



What do Vulnerable Road Users think about ARTS?

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Acknowledgements

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- ✓ Lausanne:
 - ✓ Anne Koymans Mellano, Philippe Vollichard,
- ✓ Trikala:
 - ✓ Evangelia Portouli, Giannis Karaseitanidis, 'Xristina Karaberi

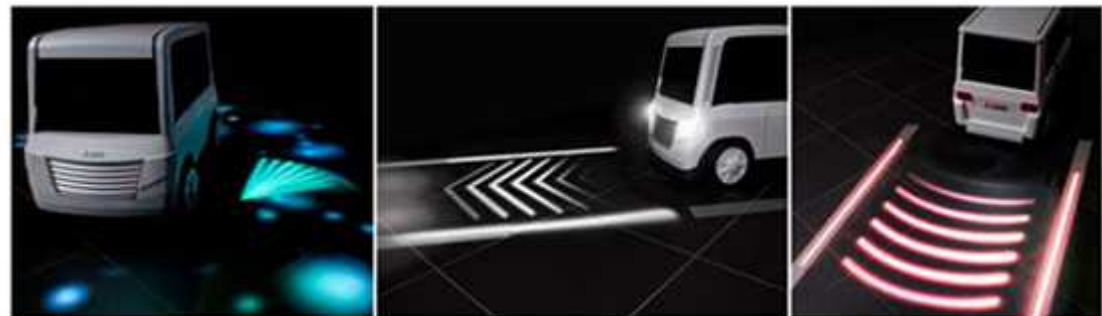
Main aim:

- ✓ How do cyclists and pedestrians feel (safety/priority) about the ARTS?
- ✓ What information do cyclists and pedestrians require from the ARTS?
- ✓ What kind of interactions do they have with the ARTS?

Human Machine Interface



Nissan



Door opening indicator

Forward indicator

Reverse indicator

Mitsubishi

Google's patents

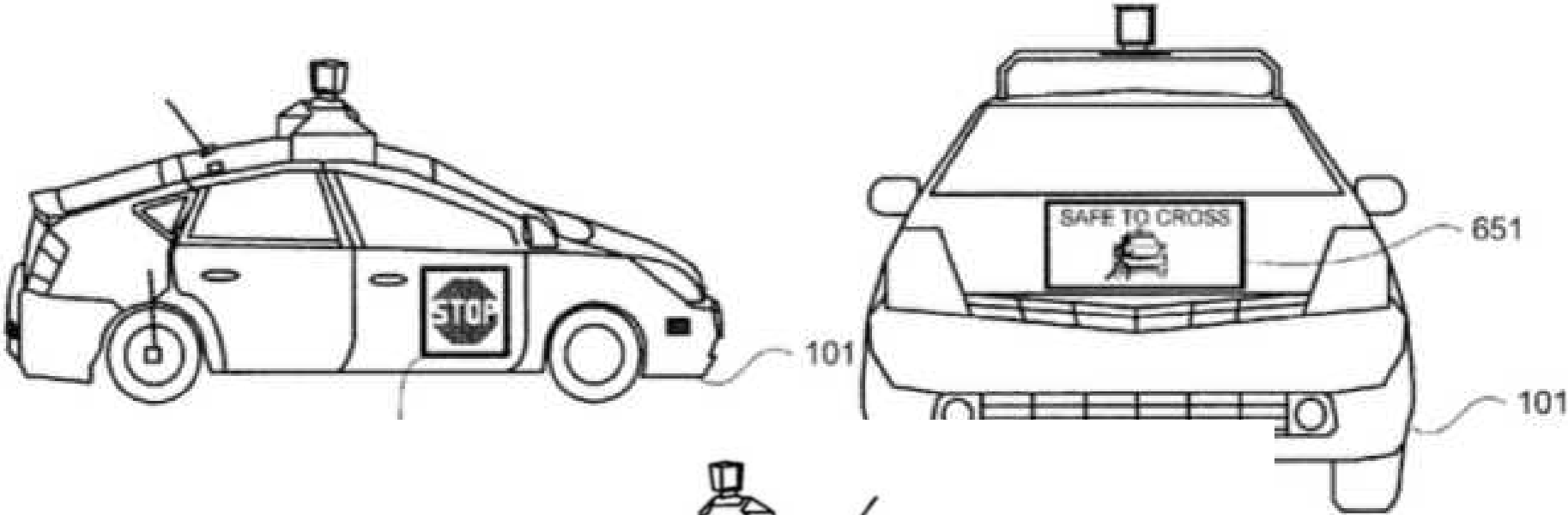
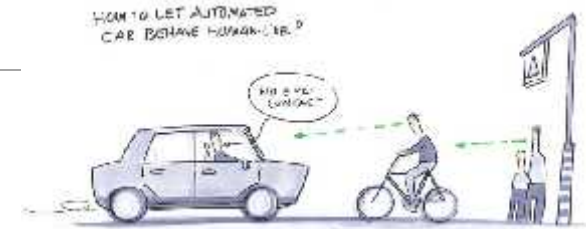


