

# A Case Study in Pervasive Game Design: The Songs of North

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## ABSTRACT

Pervasive games are new type of digital games, which combine game reality and physical reality within the gameplay. This novel game type presents new kinds of research and design challenges. In this paper we describe a location aware mixed reality game called *The Songs of North*, which was designed to demonstrate possible technical and game design solutions for pervasive games. We gathered the players' input as early as possible, and therefore did first a scenario study on gameplay. Its results were then formulated as requirements for design. One of the main findings was that utilizing user requirements and overcoming technical limitations in actual design process is a hard challenge and requires creativity.

## Author Keywords

Game Design, Pervasive Games, Mobile Games

## ACM Classification Keywords

H5.2. User Interfaces. Prototyping

## INTRODUCTION

The goal of research project *Wireless Gaming Solutions for Future* (MOGAME) in Hypermedia Laboratory of University of Tampere is to develop a prototype of a persistent multiplayer game for mobile terminals. Focus of the research is in game concepts that take advantage of characteristic attributes of mobile terminals such as their communication possibilities and their usability in varied contexts (e.g. in different locations).

Implemented prototype can be seen as a detailed hypothesis to the research questions of the MOGAME project: the feasibility of a mobile persistent game world, game design that supports communication and player community

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formation, and the study of the revenue models that combine entertainment games and lottery games. Hypothesis implemented as a prototype has obvious advantages: it can be tested and evaluated with players. We have used this *prototype as hypothesis* approach also in an earlier study, which was about integration of dramatic narrative (television series) and game for interactive television (see [1]). In that study, the requirements were collected e.g. from the literature of television usage.

Similar process is used in the MOGAME project. Instead of using only literature to formulate requirements we used a scenario-based player study (we refer to this study as *player study* later in this paper) as the major source of requirements for the game design [2]. Such requirements included, for example, support for team play and alliance forming, securing the player anonymity, and integration of all game elements (including interaction with the game device) into the game. Naturally the player study is not the only source of requirements: they also come from the research plan where they were adopted as starting points to provide an interesting and challenging research question with relevance to ongoing development. Some requirements were also related to technical limitations and possibilities of a mobile terminal. In the next chapters we will describe the prototype and the reasons behind the adopted design solutions and how different requirements are exploited in the design.

## PHYSICAL AND SPIRIT WORLD MAPPED ON TOP OF EACH OTHER

The game is called *The Songs of North* (SoN), and takes place in present time and a mixed semi-fantastic reality, where elder gods of the Finnish pantheon contact the player. The player is given the role of a shaman, who can contact the spirit world forgotten by most people through a shaman drum (i.e., the game device). This spirit world is invisible, but the player is able to hear sounds originating from there, and she can see bones on the skin of her drum representing things in the spirit world: other spirits, places of importance and items all have their own bones. The main game interface therefore consists of the drum. By drumming (selecting key combinations from the numeric keypad) the player is able to act in the game world. This inspired the game design team to use visuals of a 2D

shaman drum seen from above, bones, and background imagery that would further strengthen the gaming experience (see figure 1). It was decided to show the drum interface from above, instead of using perspective. The reason for this is that the drum acts also as a map, and should be able to be projected over a real map of, say, the city of Tampere or, more precisely, to give tools for the player to play a game by moving in the physical world based on a situation in the game.



Figure 1: Game interface.

Player that is logged in moves in (fictional) game world by moving in the (real) physical world. Spirit world entities are mapped over the physical world. Thus spirit world and physical world together produce a mixed world where physical entities and spirit entities can interact, when a player is actually logged in the game. It should be noted that the game is possible to play without logging in, like any other persistent game: this happens for example when two players meet in the physical world or send an SMS or phone to each other. Figure 2 shows how the game spirit world and physical world come together. At the level of the physical world there are two players. The player on the left side is logged in the game and the player on the right side is not logged in but is discussing with some other player. The player on the left is able to perceive the two items nearby in the spirit world and interact with them by using spells (game terminal).

For the world of our game the aim was to have something distinctive, yet familiar to work with. We came up with the idea of a spirit world and spells or chants as a form of communicating with it. The objective was to create a concept that might appeal to people who are not hard-core computer and console players. For this reason we chose *Kalevala*<sup>1</sup> and northern myths as a theme for the game.

### GAME DYNAMICS AND MECHANICS

One major requirement derived from the research plan is the requirement of a persistent game world. Based on a study made by Järvinen, Heliö and Mäyrä, persistence of the game world and game identities were deemed to be favorable for community forming [3]. Social construction of significance relies on communication, and may lead

under the right circumstances to community creation (see e.g. [7]). Persistent game world is one way to support the creation of persistent social networks.

