Piloting Site Questionnaire: User and Acceptance Evaluation

L3Pilot Final Event

Professor Natasha Merat
Dr Yee Mun Lee, Dr Ruth Madigan, Dr Tyron Louw

UNIVERSITY OF LEEDS

Pilot Sites and Questionnaire: 3 Urban Chauffer and 11 Motorway Chauffer

System Description in Brief

Capabilities

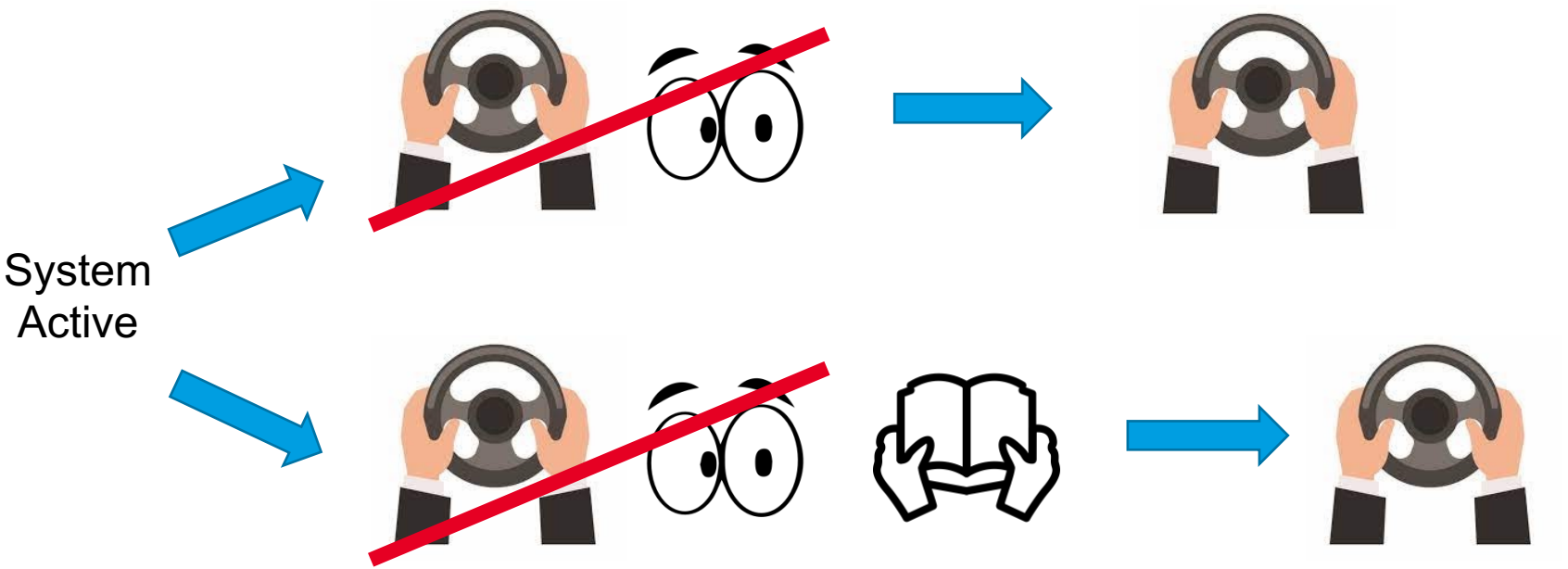
- Automatic Lane Changes
- Speed/Distance
- Lane Keeping/Centring/Following
- Motorway Exits and Entrances

Limitations

- Construction sites
- Extreme weather (i.e. heavy rain and snow)
- Night time

https://www.flickr.com/photos/chriswaits/6245329787
https://www.geograph.org.uk/photo/4216151
https://www.flickr.com/photos/traveller_40/6055806530

