

# Audio information in mobile services

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## ABSTRACT

In order to provide increased flexibility and accessibility, many providers of electronic services are beginning to offer their services via a variety of service delivery channels. The services may be available through web, digital television, mobile phones, or other hand held devices. However, designing usable and accessible services are a challenge because of the different device properties, use contexts and diversity of users.

Many electronic services are relying heavily on visual information. A working hypothesis is that especially in mobile services, the audio channel could be better utilized for providing information and instructions to the user. The aim of this position paper is to present and discuss the use of audio for providing help and information in mobile services. A prototype implementing this idea is presented.

## Author Keywords

Mobile services, multimodal interfaces, audio information, universal design, design for all, accessibility, prototype.

## INTRODUCTION

After a rather slow uptake of services using the mobile phone, recently progress has been made in terms of technological improvements. The services are now getting more flexible and robust, and the functionality and capabilities of the mobile devices have gone through rapid developments. Nevertheless, the device characteristic, such as small screen and keyboard, and the varying environments and use contexts of mobile services, makes the interaction design particularly challenging.

The mini screens of mobile devices are commonly seen as inadequate for presentation of more than simple lists of choices or very brief information [1, 2]. Rather than disqualifying services that are rich in information for the mobile environment, researchers are now exploring methods of overcoming this barrier. The screen sizes of mobile devices are increasing, and they are getting more sophisticated in terms of graphical capabilities. Researchers are investigating how to present visual information more effectively on the screens of mobile devices [1, 3].

It is equally important to investigate how to include audio information in mobile services. When using mobile services, the visual attention and the reading capabilities

might be reduced as a combination of device characteristics and use context. In addition there are many users that can not utilize visual or written information due to visual or cognitive impairment. The popularity of mp3 players, not only for music, but also for pod casts and audio books indicate that that the audio channel are suitable for longer pieces of information. Also, wearing a mobile device with earplugs is more and more common. This is convenient if the audio information is confidential or private, or if one does not want to disturb others.

## A PROTOTYPE WITH AUDIO INFORMATION

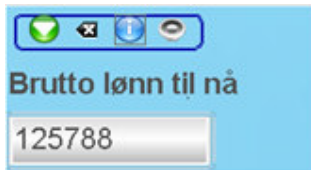
### A mobile service for changing tax cards

Based on information in a tax deduction card (hereafter called tax card), employers in Norway are obliged to deduct and withhold tax from the salary of each employee before payment of wages. The local tax assessment office issues tax cards on the basis of information regarding expected net income and net wealth. The tax card is automatically produced by the computer system of the Tax Administration and sent by mail to all potential tax payers.

Each individual must assess the tax card. If the information is not correct, the person must report new and correct information and apply for a new tax card. This can be done by filling in and send a paper form, or by using the Internet service for changing tax card. It is then the responsibility of each employee to deliver the tax card to the employer who updates the salary system. If he employer has not received the tax card, 50 percent tax will be withheld from the salary.

The web application for changing tax card has a large number of possible input fields. Due to the mobile use context, the small screen size and limited input methods, the user interaction in the mobile services must be reconsidered. The mobile prototype is a simplified version of the web service. Based on statistics of causes for new tax card requests, a few causes that frequently lead to the need for a new tax card were selected. Examples of such causes are changes in level of income, loans, interests and marital status.

The mobile prototype application is downloaded on the phone. For each input field there is a sub menu which is opened when the user presses the select key of the mobile.



**Figure 1** Input field with submenu

By selecting the third in Figure 1, the user will get written information, and the fourth icon will give audio information.

The audible information and help messages are stored as MP3, and are played by the phone's built in MP3 player.

To uncover problems with the design, a heuristic evaluation and a usability test with 5 young (17-21 years) participants were conducted [4]. Even if these tests were very limited, a number of design issues that must be further investigated were uncovered. For example the test users did not try to use the information/help functionality, neither text nor audio, even if they obviously had questions and difficulties. There may be several possible reasons for this. Due to limited screen space these icons would not appear until the user presses the select button when in an input field. May be the submenu should have been opened automatically when the user entered the field. The icons also need improvements. In spite of some difficulties, all the participants were positive to the application.

#### CHALLENGES AND FURTHER WORK

Both the web service and the mobile prototype for change of tax cards is based on the concept of self service. The services will be directed to all potential tax payers, and thus it is necessary to make the services accessible by as broad a range of users as possible, regardless of their abilities. Therefore special attention must be given to accessibility and design for all aspects.

This first version of the prototype has combined visual and audio information. This has been done in order to reduce the need to read lots of text on a mobile phone. This may be an advantage to people that have reading difficulties (eg. dyslectics), or in situations with poor reading conditions. To make the application accessible for blind people, the application must work with text to speech software. Others need or prefer to have all information visually (eg. people with hearing impairments, if the device does not have an mp3 player, or if the device does not have earplugs). The application must be flexible enough to accommodate the various needs. However, a consequence of the flexible multimodal user interfaces may be that the user is presented with many choices [5]. The challenge lies in how to offer this kind of flexibility without adding more complexity to the user interface. For example is the possibility to repeat an audio message not only desirable but often essential [6]. Also the need for more functionality to interact with the audio information, such as forward, backward, stop, start, adjusting speech speed, etc., should be carefully considered. Adding functionality may add to the complexity of the user interface.

As the information in the tax application does not change often, we chose to use natural speech. Natural speech is generally preferred by the user before synthetic speech. Also people with a hearing impairment often have difficulty in understanding synthetic speech output since it has less redundancy than natural speech. This also is an argument for using natural speech in a mobile environment where the background noise may vary. In this version of the prototype, the audio messages are stored locally on the mobile devices, but in future versions there are plans to stream the audio. Streaming media on IP networks face limitations in form of latency or delay. A solution for streaming of the audio information is under development.

#### CONCLUSION

The aim of this paper has been to present and discuss the use of audio for providing help and information in mobile services. The fact that many people listen to audio information like audio books and pod casts on mobile devices may suggest that audio also can be utilized for providing information in connection with mobile services. A prototype which implements this idea has been briefly presented and discussed. In order to accommodate the diversity of needs and use contexts, mobile services should be flexible with regard to modalities and follow universal design/design for all standards. A major challenge is to achieve this flexibility without increasing the user interface complexity and thus make the service hard to use. User profiles, personalization and automatically adaptation may be part of the solution to meet these challenges.

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