



SUpporting acceptance of automated VEHICLE

## Introduction of the project



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 814999



INSTITUTO DE  
BIOMECÁNICA  
DE VALENCIA

# Introduction

- While the **deployment of connected automated vehicle (CAV)** turns into **reality, its acceptance has been called into question** for the user awareness about the **risks of CAV technology** and the **increase of user scepticism** about **ethical aspects**.
- The latest ERTRAC Automated Driving Roadmap ascribe **paramount importance** to **public acceptance, user awareness, and ethical issues** related to CAV.
- On top of that, **gradual deployment of CAV** implies that CAVs will **co-exist with other road users** (vulnerable road users and conventional vehicles) for some time, making the harmonization and acceptance by other road users a prime subject.



# Introduction

- The latest Eurobarometer report observes that the **Member States do not have a specific policy to enhance public acceptance of CAV.**
- The **current approach**, based on the technology push, jeopardizes social viability of innovative technology like CAV, as it creates a gap between the well-thought technical reliability and public acceptance by **failing to integrate human component** in the design process.



# Introduction

- **SUaaVE aims to make a change in the current situation** by leaning on a **Human-Driven Design (HDD) approach**, where the user is not only the centre of the process but actively contributes and even leads the definition of concept, development of technology and participates in its testing.
- **SUaaVE will focus on the human side, working to improve more “intangible” aspects as safety perception, attitudes and, in general, emotional appraisal of CAV.**

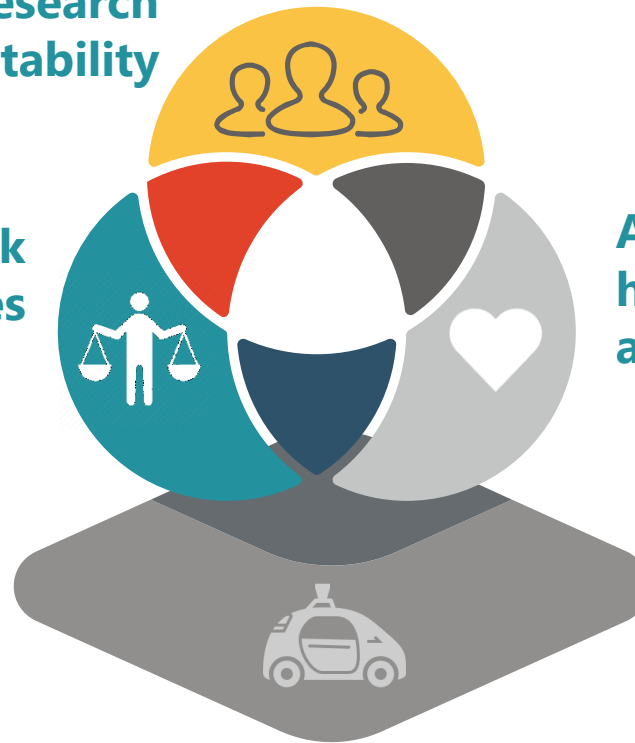


# Project aim

- SUaaVE **proposes to enhance public acceptance** of CAVs (L4+) through:

**Social-psychological research  
on CAV acceptability**

**Cross-cultural framework  
for ethical and legal issues**



**ALFRED: concept to  
humanise the vehicle  
actions**

**Immersive Virtual  
Human Centred Design  
(V-HCD) platform**



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# Project aim

- **Social-psychological research on CAV acceptability**
  - **Investigate** the **psychological factors** that **influence acceptability of CAV** among the different types of road users, such as CAV passengers (e.g. current and not current drivers, children, senior citizens, people with disabilities) and other road users (e.g. pedestrians, cyclist, other drivers).
  - **Develop a psychological model** depicting the key predictors of public acceptance for CAV and a **protocol for the assessment of all road users' acceptance**.
  - **Propose** evidence-based **mitigation strategies** for decision makers that might effectively stimulate people towards higher individual and societal acceptance of CAV.



