A Guide2Autonomy from the different perspectives of different users

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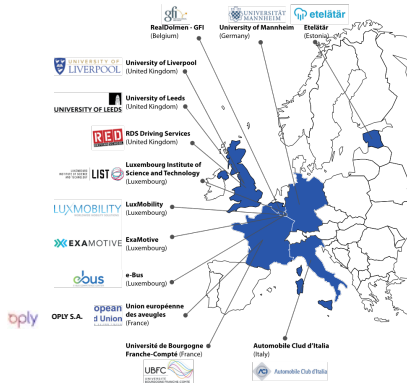
PAsCAL PROJECT

Enhance driver behaviour and Public Acceptance of Connected and Autonomous vehicLes

Connected and autonomous vehicles & roads: a path towards a safer future

27-28 October 2021

PROJECT OVERVIEW



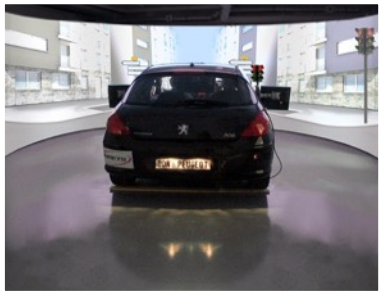
- Enhance driver behavior and acceptance of connected, cooperative and automated transport

- 13 partners
- 7 countries
- 34 deliverables

- **Start date** 06.01.2019
- **Duration** 36 + 6 months
- **Budget** € 3.974.041,25

SURVEYS

SIMULATORS



TRAINING

5 PILOT STUDIES

- High-capacity autonomous bus
- Autonomous driving training
- Autonomous bus shuttle line
- Shared connected transport
- Vulnerable travellers

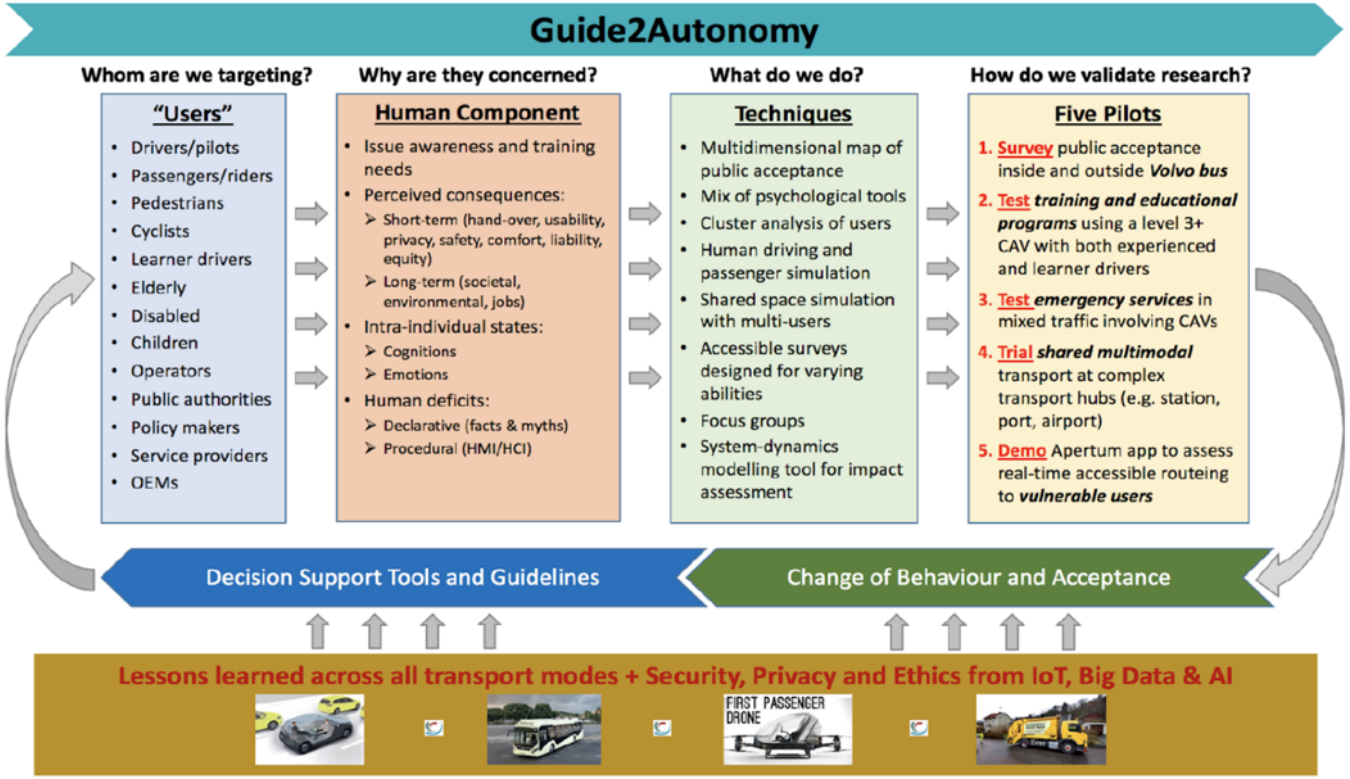
Guide2Autonomy

PasCAL project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 815098

Focus on

Guide2Autonomy

A set of guides and recommendations (about 100) that allow the industry, public authorities and other relevant stakeholders an improved understanding of the public awareness and the requirements and needs of different types of users in relation to CAV.



