

Game Design Patterns for Mobile Games

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Executive summary. This report aims to explore the design space of mobile games. It provides a brief overview of the current state of the mobile games industry but the primary research is focused on investigating the gameplay mechanics of mobile games. The chosen methodology is to apply and expand Game Design Patterns by identifying new patterns that describe the unique characteristics of mobile games and describing how existing patterns are modified in a mobile context. 75 new and expanded game design patterns are described in detail as well as the background survey of existing games and design workshops that provided the basis for the pattern work.

Table of Contents

1	Introduction	3
2	Background	4
2.1	Mobile Games – State of the Industry 2004.....	4
	Mobile Entertainment & Mobile Games	4
	Hardware Platforms	5
	Software Environments.....	5
	Business models, Key Players and the Value Chain.....	6
	The Global Perspective	6
2.2	Characteristics Defining Mobile Games	7
2.3	Game Design Patterns.....	8
3	Method.....	8
3.1	Evaluating and Examining Existing Mobile Games	8
3.2	Workshops.....	9
3.3	Internal relationships between mobile GDPs	9
3.4	Describing mobile patterns	9
4	Execution.....	10
4.1	Mobile Game Survey	10
4.2	Pattern Extraction from Mobile Game Collection	11
4.3	Workshops.....	11
	Workshop 1: Bonn, Germany 2004-09-23	12
	Workshop 2: Gothenburg, Sweden 2004-11-01	12
	Workshop 3: Tampere, Finland 2004-11-08	13
4.4	Describing Mobile Game Design Patterns	14
5	Results	15
5.1	New Patterns List.....	15
5.2	Revised Pattern list	28
6	Discussion & Conclusions	40
6.1	The industry and the market	40
6.2	The Method	40
6.3	Future work	41
6.4	Conclusions	41

Links	42
References	42
Appendix I - Mobile Games Studied	42
Appendix II – Game-Pattern Matrix.....	48

1 Introduction

Since ancient times, games have been a part of human culture [Huizinga50]. Around digital games (computer & video games), which can be claimed to have become the dominant form of recreational play during the 80s and 90s, players have developed a number of terms and concepts such as “first person shooter”, “camping” etc. Although these concepts let specific subgroups communicate clearly with each other, they are superficially defined (if at all) and are mainly used to characterize game genres.

Ludology, the emerging research discipline dedicated to games and the activity of gaming, is an acknowledgement of the cultural significance of games. However, research on this cultural phenomenon has been almost entirely restricted and dedicated to social studies, while the building blocks of games have remained relatively unexplored. Consequentially, game reviewers and marketing etc. have come to rely on established terms and concepts from narrative media such as literature and film theory and thereby disregarded what is the primary distinguishing feature of games: their interactivity. This has led to a situation where today, even with a large computer game industry and a growing academic field, there is no satisfying language or rhetorical framework to describe the inner workings of games to support design.

Game Design Patterns is a methodology developed to remedy these shortcomings. The objective is to create a common language for game developers to facilitate the analysis and design of games. *Patterns in Game Design* [Björk04] have identified more than 300 patterns describing game mechanics and interaction elements in traditional games and computer games.

As a continuation on this work, *Game Design Patterns for Mobile Games* seeks to apply the method to mobile games in particular with the aim of supporting game design of mobile games, taking full advantage of the gameplay possibilities of the new medium. To provide a useful subset of patterns for this area a survey of existing mobile games was performed which was then analyzed using game design patterns. The findings of this analysis were supported by the results from three workshops in which various experts analyzed and designed game concepts. A ranking of patterns based on

their relevance to mobile games was created together with a set of new game design patterns found specifically in mobile games. These two collections of patterns were combined into a subset of 74 game design patterns which are described in detail in this report.

2 Background

2.1 Mobile Games – State of the Industry 2004

Mobile Entertainment & Mobile Games

Mobile games, broadly defined as games played on mobile platforms such as cell phones, PDAs and dedicated gaming devices (the Nintendo Game Boy Advance, the Nokia N-Gage) are expected to grab an increasingly larger slice of mobile entertainment over the next couple of years. Industry optimists predict the global market will climb to nearly \$4.5 billion by 2007¹. However, this assumes that some current problems (handset limitations, lack of compelling content, standardization problems etc.) will be remedied in the near future.

Nintendo pioneered the development with their Game & Watch devices twenty years ago, but today's market is diversified and a lot more complex with a wide range of products (gaming devices) and many invested parties. Though mobile games are believed to be the “next big thing”, and has received acknowledgement from interactive entertainment giants such as Eidos, the Sony Corporation and Sega, consumers are not yet in sync with the demanding industry expectations and it has proven difficult to sell rich content, such as games, to this “immature” audience that is yet to embrace the media. As a result, current mobile games are often simple ports of old games that do not showcase the potential entertainment value lodged in, for example, wireless technology.

Though ‘mobile games’ is indeed an important sub-category of ‘mobile entertainment’, the latter definition also includes entertainment services such as ring tones and other downloadable media content. According to Wiener [Wiener02] ring tones is the most successful service to date, a service that generated revenues between \$600 and \$1700 million during 2001 in Europe alone. During that same time period, revenues from Mobile Games were approximately \$830 million. The introduction of 3G wireless

¹ According to a report by *The Arc Group* published in 2002

broadband is expected to have a considerable effect on mobile entertainment consumption once it has been widely adopted, making it possible to use mobile phones to download music and film.

As mobile phones are quickly being transformed into entertainment/communication devices (the Nokia N-gage being the most striking example), they are sure to meet some stiff competition from portable, dedicated gaming devices such as the Nintendo GameBoy Advance. Future products, the Sony PSP and the Nintendo DS in particular, are likely to affect market and demographics. With built-in connectivity, these machines can be used for online gaming and by that intruding on a segment previously reserved for mobile phones. Functions are clearly beginning to overlap [Adams04].

Hardware Platforms

Mobile games are played on phones, PDAs (Personal Digital Assistants, e.g. the Palm series and the Compaq iPAQ), dedicated systems such as the Nintendo GameBoy Advance and the Nokia N-gage and sometimes on custom-built hardware for specific applications. According to Adams [Adams04], mobile phones will see the broadest range of game types, as PDAs are “adult-only” and game handhelds are “children-only”. Clearly, different hardware platforms appeal to different demographics- it is however unlikely that the next-generation platforms will be priced and targeted towards a young audience; seeing how the average game buyer is 36 years old², it may very well leave phones with a group of casual gamers reluctant to pay for quality mobile games. Furthermore, Adams [Adams04] claims that the problems Nokia encountered upon the release of their N-Gage system, was due to it falling between two seats: it was neither designed to “serve the hand” (critical for handheld gaming systems) nor the ear (the main purpose of phones). This seriously questions the existence of multi-purpose devices.

Though the mobile games market has often been thought of as a refuge for independent game developers lacking the massive funds that have become necessary to produce console games, a number of things still have to be taken into consideration. For one, the large number of cell phone models from different manufacturers means that games have to work with many types of hardware and firmware if the developers want to capture a large group of potential customers.

Software Environments

Games currently developed for mobile phones and PDAs are built on a number of different software platforms, including Sun’s J2ME, Qualcomm’s BREW, Symbian OS

² ESA „Top ten industry facts” – www.theesa.com

and Microsoft's Smartphone [Booz03]. While some of the platforms overlap, they can be thought of as independent.

Standardization issues that are pertinent on the "open" market for mobile phones are not a problem for dedicated devices, given that system specifications are fixed and published by hardware manufacturers.

Business models, Key Players and the Value Chain

Mencher [Mencher04] points out how development processes differ between mobile games and console game development: Budgets are smaller, shelf lives are shorter, development cycles are reduced, team sizes are smaller, memory, processor and power are substantially lower, screen sizes and resolution are different, and the number of target mobile device platforms is ever expanding. To address problems that could arise from the last issue, Sony Ericsson, Nokia, Motorola, Siemens launched the Mobile Games Interoperability Forum in 2001 to promote open standards in mobile games.

The sharing of revenues may be one of the biggest challenges, making sure that content providers get a large enough slice to motivate a venture into mobile games.

One of the biggest challenges is to come up with new business models, since mediocre content cannot command separate content fees. The Nokia N-Gage uses a business model similar to the one used by the games industry for other console games: Only authorized developers can produce games for the N-Gage and each title has to prove to a consistent level of quality. Publishers pay a royalty fee on each copy of the game to Nokia. This excludes the network operator, and includes hardware manufacturers. As in the case of console systems (Microsoft Xbox, Sony PS2, Nintendo GameCube), content providers need to be registered as authorized developers and their products will have to prove to a consistent level of quality.

According to Booz [Booz04] the fate of the industry is depending on what "participant" in the value chain will take the lead: operators (e.g. Vodafone, Sprint), device manufacturers (Nokia, Sony Ericsson, Motorola), content providers (Gameloft, It's Alive!) or software environment designers. (Hypothetically speaking, a powerful company like Microsoft could release a new standard and become an important player).

The Global Perspective

Currently, Japan and South Korea represent 80-90% of the global market [Weiner02], much due to better working business models and a higher adoption rate [Alker04]. Second is Europe, lead by Italy, Scandinavia and the UK. The market of the United States is seen as immature much due to a frosty relationship between device manufacturers and game publishers and overall low adoption rate to mobile

entertainment. However, sources predict that the USA and China will be the leading markets in 2007 (<http://www.cellular-news.com/story/10022.shtml>).

As pointed out by [Swallow02], mobile entertainment needs to be tailored to be “linguistically and culturally relevant”. [Smorodinsky] writes:

”In Israel we like to talk, and this has influenced the type of games that are popular, he says. One of the most successful applications is a voice-based quiz game. Players hear questions and then reply to them using their handsets. Although this is big in Israel, it’s difficult to say whether the same type of games would do well elsewhere. Another example is a Tamagotchi game that tells the user what is happening to their pet. They can then use their keypad to do different things in response”

2.2 Characteristics Defining Mobile Games

The video game industry has always been on the frontline of technological evolution, and thanks to its mass-market appeal it has catalyzed the development of 3D graphics and artificial intelligence. As games are becoming important content in cellular phones, there is reason to believe that they will have a similar effect on the development of wireless technology. Mobile multiplayer games, such as *Tom Clancy’s Ghost Recon: Jungle Storm* and *Pathway to Glory* are designed based on the capabilities (and limitations) of Bluetooth technology. The limited bandwidth presently excludes fast-paced real time action gaming.

At the European edition of the Game Developers Conference in August 2004, several lecturers spoke of the often-neglected group of *casual gamers*, people that buy games occasionally and engage in shorter play sessions. This neglected demographic could be a potentially important customer basis for mobile games, seeing how they are, by definition, played “on the go”. This not only affects pacing and level design but also *theme*; casual and hardcore gamers are attracted to different things [Olhava04].

