Designing Cross Media Games

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ABSTRACT

Cross media games focus on a wide variety of gaming devices including traditional media channels, game consoles as well as mobile and pervasive computing technology to allow for a broad variety of game experiences.

This paper introduces cross media games. It addresses challenges of cross media games and points out game design, technical, commercial and ethical aspects. A gaming scenario illustrates cross media specific game elements and game mechanics. Initial results gained in a paper-based version of the gaming scenario are presented. The paper concludes with an outlook.

Categories and Subject Descriptors

J.7 [**Computer applications**]: Computers in other systems – *consumer products, real-time.*

General Terms

Design, Human Factors.

Keywords

Pervasive Gaming, Cross Media Gaming, Cross Media Devices

1. INTRODUCTION

Pervasive games focus on a game play that is embedded in our physical world. Elements of the physical world are inherent parts of the game. Their characteristics and states are sensed and influence the course of the game. Additionally, pervasive games allow for a game that can be potentially accessed at any time and from any location. A variety of pervasive games have already been implemented [Flintham et al., 2003; Thomas et al., 2000]. Many of them rely on mobile and pervasive computing

technology, such as cellular phones and location sensors and focus on location-based aspects.

Cross media games are a form of pervasive gaming. They focus on games that are played across different devices and media channels and that employ a wide variety of gaming devices and media channels in the game play, including state-of-the-art mobile and stationary computing devices as well as more traditional communication and information channels such as television broadcast or print media.

Cross media games open the possibility to explore how human activity takes place in these kinds of mixed reality environments. This requires an extension of concepts for social presence [Short et al., 1976] to suit the cross media mixed reality player interactions. Cross media game activities in the physical environment may interfere with everyday activities and thus may be considered within the schema games as cultural environments [Salen and Zimmerman, 2004].

This paper is structured as follows. Section 2 highlights the challenges for designing and realizing cross media games. Section 3 describes a cross media gaming scenario and Section 4 summarizes results of initial experiments with a particular cross media game. Section 5 concludes this paper and gives an outlook.

2. CHALLENGES OF CROSS MEDIA GAMES

This section describes the challenges for realizing cross media games with respect to game design, technical realization and ethical and commercial aspects.

2.1 Game Design Aspects

In a cross media game, the different gaming devices and media channels associate different forms of game play within the game. A desktop PC is more suitable to gain an overview of the game space whereas a mobile phone with a rather limited display size could be used to indicate interesting game artifacts in the player's proximity. The functionality of different devices in a cross media game should reflect the different affordances devices imply. E.g. a dog robot in a game may imply that you can pet it or that you can talk to it.

Pervasive games integrate aspects and characteristics of the physical world into the game play. By influencing aspects of the physical world, e.g. by turning on the electric heating in a room, a

player could directly interact with a game and the turning knob of the heating becomes a kind of gaming device, so called physical gaming artifact. Physical gaming artifacts offer a new quality of interaction and should be considered when designing cross media games.

From a game design perspective it is important that the gaming experiences players have with different devices should be somehow balanced. It is important to make a conscious decision about the benefits and pleasures afforded by the devices with respect to game play. Another interesting aspect is to design a game that encourages players to switch devices during a game session. Based on the current situation of a player, a certain functionality could be required that is only available on a special device.

To incorporate a wide variety of devices and media channels devices attracting a mass audience need to be considered. Some devices and media channels don't offer a back channel and are therefore more suitable for observing the game. Some devices could be used as voting tools, whereas others allow for realizing a broad functionality and a rather immersive game experience. Some basic forms of participation that can be derived from the different types of devices and media channels are: observing the game, influencing the course of the game, occasionally participating in the game and actually playing the game. A cross media game should support at the least some of these participation types.

As a pervasive game, a cross media game does neither take place purely in the physical world nor purely in the virtual world. Based on the gaming devices, different combinations of physical presence and virtual experience are supported within a cross media game. Devices that are rather stationary such as public displays or game consoles imply a game experience that is more focused on the virtual aspects of the game, whereas mobile devices such as mobile phones stress the physical presence of the player. The game design of a cross media game needs to make conscious decisions on the different types of game experiences it delivers.

2.2 Technical Aspects

Apart from the different forms of game play devices imply, there are some technical aspects that should be considered.

In order to communicate between the different devices at least some kind of common platform protocol has to be used or a platform independent framework or game engine, which reduces the implementation time of the different parts of the game. However, this is of course true for all games that have to run on different platforms.

For the technical realization of cross media games two different device-related aspects need to be considered: Platform-independent development on the one hand and abstraction of interaction devices on the other hand. Platform-independent development allows a straightforward porting of an application to a different computing platform. Abstraction models for interaction devices classify devices by their functionality to make similar devices exchangeable while still providing a specific interface for each device. E.g. a GPS tracker provides different values than a 3-DOF position tracker, namely two angles, a height and a velocity, while the 3-DOF position tracker provides x, y and z coordinates. Although some applications might want to use the different values

of the GPS tracker, other applications would like to use the GPS and the 3-DOF tracker, e.g. for indoor and outdoor tracking. In order to prevent additional code within the application for both tracker types, the device abstraction model handles the differences between these trackers and provides both through the same interface.

