

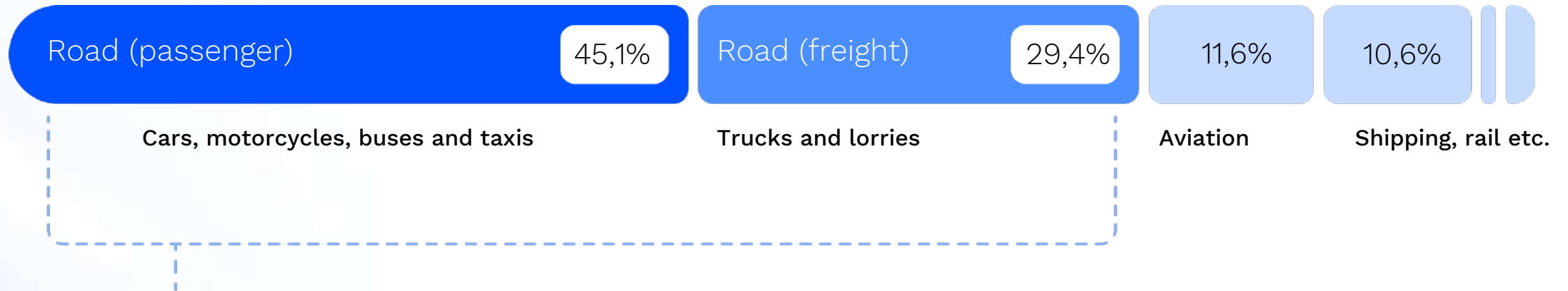
Auve Tech

Building the world's most flexible last-mile transportation ecosystem with our autonomous shuttles.