Yet another possible path of development is mobile platforms used to complement/enhance the experience of console and PC games. In the GameCube game *The Legend of Zelda - Windwaker*, a second player can connect using a Nintendo GameBoy Advance and help out navigate its massive underground caves. [Alker04] predicts future games will be “multiplatform”: “games that allow subscribers to play a game on one platform (such as a console) and then continue it on another (such as a cell phone when away from home)”. [Peitz04] proposes the term Coupled Games for games which tie into each other through shared game data. A football game could, for instance, allow the player to train individual team players through a handheld device while on the go.

As handheld gaming devices are becoming more popular mainstream products, developers become more daring in trying new concepts. The game Boktai features a sunlight sensor which requires the player to be out in the sun in order to charge his

weapon. The amount of sunlight which the game is exposed to is also used to affect other details in the game. Instead of getting caught up in the current trend of 40 hour game experiences, the game Wario Ware, Inc. offers 200 micro games which each take 3-5 seconds to play. With new phones being equipped with GPS some games also push the envelope for position-based gameplay. Games like the item hunter Mogi Mogi are becoming increasingly popular.

2.3 Game Design Patterns

As mentioned earlier, the industry lacks a formalized language to discuss gameplay elements in a structured manner. Game studies have often used terms and concepts from literature, theatre and film and thus focused on the narrative of games and consequently neglected their defining characteristic: interactivity. Traditionally, video games have been categorized by genres, but this is an obtuse method that is becoming less useful as genres merge. In *Patterns in Game Design* [Björk04] the authors propose models based on Game Design Patterns, which they define as “descriptions of recurring interaction elements relevant to gameplay”. Patterns are believed to have greater flexibility as well as providing a fresh new perspective. Each pattern has been given a name and a description, the consequences of using the pattern have been analyzed, and its relationship with other patterns investigated.

3 Method

The overall objective of this survey is to identify 75 design patterns that are applicable to mobile games and that may facilitate the analysis and design of the same. This entails identifying completely new patterns as well as evaluating existing patterns and investigate if they are relevant to the design of mobile games. The concept of gameplay will be our focal point, though it is commonly known that many games become successful for other reasons; they may be sequels to successful games, they may be based on movie licenses, boast high production values or rely on novel technology gadgets. These contributing factors are completely disregarded here.

3.1 Evaluating and Examining Existing Mobile Games

The initial part of the research deals with defining ‘mobile games’. The purpose is to find a population of test subjects, taken both from the existing pool of commercial mobile games and from the smaller group classified as “experimental” or “research” mobile games.

Once a satisfyingly large amount of games has been found, analysis will commence and advance through the following stages.

1. Each game will be reviewed and categorized based on the presence of recognizable design patterns.
2. Existing patterns will be evaluated based on their relevance in a “mobile” context. They will be individually ranked based on:
 - How often they are identified in the researched games
 - Their individual characteristics (it is predicted certain new (and interesting) patterns will emerge that are not easily connected to a certain game)
3. Provide each new pattern with an identity (a name and a core definition)
4. Find a total of 75 design patterns for mobile games, based on the above conditions mentioned above.

3.2 Workshops

In parallel with the activities mentioned in the previous section, a number of workshops will take place. The main purpose of arranging the workshops is to obtain verification of the scientific method and evaluate the results. Through a number of analysis & design exercises, answers to the following questions will be sought:

- Following a brief introductory lecture on the *conceptual* idea of Game Design Patterns, what patterns do the participants themselves discover in mobile games? What aspects of gameplay do they focus on?
- How do these patterns relate to our own results? Do they correspond or are there any significant differences?
- What patterns are most useful in creating new game concepts?

3.3 Internal relationships between mobile GDPs

To effectively model the design space of mobile games, internal relationships between design patterns must be studied and categorized. The intention is to use a similar method, as applied by Björk & Holopainen [Björk04], to describe how the use of a certain pattern in a game system changes the conditions of those already present.

3.4 Describing mobile patterns

The final stage of research includes describing and classifying the patterns in even greater detail. New patterns will be provided with core and general definitions, examples of games using the patterns will be given, their relationship with other

patterns will be described as well as the direct consequences of using the individual patterns. In addition to this, previously existing patterns will be updated to fit in a mobile context.

4 Execution

4.1 Mobile Game Survey

The first objective in order to develop a set of game design patterns for mobile games was to identify a collection of existing mobile games. The collection was created from a variety of sources: picking commercially successful mobile games from the ELSPA games sales charts; identifying new games that utilized the latest wireless technologies, phone cameras and sensors; and finding experimental game prototypes from the academic community that were explicitly created with the ambition to innovate gameplay or find novel uses for technology.

From an initial 55 mobile games 40 were selected for the collection and brief descriptions of the games can be found in Appendix I. The ones that were removed from the initial collection were removed either due to lack of publicly available documentation, insufficient “mobility” in gameplay was found, or because they were not unique enough in regards to mobile gameplay when looking at other games in the collection. The motivation for the latter exclusion was that the collection was not meant to represent a survey of use but instead a survey of possibilities in mobile game design. The following games were part of the collection:

Boktai	Supafly
Donkey Kong – Game & Watch version	Mogi Mogi
Snake	Botfighters
WarioWare, Inc.	Tom Clancy’s Ghost Recon: Jungle Storm
Pokémon Sapphire/Ruby	“Laser Dome”
Super Mario Advance	Tim’s World
The Legend of Zelda: Four Swords	PacMan Must Die!
Adventures	PP: Storyteller
Advance Wars	PP: Colorado
Tamagotchi	PP: Mosaic
BlackJack	MyTheme
IR Pong	Human PacMan
Prince of Persia – The Sands of Time	Backseat Gaming
Tom Clancy’s Splinter Cell	Uncle Roy All Around You
Barcode Battler	I Like Frank
Red Faction	Treasure Machine
Killer Virus	PacManhattan
Harry Potter – the Prisoner of Azkaban	AR-Quake
Dance Dance Revolution	GeoCaching

4.2 Pattern Extraction from Mobile Game Collection

Having put together a broad collection of different games they were analyzed individually for core gameplay characteristics. These characteristics were given descriptive names and their presence in other games in the collection was noted. The identified characteristics were treated as candidates for new game design patterns. Doing the extraction without regards to previously existing patterns was intentionally done to avoid getting caught up in existing terminology and to focus on finding new patterns.

After the core gameplay of all the games had been described, all games were examined for the presence of all previously described design patterns. The resulting matrix of 40 games and 300+ patterns clearly present which patterns were used often and which ones were not. It is important to note that even though the presence of patterns in games was treated as a binary entity, the requirement was not the mere existence of the pattern in the game; the requirement was instead the rather subjective opinion on how influential the pattern was in defining gameplay and differentiated the game from other games. Thus, some patterns, such as *Tension*, were not noted even though they were present because they were not part of the defining gameplay nor distinguished the game from similar games. See Appendix II – Game-Pattern Matrix for the final matrix.

In order to cut the set of patterns down to an acceptable number, the patterns that were uncommon in the matrix were removed with the exception of those which explicitly defined mobile characteristics. This was not enough to shrink the set of patterns and to further cut the set all patterns were manually ranked by their relevance for mobile gaming. The 75 top patterns from that list became the initial collection of patterns, forming the subset of mobile game design patterns. This set was made up of approximately one third completely new patterns and the rest were previously defined patterns.

4.3 Workshops

Specific details on each workshop are presented below. However, they all shared a common structure which included an introduction to the topic followed by two exercises in analysis and design.

The introduction included a brief lecture on the concept of Game Design Patterns and was rounded off with a presentation of mobile games. In the latter part it was explicitly noted that many of today's "mobile" games do not necessarily incorporate

the player's physical mobility in the gameplay or the game experience. This was to help participants focus on possible future mobile games.

The first exercise focused on analysis. Working in groups, participants were asked to pick one of the mobile games presented earlier and, with the help of a structural framework [Björk04] that helps identify parts of a game design, identify their own game design patterns describing interaction elements in that particular game. Results were then shared with the other groups in a presentation and organized discussion.

In the second exercise participants were instructed to create a game concept from the design patterns identified in the analysis exercise. The concept was to be gradually refined by choosing complimentary patterns. Finally, results were shared with the other groups in an organized discussion.

Workshop 1: Bonn, Germany 2004-09-23

Participants: Game researchers on the IPerG project
(<http://www.pervasive-gaming.org>)

Duration: Full day

Details: The participants were asked to create a children's game which involved rain and some form of mobility. No explicit requirement of technology use was stated to avoid focus on existing technology. Two games were created by the participants: one based on the use of mobile phones, one on the concept of snow. In the first game children dared each other to copy each other pictures according to the rule that two out of three parts of the picture (person, activity, and item) had to be the same (but not identical). The second game focused upon the possibility of betrayal in team play and the use of a limited resource, snow, which could either be used to create defenses or used to attack the enemy.

The first game identified the game design pattern Memorabilia which was incorporated into the set of 75 mobile game design patterns.

Workshop 2: Gothenburg, Sweden 2004-11-01

Participants: Game researchers, people in the video game industry and master level students.

Duration: half day

Details: The two groups analyzed *Backseat Gaming* and *Mogi Mogi* respectively. The group analyzing *Mogi Mogi* identified design patterns that were mainly focused on the concepts of "Augmented reality", player-avatar identification, the relatively large size of the game world, and the "casual" nature of the game experience i.e. how players are committed to the game in shorter time intervals. The other group also mentioned "augmented reality" and focused on how the player's physical location determines the

game state and how his/her movement advances the linear plot of the game. Backseat Gaming was also considered a “casual game“, with the main purpose of killing idle time.

Two mobile game concepts were created; a loosely defined “Spy Game”, and a “Dating game” inspired by reality TV-shows. During discussions, the idea of expanding the concept of “gameplay” to “game experience” was brought forward, suggesting that the former term is too narrow and fails to include important aspects of games such as atmospheric graphics and compelling storylines. It was noted during the exercises that participants ably identified relevant design patterns but had trouble finding relationships between them.



Image 1 – Participants in workshop 1.

Workshop 3: Tampere, Finland 2004-11-08

Participants: Nokia employees

Duration: full day

Details: The initial planning of the workshop had to be modified due to a low and fluctuating number of participants; a total of 6 people participated with 2 for the full

day and no more than 4 at any point. Requirements on the game design was that it had to be hosted by a mobile phone, require both mediated and non-mediated communication and use GPS, RFID or peer-to-peer networking. Further, spy games and dating games were not allowed based upon previous experiences. Earlier workshops had shown that these were common concepts that prevented participants from thinking constructively in terms of gameplay.

