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# The Mobile Oracle – a Tool for Early User Involvement

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## ABSTRACT

This paper describes a novel tool for eliciting user requirements early in the design process of mobile applications. The “Mobile Oracle”, as we have called it, is intended to help developers and designers obtain a better understanding of what the user wants at different points in space and time. It is an extension of a lo-fi version of the well-established Wizard of Oz technique, but it adds an “on demand” component to force users to explicitly request the information they need. The technique has been tested in an investigation involving 15 users (sighted, visually impaired, and elderly). Our preliminary results show it to generate valuable information concerning the ways people ask about directions and distances, as well as the services they would like to have in future mobile applications.

## Categories and Subject Descriptors

D.2.1 [Requirements/Specifications]

## General Terms

Design, Human Factors

## Keywords

Design, on demand, wizard of oz, user requirements

## 1. INTRODUCTION

The study presented in this paper is performed within the framework of HaptiMap project [6]. In this project, we target the design of systems making use of geospatial data for helping different future user groups in orientation and wayfinding. In this sense, one of the questions we need to address is “what kind of information does the user need during the process of wayfinding and exploration, at different points in time and space”. The project concentrates on a large number of future users (e.g. visually

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impaired, elderly and users without any particular sensory impairment) and also on multiple usage scenarios which include city navigation, cycling, hiking etc. Thus, we need methodologies for user requirements elicitation that are flexible enough to adapt to different user profiles, activities and usage environments. Since we have a particular focus on the non-visual interaction design within HaptiMap, we need to be able to handle also these types of interaction.

A literature review showed that previous research used mainly interviews, questionnaires, and experimental evaluations of cognitive wayfinding strategies or of prototypes of pedestrian navigation systems [e.g. 7]. Though these methods provide valuable knowledge and input for design, they are often applied out of the user’s context of daily activity and relevant elements of this context may be overlooked. To get insight into these contextual elements, we decided to use ethnographically-informed observations of users’ wayfinding strategies applied in naturalistic settings [2].

## 2. OUR APPROACH

The study presented in this paper adopts the approach of combining a lo-fi Wizard-of-Oz (WOZ) methodology with an “information on demand” technique [8] in a test design which we call the “Mobile Oracle”. In this design, the user is instructed to request information from a mobile navigation service when he/she feels this is necessary. Our assumption was that such a combination could result in a potentially useful tool for providing additional insights into the kind of information users are interested in during navigation and exploration. To further strengthen the idea of the “on demand” part of the design we decided to call the individual impersonating the imagined device the “Oracle”, since an oracle is held to respond wisely when consulted and asked questions.

The Mobile Oracle design was selected for three major reasons: 1) the openness of a traditional WOZ task, in which there is no single correct answer to a question asked by the user; 2) the additional freedom and initiative given to the user thanks to the “on-demand” part of the technique, and 3) the richness and dynamics of cooperative dialogues, in which protagonists’ objectives are co-constructed to gradually concord [5].

### 3. TEST DESCRIPTION

The study was done in a shopping mall, which is an interesting place because shoppers often have problems in finding their way in a mall, while at the same time there are few studies on this topic [but see 4]. At the same time we expected to obtain general information about wayfinding in urban environments, because a large part of the cognitive wayfinding strategies are similar in both settings. Since we target several user groups we included 3 sighted, 4 visually impaired and 8 elderly in the test. We conducted 2 pilot tests before the actual testing to make sure that the test design worked as intended.

Each test followed the following fixed scenario:

“You are to attend a birthday party. You have not yet bought the present and have a limited amount of money to spend. The person you are buying the present for is Oscar, 13 years old and a fantasy fan. He has a wish list that contains the following items: 1) a t-shirt/sweater with a fantasy motif (dragons/skulls or similar); 2) a necklace with a dragon/skull pendant (“cool” male type necklace); 3) a fantasy book with dragons in it.

You want to check all three types of things and buy the cheapest. But you can only spend 30 minutes on this task in order to make it for the party.

An ORACLE - a person, who simulates a mobile navigational service, follows you. Please ask the ORACLE as soon as you feel you need some service or information. If possible we appreciate if you also try to “think aloud” about your navigational decisions/considerations.”



Figure 1. Pictures from the test environment

The “Mobile Oracle” was designed to know the layout of the mall and could say things about the general type of content in different shops. It could also remember places or things for the user and could point out where things are in general (like different sections in a shop). Moreover, once at a particular stand the oracle could pretend to be a shop assistant/sales person (we did not want to disturb the personnel in the shops since we did not intend to buy anything). We gathered test data by using a mobile phone to record audio and a small digital camera to take pictures (due to security regulations, video recording was not allowed, but we were granted permission to take pictures).

After the actual test we interviewed the participants about the navigational experience and their thoughts on potential navigational services. They also filled in a questionnaire containing questions about how familiar they were with the mall in question, their visual ability and their sense of direction.

### 4. FIRST RESULTS AND CONCLUSION

The method used was seen to work well for all the users involved in the study. The resulting questions were recorded and grouped. The individual questions were seen to provide rich and detailed input for the design process while the overall categories “Content overview”, “Spatial layout”, “Direction/route”, “Distance”, “Notification/prompts”, “Confirmation”, “Content”, “Recommendation”, “Memory”, “Time” and “Capability of the device” agree with what is found in earlier studies [1, 3, 9] confirming the validity of the “Mobile Oracle” approach. Landmarks, distances, directions and orientation hints were things of interest to all users (in agreement with [7]). Future users were also interested in a shop indicating service that helps you noticing things as you move from A to B (e.g. I’m going from here to the bookshop but I would like to add suitable shops for clothes on the way). Worth noting was the frequent use of relative locations (eg. behind, in front of, to the left of) and also of imprecise distance measures (eg. a bit further, a fair distance away) as well as the frequent use of physical pointing. Specific requirements for more severely visually impaired users were information about the precise location of the entrances and obstacles as well as the possibility of optimizing the way to a shop.

### 5. ACKNOWLEDGMENTS

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