# Project aim

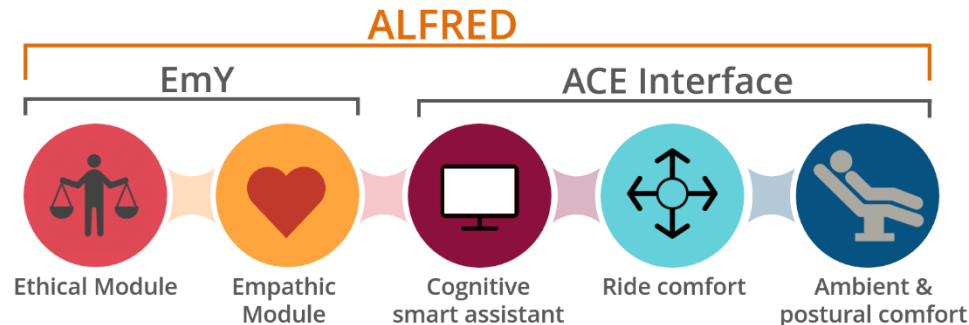
- Generate a cross-cultural framework for ethical and legal issues from CAV deployment
  - Propose **policy recommendations** based on the **ethical** dimension and the corresponding **legal issues**.
  - Generate **ethical principles**, which can be **integrated** in computable **algorithms**.
  - Propose **policy recommendations** based on The legal rules on consent through the principles of contract law and the general data protection regulation (GDPR).



# Project aim

- **ALFRED**

Architecture to **understand** the emotions of the passengers of the CAV and to **adapt** the vehicle features to **enhance** the in vehicle **user experience**.

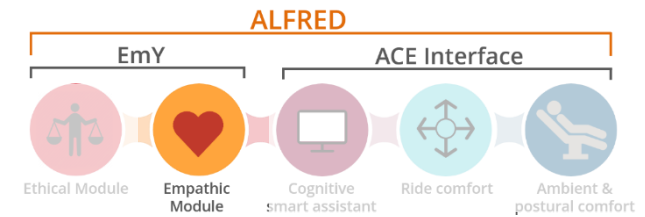


- **“EMpathY” Unit (EmY):** Understand the emotional and cognitive state of the passenger, while taking into account ethical principles.
- **“Adaptive, Cognitive and Emotional” (ACE) Interface:** control strategies for the management of CAV behaviour.





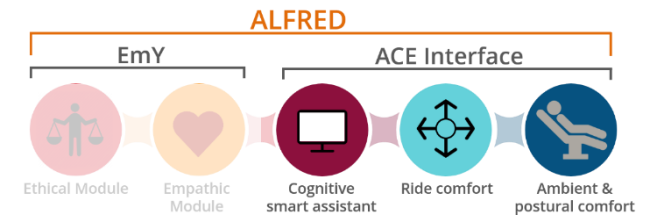
# Project aim



- **ALFRED**
  - **Empathic module: Investigate and develop a model to monitor and interpret the passenger state**
    - Develop an **emotional model** to **monitor** in **real time** the **passenger's** state.
    - Generate a **cognitive model** to characterise “drivers” from the perspective of **Situational Awareness**.
    - Development of **observation algorithms** to **estimate** the **emotional state of passengers** and other relevant individuals, **using available measures**.



# Project aim



- **ALFRED**
  - **ACE interface: Define on-board services to influence on passenger's state and improve their experience**
    - Develop a **cognitive smart assistant** to increase the Situational Awareness of the “driver”.
    - Generate **algorithms** for **adjusting the vehicle dynamics** and itinerary for a comfortable and safe ride.
    - Define **guidelines** for **ambient and postural comfort** in CAV.



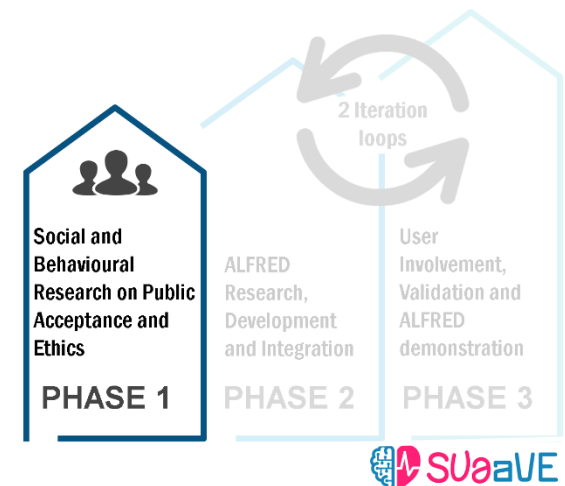
# Project aim

- Immersive Virtual Human Centred Design (V-HCD) platform
  - Develop with V-HCD platform a simulated version of ALFRED.
  - Provide a **final demonstrator** for large dissemination of ALFRED to European citizens and stakeholders.



