INSTITUT VEDECOM
DU VÉHICULE DÉCARBONÉ ET COMMUNICANT ET DE SA MOBILITÉ

FSW French-Swedish Workshop on Research, Innovation and Education 2019

Human Factors issues in automated driving

Mercedes BUENO GARCIA

AUTOMATED VEHICLES

Automated driving is experiencing an increasing development in recent years

Benefits

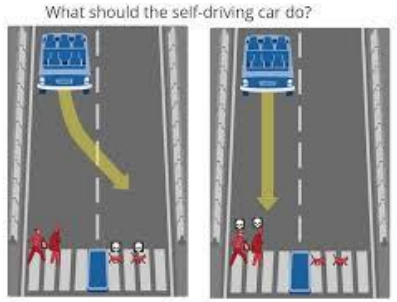
- SAFETY
- ENVIRONMENT
- MOBILITY

Challenges to be resolved from different perspectives:

Technical

Legal

Ethical



Human Factors

HUMAN FACTORS

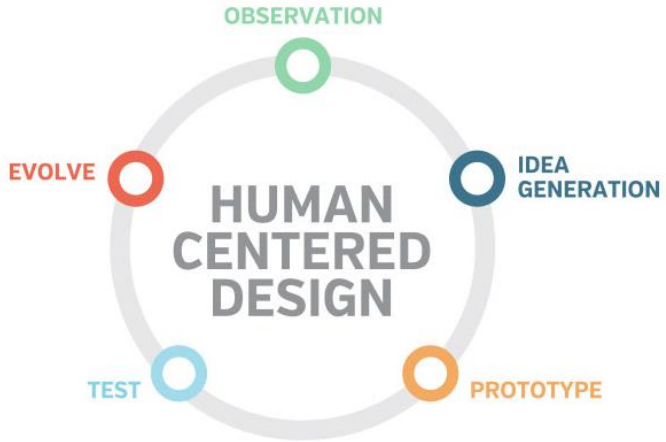
Human Factors objective

Understand interactions between humans and systems in order to:

- Improve performance and design of systems
- Improve acceptance and comfort of users

Human centered design process:

- Systems must be designed to fit the users rather than the opposite

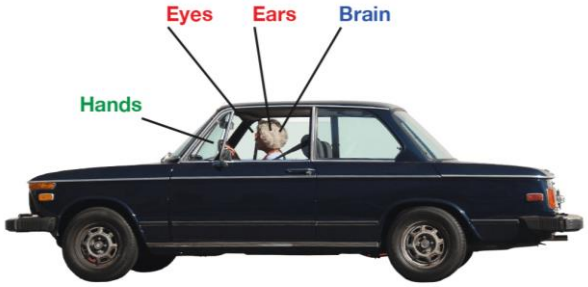


Bad exemples

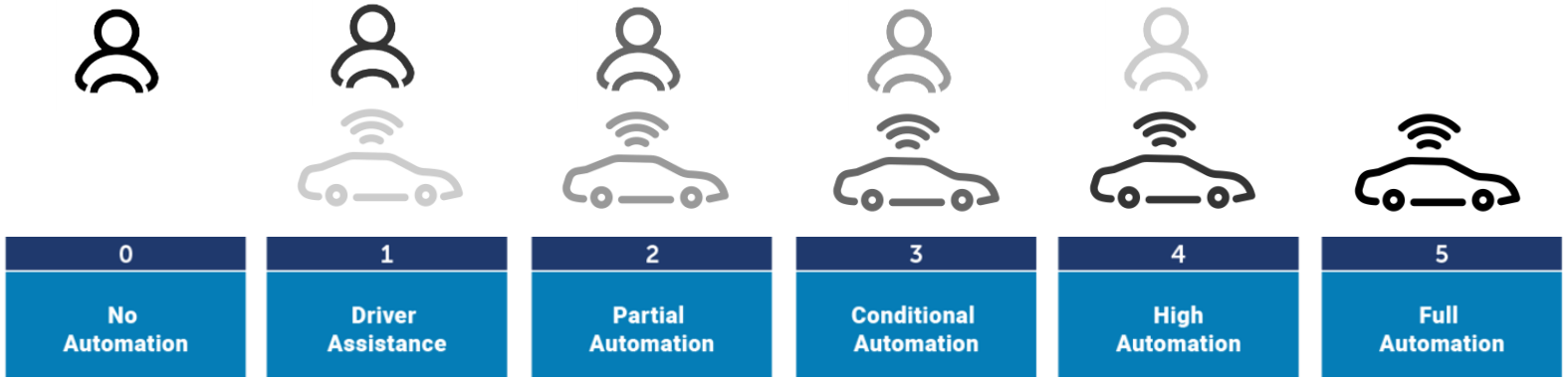


AUTOMATED VEHICLES AND HUMAN FACTORS

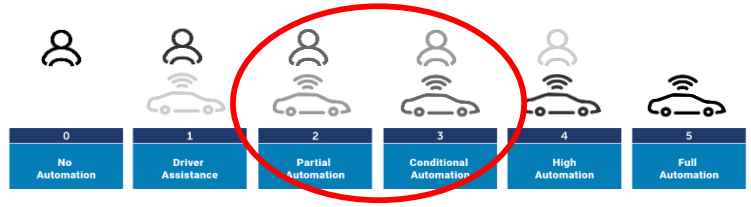
- Automated cars will be driven, used and in interaction with humans
- Driving activity is going to change: manual driving → automated driving



