


IPIC 2023

9th International Physical Internet Conference

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Athens, Greece

# All Weather Autonomous Real logistics operations and Demonstrations

AWARD has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement No 101006817.

AWARD
Scaling autonomous logistics

13-15 JUNE 2023 Athens, Greece www.pi.events/IPIC2023

alice Alliance for Logistics Innovation through Collaboration in Europe

Expanding the logistics Scope

# An introduction to the AWARD project

## H2020 framework

- **2018-2020** : Digitising and Transforming European Industry and Services: Automated Road Transport
- **DT-ART-05-2020** : Efficient and safe connected and automated heavy-duty vehicles in real logistics operations

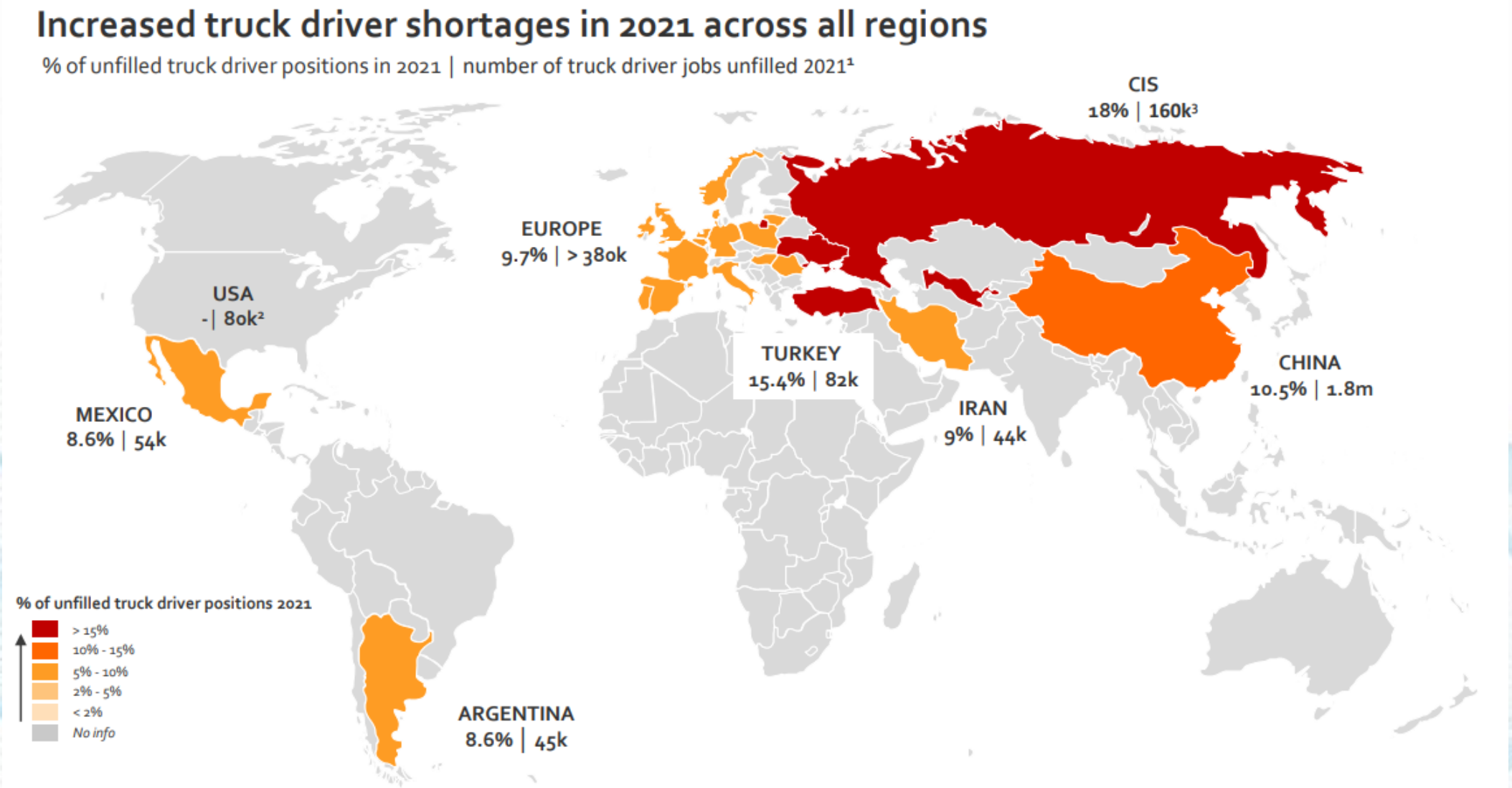
**AWARD :** All Weather Autonomous Real logistics operations and Demonstrations

