Navigation System for the Visually Impaired Based on an Information Server Concept

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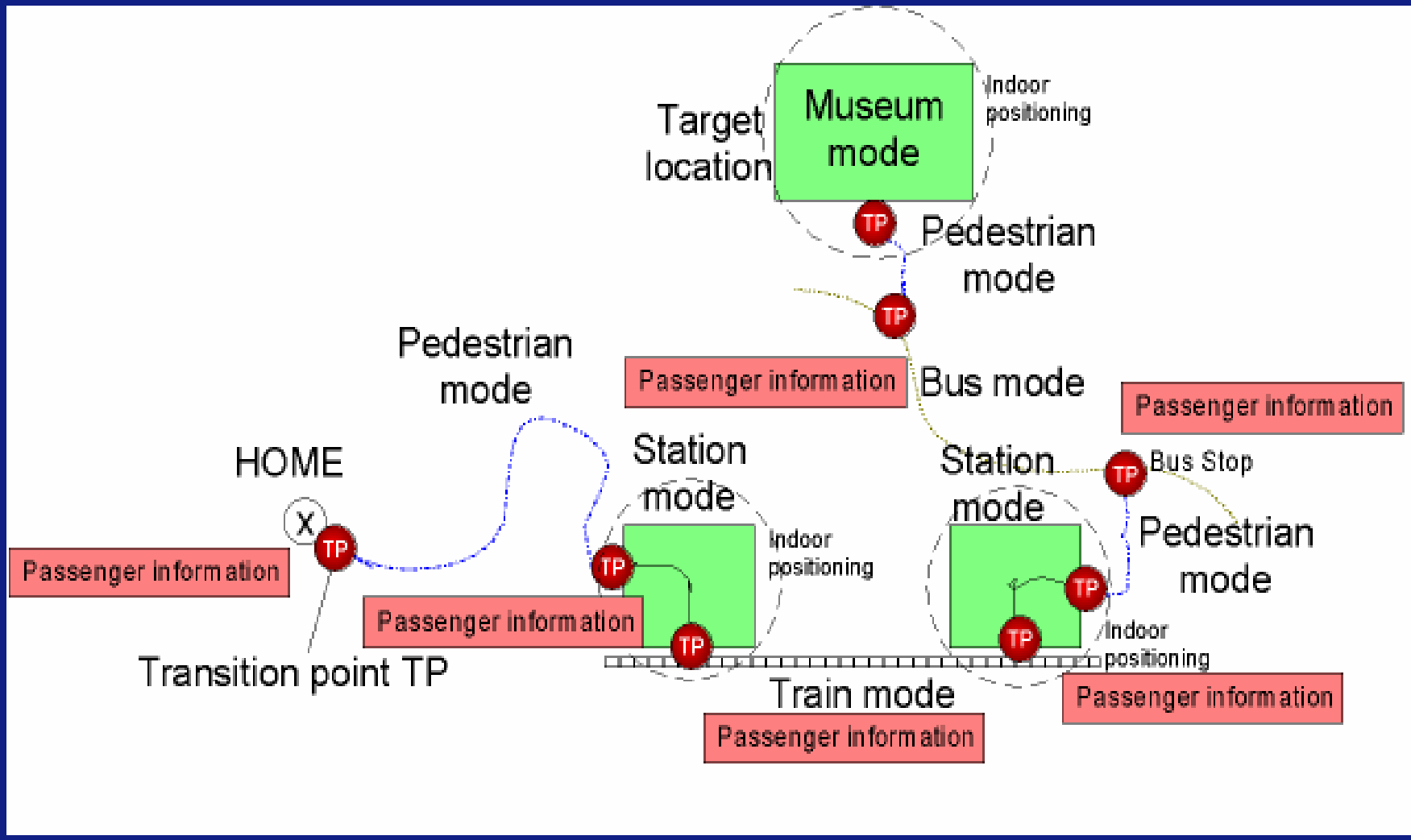
Development of Electronic Travelling Aids

