The co-evolution of taxi drivers and their in-car navigation systems

Fabien Girardin, Universitat Pompeu Fabra
2008 AAG annual meeting, April 15, 2008
Motivation

• 17% U.S. adults use a GPS location device/service. 33% of them use it in their vehicle (Harris Interactive, 2007)

• Relative market success with issues of poor integration of the technology into driving practices

• Chance to observe how users adapt to the technology and adapt the technology to their needs (co-evolution - O’Day et al, 1996)

• Observe how positioning and navigation technologies integrate into/change already existing practices and how practices influence the use of the technology

• Inform the design
Aim

• Similar approach as other research on understanding mobility practices with technology devices (Activities not as isolated events, but situated within the context)

• Socio-technical lenses to analyze the complexities of changes created by the introduction of new technologies

• Acknowledge change and adaptability as inherent part of location-aware system use

• Focus on drivers for whom mobility is a labor
Previous works

• We know that there are issues in realability, wayfinding, the support of mobile workers

• Interaction with the in-car device result in distraction from driving task (often in the news). Studies at an experimental level (see Burnett’s work)

• However, device-centered perspective falls short of full appreciation of the envolvment people and their use of novel mobility enhancing technologies.

• It neglects the role of the user in co-constructing technology (technology studied in context)

• Lack of empirical evidences. Particularly useful for the design of future location-aware systems
Focus

Analysis of use, adoption, and appropriation

Not focused on how the system work but how the systems are used

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition</td>
<td>Why and how does this new technology get integrated among other artifacts, and how satellite navigation systems impacted the use of these artifacts.</td>
</tr>
<tr>
<td>Gap in expectation</td>
<td>Understand if the reasons to adopt are matched in practice.</td>
</tr>
<tr>
<td>Appropriation</td>
<td>How much the system can be trusted and what is the reaction when the quality is not met (awareness of the limitations/imperfections). Importance of the knowledge of the urban environment.</td>
</tr>
<tr>
<td>Access to the geoinformation</td>
<td>What kind of geoinformations are used by the drivers both from the system and from the environment (experience, radio, interaction with customer, context such as visibility to landmarks).</td>
</tr>
</tbody>
</table>
Method

- Interpretative and not statistical
- Examine situated activities
- Ethnography, interviews supported by in-car observations
- Users accounts
- Small sample (12 taxi drivers) but, but rich data (extended field notes of accounts and observations). Coded as themes emerges
- 6 months to 25 years of experience
Barcelona taxi drivers: massive population of early adopters, strong practice of relying on mobile technologies and maps to support their work
Findings
Eco-system of artifacts

- computer assisted dispatch
- satnav
- radio, mobile phone
- newspapers and notes
- "guia"
Sources of information

• satnav (discussed later)

• “Guia”: useful in areas with points of reference

• Mobile phone: primarily a social link, used when “really lost”

• Newspaper: keep general knowledge of the activity in the city

• Personal notes: list of “unofficial” POI not present in satnav or “Guia”

• The customers is a prime resource for information
Acquisition of tranquility

- Acquisition of satnav is not about performance, safety, or efficiency

- Biggest moment of uncertainty is to drive to unknown neighborhoods (villages, remote business areas)

- Satnav is a life saver for getting to destination

- Relieves the car driver to closely observe the environment, to look out for road signs or landmarks

- Relaxes the customer “they know they cannot be cheated with it”

- HOWEVER, the less experience drivers are confronted to system imperfections
Knowledge of the city

- Different appropriation depending on the knowledge of the space

- Inexperience drivers demand of accurate and updated information quickly reached the limits of the systems (unable to judge the accuracy or improvise)

- Their dependance made them rely on the “guia”

- Satnav as a learning tool (passive mode)

- Tendency to rely on it less and less with the experience (for navigation). Passive mode used to keep track of radars or speed

- Experienced drivers stopped using the “guia”
Breack the myth of deskilling

• Assumption that satnav makes the practice accessible to cheap labor

• Satnav supports a reduced understanding of the city

• This study shows that knowledge is acquired by multiple sources, technology do not replace it
The different granularity of information

- To go: indication of an area, a neighborhood. Coarse-grained (no indications to avoid misleading recommendation).

- To arrive: specific building number. Fine-grained (with indications). Satnav engaged at a stop, slow traffic.

- To return: Need of landmark. Very cautious in the path taken. Push “barcelona” or “plaza espana” to get back to familiar places. Both fine-grained/coarse-grained.
Implication for design

• Big issue of uncertainty and its representation. Reveal the ambiguity of positioning and incomplete map data (important for inexperienced drivers)

• Distinctive usage in a journey. Tailor the navigation to the context (go, arrive and return)
Conclusion

- First chance to observe how users adapt to the technology and adapt the technology to their needs in the context of location-aware systems.

- Limitations in the generalization: Spanish drivers (cultural bias), males (gender bias), workers (activity bias)

- Wayfinding, tendency to be used less over time

- Not necessarily deskilling of navigation and orientation

- Maybe deskilling in social. Transfer of the trust from social interacting to machine-supported. May lose interaction with the client, important in the learning process. Or new kind of interaction