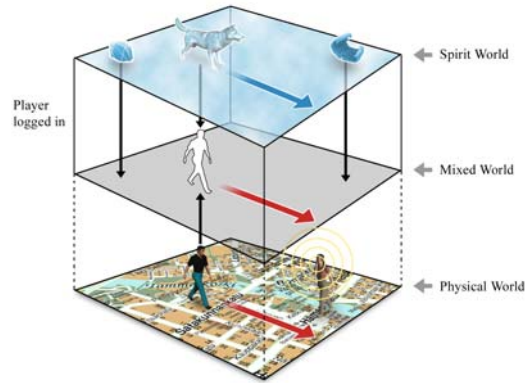


Figure 2: Physical world and spirit world.

### Persistent Game World

Persistence as such is not difficult to implement in a game, since a game without a pause or ending is persistent by definition. Persistence is a quality of actual life and the physical world, and games with persistent nature are more life-like. When designing a persistent game, one possible approach is to make a totally separated game world that does not have any actual connection to the physical world. A basic MUD is an example of a separate dimension that mostly exists without direct links to physical world. An opposite approach is to connect the physical environment to the game using information or context gathered from the physical environment. Thus the nature of persistence is closely related to the nature of ubiquitous as understood in the ubiquitous computing research field. The research into the design of pervasive games as we approached it in this project involves related, but different questions of integration and mixing of media technologies with physical environment.

Because we decided to use the mythical spirit world as a setting, we needed quest structures that are linked thematically to the background material of the game, to create meaning and motivation. However, no matter how sophisticated the back-story would be, the game would still remain shallow and uninteresting to play without well functioning game mechanics. The persistent world was one of the main research issues, explored as a means to support the need for players to return to the game world. So we utilized quests as ongoing motivating structures that would create the meaningful context for the game [6]. We created quests that are playable and solvable by one player and also quests that require the co-operation of several players. Most of the quests are combinations of these two types. The main point is that for the players a more efficient, faster and maybe more interesting way to solve quests will be to solve them together. Completing some of the quests required several players with different skills.

<sup>1</sup> Kalevala stories/poems are collected from the Carelia area and edited by Elias Lönnrot in the early 19<sup>th</sup> century.

The spirit world, conducted by the game server, is always running and ready to interact with players. The spirit world allows maintaining a collection of game rules and mechanics over the physical environment. While the player as a physical creature is controlled by the natural rules of the physical world, the player's extension, the spirit, is controlled by spirit world rules. The spirit world and its physical counterpart thus share time and space. However, the difference in the level of persistence between these parallel game environments is in the fact that a player has the choice to disappear temporarily only from the spirit world. To disappear from the spirit world a player just needs to turn the game client off. The integration of the physical and virtual environment into a coherent game world is not a trivial problem. Defining the spirit world to be invisible is helpful, as a player does not need to use her imagination to fill in any objects to physical world. The setting of SoN is our actual physical world augmented with the spirit world.

### **Supporting Communication**

Support and motivation for communication is also a major requirement for the design, based on the preference on social networks and socially constructed significance mentioned earlier. When we designed collaborative and communicational aspects for SoN, the aim was to make sure that players, who communicate and form groups or guilds, benefit from collaboration. However, the purpose was not to make explicit mechanisms that would force players to communicate. On the contrary, it was clear for us that the game mechanics and rules should implicitly support communication and collaboration by showing that players can achieve more and have more fun when helping each other.

For example, when designing different player roles and quests that require diverse skills we are also supporting communication and collaboration. Johan Larson and Johan Skårman have noted in their master's thesis study that games that require collaboration encourage players to talk with each other. The games studied by them used design patterns called multiple keys, shared screen and guide-and-follow. [4]. Even though their results can't be generalized as such, we see that their study implies more generic structures than could be used in the same role. For example, the guide-and-follow pattern is about unevenly distributed information forcing players to combine their knowledge in order to progress in a game. The comments of players about communication or usage of communication in the *Footprints of Power* (about the game see e.g. [1]) seems to imply that a common enemy, like a player in the lead, would encourage players to form alliances in order to take down the common enemy. Players also started to use information that was only available to him/her, for trading with other players.

Making a contract, in general, requires negotiating the terms of the contract and therefore requires communication.

