one for the white. In cases when the game instance and the game sessions match exactly, it may be of little use to differentiate between the concepts. One example of when the distinction between the two is more important can be found in Massively Multiplayer Online Games, where the players start playing the game independently of each other and the game sessions of the players may never overlap at all.

Example: The game sessions in many tabletop and live action roleplaying games are open ended as there are no specific game rules to determine when the game ends; rather the game sessions finish when players decide to stop playing (and stick to that decision) or when the people organizing the game stop maintaining it.

Example: In *Coup* the game sessions had definite lengths as the game characters grew older as the game progressed and finally died of old age. After dying the player could start a new game session as a new character.

2.4.3Play Session

Although a game session describes the whole activity of one player playing a game, in many cases, especially for long and complex games, the time spent actually playing the game is divided into several different occasions. Each of these occasions is a play session so a game session can be described as consisting of one or more play sessions. Similar to game sessions, play sessions are player dependent; i.e. in online games, for example, players may play the whole game without having overlapping play sessions with other players.

By controlling the moments when game pauses or saves can be made, the designers can control the length of play sessions. For example, shorter games can be made more intense by not allowing the player to differentiate between play and game sessions.

Game design can heavily influence, although not actually forcing, players what a play session should be by having specific save points create natural points for players to stop playing the game. To reach these save points then also become subgoals in the game. In games where players can abandon the current game state and reload previous states, the time which is spent from the save point to when the reload takes place can be said to be a separate play session, which does not become part of the overall game session.

In temporally expanded pervasive games the start and the end of the play sessions are not necessarily controlled by the players themselves but the game system can notify or alert the players when the game situation so demands. Some games also allow the players to control when they want to have to alerts and when not.

Example: The players of *BotFighters* were, in one sense, playing the game all the time they were "online" as their position was tracked constantly and other players could attack them. The play sessions, however, were still scattered over the time the player spent online. The start of a play session could be triggered by either the player actively starting to play the game or when another player attacks the player regardless of if the player was actively playing the game or not.

Example: In *Momentum* the players' play sessions were scattered over the 5-week period of the game instance and the game was continuously going on in the background. The players, in theory, were playing the game all the time but in effect the play sessions varied from a few minutes to several hours depending on the phase of the game.

2.4.4Set-Up Session

Each of the previous components can have a specific phase, which consists of not playing the game but rather preparing for playing the game. These set-up sessions can in many cases seem trivial, but they can be ways for players to do creative work or to determine their play experiences, for instance by setting personal goals. The latter case can be supported by the game having a set of gameplay options the players or game facilitators can choose from. While the former case is usually provided by making it possible for people to insert their own material into the game, it is also possible to support creativity by making the possible combinations of options in a game different enough, for example setting mutators in *Unreal Tournament* games. Just as game and play sessions can differ between players, the set-up sessions can differ between players and several set-up sessions can be necessary before the actual gameplay begins.

Example: Setting up a game instance of an online game includes many decisions, for instance deciding on which maps to use, banning or allowing certain actions or ways to access information etc. Such decisions allow players to affect the gameplay experience they will have, but will also affect the balance between the players or to try and gain tactical advantages.

Example: Game mastering a roleplaying game usually requires reading prewritten adventures and campaign modules, creating own plots and characters, or a combination of both. The primary reward for the game master for moderating the game can often be in seeing how the players enjoy the development of the planned experience, how the players surprise the game master by making unexpected choices or how the players bring the predefined story to life.

Example: Almost all MMORPGs offer the player the possibility of choosing and modifying the character before starting the first game session of playing the character.

2.4.5Set-Down Session

The act of collecting the components used in the game for storage and returning the game space to its previous state between game and play sessions is usually uninteresting from a game experience perspective. However, the set-down sessions can allow individual players to do individual administrative or planning activities.

In addition, when games provide the means to create narrative stories or the means to compare the game instance with other game instances of the same game, these activities belong to the set-down session. The comparison of different game instances is practically required in games that cannot be won to measure success relatively to other game instances. Similarly, game instances need to be comparable for games to be played in tournament forms.

Example: The activities of raising or gaining skills and stats in roleplaying games, especially tabletop and live versions, can sometimes be considered to be outside the actual play session. For tabletop versions such activities usually take place in the set-down session as records are usually kept by one person and the activities do not take that much time. Live roleplaying games, due to their complexity and size, usually handle the character development as an extra-game activity.

2.4.6Extra-game Activities

Many activities in games are not actually that much about playing the game itself or even preparing for playing the game. Of course, it could be argued that buying a new pair of tennis shoes is, in fact, part of the preparatory phase of playing a game of Tennis. It can also be argued that getting your name in the highscore list is sometimes an even more important aspect of playing than the game itself. The extra-game activities component of the framework contains all the activities related to the game which do not have a direct impact on the game (or the meta-game) state or players' strategies for a single game instance. The amount of extra-game activities is, of course, only limited by players' time, interest and imagination, but the designers can provide mechanics within the game to support extra-game activities, which could have an impact on the overall gameplay experience. One borderline case is buying virtual items or property in persistent games. The items can range from changes in graphical appearances to fully functional game items and even pieces of virtual real estate (Lehdonvirta 2005; Oh & Ryu 2007).

Example: *The Sims* allows players to make and distribute their own skins (modifications to the original graphics or original creations) and some players have set up web-sites with comic strips created by taking screenshots from the game. These activities do have a direct impact on the play experience and how a player actually plays the game; for example, much effort can be put into creating the right game state to take a screenshot, but this does not affect the game state or player strategies of a particular game instance directly

Example: The possession model[3] used in *Momentum* enticed, or even required, the players to surf the web, go the library etc. in order to get more information about the history of the game characters.

[3] The players were "possessed" by ghosts of real dead people and the players could move freely between being themselves or in the possession mode.

2.5 Communities

Communities and groups will appear almost inevitably in persistent game worlds with enough players. The main problem from the game design point of view is how to get and maintain that critical mass of the players. Having game features supporting community and group formation helps players to have long enough commitment to the game world (Bartle 2005; Friedl 2003; Mulligan & Patrovsky 2004).

An online game community can be defined as a group of people (players, spectators, and other kinds of participants) doing something together with a shared purpose and acknowledging the presence of the other participants.

Arrasvuori et al. (2008) offer a community framework describing the main elements of online communities: Members, Social Capital, Member and Group Identities, Participation, Policy, Privacy, Roles, Motivation, and the Community Service itself. In their participation model members possessing social capital have different kinds of motivations for participating in the community using the community service. The perceived member identity (not to be confused with player identification) is the perception of the member by other members based on the representation (audio-visual, textual, physical etc.) and behavioural history provided by the platform. Members can form groups within the platform and each of these groups has a more or less stable group identity. The members can assume different roles, such as 'helper' and 'organizer', while participating in the community. Participation is governed by explicit and implicit policies taking also into account the privacy issues of using the community platform.

The model further classifies the participation into socializing, observing, governing, playing, recruiting, and participating in external activities. The participation modes can also be tied to specific and official roles, such as Game Masters who have tools for governing the community. In online communities, and especially in online game communities, these activities can be intertwined, for example, the raid party members in WoW can socialize, i.e. just chat for the sake of chatting, while at the same time play the game in an intense manner. An interesting point here is that the model suggests that the online platform should provide means for all these participation modes. According to Montola et al. (2006) an important new mode arises in socially expanded pervasive game, that of a bystander. In the bystander mode the participant can observe the game actions and events but does not interpret them as being part of a game.

According to the model the membership cycle consists of five main phases: discovery, appraisal, join, participation, and abandonment. In the discovery phase the would-be-member gets an invitation (see recruitment) or otherwise stumbles across the community. During the following appraisal phase the potential member checks out the content and the offered features of the community and decides to either join the community and continue participation proper or opt-out. Sooner or later the member either explicitly leaves the community or just stops participating.

From the mobile phone game perspective the most critical phases are the discovery and appraisal; the often touted importance of the first five minutes for computer and console games is changed to the importance of the first 30 seconds for mobile games. The appraisal phase should allow the potential players to test out the game features and have at least some kind of feeling of the community before requiring proper registration or any kind of subscription of download fees.

3 DESIGN GUIDELINES

These design guidelines have been identified through practical and theoretical work throughout the whole IPerG project, most notably workpackages 5, 9, and 13. More details can be found in deliverables *D9.1 Guidelines for Socially Adaptable Games* (Björk et al. 2004), *D9.6 Report on Short-Term Play Testing of Socially Adaptable Game Prototypes* (Åresund et al. 2005), *D9.9 Coup and Insectopia Evaluation Reports* (Saarenpää et al. 2007), *D13.5 Evaluation Report of MMM Showcase* (Korhonen & Saarenpää 2008), and mobile phone playability heuristics (Korhonen & Koivisto 2007).

Applicability of design guidelines will depend on the game that are designed, but following guidelines are meant to give designers a toolset what kinds of issues they should consider when designing games.

3.1 Support and stimulate social interaction

The basis of a multiplayer game is that a player is aware of and can communicate with other players. This can happen either directly by talking or indirectly through the game events. In the more complex multiplayer games, the friends in the game are usually a major reason for the players to keep playing the game (Jensen et al. 2002) and (Patrovsky & Mulligan 2003).

Depending on the game, communication channels for different purposes need to be supported. Players can communicate synchronously or asynchronously in a game. Asynchronous communication is often useful in games that last longer than one play session. Synchronous communication is useful during the play sessions when the communication is related to game events. The players should also be able to choose with whom they like to communicate and ignore other players if necessary.

The game design can control the range of communication. Sometimes it is feasible to limit the communication only to players who are nearby in the game world, but the best communication methods depend on the game. Limitations will keep the amount of messages reasonable, if the game world contains different sections or the communication is context dependent.

The pacing of the game should be designed in a way that allows players to communicate using the communication channels provided by the game system and the game platform. Player to player communication, apart from direct voice calls, is difficult because of the cumbersome text input in mobile games. The intrusiveness of the communication channels should also be taken into account. For example, some research suggests that using voice intensifies the social impact in both good and bad ways (Williams et al 2007).

Supporting gameplay design patterns: *Social Interaction, Communication Channels, Unmediated Social Interaction, Chat Forum,*

3.2 There are reasons for communication

A game should provide meaningful issues for the players to discuss about. When the player is able to see how other players are doing in the game, it will generate discussion topics. In a very simple game it may be interesting to discuss about the game tactics. More complex games can provide events, difficult boss monsters that require collaboration to overcome, interesting game objects, or puzzles to give the players more

reasons to communicate. Common interests make it often more enjoyable to discuss with other people.