Global CO₂ emissions from transport

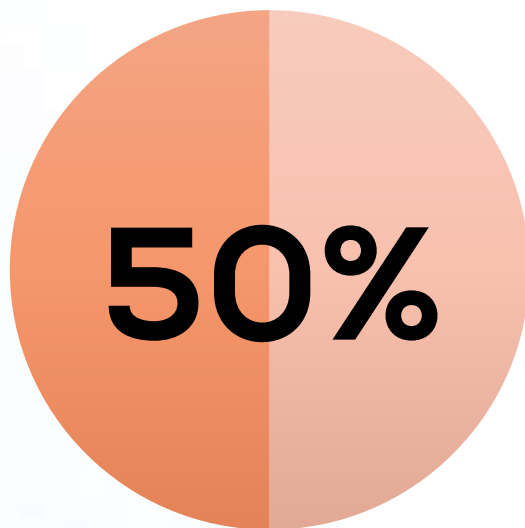
8 000 000 000 tonnes of CO₂



1/5 of global CO₂ emissions



The urban mobility model isn't sustainable



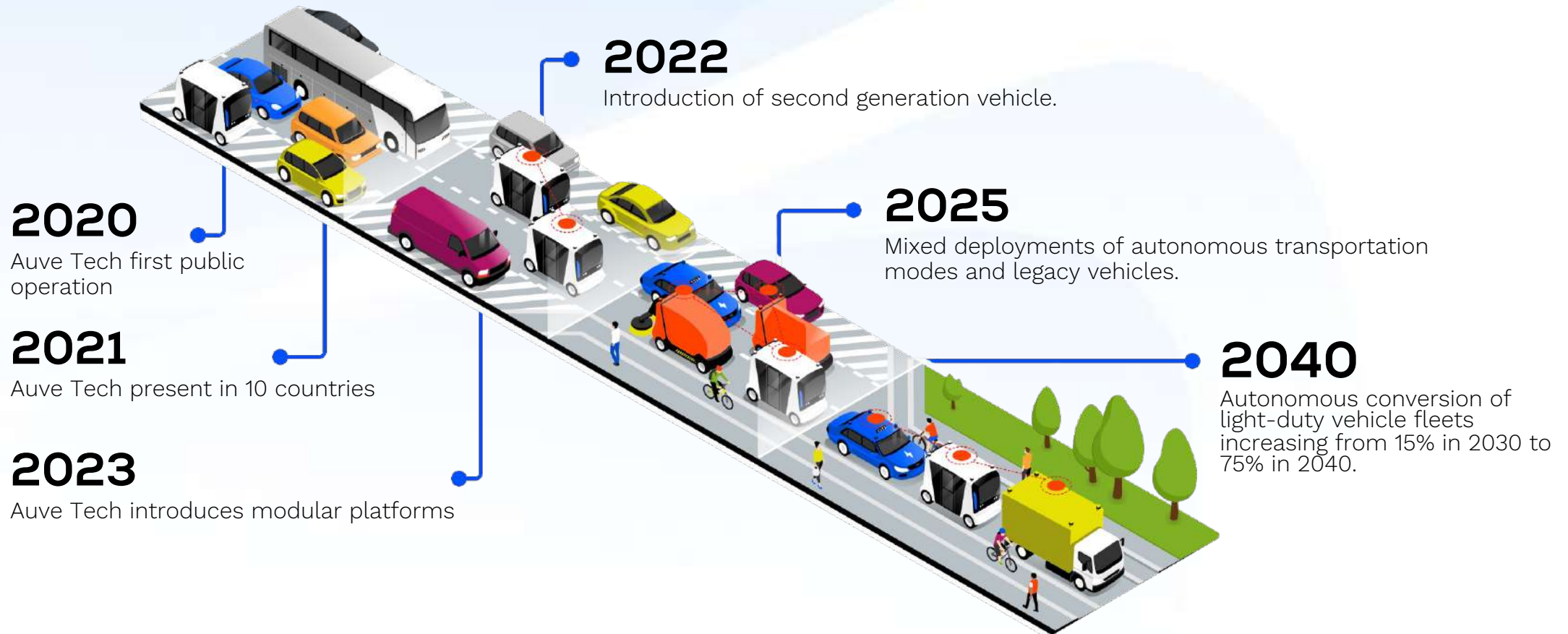
of public space is allocated to roads and parking facilities

We still lose **130 billion euros** annually to congestion, fail to keep up with the demand for mobility and the dependency on personal vehicles is on the rise.



The timeline towards sustainable road transportation

The goal is to introduce more sustainable ways of transportation that benefit the environment and also help re-think land use and city planning in order to make way for pedestrians, cyclists and public places both in urban and suburban environments.



Building the world's most flexible autonomous shuttles service to solve last-mile transportation for early adopters of innovation.

Last mile transportation

Extending the weather proof last mile from bus/tram/train stop to doorstep in business centres and residential areas with the aim of reducing the trips taken with personal cars.

Open traffic

The shuttle is road legal in several EU countries and capable of driving in mixed traffic at limited urban speed.

Closed areas

Using automated vehicles in resorts, theme parks, zoo's, airports, ports and logistic centres can considerably reduce the cost for man power and can make transport more seamless.

Only mile transportation

A lot of "simple" routes can be made more comfortable by providing autonomous last mile connection. Especially useful for families with kids and elderly or during bad weather.





Truly on-demand

The solution can be suited to the needs of the particular environment to offer people the transportation that they need.

Safe

Autonomous driving reduces the human error that is responsible for 90% of traffic accidents happening today.

Easy to integrate

The system does not require any additions to the existing infrastructure.

Innovative

Paving the way for new and effective road regulations by making use of various safety systems and fleet teleoperation. Developing new alternative solutions and platforms.



Affordable

A fleet of autonomous shuttles can be overseen by a safety operator from a distant control room, instead of having separate drivers for each vehicle.

The most affordable autonomous mobility solution on the market today.



Full Scope Capability

Auve Tech is an autonomous driving solution specialist and advanced software technology specialist with the following service offering:

- ▲ **Application analysis**
risk analysis and safety assessment of the application and environment .
- ▲ **Autonomous vehicle**
in-house production that enables us to stay flexible and adapt to different customer needs.
- ▲ **Route set-up**
includes creating a high-resolution 3D map of the route and on-site efforts for setting up the vehicle or fleet.
- ▲ **Personnel training**
trained safety operator on board with technical know-how or in a control room where the fleet is teleoperated from the distance.
- ▲ **Operating**
on-demand shuttle service or a closed-loop operation with pre-defined bus stops according to needs.
- ▲ **Support and maintenance**
qualified off-site remote support and necessary software updates during the project and maintenance visits on-site whenever needed.



Auve Shuttle specifications

Lightweight & Compact

The shuttle has the size and the mass range of golf cart which makes it suitable for pedestrian roads as well.

