

Ubicomp: From Theory to Play

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ABSTRACT

Ubicomp systems have a history that extends back to the late 1980s, to work at Xerox PARC and EuroPARC. Researchers, in particular Mark Weiser, drew from much older theory and discourse in framing a new system design research agenda. Studying the strengths and the weaknesses in this conceptual work led us to explore new approaches to designing, analysing and understanding the use of ubicomp systems. Our vehicle for much of this research has been mobile multiplayer games, such as *Treasure* and *Feeding Yoshi*, and analysis tools such as *Replayer*. In giving an overview of this work, I hope to give some practical examples of how apparently contradictory opposites within ubicomp are interdependent and synergistic.

Categories and Subject Descriptors

C.2.4. Distributed systems – distributed applications. K.8.0. Personal Computing – games.

Keywords

Mobile multiplayer games, ubiquitous computing, seamful design.

1. INTRODUCTION

At U. Glasgow, we have been working with other colleagues within Equator (www.equator.ac.uk) on a series of mobile multiplayer games, called *seamful games*. These games demonstrate the concept of seamful design, which itself was derived from reflection on earlier Equator user experiences. Those earlier experiences relied on uniformly accessible resources for interaction such as wireless networks and positioning systems. However, in user trials, participants were often either constrained in where could go while still taking part in the experience, or had to handle features such as network disconnection and variable positioning. One traditional response to such issues is to 'design out' such gaps, breaks and seams, but we are exploring a new approach inspired by some of Mark Weiser's early writing and also by established media theory, theory of language and design practice. In seamful games, we aim to accept or even take advantage of the characteristics of technological media, as perceived and used in users' experience. This means selectively revealing aspects of system infrastructure that are often hidden or ignored.

We have chosen the application area of mobile games so as to take advantage of the creativity and stress-testing that occurs in such systems used outdoors. We initially created a game called

Treasure, which was a simple 'treasure hunt' game for players using PDAs with 802.11 wi-fi and GPS [1]. Players chase, collect and steal 'coins' appearing on their PDAs' maps, all the while maintaining awareness of other players, of people and objects beyond the game, and also of the distribution of the wireless network used in the game. *Feeding Yoshi* [2] let us explore issues of how people fit ubicomp technology into the 'fabric of everyday life', in handling or taking advantage of inconsistent state among mobile devices as well as wi-fi distribution across the city. We are currently trialling a game called *Castles* [3], in which the configuration of software components that make up the system is itself part of a game that relies on mobile ad hoc networks and epidemic algorithms for sharing information.

In these games and related systems, we are exploring how ubicomp's traditional goal of 'invisible' use is interdependent and synergistic with its 'visible' opposites, such as breakdown, learning, teaching, adaptation of use and adaptation of the system [4]. We find that seamfully exposing infrastructure can let people consciously develop ways to use it invisibly. Similarly, in evaluation, we are looking at ways to combine apparent opposites. The *Replayer* system involves reduction of user activity to formal quantitative data and yet also supports informal qualitative interpretation. We couple visualisations and statistics of sensed/logged data with replays of video, audio and field notes.

In ongoing work, we are exploring how game play, traditionally treated as insignificant or trivial, can have useful side effects for players. We are exploring games that make players healthier, for example. We are also beginning to look at software design, and how we might extend 'type' from objective content to include subjective, contextual histories of use. Reflecting on *Castles*, we aim to integrate rich use histories into software components' definition, design and deployment.

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