The participants analyzed the children's game Kick the Can and developed several partial game concepts based on viral scoring mechanics, traps, and proximity-based interaction. The participants had no problems using design patterns as a basis for discussions but were unable to reach consensus about what partial concept to develop further due to the changes in participants during the workshop.

4.4 Describing Mobile Game Design Patterns

All game design patterns have relations which describe their influence on each other. To identify these relationships each pattern name was written on a post-it note and placed on a large worksheet, and the patterns could then be arranged into subgroups which were used as starting points for defining the relations. Relying on internal knowledge and previous experience in the field, intense discussion lead to all patterns eventually getting their own place on the sheet and their internal relationships were marked and documented. Twenty patterns had no identifiable, or tangible, relationship with the rest of the group and were left on the side. These were however still considered interesting for mobile games although the only relations they had were to game design patterns primarily found in traditional games.



Image 2 – Relations between initial set of game design patterns.

The “network position” of each pattern was based on its individual characteristics. Four descriptive categories were used to indicate if the introduction of a new pattern into the system directly caused the inception of other patterns or changed the conditions of existing ones. Example:

Memorabilia

Instantiates: Social Rewards, Trans-Game Information

Instantiated by: -

Modulates: Game Element Trading

Modulated by: Game Element Trading

When it came down to describing and categorizing each new mobile design pattern, it proved quite difficult to find examples of games that utilized specific patterns, at least with the limited amount of researched games. Examples were sometimes found among other computer & video games as well as in board games, sports and children’s games.

Finally every new pattern was described and the previously documented patterns were fitted with addendums explaining their mobile context.

5 Results

In this section the collection of game design patterns related to mobile gaming is described. The collection is split into two categories: the new patterns that were identified during the project and the old patterns that were re-examined. During the work on analyzing the patterns some patterns were removed because initiate relations to mobile games were proven weak while new patterns were added. Due to this, the final number of patterns was 74.

5.1 New Patterns List

1. Chat Forum

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

General Definition: 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:

References: -

2. Coupled Games

Core Definition: Games are *Coupled Games* if they share some amount of player accessible data.

General Definition: *Coupled Games* always refer to at least two games. 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: -

References: [Peitz04]

3. Social Rewards

Core Definition: A *Social Reward* is the result of game event which affects the social status of the player.

General Definition: 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 where 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: -

References: -

4. Configurable Gameplay Area

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

General Definition: 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: -

References: -

5. Physical Navigation

Core Definition: The player has to move or turn around in the physical world in order to successfully play the game.

General Definition: Any game where the player has to move or turn around in physical space uses *Physical Navigation*.

Example: In the game *Botfighters* the players position decides whether she is close enough to attack, or be attacked by, other robots.

Example: The mobile camera phone game *Killer Virus* uses the input from the camera as playfield and the player has to turn around physically to be able to shoot viruses coming up from behind in the game space.

Using the pattern: *Physical Navigation* can be required by games easily by using *Player-Player Proximity*, *Player-Location Proximity*, *Player-Artifact Proximity* (allowing for a form of *Gain Ownership* goals), *Artifact-Artifact Proximity*, or *Artifact-Location Proximity*. Depending on the actions that motivate the *Physical Navigation*, the movement may take the form of using *Stealth* or being a *Race*.

Consequences: When a game uses *Physical Navigation*, the *Player's Physical Prowess* can affect how people play and experience the game. Also, if the game is a *Pervasive Game*, a natural consequence is that *Real-life Activities Affect Game State*. A game which uses any kind of proximity values between players will cause *Physical Navigation* to rise.

Relations:

Instantiates: *Player Physical Prowess*, *Real-life Activities Affect Game State*

Modulates: -

Instantiated by: *Player-Player Proximity*, *Player-Artifact Proximity*, *Player-Location Proximity*, *Artifact-Artifact Proximity*, *Artifact-Location Proximity*, *Gain Ownership*

Modulated by: *Stealth*, *Race*

Potentially conflicting with: -

References: -

6. Player Physical Prowess

Core Definition: Players actual physical attributes decide how well they will do in the game.

General Definition: By tapping into the player's own attributes the player will have to commit herself in order to affect the current game state. This can be anything from moving around in order to move in the game world to turning and aiming in specific directions.

Example: In the analog and human-starred game *PacManhattan*, players take the roles of PacMan and the ghosts that hunt him. In the original game, PacMan and the ghosts moved at the same speed, but in this version the player playing PacMan can outrun the ghosts if she has the physical means to do so.

Using the pattern: Putting *Player Physical Prowess* in a game gives the players a lot of responsibility over her own playing experience. By designing *Physical Navigation* into the game one automatically has to consider *Player Physical Prowess*. *Dexterity-Based Actions* can be seen as a specific form of *Player Physical Prowess*.

Consequences: *Player Physical Prowess* gives possibilities of having *Game Mastery* that depend on attributes such as strength and endurance. The use of the pattern can instantiate *Real Life Activities Affect Game State* if the measurements are done while players are doing everyday activities.

Relations:

Instantiates: *Game Mastery*, *Real Life Activities Affect Game State*

Modulates: -

Instantiated by: *Physical Navigation*, *Dexterity-Based Actions*

Modulated by: -
Potentially conflicting with:

References: -

7. *Late Arriving Players*

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

General Definition: 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.

Relations:

Instantiates: -
Modulates: -
Instantiated by: *Persistent Game Worlds*
Modulated by: *Interruptability*
Potentially conflicting with: -

References: -

8. *Player-Location Proximity*

Core Definition: The distance between the player and a certain physical location is a factor which can affect gameplay and trigger events in the game, or be used in an evaluation function.

General Definition: As soon as a game which takes place in the physical world (and has the players moving around in it) uses some kind of location-based data, the distance between the players and the locations becomes interesting.

Example: In the sport orienteering, players navigate through physical space between checkpoints which all have to be cleared before the player can enter the goal area. Players can, by judging where the other players are in relation to the checkpoints, get an idea of their current position.

Example: In the Backseat Gaming project the game receives new events as soon as the player comes within a certain distance of a gameplay object.

Using the pattern: *Player-Location Proximity* can be used to indicate completion of *Exploration*, *Race*, *Traverse*, or *Herd* goals, or be used to trigger events in *Narrative Structures* for games which use the journey as a story structures.

Consequences: As soon as a game actively uses *Player-Location Proximity*, the game starts to use *Physical Navigation*. Depending on what *Strategic Locations* are used and how these are distributed, the *Player-Location Proximity* may vary in effect.

Relations:

Instantiates: *Physical Navigation*
Modulates: *Physical Navigation*, *Race*, *Traverse*, *Herd*, *Exploration*
Instantiated by: -
Modulated by: *Strategic Locations*
Potentially conflicting with: -

References: -

9. *Artifact-Location Proximity*

Core Definition: The distance between the game element and a certain physical location is a factor which can affect gameplay and trigger events in the game, or be used in an evaluation function.

General Definition: As soon as a game that takes place in the physical world and has players moving game elements around in it, the game depends on location-based data.

Example: In the sport orienteering, players navigate through physical space between checkpoints which all have to be cleared before the player can enter the goal area. Players can, by judging where the other players are in relation to the check points, get an idea of their current position.

Example: In the Backseat Gaming project the game receives new events as soon as the player comes within a certain distance of a gameplay object.

Using the pattern: *Artifact-Location Proximity* can be used to specify *Delivery* or goals.

Consequences: As soon as a game actively uses *Artifact-Location Proximity*, players either need to use *Physical Navigation* to transport game elements, use transportation means, or even throw game elements.

Relations:

Instantiates: *Physical Navigation*

Modulates: *Physical Navigation, Delivery*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

References: -

10. *Player-Player Proximity*

Core Definition: The distance between the player and another player is a factor which can affect gameplay and trigger events in the game or be used in an evaluation function.

General Definition:

Example: In the game BotFighters, players roam the cities and suburbs in search for human adversaries. Other players can only be found if they are within the radar range of a player's bot

Example: A simple example is in the game PacManhattan where the player playing PacMan only can be caught if she is very close to a ghost (arm's length).

Using the pattern: *Player-Player Proximity* can be used to determine the completion of *Capture* goals. Further, if a game uses *Stealth*, *Player-Player Proximity* is always an issue as it regulates when the *Stealth* is successful.

Consequences: *Player-Player Proximity* automatically opens up for *Physical Navigation* as the players need to be able to change the distance between them. When two or more players are closer still, they can take part in *Game Element Trading*. Also, if two or more players are close enough to talk to each other, *Unmediated Social Interaction* can occur and this must be taken into account in the game design.

Relations:

Instantiates: *Physical Navigation, Unmediated Social Interaction*

Modulates: *Physical Navigation, Game Element Trading, Stealth, Capture*

Instantiated by: *Stealth*

Modulated by: -

Potentially conflicting with: -

References: -

11. *Player-Artifact Proximity*

Core Definition: The distance between the player and a certain artifact is a factor which can affect gameplay and trigger events in the game, or be used in an evaluation function.

General Definition: *Player-Artifact Proximity* describes every kind of spatial relationship between a player and a game artifact. The effect of this distance must not be directly visible to the player but it can serve as a function to calculate other in-game effects.

Example: In the treasure-hunting game GeoCaching, the players need to find the exact spot of the treasure in order to claim it.

Example: The collection game Mogi Mogi allows the player not only to see her own position in relation to the game artifacts, but the locations of other players.

Using the pattern: As in all proximity-related patterns, *Physical Navigation* comes into play as well. *Player-Artifact Proximity* also makes it possible to regulate *Game Element Trading* which is done easiest by having the players stand next to each other in order to make the trade. This can decide how objects add to a player's *Collection* by deciding how close the player needs to be.

Consequences: *Player-Artifact Proximity* can be used to mediate interaction between players so that *Player-Player Proximity* can become optional. Examples of how this can be used is to support message passing or trading.

Relations:

Instantiates: *Physical Navigation*

Modulates: *Game Element Trading, Physical Navigation, Collection*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

References: -

12. *Memorabilia*

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

General Definition: 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.

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: -

References: -

13. *Artifact-Artifact Proximity*

Core Definition: The distance between two real-world artifacts is a factor which can affect gameplay and trigger events in the game or be used in an evaluation function.

General Definition: A game with physical game elements or artifacts can use the artifacts as an indirect way of controlling the game. The distance between the artifacts can be used as input to any kind of event in the game world.

Using the pattern: Unless the artifacts in question can move by themselves, they have to be moved by the players, this affects the *Physical Navigation* of the game. Also, if the players are required to use *Game Element Trading*, the distance between the objects can decide whether the artifacts can be traded or not.

