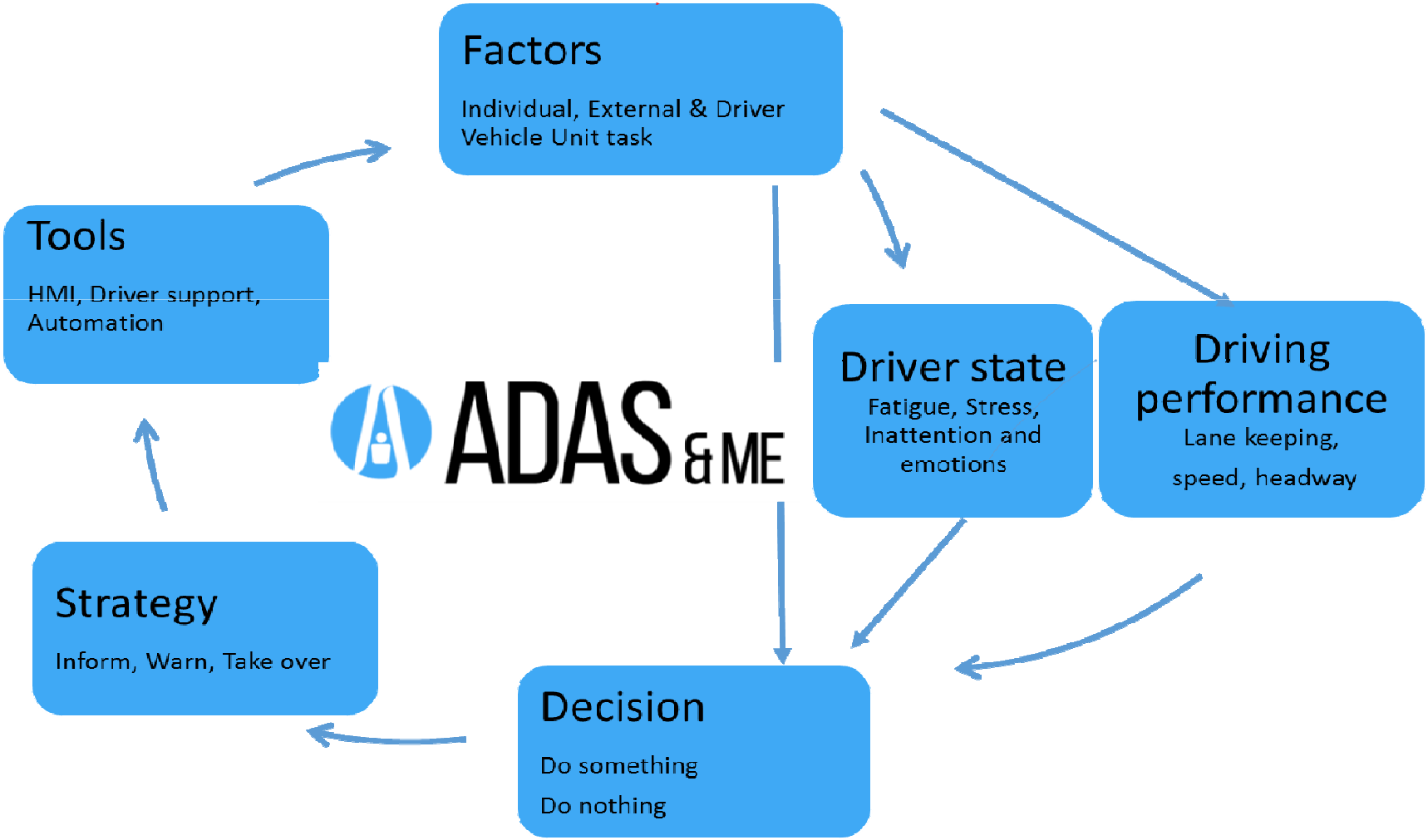
# ADAS&ME

## ADAPTIVE ADAS TO SUPPORT INCAPACITATED DRIVERS MITIGATE EFFECTIVELY RISKS THROUGH TAILOR MADE HMI UNDER AUTOMATION

# ADAS&ME Targets

- Develop **ADAS**…
- … that incorporate **driver** / **rider state**, **situational** / **environmental context** and…
- … **adaptive HMI**…
- … to **automatically hand over different levels of automation** and thus…
- … ensure **safer** and **more efficient road usage**…
- … for **all vehicle types** (conventional and electric car, truck, bus, motorcycle)