Motorway Chauffeur System - Method



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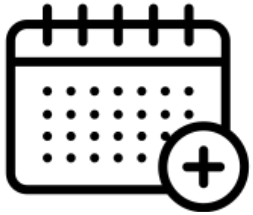
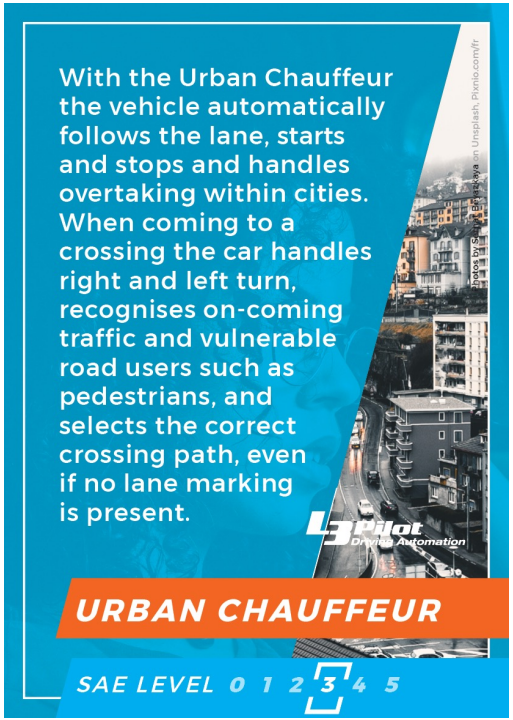


May 2019 – September 2021

Various Locations in Europe
Traffic: quiet→ traffic jam

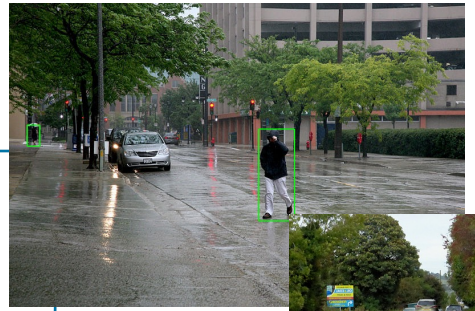
Ave: 1 to 1.5 hours
Min: 30 mins, Max: 6 hours
Between 60 and 133km

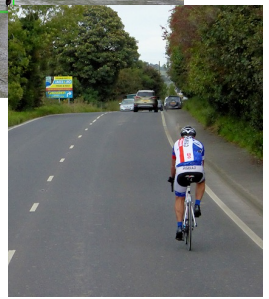
Urban Chauffeur System



Capabilities

- Detect Vulnerable Road Users



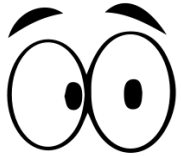


Limitations

- Extreme weather (i.e. heavy rain/snow)
- Detection of traffic lights

Urban Chauffeur System - Method

Most of the participants were front seat PASSENGERS, and they were asked to

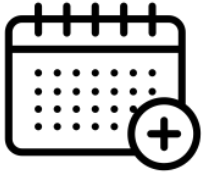


Focus, observe and experience the system

In some studies: allowed to engage in a secondary task because they were the passengers

In some studies: participants were also asked to imagine sitting in the driver's seat be aware of the take-over request from the vehicles.

Urban Chauffeur System - Method



September 2020 to November 2020

Several locations in Europe. Multiple-lane urban roads, including signalised and non-signalised intersections, pedestrian crossings, traffic lights, presence of bicycle lanes. The speed limit of urban roads were 50 km/h.

The test routes were 2.4 km to 2.8 km per route, the drives were between 10 and 40 mins (one or two laps).

Overall Method

Briefing:
Motorway: ✓
Urban: ✓

Practice Drive:
Motorway: ✓
Urban: NA

Motorway:
- Monitoring hazards & the system
- Prompt the driver to take over during critical situation
- In some cases, taking over control
- Triggering Level 3 availability
- Ensuring travel directions were correct

Urban:
- Seated in the driver's seat
- Similar role as Safety Driver on Motorway
- Did not have to warn the passengers

