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# Orchestration and Direction of Mobile MR Games

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**Abstract**

Mobile Mixed Reality Games are embedded in the physical environment of a user and pose therefore new requirements on design, authoring, orchestration and direction of the game. New supporting tools are required to meet the challenges of such games and to create an exciting and coherent experience for the users.

In this paper we focus on the aspects of orchestration and direction of Mobile MR Games and how tools can support the developers and the people setting up such games. We highlight also the fact that supporting tools might become an important game element.

**Keywords**

Mixed Reality Games, Orchestration, Direction, Tools

**ACM Classification Keywords**

H.5.1 Multimedia Information Systems – Artificial, augmented, and virtual realities, Evaluation/methodology. K8.0 General-Games. K8.3 Management/Maintenance.

**Introduction**

In Mixed Reality (MR) environments the real world is superimposed by virtual objects, enhancing the user's

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ACM 1-xxxxxx

natural environment and allowing him to interact with them. Bringing MR into mobile pervasive games adds fascinating possibilities to the aspect of traditional computer games.

Since traditional computer games do not relate in any way on the environment in which they are played, no work has to be done to setup the game or adopt it to the local environment. Additionally, gamers are typically familiar with the standard gaming interaction devices. This is not the case in Mobile MR Games, thus the developers have to cope with new challenges. In particular, although the game design might be independent from the actual game environment – the real game area – game actions, items, events and virtual characters have to be closely integrated and require a strong relation to the current real environment. Additionally, the technology used for playing Mobile MR Games is in general new and mysterious for the players, therefore the game play typically has to be adapted to meet the requirements of the different user groups. Such pre-game configuration and setup is known as game orchestration and is an essential part of a Mobile MR Game. In case the Mobile MR Game has an event like character – where the players are equipped with special technology and the environment needs to be setup as well – it is also very crucial that such adaptations to the game play can be performed during a gaming session in order to influence the game play. In this paper we use the term direction for in game monitoring and adapting the game play.

In this paper we describe a set of tools helping the developer to meet the challenges of orchestration and direction for Mobile MR Games. Additionally we will

illustrate this upon two different games. Usage of these tools has not been limited to the game developers, but also became a part of the game itself and hence support the whole process chain of creating, authoring, orchestrating and directing for Mobile MR Games (see figure 1).

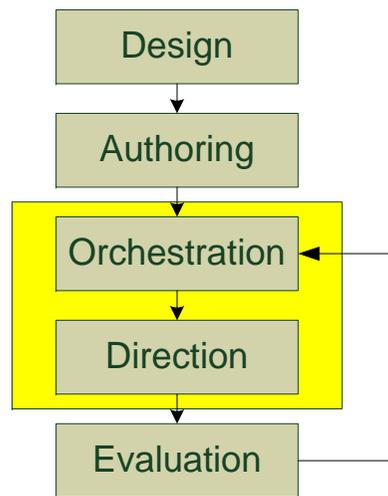
### Related Work

Although MR Games have been developed for a couple of years, there are a lot of examples where the game does not relate to the environment or it has been set up for a specific environment. An example for environment unrelated games is *ARQuake* [5] and *ARPacman* [3] for a fixed location game.



**figure 2.** The orchestration board of the game Epidemic Menace.

The mobile SMS game *Day of the Figurines* the staff managing and leading the game, used orchestration in order to manage and track the production of game play narratives during the game session. They state that



**figure 1.** The process chain of creating Mobile MR Games. It is an interactive process after the design and the authoring phase, the game play is tested and evaluated, afterwards, it is adapted again. (The focus of this paper is on orchestration and on direction.)

orchestration is inseparably intertwined with the game play [2].

Epidemic Menace [4], a cross media pervasive AR game, used orchestration tools for pre-game setup and in-game adaptations. In this game two teams have to fight a spreading viral menace. While the outdoor players have to fight the virus, the indoor players have the overview of the game and communicate that to the outdoor players.

A good overview about the technology challenges of pervasive augmented reality games is given by Broll et al. [1], where the different aspects are closely reviewed and solutions are presented.



**figure 3.** The Mobile Information Terminal of Timewarp. The map on the right shows the current location of the player and the screen on the left important game items.

### Game Orchestration and Direction

Game orchestration and direction are major issues for Mobile MR Games, since they allow for easy adaption of the game before and during the game session. Game orchestration deals with all aspects of configuring and setting up the game for a certain game session, while game direction deals with monitoring and adapting the

game session while it is played. In general all aspects of the game that are configurable can be adapted during the orchestration phase and those which can change the state during a session can be adapted during the direction phase. This close relation between orchestration and direction suggests a tool that covers both aspects and is aware of the current phase. In the next section we will present the tool AuthOr, which is designed to support these phases of the process chain.

### Supporting Tools

Within our recent MR games, namely Epidemic Menace [4] and Timewarp, we used a set of supporting tools for orchestration and direction. Within Epidemic Menace, a pervasive AR game, we developed an orchestration board. It uses a stylized map of the game area and provides functionality for configuring the teams, placing viruses, assigning devices to individual players (see figure 2). The initial configuration of a session can be saved and used in the game engine. It was also used during the actual game play for receiving information about the current location of the players and the viruses and displaying this information on the map. The orchestration functionality was also enabled during the sessions allowing the game supervisors to add/remove players, place viruses and assign devices to the players, making the game flow adjustable. Due to the monitoring functionality of the board, it was additionally used within the game as an overview map for the teams, where they could observe the outdoor players. Epidemic Menace has another direction tool: web cams in the game environment provide augmented video streams to the players as well as to game observers, allowing for audience participation and also supporting the evaluation of the game play. For the Mobile MR Game Timewarp, we redesigned and reimplemented

the orchestration board in order to meet the requirements stated above. While in Epidemic Menace a relocation of the game to a different location would have meant a great effort, this new tool – called AuthOr – is much more general. One of the key features of AuthOr is hence augmentation of arbitrary maps with overlays (images, lines, text, ...), e.g. for player positions, paths, game items, game events and so on. An interface to map services such as Google Maps, Google Earth and Virtual Earth allows playing the game everywhere in the world. Therefore, it is possible to register and display virtual objects and game actions in the real environment. Further, the effort for adapting a game session to a new location becomes reasonable. If used as an orchestration tool, the game area can be defined, and arbitrary game items can be placed. During a game session it is used by the staff to supervise the game play and relocate, add or delete game items, additionally it is provided to the players as a map tool, where they can see their current location on the map and interesting spots (see figure 3). As the playing area becomes larger, zooming functionalities of the map are essential in order to get an overview of the game, or a close up look for more detailed information. For efficient zooming support the maps can be specified for different levels.

### Conclusion and Future Work

As we showed, supporting tools for the process chain of creating and managing Mobile MR Games are a crucial part for balancing and managing the game and can even be part of the game play itself. If the location, where the game is played, is not fixed, such tools allow for easy adaptation.

In our future work, we will continue to focus our work on AuthOr in order to support even more steps of the Mobile MR Game process chain, e.g. using it for supporting evaluation by playing recorded sessions. Such functionality can include showing paths of the players, events that happens and so on.

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