- ▲ Electric
- ▲ Compact – 8 passengers
- ▲ Low speed – the speed of the urban future
- ▲ SAE Level 4 autonomy within pre-mapped areas
- ▲ Air conditioning
- ▲ Wheelchair accessibility
- ▲ Operating time per charge 8 hours
- ▲ Cruising speed up to 25 km/h



In-house
manufacturing



LiDARs,
cameras, GPS



Fleet
teleoperation

Flexible & Affordable

In-house production gives us the flexibility to develop the shuttle in accordance to the specific needs while keeping down the costs.



Height
2400 mm

Length
3500 mm

Width
1500 mm

The most capable solution regardless of the environment

The solutions is tested in

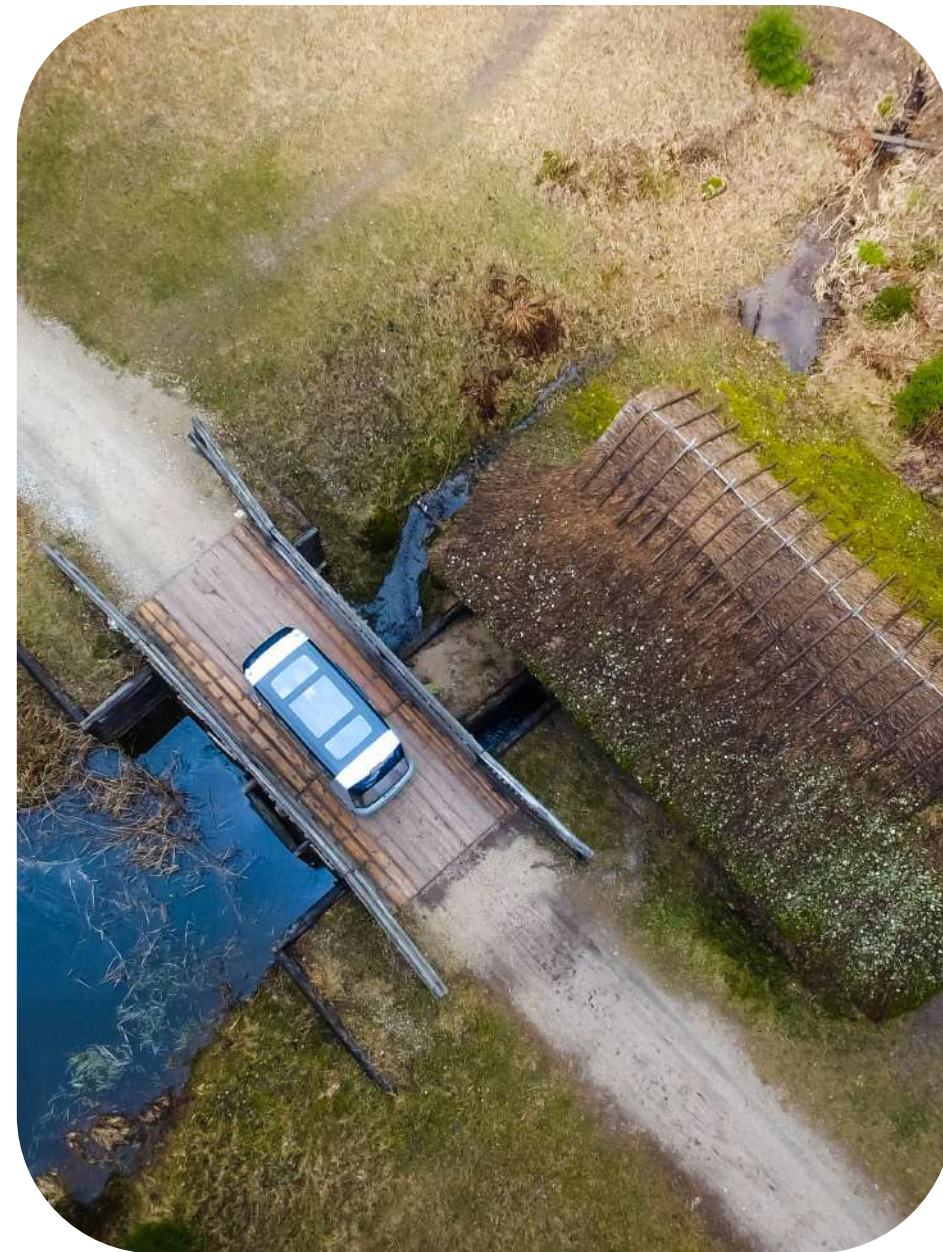
- ▲ Rain
- ▲ Snow
- ▲ Blistering sun
- ▲ Gravel roads
- ▲ Forest roads
- ▲ Vast flat areas