Consequences: If players have to move artifacts for *Artifact-Artifact Proximity* to occur, the use of this pattern automatically generates cases of *Player-Artifact Proximity*. Being able to detect *Artifact-Artifact Proximity* regardless of player involvement allows for relations between physical objects to be part of the game state detectable by computer systems. This can for example be used to notice a form of *Extra-game Input* when non-players have separated artifacts from each other.

Relations:

Instantiates: *Physical Navigation*, *Extra-Game Input*

Modulates: *Physical Navigation*

Instantiated by: *Game Element Trading*

Modulated by: -

Potentially conflicting with: -

References: -

14. *Interruptability*

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

General Definition: 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*. *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.

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 it 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*

Modulated by: *Coupled Games, Agents, Spawning*

Potentially conflicting with: *Multiplayer Games*

References: -

15. *Common Experiences*

Core Definition: 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.

General Definition: 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.

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: -

References: -

16. *Game Element Trading*

Core Definition: Physical game elements can be traded between players.

General Definition: 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: -

References: -

17. *Augmented Reality*

Core Definition: The player's perception of the game world is created by augmenting the player's perception of the real world.

General Definition: The game takes place in the real world but an overlay is applied to give players additional information than what is available to normal people. The real world defines the whole or part of the game world.

Example: In the game project AR Quake, players wear headsets with goggles which superimpose a digital image on what they normally would see. On this image, enemies and in-game objects appear and can be interacted with.

Example: The game The Invisible Train lets the player see the game world both in real life but also through a camera mounted on a PDA. The trains are virtual and only visible on each player's personal PDA.

Using the pattern: The primary design concern when using *Augmented Reality* is what additional information the players should be provided with. When several players perceive the same part of the real world, the additional option of providing different information to different players exists, i.e. creating *Asymmetric Information* between the players.

Consequences: *Augmented Reality* creates a *Hybrid Space* since it is a combination of virtual and physical data. The augmentation can either be used to give players different views of the game or it can be used to enhance everybody's view.

Relations:

Instantiates: *Hybrid Space*

Modulates: -

Instantiated by: -

Modulated by: *Asymmetric Information*

Potentially conflicting with: -

References: -

18. *Hybrid Space*

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

General Definition: 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

References: -

19. *Unmediated Social Interaction*

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

General Definition: 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: -

References: -

20. *Social Skills*

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

General Definition: A player's social skills determine 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 influence 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*

References: -

21. *Pervasive Games*

Core Definition: The play session coexists with other activities, either temporally and spatially.

General Definition: As technology is getting smaller, cheaper and more powerful it can be incorporated into objects traditionally not perceived as technological. This facilitates simultaneous gameplay alongside other everyday activities.

Example: The game *Botfighters* allows the player to play the game whilst going on with her everyday life by having the bot's position vary with the player's physical position.

Example: In the game project *Visby Under*, players walk the streets of Visby, interacting with a small creature in a PDA. The creature, which has to be nurtured to some extent, tells them about various sights and assigns different quests to the player.

Using the pattern: As soon as a game has *Real-life Activities Affect Game State* or a game uses *Hybrid Space*, the game is a *Pervasive Game*. How well the game functions with and is affected

by the surrounding activities can be controlled through *Extra-Game Input*.

Consequences: *Pervasive Games* by their nature may require *Attention Swapping* between playing the game and performing other activities. Since the game can take place in spaces inhabited by non-players, all actions performed in the game can be considered to have some form of *Extra-Game Consequences* if the non-players do not know that a game is being played. If the non-players can recognize the game for what it is, they can be considered *Spectators*.

Relations:

Instantiates: *Attention Swapping, Extra-Game Consequences, Spectators*

Modulates: -

Instantiated by: *Hybrid Space, Real-life Activities Affect Game State*

Modulated by: *Extra-Game Input*

Potentially conflicting with: -

References: -

22. *Real Life Activities Affect Game State*

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

General Definition: 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.

Relations:

Instantiates: *Extra-Game Input, Pervasive Games*

Modulates: -

Instantiated by: *Physical Navigation, Player Physical Prowess*

Modulated by: *Real-time Games*

Potentially conflicting with: -

Uncharacterized connection with: *Hybrid Space*

References: -

23. *Extra-Game Input*

Core Definition: The game state depends on external input in addition to input from the player(s).

General Definition: The game state is updated by external factors, in addition to the player's actions and "the system itself". This is done intentionally as a part of the game design.

Example: In *Boktai*, a sensor on the game cartridge transforms actual sunlight to ammunition for the player's ray gun (in the game).

Example: In *Animal Crossing*, stores are open only during real-life office hours.

Using the pattern: *Extra-Game Input* can be considered a subset of *Real Life Activities Affect Game State*. However, since its inclusion in the game design is intentional, its consequences for

gameplay are somewhat more predictable.

Consequences:

Relations:

Instantiates: -

Modulates: *Pervasive Games, Reasonable Waiting Times*

Instantiated by: *Artifact-Artifact Proximity, Hybrid Space, Pervasive Games, Real Life Activities Affect Game State*

Modulated by: -

Potentially conflicting with: -

References: -

24. *Heterogeneous Game Element Ownership*

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

General Definition: 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: -

References: -

5.2 Revised Pattern list

In this section we describe the patterns which were already defined but that was found to be useful in a mobile context. The relationships of each pattern only include relations to the 74 identified patterns. Other relationships these patterns have to other patterns are not listed here but can be found in the book *Patterns in Game Design* [Björk04]. Relations between patterns in this list are noted but not described as details of there relationships exist in the mentioned book. It is suggested that the original description is

used in conjunction to a description found here when doing design work since this will provide a complete description.

25. *Extra-Game Information*

Like most games, mobile games need to give the player proper instructions to play the game. This is even more important in mobile games, that often are downloaded and do not come with a printed manual. Also, mobile games are often used in social contexts and information about the game can come from a social source (e.g. through *Social Interaction* with other players) instead of from the game directly.

Instantiates: -

Modulates: -

Instantiated by: *Social Interaction*

Modulated by: -

Potentially conflicting with: -

26. *Highscore List*

With mobile games (and cell phone games in particular), it is fairly simple to build a multiplayer layer by just adding an on-line highscore list. Even if players are not playing the game together, they can compare their game sessions and can thereby have a perception of *Common Experience*. This instigates competition among players and can be used by players for bragging and increasing their *Social Status*.

Instantiates: *Score, Common Experience*

Modulates: *Social Statuses*

Instantiated by: -

Modulated by: *Score*

Potentially conflicting with: -

27. *Score*

A lot of mobile games use the traditional score reward. It's a simple way of judging the outcome of a game and it can easily be compared between players or used in a *Highscore List*, in both cases stimulating *Social Interaction*.

Instantiates: -

Modulates: *Highscore List, Social Interaction*

Instantiated by: *Highscore List*

Modulated by: -

Potentially conflicting with: -

28. *Strategic Locations*

Mobile games that require *Physical Navigation* often make use of *Strategic Locations* where players receive special benefits. The distance between certain locations and the players can be used as an evaluation function and if the *Strategic Location* co-exists with a physical property it can be used favorably in *Pervasive Games*. The *Strategic Location* can be used to determine the geographical definition of *Player-Location Proximity* or *Artifact-Location Proximity*.

Instantiates: -

Modulates: *Physical Navigation, Player-Location Proximity, Pervasive Games*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

29. *Gain Ownership*

Some mobile games, both pervasive and “traditional”, require the players to claim items in order to progress in the game. This is particularly interesting in games which require *Physical Navigation* where player might have to *Race* each other in order to arrive first to an item. *Gain Ownership* may also become a meta-level goal in games that allow *Game Element Trading*.

Instantiates: *Collection, Physical Navigation, Game Element Trading*

Modulates: -

Instantiated by:-

Modulated by:

Potentially conflicting with:

30. *Stealth*

Mobile games that make heavy use of *Physical Navigation* can use *Player-Player Proximity* as an evaluation function to support *Stealth*. *Stealth* can also be supported through technology limitation like GPS shadows and line-of-sight requirements of IR.

Instantiates: *Physical Navigation*

Modulates: *Physical Navigation, Player-Player Proximity*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

31. *Race*

Games in which players race each other in the physical world naturally give rise to *Physical Navigation* is part of the gameplay. *Races* are especially exciting in mobile games as *Player Physical Prowess* influences the outcome greatly.

Instantiates: *Physical Navigation*

Modulates: -

Instantiated by: -

Modulated by: *Player Physical Prowess*

Potentially conflicting with: -

32. *Predefined Goals*

Mobile games, as most other games, rely heavily on *Predefined Goals*. What is specific to mobile games is that *Player-Location Proximity* and *Artifact-Location Proximity* but at least be partially a predefined goal since a specific location cannot move (although the goal may change to be another location of course). The goal is explicitly or implicitly stated when the game starts and once the goal is fulfilled the game is over. The may either be predefined by the game or part of a *Configurable Gameplay Area*.

Instantiates: -

Modulates: -

Instantiated by: *Player-Location Proximity, Artifact-Location Proximity, Configurable Gameplay Area*

Modulated by: -

Potentially conflicting with: -

33. *Continuous Goals [JP, OD]*

Mobile games have excellent support for continuous goals since the game can be allowed to run in the background while the player goes about her daily routine. This is exemplified by Tamagotchi-style games where the player has to take care of a virtual pet and also in Barcode

Battler where players engage in the search of the ultimate barcode.

Instantiates:

Modulates: *Pervasive Games*

Instantiated by:

Modulated by:

Potentially conflicting with:

34. *Game Masters*

Mobile games can be advanced set-pieces, like Uncle Roy All Around You and I Like Frank. In these cases, where a computer cannot manage the game on its own, a *Game Master* is needed to pull strings in the right direction.

Instantiates: -

Modulates: -

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

35. *Self-Facilitated Games*

In mobile games it is not always necessary to have a computer or any other kind of judge that enforces the game rules. Often the players themselves can be used to make sure the game remains within its boundaries.

Instantiates: -

Modulates: -

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

36. *Delayed Effects*

In a mobile game which sends and receives data to and from a server, delays are sometimes very long. This *Downtime* can be hidden by making everything the player can do have *Delayed Effects*.

Instantiates: -

Modulates: *Downtime*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

37. *Downtime*

Players playing mobile games can have *Downtime* for many reasons. Since mobile hardware often has limited capacity, loading times might force the player to take a break. If the game is a multiplayer game and the players take turns playing, the inactive player will have nothing to do while waiting. This can be solved by having a *Spectator* mode in the game that players can enter while inactive. Another solution if the turn based game mode has very long turns, is to allow game access through a *Coupled Game*. Also, mobile games which rely on communication with a server will sometimes suffer *Downtime* if the response time from the server is too long.