In addition, due to the mobility aspect of pervasive games, one cannot rely on constant communication between the devices and the game server. Regardless of the network being used, whether it is GPRS, 3G or WiFi, none has a perfect coverage of a larger area. When designing a pervasive game in general and a cross media game in particular, it is important to consider disconnectivity and other technical limitations and to incorporate them into the design. Some games, e.g. *Can You See Me Now?*[1], even exploit the fact that players can be disconnected.

2.3 Commercial and Ethical Aspects

When designing a cross media game designers should be aware of a number of ethical and commercial aspects to be able to make conscious decisions on the game design. Since being aware does not mean avoiding such aspects, these aspects still can play a very significant role in the game design. This section lists some ethical and commercial aspects. The authors are aware of the fact that some of the commercial aspects are in contrast to ethical aspects of cross media games, but none of the aspects are judged in this paper.

Due to the focus of cross media games on rather technical aspects such games are well suited to promote new devices. If the game can only be played on proprietary devices users have to buy them to play the game. This concept is not new to cross media games, but has been exploited by almost all game console manufacturers. The unique chance of this type of games is the possibility to promote several devices, e.g. a smart phone, a mobile game console and a PDA. Thus cross media games are attractive under a commercial perspective. However, under an ethical perspective the costs of the equipment may disadvantage players that have limited financial resources (see below).

Many pervasive games make heavy use of the location of players [Benford et al., 2002; Lindt and Broll, 2004; Mansley et al., 2004]. For a technician or a game designer this is a very interesting feature, which should be exploited, but a lot of people possibly do not want to expose their positions all the time. They may feel scared about the fact that the game always follows their steps. Some games even drag their players into the game when they are at a certain location, e.g. a device of a player could recognize other players within its proximity to start a competition. Of course, such functionality can be very exciting for players, but on the other hand, the game must provide mechanisms to let the players decide at what times they are willing to play the game.

If players are able to decide how much time they want to commit to the game, the design usually rewards longer playing times to keep players in the game. In contrast to this, the disadvantage for not spending a large amount of time should not be too big in order to maximize participation. The difficulty hereby is to find a good balance so that the game does not get boring. This balance is recommended both from an ethical and from a commercial perspective and requires not disadvantaging players with a low

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[1] http://www.canyouseemenow.co.uk/

temporal budget and makes thus the game attractive to a wide audience of players.

The localization of players and the use of media streams within the game can also be used for commercial reasons, e.g. for advertisement. A player who has to watch e.g. a television show for a clue in the game would not switch to another channel during the commercial break, or if a store or a restaurant is part of the game, players can be directed to go there to proceed in the game.

Especially in cross media games, the financial situation of players might give players an advantage over others, since they are able to buy more sophisticated devices. Therefore the roles and the functionality of the devices within the game have to be again fine balanced. Although one of the commercial aspects is to launch a new device by making the game impossible to play without it, this aspect is in contrast to the ethical aspect of letting players participate in the game independently of their financial situation.

Apart from the devices within the game, the financial situation might also be important when traveling is part of the game play. A game taking place in a number of cities, e.g., has to expose the meaning of the different cities and what can be achieved in any of them. Such a game scenario can allow and reward players who form groups to solve the game; otherwise players who cannot afford to travel are overly handicapped.

If a game uses a range of expensive equipment, which most of the players will not be able to afford like in the following gaming scenario, where wearable computers, robots and head-worn AR displays are part of the game, the devices can be handed out to the players for an event. Such an event could be to solve a mystery during a cruising and the devices are provided by the cruising company. Another event could be a history game within a museum or an archeological site, where students use the devices to learn the history in the context of the game play.

In means of billing the players, cross media games do not differ from any other pervasive or massive multi-player online game. Anything from monthly-fees, single game licenses, or advertising is possible and depends on the focused consumer group and the game design.

3. A CROSS MEDIA GAMING SCENARIO

This section describes a cross media gaming scenario with its storyline, rules, game spaces and devices.

Storyline: The Epidemic Menace
"As epidemics become more and more powerful and threatening to humankind, scientists are busy calculating risks and developing remedies to cure them. A scientist at university Bonn has found a dangerous new virus that could have the potential to extinguish human life on the planet. He manages to model the virus and uses a computer program to simulate its mutation and evolution in order to find out its destructive potential. After studying the data he finds a lethal but inconspicuous mutation of the virus, which is transmitted from person to person, and builds it. A bitter colleague of the scientist from Berlin steals the hard drive of the computer containing the virus simulations. Inadvertently she contaminates the campus as she flees back to the capital. When she arrives at work, the contamination spreads to her own university. She is surprised by the virulence of the virus as it spreads faster and further with effects that could not be predicted. As she appreciates the scale of what she has done, she realizes

that she has infected herself with the virus and falls into a coma… The virus has to be destroyed before it manages to escape the two campuses."

Game Settings
The scenario takes place in the following game settings:

- The game will be played in secured environments (e.g. university campus).
- The game will be played indoors and outdoors.
- The game supports teams of players.
- The target group are undergraduate students.
- The game lasts for 3 to 7 days.