**Project Coordinator :** EasyMile

**Partners :** 29 based in 12 countries

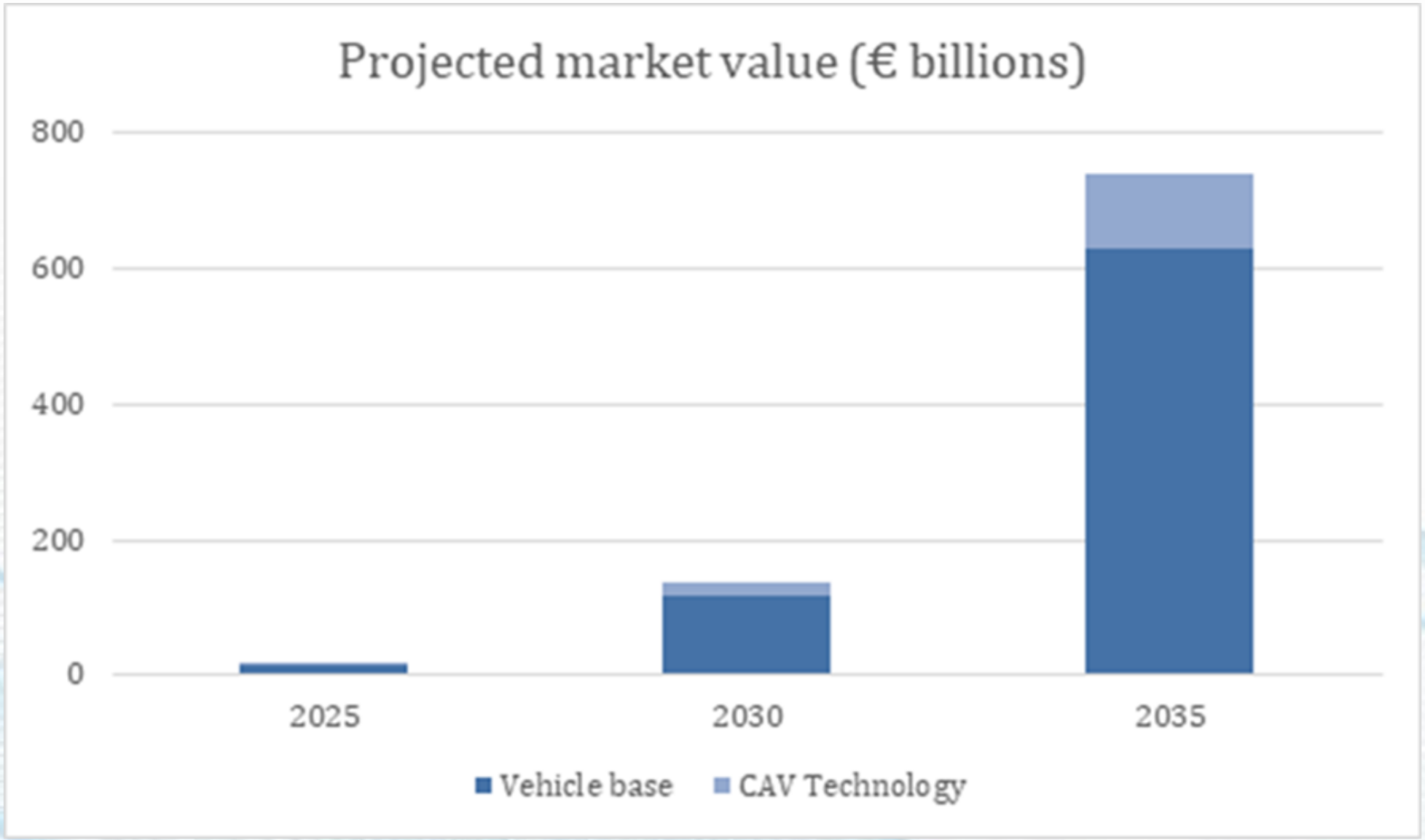
**Budget :** € 26M

# Over 2.6 million truck driver jobs were unfilled in 2021 in surveyed countries




Source: IRU survey 2021 and national road transport associations; 1. Unfilled truck driver jobs calculated based on the total number of truck drivers in each country, and the share of unfilled positions reported by road freight transport companies' answers (more details in methodology); 2. For USA, showing number of truck drivers missing (estimated driver demand minus driver supply, source ATA 2021) instead of number of truck driver jobs unfilled (average % of driver positions unfilled out of total drivers needed for companies surveyed); 3. Estimation based on number of trucks and share of trucks reported to be stopped due to a lack of drivers (RG.RU)