Collaboration between players is a way to provide reasons for communication. The collaboration situations should structure in such a way that the outcome is meaningful and, at least potentially, rewarding for the players. As Kaptelin & Cole (2002) state:

> If collaboration cannot help people to reach new goals, that is, if by acting alone they can achieve the same (or better) results, children are less inclined to cooperate, or can even find cooperation a nuisance. So, collective activities should be arranged so that learners can attain goals which are difficult or impossible to reach alone.

Supporting gameplay design patterns: *Social Interaction, Social Organizations, Social Dilemmas, Cooperation, Competition, Social Skills, Selectable Social Roles, Selectable Functional Roles, Competition, Cooperation, Social Rewards, Common Experience, Game Element Trading, Heterogeneous Game Element Ownership, Social Rewards, Memorabilia, Common Experiences*

3.3 Communication outside the game world

Players want to be aware about game events also when they are not actively playing the game. Participants highlighted this issue clearly during the evaluation interviews of *Mythical Mobile* (Korhonen & Saarenpää 2008). From the interaction design point of view this issue is interesting because the game UI expands outside the game and designers need to decide how game events are communicated when players are not logged in.

The designers should decide both the communication and presentation methods when providing information from the game world. The first thing in the communication method is to decide whether to use direct or indirect communication. The benefit of direct communication is that messages will be delivered immediately and the player can act without delays. The drawback of direct communication is that it will cost something to the game master because you have to use a messaging service such as SMS, MMS, or email.

Indirect communication means that important game data is accessible through a medium, which does not require that the player is logged in the game world. One viable option is to use a web page, which displays game events to players. This solution does not create extra costs as the game server and web server can be in the same local network and information can be transferred internally. Indirect communication assumes that players are active and will check the web page spontaneously. However, it is always possible that players do not get necessary information in time.

Instead of using messaging services or web services for communication it is possible to build automatic update functionality to the game itself. In this solution the client connects to the game server at certain intervals and retrieves recent game events. Information is then displayed to the player on the client. The player can view information without accessing the game, but if some actions are needed then the player should log in to the game. This solution creates frequent data traffic between the mobile device and the game server and the player pays expenses of the traffic.

Presentation method depends on the communication method. SMS/MMS messages can have some limits how long messages can be, but for emails then length is not an issue. However, it should be noted that emails are supposed to be read on mobile device in order to achieve immediate information delivery. Textual information is in many cases sufficient, but images and graphics can make messages more appealing.

Another important issue in presentation method is to decide what game events are communicated to a player. In other words how many messages the player will receive when not logged in. The basic rule is that the player should be notified about anything that would cause some actions when the player is actively playing the game. However, the amount of messages should not be overwhelming because it can easily lead to negligence and it may disturb player's other activities. The player should be able to define the proper amount of messages depending on the player's needs and interest of monitoring the game offline.

The communication does not have to direct player to player interaction regarding the current game states. For example, player created or generated stories during and after the game session can be used to give the players stronger focal points for player and game world identification (Sorens 2008).

Supporting gameplay design patterns: *Unmediated Social Interaction, Communication Channels, Memorabilia, Chat Forum, Social Skills, Social Rewards*

3.4 Support groups and communities

Particularly the more complex multiplayer games benefit of supporting groups and communities. The players who feel that they belong to a community are more likely to keep playing the game (Seay et al. 2004). The players should be able to collaborate with each other and form groups when necessary. It is useful to provide the players means for organizing temporary groups or longer-lasting communities. The features that support this are, for instance, associating players with certain roles or providing an enclosed communication channel for members. It should be noted that a community does not have to be in the game, but it can also live outside the game world.

As already noted above (cf. Communities) persistent game worlds with enough players will most probably have some kinds of communities. Even though some claim that you cannot design a community (Preece 2000) it is certainly true that you can design *for* a community or communities. Communities can exist in the same persistent game in many levels. The overarching community is the players who play the same game and in this sense have similar interest in the game and the game world. This "community" can be vague and widespread but it still can provide the players some sort of an anchor for identifying with the other players. For example, *Magic: The Gathering* players all over the world have common interest in MtG cards and playing the game. Many massively multiplayer games run several parallel instances of the game, mainly because of design and technical problems. These separate shards, worlds, and servers are separate communities within the whole game community. For example, players in Kul Tiras server in *World of Warcraft* have their own community distinct from the one in the Azeroth server. The game can provide methods for further communities either through specific game mechanics such as Horde vs. Alliance structure in WoW, which "forces" the players to take sides or by letting players themselves create stable group and community identities within the game.

When designing the game with support for communities it is advisable to think through and formulate as specific design goals what kinds of communities the game is intended to support. You should also analyze the game mechanics and the communication methods from he intended and expected player behaviour point of view. For example, if the reward for player killing is greater than the social penalty then the players are going to kill other players (to early Ultima Online). In the case of *Mythical Mobile* one of the explicit design goals was to support both local and global community and group formation. One way to achieve this purpose was to build dynamics of collaboration and competition within and between players from certain geographical areas through different player ranking comparisons.

Community with a shared purpose or goal has better chances to stay together. The purpose can be defined by players themselves in an informal way but it is worthwhile to consider giving players explicit tools in the game itself to define the purpose and also other aspects of the policy (Arrasvuori et al. 2008) for the particular community. The game can also force or provide overarching purposes for player communities. Easy ways are to design explicit rivalry or other conflict situations between different player communities or to create external threats to player communities[4].

For a relevant discussion about online games in general see the Community Design chapter in Friedl (2003).

Supporting gameplay design patterns: *Social Interaction, Social Organizations, Competition, Collaboration, Social Rewards, Communication Channels, Chat Forum, Selectable Functional Roles, Selectable Social Roles, Common Experience, Memorabilia*

3.5 Help the player to find other players and game instances

Multiplayer games are played in collaboration and competition with other players and the player should get a feeling that there are other players in the game world. If the player does not know all players in advance, the game should provide means for meeting new players in the game world. Additionally, the game design can provide a search feature, which allows the player to use character properties or titles for searching players. In online multiplayer games making friends can be a big part of the gaming experience.

If the game design includes game instances, the player should be able to easily find and join new game instances. It can be useful to allow the non-players to be spectators before joining the game.

Supporting gameplay design patterns: *Communication Channels, Social Organizations, Chat Forum, Late Arriving Players, Negotiable Game Instance Durataion, Negotiable Game Sessions, Configurable Gameplay Area*

3.6 Player presence: provide information about other players

Knowing some information about the other players is important in multiplayer games. This does not only increase bond with other players in the game, but it also makes the players aware of the presence of other players. In competitive situations, finding proper

[4] An external threat or rivalry between communities make the members' community commitment stronger (Forsyth 2005).

opponent is an important aspect of the game. During competition the player needs to estimate at least in some level what the other player is doing and match his or her own actions accordingly. In collaborative situations, the player needs to know other players' location and whether they need assistance. Once the players have formed a group, they need to be able to observe group members and see their current status (Koivisto 2003).

The game should give the feeling that there are other players *actively* playing the game. Usual methods are to give simple indicators of overall current player activity such as number of players currently online and ways to provide some game related information of other players. Even very simple indicators can make the difference. Some studies suggest that just indicating that there are other, real people playing with or against you will change the player experience (Ravaja et al. 2006, Gallagher et al. 2002).

Supporting gameplay design patterns: *Social Interaction, Social Organizations, Communication Channels, Chat Forum, Unmediated Social Interaction, Hybrid Space, Social Rewards*

3.7 Overcome the lack of players

Many online games have a "critical-mass problem", which means that there are not always enough players in the game world to make the gameplay meaningful or waiting other players to show up can take some time. The game design should take this into account and provide the players something meaningful to do while there are not other players around. For example, the player could compete against AI while waiting for other players.

Furthermore, the more complex multiplayer games should provide content for solo players. Depending on the playing style, current context or mood, the player may prefer play alone. The player should be able to do this even if it is a multiplayer game world. However, joining with other players should be available instantly.

Finally, the proximity multiplayer mobile games should be designed so that it is possible to distribute the client version to players who do not own the game. This will greatly improve the possibility to find other players to play with.

Supporting gameplay design patterns: *Coupled Games, Common Experiences, Late Arriving Players, Negotiable Game Sessions, Negotiable Play Sessions, Asynchronous Collaborative Actions, Interruptability*

3.8 Viral invitations and player recruitment

Achieving and maintaining a critical mass of players is important for keeping a massively multiplayer game alive. It is good practice to estimate the required amount of players and their required overall activity already in the early design phases. In cases where there are design enforced player factions in the game it is important to estimate the required player amount for each faction separately and also to figure out balancing mechanisms for keeping the faction dynamics interesting.

One effective way to get new players is to provide in-game incentives for players to actively recruit new players. *Coup* (Saarenpää et al. 2007) allowed players to recruit new players directly from the game itself. The recruitment notification was sent as a text message and the newly invited players were placed in the social hierarchy as underlings of the inviting player. Thus recruiting new players to the game was rewarding in the

game mechanics. What *Coup* missed out was that accepting the invitation should be rewarding also for the new player. In *Mythical Mobile* a similar mechanism was designed where the also the new player got an in-game reward. Sadly this feature had to be dropped out in the final implementation of the game.

Potential players should be able to get an adequate overview of the game and, if at all possible, be able to get the feeling of playing the game even before official registration to the game itself. The appraisal phase (cf. Community) should be structured in such way that there are as little costs (money, time, other resource commitments, and risks) as possible to the potential player. Having a free trial period for new players is a good start, especially if the period is structured in such way that the player is "forced" or guided to get in touch with other players providing implicit social commitment. The early collaboration situations with other players should be rewarding for the new players. Giving new players concrete in-game rewards consistently during the trial period will also increase the likelihood of further collaboration (Kaptelin & Cole 2002) and joining the game proper.

With this recruitement method it is important to know whether the invited player is acutally able to play the game. The invitation mechanism should confirm that the invited player has compatible device and installation procedure is easy enough (including needed storage space) before transferring the game to a new player.

Supporting gameplay design patterns: *Social Interaction, Unmediated Social Interaction, Chat Forum, Social Organizations, Game Element Trading, Social Rewards*

3.9 Keep the players informed about game state changes

Players play pervasive games as their time permits. Playing time can be very diverse and the game design should take this into account. Moreover, as the game sessions are blended into other activities it is possible that the player needs to leave the game suddenly.