Game Rules
The overall goal of the game is to prevent the virus from escaping the campus, to extinguish all viruses instances and lead the high score list. The winners are the team that managed to extinguish the most virus instances and that leads the top score list. The game consists of several competing teams (min of 3 teams, max of 5 teams) and each team holds a minimum of 3 players.

Each team receives at the beginning of the game:

- 3 smart phones (one for each player)
- 1 PSP
- 1 AR system
- 3 joker cards for use with an AIBO
- 3 online accounts (one for each player)

Players can change devices or play modes anytime and can play on their own if they wish but have clear advantages through collaboration.

Gaming Devices
The gaming scenario allows for the following gaming devices:

Figure 1. Devices of the cross media gaming scenario.

Figure 1 shows some of the gaming devices that are relevant in the gaming scenario. The different gaming devices allow for

different forms of participation and imply different roles within the game. Players equipped with heads-up displays, for example, can see the virus in the physical game space and might directly fight the virus. Players sitting in front of a web interface on the other hand cannot directly fight the virus, but have an overview of the game area instead and can give advice to players in the physical game space.

Game Spaces

The game is played in a physical and a virtual game space and teams have to play in both spaces in order to extinguish the virus. The virtual game space will be a model of the physical game space and game appearance and game mechanics will be adapted in the physical and the virtual game space. An example is the virus appearing differently in the two spaces.

In the physical world the virus may appear as:
- Spatialized sound
- Textual information on viruses in proximity
- Environmental changes (e.g. trees change the color of their leaves)
- Overlaid 3D graphics on AR devices

And in the virtual world the virus may appear as:
- Sound
- Animated 2D and 3D graphics

4. INITIAL EXPERIMENTS

The complexity of the design constraints (see Section 2) make it necessary to set up an interactive design process where playability is evaluated in all phases of the design process, as recommended for social technical design [O'Day et al., 1996]. Therefore a paper mock-up [Ehn, 1988] of the first cross media game was setup and staged with participants of the IPerG project. The aim was to get player feedback on the virus concept and the two play modes (virtual and physical play mode).

As game board, a paper map was created from an intended physical location for the scenario described in Section 2 (see Figure 2). The game rules were simplified and a small program was developed to calculate the virus behavior. Both play modes were played out on the paper map but in separate rooms. Game masters synchronized the two game boards to show the calculated number of viruses on the respective fields.

The game began by telling the epidemic menace story to all players. The rules for the respective play modes were written on public paper boards and read out to the players. The virtual players could perceive all viruses across the game board but had rather weak virus attack power. The players in the physical world could "scan" viruses in adjacent fields only, but they could carry devices with different scan and attack power, i.e. they had paper descriptions of the game facilitation of a smart phone, a Portable PlayStation or an Augmented Reality system. During the game, players could communicate with team mates in the other room by sending SMS.
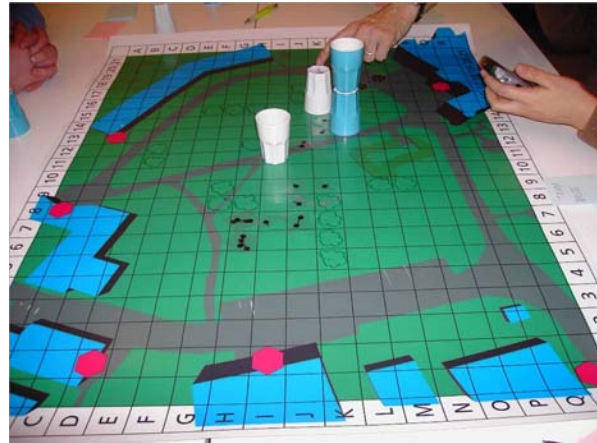

Figure 2. Game board used for the paper-based game.

The differences between virtual and physical play mode encouraged collaboration and communication – as intended. Via SMS the teams communicated and coordinated their actions; e.g. players told their team mates where they should go, where viruses were, and where they should extinguish viruses. A particular focus of the collaboration between players in the two realms was to make joint attacks on the virus and thus multiply the effectiveness of their weapons.

After a period of play, the pure extinction of the virus appeared to be a too simple as the only goal. The fun in the game increased when the players detected that another player was infected and left infected traces. Other and more complex interaction possibilities with the virus have been identified as game design goals for the next iteration of the game.

This experience with the paper mock-up gave a large number of valuable hints for the further design process.

5. RESUME AND OUTLOOK

We have shown that cross media games pose specific challenges and that different aspects need to be considered regarding game design and technical realization as well as commercial exploitation and ethical issues. A cross media gaming scenario has been explained and results of early paper-based experiments based on this scenario have been presented.

As part of the IPerG project we are currently designing and realizing a cross media game, which is based on the game scenario outlined before. After staging a first prototype by the end of the year, we will evaluate the game play and enter a new design cycle to consider more of the aspects mentioned in this paper. This will give us important insights into the relative importance of the different game design aspects.

6. ACKNOWLEDGMENTS

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