FIGURE 6C



WP18 Main Aims



Source: SMART 64

- “WP18 will follow the technological progresses (and challenges) of the vehicles during the demonstration with a specific focus on human factors (how do people outside react to automated vehicles)”

• **Tasks:**

- T1: Users’ comprehension of (and attitude towards) automated vehicles (Interviews)
- T2: Qualitative analysis of road users’ interactions and perceptions (Surveys)
- T3: Use of sensors and videos to observe collisions/near collisions

Pedestrians and Cyclists

• **Deliverables:**

- D18.1 – Road users’ acceptance and understanding of automated vehicle interactions –(M42)
- D18.2 – Report on measurements of interactions with other road users – (M48)

Timeline and partners

Partners: Inria, ITS Leeds, DLR and VisLab



Methods



N = 26



N = 664



- La Rochelle (Robosoft)
- Lausanne (EZ10)
- Trikala (Robosoft)



N = 20

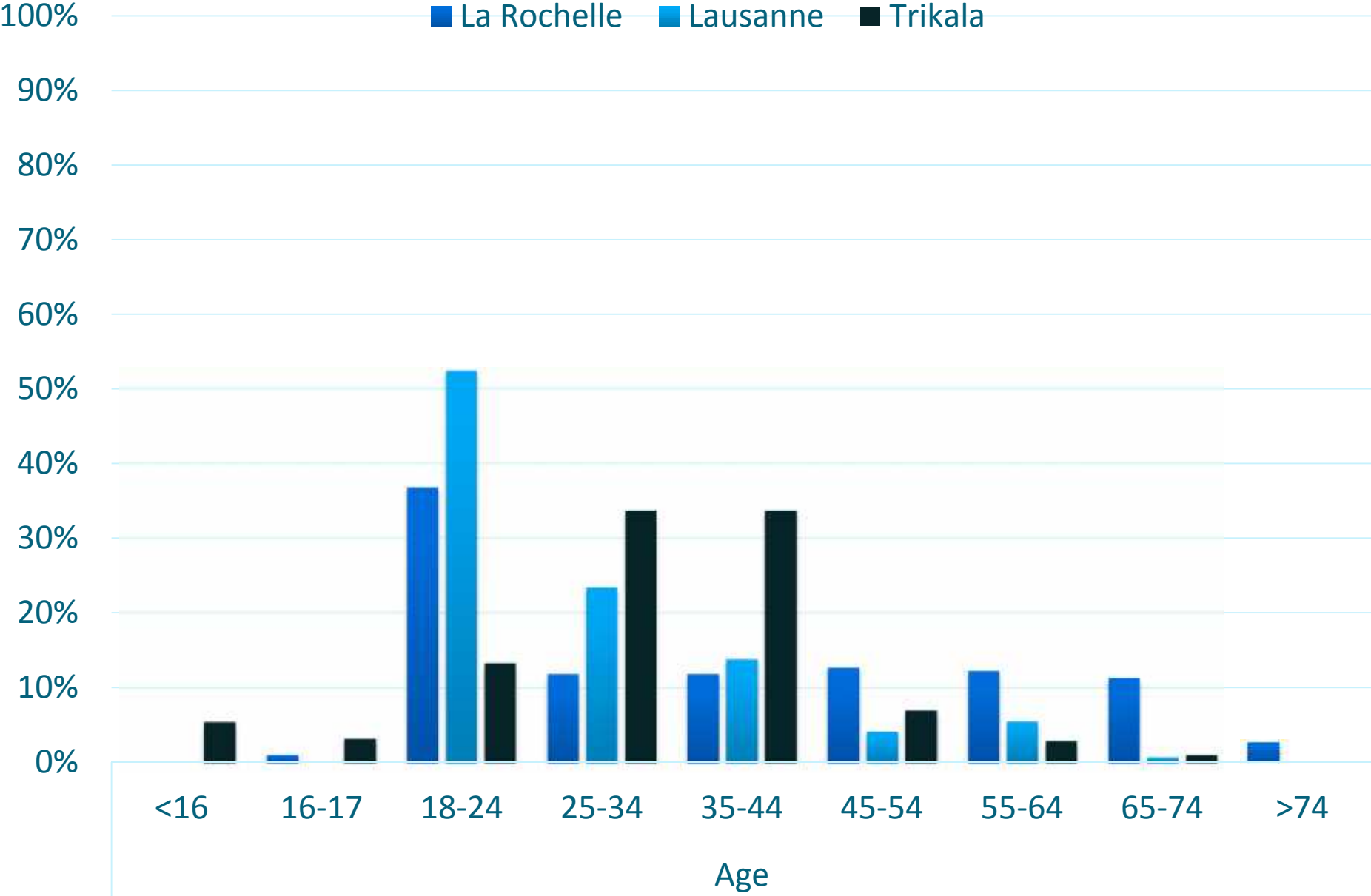


The Questionnaire

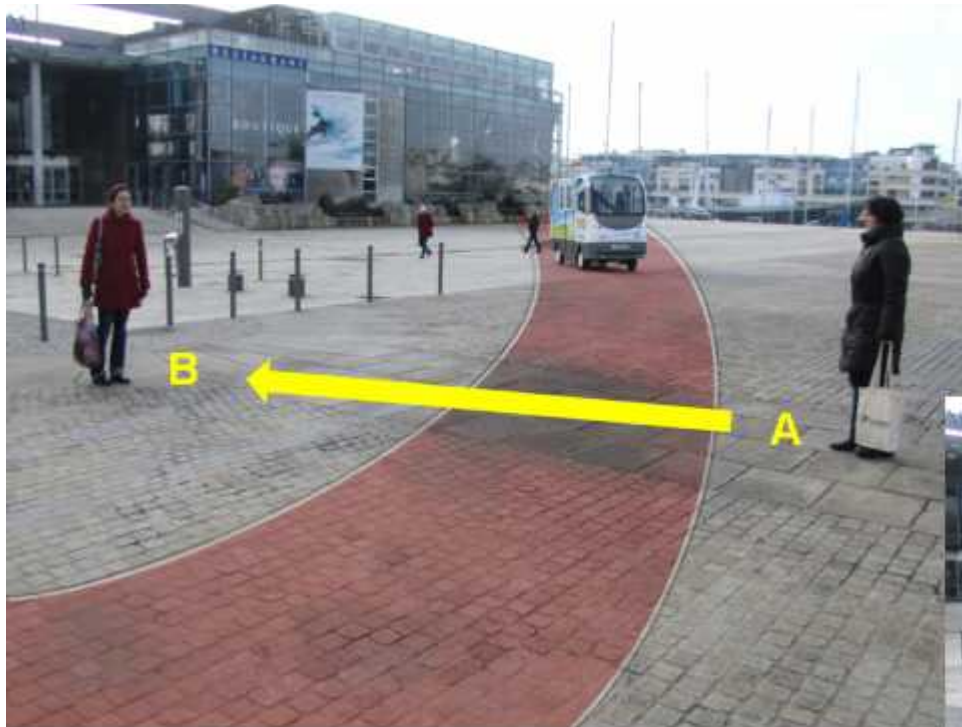
- ➔ **20 questions** (but some with sub sections)
 - ➔ Demographics
 - ➔ Questions on *Unified Theory of Acceptance and Use of Technology* (UTAUT, Vankatesh et al, 2003)
 - ➔ Questions related to interaction/information signals for safety, detection, speeding, turning, stopping...