Instantiates: -

Modulates: *Reasonable Waiting Times*

Instantiated by: *Interruptability, Turn-taking, Spectators*

Modulated by: *Coupled Games, Delayed Effects*
Potentially conflicting with: -

38. Turn Taking

Mobile multiplayer games not wanting to rely on fast communication between units can make use of *Turn Taking* to ensure a fair and playable game. This can be used for both long and short turns depending on how much *Downtime* the players can endure. Another option is to construct *Synchronous Games* by letting each player have her turn and then update the game state.

Instantiates: *Downtime, Spectators*

Modulates: *Synchronous Games*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

39. Spectators

An advantage of mobile games is that once the players are on the streets playing the game, the game can have live *Spectators*. Players experiencing *Downtime* or having finished a move in a *Turn-taking* game can go into Spectator-mode and watch the game directly or use *Public Information* displays to see what is going on.

Instantiates: *Downtime*

Modulates: -

Instantiated by: *Turn-taking, Public Information*

Modulated by: -

Potentially conflicting with: -

40. Meta Games

Mobile games are excellent candidates for *meta games*. Two reasons for this is that external factors in the gameplay environment can inspire meta games and that other people can become involved in the gameplay activity. Typically examples of meta games that can arise of these situations are *Tournaments* or *Betting* but *Meta games* can be used as a multiplayer layer on top of the original game by using something as simple as a highscore list.

Instantiates: -

Modulates: -

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

41. Trans-Game Information

Mobile games are likely to blend with players everyday activities and players are likely to discuss the games among each other in between game sessions, and the game result might affect their *Social Statuses*. *Trans-Game Information* can assume the shape of rumors but also provide players with the opportunity to show the game to new players in form of *Memorabilia*.

Information from a non-mobile game can also spread through a *Coupled Game*.

Instantiates: *Social Statuses*

Modulates: -

Instantiated by: *Memorabilia, Coupled Games*

Modulated by: -

Potentially conflicting with: -

42. Individual Penalties

In mobile *multiplayer games* the game structure will likely need to penalize individual players for breaking rules or for complicating matters either for themselves or for their team without making the game harder for the rest of the team.

Instantiates: -

Modulates: *Social Statuses*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

43. Individual Rewards

In mobile *multiplayer games* the game structure will likely need to reward individual players for reaching goals without having to reward the rest of the team.

Instantiates: -

Modulates: *Social Statuses*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

44. Shared Penalties

Teams or players playing together who breaks rules or fails to reach goals might need to be penalized as a group. This will enhance the sense of a *Common Experience*.

Instantiates: *Common Experience*

Modulates: *Collaborative Actions*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

45. Shared Rewards

Teams or players playing together who reaches goals together might need to be rewarded as a group. This can be in the form of increased shared resources or perhaps a temporary advantage over the other team. *Shared Rewards* leads to *Common Experiences*.

Instantiates: *Common Experience*

Modulates: *Collaborative Actions*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

46. Collaborative Actions

Some goals in mobile multiplayer games can only be reached through a *Collaborative Action* executed by two or more of the players. This includes but is not limited to the action of simply being at the same location at the same time or attacking a target simultaneously.

Instantiates: *Common Experience*

Modulates: -

Instantiated by: -

Modulated by: *Shared Rewards, Shared Penalties*

Potentially conflicting with: -

47. Cooperation

Cooperation forces players of a mobile game to work together in order to progress in the game. This can make people who otherwise never would have met to cooperate.

Instantiates: *Common Experience*

Modulates: -

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

48. Team Play

Team Play increases the social bond between players and is an integral part of any team-based mobile multiplayer game. The game should take into account how teams are formed since special player attributes may make the team unbalanced.

Instantiates: *Common Experience*

Modulates: -

Instantiated by: -

Modulated by: *Team balance*

Potentially conflicting with: -

49. Social Organizations

In a *Persistent Game World*, *Social Organizations* are likely to arise. Formed by players, they can be affected by the players' *Social Statuses* and usually entail a lot of *Social Interaction*. This is extra interesting in a mobile game where players can meet physically.

Instantiates: -

Modulates: *Social Interaction*

Instantiated by: *Social Interaction*

Modulated by: *Persistent Game World*, *Social Statuses*

Potentially conflicting with: -

50. Social Statuses

Gaining *Social Status* is common motivator among players. As many mobile games take place in a *Hybrid Space*, a player's social status in the real world is likely to be affected in a more tangible way, both in the game and outside.

Instantiates: -

Modulates: *Social Organizations*

Instantiated by: *Trans-Game Information*, *Status Indicators*, *Highscore List*

Modulated by: *Social Rewards*, *Social Skills*

Potentially conflicting with: -

51. Social Interaction

Social Interaction in mobile games is likely to take on a more personal form, since players have the possibility to meet face to face and have *Unmediated Social Interaction*. The *Social Interaction* is heavily influenced by *Player-Player Proximity* and if it's unmediated the design must take into account what *Extra-Game Information* can be exchanged or what *Game Element Trading* can occur.

Instantiates: *Common Experience*, *Social Rewards*

Modulates: *Extra-Game Information*

Instantiated by: *Chat Forum*, *Unmediated Social Interaction*

Modulated by: *Social Organizations*, *Player-Player Proximity*, *Multiplayer Games*, *Game*

Element Trading, Indirect Information, Social Skills, Score

Potentially conflicting with: -

Uncharacterized connection with: *Communication Channels*

52. Trading

Trading in mobile games can comprise real-world objects as well as virtual objects. When part of the game design and utilizing technology in such a way so that the players much be physically close in order to make the trade, gives rise to mediated *Social Interaction*.

Instantiates: -

Modulates: -

Instantiated by: *Game Element Trading*

Modulated by: -

Potentially conflicting with: -

53. Public Information

Hiding/revealing information from players of mobile games is a particular challenge to game designers. For games taking place in a *Hybrid Space*, *Spectators* can share the game experience through the game's interface or by observing events taking place in the real world.

Instantiates: *Spectators*

Modulates: -

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

54. Indirect Information

Mobile game players can learn about the game through many more channels than just through the game. Passing information indirectly from player to player gives rise to *Social Interaction*. Obtaining *Indirect Information* such as checking a bus schedule may also be part of the gameplay.

Instantiates: -

Modulates: *Social Interaction*

Instantiated by: *Communication Channels*

Modulated by: -

Potentially conflicting with: -

55. Asymmetric Information

By giving players asymmetric information in a mobile *Pervasive Game* can both lead to interesting gameplay structures but also allow players to play the game differently depending on what information they have. This can help players take different roles in one and the same game.

Instantiates: -

Modulates: -

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

56. Imperfect Information

Imperfect Information is very common in mobile *Multiplayer Games* as it is extremely hard to

keep track of the other players in a changing real life environment. The game design should be aware of this and support it. As a deliberate design choice, providing the player with *Imperfect Information* of the game state can produce structures where players have to cooperate in order to complete the picture. A game may for instance, give the player abstract information in electronic form which has to be complimented by details in the real world.

Instantiates: -

Modulates: -

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

57. Perfect Information

Perfect Information might be difficult, next to impossible, to achieve in a mobile multiplayer game where the screen is small and the possible actions are many, especially in a game with *Physical Navigation*. One way of getting around this problem can be by using a variety of different *Outcome and Status Indicators*.

Instantiates: -

Modulates: -

Instantiated by: -

Modulated by: *Outcome Indicators, Status Indicators*

Potentially conflicting with: -

58. Outcome Indicators

Mobile *Multiplayer Games* might have a harder time to communicate the outcome of certain game actions and it is important that the game design take this into account and delivers proper *Outcome Indications* to the players.

Instantiates: -

Modulates: -

Instantiated by: -

Modulated by: *Status Indicators*

Potentially conflicting with: -

59. Status Indicators

Mobile games taking place in an urban landscape can make heavy use of *Status Indicators* others than those available in the gaming device. The game could make use of all kinds of available apparatus and other public displays.

Instantiates: *Social Statuses*

Modulates: *Outcome Indicators*

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

60. Multiplayer games

Given the nature of the core technologies upon which mobile games are built (GPRS, Bluetooth etc.), it is possible to create intense *Multiplayer* experiences and including lots of *Social Interaction* in the gameplay. This creates a *Common Experience* for the participants. One should also be aware of that mobile phones are foremost a communication device and this promotes *Multiplayer Games* more than anything. If there is a lack of human players, *Agents* can be used.

Instantiates: *Common Experience*

Modulates: *Social Interaction*

Instantiated by: -
Modulated by: *Agents*
Potentially conflicting with: -

61. Agents

Like in “regular” on-line *Multiplayer Games*, *Agents* can be used when there is a lack of human participants. *Agents* may also be used as a vehicle to support a narrative structure.

Instantiates: -
Modulates: *Multiplayer games*
Instantiated by: -
Modulated by: -
Potentially conflicting with: -

62. Communication Channels

Using mobile devices players may find alternative *communication channels* with which they can communicate the status of the game state instead of just using the game device. Or communication channels may provide players with *Indirect Information* about the game state. Designing a game around communication channels and the flow of different types of information could form an intriguing premise.

Instantiates: *Indirect Information*
Modulates: -
Instantiated by: -
Modulated by: -
Potentially conflicting with: -
Uncharacterized connection with: *Social Interaction*

63. Team Balance

As the physical shape of players has an impact on gameplay in some mobile games, this should be taken into consideration when teams are put together. Other factors, such as physical location, may also have to be considered.

Instantiates: -
Modulates: -
Instantiated by: -
Modulated by: *Player Prowess*
Potentially conflicting with: -

64. Team Killing

Mobile games where teams compete against each other might be tedious to set up and players are likely to expect to be entertained for a while. Measures should be taken in order to avoid that an entire team is eliminated in order to make sure that the game session takes the desired time.

Instantiates: *Eliminate*
Modulates: -
Instantiated by: -
Modulated by: -
Potentially conflicting with: -

65. Quick Games

Games allowing for quick game sessions are particularly well suited for mobile games given that many mobile games are played casually and on-the-go.

Instantiates: -
Modulates: -
Instantiated by: -
Modulated by: -
Potentially conflicting with: -

66. *Real-Time Games*

Having game/play sessions played in real time introduces the possibility to modulate *Real-Life Activities Affecting Game Play*, given that the game takes place in a *Hybrid Space*. The player's response and reaction time is a factor that affects the outcome of the player's actions.

Instantiates:
Modulates: *Real-Life Activities Affecting Game State*
Instantiated by: *Hybrid Space*
Modulated by: -
Potentially conflicting with: -

67. *Asynchronous Games*

The casual game player, requiring *Interruptability*, may still participate in the evolution of a *Persistent Game World* if it is implemented as an *Asynchronous Game*. A console or PC game may also be accessible through a *Coupled Game* on a mobile device.

