5G for CAM in Cross-border environments: 5G-MOBIX results and recommendations

User Acceptance Evaluation

Emanuel Sousa (CCG)

29 September 2022

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 825496

Objectives

Evaluate the acceptability of 5G-enabled Automated Driving User-Stories

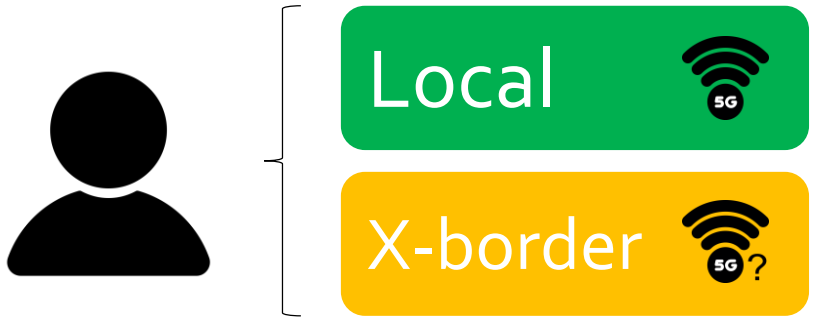
Evaluate how breaks in service continuity, in the border crossing, interfere with the user experience and consequently with acceptability

With Users!

5GMOBIX

Approach

Separate the user-experience of the CAM user-story from the service continuity breaks



Main KPIs

- Intention to use
- Perceived usefulness
- Perceived Ease-of-use
- Trust
- Reliability

Questionnaire

5GMOBIX

User inquiring

Questionnaire – psychometric scale

Intention to use:

- "Assuming I have access to the autonomous vehicle, I intend to use it in the future"
- If I had such autonomous vehicle, I would use it frequently during my trips
- …

Perceived Usefulness

- " I would find the autonomous vehicle useful in my driving (daily life)."
- …

Perceived Ease-of-Use

- "I will find the autonomous vehicle easy to use. "
- …

…

Interviews and focus groups

Open answer questions:

- Capturing the perks of the interaction
- Understand which aspects of the technology affect the experience (with focus on connectivity)