User Acceptance & Evaluation

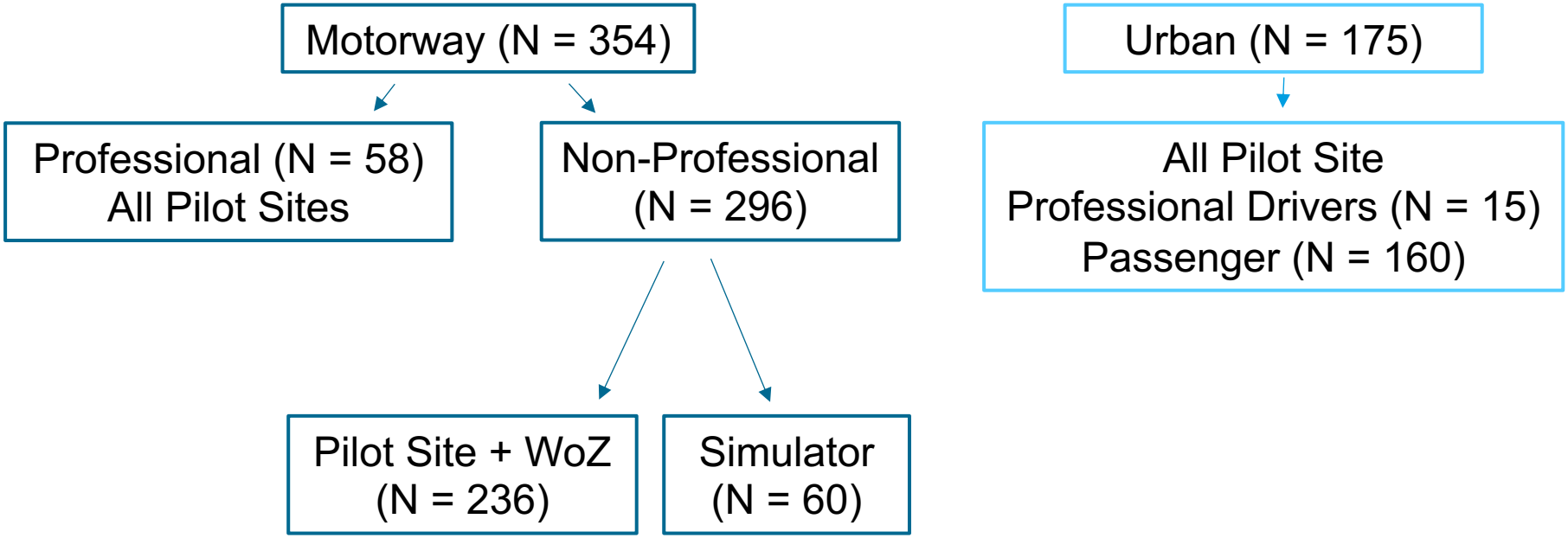
User Acceptance & Awareness

- Are drivers **willing to use** an Automated Driving Function (ADF)?
- What is the **user acceptance** of the ADF?
- What is the impact of ADF on **driver state?**
- What is the impact of ADF use on **driver awareness?**
- What are **drivers' expectations** regarding system features?

User Experience

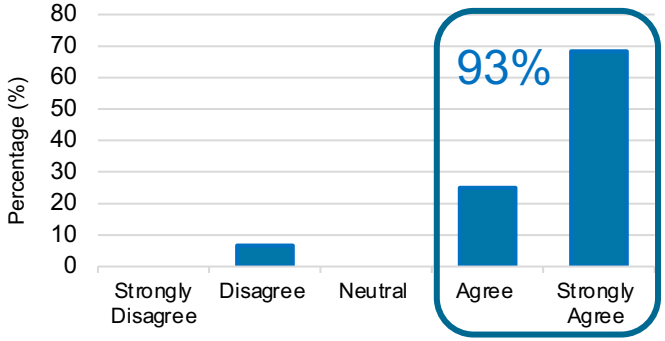
- What is drivers' **secondary task** engagement during ADF use?
- How do drivers respond when they are required to **retake control?**
- What is the impact of ADF use on **motion sickness?**

