RGI-233 consortium meeting presentation
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Geo-identification and pedestrian navigation with geo-mobile applications: how do users proceed?

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Overview

This work is part of a PhD research on the usability of geo-mobile applications. It also aims to support the government funded Dutch research project on *Usable (and Well-scaled) Mobile Maps for Consumers* (UWSM2)

keywords:
- geo-identification
- landmarks
- mental maps
- smooth zooming
- user research methodology

Outline

- Introduction
- Geo-identification problem of mobile users
- The experiment
- Selecting existing applications for the tests
- The test areas
- Methods applied and put to the test
- Field based usability testing system implemented
- Field survey execution
- Results
- Mental map drawings analysis
- Conclusion

Introduction

- The ever increasing mobility of people asks for effective tools supporting their geographical orientation and navigation
- Increasing availability & decreasing price of smart mobile devices spread their use more and more
- The capabilities of these devices allow to serve users as a better digital and interactive alternative to paper maps
- Thus they show an improved potential for mobile orientation and navigation, as well as location based services

Introduction (cnt.)

Issues and challenges?

Most of current commercial geo-mobile applications are dedicated to car navigation and are not suitable, for instance, for use by pedestrians

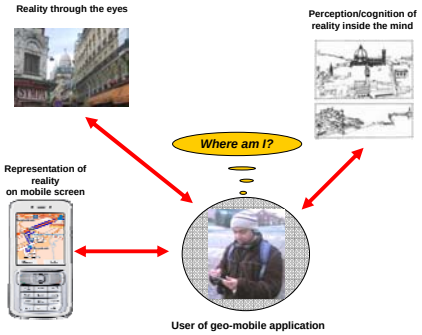
Why?

Not only because of the database contents, but also because of their interface and presentation aspects

Thus…

User's orientation or personal geo-identification is not supported well and users often found lost after a malfunction of these systems

Geo-identification problem of mobile users



Geo-identification problem of mobile users (cnt.)

- *Landmarks* and other structural elements may act as common points between the virtual and real worlds available to mobile map users
- Because landmarks are strongly supporting orientation, navigation and wayfinding processes *they should be visible in all the used scales* so that they support the mental map connection between the real and virtual geographic worlds
- *Memorization of landmarks* and their surrounding less prominent objects is a usual technique that the human mind is often using in order to keep that connection
- *Zooming and panning* is used in order to keep the mental connection with both overview and detailed map information

The experiment

- Context: visitors to unfamiliar cities/areas using geo-mobile applications represented by ITC PhD students
- Testing area: Amsterdam (unfamiliar area)
- User sample: 8 PhD students
- scenario-based test sessions and navigation tasks

The experiment (cnt.)

Finding out:

- What type of information which users of geo-mobile applications are first seeking for in order to geo-identify themselves?
- What types of Landmarks exist in both the users' mental maps and in mobile maps?
- What are the problems with linking "mental", map and reality landmarks?
- What are the ways of using of landmarks for orientation?
- What is the frequency of location confusion and what are the reasons for that?
- What are the reasons for direction mistakes?
- Are there any benefits from smooth zooming techniques?
- Are there any benefits from 3D landmarks representation?

Selecting existing applications for the tests

Igo MyWay 8

Google Maps

Criteria:

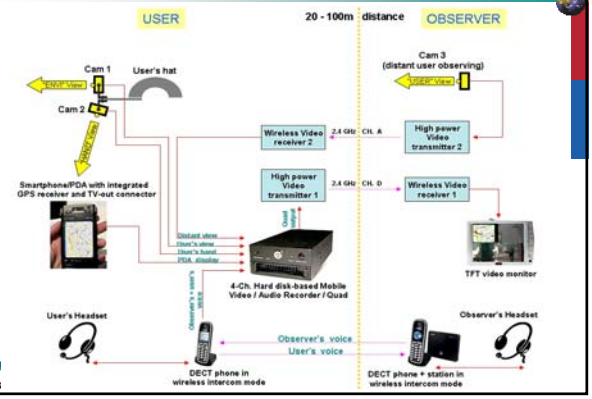
- Landmarks presented in 3D
- Coverage of the study area (Amsterdam)
- Zooming / panning functions
- Smooth zooming capability
- Availability to the researchers

The test areas

Methods applied and put to the test

- Questionnaires
- Observation
- Thinking aloud
- Video / audio recording
- Screen logging
- GPS tracking
- Mental map drawing
- Semi-structured interviews

Field based usability testing system implemented



Field survey execution

Installing / checking equipment

Observing the users

User Observer

Field survey execution (cnt.)

What information is recorded?

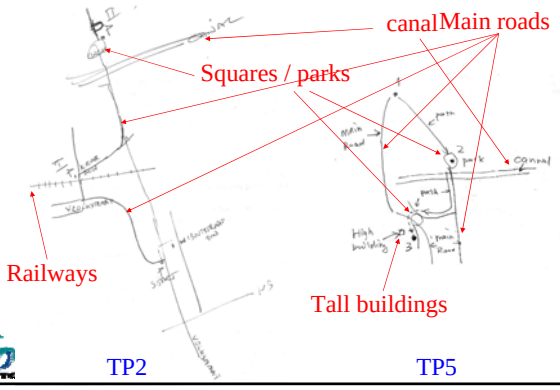
Results

- The types of landmarks and features that helped the test persons to orientate and navigate during the tests were the canals, the road patterns and sizes, the street names and the parks / squares and roundabouts
- Landmarks that would help them but were not (always) available on the map displays are the bridges, pedestrian paths crossing roads, important buildings, such as municipal offices, or tall buildings that are visible from a distance
- Specific landmarks that they expect to come across in order to help them to find their way in an unfamiliar city are big shops and easily distinguishable restaurants, such as fast food branches, churches, noticeable monuments, canals, bridges and parks
- Test persons did not find actual difference between smooth zooming and step-wise zooming
- A plethora of 3D models of buildings on the map was confusing, and only a few (important) of them should remain visible

Results (contd.)

- Photos of important buildings (such as corner / easily recognizable buildings) more preferable than 3D models
- The development of their mental maps based on landmarks was decelerated by their looking at the mobile screen most of the time. The majority of test persons argued that if they had used a paper map (or no map at all) they would have developed, combined and memorized more landmarks.
- The test persons would prefer a map continuously rotating towards the direction of their movement and towards their point of view when they are not moving as well
- they agreed that frequent zooming in and out is required in order not to lose the contact between reality and the maps in their minds except some important landmarks were visible in many scales

Mental map drawings analysis



TP2 TP5

Conclusion

- Determination of the types of landmarks that support user geo-identification was feasible
- Representation of these landmarks as a combination of unique icons and popping-up windows showing pictorial and text information was preferable
- The zoom levels that are mostly used and the landmarks and information that is missing in specific types of points of confusion can be determined by video recording analysis
- Further research on smooth zooming usability and proper visualization of environmental and mental landmarks needed
- Finding proper ways to connect the real and virtual geographic worlds that the user of geo-mobile applications interfaces with, could be one of the keys to developing more usable geo-mobile applications

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