Instantiates: -
Modulates: *Persistent Game Worlds*
Instantiated by: -
Modulated by: *Interruptability, Coupled Games*
Potentially conflicting with: -

68. *Synchronous Games*

In the broadest sense, *Synchronous games* simply mean that players' actions affect each other. Players of a *Synchronous Game* play the game during the same "time slot". This is especially interesting in *Pervasive Games* which require players to play at the same time in order to be able to interact.

Instantiates: -
Modulates: -
Instantiated by: -
Modulated by: *Turn-Taking*
Potentially conflicting with:

69. *Persistent Game Worlds*

Persistent Game Worlds evolve during the player's absence. Their nature and longevity allows for *Late-Arriving Players* and promotes *Social Organizations*. Since you can expect mobile players to come and go a *Persistent Game World* is particularly suiting for *Asynchronous Games* and *Coupled Games*.

Instantiates: *Late-Arriving Players*
Modulates: *Social Organizations*
Instantiated by: -
Modulated by: *Asynchronous Games, Interruptability, Coupled Games*
Potentially conflicting with: -
Uncharacterized connection with: *Hybrid Space*

70. Reasonable Waiting Times

Mobile games are often played 'on the go' and the player will probably not have time to wait for slow connections and long response times. It is therefore important to keep waiting times to a minimum. However, if the game play is slow, this is not a problem.

Instantiates: -

Modulates: -

Instantiated by: -

Modulated by: *Downtime*

Potentially conflicting with: -

71. Collection

Collecting objects has been a goal in life and in games-and particularly video games-since prehistoric times. The simple goal of collection is particularly well-suited to mobile games, where the player's physical location controls the *Player-Artifact Proximity* of a desirable object

Instantiates: -

Modulates: *Player-Artifact Proximity*

Instantiated by: *Gain Ownership*

Modulated by: -

Potentially conflicting with: -

72. Gain Information

Mobile games can utilize the player's mobility to have the player search for information in many different places. The information can be located in other media than where the actual game platform resides. This has been found to be a common denominator of many mobile games; finding information that leads to a *Strategic Location*.

Instantiates: -

Modulates: -

Instantiated by: -

Modulated by: -

Potentially conflicting with: -

73. Role Reversal

The pattern *Role Reversal* is particularly common in games building on the goals *Collection*, *Race* and *Stealth*. *Role Reversal* often requires information on *Player-Player Proximity*.

Instantiates: -

Modulates: -

Instantiated by: -

Modulated by: *Player-Player Proximity*

Potentially conflicting with: -

74. Spawning

Spawning the player into the game world might require specific *Spawn Points*. If there is a penalty for needing to respawn the player could suffer *Downtime* before being able to get into the game. Spawning in a mobile game can be different from spawning in a computer game since the player might have to travel large distances in order to get to a viable spawn point. This can be used as an *Individual Penalty* and can increase the *Tension* when being far away from a spawn point. An issue with *Spawning* in mobile games is that it may generate dependencies with *Player-Location Proximity*.

Instantiates: *Spawn Points*

Modulates: *Downtime*
Instantiated by: -
Modulated by: *Player-Location Proximity*
Potentially conflicting with: -

6 Discussion & Conclusions

6.1 The industry and the market

Most likely, mobile games will attract a different demographic of gamers, not so much appealing to the community of hardcore gamers but to a group of casual gamers. This group of gamers is also more likely to embrace the new business models that are required for the games reach a large enough community of gamers. However, this demographic is not as easily swayed by the premises of old games, new themes need to be introduced and efforts be made to make sure content is culturally relevant.

Today's mobile games can be divided into three categories. The first category consists of ports of arcade games that really do nothing to develop the media further. Another category of games are mainly designed as promotional material, to encourage consumers to purchase and consume related products such as paraphernalia or movies. A minority of games is focused on gameplay, and a yet even smaller set makes use of the unique possibilities provided by mobile platforms. In this report we have aimed at investigating the latter third as we feel sufficient material on the others has been produced already.

6.2 The Method

A factor that contributed to the complexity of the investigation was the large amount of patterns that had to be reviewed and studied on a continuous basis. These were only available in a text document which did not allow for flexible and efficient use. This made categorizing the games a long and cumbersome process.

Arranging workshops is indeed a skill in itself; a viable conclusion is that for this type of activity, a full day is required at a minimum in order to understand the rather complex concept of game design patterns well enough to produce interesting results. Also, a critical number of attendees must be reached to ensure active participation. It was also noted that participants had great difficulty "thinking out of the box" and mostly tried to re-work already existing game concepts.

In the process of extracting gameplay patterns from the selected set of games we came across patterns of very specific types. "Knowledge of future events or geographical structures", "game-like set-up phases" and "player diligence" was

examples of a few that passed under the microscope. These new patterns were identified but they were not regarded as vital gameplay components and were consequently not elaborated on any further. Nevertheless, they remain interesting concepts for mobile games and could/should be examined in related research.

6.3 Future work

One of the biggest issues that arose during the research process was the lack of concrete examples and reference material. In order to effectively carry on the work on mobile game design patterns we believe we must either wait for the industry to take the plunge into an unfamiliar territory or to conduct a number of design experiments (anchored in the academia) which investigate and exploit certain distinct features of mobile games.

As mentioned in the previous section a few interesting patterns were identified but not investigated further, these could benefit from a thorough analysis which could possibly result in the appearance of new relationships and concepts.

Another natural extension would be to narrow down the field of research even more. Currently, the term “mobile games” covers a multitude of games and gaming styles making it hard to establish a common ground. Focusing on a single or more narrowly defined concept like “physical games” or “location-based games” and go deeper into detail in these areas would probably benefit to all as this report merely manages to scratch the surface.

6.4 Conclusions

Game design patterns are powerful tools and this report shows how they can be used to discover new areas of gaming. It is obvious that mobile games require different design components than regular video games in order to become truly compelling to a group of consumers. At the moment, the industry is seemingly slipping into the same old tracks and continues to make ports of aging arcade games, but it has a chance of utilizing this new device for what it is really worth instead of disguising old ideas in a new costume. Mobile games indeed open up a plethora of interesting game designs; seeing how the cell phone industry has been so successful in changing the communication needs and the lifestyle of consumers worldwide, they should not have to resort to peddling ancient game concepts to a demographic that is otherwise so obviously susceptible to innovation.

Links

www.mobileentertainmentforum.org
www.mobenta.com
<http://www.wgamer.com/>
http://www.businessweek.com/bwdaily/dnflash/jul2001/nf2001072_760.htm
www.mobiledia.com/forum/topic7319.html

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Appendix I - Mobile Games Studied

Boktai

Description: The player is a vampire hunter exploring maze-like environments. A light sensor on the game cartridge charges the player's gun with sunlight used to battle the undead. Charging stations can be used to store sunlight for later (=darker) play sessions.

Reference: <http://www.konami.com/gb/boktai/>

Donkey Kong – Game & Watch version

Description: Jumpman trying to rescue his girlfriend through running and jumping over barrels in the popular handheld game (with dual screens) released in 1982. A traditional computer game on a handheld device.

Reference: <http://www.gameandwatch.com>

Snake

Description: Popular game played on Nokia cell phones in the mid 1990s. The player controls a rapidly growing “snake”, eating apples while avoiding bumping into walls and crossing its own tail.

Reference: www.nokia.com

WarioWare, Inc.

Description: WarioWare, Inc. for the Nintendo GameBoy Advance, is a series of micro games with a distinct visual style played in a frantic tempo.

Reference: <http://www.nintendo.com/gamemini?gameid=m-Game-0000-1643>

Pokémon Sapphire/Ruby

Description: Beside the ordinary RPG elements, players can connect their handheld devices to share tactics, trade pokémons and battle each other.

Reference: <http://www.nintendo.com/gamemini?gameid=m-Game-0000-1390>

Super Mario Advance

Description: A handheld version of Super Mario Bros. 2 including a multiplayer version of the original Mario Bros. game

Reference: <http://www.nintendo.com/gamemini?gameid=m-Game-0000-329>

The Legend of Zelda: Four Swords

Description: Up to four Nintendo GBAs can be connected to each other allowing for cooperative and competitive campaign play.

Reference: <http://www.nintendo.com/gamemini?gameid=m-Game-0000-1381>

Advance Wars

Description: A popular strategy game for the Nintendo GameBoy Advance which includes a turn-based multiplayer mode.

Reference: <http://www.nintendo.com/gamemini?gameid=m-Game-0000-633>

Tamagotchi

Description: Electronic “pocket-pets” that started a craze in the late 1990s. Like real pets, they need attention and nurturing to survive.

Reference: <http://www.tamagotchi.com/>

BlackJack

Description: One of the first cell phone games; a simple text version of the card game Black Jack. Available on the Siemens C30 among others.

Reference:

IR Pong

Description: An updated, multiplayer version of the classic arcade game *Pong* played on PDAs with Bluetooth or IR connection.

Reference: http://www.harbaum.org/till/palm/ir_pong/

Prince of Persia – The Sands of Time

Description: Though released in 2003, this cell phone game is visually, and in matters of gameplay, reminiscent of the classic platform game from 1989.

Reference: www.gameloft.com

Tom Clancy's Splinter Cell

Description: A platform game for cellular phones which combines elements of stealth and action.

Reference: www.gameloft.com

Barcode Battler

Description: A novelty gaming device which employs a barcode scanner to generate monsters from scanned barcodes. Players' monsters can battle each other.

Reference: <http://www.vidgame.net/misc/barcodebattler.htm>

Red Faction

Description: An FPS supporting multiplayer via Bluetooth, on the Nokia N-Gage

Reference: http://www.gamespot.com/mobile/action/redfaction/factsheet_6110069.html

Killer Virus

Description: An "augmented reality shoot 'em up" played on cell phones equipped with cameras. Enemies are superimposed on the camera view and the player has to eliminate approaching virus particles by aiming and shooting.

Reference: <http://www.ojom.com/games/augmentedreality/attackofthekiller.htm>

Harry Potter – the Prisoner of Azkaban

Description: A turn-based, team-oriented RPG for the Nintendo GameBoy Advance. Can be connected to the Nintendo GameCube console

Reference: http://www.eagames.com/redesign/games/gba/hp_azkaban/home.jsp

Dance Dance Revolution

Description: The "mobility" of this arcade game does not refer so much to the platform itself as to the actions of the player: the objective is to synchronize dance moves to the music in coherence with a rapid flow of instructions on the display.