The game should be designed so that it is possible to leave the game any time without reducing player's change to win the game. The game should be capable of taking control over player's game character and make reasonable choices.

In asynchronous gameplay the player should be able to adjust the pace of the game and match to available playing time. Sometimes it is preferable to play the game almost in real time while in sometimes slower game pace is preferred that will give time to do other things at the same time. In this case the game requires minimal attention, but the player can still keep track on game events.

Mythical Mobile did not require that the players give their mobile phone numbers and in retrospect this might have been a design mistake. The system could have informed players of, for example, new content and new local players, which might have enticed some inactive players back to the game. The system should allow the player to adjust the frequency of the notifications and it is advisable that the players are capable of unsubscribing/stopping the notifications using the communication channel. For example, if text messages are used for notifications replying STOP (or similar) to a notification would unsubscribe the player from event notifications.

Supporting gameplay design patterns: *Common Experiences, Hybrid Space, Real Life Activities Affect Game State, Chat Forum, Game State Overview*

3.10 Minimize deviant behaviour

When players are in close proximity or know each other well, the probability for bad behaviour is smaller. Online multiplayer games often facilitate deviant behaviour. Examples of such behaviour in are cheating, exploiting, hacking, and grief play.

Cheating can be defined as "An action by a player that violates the rules of the game 'as written' or commonly understood" (Cornett 2004). An exploit can be understood as a technique for cheating in the game. Hacking, in this context, means an act of creating an exploit. Grief play can be defined as "Play styles that disrupt another player's gaming experience, usually with specific intention to" (Friedl 2003).

Often, preventing grief play requires restricting player-to-player interaction. The balance between player-to-player interaction and preventing grief play should be carefully considered. Setting too strict restrictions may end up in dull gameplay.

It is also good to minimize deviant behaviour between players and non-players. From a design perspective the relationship has four relevant categories:

- Closed non-player relation: the game is cut off from non-players in a way that does not allow them to be spectators. Gameboy games and games for similar handheld devices are an example games with a closed non-player relation.
- Clearly defined non-player relations: the game is cut off from non players (spectators in this case) in a visible way. Most sports have this non-player relation.
- Weakly defined non-player relations: players and non-players share the same spatial and temporal arrangements but it is obvious who is playing and who is not. Bicycle races and live role-playing games are examples of this.
- Hidden non-player relations: games where it is not visible who the players are. Some live role-playing games would be examples of this.

Supporting gameplay design patterns: *Unmediated Social Interaction, Selectable Functional Roles, Selectable Social Roles, Social Organizations, Social Skills*

3.11 Hide the effects of network

There are four major network-related issues that need to be taken into account in online games: bandwidth, latency, disconnections, and pricing of data traffic. Bandwidth and amount of transferred data influence quite a lot how smoothly the online gaming is. If there is a conflict between bandwidth and the transferred data, it will cause other problems such as latency and disconnections. The latency can disrupt the gameplay and cause delays to interaction (Friedl 2003). Mobile games can be designed so that they hide the latency (Palm & Koivisto 2004). If the player gets disconnected from the game, it needs to be handled gracefully (Forum Nokia 2005). The amount of data to be transferred between server and mobile devices can become a barrier for playing the game. Currently mobile networks are still slower than broadband connections and players usually need to pay for every kilobyte of transferred data.

Supporting gameplay design patterns: *Unmediated Social Interaction, Asynchronous Collaborative Actions, Asynchronous Games, Hybrid Space, Negotiable Game Time*

3.12 Support short, spontaneous play sessions

The normal use pattern of mobile phones is that short periods of activity are scattered over the day while some activities are triggered by outside influence, such as incoming call or a text message received notification. The use pattern is similar to the blending into the daily life feature of pervasive games. Note that supporting short and spontaneous play sessions does not mean that the game should not allow long and dedicated play sessions.

The short play sessions may lead to a situation when players, especially players who know each other only through the game, rarely have overlapping play sessions and even in case of overlapping play sessions they might not have enough time during one play session to get in contact with other players. This also means that the players get a feeling that there are only few active players in the game world reducing the "sense of belonging". The possibilities for social contact might be few and this reduces the potential for social interaction and motivations for collaboration.

The games that support short, spontaneous play session are exploiting the normal, or even natural, use of mobile phones in general. There are two aspects into this issue: first, the game should be highly interruptable meaning that the player can at any time stop playing to game and then later, if need be, come back to the game without detrimental effect to the gameplay. Second, the player does not necessarily initiate the play session herself but the initiation request can come from other players or from the game system itself.

Combining these two aspects leads to *asynchronous play* where the player can start and end their play sessions whenever they like but still collaborate in a meaningful way with other players (Bogost 2004).

Supporting gameplay design patterns: *Asynchronous Collaborative Actions*, *Interruptability Late Arriving Players, Negotiable Game Sessions, Negotiable Play Sessions, Negotiable Game Time*

3.13 Allow players to join and leave the game without disturbing gameplay

Many, especially strategically oriented, multiplayer games require that the players of the game instance start at the same time and play the instance through together, i.e. there is no room for late arriving players or players dropping out without destroying the balance of the game. If these drop outs happen the game should handle in subtle way. The players have to negotiate and coordinate the start and the end of the game instance and this causes delays, frustration, and work extraneous to gameplay for the players. For example, many play-by-mail and play-by-email games require a certain number of players before the game instance can start often leading to delays of weeks or even months before the players can really start to play the game. Games that allow players to start and end their game and play sessions without disturbing the gameplay of other players are easier to approach as they do not require the extra coordination effort with other players. This, however, can lead to a situation where an individual player's feeling of influence to the progression of the game is reduced to almost nothing. Almost all MMORPGs overcome this by making the sense of progression in the game very player

specific, i.e. the player's actions almost solely have effect on the attributes of the player's character and persistent effects on the whole game world or on other players' attributes are minimal. The playing style of these games is close to "playing alone together" (Ducheneout et al. 2006).

Supporting gameplay design patterns: *Asynchronous Collaborative Actions*, *Interruptability Coupled Games, Late Arriving Players, Negotiable Game Sessions, Negotiable Play Sessions*

3.14 Support activity blending

The ability of a game to be merged with other activities surrounding the game event, meaning that a game with a high possibility for activity blending should allow players to engage in other activities during gameplay (answer a phone, eat and drink, engage in a conservation about something else than the game etc.) Slow games with turn-taking, such as many board games, are examples of games with a high possibility for activity blending. Games with a constant flow in the game time and rules that calls upon all the players activity at all times have a low possibility for activity blending. The games supporting activity blending should also have mechanisms for controlling their investment in the game, i.e. how much the player expects to participate in the game in terms of pacing (frequency and length of play sessions). Live-action roleplaying game design philosophy Merging Game with Life (Montola & Stenros 2008) can be seen as an extreme form of activity blending

One way to support activity blending is to use a slow update mechanism in the game, where the effects of player actions are determined within certain intervals or after a certain time has passed. This interval can vary from several minutes to even days.

Sharing time between different tasks is possible once the game event interval is long enough and fixed that the player can fully concentrate on the other task and have time to do something reasonable. The players should be able to check the current status of the game was quickly and in a manner that does not distract other activities.

Finding the right circumstances to play the game can be a challenging task and players are usually aware of when it would be beneficial to play the game. Regardless of these opportunities gaming is not always possible due to more urgent tasks or player's social context. As the gaming is not anymore an isolated activity or tied to the front of the big display, player's social context is much more meaningful. The players have to think about their influence on others while they were playing the game because they might unintentionally be impolite towards other persons in the vicinity.

Supporting gameplay design patterns: *Activity Blending, Interruptability, Hybrid Space, Asynchronous Collaborative Actions*

3.15 Equal possibilities to play

Using context information in the game should be carefully designed and designers need to make sure that all players have equal possibility to access relevant context information. The player progression should not be depended on context information that is unreachable for a player and it should not force the player to play the game at certain time. Furthermore, most context information is also dynamic and designers cannot

control changes in context information (e.g. weather information), which may place players to unequal position.

In addition to uncontrollable changes in context information, there can be player-related reasons why the player cannot access certain context information. For example specific time of the day may not be suitable for the player due to other activities or the player's current social context does not allow the player to play the game. The player may not be able to travel some specific location to retrieve location specific information or some resources are not available on the player's current location.

However, if some context information is available only for some players, the game design should enable and emphasize collaboration between players. With this solution all players can access context information. This will also increase player-to-player interaction in the game. Other possibility is that utilization of the context information is time-independent and the player can use context information when it becomes available. If certain context is not available, the player should always be able to do some other things that will require some other context information. Finally, the game should provide meaningful things to do that do not require certain context conditions to be fulfilled. Other alternative is that player can complete everything, but the reward is determined based on how well context conditions were met. If the player's context matches to the conditions, the player receives a normal reward. Otherwise the rewards are substantially worse.

Supporting gameplay design patterns: *Hybrid Space, Real Life Activities Affect Game State, Heterogeneous Game Element Ownership, Common Experiences, Asynchronous Games*

3.16 Perception of the current context

Pervasive mobile games typically use context information to define some conditions in the game world or to convert context information to a game element. One part of the fun in pervasive games comes from discovering the correct context and playing the game when conditions are favourable for the player.

The difficulty in utilizing the context information in the game is that the game system and a player may not have mutual understanding of the current context. The player may also be uncertain how the game system interprets current context information even though it would be otherwise clearly recognizable. For example, the game can utilize environment context information such as cloudiness in the game. Even though cloudy and partly cloudy skies are different by definition, from the player point of view they are alike compared to clear sky. The designer should decide whether similar context information is considered as same or treated as different in the game. The best option is that the game system uses only context information that is clearly distinguishable and unambiguous for the player.

Therefore, the game should assist the player by notifying what the game system considers as current context. The difficult issue for designers is that how context information should be revealed to a player without contaminating gaming experience. In addition, there can be several contexts that need be informed to the player.

Sometimes it is feasible to inform current context directly to the player. In this case the outcome of the current context is much more interesting than discovering the right conditions. If the player needs to find the right context condition, then the game should

allow the player to figure it out by herself. The game can still give some implicit clues. If the designer decides not giving any clues then the designer should make sure that the player can figure out the context information and it is unambiguous.