- Solution for a single problem
- Simple device, difficult to use
- Needs additional infrastructure
- Works well in small scale implementations
- Large scale implementation would be extremely costly
- The most important guidance aids are still the white cane and guide dog. Electronic travelling aids are only complementary equipment

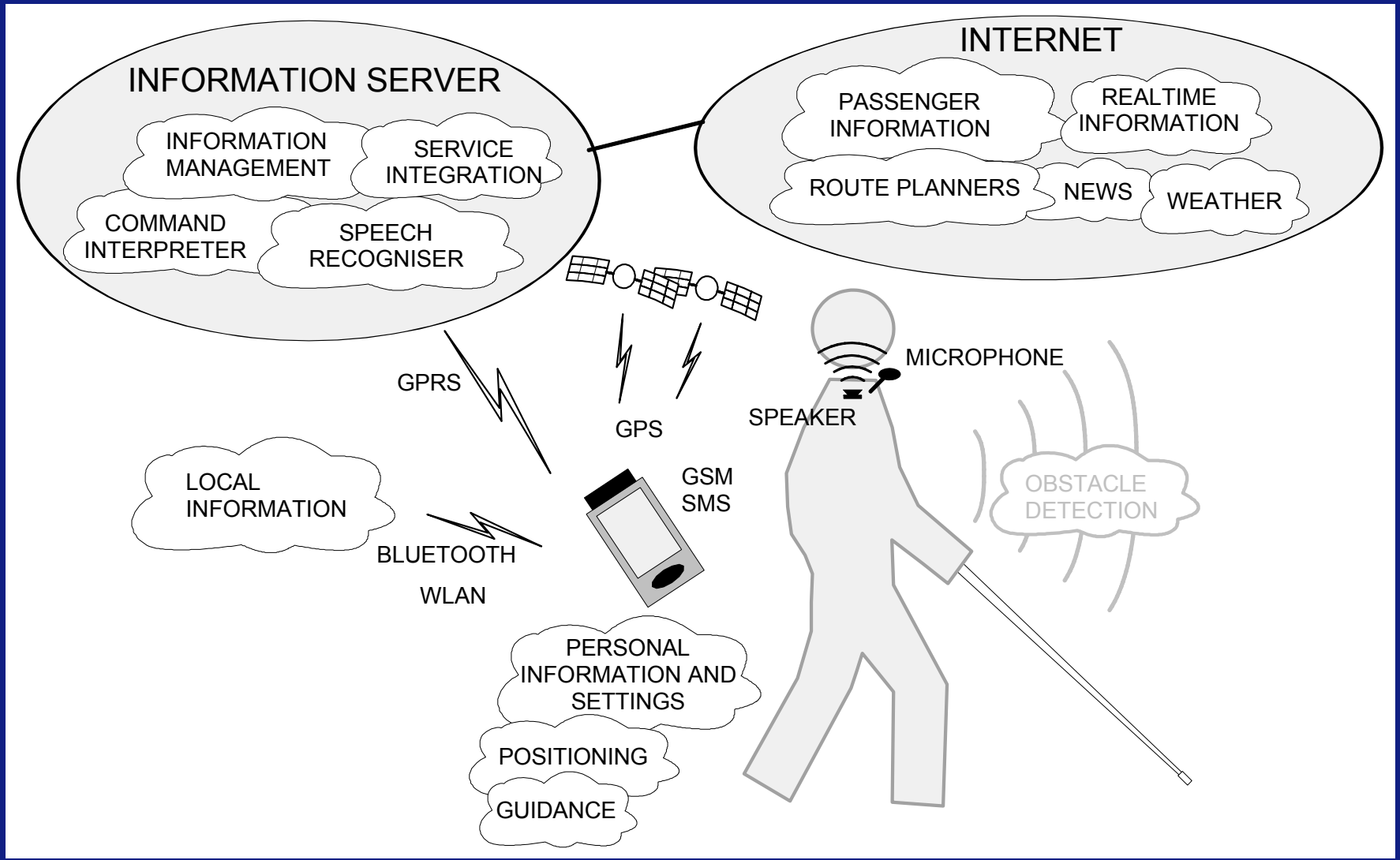
Visually impaired persons and unbroken trip chain