**IRU Driver Shortage Global Report 2022**




**Global market for AVs (Level 3 or above) and Connected and Autonomous Vehicles (CAVs) technologies is expected to reach about €741bn in 2035**

# An introduction to the AWARD project

## 4 real-life conditions demonstrations, showcasing the work of all consortium members

### Development of the ADS


- Able to **handle adverse environmental conditions** such as heavy rain, snowfall, fog
- Targeting compliance with **ISO 26262** and taking into consideration **SOTIF recommendations**
- Integrating **multiple sensor modalities and an embedded teleoperation system to address 24/7 availability**
- **Optimized fleet management & supervision system** for logistics use cases

### Integration into HDV

AIT

KAMAG

TLD

TERBERG

### Demonstrations

Autonomous loading & unloading operations

Hub to hub autonomous logistics on public roads

Airport autonomous ground support equipment

Port Trailer autonomous transfer operations

# Autonomous driving demonstrations in real logistics operations

## Autonomous Truck loading with Autonomous Forklift demonstrator


### Use case

- Truck parks at arbitrary position
- Driver or FMS assigns an area to unload
- Crayler starts autonomous unloading
- Operator responsible for supervision

### Market expectations:

In 2021, 120.000 vehicles in annual sales. Out of the 120.000 E-trucks, it is estimated that 5% will be automated in 2026.

### Status

- Sensors mechanical and electrical integration
- ADS implementation

# Autonomous driving demonstrations in real logistics operations

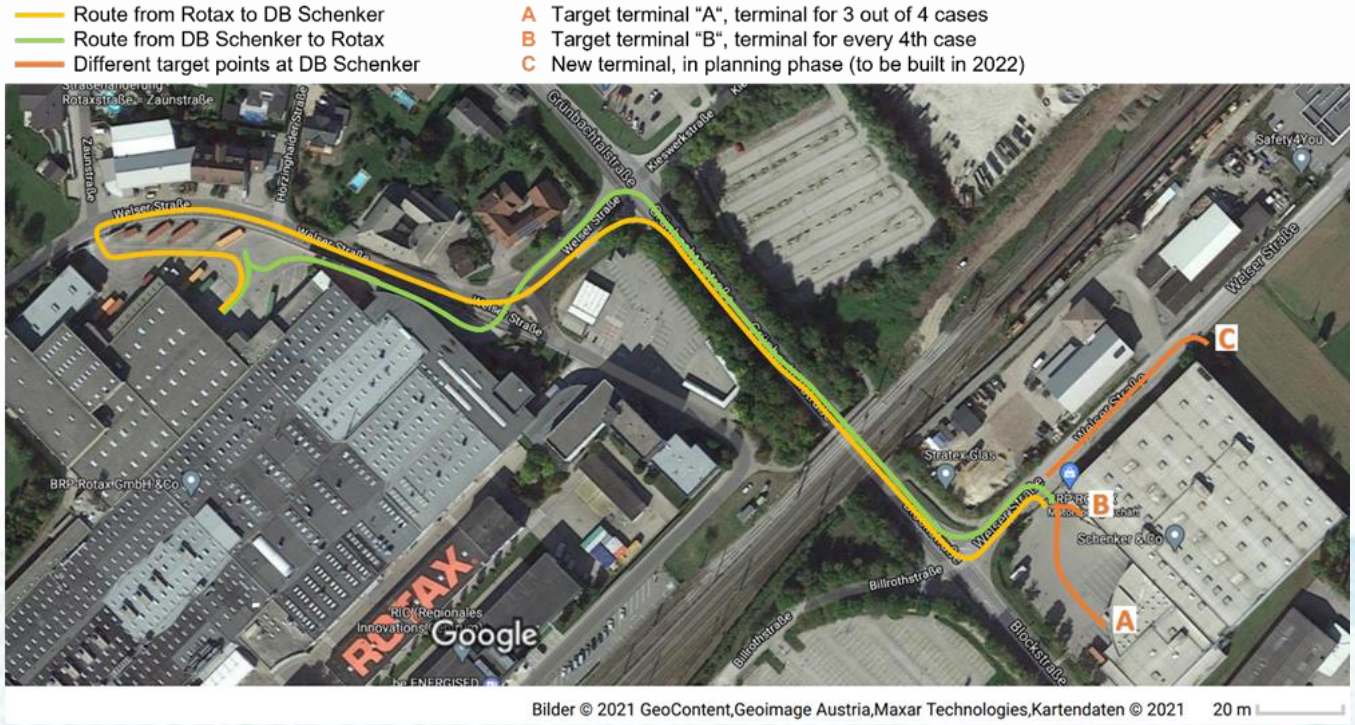
## Hub-to-hub autonomous logistics

### Use case

1) Component pick-up at a logistic site
2) Autonomous movement through mixed traffic with VRU
3) Delivery at Factory site with human environment
4) Autonomous movement trough mixed traffic on the way back