From rural grounds

Estonian Open
Air Museum Estonia

2020



... to gravel roads

WRC Rally Estonia

2021



... to snowy winters

Estonian Open Air Museum

Old Town 2021

Estonia



Auve Tech in numbers

Projects per use cases

Auve Tech has proven its concept and its ability to handle different real-life challenges on a university campus, zoo, open-air museum, business districts and many other closed areas and mixed traffic environments including even the official WRC rally stage.

**19**

Mixed traffic

urban districts
public campuses
shopping malls
suburban areas

11

Closed areas

university campuses
gated communities
cemeteries
zoo
Open Air Museum
airports
industrial parks
manufacturing facilities
mobility testbeds
Old Town
events

Auve Tech in numbers

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Service terminals

Auve Tech carried out a demo project at the airfield of Gdansk airport for mapping the transportation needs at the airport and offer possible solutions for VIP and staff transportation



Urban space

Auve Tech has carried out several projects in urban spaces ranging from the busiest business district in the Baltics (Ülemiste city) to old towns (Tallinn Old town) in order to extend the current public transportation network.

19

Mixed traffic

urban districts
public campuses
shopping malls
suburban areas

11

Closed areas

university campuses
gated communities
cemeteries
zoo
Open Air Museum
airports
industrial parks
manufacturing facilities
mobility testbeds
Old Town
events

Auve Tech in numbers



10 000+

people transported

10

countries where operated

18

shuttles manufactured

30

Operating deployment
completed

The most capable solution regardless of the environment

Proof of concepts



TalTech University
Campus Estonia



Estonian Open Air
Museum Estonia



Tallinn Zoo
Estonia



WRC Rally Estonia
2020 Estonia



Rakvere City
Estonia



Kakumäe Beach
Estonia



Chateauroux
France



Brussels
Belgium



Rotterdam
Netherlands



Prague Czech
Republic



WRC Rally Estonia
2021 Estonia



Munich
Germany



Commercial projects



Ülemiste City
Tallinn



Lamia
Greece



Tampere, Hiedanranta
Finland



Pirita
Estonia



Ülemiste City (on-
demand) Estonia



Helsinki
Finland



Gdansk
Poland



Tartu Car-free
avenue, Estonia



Tartu Museum
Shuttle, Estonia



Tallinn Old Town,
Estonia



Lasnamäe, Estonia



Hasselt, Belgium





Von der Leyen in Tallinn with good news

 Berit Nuka
toimetaja



European Commission President Ursula von der Leyen and Prime Minister Kaja Kallas took a short trip in a self-driving bus in the Ülemiste Campus.
PHOTO: Tarmo Lutter

"For me it was the very first time in my life that I was a passenger in an autonomously driving vehicle. It was a good experience, so I want more of that. Really recommend!"

Ursula von der Leyen, 5.10.2021



Timotheus Höttges,
Deutsche Telekom CEO



Mr. Jean-Baptiste Djebbari
the French Minister of Transport

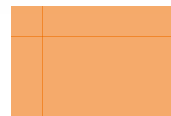
Headlines across news outlets!