- ➔ Completion time: ~ **8 ± 3 mins**

Demographics



Survey: Safety and Priority?

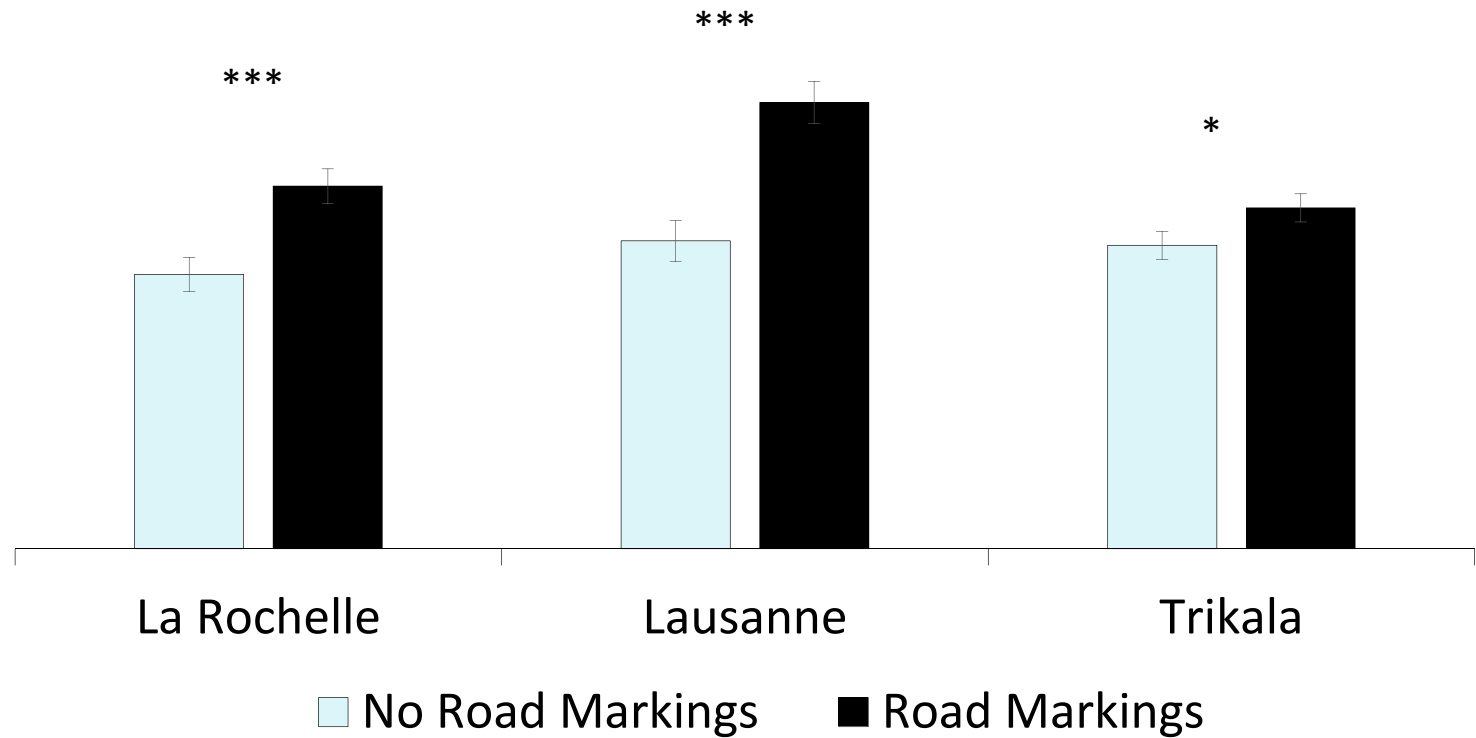


Do you feel safe?