Supporting gameplay design patterns: *Hybrid Space, Real Life Activities Affect Game State, Heterogeneous Game Element Ownership, Common Experiences, Game State Overview*

3.17 Acting with the real world

Taking context and pervasive expansions mentioned in the previous chapter into account enables games where the players and the game use the real world as a significant game element.

Often the awareness of participating in the game changes during the invitation phase using the so called rabbit hole invitation model (Szulborski 2005). In this model the player is first unaware that the activities and the information provided by, for example, web-sites is game related but it is gradually revealed when the player gets in contact with more information about the game and other players. In these cases the ambiguity of the player's social context moves from being in an unaware state (the game related information is ignored or is interpreted as normal circumstances) to an ambiguous state (the game information and events are too obvious to be ignored but the players are still not capable to interpret them as being part of a game), and finally to a conscious state (the players correctly interpret the game information and events as gameplay).

Montola et al. (2006) also list a variety of methods for changing the participatory roles, what they call ambiguous and in-context role offers, in socially expanded pervasive games. The first one is invitation to play, where the game offers active participation in the game as a player. The second one is invitation to participate, where the game offers active participation but not as a player. Active non-player participation roles are, for example, referees in team sports and non-player characters in live action role playing games. Third offer is invitation to spectatorship where the participant is offered an opportunity and means to follow, but not affect, what happens in the game. The last one is invitation to refuse where the game offers an opportunity and, in some cases, the means to ignore the game. Note that the person does not necessarily have to interpret the offers as game experiences, i.e. the person can be either in unaware or ambiguous state while receiving the offer. This might lead to situations where, for example, an invitation to play is interpreted as a threatening social situation.

Using environment context makes the game world connected to the real world. This makes players see the real world in different ways, since everything in their surroundings can have other meanings in the game than they have in the real world. Environment context can be used either passively or actively. Passive interaction is one way interaction and the player cannot affect what information is gathered from the physical world and used in the game. This information is fair for every player, since they cannot influence it. Example of such information is weather. The issue that makes the use of environment context information interesting is that it cannot be predicted accurately and it sometimes can limit actions in the game world if conditions are not met. Another interesting aspect is that the collected information can be used as it is in the game, but it can also be transformed to something have other meaning in the game.

Active interaction in environment context means that the player must act on something that happens or exists in the real world and which results are transformed into the game. Examples of active interaction are when a player uses real world infrastructure like Wi-Fi, Bluetooth, mobile phone base stations, and beacons. Moreover, physical items with barcodes, RFID tags or price tags can be used, and so can other information that is available in the physical world such as arrival times of local trains. Basically any information that can be collected from the real world can be used in the game. The argument is if it is interesting to seek this information and if all players have equal chance to get this information.

The real world information can be used as thematic elements in the game. The information does not necessarily have to have a direct impact on the gameplay but rather provides background knowledge or setting for the player actions. There is a wealth of such real world information from local geography to local folklore. Using the "reality as a source book" gives the players manifold means of immersing themselves in the game world (Montola and Stenros 2008). This strategy was used effectively in *Mythical Mobile*. The background story contained references to local mythologies and folklore. Even simple tricks, such as describing otherwise location neutral game events happening in or near players' hometown, can be effective in creating a sense of an active game world overlapping with the real world.

Supporting gameplay design patterns: *Hybrid Space, Real Life Activities Affect Game State, Heterogeneous Game Element Ownership, Game Element Trading*

4 Supporting Gameplay Design patterns

Most of the following design patterns are directly adapted from the *Patterns in Game Design* book (Björk & Holopainen 2005) and the *Game Design Patterns for Mobile Phone Games* (Davidson et al. 2004). The newer patterns are the result of a cluster analysis of pervasive games (Björk & Peitz 2007) which included an analysis of all games developed within the IPerG project. The newer patterns are not described to the same level of detail due to limited time resources available during their development.

As described in *Patterns in Game Design* (Björk & Holopainen 2005), each pattern has six sections: name, core definition, general description, using the pattern, consequences, and relations to other patterns:

- Core Definition is a brief sentence in italics describing the core idea of the pattern.
- General Description section contains the properties found in games that are the basis for the pattern, followed by the motivation for the pattern's name. General properties of the pattern are described using game examples.
- Using the Pattern section is mentions the common choices a designer is faced with when trying to apply a pattern.
- Consequences section deals with the consequences of gameplay that can appear when the pattern occurs in the game. As such, the section is directed towards analyzing gameplay, in order to understand the gameplay in a game, to solve a design problem in an already existing design, or to provide information to support decisions of what other design patterns to instantiate in the design of the game.

- Relations section lists the patterns which can be used to support or are supported by this pattern.

References to other patterns in the descriptions are indicated in *Italics and Capitals*. Most of the patterns referenced from the following patterns are not found in this report but in the pattern collection gathered in the *Patterns in Game Design* (Björk & Holopainen 2004). Most, if not all, of the reference patterns, however, are not needed for understanding the main gist of the pervasive game design patterns.

The gameplay design pattern tool (*D5.9 – Gameplay Design Patterns Software Tool)* developed within IPerG can be used to design and analyze pattern collections used in a game project.

4.1 Communication Channels

Communication Channels are the medium and the methods players can use to send messages to other players.

Available at the CD-ROM in Björk&Holopainen (2005).

4.2 Chat Forum

A communication channel independent of game instances where players can talk to each other about a game.

A communication medium, most often text-based, that allows players to communicate with other players. It is not tied to specific game states or game instances, for this see *Communication Channels*.

Example: Using Blizzards battle.net, Diablo II allows players to meet in a *Chat Forum* to talk and to join/create game sessions.

Using the pattern

Chat Forums can be designed to support *Handles* and *High Score Lists* so that players can differentiate between players based on *Game Mastery* and *Social Status*.

Consequences

By putting a *Chat Forum* into a game, players can easily get in touch with other players who also want to play. Groups of players can advertise vacant slots and lone players can look for teams. This is also a good place to ask for advice on game related issues, sharing and spreading *Strategic Knowledge*. A *Chat Forum* automatically forces users into *Social Interaction*. Without interacting with the other players, no information or knowledge can be gained. Depending on the people's *Social Skills*, they may have different experiences. Abusive players are often punished by being ignored, while everyone want to be on the skilled players' team.

Relations

Instantiates: *Social Interaction, Strategic Knowledge*

Modulates: *Social Status, Game Mastery*

Instantiated by: -

Modulated by: *Social Skills, Handles, High Score Lists*

Potentially conflicting with:

4.3 Social Interaction

Social Interaction is when two or more players have two-way communication between each other, i.e. the other players can respond to the individual player's communication.

Available at the CD-ROM in Björk&Holopainen (2005).

4.4 Asynchronous Games

Games where the players game and play sessions do not necessarily overlap in time.

Available at the CD-ROM in Björk&Holopainen (2005).

4.5 Social Organizations

Social Organizations are more or less stable group of players who have common long-term interests within the game.

Available at the CD-ROM in Björk&Holopainen (2005).

4.6 Social Dilemmas

The players tend to compete against each other even though cooperation would be beneficial for all players involved.

Available at the CD-ROM in Björk&Holopainen (2005).

4.7 Selectable Social Roles

Supporting players to actively choose what social role they have in a game by tying the roles to game mechanics.

Several models for describing player types have been developed Bartle 2003; Yee 2002; Foo 2004; Fullerton et al. 2004; Farmer 1992). However, these are not specifically developed for describing social roles, and especially that player may shift social roles during play and game sessions. Different games typically promote different social roles makes each game have its' own individual set of social roles, but a potential list follows (see (Björk et al. 2004) for details):

- Banned
- Outcast
- Recluse
- Motivator
- Negotiator
- Mediator
- Helper
- Violator
- Dominator

- Exhibitionist

Example: *Return to Castle Wolfenstein* or other class-based first-person shooters support the helper social roles through medic and engineer classes.

Example: Some text-based multiplayer adventure games supported the mediator role through letting other players' characters follow that character through an explicit command.

Using the pattern

To ensure the presence of the pattern, one should analyze different activities in games, or modes of play, for how they are related to different social roles. After this, consider how the game support transitions between the different roles during gameplay.

Since different social possibilities and requirements are typically tied to what one is functionally possible of doing, having different *Selectable Functional Roles* in a game supports *Selectable Social Roles* as long as the functional roles do not all have the same possibilities and requirements on social interaction. For role-playing games this is related to *Characters* since if players have some *Creative Control* over the character creation they can determine what social roles that character will have, and by proxy the player.

Consequences

Allowing players to seamlessly move between socially active roles and completely passive roles is one way of supporting *Interruptability* through a form of *No-Op* if social interaction is part of the gameplay. If a game has *Selectable Social Roles* that support being mentors and apprentices the game has a socially-based *Smooth Learning Curve*.

Relations

Instantiates: *Social Interaction*, *Interruptability*, *Smooth Learning Curve*

Modulates: -

Instantiated by: *Selectable Functional Roles*, *Characters*

Modulated by: -

Potentially conflicting with: -

4.8 Selectable Functional Roles

The players can select different functional roles where the abilities of the players and the choices they can make are different.

The functional roles are defined by the sets of actions that are available to players due to the game rules and game state rather than on players' skills and ephemeral desires. Note that functional roles do not have to be permanent in a game instance; in many games the change of functional roles is an intrinsic part of gameplay.

Example: "class-based" multiplayer first person shooters such as Return to Castle Wolfenstein: Enemy Territory and Team Fortress Classic (and to a lesser extent America's Army and Battlefield 1942).

Example: roleplaying games often have different classes, such as the classic Mage, Priest, and Warrior distinction.

Using the pattern

Functional roles in games can be described by five categories of *Asymmetric Abilities* they give players based on how these differ from the abilities given by other functional roles. These categories allow abstract functional roles to be created (i.e. what the generic class would be in a class-based game if none exists) or allow focus upon the defining abilities of a functional role. All functional roles consist of abilities from one or more of these categories. The categories of *Asymmetric Abilities* that create the functional roles are:

- Observational functionality – people who are not players but can only observe gameplay, i.e. they may receive information about the game state but cannot affect it.
- Basic functionality – the action are available to all players.
- Dedicated functionality – the actions are available to some, but not all players.
- Unique functionality – the actions are available to only one of the players.
- Meta functionality – there are actions available that affect the characteristics of the game instance or meta games.