Commercial partnerships

Operating partnerships



Project partnerships



Accelerators/Development



Competitive landscape

Last mile passenger carriers & others

Robotaxis

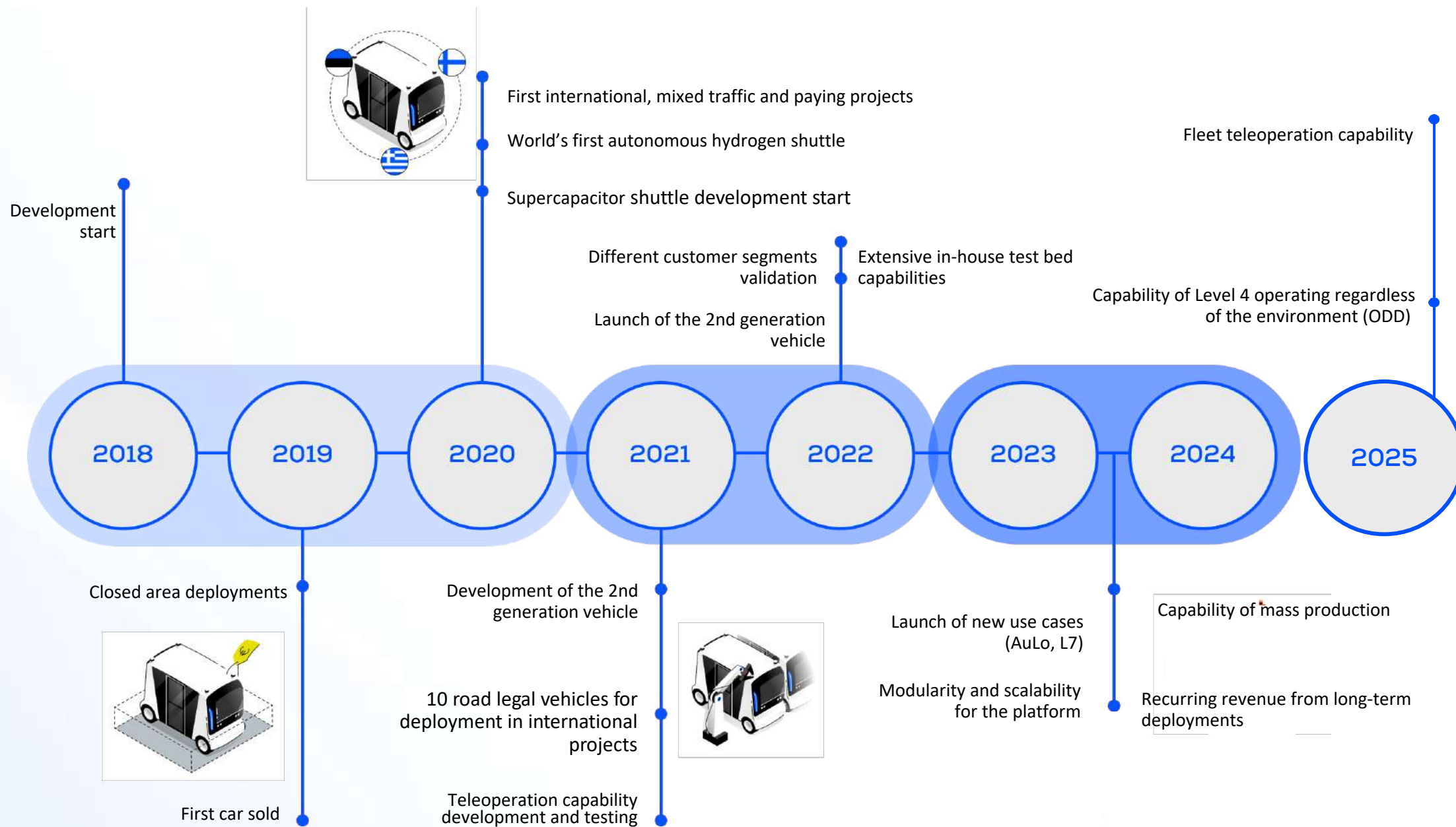


Autonomous last mile



Key advantages compared to robotaxis

- ▲ In-house engineering grants flexibility
- ▲ Best in bad weather
- ▲ 10x more cost-effective
- ▲ First in H2 and ultracapacitors



Near-time goals

2023
-
2024

Auve presence in all relevant markets:

