Towards smart and sustainable multimodal public transports based on a participatory ecosystem

Nic Volanschi
Inria Bordeaux
Outline

• Public transport applications
• Consumer vs participatory assistants
• Benefits of a participatory ecosystem
• Conclusion & future challenges
Public transport applications

- mobile computing
- open data (RT)
- Bicycle Sharing Systems

Static trip planners

Contextual assistants:
- step-by-step guiding
- notifications about incidents
Consumer assistive app

Open data

Ongoing trip
Position
Ideal trip
Participatory assistive app

- Ideal trip
- Position
- Ongoing trip
- ID

- Greener assistance
- Smarter resource management
- Smarter incident bypassing

Smarter Infrastructure planning
Green assistance scenarios

ongoing trip

ideal trip

ID = TicketNo

App notifications
Green assistance scenarios

- ID = TicketNo + phoneNo
- ongoing trip
- ideal trip
- SMS notifications
Green guidance benefits

- Owns a mobile phone
- Owns a smartphone
- Installs assistive app
- Data connection
- Keeps app on
- GPS on
- ...

...
The VIP prototype

- State-of-the-art assistive app
  - enhanced for providing user data
- Server part
  - monitors traffic incidents
  - alerts BSS operator on resource shortages
- TBD: integrate real operator, test optimization actions
Conclusion

• Participatory apps go beyond community-based apps
  • leverage operator’s sensors infrastructure
  • feed (anticipated) information guiding operator’s actions
  • provide direct measure of missing operator’s resources

• Remaining challenges
  • User acceptance
  • Inter-operability and long-term maintenance
  • Established simulation testbed
Thanks!
Driving factors in transport planners

2007: iPhone 1
2009: Android 1.0
2004: OECD declaration
2009: data.gov
2005: Velo’v (Lyon)
2007: Velib (Paris)
2015: 800+ BSSs
Assistive transport apps: Limitations

• Consumer-only model
  • consume open data & aggregate it with user data
• Perform redundant computations (based on GPS)
• Transporter cannot use useful user data
  • intended destination, trip schedule
  • future resource needs
• current position
• ideal trip (if unfeasible)
Participatory optimizations

- Greener assistance
  - Turn the GPS off
  - Navigate offline
  - Use any cellphone
- Smarter resource management (BSS)
- Smarter incident bypassing
- Smarter infrastructure planning
Future work

• Measure scalability of server side (Hist)
  • DiaSuite server / DiaSwarm server

• Measure resource anticipation times (Hist)

• Compare “exact” vs. predicted needs (Sim)

• Test effectiveness of rebalancing actions (Hist/Real)

• Measure user acceptance (Quest)

• Measure user satisfaction (Real)