Consequences

Allowing different functional roles for the players usually, if not always, leads to *Social Interaction* if the players have *Mutual Goals* where they have to coordinate the use of their *Asymmetric Abilities*. In this case there have to be suitable *Communication Channels* for the players. Selectable *Functional Roles* automatically creates more *Varied Gameplay* because the players have different ranges of choices based on their functional roles.

Relations

Instantiates: *Social Interaction, Varied Gameplay, Selectable Social Roles*

Modulates:

Instantiated by: *Asymmetric Abilities*

Modulated by: *Communication Channels, Mutual Goals*

Potentially conflicting with: *Single-Player Games*

4.9 Social Rewards

A Social Reward is the result of game event which affects the social status of the player.

As soon as a game links players together in some order, by multiplayer or some other ways of sharing results it is possible to receive *Social Rewards*. This can be anything from recognition among one's peers to becoming a celebrity.

Example: Winning the world championship in Counter Strike.

Example: Beating someone else's score on an on-line high score list in Icy Tower.

Using the pattern

Social Rewards are side effects of playing a game were a player is rewarded based on his relative skill to other players. *Social Rewards* become even higher if the game is well-known outside the community of active players. Giving *Social Rewards* to players playing the game is achieved by setting up *Social Interaction* within the game so that players can have *Common Experiences*. The use of *Spectators* gives players the opportunity to receive *Social Rewards* independent of *Social Rewards* received directly from other players.

Consequences

Social Rewards give additional value to achievements in games by providing *Extra-Game Consequences*.

Relations

Instantiates: *Extra-Game Consequences*

Modulates: *Social Statuses*

Instantiated by: *Social Interaction, Common Experience, Memorabilia, High Score Lists, Spectators*

Modulated by: -

Potentially conflicting with: -

4.10 Unmediated Social Interaction

The game allows players to communicate outside channels controlled by game rules.

Social interaction can take many expressions in a game. When the game design does not restrict the content of what is communicated it can be defined as being *unmediated*. Note that this does not mean the game does not provide the technological medium which enables the social interaction, it rather does not try to interpret individual messages. Often this is simply due to inability to parse complex or ambiguous messages.

Example: In the multiplayer version of the game Advance Wars, players can talk to each other during the game of the whereabouts of certain units even if the game features *Fog of War*.

Example: In *Can You See Me Now* the runners can easily talk to each other and set up strategies. This goes for the online players as well who can give each other hints on how to not get caught, perhaps through an external communication channel.

Using the pattern

Even if games have *Unmediated Social Interaction* they may restrict what players have access to what channels. The most common case for this is *Team Play* to allow for secret tactics. Other possibilities include allowing players to create channels where they can develop *Secret Alliances* or supporting *Social Organizations*. Games with different modes for players where different amounts of information are shown may restrict channel use to avoid the sending of sensitive information. An example of this can be found in Counter Strike, where players who have been killed assume the role of *Spectators* and may follow the other team's *Avatars* and the progression of the play session. Inactive players can communicate with each other via text messages but they cannot talk to players still alive and active in the game.

Consequences

When supported by the game design, *Unmediated Social Interaction* takes place over a *Communication Channel*. In games with *Player-Player Proximity* the game design has to be considered a *Self-Facilitated Game* or be designed so that all information that can be exchanged between players does not destroy the intended gameplay.

Relations

Instantiates: *Social Interaction, Communication Channel*

Modulates: *Social Skills, Team Play, Secret Alliances, Social Organizations,*

Instantiated by: *Player-Player Proximity*

Modulated by: -

Potentially conflicting with: -

4.11 Social Skills

The players' actual skills in socializing are vital for gameplay.

A players social skills determines how well she interacts with other players and non-players in a social environment.

Example: In the game *Crowd Machine* players score points by gathering large amounts of people playing the same game. The more people you can gather through social skills, the more points you get.

Example: The game *Diplomacy* is primarily depending on a player's social skills in creating alliances and deciding when to dishonor agreements.

Using the pattern

The types of *Social Interaction* allowed by a game strongly influences how much impact *Social Skill* has on gameplay. *Unmediated Social Interaction* typically allows *Social Skills* to have a strong impact although this can be affected by the presence of *Symmetric Information* and *Perfect Information* about the game state.

Consequences

In games, *Social Skills* most often affect how well *Team Play* and the creation of *Dynamic Alliances* works, as well as how successful players are at *Negotiation*. Outside actual gameplay, players' *Social Skills* typically affect their roles in *Chat Forums* and affects their *Social Status* and the amount of *Social Interaction* she can perform.

Relations

Instantiates: -

Modulates: *Chat Forums, Social Statuses, Team Play, Negotiation, Dynamic Alliances*

Instantiated by: -

Modulated by: *Unmediated Social Interaction*

Potentially conflicting with: *Perfect Information, Symmetric Information*

4.12 Common Experiences

Different players' experiences of playing a game can be communicated to each other so that they can identify it as being from the same game instance.

As soon as players are involved the same game they are likely to get some common experience. However, common experience only happens when the players are experiencing the same thing. Just being in the same game world as another player does not count for common experience, they have to actively cooperate or compete for the same goal.

Example: In the item hunting game *Mogi*, players sometimes race each other for valuable items. When the players spot each other and realize that they're heading for the same thing they have a *Common Experience*.

Using the pattern

Common Experience can appear in a game for many reasons. *Team Play* is a good example where players do *Collaborative Actions* together. Depending on the result of the actions players can be given *Shared Rewards* or *Shared Penalties* which also can be seen as a *Common Experience. Player-Player Proximity* ensures that the experience is both within the game and in reality while *Avatars* and *Units* give players points of reference that ease discussions between players. *Spectators* can make *Common Experiences* possible without having all people take part as players.

Negotiable Play Sessions and *Negotiable Game Sessions* can both limit the sense of a *Common Experience*, but this can be mitigated in different ways. Even if not a true *Common Experience*, *High Score Lists* can be used to create illusion of shared experiences in *Single-Player Games*. This weaker form of *Common Experience* is possible when players can communicate the experience of controlling a specific focus loci and if the gameplay follows the same basic structure from game instance to game instance.

Consequences

Common Experiences make it possible for players to have *Social Rewards* and can be starting points or motivations for extra-game activities. When *Common Experiences* are discussed, they can lead to the transfer of *Strategic Knowledge.*

Relations

Instantiates: *Social Rewards*

Modulates: -

Instantiated by: *Team Play, Cooperation, Social Interaction, Shared Rewards, Shared Penalties, Collaborative Actions, Spectators, High Score Lists*

Modulated by: *Player-Player Proximity*

Potentially conflicting with: *Negotiable Play Sessions, Negotiable Game Sessions*

4.13 Cooperation

Players cooperate, i.e., coordinate their actions and share resources, in order to reach goals or subgoals of the game.

Available at the CD-ROM in Björk&Holopainen (2005).

4.14 Asynchronous Collaborative Actions

Compound actions that require players to perform individual actions without requiring simultaneous actions.

Some effects in games require several players to do act together for the effects to take place. These actions are called *Collaborative Actions* since the players are either actively collaborating or can be seen to do so even if they are not aware of it.

In *Asynchronous Collaborative Actions* the players' individual actions do not have to happen simultaneously, even though the whole compound action requires coordination and negotiation with other players.

Example: item auctions in *World of Warcraft* allow the players to place their bids regardless of when other players place their bids.

Example: in *Mythical Mobile* the players can finish their parts of a complex ritual whenever it suits them. Once all the ritual parts have been completed successfully the ritual completion reward is distributed to the players.

Using the pattern

When designing *Asynchronous Collaborative Actions* the following have to be taken into account: the amount of coordination needed between the players; how the collaborative action is initiated; how other players can participate in the action; how players can get information about the on-going actions; what kind of individual actions the players have to do; are the individual actions sequenced or can the players do their individual actions in any order; how the effect of the compound action is calculated based on the individual actions; are there *Time Limits* for individual actions or the whole compound action; can the players replay their actions before resolving the final outcome; and how the possible *Rewards* or *Penalties* are shared between the participating players.

As the players do not have to be even playing the game simultaneously it is required that there are at least some asynchronous *Communication Channels* for the players to coordinate their individual actions.

Consequences

As is the case with *Collaborative Actions* generally there is a need for the players to coordinate their actions leading into *Negotiations* and *Social Interaction*. Because the players do not have to act simultaneously *Asynchronous Collaborative Actions* usually take a long time and sometimes *Social Interaction* between participating players is necessary between the initiation and resolving the effects of the action.

Relations

Instantiates: *Social Interaction, Negotiation*

Modulates: *Collaborative Actions*

Instantiated by: *Communication Channels*

Modulated by: *Time Limits, Rewards, Penalties*

Potentially conflicting with: *Single-Player Games*

4.15 Game State Overview

Players are provided with information that extends beyond the observational abilities provided by game elements.

Available at the CD-ROM in Björk&Holopainen (2005).

4.16 Coupled Games

Games are Coupled Games if they share some amount of player accessible data.

Coupled Games always refer to at least two games (Peitz 2004). A single game cannot be coupled. The coupling occurs when the games in question share some data. This can be anything from player specific data, gold coins to the actual world where the game takes place.

Example: In *Sonic Adventures* the player can find eggs which can be transferred to a handheld device and "hatched" there. The hatched creature, Chaos, can then be nurtured and taken care of in a small game on the handheld.

Example: In Metroid Prime and Metroid Fusion the player can, after having completed one of the games, connect the two games and unlock new features in one of the games.

Using the pattern

Using *Coupled Games* one must make sure that playing one of the games more then another doesn't make the other game unbalanced once played. In most cases the games are *Asynchronous Games* and actions that take place in one game become *Trans-game Information* in the other and it is important that the other game doesn't alienate this. Depending on the setup between the games, one game can also be used as a way to build *Interruptability* into the other. This also makes it possible to access a *Game World* through another game if the current one experiences *Downtime*.

Consequences

Coupled Games allow players to influence the game state of a game which otherwise would not be accessible, e.g. due to connectivity problems or demands from the social environment.

Relations

Instantiates: *Trans-game information*

Modulates: *Downtime, Asynchronous Games, Interruptability*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

4.17 Configurable Gameplay Area

The area in which the game is played can be configured by the players and have a direct effect on gameplay.

Players can setup and configure their own game session and game world at any location and in any scale and alter basic conditions. This applies for the physical space where the game takes place, not for the content.

Example: In Laser Tag, where players try to get to each other's bases and destroy them before being shot, players can set up the bases at any location and define the play area all by themselves.