# ADAS&ME Concept



# ADAS&ME Fact Sheet

- **Administrative Coordinator:** Anna Anund, VTI
- **Technical Manager:** Evangelos Bekiaris, CERTH
- **Innovation Manager:** Stella Nikolaou, CERTH
- **Topic:** MG3.6a “Safe & connected automation in road transport”
- **Budget:** ~9 M€
- **Start Date:** 01/09/2016
- **Duration:** 42 months
- **Number of partners**: 30
- **Countries**: 10 (Sweden, Greece, Italy, Germany, Switzerland, Netherlands, France, Spain, Ireland, Belgium)
- **Project Officer:** Georgios Sarros, INEA
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# Consortium


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HELLENIC INSTITUTE OF TRANSPORT
UNIVERSITY OF PATRAS
FORTH

# Structure

- WP1 Critical scenarios identification and use cases
- WP2 System architecture and specification
- WP3 Environmental sensing
- WP4 Driver/Rider State monitoring
- WP5 HMI Actions and Transitions
- WP6 System integration and demonstrators development
- WP7 Evaluation
- WP8 Impact
- WP9 Dissemination and Exploitation
- WP10 Management
- WP11 Ethics requirements

# Objectives 1/2

- Development of robust detection/prediction algorithms for driver/rider state monitoring of fatigue/drowsiness, stress, inattention/distraction and impairing emotions.
- Development of multimodal, user oriented and adaptive information, warning, actuation and handover strategies.
- Integration of the developed algorithms, sensing technologies, supportive technologies (automation, V2X) and HMI algorithms/components into driver/rider state monitoring systems.
- Development of personalised driver/rider behaviour profiles, considering inter-individual differences.
- Design of HMI concepts, prototypes and guidelines for automated functions that take into account driver/rider state.

# Objectives 2/2

- Instrumentation of evaluation/demonstration tools (simulators & vehicles) to evaluate the developed systems in different environments.
- Adaptation of existing EuroNCAP test protocols from non-automated to automated driving modes.
- Performance of targeted tests for the selection of HMI elements that optimally support each Use Case.
- Evaluation of the developed systems and use cases with a wide pool of drivers/riders under simulated, controlled and real road conditions and for different driver/rider states and automation use cases/levels.
- Holistic impact assessment of automation opportunities to enhance safety by supporting the impaired driver/rider, as well as of handover transitions optimisation.

# ADAS&ME Use Cases

## *Attentive Long Haul Trucking*

1) The truck recognises Anna and loads the driving plan for today.

2) After some manual driving, **the truck** announces Anna it will **take over driving** once they reach the highway.

3) Anna performs tasks other than driving while the truck keeps her informed about what's happening.

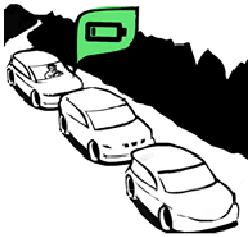

4) The truck detects **Anna is snoozing** and wakes her up far before she must re-take control.

5) **The truck checks that Anna is ready** to take over control again and then handles the driving task back to her.

# ADAS&ME Use Cases

## *Electric Vehicle range anxiety*


1) **Paul is stressed** about the limited driving range of the EV, which he drives only seldom.



2) Paul gets stuck in a traffic jam, therefore the range decreases fast and **he starts feeling anxious**.

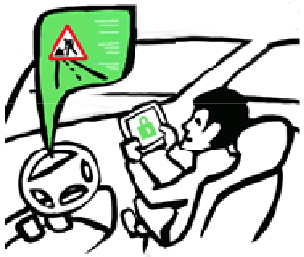

3) An alternative route to a charging point is generated, and consumption is limited.

