

# Afgestudeerd

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## Designing accessible mobile web applications for visually disabled people

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### Introduction

Mobile web applications have become of significant importance to visually disabled users. Applications related to travel and navigation in particular support freedom and independence. Certain touch screen smart phones nowadays offer built-in accessibility features exclusively meant for visually disabled users. Sight impaired users with partial vision, for instance, use their device in landscape orientation or apply a pinch gesture to magnify the screen content. Blind users, on the other hand, operate their smart phone by means of a screen reader. It translates the content and interactive behavior of each item of the interface enabling blind users to read text, operate buttons, select options from drop down menus and even type. For this reason it is crucial to ensure that these features have optimal access to the mobile web application itself in order to support optimal user interaction. The purpose of this project was to design a method which supports designers in creating such accessible mobile web applications. This was done by formulating a set of design principles describing the criteria for accessible mobile web design for visually disabled users.

### Methods

Five visually disabled participants were personally interviewed and observed while working with several mobile web applications. Based on these conversations and observations the following six design principles were formulated, describing the criteria for accessible mobile web design for visually disabled users.

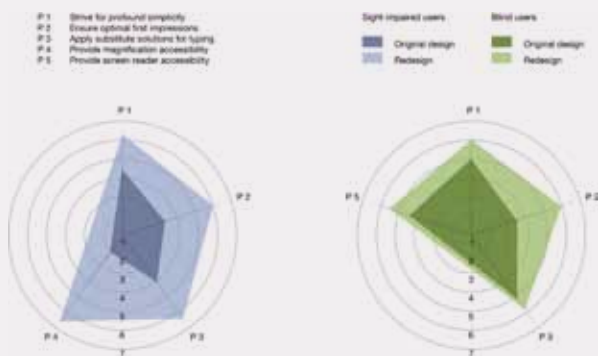
- *Use your imagination.* Gain understanding of the target group. Discuss mobile web accessibility with your users and observe them while working with applications. This is the key to accurate decision making and suitable design solutions.
- *Strive for profound simplicity.* Limit the information to the absolutely necessary, without wasting information that significantly contributes to intuitive usage.

Organize the information in a structure which meets the consistency of apps.

- *Ensure optimal first impressions.* Design a start screen which offers the user immediate access to the main functions of the application. A limited number of actions is strongly related to the user's devotion to foster the application.
- *Apply substitute solutions for typing.* Typing is a very time-consuming and exhausting activity for visually disabled users. Apply substitute solutions for typing as much as possible, such as drop down menus to select options, dates, times and locations. When typing solutions cannot be avoided, a proper support of word prediction is needed while typing.
- *Provide magnification accessibility.* Make sure the application supports pinch and landscape magnification. When magnified, users should be able to have quick access to all relevant contextual objects in order to reserve a proper understanding of the application.
- *Provide screen reader accessibility.* Realize that blind users only have auditory information to refer to. Make



Figure 1. Redesign of the app '9292OV Pro'



**Figure 2. Average scores of the accessibility level. To sight impaired users P5, 'Provide screen reader accessibility' is not applicable. To blind users P4, 'Provide magnification accessibility', is not applicable. Since the design principle 'Use your imagination' concerns an advice to designers instead of a criterion for the design of the application, it did not take part in this analysis**

sure that objects are transcribed in a valid order. Screen readers should only transcribe the content and the interactive behavior of an object. This enables the user to understand what the object is about and how one should interact with it.

In order to determine the effect of the design principles on the accessibility level, the principles were put into practice by creating a redesign (figure 1) of the app '9292OV Pro'. The original design and an interactive prototype of the redesign were tested. Five sight impaired and five blind users participated in the test. The test consisted of assignments and evaluation interviews that were executed with both designs.

### Results

Figure 2 presents the average scores of the accessibility level for sight impaired users (blue diagram) and for blind

users (green diagram). The diagrams show the scores of each design principle for the original design (dark coloured surface) and for the redesign (light coloured surface). The centre of the circle represents the lowest score 1, the outer circle represents the highest score 7. In short, the larger the coloured surface, the better the accessibility level.

### Conclusions

The figure shows that the accessibility level has strongly increased for both sight impaired and blind users. Statistical analysis has proven this effect to be exceptionally high. In conclusion, the design principles improve the accessibility level of mobile web applications for visually disabled users.

### Reference

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With this project ir. Roos van Rhijn graduated for the master Design for Interaction at the Delft University of Technology. She currently works as an information designer at Mijksenaar and as a freelance user interface designer at Yunity UID.

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