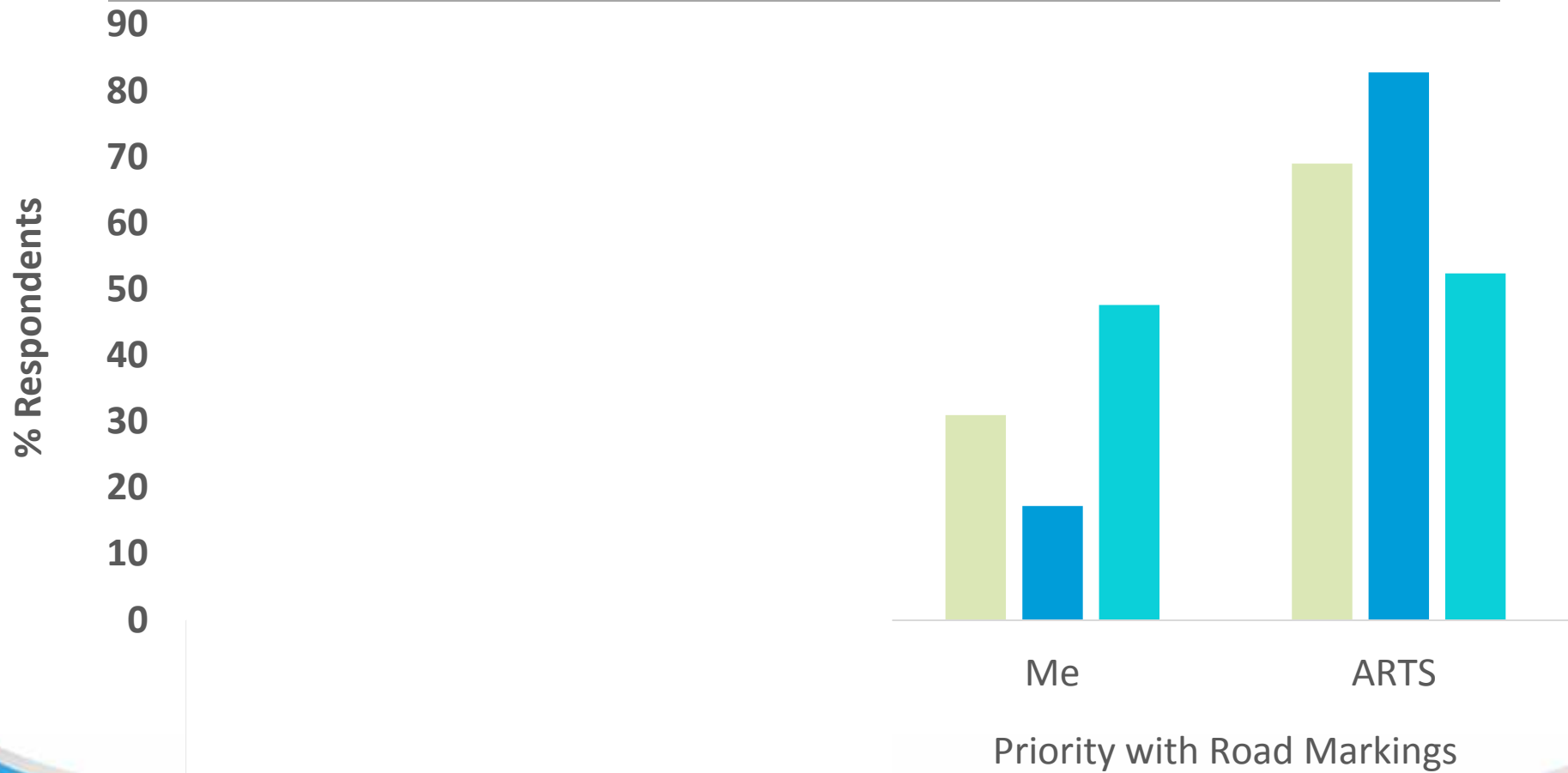
More safe

As Safe

Less Safe



Who has priority?



■ La Rochelle ■ Lausanne ■ Trikala

What information more important in the absence of road markings?

- ✓ *whether it is stopping*
- ✓ *whether it is turning*
- ✓ *how fast it is going*
- ✓ *whether it is going to start moving*
- ✓ *whether it has detected me*

What information more important in the absence of road markings?