### Status

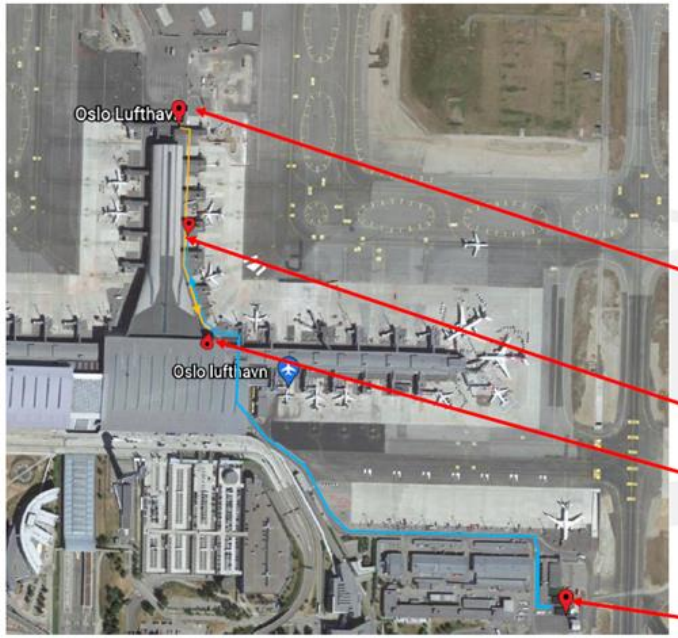
- Sensor calibration and tuning of vehicle parameters done
- V2I tests and vehicle functionality tests done




# Autonomous driving demonstrations in real logistics operations

## Airport demonstrator

## Route Description




- Use Case:
  - TractEasy waiting mission point
  - Go manually to pick up empty dollies along P-North, then go to Start Auto Mission point
  - Bring them autonomously to containers storage
  - Go back autonomously to End Auto Mission point
  - Drive manually to TractEasy waiting Mission point

## Status

- Sensor calibration and data comparison
- Development of the Fleet Management System (FMS)

# Autonomous driving demonstrations in real logistics operations

## Port demonstrator



### 3 phases

**Phase 1**: Trailer move from drop off area to holding area ready for loading onto the ship

**Phase 2**: Public road access and gate-processes

**Phase 3:** Loading of a trailer onto a ship

### Use case

- Container parking and roll ship loading
- Cooperative operation with human drivers
- Hub to hub capability with offloading site

### Status

- Sensors integration and testing to begin June 2023

### Market size:

250 million containers are handled per year at EU ports

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# Autonomous vehicles under all weather conditions: steering towards a harmonised legislative framework enabling real-life deployment

# Introduction – Aim of the analysis

In the framework of AWARD H2020 project, this paper and the project's task aim to analyse the different regulatory frameworks for testing and operation of autonomous vehicles in the EU and beyond

Regulations analysed: UN, EU, EU member states (Germany, France, Spain, BENELUX, Portugal, Italy etc.), Switzerland, Norway, USA and others

Output of the task: Develop recommendations on best practices for legislators to safely allow the market uptake of autonomous vehicles in the EU

Final results and recommendations will be submitted and published in Q1-Q2 2024

The current paper is including a first analysis of the EU's ADS Act, Norway, Austria and France

# European framework on vehicle type-approval conditions: The ADS act

- Provides guidance on performance and technical specifications of vehicles equipped with ADS, focusing on:
  - the information required to support the ADS manufacturers' request for EU type-approval;
  - the performance requirements and technical specifications applicable to ADSs, under a variety of scenarios and operating conditions (OOD) that the vehicle finds itself in;
  - the review process of relevant approval authorities in their assessment of ADS compliance with the applicable technical specifications;
  - the review of documentation, tests to be conducted and guidance for approval authorities, when reviewing applications.