Using the pattern

Configurable Gameplay Areas require that the game system can either inherently support the setup or that the technology used for the game can locate game elements within that space. This means that *Artifact-Location Proximity* is not only used for game elements but also for *Book-Keeping Tokens*

Consequences

Allowing players to configure the game world by themselves opens up for a lot of player design like house rules and other kinds of localization. By using this pattern, the players also access how the *Hybrid Space* between the real world and the game world is defined. The design of what gameplay area to use often creates *Predefined Goals*, at least concerning geographical variables.

Relations

Instantiates: *Predefined Goals*

Modulates: *Hybrid Space*

Instantiated by: *Book-Keeping Tokens, Artifact-Location Proximity*

Modulated by: -

Potentially conflicting with: -

4.18 Memorabilia

Content or artifact created during the game can be kept for affection value after they have lost their gameplay value.

In some games players create new items or images while playing. These can often be kept by the player after the game has ended to remind her of the game session. The players can also get *Memorabilia* for completing the game, for example, getting a new ring tone for free in a mobile phone game.

Example: The PhotoFun project game *Mosaic* allows players to take pictures with their phones and send it to a public screen which produces a larger picture consisting of all the small ones. This way, both the picture taken by the player and the larger one can be saved for later use.

Example: In *The Sims 2* the users can take screenshots, make movies and more showing the lives of her sims.

Using the pattern

Allowing for *Memorabilia* makes it possible for the player to create her own *Trans-Game Information*. This can in turn open up for *Social Rewards* as the player has solid

evidence of something that happened in the game. If the game contains any *Game Element Trading*, the game elements themselves can become *Memorabilia* when the game session has ended.

Consequences

Depending on what kind of *Memorabilia* is created the game designer must be aware that the contents could possibly ruin the game experience for another player if she is exposed to it.

Relations

Instantiates: *Trans-Game Information, Social Rewards*

Modulates: *Game Element Trading*

Instantiated by: -

Modulated by: *Game Element Trading*

Potentially conflicting with: -

4.19 Hybrid Space

Part of the game state is defined and continuously updated by real world conditions.

With modern technology it is fully possible to extend a game beyond its own hardware. With the use of sensors and actuators, the game can have a continuously updated relationship with the real world, in principle making the game state continuously updated by events in the real world.

Example: The game project *Human PacMan* makes use of the real world. A wall in the real world is a real wall in the game world and cannot be traversed.

Example: The handheld game *Boktai* uses sunlight as an important input, both to the game world and to the player's resources.

Using the pattern

Hybrid Space can be created in three different ways: through *Augmented Reality*, through *Extra-Game Input*, or through *Configurable Gameplay Areas*. In *Augmented Reality* the game state is created by using the real world as a basis and adding information from the abstract game state. *Hybrid Spaces* based on *Extra-Game Input* use a traditional game state presentation style but has the game state updated by input that is not generated by players. *Configurable Gameplay Areas* create *Hybrid Spaces* by using locations in the real world to define the game world.

Consequences

Games with *Hybrid Spaces* are *Real-Time Games* if the intersection between the real world and the game world is more complex than rather just purely spatial, since they in the case of more complex relations continuously receive *Extra-Game Input*. *Hybrid Spaces* often turn games into *Pervasive Games*, both since non-players may be performing their activities within the space and since players may or must perform non-game related activities.

Relations

Instantiates: *Pervasive Games, Real-time Games*

Modulates: -

Instantiated by: *Extra-Game Input, Augmented Reality*

Modulated by: *Configurable Gameplay Area*

Potentially conflicting with: -

Uncharacterized connection to: *Persistent Game Worlds, Real-life Activities Affect Game State*

4.20 Heterogeneous Game Element Ownership

The ownership of all game elements in a game instance is divided among players.

Games using *Heterogeneous Game Element Ownership* are those that are based part of the gameplay (or meta gameplay) on the fact that players bring objects to the game session which they own. A counterexample: If Monopoly's design was based around this pattern, it would mean that for each game session players would bring along their privately owned property necessary to play the game: John would bring the game board, Alice brings a stack of event cards, Alex brings a bag of hotel tokens etc. **Example**: In *Magic: the Gathering*, the player needs to make a conscious choice as to which cards her/she will use for a particular play session.

Example: To participate in on-line multiplayer games, players often need to own their respective copy of the game. However, the distribution of ownership is seldom heterogeneous since all copies of the game, by definition, are identical.

Using the pattern

When creating games with *Heterogeneous Game Element Ownership* one has the possibility to make the element have specific gameplay effects. Further, if *Game Element Trading* is encouraged this can become part of the ordinary *Trading* in the game but this typically requires *Persistent Game Worlds* so that the game system can control the ownership.

Consequences

Heterogeneous Game Element Ownership makes it possible to have *Game Element Trading* and for players to have meta-level *Gain Ownership* goals.

Relations

Instantiates: *Game Element Trading*

Modulates: *Trading, Social Statuses, Persistent Game Worlds*

Instantiated by: *Gain Ownership*

Modulated by: -

Potentially conflicting with: -

4.21 Game Element Trading

Physical game elements can be traded between players.

Any kind of objects can be traded between players. It does not have to be similar objects but just about any kind of resources.

Example: The game *GeoCaching* has players hiding treasures and then dropping clues on a website. Upon finding the treasure the player can either take the treasure or replace it with another treasure for someone else to find.

Example: Marbles used in various children's games can be traded regardless of what games they are used in.

Using the pattern

Game Element Trading can occur in games with *Persistent Game Worlds* unless the game has been explicitly designed not to allow this. In games with *Heterogeneous Game Element Ownership* the possibility of *Game Element Trading* is often an integral part of the game design and gives rise to meta-level *Gain Ownership* goals.

Consequences

Game Element Trading is a form of *Trading* which requires physical artifacts. If these artifacts are user-created they may be used as *Memorabilia* when the game is finished. If used in conjunction with *Player-Artifact Proximity* and *Player-Player Proximity* the game can control the *Social Interaction* in the game by forcing players too meet in order to make the trade.

Relations

Instantiates: *Trading*

Modulates: *Memorabilia, Social Interaction*

Instantiated by: *Persistent Game Worlds, Heterogeneous Game Element Ownership, Gain Ownership*

Modulated by: *Memorabilia, Player-Artifact Proximity, Player-Player Proximity*

Potentially conflicting with: -

4.22 Competition

Competition is the struggle between players or against the game system to achieve a certain goal where the performance of the players can be measured at least relatively.

Available at the CD-ROM in Björk&Holopainen (2005).

4.23 Negotiable Play Sessions

That a player can determine whenever to join or leave an ongoing game instance independent of other players' play sessions.

Typically games are played by people agreeing to play together, beginning and ending the gameplay activity at the same time. However, demands from the real world can require players to have to begin latter than the others or end sooner, or even miss altogether a specific part of the game instance if the game instances consists of several game sessions.

Example: Most role-playing games provide players with the opportunity of not taking part in a specific game session, or only taking part of part of it, as long as sufficiently many other players do play.

Example: Team-based First-Person Shooters typically allow players to drop out of the game whenever they choose to and balance the game by replacing a leaving player with one from a queue of people who are waiting to start playing.

Using the pattern

Late Arriving Players supports *Negotiable Play Sessions* in removing the requirement that all players need to be presence at the start of the game instance.

In *Team-Based Games* it is possible to support *Negotiable Play Sessions* by letting team mates control the leaving player's resources (which can be seen as a form of *Shared Resources*).

Consequences

Depending on how short the play sessions can be, and how often starts and stops can occur, *Negotiable Play Sessions* can support both *Interruptability* and *Activity Blending*. If the game does not require all players to all participate simultaneously in the beginning or end of the game instance, *Negotiable Play Sessions* naturally gives rise to *Negotiable Game Sessions*.

Since not playing the game at the same time as other players led to different experiences of the gameplay, *Negotiable Play Sessions* may reduce the sense of a *Common Experience*.

Relations

Instantiates: *Interruptability*, *Activity Blending*, *Negotiable Game Sessions*

Modulates: *Team-Based Games*

Instantiated by: *Late Arriving Players*, *Shared Resources*

Modulated by: -

Potentially conflicting with: *Common Experience*

4.24 Negotiable Game Sessions

The feature of a game that the length of a game sessions can be decided by the players independent of other players' game sessions.

How long a game is played by a player is typically determined by its players. However, games can provide players with different types of supports for this decision, either if it is taken before the game session begins or during the game session. This can help games being ended in a fashion which given all players closure if not the normal or optimal time is available, or if the game has to be more or less unexpectedly ended prematurely.

Example: Due to the typical length of campaigns in tabletop or live action role-playing games players typically do not have game sessions equaling the game instance, which for these types of role-playing games can be defined as the game master's game session. This is solved by the game master introducing new player's characters or explaining the disappearance of leaving player's characters through in-game narratives.

Example: Gambling games such as Blackjack allows players to sit down and play against a croupier for as long as they wish and have markers independent of the other

players. Although there is little interaction between players they are sharing a game instance since they are playing using the same deck of cards.

Using the pattern

Negotiable Play Sessions is a direct approach to making a game have *Negotiable Game Sessions*. However, special attention needs to be made if players should be able to begin playing after the game instance has begun or if players should be able to stop playing before the game instance ends. *Late Arriving Players* provide support for the former while the latter

Although *Shared Resources* can be used in *Team-Based Games* to support *Negotiable Game Sessions* in a fashion similar to *Negotiable Play Sessions*, this does not automatically give the quitting player an individual closure.

Consequences

Naturally, if a *Negotiable Game Session* leads to an exact duration it puts a limit on *Continuous Goals* and modulates *Resource Management* since players may know how long the resources needs to be available. If all players can communication with each other to use *Negotiable Game Sessions* to synchronize the ends of the game sessions, this gives rise to *Negotiable Game Instance Duration* (if they cannot communicate they still decide this but are unaware that they are doing so).

As is the case for *Negotiable Play Sessions*, letting players play the game when other players are not playing can prevent a *Common Experience*.

Relations

Instantiates: *Negotiable Game Instance Duration*

Modulates: *Resource Management*

Instantiated by: *Negotiable Play Sessions, Late Arriving Players*, *Shared Resources*

Modulated by: -

Potentially conflicting with: *Continuous Goals*, *Common Experience*

4.25 Negotiable Game Instance Duration

The ability of players to decide how long a specific game instance should last of a game.