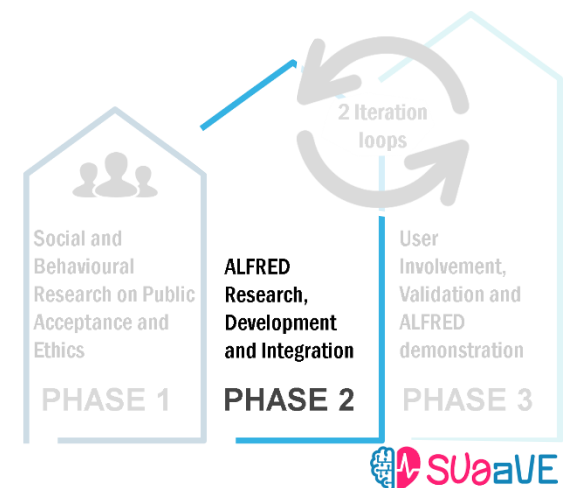
# Methodology

- **PHASE 1. Social and Behavioural Research on Public Acceptance and Ethics**
  - Formulate requirements to support CAV acceptance, including ethical and legal issues.
  - Focus groups, Delphi study, large-scale survey and user tests to assess user behaviour and acceptance levels.
  - Workshops with stakeholders and advisory board to understand different perspectives of CAV acceptance.



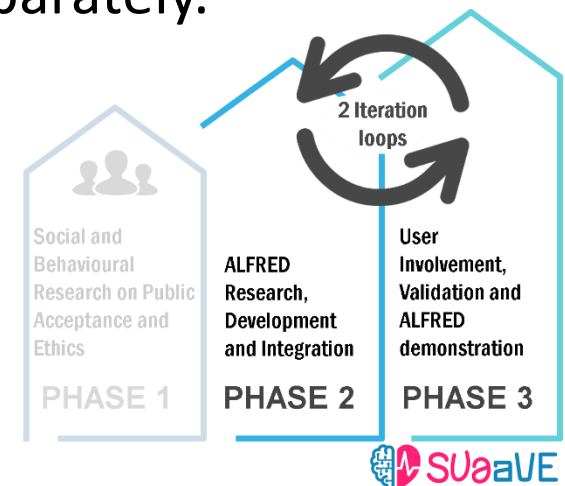
# Methodology

- **PHASE 2. ALFRED research, development and integration**
  - Generation of the different modules of ALFRED.
  - Development of V-HCD platform.



