



# HaptiMap

Haptic, Audio and Visual Interfaces for Maps and Location Based Services

## Background

If you are walking or cycling, and don't want to (or are unable to) spend most of the time focusing on a screen, the use of mobile devices tends to be a frustrating experience. The same is true in bright sunlight or if your eyesight just isn't good enough to see every detail on the mobile screen.



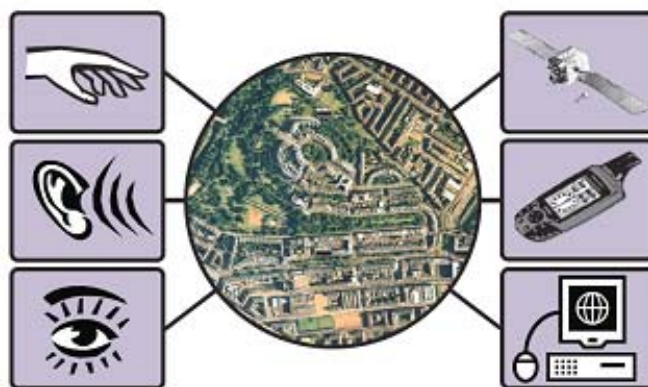
*An environment where mobile devices are used*

The persisting problem of displaying information on the small screens of mobile devices is pushing both display development as well as that of non-visual interaction channels such as gestures, tactile/haptic interaction and sound. One problem is that the non-visual channels are often used only as an enhancement of the visual instead of being truly designed to maximize the haptic and auditory channels themselves. Improved multimodal perceptualizations (visualization including other senses than the visual) would make applications more accessible and easier to use in actual mobile, navigational situations.

## HaptiMap contribution

The HaptiMap project is aimed at making maps and location based services more accessible by using several senses like touch, hearing and vision.

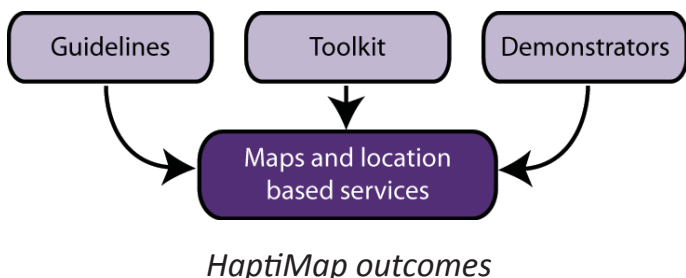
HaptiMap will enable digital maps and mobile location based services to be accessible to a wide range of users. Our strategy is: to develop tools that make it easier for developers to add adaptable multimodal components (designed to improve accessibility) into their applications; to raise the awareness of these issues via new guidelines and to suggest extensions to existing design practices so that accessibility issues are considered throughout the design process.



*The HaptiMap concept*

Multimodality is a useful addition for navigation applications, allowing transfer of information from the relatively overloaded visual sense to hearing and touch. However, unless well understood the use of touch and sound can be annoying. In HaptiMap we are looking at ways to effectively employ touch and hearing to make map and navigation applications more useful and engaging as well as more accessible to users with impairments.

With the Toolkit API being developed developers of mobile navigation programs wishing to endow their software with the capability of user-interaction through the senses of touch and sound, as well as visually, will be able to do this. The toolkit will be able to adapt to the capabilities of the device on which the program is working, and to the sensory information that the device can provide (such as location) to intelligently suggest what that user is doing, and in what context they are doing it.



We have chosen to focus on geospatial information and maps since this kind of information tends to be hard to access for persons with limited visual ability. We expect our results to also be relevant for mobile phones and computers in general.



*The users are central in HaptiMap*

The result of the design method development is another aspect of the work that is not tied exclusively to maps and location based services, and which will be relevant for a wider audience. In the HaptiMap project our goal is to increase the number of persons who are able to use mainstream map services. Thus our user group

contains both sighted persons and persons with visual impairments (including elderly persons).

## Accomplishments

In the first year of the project we have carried out initial user studies, started our interaction design work, started building the toolkit architecture, investigated current industrial design practices, done design method development and published the HaptiMap user study guidelines. HaptiMap was disseminated widely in 2008/2009, for instance at the European Ministerial e-Inclusion Conference, Interact and AAATE. In 2010 we will organize the workshop “Multimodal Location Based Techniques for Extreme Navigation” at Pervasive (<http://www.haptimap.org/events/organized-events/pervasive.html>).

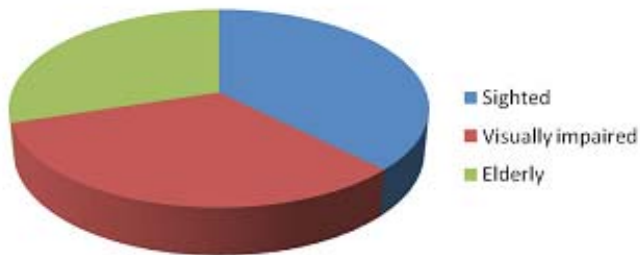


*Evaluating technology in a mobile context*

In the HaptiMap project we use and advocate an iterative and user-centred design methodology where end users are involved all through the work process and where designs and prototypes are tested iteratively. The focus of the project as a whole during this first year has been the user studies. In order to get a full picture of the relevant issues we have used a range of techniques that involve questionnaires, interviews, focus group discussions, probe studies, workshops, and contextual tests. 221 users have been involved in our activities, where 83 were sighted, 72 visually impaired and 66 elderly. In addition, 188 users answered a web questionnaire.