In many game situations players want to be part of the whole game. This means that they want the game to not last longer than they can play and preferably as long as they want to play. Looking at one particular game, instead of simply choosing the game which best fit the time requirements of the players, this is most easily supported if the game design allows for the game instance duration to be influenced by player choices.

Example: Player-run servers for First Person Shooters typically allow winning conditions to be set in the form of time played or score achieved.

Example: Role-playing games have no pre-determined criteria when they end, meaning that they continue as long as the game master and players find the game rewarding to play.

Using the pattern

The negotiation of the length of a game instance can be divided into two categorized: that which takes place before the game instance starts (i.e. during the set-up phase) and that which takes place during or after the game instance.

For the former, *Player Defined Goals*, can be used implicitly or explicitly supported by the game system, to set get winning goals of a game provide players with a way to decide the length of the game. If time can be part of the defined goal (e.g. "most points after 60 minutes") players can have exact control of the game session duration, but even without this level of control an approximate duration can be set if players have experience of playing the game. When players know the exact numbers of turns in a *Turn-Based Game,* or the upper limit in the number of turns, *Negotiable Game Time* allows the players to determine the length of the game session.

For the latter, *Negotiable Game Sessions* can be seen as a form of *Negotiable Game Instance Duration* since games can be created where a game instance ends when there are no players left. However, this solution requires that the game can be played with different numbers of players during the game session without losing *Player Balance* or becoming unplayable. If the game system supports modification of *Player Defined Goals* after the game instance has ended it supports a way to resurrect the game instance, e.g. "ok you won with 1-2, let us play best of 5 instead."

Consequences

As for *Negotiable Game Sessions*, having a *Negotiable Game Instance Duration* lead to an exact duration puts a limit on *Continuous Goals* and modulates *Resource Management* since players may know how long the resources needs to be available.

For games where the duration of a game session can be decided during the game session, and may even be part of explicit gameplay, the necessary negotiation make players need *Social Skills* to play the game.

Since *Negotiable Game Instance Duration* supports players in planning the play activity it supports the possibility to play together as much as wanted and thereby give a *Common Experience*.

Relations

Instantiates: *Social Skills*, *Common Experience*

Modulates: *Resource Management*

Instantiated by: *Player Defined Goals*, *Negotiable Play Sessions, Negotiable Game Sessions, Negotiable Game Time*

Modulated by: -

Potentially conflicting with: *Continuous Goals*

4.26 Negotiable Game Time

The ability of players to decide how often the game state should be updated in the game.

The events that take place within a game have a chronological order since the cause and effect of each event depends on previous events and the initial game state. This means

that all games can be said to have a timeline and each event indicates a progression on this timeline. This timeline can be exactly mapped to real-time but in many cases is not, either by the possibility or requirement of pauses in the game or by not having a synchronization between each game event and a specific time interval.

Example: The possibility to require time-outs in some sports is an example of negotiable game time in a real time game.

Example: Play-by-email games typically set a regular interval by which players must have submitted their move, otherwise they do nothing. These systems typically either allow players to choose from several servers with different intervals, or let the players set up their own servers where they can exactly set this interval.

Example: In most traditional board games and card games the update of a game state is equal to a player making his or her move. The most common solution is to socially mediate how long time a player can plan before having to do the move, but in more formal or competitive settings hard time limits can be set, e.g. having a total of 5 minutes to make all ones moves in a game of Chess.

Example: Role-playing games have a very varied mapping between real-time and game time, letting months in the game pass in a second when the players' characters are not adventuring but letting seconds of a combat take hours to play.

Using the pattern

The main requirement of *Negotiable Game Time* is to separate the possibility to do actions in the game with real-time measurements. This means that *Negotiable Game Time* is often incompatible with *Real-Time Games* but they can be combined to support planning of the actions that are later to be done in real-time through *Game Pauses*. Thus *Negotiable Game Time* is most often feasible in *Turn-Based Games* or *Tick-Based Games*.

Negotiable Game Time can be present in a game in two ways. The first is to let players at every moment have the possibility to negotiate if the game state should be updated; this is the typical case in *Self-Facilitated Games*, where players typically can object to another player taking to long time to perform a game action. The second way to have *Negotiable Game Time* present in a game design is to let players set a specific *Time Limit* that the game will update regardless of players' objections, creating a *Tick-Based Game* where *The Show Must Go On*.

Consequences

Negotiable Game Time can meant both that players determine an exact mapping between game time and real-time (e.g. "one has 30 seconds to complete a move") and that provides a means for *Negotiable Game Instance Duration*.

Relations

Instantiates: *Negotiable Game Instance Duration*, *Tick-Based Games*, *The Show Must Go On*

Modulates: *Turn-Based Games*, *Tick-Based Games*, *Real-Time Games*

Instantiated by: *Game Pauses*, *Time Limit*

Modulated by: -

Potentially conflicting with: *Real-Time Games*

4.27 Late Arriving Players

Players can join an already running game asynchronously without having been there when the game/play session was set up.

In order to allow for some flexibility *Late Arriving Players* gives the game support for letting players join the game session whenever they can. If online games such as Counter Strike allow *Late Arriving Players* depends on if one regards a single round of Counter Strike a game or all rounds on a single map as a game.

Example: The game Botfighters runs continuously and new players can join at any time.

Example: EverQuest and other MMORPGs that have persistent game worlds and most player start playing some period of time after the game has started.

Using the pattern

Support for *Late Arriving Players* often come automatically for games that have *Persistent Game Worlds*. Allowing players to interrupt their session using *Interruptability* is closely connected to this pattern and should be considered.

Consequences

Providing support for *Late Arriving Players* reduces the need for players to coordinate and plan when to play games. It supports *Negotiable Play Sessions* in creating *Negotiable Game Sessions* by making it unnecessary for player to have a play session when the game instance begins.

Relations

Instantiates: - *Negotiable Play Sessions*, *Negotiable Game Sessions*

Modulates: -

Instantiated by: *Persistent Game Worlds*

Modulated by: *Interruptability*

Potentially conflicting with: -

4.28 Interruptability

Players can end play sessions without disrupting the game play for other players.

Some games take a bit more time to play than a player can dedicate to it in a single play session. Since most people nowadays are not able to spend hour after hour playing, games can support *interruptability* in various ways to allow the players to interrupt their play session.

Example: Massively Multiplayer Online Role Playing Games such as EverQuest allow players to log in and out from the game at any time.

Using the pattern

Interruptability can be created in two main ways: having *Game Pauses* and allowing *No-Ops*. *Game Pauses* freeze the updating of the game state but may not be possible in *Multiplayer Games* unless *Negotiable Play Sessions* are supported. *No-Ops* work are compatible with *Multiplayer Games*, and are inherent in *Real-Time Games*, but usually

affect game balance negatively as the other players can still perform actions to improve their positions. For games where social interaction is a significant part of the gameplay, allowing *Selectable Social Roles* which includes choices of passive roles provides a form of *No-Ops*.

The disadvantages with both solutions can be somewhat mitigated. If a game can be constructed in such a way that the player is still in the game while not actively participating this can be used as an interesting *Tradeoff* for the player. In this case, the player's game data could also be controlled through a *Coupled Game* or an *Agent*. Other structures include but are not limited to leaving the player's avatar in the game but that her state is somehow frozen and cannot be affected until the player returns or simply removing the player's avatar from the game state and reinserting ii when the player reenters the game, i.e. *Spawning*.

Consequences

When the player is interrupted while playing she experiences *Downtime* while not focusing on the game. *Interruptability* is especially important to consider if the game has a *Persistent Game World* as it will allow for both *Asynchronous Games* and *Late-Arriving Players*.

Relations

Instantiates: *Downtime, Tradeoffs*

Modulates: *Persistent Game Worlds, Asynchronous Games, Late-Arriving Players*

Instantiated by: *No-Ops, Game Pauses, Selectable Social Roles*, *Negotiable Play Sessions*

Modulated by: *Coupled Games, Agents, Spawning*

Potentially conflicting with: *Multiplayer Games*

4.29 Real Life Activities Affect Game State

Everyday life activities are made part of the game play or used for evaluation functions.

A game can take a lot of different input. Taking input from the player continuously or when the player is not aware of it blurs the boundary between playing the game and other activities.

Example: In the game *Botfighters*, the player's mobile phone contains a virtual robot which is carried with the user at all times. Thus, the location of the robot corresponds with the player's physical location, intentionally or unintentionally

Using the pattern

The prime design choice when using *Real Life Activities* is what activities to use and determine how they can be registered by the game. Using *Physical Navigation* as *Extra-Game Input* is a simple way of making players' everyday activities affect the game. If the game is also a *Real-time Game*, a lot of actions the player performs in her real life can be interwoven with the gameplay and in many cases can make *Player Physical Prowess* part of the game.

Consequences

A game with *Real Life Activities Affect Game State* has *Extra-Game Input* and therefore becomes a *Pervasive Game*. However, the *Real Life Activities Affect Game State* differs from other forms of *Extra-Game Input* as it is still the player who creates the input. The game can also make use of *Hybrid Space* and let it affect the real life right back. Since *Real Life Activities Affect Game State* lets the activity be seen as both a game activity and a real life activity it instantiates *Activity Blending*.

Relations

Instantiates: *Extra-Game Input, Pervasive Games*, *Activity Blending*

Modulates: -

Instantiated by: *Physical Navigation, Player Physical Prowess*

Modulated by: *Real-time Games*

Potentially conflicting with: -

Uncharacterized connection with: *Hybrid Space*

4.30 Activity Blending

That the game can be played while performing other activities.

Many games allow players to do other activities while playing the game. This can range from playing a game to spend time while waiting or traveling on public transport to being able to immerse oneself into a complex game and easily perform simple tasks outside the game when required.

Example: The game *Wizard's Apprentice* supports an adult to play a game with children with player where the adult can do other activities for extended period of times, with potential quick interludes playing the game.

Example: The game *Insectopia*, using Bluetooth harvesting as a game mechanic, typically requires moving to find new devices. Since nothing needs to be done in the game while moving, except moving, that part of the game can be blended with activities such as commuting.

Using the pattern

An easy way to support *Activity Blending* is through *Interruptability* but this may be problematic in multiplayer games, either through stopping the game for other players or upsetting *Player Balance* (typically due to the pausing player loses possibility to influence the game *or* by becoming invulnerable). Another way to allow player to mix playing a game with other activities is to have highly *Negotiable Play Sessions*, so the switch from playing the game and not playing the game is very easy to do.