4) The car guides Paul to the closest available charging station. After 30 minutes, Paul is able to continue driving home safely.

# ADAS&ME Use Cases

## *Driver state-based smooth & safe automation transitions*


1) **Your car detects that you are very fatigued**, so you decide to activate the highly automated driving mode.



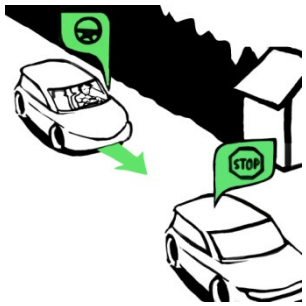
2) Your vehicle detects a road work ahead and **prepares you to take over the control of the driving**.


3) Your hands are on the wheel, your gaze is on the road and **your vehicle verifies that you are able to drive manually**.

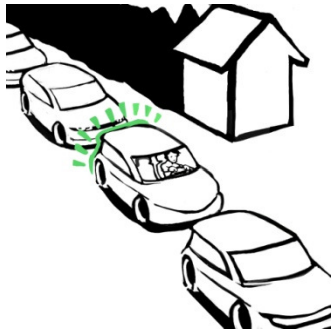
# ADAS&ME Use Cases

## *Non-Reacting Driver Emergency Manoeuvre*

1) You take a telephone call while driving, which **distracts** you…




2) Suddenly, the vehicle ahead brakes abruptly. Since **your vehicle detects that you are not attentive**, it **starts to brake automatically**.



3) Your vehicle “tells” the vehicle behind about the planned emergency steering maneuver, **avoiding another crash**.

# ADAS&ME Use Cases

## *Long range attentive touring with motorbike*


1) Great weather this morning, so Bruno decides to go riding. Bruno's motorcycle informs him all along the road about the **environmental conditions** to enjoy a safe ride.


2) The temperature is dropping and Bruno is **getting stressed and exhausted**. Bruno's motorcycle informs him that his **body temperature** is not anymore within comfort zone and warns him through his gloves and on a display to take a break soon.


3) Bruno accepts the suggestion to take a rest and follows the guidance.

# ADAS&ME Use Cases

## *Rider faint*

1) Tania takes her motorcycle and, after a few minutes realizes that the sun is really hot today and she starts to **sweat**.


2) The MC informs Tania that her body is under **excessive sweating**, warns her through her **gloves** and on a display, and suggests her to take a break soon.

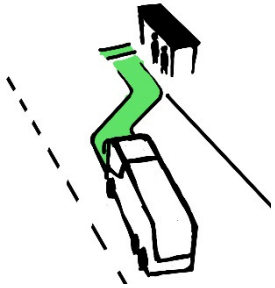
3) After a while, Tania starts to **feel dizzy** and her conditions get rapidly worse. Without realizing how bad the situation is, the **heat and dehydration make her faint** while still riding her bike.


4) Tania's clothing, helmet and motorcycle have **detected** her situation and the **motorcycle goes into recovery mode**. This means that it turns on the hazard lights, decelerates automatically and assists her in maintaining stability while slowing down and helping to position at the side of the road.

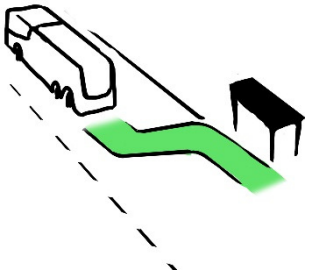
# ADAS&ME Use Cases

## *Passenger pick up/drop off automation for buses*

1) As Peter, a bus driver, approaches a specified bus stop area, the **system asks for driving control**, which Peter accepts.



2) The system takes over and approaches the bus stop in a safe and comfortable manner. During the approach, Peter can leave his seat and interact with the passengers.



3) Once passengers have ended boarding/debarking, the bus leaves the bus stop autonomously while Peter takes his place back behind the steering wheel.


4) When the bus is approaching the end of the bus stop area the **system checks if Peter is in position, attentive and ready to take over**. If not, the bus will stop before leaving the bus stop area, otherwise, it keeps driving in SAE level 3 mode.

# Thank you for your attention

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