Our studies of severely visually impaired, elderly and sighted users indicate general similarities in the types of information all people need,

although we observe that in general visually impaired users require a higher level of detail.



### *Distribution of user groups in the user studies*

We have explored both goal directed navigation and other more exploratory situations, since appliances supporting navigation may be used in both scenarios.

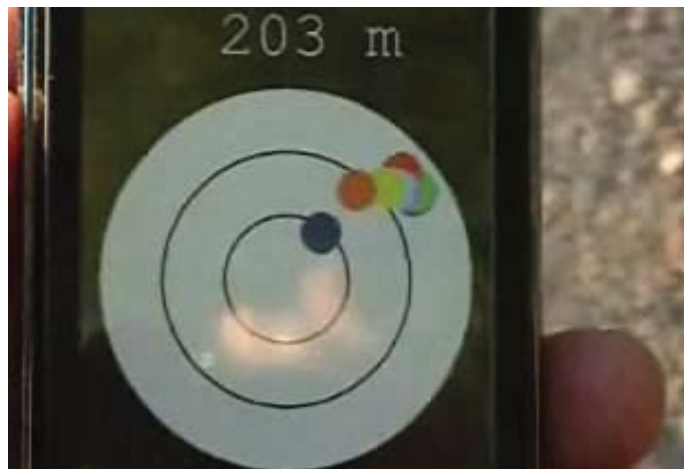


### *Exploring navigation in a shopping mall*

The contemporary lack of a proper solution for pedestrian navigation was apparent throughout our current studies. All user groups stressed the need for better adaptation of information and device interaction to the pedestrian situation (preferably organized in layers to allow different levels of detail). There were also requests for more use of additional sensory channels – as well as hands-free use. This is well in line with the basic assumption underlying the HaptiMap project, and with this work we have a solid basis for the design and development effort ahead of us.

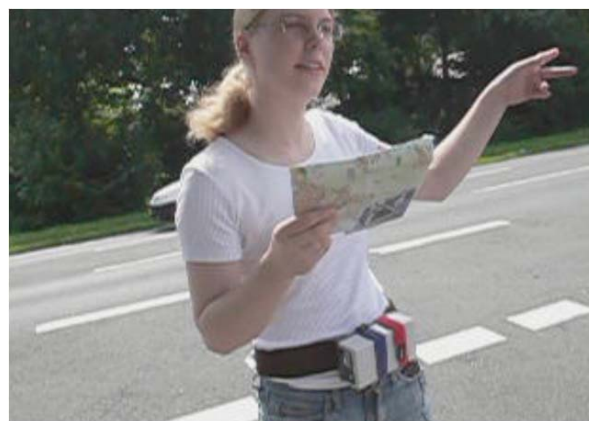
Another important result from the first year is the HaptiMap user study guidelines (available through the project website). The guidelines

were compiled to provide a common basis for the work in HaptiMap, but this document is written also to be valuable and useful for designers, developers and researchers outside HaptiMap.



### *Creating a trail of soundcrumbs*

In the first year of the project, we have furthermore performed studies to improve our understanding of how multimodality can be employed to improve navigation and way finding. Informed from the user studies we have looked at the different scenarios in which users navigate and how multimodality can be effectively employed. We have explored how these situations can be supported with current technologies.



### *Paper maps can also be enhanced multimodally*

Studies range from using vibration to provide awareness of nearby facilities for cyclists to using sound to allow users to find and then re-find geographical points of interest. The results have informed our design of future technologies to supply the user with information more effectively.

We have also laid down the foundation of the API by designing the kernel of a multi-tasking software suite to achieve this goal.



*EdgeTouch provides a sonified overview of off-screen information*

The software will be capable of using the context sensing concepts developed, and the range of novel haptic hardware devices available within the consortium.



*Depending on preferences, different kinds of maps can be shown*

We have also begun the process of defining an internal interface to, and storage format for, a wide variety of complementary map data provided by project partners and other sources.

We have explored the rapidly evolving field of “smart” mobile technology and carried out small proof-of-concept exercises. They demonstrate that it will be possible to provide a seamless integration of the toolkit API into applications that work across the major mobile computing platforms in use today.

Our activities allow us to continue work on a strong footing and further improve the navigational experience.

## About HaptiMap

HaptiMap, Haptic, Audio and Visual Interfaces for Maps and Location Based Services, is a project which receives financial support from the European Commission in the Seventh Framework Programme, under the Cooperation Programme ICT – Information and Communication Technologies (Challenge 7 – Independent living and inclusion).

The HaptiMap project is coordinated by Lund University, Sweden. The other partners in the project are NAVTEQ, Siemens, BMT Group, CEA, ONCE, Finnish Geodetic Institute, University of Glasgow, OFFIS, Queen’s University, Fundacion Robotiker, Kreis Soest, and Lunds Kommun.

### Project website

[www.haptimap.org](http://www.haptimap.org)

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