✓ Overall:

- ✓ Most important: detection
- ✓ Least important: speed of travel

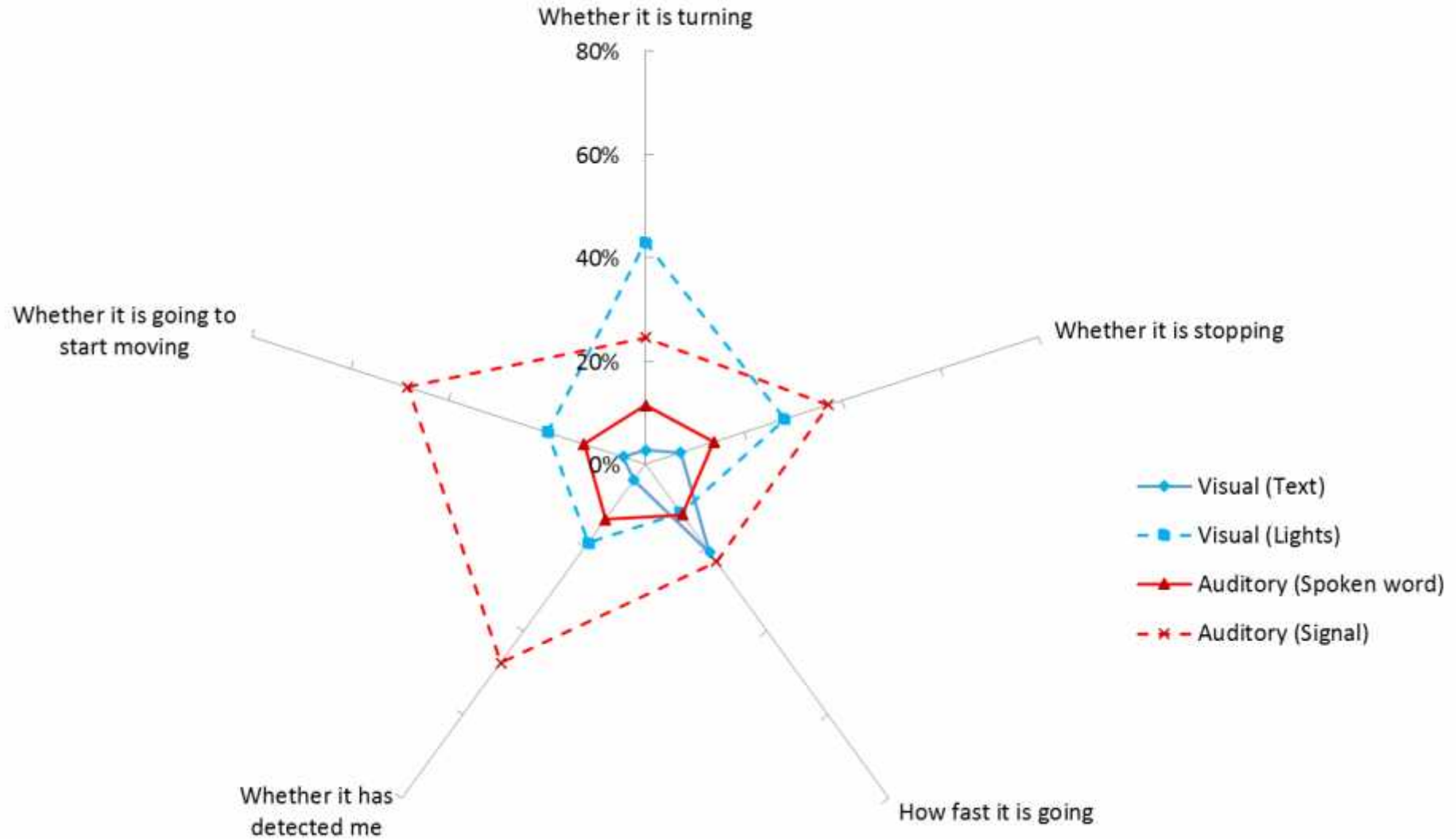
✓ Per site:

- ✓ La Rochelle, if it has detected me and turning
- ✓ Lausanne, all but speed
- ✓ Trikala none

How would you like to receive this information?