Focus on

SURVEYS

Expected consequences and acceptance of autonomous vehicles across the EU

Horizon 2020
European Union Funding
for Research & Innovation

10% completed

Now imagine that YOU would regularly use autonomous cars. What effect would that have on you?

	1	2	3	4	5	6	7	
If I used autonomous cars, my reputation in society would be... lower	○	○	○	○	○	○	○	higher.
A good reputation in society is... unimportant	○	○	○	○	○	○	○	important to me.

	1	2	3	4	5	6	7	
If I used autonomous cars, traveling on the road would be... more dangerous	○	○	○	○	○	○	○	safer for me.
A high level of safety while travelling is... unimportant	○	○	○	○	○	○	○	important to me.

Horizon 2020
European Union Funding
for Research & Innovation

14% completed

Now imagine that LARGE SECTIONS OF THE POPULATION use autonomous cars. What effect would that have?

	1	2	3	4	5	6	7	
If large sections of the population used autonomous cars, the health burden for the population would be... higher	○	○	○	○	○	○	○	lower.
A low health burden on the population is... unimportant	○	○	○	○	○	○	○	important to me.

	1	2	3	4	5	6	7	
If large sections of the population used autonomous cars, the pollution caused by exhaust gases and particles would be... higher	○	○	○	○	○	○	○	lower.
Low exposure to fine particles is... unimportant	○	○	○	○	○	○	○	important to me.