- Driver role is going to change: 6 different roles



AUTOMATED VEHICLES AND HUMAN FACTORS – SOME ISSUES



Level 2 & 3 raise important concerns in **terms of safety**:

The system performs most of the driving tasks but the driver is still required for monitoring environment and resume control of the vehicle

- **Vigilance**: drivers will have a passive role during automated driving and we know that we are poor monitors

→ How drivers will resume control of the vehicle after a period of inactivity?

- **Non-driving activities** engagement is one of the main advantages of the automated driving, but they can affect takeover performance

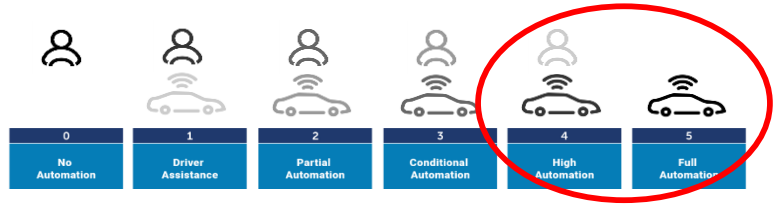
→ How drivers will resume control of the vehicle after being engaged in non-driving activities?

and increase motion sickness (e.g. reading)

→ Will drivers accept this technology?

AUTOMATED VEHICLES AND HUMAN FACTORS – SOME ISSUES

Level 4 & 5, the system is capable to perform all driving tasks without driver intervention in all or almost all situations



- **Interaction with other users in a mixed traffic**

→ Should automated vehicles communicate their actions and intentions and if yes, how (e.g. waiting for you to cross)?

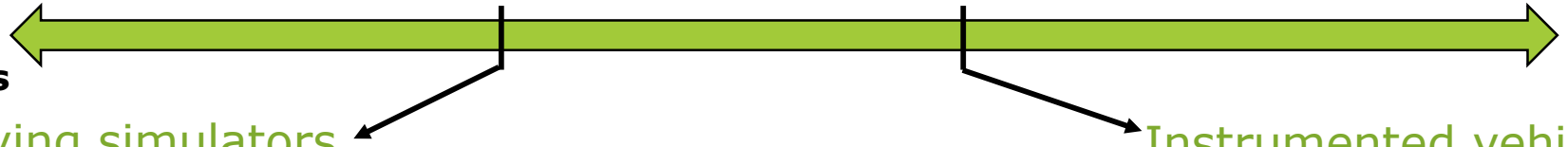
- **Remote supervision and control:** in the future there will not be a safety officer inside automated vehicles

→ How to inform these safety officers about functioning and limits of the system?

→ How can they resume control of the vehicle remotely?

AUTOMATED VEHICLES AND HUMAN FACTORS – METHODOLOGY

Controllability
Replicability
Risky situations



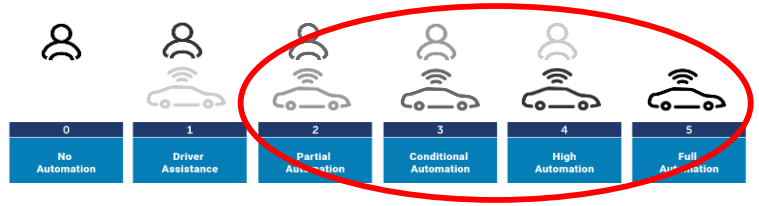
Reliability
Validity

Driving simulators

Instrumented vehicles

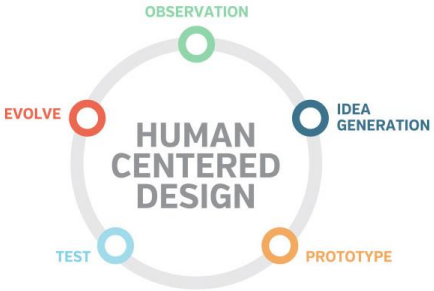
INSTITUT VEDECOM

AUTOMATED VEHICLES AND HUMAN FACTORS – SOME RESPONSES



Research focuses on:

- Transitions from automated to manual driving
  - ✓ Determine the minimum requirements for a safety takeover response
  - ✓ **Time** is important but also the **quality** of the takeover response
- Developing the interaction between the system and the driver
  - ✓ Detecting drivers state will allow to adopt the strategy in case the driver is not able to takeover control (**driver monitoring**)
  - ✓ Informing drivers about the functioning and limits of the system (**training & HMI**)
- Developing the interaction between the system and the other road users
  - ✓ **External HMI**



This will contribute to the development of safe and accepted automated vehicles

INSTITUT VEDECOM
DU VÉHICULE DÉCARBONÉ ET COMMUNICANT ET DE SA MOBILITÉ

Thank you for your attention

mercedes.bueno-garcia@vedecom.fr