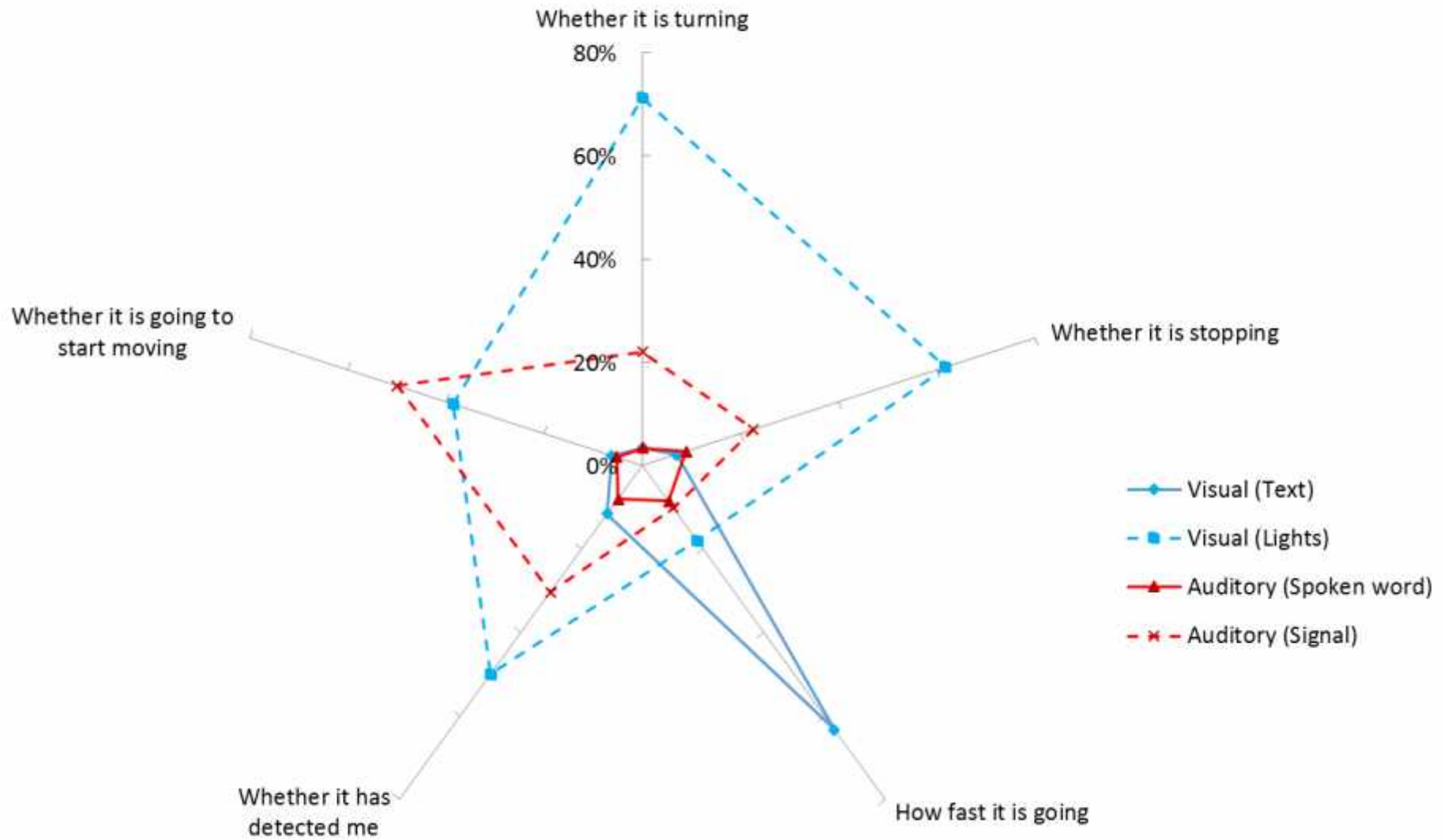
- ➔ Visual (Lights)
- ➔ Visual (words)
- ➔ Auditory (tones/signals)
- ➔ Auditory (words)

