Enhancing Mobility and Perceived Safety via ICT : The Case of a Navigation System for Visually Impaired Users

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Introduction

For vulnerable social groups, access to information may be the deciding factor in whether or not to travel…

…and mobility influences access to jobs, social services, inclusion

ICT/ITS to meet challenges e.g. information provision

Issues with such systems/applications include:

- Accessibility due to sensory or cognitive disabilities
- Collecting and protecting personal data
- Enhancing personal integrity via increased assurance, independence, autonomy

Background – Mobility & Independence

- PT has physical barriers
  - walking & waiting, entering/exiting vehicles, personal security, etc
- PT has informational barriers
  - greater need for relevant information about the entire journey in order to plan and complete a trip
- PT has real and perceived safety barriers
  - on trip and whole journey
  - broaden concept to include the reassuring affects of access to relevant information and/or communication (help) → assurance
- Mobility is a characteristic of & precondition for modern social life. It contributes to health, independence, social inclusion, etc
- Opportunities for ICT/ITS to relieve some of these barriers via relevant, real-time information provision and access to help when needed

Background – Stockholm context

Dial-a-Ride (DaR) in the Stockholm region

- Permits for those who hae "significant difficulties with independent mobility or with traveling with public transportation…"
- All the counties in Stockholm province cooperate to provide DaR
- 71K permit holders, 2.9 million annual trips, ~600 million SEK, 85% subsidized by the county council

Stockholm's "Easy Access Project" increasing accessibility of PT & the built environment

e-Adept pedestrian navigation system (PNS)

- smart phone with GPS, dead reckoning, etc
- digital pedestrian, bicycle, & road networks & municipal databases
- PT information, support alarms, etc

Method & Instrumentation

Structured Interviews

(ordinal data → non-parametric data analysis)

Socio-demographics & travel situation

General attitudes

- assurance, independence, technology, trust, privacy, etc

Specific attitudes / Scenarios – pedestrian navigation system

- perceptions of effects on assurance, mobility & lifestyle, personal benefit, privacy, etc

Control + open questions

Respondents

Number of Respondents	23
Experience Indicator	10 yes + 13 no
Gender	16 male + 7 female
Age (years)	Average 47 (median 48), range [23, 92]
Education level	17 univ (or equivalent) + 6 high school
Main occupation	7+1 employed (ft+pt); 3 student; 4 unemployed; 8 retired
Level of visual impairment	3 totally blind from birth; 6 totally blind (with previous vision); 14 partial vision
Persons in household	14 one person; 7 two people; 2 four people
Available vehicles in hh	17 zero vehicles; 5 one vehicle; 1 two vehicles
Dial-a-Ride eligibility	23 yes + 0 no

Travel Situation

Most common mode: walking…DaR, subway, bus, train, car passenger

Use DaR* and PT at least once per week; usually travel alone

Favorable attitudes towards their sense of assurance when using PT*
& understanding the PT system

Reasons for choosing Dial-a-Ride (max 3):
16 – unfamiliar area/destination
6 – avoid PT transfers

Reasons for choosing PT (max 3):
8 – shorter (or equal) trip time
5 – familiar area/destination; Dial-a-Ride unreliable;
I try to use PT if available

* sig diff at 5% between experienced & non-experienced groups

Attitudes – Technology

Technology, in general, benefits individuals and society

> *"Good technology benefits individuals and society, but bad technology damages them." (Participant 2)*

Participants:

- express a personal interest in technology*
- own a mobile phone → concerns about touch screens
- plan their trips in advance
- feel more assured with directions
- think it would be beneficial to know their location (GPS)

* sig diff at 5% between experienced & non-experienced groups

PNS – Effects on Assurance

Perceived positive effects on assurance

Especially:

- when traveling alone
- unplanned trip
- unfamiliar destination

→ PNS most likely used for unaccompanied travel, potentially in lieu of a personal guide

PNS – Effects on Mobility & Lifestyle

Participants feel that they would more often:

- travel alone (mean = 3.61)
- travel to unfamiliar destinations (mean = 3.61)
- travel with PT instead of DaR (mean = 3.87)

"The system would greatly increase my independence" (mean = 4.26)

→ More than traveling alone…also spontaneity, self-reliance

"I would greatly benefit from such a system" (mean = 4.35)

- facilitation & convenience
- independent living & mental health

Interest in purchase…or government subsidy (as a matter of principle)

PNS – Additional Concerns

Continued support for such projects in general

> *"Nothing usually happens with handicapped-related projects after they are finished. The technology isn't updated." (Participant 2)*

…indeed Stockholm is currently trying to develop a sustainable business model for maintenance and operation

The nature of the project

- why develop yet another system
- how to maintain stakeholder interests and balance ownership

Need for a continued focus on the accessibility of the built environment

- PT accessibility > technology
- faster communication to responsible parties and problem fixing
- illegal placement of signs on sidewalks, conflicts with bicyclists, etc

Conclusions

Potential to enhance mobility & independence (personal integrity)

- previous experience has little to no influence on attitudes
- users consider technology advantageous, already carry mobile phones, utilize information to plan travel, etc
- high perceived personal benefit
- interested in purchase
- increase in independence
- increase in use of public transportation over Dial-a-Ride

Conclusions

Ethical implications

- promises of enhanced independence and autonomy
- dangers of exclusion and powerlessness, new layers of vulnerability

→ smart technology <> ethically sound technology

→ government and law lie off the pace of technology;
need to be proactive instead of reactive

→ technology not a magic bullet…do not forget the built environment

→ need a coordinated effort on multiple fronts to meet broader social goals of social inclusion, accessibility (trans., tech., info.)

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Thank you for listening!

Questions & Discussion?

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