The strongest level of *Activity Blending* is when an action performed by a player is both a game activity and action in another activity. When the motivation for the action is primarily from the non-game activity it is an example of *Real Life Activities Affect Game State*.

Consequences

Given that games in many cases are played as social activities, the possibility of *Activity Blending* in a game opens up the possibility of players engaging in *Social Interaction*.

Relations

Instantiates: *Social Interaction*

Modulates: -

Instantiated by: *Interruptability*, *Negotiable Play Sessions*, *Real Life Activities Affect Game State*

Modulated by: -

Potentially conflicting with: -

5 Summary and Conclusions

This design kit has described some of the basic concepts relevant for designing massively multiplayer pervasive mobile phone based games along with a list of design principles and a collection of supporting gameplay design patterns. The basic concepts describe high level features and characteristics which we believe are important to take into account in designing any massively multiplayer pervasive game. The design principles are based on the authors' previous work and the lessons learned from implementing and deploying IPerG-showcase games. The principles are intended to give the designers an overview of the design possibilities and describe some of the good practices in concrete designs. The designer does not have to follow the principles; it is also possible to base the design on breaking or contradicting the principles. In this case the principles can be used as inspiration for novel game concepts. The pattern collection included in this report focuses on the pervasive aspects of massively multiplayer games. The collection contains many references to the main pattern collection available in Patterns in Game Design (Björk and Holopainen 2005) and it is recommended to be used together with the patterns described in this report.

The design of novel massively multiplayer pervasive games is a difficult task and we hope that this design kit helps the developers, and other stakeholders, to understand the opportunities provided by this new genre of games. There are also tools such as CAGE available that allow designers to build structural drawings of game designs in terms of the various elements, including gameplay design patterns, within the games (Holopainen et al., 2007).

References

Arrasvuori, J., et al. (2008). "Online Community Framework." Nokia Research Center Technical Report. Forthcoming at http://research.nokia.com/tr/index.html.

Bartle, R. (2003) Designing virtual worlds. Prentice Hall PTR 2003.

Björk, S., Eriksson, D., Holopainen, J. & Peitz, J. (2004). Deliverable D9.1: Guidelines for Socially Adaptable Games. IPerG deliverable D9.1, available at http://iperg.sics.se/.

Björk, S. & Holopainen, J. (2005). Patterns in Game Design. Charles River Media, 2005.

Björk, S., Peitz, J. (2007). Understanding Pervasive Games through Gameplay Design Patterns. In 'Situated Play', Digital Games Research Association Conference, 2007.

Bogost, I., (2004). Asynchronous Multiplay: Futures for Casual Multiplayer Experience. Paper presented at the Other Players Conference, Copenhagen, Denmark, 2004. Available at http://www.bogost.com/writing/asynchronous_multiplay_futures.shtml. Last accessed February 22nd 2008.

Cornett, S. (2004). The Usability of Massively Multiplayer Online Roleplaying Games: Designing for New Users, in proceedings of ACM CHI 2004, ACM Press, pp. 703-710.

Davidson, O., Peitz, J., Björk, S. (2004). Game Design Patterns for Mobile Games. Report available at http://www.gamedesignpatterns.org.

Dey A.K. (2001). Understanding and Using Context, Personal and Ubiquitous Computing, Vol 5, pp 4-7.

Ducheneaut, N.; Yee, N.; Nickell, E.; Moore, R. J. (2006) 'Alone together?' exploring the social dynamics of massively multiplayer online games. ACM Conference on Human Factors in Computing Systems (CHI 2006); 2006 April 22-27; Montreal; Canada. NY: ACM; 2006; 407-416.

Ermi, L. & Mäyrä, F. (2007) Fundamental Components of the Gameplay Experience: Analysing Immersion. In Suzanne de Castell & Jennifer Jenson (eds.) Worlds in play - International Perspectives on Digital Games Research, s. 37-53. New Literacies and Digital Epistemologies Vol. 21. New York: Peter Lang.

Farmer, R. F. (1992). Social Dimensions of Habitat's Citizenry. Carl Eugene Loeffler & Tim Andersson (Eds.), The Virtual Reality Casebook. New York, Van Nostrand Reinhold, 1992.

Fine, Gary Alan (1983): Shared Fantasy. Role-Playing Games as Social Worlds. The University of Chicago Press, Chicago and London.

Foo, C.Y., Koivisto E. (2004). Grief Player Motivations. Other Players conference 2004.

Forsyth, D.R. (2005). Group Dynamics, 4th edition. Wardsworth Publishing.

Forum Nokia (2005). Overview of Multiplayer Game Design. A paper in Forum Nokia. Available at http://www.forum.nokia.com

Fine, G.A. (1983). Shared Fantasy: Role Playing Games As Social Worlds, University of Chicago Press (Chicago, IL), 1983.

Friedl, M. (2003). Online Game Interactivity Theory, Charles River Media, 2003.

Fullerton, T., Christopher S., and Hoffman, S. (2004). Game Design Workshop: Designing, Prototyping, and Playtesting Games. CMP Books, 2004.

Gallagher, H.L., Jack, A.I., Roepstorff A., and Frith C.D. (2002) Imaging the intentional stance in a competitive game. NeuroImage 16(3 Pt 1):814-21, 2002

Guarneri R. (ed.), Sollund A.M., Marston D., Fossbak 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. Available at http://www.ist-eperspace.org/deliverables/D5.1.pdf

Holopainen, J. (2008). Mythical: The Mobile Awakening Final Report. IPerG Deliverable D13.6. http://iperg.sics.se/downloadsub1.html

Holopainen J. Björk S., Kuittinen J. (2007), Teaching Gameplay Design Patterns. Available at http://www.isaga2007.nl/uploads/final%20papers/p51-def.pdf

Jensen, C., Davis J. Farnham S. (2002). Finding Others Online: Reputation Systems for Social Online Spaces, in proceedings of ACM CHI 2002, ACM Press, pp. 447-454.

Kaptelinin, V., & Cole, M. (2002). Individual and collective activities in educational computer game playing. Retrieved February 14, 2008, from http://lchc.ucsd.edu/People/MCole/Activities.html.

Koivisto, E.M.I. (2003). Supporting Communities in MMORPGs by Game Design. In proceedings of Level Up! Games Reserch Conference, 2003.

Korhonen, H. and Koivisto, E.M.I. (2007). Playability Heuristics for Mobile Multi-Player Games. In Second International Conference on Digital Interactive Media in Entertainment and Arts: DIMEA 2007 , Perth, Australia, 2007.

Korhonen, H., Saarenpää, H. (2008). Mythical: The Mobile Awakening Evaluation Report. IPerG Deliverable D13.5. http://iperg.sics.se/downloadsub1.html

Lehdonvirta, V., (2005). Economic Integration Strategies for Virtual World Operators. Master's thesis, Helsinki University of Technology, 2005. Available at http://www-old.hiit.fi/u/vlehdonv//publications/economic_integration_thesis.pdf.

Lindt I., Fischer J., Wetzel R., Montola M., Stenros J. (2007), Crossmedia Games Design Kit., Deliverable D5.6

Montola, M., Jäppinen, A., Lahti, J., Lankoski, P., Waern, A. & Holopainen, J. (2006): Pervasive Game Design and Evaluation Guidelines for IPerG Phase Two. IPerG Deliverable D5.4. http://iperg.sics.se/downloadsub1.html

Montola, M., Stenros, J. (2008): ELarp Design Kit. IPerG Deliverable D5.9. http://iperg.sics.se/downloadsub1.html

Montola M., Waern A., Nieuwdorp E., Domain of Pervasive Gaming, Deliverable D5.3B

Oh, K., Ryu, T. (2007). Game Design on Item-selling Based Payment Model in Korean Online Games. In proceedings of DiGRA 2007, Situated Play, Tokyo, 2007. Available at http://www.digra.org/dl/db/07312.20080.pdf.

Palm, T., and Koivisto, E. (2004). Developing Online Mobile Games. Speech in Game Developers Conference Europe, London, UK, 2004.

Peitz, J. (2004) Coupled Games, Enhancement of Video Games using Mobile Functionality. A Master's Thesis, Chalmers Technical University.

Ravaja, N., Saari, T., Turpeinen, M., Laarni, J., Salminen, M., & Kivikangas, M. (2006). Spatial presence and emotions during video game playing: Does it matter with whom you play? Presence: Teleoperators and Virtual Environments, Volume 15 , Issue 4 (August 2006).

Saarenpää, H., Kuittinen, J., Montola, M., (2007). Coup Evaluation Report. IPerG Deliverable D9.9. http://iperg.sics.se/downloadsub1.html

Sotamaa, O. (2002). All The World's A Botfighters Stage: Notes on Location-Based Multi-User Gaming. In Frans Mäyrä (ed.) Computer Games and Digital Cultures: Conference Proceeding. Tampere: Tampere University Press.

Seay, A.F, Jerome W.J., Lee K.S., Kraut R.E. (2004) Project Massive: A Study of Online Gaming Communities, Ext. Abstracts CHI 2004, ACM Press, pp 1421-1424.

Sorens, N. (2008). Stories from the Sandbox. Article available at Gamasutra http://www.gamasutra.com/view/feature/3539/stories_from_the_sandbox.php. Last accessed February 22nd 2008.

Williams, D., Caplan, S., Xiong, L. "Can You Hear Me Now? The Impact of Voice in an Online Gaming Community." Human Communication Research 33 (2007) 427–449.

Yee, N. (2002). Facets: 5 Motivation Factors for Why People Play MMORPG's. Available at http://www.nickyee.com/facets/home.html.

Zagal, J.P., Nussbaum M., Rosas R. (2000). A model to Support the Design of Multiplayer Games, Presence: Teleoperators and Virtual Environments, Vol. 9, No 5, MIT Press, 2000, pp. 448-462.

Zillmann, D. (1994). Mechanics of emotional involvement with drama. Poetics 23 (1994), p. 33-51.

Zillmann, D. (2006) Empathy: Affective Reactivity to Others' Emotional Experiences. In Vorderer, P. & Bryant, J. (eds.) Psychology of Entertainment, Lawrence Erlbau, 2006.

Åresund, M., Peitz, J., Jäppinen, A., Lahti, J., Montola, M., Björk, S., (2004). IPerG Consortium deliverable D9.6: Report on Short-Term Play Testing of Socially Adaptable Game Prototypes.