Used Approach

- Terminal is a standard mobile device
- Service must be easy and very fast to use
- Improve the accessibility of public transport information services and journey planners
- Possibility to use real time information
- No installations to buses or anywhere else
- Service affordable for the users, no SMS/MMS pricing
- Speech user interface
- Applicable both indoors and outdoors

Noppa Architecture

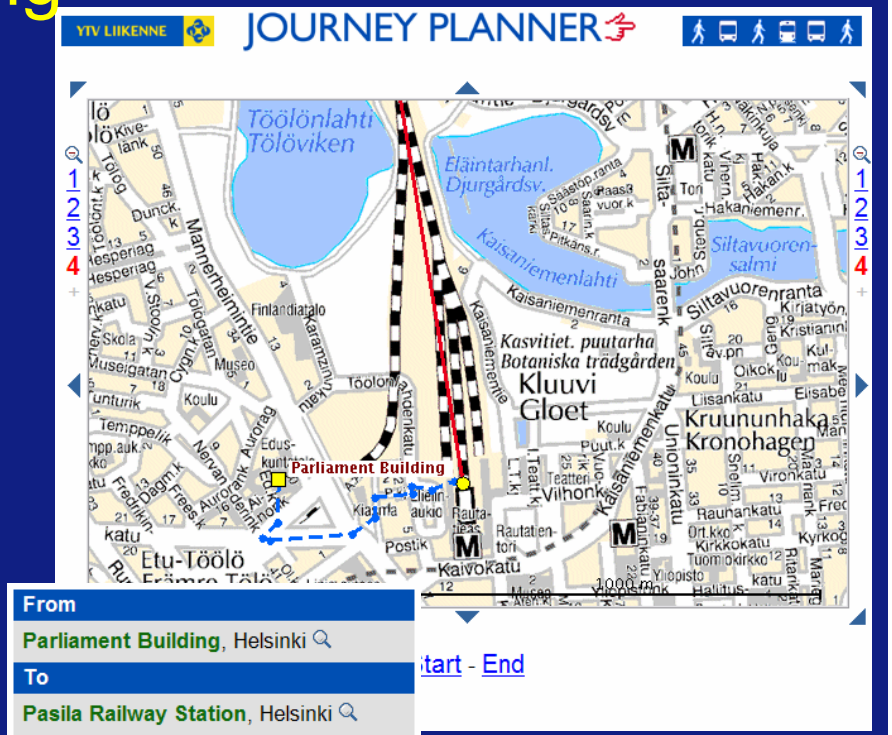


Information server

- Interpreter between the user and information systems.
- Visually impaired use speech, deaf use text or sign language.
- User centred, task oriented, context aware and proactive approach.
- Collects and integrates information from different sources and creates the detailed journey plan.
- Follows progress of the journey and seeks changes and disturbances concerning the rest of the journey.
- Mode switching is based on location and time.

Trip planning

- An advanced route planner available with HTML and XML interfaces
- Some pedestrian route information available
- Accurate bus stop coordinates
- Planner is de facto in Finland
- Public road works from Winkki-database inside Helsinki
- Additional Point of Interest and Area of Interest information



Start - End

From
Parliament Building, Helsinki

To
Pasila Railway Station, Helsinki

Time
13 : 10 ◉ Departure ○ Arrival

Date
30 . 04 . 2004

SEARCH

1. Parliament Building - Pasila Railway Station

Linja	Origin	Start at
Walk	Parliament Building	**13:10**
P-Train	Hki, rautatieas/VR	13:22
Walk	Pasila,päärata/VR	13:27
at dest.	Pasila Railway Station	**13:27**

• Show route on the map

Pedestrian navigation

- Maps are made for car navigation, information deals only street centre line, name and street class
- For pedestrian use, pavements, zebra crossings and footpaths are needed.
- Accuracy <5 meters, coordinates and form points should be included
- Routing errors can't be recognised without environment perception system
- Positioning accuracy varies, but error estimate is available
- GPS receiver: Operating time >12 hours, TTFF < 30 s
- Sensitivity in indoor/bus essential