# European framework on vehicle type-approval conditions: The ADS act (next steps)

- ADS act as part of a broader maturation in Europe's AV regulatory and commercial environment
- EU legislation to provide harmonised approach while granting an adequate flexibility to enable the safe development and deployment of AVs in Europe
- Next step is to create a legal framework (EU and national) that ensures safety of AVs and facilitate their deployment and commercialization on public roads and private areas, by learning from good national practices

# Status Quo Austria: legal framework

## Who is allowed to test?

vehicle manufacturers, system developers, research institutions, transport companies and operators of bus routes, goods carriage companies, operators of multistorey car parks and car parks, road maintenance organizations

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» contact point automated mobility

= First point of contact in legal and technological issues for national and international companies and projects

# Automated Driving Ordinance („AutomatFahrV“)

- 2016 Automated Driving Ordinance came into force
- 2019 1st Amendment
- 2022 2nd Amendment

***The Automated Driving Ordinance specifies the conditions for testing automated vehicles on public roads and defines which systems in which traffic situation, on which types of roads, up to which speed ranges can be tested.*** *The regulation does not foresee to impose additional restrictions regarding time of operation, weather conditions or similar conditions.*

***The driver may transfer certain driving tasks to these systems, but remains responsible at all times for resuming all driving tasks.*** *The legislation for testing of fully automated vehicles without safety driver in the vehicle (remote operation) is currently under development in Austria.*

*The Ordinance defines two Use Cases for Systems in Series Production:*

*“Parking Assistant”*

*“Motorway Assistant with Automatic Lane Guidance”*

# 8 Use Cases for test purposes

**Automated minibus**
a minibus equipped with a system capable of taking over all driving tasks at a speed of up to **20 km/h.**

**Automated vehicle for passenger transport**
speed limitation to **50km/**h that are based on type-approved vehicles (categories: M1, M2 and L7e)

**Automated vehicle for the transport of goods**
speed is limited to **30 km/h:** for tests with AV that **have not been type-approved** before and to 50 km/h for tests with AV that are based on type-approved vehicles.

**Motorway pilot with automated lane change**

**Motorway pilot with automated driving on motorway on- and off-ramps and exits**

**Autonomous military vehicle**

**Automated valet parking**
enables testing of automated parking, for example in multi-storey car parks at speeds of up **to 10 km/h**.

**Automated working machine**
allows working machines to be tested without an operator on board and with a maximum speed of **up to 10 km/h**.

***Currently, testing permits can only be issued if they are covered by one of the pre-defined use-cases.***

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# Summary of requirements and necessary information to obtain a test permit in Austria

| Filled in application form: | Safety relevant information: |
|---|---|
| • Contact person<br>• Description of the use-case<br>• Purpose of the test/research questions<br>• Name of operators<br>• License plate number<br>• Confirmation of third-party liability motor insurer<br>• Duration of tests<br>• Planned route or area<br>• Evidence of having informed the state governor and the road administration<br>• Approval from the driver/operator to perform data recording<br>• Accident data recorder<br>• Description of necessary infrastructure adaptations<br>• Additional questions | • Analysis and risk assessment of the planned route following a given template (including corresponding documentation of risk mitigation measures)<br>• Confirmation of operator training:<br>  ○ Test driver certificate (or similar) – focusing on driver skills<br>  ○ Training/introduction covering the vehicle specifications, route specifications, use-case specific maneuvers. etc.<br>• Description of how the necessary maneuvers have been tested beforehand on a proving ground and in simulation<br>• Description of manual override of the system<br>• Description of manual deactivation of the system<br>• Description of a risk analysis for the whole test and if mitigation measures have been taken; including description of method used |

# The case of France

| Overview of provisions depending on use-cases | | |
|---|---|---|
| **Use-case** | Case A: On-board driver | Case B: Remote intervention |
| **Partially automated vehicle** | To be able to respond to any request for handover<br>To be able to respond to law enforcement orders and facilitate the passage of priority vehicles | Not allowed |
| **Highly automated vehicle** | To be able to respond to any request to take over (NB: by design = out of scope)<br>Be able to respond to law enforcement orders and facilitate the passage of priority vehicles | Only within an automated road transport system (ARTS)<br>System validated by decision of the service organiser, after safety demonstration and opinion of an approved qualified body.<br>Remote operator able to intervene according to the system's conditions of use |
| **Fully automated vehicle** | Not applicable | |

# Discussion – expected outcomes

Legislation in the studied countries allows for testing autonomous vehicles under pre-defined use-cases

The documentation needed to be submitted is rigorous in most cases

In most countries the legislation is going to be updated soon or is updated often

# Next steps of the analysis

- Analysis of the regulatory frameworks of different countries in Europe and beyond is work in progress
- Recommendations based on the best practices to be produced
- Workshop to present the recommendations involving policymakers at both EU and national level in Q4 2023

Thank you

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