La Rochelle modality preferences without road markings



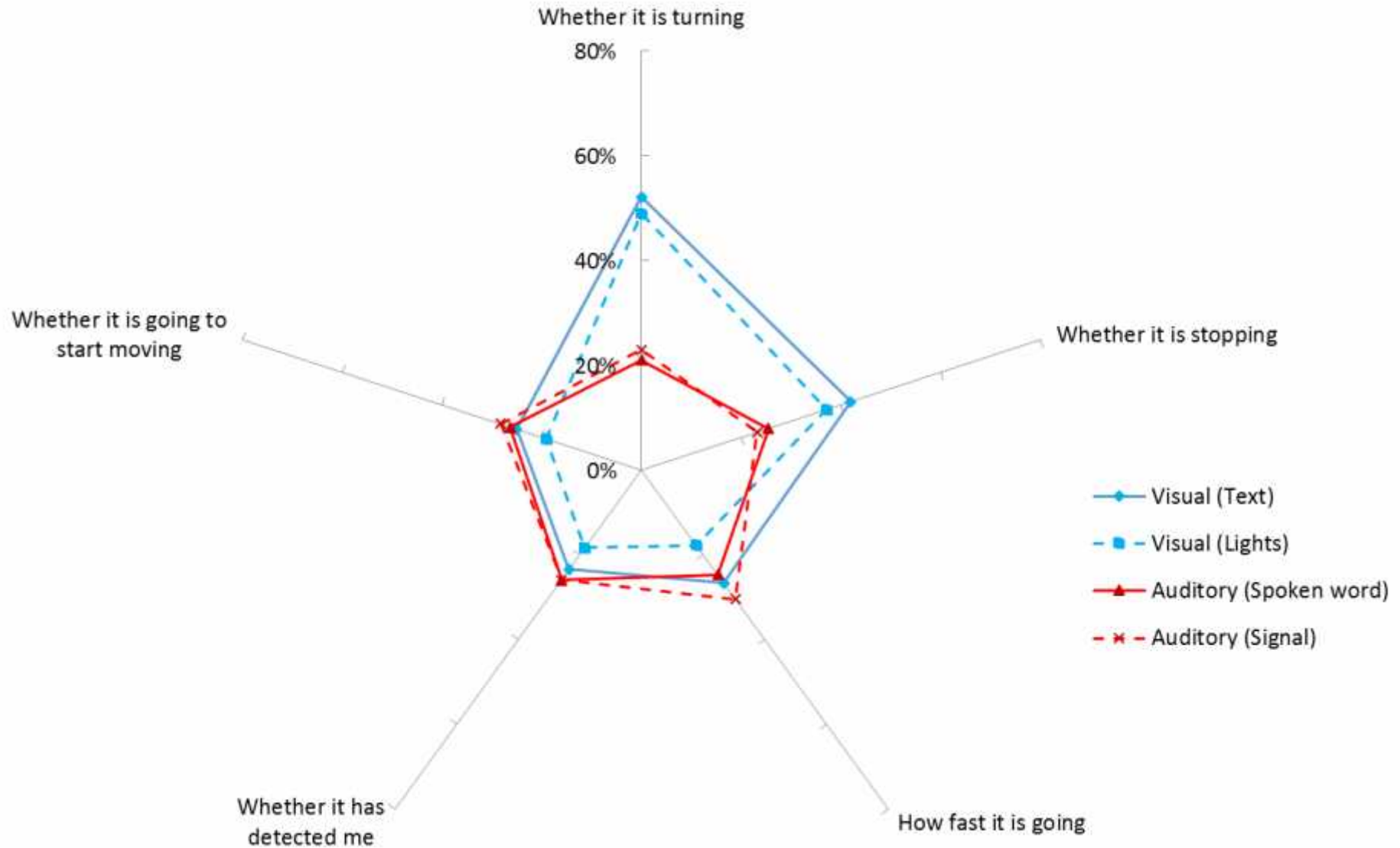
Lights for turning, sounds for moving and detection

Lausanne modality preferences without road markings



Lights for all manoeuvres, apart from 'start moving' (n.s)

Trikala modality preferences without road markings



Lights for turning and stopping, sound for detection

Focus Groups



Focus Group: 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. 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 as shared space
- Better for **tourists** than commuters



Identifying and Categorising Conflicts using Videos



General remarks for Discussion

- As the deployment of automated vehicles becomes 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
- Do we need totally new or modification of existing
 - Signage?
 - Road infrastructure?
 - Traffic rules?
 - Road safety training?



THANKS FOR LISTENING

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