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Focus on **SURVEYS**

Expected consequences and acceptance of autonomous vehicles across the EU

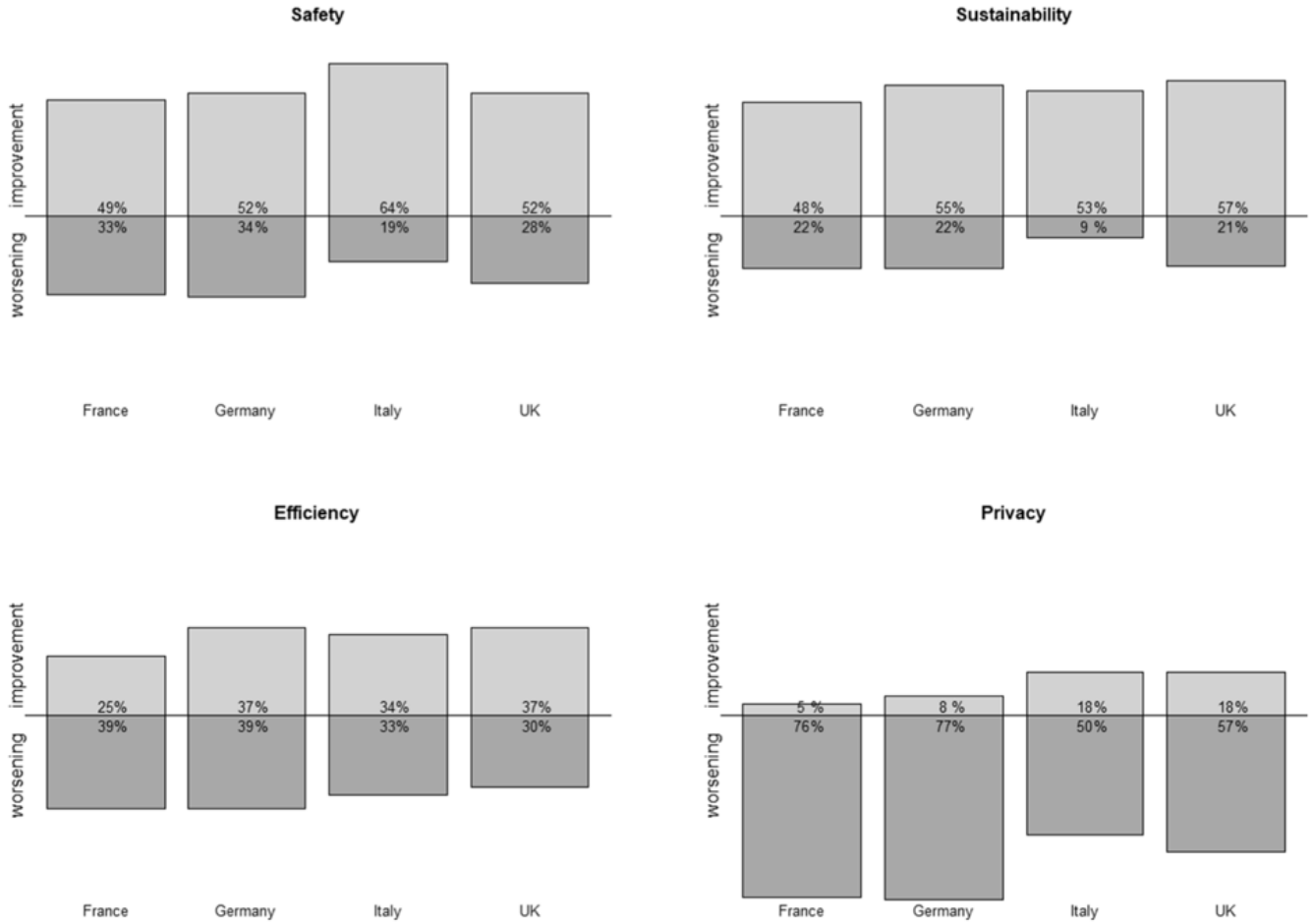

Fig. 4. Percentage of respondents across four countries (France, Germany, Italy, UK), expecting improvement (rating values > 0.5) or worsening (rating values < -0.5) from CAV introduction on the four factors Safety, Sustainability, Efficiency, Privacy.

Kacperski, C., Kutzner, F., & Vogel, T. (2021). Consequences of autonomous vehicles: Ambivalent expectations and their impact on acceptance. *Transportation Research Part F: Traffic Psychology and Behaviour*, *81*, 282–294. https://doi.org/10.1016/j.trf.2021.06.004

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Focus on
SIMULATORS

Immersive Arena experiments

Focus Groups

- 2 focus groups with 14 citizens
- Objective: Understand the pains of pedestrians when they are crossing a road

Survey on eHMIs

- A survey on 21 eHMIs (224 respondents)
- Objective: Classifying the eHMI regarding their user experience and the receptivity

Immersive Arena Lab

- A pedestrian simulator experiment on 39 participants in Immersive Arena Lab
- Objective: Test eHMIs, better understand pedestrian behaviour in relation to CAVs, and improve their experience

Focus on

SIMULATORS

Immersive Arena experiments

Some recommendations:

- A CAV feedback is waited by pedestrians in all situations and particularly in dangerous ones.
- CAVs have to be easily identified in the traffic.
- When a CAV stops to let crossing a pedestrian, it is better to send a signal that the CAV will wait the pedestrian's crossing.
- When no pedestrian crossing is painted on the road, the pedestrians mostly expect that the CAV does not stop.

Focus on

DRIVING TRAINING

Key question: ***Which features should characterize a CAV road education environment?***
Which features differentiate this environment from the "usual" one and how?

- Driving Schools
- Home Study Simulator:
  - *Autonomy Levels: L3/L4*
  - *Driving environment: Urban/Highway environment*
  - *Driving style: eco/safe vs sport/aggressive*

- Tests:
  - *Driver experience: Novice / Experienced / Professional / Trainers*
  - *LUX: 25 at LIST, IT: 135 + 20 + 20 at Ready2Go in Lecco, Modena, Savona, UK 135 + 20 at Donnington Training Centre*
- *Key points of study:*
  - *Acceptance*
  - *Safety (Focus on control Hand-over)*

Focus on **DRIVING TRAINING** …so far

CAV L3

When to use Autopilot?

- **Ideal Situations**
- **Critical situations**

What should be investigated to define these two macro conditions?

- ***How does* on board technology work**

  - Identify abilities and limits of sensors
  - Analyse the topic of « False Positives »
  - Warning lights and (acoustic) warnings
  - Integration of other driving aid systems to facilitate the driver
  - (HEAD UP Technology essential to keep the attention on the road)

CAV L3

Once there is an answer to the question "When do we use Autopilot?" we will define

- ***Ideal situations***

  Best Practices while using Autopilot

  - Driving position
  - What to observe on the road
  - Tips to maintain attention

- ***Critical situations***

  Management of critical situations

  - Timely acknowledgment of warnings
  - Identification of one or more procedures to implement specific situations
  - How to prevent them

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Focus on **DRIVING TRAINING**

…so far

CAV LV3

The Training Cycle

At this moment, we may suppose that this methodology will integrate the usual teaching provided for by existing regulations.

Basing on the results of PAsCAL 1st DS Workshop, which analyzed the first results of tests with the HSS, methodology should be approached in a circular/cycling way:

- *Theory*
- *I° Cycle simulation tests*
- *Test Drive in protected and equipped area*
- *II° Cycle simulation tests*
- *Final Test Drive*

What can other actors/stakeholders do for us?

OEMs/ Decision-makers

- *Standardization of Indicators, Warnings, Alarms*
- *Obligation to Use HEAD UP Technology*
- *Dissemination of information on the functioning of technologies*

Legislator / Certifying Bodies (EuroNCAP?)

- *Study a rating scale for ADAS and Autopilot*

Legislator / Training centers

- *Establishment of a dedicated License*
- *Periodic reminders for Manual driving training (from CAV4)*
- *Creation of restricted/protected areas for CAVs driving training*

Thanks for your attention

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