Public transport terminals

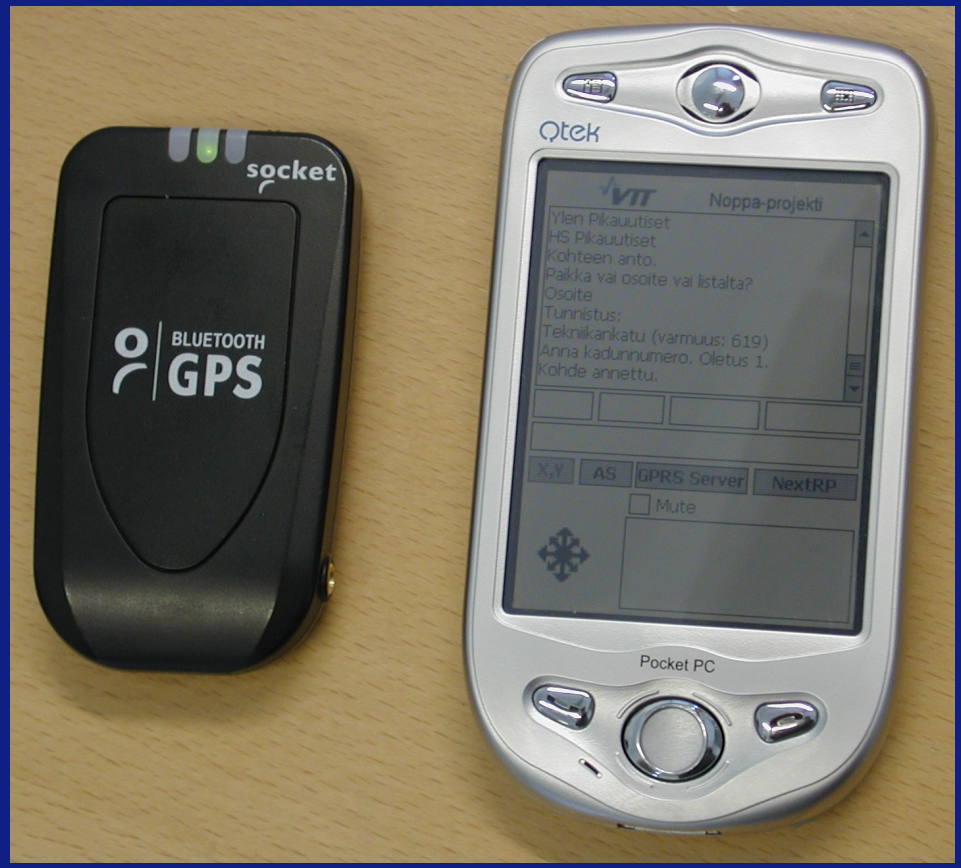
- Usually indoor environments
- No standard positioning systems indoors
- No map standard or standard data models available
- Noppa use Area of Interest (AOI)-concept
- Proximity of AOI is detected by position coordinates
- Speech descriptions for visually impaired made by mobility trainers
- Information systems should have public interface

Personal announcements

- Acoustic announcement systems may be turned off, or vehicle doesn't even have one.
- Deafs and passengers who belongs in a minor language group can't reach this information at all.
- Only information concerning our journey is delivered
- In automatic systems information is already in the text mode. *Ad Hoc* -announcements are more problematic.
- Problems with availability, standard interfaces are needed.

Current Prototype

- Speech user interface
- GPS (optional: pedometer & compass)
- GSM phone and SMS services
- Time tables, airport departures
- Route planning & guidance in four cities (bus, train, tram, metro)
- Personal stop announcements
- Early development: bus and train real time information
- Pedestrian guidance (also recorded routes, search of current address)
- Connection to a roadwork database
- News, watch, local weather, voice memo



Conclusions - Service Concept

- The prototype fills the set requirements
- Guidance system can be built on the common services for passenger information and personal navigation.
- Information has a lot of users, no blind specific databases
  ⇒ Minimises the costs and work to maintain and update
- Standard interfaces and availability through the net are essential.
- The Information server concept has shown its strength and applicability .