# Evaluating a location-based mobile game in early stages of the development

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## Introduction

When employing a User-Centered Design (UCD) approach for the development of an interactive system, the active involvement of end-users is recommended [2]. Within the VIP-lab project [1], some case studies were carried out using UCD in five different application domains. This contribution will introduce two techniques to measure the user's experience for a location-based mobile game.

## Location-based mobile game

Since children seem rather uninterested when they visit a museum or a park, the aim of the case study for the domain of tourism and culture was to make school excursions more interesting for children between the age of 8 and 10. During first meetings with cultural and tourist organizations, it became clear that a prototype of a mobile location-based application might be suitable to attract the children's attention, but only if it would offer more than just an informative guide on paper.

In order to get an overview of the needs of the end-users, researchers joined several school groups visiting a museum or a park, and observed the children. Based on this user and task analysis, a list with points of interest was created. For instance, children liked the tours that were based on a story providing some excitement and suspense.

These points of interest were used to create two game concepts within a multi-disciplinary team. Besides computer scientists and social scientists, a graphic designer and delegates of a mine museum and a nature resort attended brainstorm sessions.

## Adding locations to a lab

To measure the user experience of the game concepts, some first designs of the user interface were evaluated. The fidelity of the prototype implied that the first evaluation took place in a lab. Since the test persons should visit several locations in a nature resort and a mine museum while playing the games, two physical locations in the lab were used. On these physical locations beamers projected virtual locations on white screens (see figure 1). Using materials similar to what is used in participatory approaches such as PICTIVE [3], the behavior of the game was simulated. Screenshots for the two games, designed by the graphic designer, were printed on paper and could be stuck on a plasticized picture of a PDA that the test users carried with them while they walked from one location to another.

Four groups of two children tested the games, while two researchers were observing, and two other researchers simulated the role of the computer by providing the audio of the game, sticking the correct screens on the picture of the PDA and making available the projections of virtual locations. Although we used basic materials instead of an interactive prototype, the test users were very amused while playing the games and loved the designs. The concept of walking to several locations became obvious to the children after some hints of the facilitator, but they sometimes forgot to take the picture of the PDA with them. In a later stage of the case study we experimented with a virtual model of the mine museum to add locations to a lab environment. First results showed that walking around in this virtual environment was more intuitive for the children.

The test results revealed a few weaknesses in the user interface, but showed on the other hand that the game concept was clear for children.

## Involving a wizard in field tests

The next iteration of the case study concerned the development of an interactive prototype for a PDA and its evaluation in the field. Since it was impossible to use a similar location detecting technology for both the indoor mine museum and the outdoor nature resort, a Wizard of Oz application was developed, which was deployed on a second PDA, connected to the game PDA using an ad-hoc Wi-Fi connection.

Using the Wizard of Oz application, location information could be send to the game to help the children finding their way, or to trigger a new task. During field tests in the nature resort and the mine museum, ten groups of two to four children played the game. Simultaneously a researcher (wizard) operated the Wizard of Oz application (see figure 2). Although the wizard was participating to the test, the test users did not notice that the location information was passed on by the Wizard of Oz application. Afterwards children were enthusiastic about the game and they even asked if this prototype can be used to play location-based games at home.

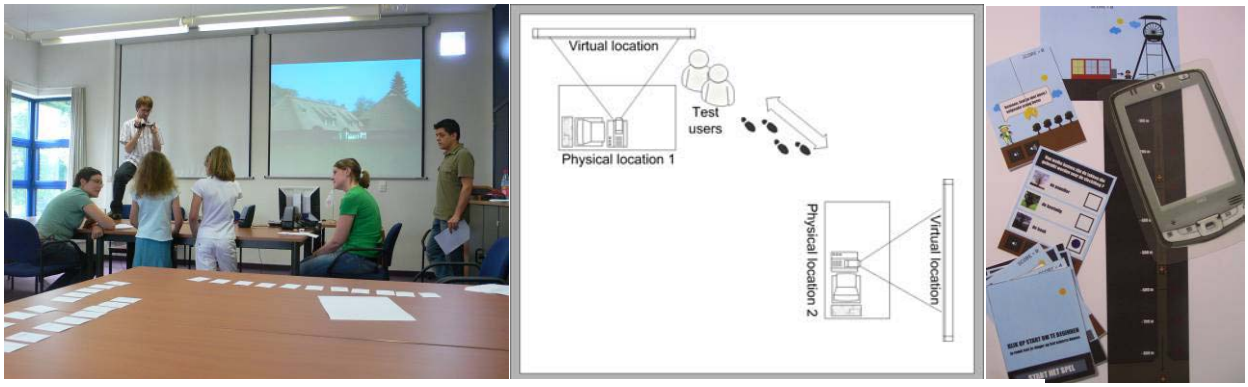


***Figure 1**. The setup and materials for the lab test of the location-based mobile game.*

***Figure 1**. The "wizard" sends location information to the game PDA.*

## Conclusions

In this contribution we presented two techniques to evaluate a location-based mobile game when detailed location information is missing. By evaluating after each iteration, in the lab or in the field, the prototype can be fine-tuned in a cost-effective way. These techniques provide suitable results and can be used to measure the user experience of location-based prototypes in early stages of the development.


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