5GMOBIX

User-Stories

HD Media Service

Advanced Manoeuvres

- Lane Merge
- Overtaking
- HDMaps

Shuttle US

- Remote Driving
- Cooperative Automated System

5GMOBIX

Methodology

Real-world trials

HD Media Service

Real world

Controlled Trials

Adv. Manoeuvres (partially) + Shuttle US

Local

X-border

Online Interviews

Advanced Manoeuvres US

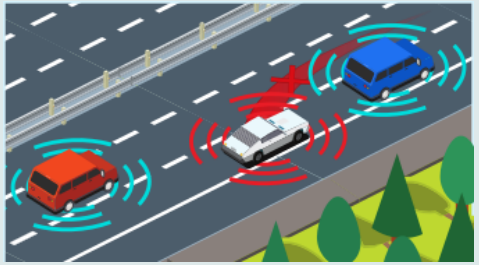
Best

Average

Worst

Survey

Advanced Manoeuvres + Shuttle US



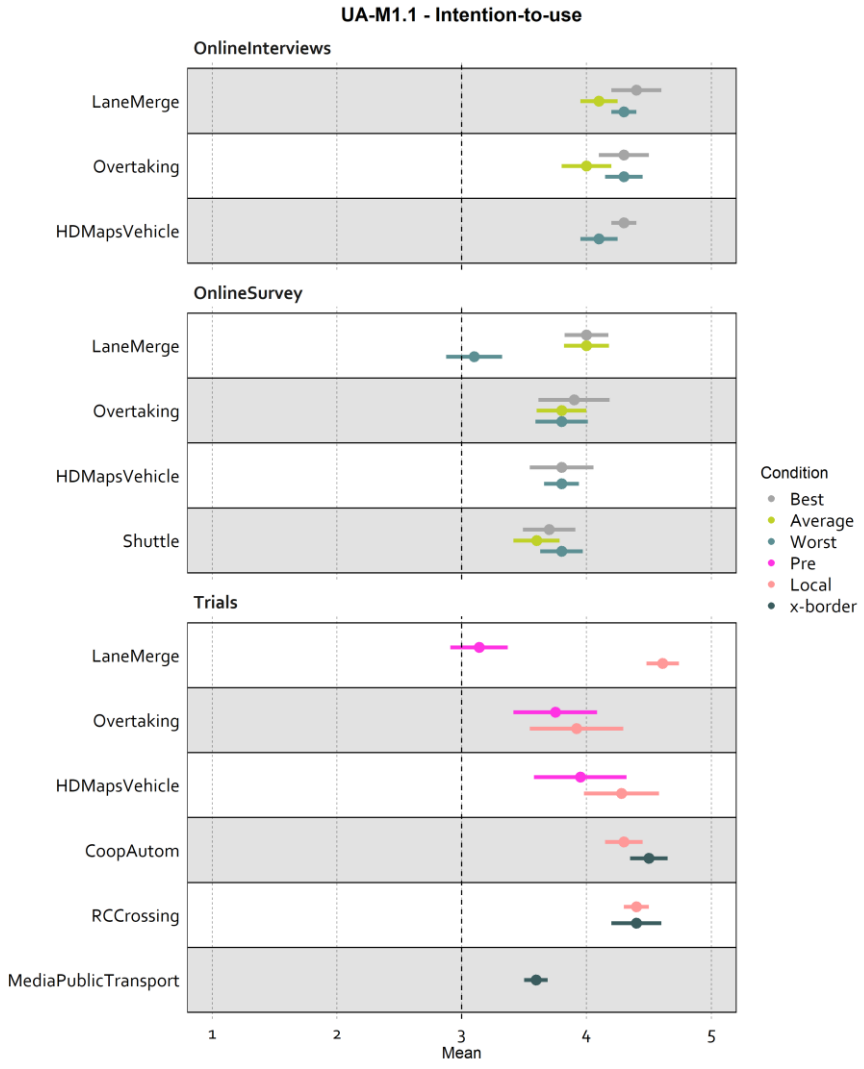
Best

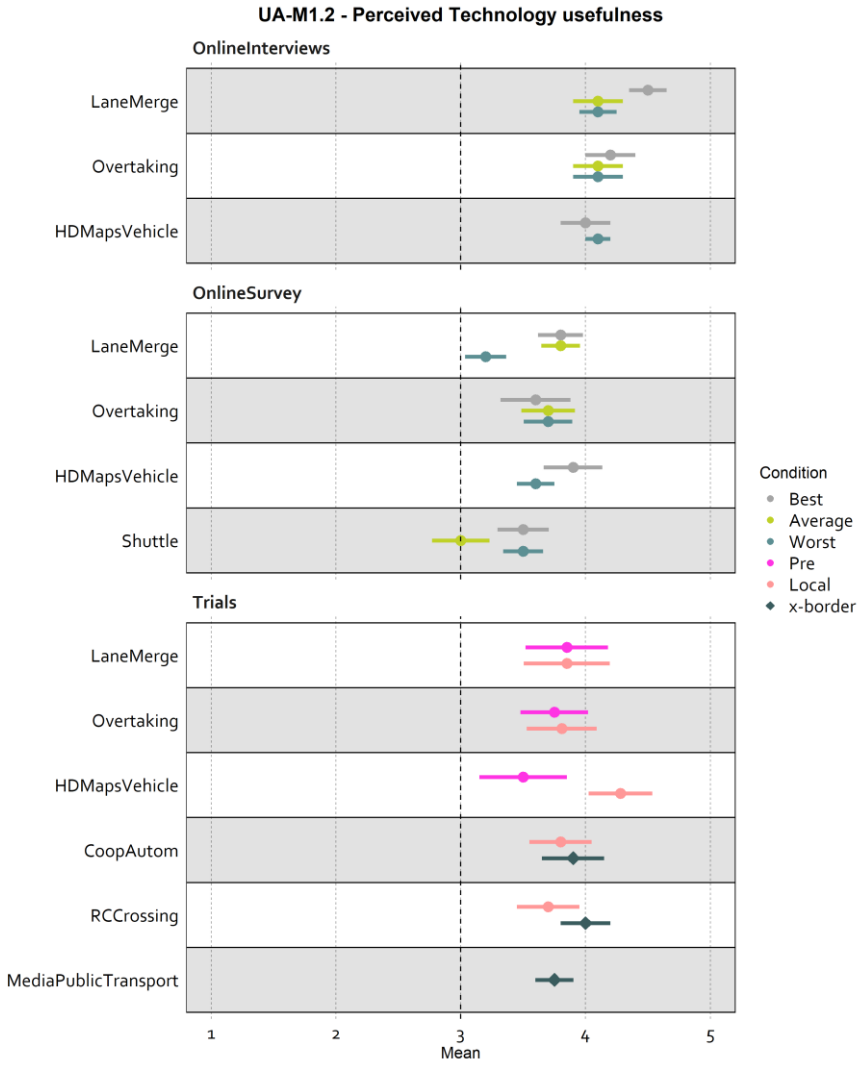
Average

Worst

5GMOBIX

Results





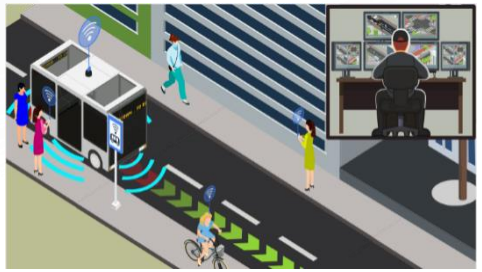
5GMOBIX

Results – HD Media Service

- Positively evaluated despite some service degradation (>3 in a 1 to 5 scale)
- Availability of the service by itself seems to be regarded positively

5GMOBIX

Results – Shuttle

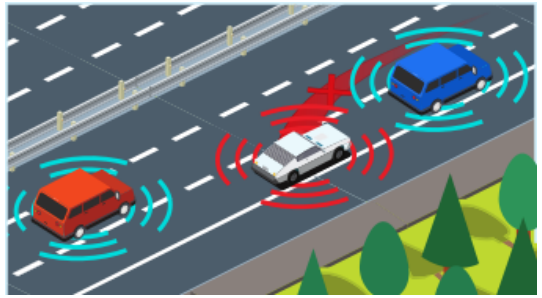


- Positive evaluation of the acceptability, specially on the trials (>4 in a 1 to 5 scale)
- No significant differences found between the local and the x-border trials

  (Handover performance was high)
- Most of the concerns manifested by the participants were related with safety
- *Trust* and *perceived usefulness* are strongly correlated with the *intention-to-use*

5GMOBIX

Results – Advanced Manoeuvres



- Users recognize the value of 5G-enabled CAM;
- Positive evaluation of the acceptability, specially on the interviews (>4 in a 1 to 5 scale);
- Degraded network conditions affect acceptability;
  - On the **online interviews**, the average scenario (network conditions) had lower acceptability scores;
  - In this situation, the *trust* KPI is the most negatively affected;
- *Intention-to-use* is strong correlated with *perceived usefulness* and *trust*

5GMOBIX

Conclusions

- Acceptability was, in general, positive;
  - User stories were well evaluated, even in situations with degraded connectivity
  - Were considered **useful, easy to use** and **trustable**
  - Participants regarded the 5G-enabled CAM features positively;

- Network performance affects acceptability (particularly trust), but relation is not straighforward:
  - Will depend on the resulting vehicle behaviour
  - Behaviour seen as unpredictable was considered less trustable
  - Failsafe mechanisms should be implemented to maximize trust;

5GMOBIX