LBS TeleCartography

Geo-identification and pedestrian navigation with geo-mobile applications: how do users proceed?

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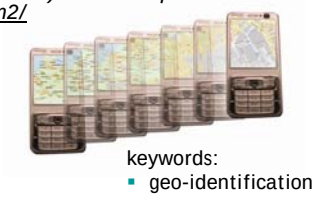
Overview

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:* www.rgi-otb.nl/uwsm2/



keywords:
- geo-identification
- landmarks
- mental maps
- Smooth zooming/generalization
- user research methodology

Outline

- Introduction
- Geo-identification problem of mobile users
- The experiment
- Research methodology
- Field survey execution
- Results
- Conclusions

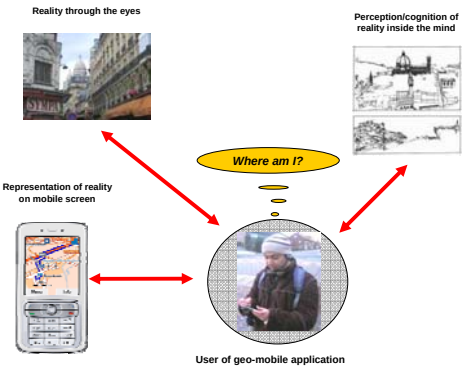
Introduction

- Ever increasing mobility of people asks for effective tools supporting their geographical orientation and navigation
- Increasing availability & decreasing price of smart mobile devices
- Interactive geo-mobile applications better serve users than paper maps, but usability considerations are important

Issues and challenges

- Current commercial geo-mobile applications are mostly dedicated to car navigation and not (yet) for pedestrian use
- Orientation of users is not well supported: they often get lost

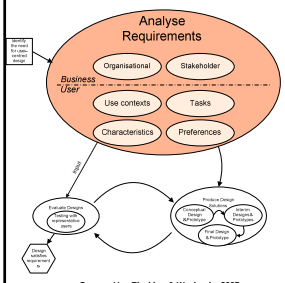
Geo-identification problem of mobile users



Geo-identification problem of mobile users

- *Zooming and panning* to get overview and detailed map information
- *Landmarks* as common points between the virtual and real worlds of mobile map users
- In order to support the mental map connection between real and virtual worlds, landmarks should remain visible on successive map scales

A UCD Requirement Analysis phase experiment



Source: Van Elzakker & Wealands, 2007

Finding out:

- Information that users are initially seeking
- Landmarks in users' mental maps and mobile maps
- Problems linking mental, map and reality landmarks
- Reasons for location confusion and direction mistakes
- Benefits from smooth zooming techniques and 3D landmarks representation?

The setting

- Context: pedestrian visitors to unfamiliar cities / areas using geo-mobile applications
- Testing area: Amsterdam
- User sample: 8 PhD students
- Scenario-based test sessions and navigation tasks

Selecting existing applications for the tests

Google Maps

Igo MyWay 8

Criteria:

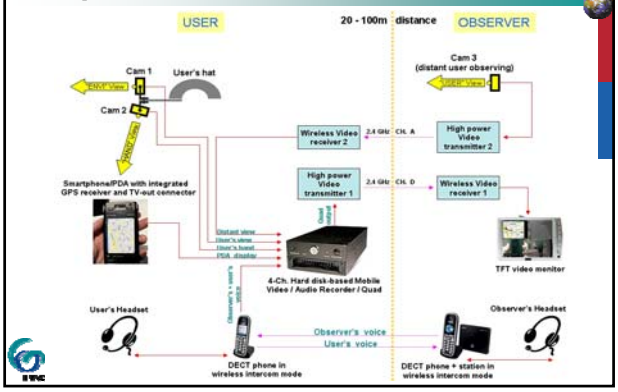
- Landmarks presented in 3D
- Coverage of the study area (Amsterdam)
- Zooming / panning functions
- Smooth zooming capability
- Availability to the researchers

The test areas

Research methodology

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

Field based usability testing system implemented



Field survey execution

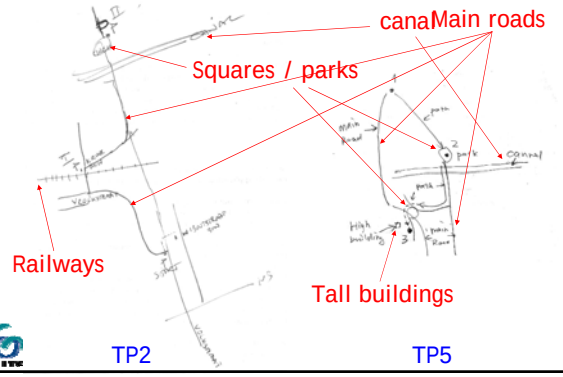
Installing / checking equipment

Observing the users

User Observer

Resulting research materials

Results: Mental map drawings analysis



Results: personal geo-identification

- First information: GPS position, linking and comparing patterns and sizes
- Sources of confusion: low diversity of structural elements, irrelevant map road sizes, inaccuracy of GPS
- Sources of direction mistakes: GPS orientation, absence of map orientation towards point of view

Results: landmarks

- Useful landmarks during the test: canals, road patterns and sizes, street names, parks / squares and roundabouts, landmarks wanted by persons: big shops, easily recognizable restaurants (e.g. fast food branches), churches, noticeable monuments, important buildings such as municipal offices, tall buildings, pedestrian paths, canals, bridges and parks
- Problems in relating real landmarks to mobile maps: absent or absent/appear in different zoom levels, not conceivable form
- Development of mental landmarks obstructed by using the geo-mobile applications

Results: visualization tool

- Not many 3D building models should be on display: only retain the important ones
- Photos more preferable than 3D models
- Rotating map display desirable (in direction of movement / point of view)

Results: zooming

- Frequent zooming in & out required to retain contact between reality and mental maps. Maintaining visibility of landmarks in successive scales could improve interaction
- No difference noticed between smooth zooming and step-wise zooming

Conclusions

- Suitable research methodology for explorative requirement analysis
- Feasible determination of landmarks to support personal geo-identification
- Simpler technical solutions are preferred (landmark representation through pop-up windows with pictorial and text information)
- Further research on smooth zooming usability and related landmark visualization needed
- Efficiently connecting user's real and virtual geographic worlds a key to increase usability

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Thank you
for your attention!

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