Reference: <http://www.ddrfreak.com/aboutddr.php>

Supafly

Description: Quoting its developer, Supafly is a "location-based virtual soap opera". The player builds a virtual character and improves its social status by spreading gossip and forming alliances.

Reference: <http://www.itsalive.com/page.asp?id=1080>

Bild saknas!

Mogi Mogi

Description: From the website : "A game where players move outside, pick up virtual items through their mobile phone interface, then trade with other players to complete collections. The goal is to get the maximum points completing collections".

Reference: <http://www.mogimogi.com>

Botfighters

Description: Players store a virtual robot on their mobile phone and the objective is to eliminate other players' robots. Information on enemy locations is transmitted via SMS, the probability of scoring a hit ("shooting" is also done via SMS) is proportional to the distance from the enemy .

Reference: <http://www.itsalive.com/page.asp?sa=0&id=1017>

Tom Clancy's Ghost Recon: Jungle Storm

Description: This multiplayer FPS for the Nokia N-Gage features a number of multiplayer game modes for up to eight players via bluetooth .

Reference: <http://www.gameloft.com>

"Laser Dome"

Description: "Real-life FPS", played in teams or one-on-one with laser guns and (most commonly) receptive chest plates.

Reference: <http://www.laserdome.se>

Tim's World / Game

Description: Tim's Game is an augmented card collecting game where cards are equipped with a small chip which can be inserted in a portable device. Cards contain characters that can battle against other players' characters and improve their skills.

Reference: <http://www.timsworld.se>

PacMan Must Die!

Description: A reversal of the classic arcade-game *PacMan*. Each player controls a ghost trying to re-capture the dots eaten/stolen by PacMan. Players have to collaborate with each other, since they need to enter other participant's screens in order to collect all dots. Played on PDAs.

Reference: <http://www.viktoria.se/fal/publications/2003/siggraph2003-collgames.pdf>

PhotoFun: Storyteller

Description: A multiplayer game where players collectively complete a short storyline by sending MMSs consisting of an image and a text string to a public screen.

Reference: Thoresson J, PhotoFun Entertainment

PhotoFun: Colorado

Description: Players compete against each other to be the first to take a photo of something which has the same color as the color specified by the game facilitator.

Reference: Thoresson J, PhotoFun Entertainment

PhotoFun: Mosaic

Description: Players send photos to a public screen where each photo is used as a pixel in a huge image.

Reference: Thoresson J, PhotoFun Entertainment

MyTheme

Description: *MyTheme* is a computer-augmented card game, which explores how stories can be generated from a combination of player actions. It is a game designed to stimulate social interaction.

Reference: <http://play.tii.se/projects/smart-its/mytheme.html>

Human PacMan

Description: Players take on to physically enact as Pacmen and ghosts, moving around in a wide-area setting. Head-mounted displays are used to visualize the game world.

Reference: <http://mixedreality.nus.edu.sg/research-HP-infor.htm>

Backseat Gaming

Description: A prototype game, designed to be used on mobile phones with GPRS capability, uses geographical information to create a fantasy world which players can interact with. The purpose is to make tedious car travel entertaining.

Reference: <http://www.tii.se/mobility/backseatgamingpresentation.htm>

Uncle Roy All Around You

Description: Players on the street equipped with handheld devices interact with online players, in a collective search for "Uncle Roy". Using web cams, audio and text messages players must work together against the clock.

Reference: <http://www.uncleroyallaroundyou.co.uk/>

I Like Frank

Description: Essentially the same as Uncle Roy All Around You, but with somewhat different technology. I Like Frank also took place in a different town which shows the problems of moving a location based game to a new location.

Reference: http://www.blasttheory.co.uk/bt/work_ilikefrank.html

Treasure Machine

Description: Players collect clues using SMS, WAP and WEB in order to be the first to know where a virtual treasure is hidden. Once the player thinks she knows where the treasure is, she can go to the physical location and "dig".

Reference: <http://www.unwiredfactory.com/products.asp>

PacManhattan

Description: Players enact the roles of Pacman (1 player) and ghosts (4 players). The game world consists of 24 square blocks on Manhattan Island. Game "generals" acting as commanders for Pacman and Ghosts respectively, communicate key locations of power-pills and adversaries to their underlings who in their turn report back with information on their location.

Reference: www.pacmanhattan.com

AR-Quake

Description: An augmented reality-version of the classic FPS game Quake. A head-mounted display, mobile computer, head tracker and GPS system provide inputs to control the game. The player moves around in the real world shooting at virtual monsters.

Reference: <http://wearables.unisa.edu.au/projects/ARQuake/www/>

GeoCaching

Description: An adventure game based on GPS technology. The basic idea is to have individuals and organizations set up caches all over the world and share the locations of these caches on the internet. GPS users can then use the location coordinates to find the caches. Once found, a cache may provide the visitor with a variety of rewards. The visitor is asked to leave something for the cache in return.

Reference: <http://www.geocaching.com>

Pervasive Clue

Description: Pervasive Clue is a live-action RPG augmented with short-range radio frequency (RF) PDA devices. The goal of the game is to solve a murder mystery, much in the same fashion as the classic board game *Clue*, with an added element of social interaction.

Reference: <http://www.cs.uoregon.edu/research/wearables/Papers/how2host.pdf>

Can U See Me Now?

Description: Street players equipped with PDAs and Walkie-Talkies, tracked by satellites chase on-line players present in a virtual representation of the same city.

Reference: http://www.blasttheory.co.uk/bt/work_cysmn.html

Appendix II – Game-Pattern Matrix

Core gameplay characteristics

		Transgame game-element selectable setup												game element trading		persistant gameworld
		Collaborative Action														
		Ultragame Ultrasource Negotion.														
		Social Lubricant														
		Unmediated Social Interaction														
		Async Multiplay														
		Multiplayer														
		Aug. Reality														
		Hybrid Space														
		Adhoc Infrastructre														
		Extra-game information														
	SUM															
Boktai	39	1	1			1						?				
Donkey Kong - Game & Watch	23		1													
Snake	19		1			1										
Wario ware	16		1													
Pokémon Sapphire	44		1					1	1				1	1		
Super Mario Advance	28															
4 Swords (Zelda)	41		1			1		1			1					
Advance Wars	30		1			1		1		f						
Tamagochi	16															
BlackJack	9															
IR PONG	13															
Prince of Persia SOT	15															
Splinter Cell	19															
Barcode Battler	22	1	1			1		?	1				1	1		
Red Faction	34		1			1										
Killervirus	22		1		1											
Harry Potter - GBA Fänge på Azkaban	29		1													
Dance Dance Revolution	35		1		1	1			1			1				
Supafly?	30		0			1			1			?			1	
Mogi	34				1	1	1								1	
Botfighters	46				1	1	1								1	
Ghost Recon	31					?		?								
Laser Dome	22															
Tim's world	44		1		1	1		1	1	1			1	1		
Pacman must die	43		1			1		1	1	1						
PP: storyteller	16						1	1	1			1				
PP: colorado	5															
PP: mosaic	9						1		1			1				
MyTHeme	22		1		1	1		1	1							
Human Pacman	29				1	1									1	
Backseat Gaming	31	1		1						f						
Uncle Roy	40	?	0	1		1	1	?								
I Like Frank	40	?		1		1	1	?								
Treasure Machine	22															
Pacmanhattan	37				1	1										
AR-Quake	55			1	1											
Geocaching	38					1	1						1	1	1	
Pervasive Clue	25				1	1		1	1							
Can U see me now?	33	1		1		1						?				
Sum	1102	4	15	5	10	20	7	8	10	2	4	4	4	4	5	

Core gameplay characteristics

Core gameplay characteristics	Extra-game geographical knowledge advantage											
	Chase games			Self-facilitated games			Diligence			Narrativity		
	Social Skills			RW Exploration			Endurance			Stamina		
	IQ			Eyehand Coordination			Resource			Resources		
	Quick games											
Boktai	f	1		1	1					1		
Donkey Kong - Game & Watch	1			1								
Snake	1			1								
Wario ware	1			1		f						
Pokémon Sapphire						1						
Super Mario Advance												
4 Swords (Zelda)				1	1					1		
Advance Wars		1			1					1		
Tamagochi												
BlackJack												
IR PONG												
Prince of Persia SOT												
Splinter Cell												
Barcode Battler	1											
Red Faction		1		1						1		
Killervirus	1			1				1				
Harry Potter - GBA Fänge på Azkaban		1		1	1					1		
Dance Dance Revolution	1			1		1						
Supafly?		1				1				1		
Mogi	f					1		1		1		1
Botfighters			1			1	1	1		1		1
Ghost Recon				1						1		
Laser Dome												
Tim's world	1	1	1									
Pacman must die	1			1							1	
PP: storyteller												
PP: colorado												
PP: mosaic												
MyTHeme					1						1	
Human Pacman						1					1	
Backseat Gaming	f	?	1	1				f		1	f	
Uncle Roy			1		?			1		1		1
I Like Frank			1		?			1		1		1
Treasure Machine												
Pacmanhattan						1					1	
AR-Quake		1				1		1				1
Geocaching	1					1		1		1		1
Pervasive Clue					1			1	1			
Can U see me now?	1										1	1
Sum	10	7	5	12	6	7	3	8	1	8	5	4

	Core gameplay characteristics					Existing game design patterns										
	Extra game future knowledge advantage	Luck	orthogonal gameplay experience	Resource Generator	Resource locations	Chargers	Movable tiles	tiles	levels	inaccessible areas	Clues	helpers		Enemies	Pick-ups	Power-ups
Boktai	1			1	1	1	1	1	1	1	1	1		1	1	1
Donkey Kong - Game & Watch														1		
Snake															1	
Wario ware											1					
Pokémon Saphire							1	1	1	1	1	1		1	1	1
Super Mario Advance							1	1	1					1	1	1
4 Swords (Zelda)							1	1	1	1	1	1		1	1	1
Advance Wars								1	1			1		1		
Tamagochi																
BlackJack																
IR PONG																
Prince of Persia SOT									1		1			1		
Splinter Cell									1					1		
Barcode Battler		1												1		
Red Faction				1					1					1		
Killervirus														1		
Harry Potter - GBA Fånge på Azkaban									1		1	1			1	
Dance Dance Revolution																
Supafly?																
Mogi															1	
Botfighters	1	?												1		
Ghost Recon									1					1	1	
Laser Dome														1		
Tim's world					1									1		
Pacman must die														1	1	1
PP: storyteller																
PP: colorado																
PP: mosaic																
MyTHeme																
Human Pacman														1	1	1
Backseat Gaming					1						1			1	1	
Uncle Roy			1		1						1	1			1	
I Like Frank			1		1						1	1			1	
Treasure Machine											1					
Pacmanhattan					1											
AR-Quake				1					1					1	1	1
Geocaching			1								1				1	
Pervasive Clue											1					
Can U see me now?			1								1			1		
Sum	2	1		3	6	1	4	5	11	3	12	7		21	15	8

