AV user acceptance & communication requirements of other road users when interacting with AVs

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Trikala: Evangelia Portouli, Giannis Karaseitanidis, Xristina Karaberi,
CityMobil2 Demonstration Locations

La Rochelle, France:
- November 2014 to April 2015
- Route 1.7km including 7 station stops
- 204 participants
- Mainly operating in shared space

Lausanne, Switzerland
- April to August 2015
- Route 1.6km including 6 station stops
- 145 participants
- Mainly operating on EPFL campus

Trikala, Greece
- September 2015 to February 2016
- Route 2.5km including 8 station stops
- 315 participants
- Mainly operating in dedicated lane
Interviews, Focus Groups, On-Site Surveys & Video Analysis

(N = 24)

(N = 20)

(N = 349)
La Rochelle = 204
Lausanne = 145
Trikala = 315
Questionnaire Study

• 42 questions
  • 8-10 minute completion time

• Demographics & travel patterns

• Interaction & communication requirements (Merat et al., under review)

• Unified Theory of Acceptance and Use of Technology (Madigan et al., 2017)
Population Characteristics

![Population Age Distribution Graph]

- La Rochelle
- Lausanne
- Trikala

![Gender Distribution Bar Graph]

- Male
- Female

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Key Questions

• What factors influence users’ behavioural intentions to use ARTS?

• How do cyclists and pedestrians feel (safety/priority) about the ARTS?

• What information do cyclists & pedestrians require from the ARTS?
What factors influence intentions to use ARTS?
La Rochelle & Lausanne

• Applying the Unified Theory of Acceptance and Use of Technology (UTAUT)

• Predictors account for 22% variance in behavioural intentions to use an ARTS

• Performance expectancy strongest predictor

• Effort expectancy least important

What factors influence intentions to use ARTS?

Trikala

- Applying the Unified Theory of Acceptance and Use of Technology (UTAUT)

- Predictors account for 58.3% variance in behavioural intentions to use an ARTS

- **Hedonic Motivation** the strongest predictor

- **Performance expectancy**, **social influence** and **facilitating conditions** also important

- Effort expectancy not significant

*Madigan et al. (2017). What influences the decision to use automated public transport: Using UTAUT to understand public acceptance of automated road transport systems. *Transportation Research Part F*, 50, 55-64*
Opinions of Other Road Users: Safety and Priority?

Images from La Rochelle
Do you feel more safe?

*Merat et al. (under review). What externally presented information do VRUs require when interacting with fully Automated Road Transport Systems in shared space?
Who has priority?

*Merat et al. (under review). What externally presented information do VRUs require when interacting with fully Automated Road Transport Systems in shared space?
What information?

- Information required on whether other road users had been detected.
- Information also desired on ARTS stopping, turning, and starting intentions.
- Explicit information on speed of travel not required.
- No effects of Road Markings.
- Preferences for how information should be presented differed across locations:
  - Audio spoken word / Audio signals.
  - Visual lights / Visual text.
Focus Group: La Rochelle

Priority

• Direction of travel not obvious
• Not sure who had priority
• Would prefer demarcations
• Not sure if the vehicle can identify hazards?
• Suggested use of horns and lights for detection and communication

Other Focus Group Comments

• **Visibility**: Colour maybe too discrete, brighter colour to make it easy to see / identify.
  - In La Rochelle yellow would be more suitable to fit in with other public transport modes.

• **Sound**: Lack of engine noise a problem for its localisation, especially for the visually impaired.

• **Speed**: Too slow, but probably ok in a shared space

• Better for **tourists** than commuters.
Summary & Conclusions

• User acceptance of public AVs likely to be influenced by enjoyment of use, how well they perform, social norms, & facilitating infrastructure

• As the deployment of automated vehicles become commonplace, the views of other road users should be sought
  • In particular, understanding how VRUs (and other vehicles) interact and communicate with a ‘driverless’ vehicle is important
  • This study shows that VRUs definitely want some information and (at the moment) prefer the ARTS to be in a dedicated space.
  • They assume they have priority in a shared space.
Thank you