Data Grouping

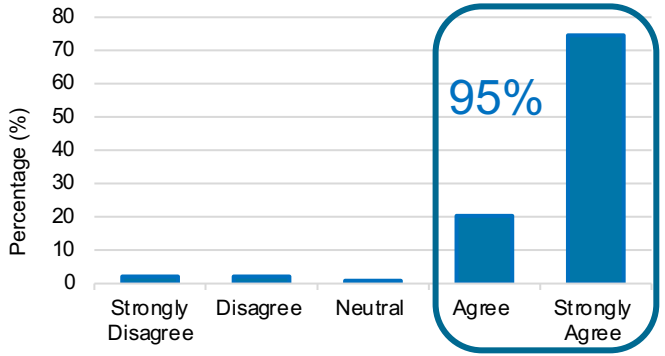


Willingness to Use – Perceived Safety/Trust/Usefulness

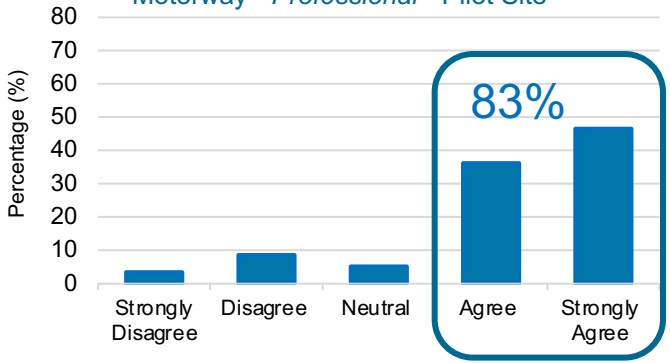
Motorway - *Non-Professional* - Simulator



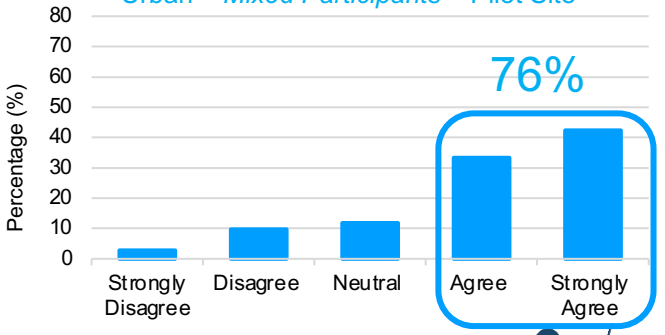
Motorway - *Non-Professional* Pilot Site/WoZ



Motorway - *Professional* - Pilot Site

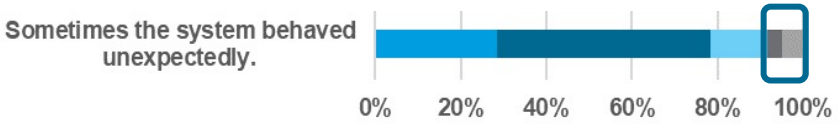


Urban – *Mixed Participants* – Pilot Site

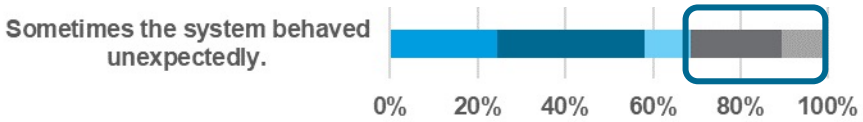


System Performance

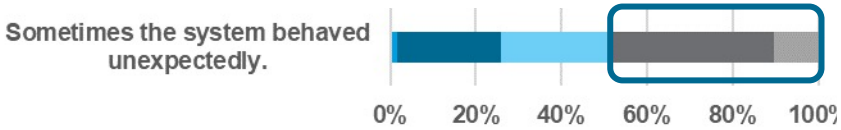
Motorway – *Non-Professional* - Simulator



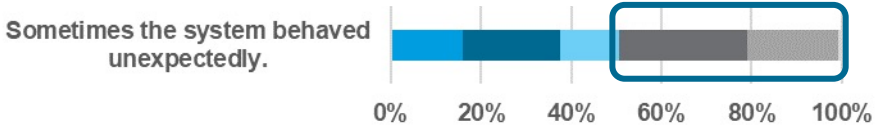
Motorway – *Non-Professional* - Pilot Site / WoZ