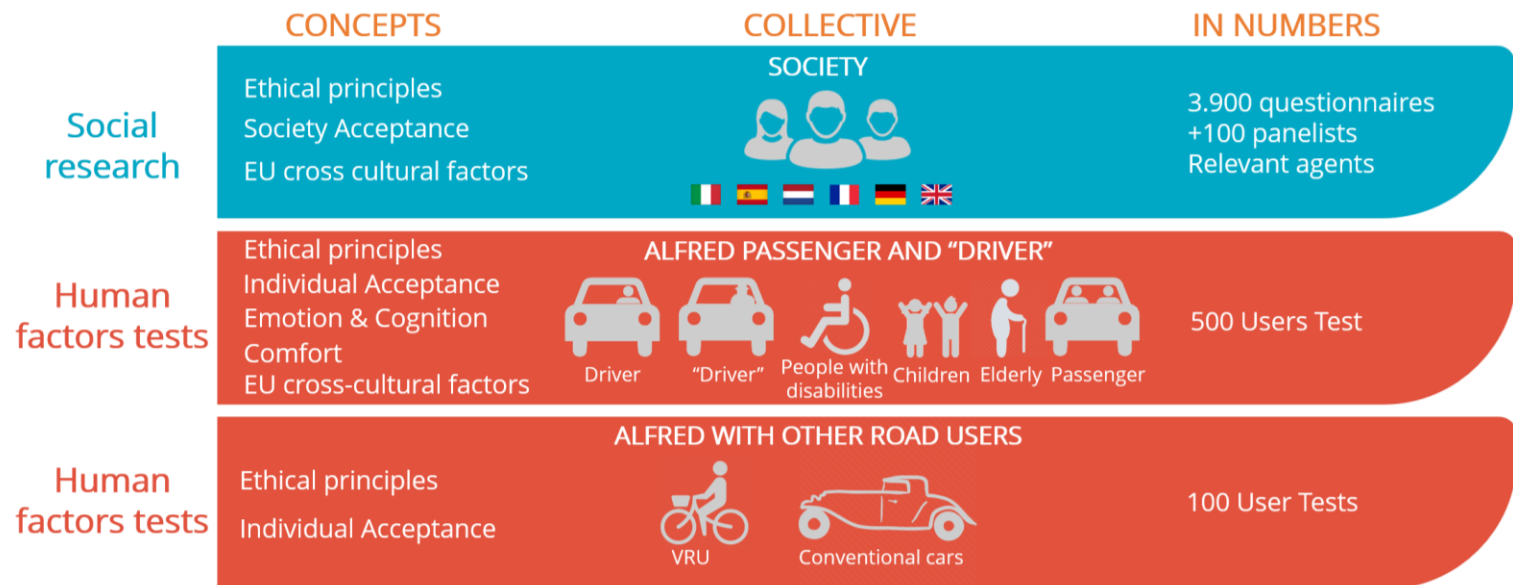
# Methodology

- **PHASE 3. User involvement, validation & demonstration**
  - Test and demonstrate the components of ALFRED in the CAV.
  - **Two iteration loops** through users:
    - Assessment of ALFRED modules separately.
    - ALFRED modules inter connected.



# Methodology

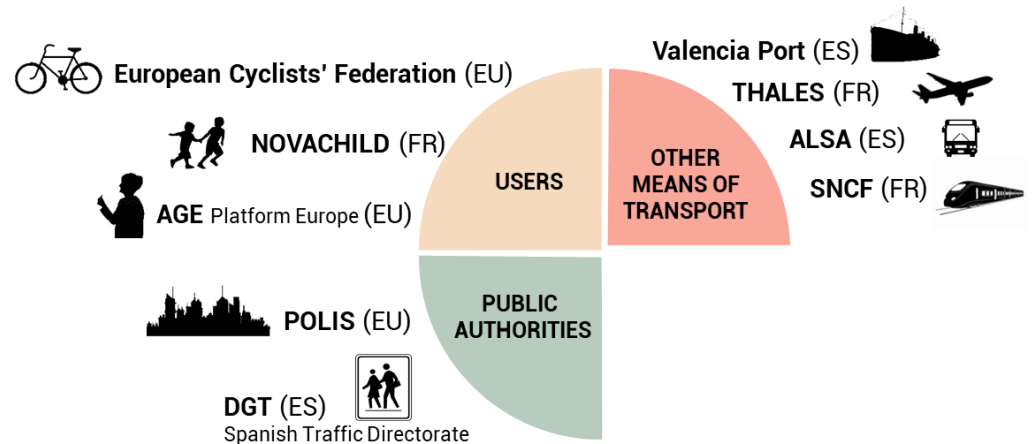
- Participatory process will consist in a **survey** in six European countries, with a participation of at least **3,900 citizens** and at least **100 panelists**.
- The iterative development process will involve participation of **600 volunteers** in **user tests**, in five European countries, experiencing with **ALFRED**.



# Methodology

- **Advisory Board**

- Mission: Participation in the definition of the requirements for ALFRED, review of Use Cases, assessing SUaaVE results and final SUaaVE demonstration.
- Composed by experts in four complementary fields: European automotive industry, road users associations, other transport sectors; and policy makers.







Consortium:



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