Existing game design patterns

	Boss Monster	Buttons	Extra game information	Score	highscore list	Trace	Resource locations	Chargers	Strategic locations	Safe havens	Obstacles	Card hand	Drawing stack	Cards	Alarm	Exploration
Boktai	1	1														1
Donkey Kong - Game & Watch				1	1					1	1					
Snake				1	1											
Wario ware																
Pokémon Sapphire	1									1	1					1
Super Mario Advance	1			1						1	1					
4 Swords (Zelda)	1	1		1						1						1
Advance Wars				1	1		1		1		1					
Tamagochi																
BlackJack																
IR PONG				1												
Prince of Persia SOT		1														
Splinter Cell			1								1					
Barcode Battler																
Red Faction				1	1						1					1
Killervirus				1	1										1	
Harry Potter - GBA Fänge på Azkaban	1										1					1
Dance Dance Revolution		1		1	1											
Supafly?																
Mogi				1	1						1					
Botfighters				1	1	F			1	1	1					
Ghost Recon									1		1					1
Laser Dome				1	1			1	1						1	
Tim's world				1	1									1		
Pacman must die			1	1	1							1	1	1		
PP: storyteller																
PP: colorado																
PP: mosaic																
MyTHeme				1								1	1	1		
Human Pacman				1												
Backseat Gaming				?												1
Uncle Roy											1					1
I Like Frank											1					1
Treasure Machine				1	1											1
Pacmanhattan				1	1	F										
AR-Quake	1	1		1	1				1	1	1					1
Geocaching						1										1
Pervasive Clue						1	1									
Can U see me now?				1	1					1						
Sum	6	5	2	20	15	2	2	1	5	7	13	2	2	3	2	12

Existing game design patterns

	Stealth	Delivery	Eliminate	Conceal	Chase	Gain competence	Survive	Evade	Gain Information	Gain ownership	Collection	Traverse	Configuration	All	Preddefined goals	Optional goals
Boktai	1	1													1	1
Donkey Kong - Game & Watch							1	1							1	
Snake										1					1	
Wario ware						1					1			1	1	
Pokémon Saphire			1			1				1	1				1	1
Super Mario Advance												1			1	
4 Swords (Zelda)			1												1	
Advance Wars			1												1	
Tamagochi															1	1
BlackJack													1		1	
IR PONG			1												1	
Prince of Persia SOT			1				1					1			1	
Splinter Cell	1		1												1	
Barcode Battler			1												1	
Red Faction			1				1	1							1	
Killervirus			1				1								1	
Harry Potter - GBA Fånge på Azkaban		1					1								1	
Dance Dance Revolution						1	1		1						1	
Supafly?															1	
Mogi										1	1				1	
Botfighters	1		1		1	1		1							1	
Ghost Recon	1		1			1	1	1							1	
Laser Dome	1		1					1							1	
Tim's world			1				1				1				1	
Pacman must die					1		1	1			1				1	
PP: storyteller															1	
PP: colorado															1	
PP: mosaic															1	
MyTHeme																
Human Pacman					1			1		1	1				1	
Backseat Gaming															1	
Uncle Roy									1				1		1	
I Like Frank									1				1		1	
Treasure Machine									1	1					1	
Pacmanhattan			1		1			1			1				1	
AR-Quake			1			1	1	1							1	1
Geocaching				1						1					1	
Pervasive Clue															1	
Can U see me now?															1	
Sum	5	2	15	1	5	6	10	10	4	6	7	4	1	1	38	4

Existing game design patterns

	Existing game design patterns															

Existing game design patterns																	
	Gameplay							Social interaction									
	Experimenting	Downtime	Camping	Combat	Movement	assymetrical abilities	Collecting	Reality link	Chat forum	Player-player proximity	Player-artifcat proximity	Social reward	Physical navigation	Extra game consequences	Meta game	Extra-game action	Common experience
Boktai								1									
Donkey Kong - Game & Watch					1											1	
Snake					1		1									1	
Wario ware	1																
Pokémon Saphire	1				1	1	1	1									
Super Mario Advance					1	1		1									
4 Swords (Zelda)					1	1		1								1	
Advance Wars					1	1	1										
Tamagochi	1								1								
BlackJack																	
IR PONG						1											
Prince of Persia SOT					1	1											
Splinter Cell					1	1											
Barcode Battler	1				1					1							
Red Faction			1		1												
Killervirus					1				1				1			1	
Harry Potter - GBA Fånge på Azkaban																	
Dance Dance Revolution						1			1							1	
Supafly?									1	1		1				1	1
Mogi						1		1				1				1	
Botfighters					1	1	1		1	1	1		1				?
Ghost Recon					1												
Laser Dome			1	1	1	1										1	
Tim's world	1				1		1		1	1		1				1	1
Pacman must die						1		1		1				1			
PP: storyteller									1								
PP: colorado																	
PP: mosaic																	
MyTHeme	1																
Human Pacman						1			1		1			1			
Backseat Gaming			1			1		1						1			
Uncle Roy						1	1		1			1		1			1
I Like Frank						1	1		1			1		1			1
Treasure Machine						1		1	1			1		1		1	
Pacmanhattan						1	1	1	1	1				1			
AR-Quake			1			1			1		1			1			
Geocaching						1		1	1		1			1			
Pervasive Clue						1			1								1
Can U see me now?						1			1					1		1	
Sum	6	2	3	16	22	7	11	18	4	6	5	2	12	1	11	5	

				Possibility of disinformation	Player killing	Trading	Collaboration	Dynamic alliances	Ganging up	Two player game	Team play	smooth learning curve	Replayability	varied game play	Third-person view	Communication channel	First person view			
Boktai												1				1				
Donkey Kong - Game & Watch												1				1				
Snake																1				
Wario ware		1																		
Pokémon Saphire	?	1				1						1	1			1				
Super Mario Advance												1				1				
4 Swords (Zelda)				1						1	1					1				
Advance Wars				1								1	1			1				
Tamagochi	1													1						
BlackJack										1				1						
IR PONG				1						1						1				
Prince of Persia SOT												1			1	1				
Splinter Cell							1			1	1					1				
Barcode Battler										1				1						
Red Faction				1		1			1		1								1	
Killervirus																			1	
Harry Potter - GBA Fänge på Azkaban												1			1	1				
Dance Dance Revolution	1									1		1								
Supafly?				1	?				1				1						?	
Mogi	1																			
Botfighters				1						1										
Ghost Recon				1				1												
Laser Dome						1					1									1
Tim's world				1						1						1				
Pacman must die				1					1											
PP: storyteller		1		1					1							1				
PP: colorado																1				
PP: mosaic																1				
MyTHeme				1												1				
Human Pacman				1						1										
Backseat Gaming		1						1												
Uncle Roy		1							?							1				1
I Like Frank		1							?							1				
Treasure Machine		1																		
Pacmanhattan		1									1									1
AR-Quake		1				1				1										1
Geocaching						1														
Pervasive Clue		1				1				1						1				
Can U see me now?		1				1	?													
Sum		12	2	16	2	5	4	5	5</											

Existing game design patterns																	
	Imperfected information	Existing game design patterns															
		Timing	Rhythm-based action	Puzzle solving	Strategic knowledge	Advantage of memorization	Game mastery	All	Real time games	Persistent game	Pervasive games	constant player activity	Late-arriving players	Dedicated game facilitator	Show must go on	Quick Games	Saving
Boktai									1	1							
Donkey Kong - Game & Watch		1				1	1		1			1			1		
Snake									1						1		
Wario ware						1	1	1								1	
Pokémon Saphire																	
Super Mario Advance						1	1		1			1			1		
4 Swords (Zelda)						1			1			1			1		
Advance Wars	?																
Tamagochi	1								1	1							
BlackJack						1										1	
IR PONG		1							1			1			1	1	
Prince of Persia SOT									1								
Splinter Cell				1					1						1		
Barcode Battler																	
Red Faction	1				1		1		1			1			1		
Killervirus									1			1					
Harry Potter - GBA Fänge på Azkaban	1			1		1			1			1				1	
Dance Dance Revolution		1	1			1	1		1			1			1		
Supafly?										1	1		1	1			
Mogi									1	1	1		1		1		
Botfighters									1	1	1		1		1		
Ghost Recon	1	1					1		1		1		1		1		
Laser Dome					1				1			1			1		
Tim's world						1							1			1	
Pacman must die	1								1			1			1		
PP: storyteller													1				
PP: colorado									1		1		1				
PP: mosaic													1				
MyTHeme																	
Human Pacman									1			1			1		
Backseat Gaming	1	1							1		1				1		
Uncle Roy	1			?		1			1		1	1		1	1		
I Like Frank	1			?		1			1		1	1		1	1		
Treasure Machine				1						1					1		
Pacmanhattan									1			1					
AR-Quake	1	1			1		1		1		1	1	1		1		
Geocaching	1								1	1			1		1		
Pervasive Clue	1								1	1							
Can U see me now?	1				1				1		1	1					
Sum	12	6	1	3	4	10	7	1	28	8	9	17	9	3	22	5	1

Existing game design patterns

	Spatial Immersion	Emotional Immersion	Cognitive Immersion	Psychological Immersion	Virtual Immersion	Non-virtual Immersion
Boktai			1			
Donkey Kong - Game & Watch			1			
Snake	1		1		1	
Wario ware			1			
Pokémon Saphire		1	1		1	
Super Mario Advance						
4 Swords (Zelda)		1	1		1	
Advance Wars			1			
Tamagochi		1	1		1	
BlackJack						
IR PONG						
Prince of Persia SOT						
Splinter Cell						
Barcode Battler		1				1
Red Faction	1				1	
Killervirus	1					1
Harry Potter - GBA Fånge på Azkaban		1	1		1	
Dance Dance Revolution	?	1				1
Supafly?		1			1	
Mogi	1					1
Botfighters	1	1				1
Ghost Recon	1	1			1	
Laser Dome						
Tim's world		1				1
Pacman must die	1				1	1
PP: storyteller						
PP: colorado						
PP: mosaic						
MyTHeme		1	1		1	
Human Pacman	1					1
Backseat Gaming	1					1
Uncle Roy	1	1		1	1	1
I Like Frank	1	1		1	1	1
Treasure Machine						
Pacmanhattan	1					1
AR-Quake	1	1			1	1
Geocaching	1					1
Pervasive Clue			1			
Can U see me now?	1		1		1	
Sum	15	14	12	2	14	14