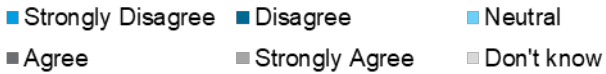


Motorway – *Professional* - Pilot Site



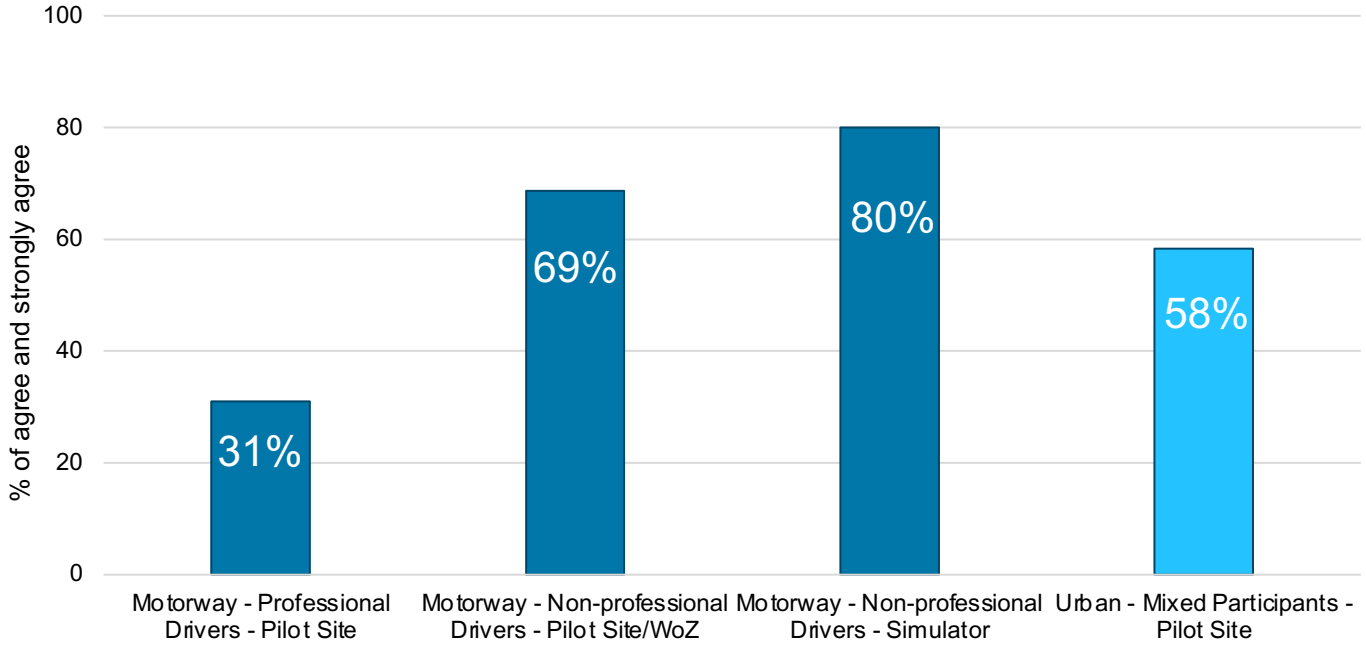
Urban – *Mixed Participants* - Pilot Site





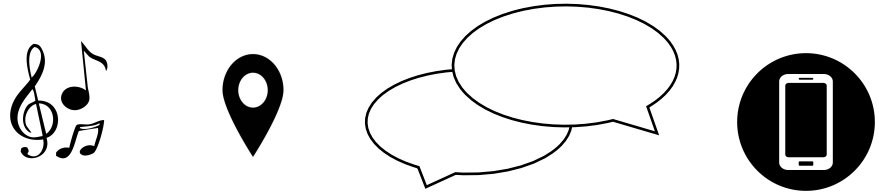
The system acted appropriately in all situations

The system worked as it should work.