More generally, team playing motivates communication between players joined together in the same team. In the game, teams can be formed (temporarily or more permanently) to reach the quest objective, whether this happens in order to conquer a common enemy or to discover unknown territory and find valuables. Quests, therefore, need to be designed so that they cannot be solved or are hard to solve just by one player. By designing rich quests players are encouraged to collaborate and communicate, but the game must also support ways of communication. Naturally players can communicate in the physical environment face-to-face or by using all the media available. Additionally, the SoN game service itself offers a simple textual communication tool for players to send inexpensive textual messages to other players. In addition to more complex forms of team playing, also simpler contracts that require communication are included in the game: trading and teaching. Trading requires negotiation between players: at least what to trade and for what price has to be agreed upon. Teaching requires the teacher to choose what to teach and to who. Thus negotiation between a teacher and a student is required to start a teacher-student relationship. These structures also relate to requirements for a possibility for team playing, derived from the player study.

### **The Design of Input/Output**

The informants of the player study seemed to consider mobile games as hard to use, or playing with mobile devices was considered meaningless button pushing. When designing a game based on a small handheld device it was therefore important to consider the role of it as an input/output device. In the early stages of the design, the aim was already to integrate the device into the game concept in such a way that would prevent the 'videogame syndrome' that emphasizes the role of a display and pushing buttons.

Our solution while addressing this was to use a player's location as a game element. Since the virtual and physical environments are mapped spatially on each other, the game motivates players to move physically. Objects in the spirit world can be reached by moving in the physical environment. Although spells can be used to execute long-range actions, spells with a target at shorter distances are cheaper in terms of spiritual power consumption. In the end, it is the player's choice to consider her preference and the trade off between spiritual and physical power consumption, or spell casting and moving, respectively. In addition to spell casting, moving supports efficient collaboration since players can meet physically and talk. It is quite easy to see that a group of players moving together can be a powerful unit to solve quests. However, requirement for physical movement might turn out to be a factor that expels current hard-core gamers – but it can also attract others.

Another design solution in tackling this requirement was to use the drum metaphor as a command interface: a player

affects the spirit world by casting spells by drumming (selecting predefined button combinations). This kind of solution was used in the successful adventure game *Loom* (1990). (For more details about *Loom*, see [5].) In that game, players needed to learn tones and reproduce them in the game to solve problems. This kind of approach requires that the game will teach players to play it.

Our player study stressed the requirement of player control. This requirement seems to have even more importance in a mixed media multiplayer game than in online multiplayer games. In SoN the player can choose when to play; there is no penalty for not being present in the spirit world: a player's spirit is not vulnerable to the actions of other players' spirits when their players are absent from the spirit world. However, it is possible to continue playing even though the player/character is not present in the spirit world, by communicating with other players/characters. The distinction between in-game and off-game is problematic since the physical environment is always a potential game arena. However, those actions that affect the game mechanics are made only in the spirit world, so that players can choose whether their counterpart in the spirit world is active and visible or not. There is no straight link between a player and her counterpart in the spirit world. A player has a choice to arrange a meeting with other player(s) in the physical environment and explicitly uncover her physical identity. For a player who does not want to be revealed, the game supported messaging tool is available. Also, the location-sensing system supported by the game is based on slight inaccuracy and ambiguity and therefore it also supports anonymity. Players can track other players, locations and other game objects in the spirit world only with some fuzziness.

As seen in this chapter, a theme is an important tool to justify and unify the design. Seamless integration of each element in the game was considered to be important in the player study. This has been an important design requirement in our work. Each game element is designed to have relation to the theme and the background story of the game.

## CONCLUSIONS

Traditionally, the choices made during a game design process are often based on intuition, the models set by successful earlier games and on designers' experience. In contrast, in this game research project the aim was to get players involved in the game design at as an early stage as possible. Our first solution was to use a player study to gather information on people's attitudes and expectations towards possible mobile game solutions. The results were then formulated as requirements for design. One of the key observations has been that systematic utilization of these kind of requirements in actual design is a challenging process which also requires much creativity. Our second step was iterative game design process involving real players as informants during the evaluation phase.

Thorough and systematic evaluation of design is important in this kind of research, and is being conducted during the later phases of the project.

An important and problematic aspect in the evaluation phase is the interpretation of results: are possible issues related to some weakness in prototype design, concept design or in the requirements harvested in the player study. For example, in the earlier *Footprints of Power* research, a problem in first prototype made it really difficult to make any solid claims about how the design (and hypothesis) worked in certain areas. The results only seem to imply that ideas behind the design were good, but there were problems in the implementation. Fortunately, it was easy to correct problems after some testing and do the second testing after that. Thus the first testing served as a reference point and made it possible to see how the changed aspects affected the gaming experience. [1]. This time, we will consciously approach the first implementation as a reference point test, and aim to reiterate the design on the basis of repeated design-testing cycles. In conclusion, combination of systematic research work and game design is not a trivial task. The empirical test results can in many cases only be derived when a prototype or a game already exists. Science and art can co-exist but they have to be approached simultaneously and they must be carefully coordinated together.

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