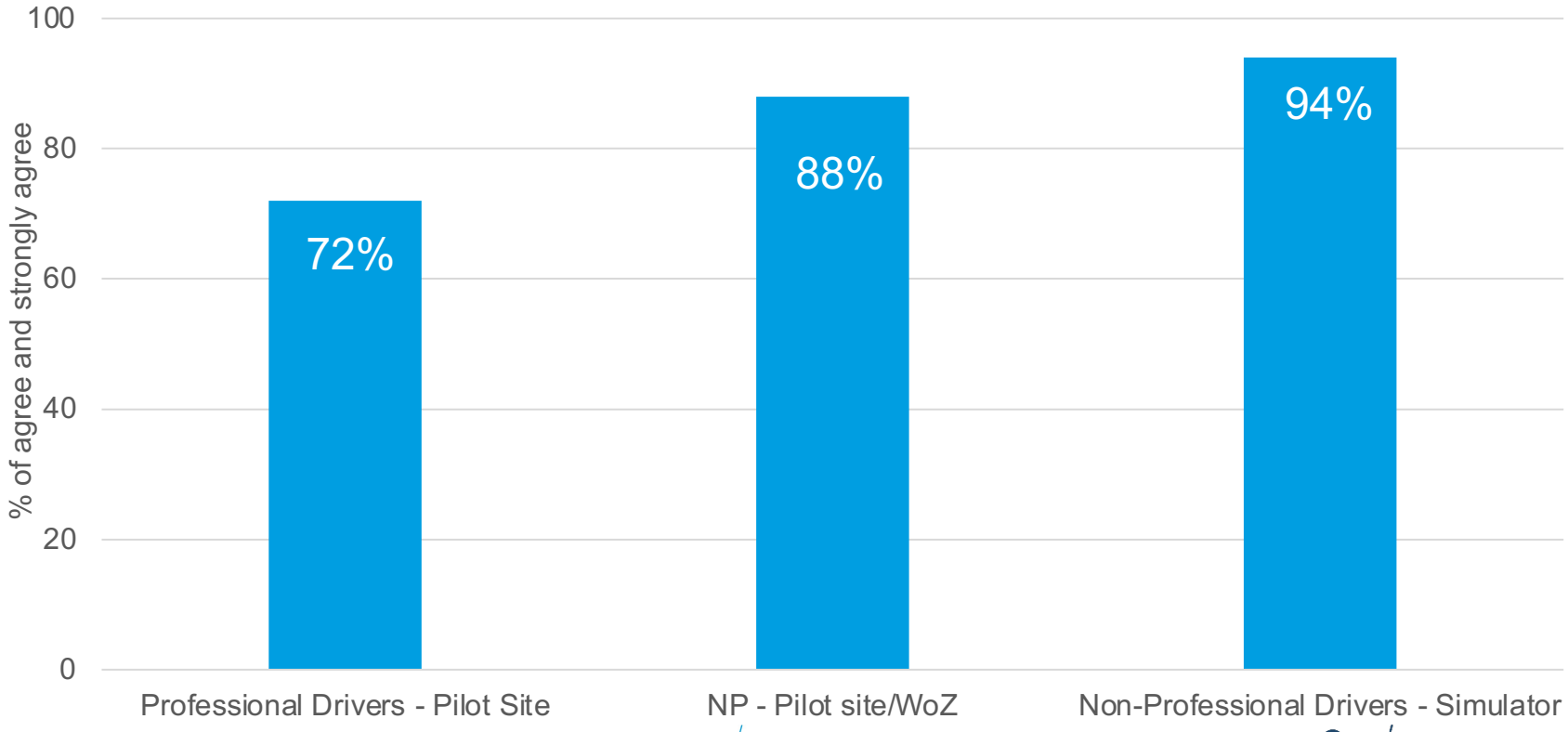
Secondary task engagement and driver comfort

- Engagement in Non-driving related activities was high for *non-professional* drivers in Motorway (82% and 98%); compared to *professional drivers* (41%) and Urban (56%)
  - music, radio, audiobook
  - navigation
  - interact with a passenger
  - smart phone apps, texting



- Majority agreed that the system was comfortable (average 88%), with no motion sickness (average 98%)
  - Less so for motorway junction areas and lane change behaviours (potentially when interactions were involved)

During the takeover, I always felt safe (Motorway)



Summary

- Drivers who experienced Motorway and Urban systems were generally positive
- Room for improvement to match users' expectations
- Professional drivers were less positive about the Motorway system than non-professional drivers.
- A hierarchical regression model showed that *Willingness to Use* increases with opportunity to engage in secondary tasks and the usefulness of the system.
- The hierarchical model also showed that in the Motorway, system familiarity and driver type did not affect *Willingness to Use*– but it did in Urban (small effect)
- Caveats:
  - Pilots studies
  - Urban: Passengers, not drivers.

Thank you for your kind attention.

Natasha Merat
n.merat@its.leeds.ac.uk

Yee Mun Lee
y.m.lee@leeds.ac.uk

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