- ▲ 150 commercial operating
- ▲ projects in 50+ locations globally

Readiness to scale from POCs to permanent fleet management

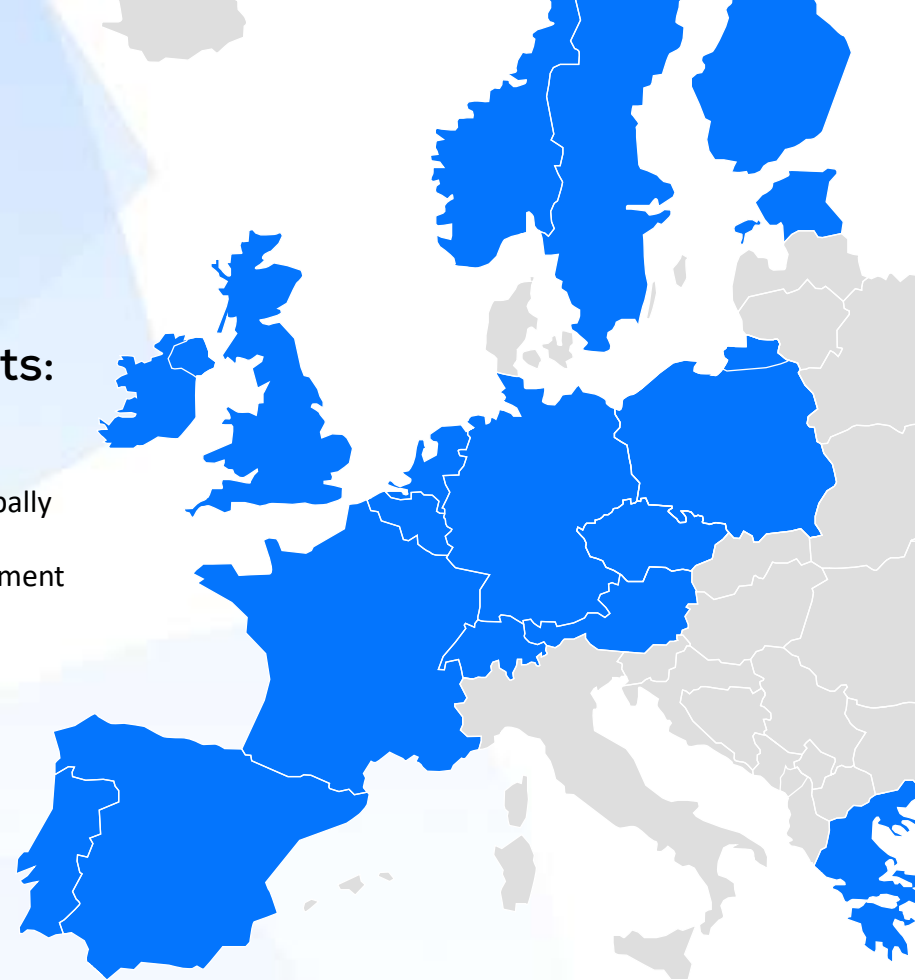
Achieving ratio of 1 safety operator per 10 shuttles

Developing scalable shuttle model to be able to meet increasing demand

2025
-
2026

Rapid growth in cooperation with external assembly partners

Achieving ratio of 1 First permanent operations of medium and large autonomous fleets emerge, estimated exponential increase in demand



EU Horizon 2020 FABULOS



Of the four consortias that participated in the projects, Mobile Civitatem, the consortia that included Auve Tech and its vehicles, was **regarded as the most successful** one during the project (2018-2021).



Ülemiste City Business District

Route ran from Tallinn Ülemiste City E - Estonia Briefing Center to the International Airport and from there to a Ülemiste shopping center. The project will be continued with an on-demand test period in 2021.

Lamia, Greece

Pilot route was 3,2 km long and included a dedicated bus lane with a speed limit of 40km/h. The route was adjacent to busy pedestrian and bicycle routes. The pilot zone included several key city points of interest.



According to the passenger surveys, the projects carried out in Lamia and Tallinn were regarded as the best pilots in regards to overall experience, safety and ease of use.

Ülemiste City

in numbers today

- ▲ the biggest privately-owned business campus in Northern Europe
- ▲ with Tallinn International Airport and Ülemiste shopping centre.

500+
smart businesses

36 ha
of surface area

12 000
people living, working
and studying daily

2005
a smart city concept
created for replacing the
ruins of old Soviet factory

2020
districts begins piloting
autonomous shuttles for
improving transportation

2021
district pilots on-demand
autonomous solutions for
inter-district commuting

2022
districts begins piloting
autonomous shuttles for
improving transportation

present

50%
more than 50% commute
with personal cars

450
buses drive through
the campus every day

7,5 ha
parking facilities
3315 parking spaces

Ülemiste City

vision for 2025

- ▲ the biggest privately-owned business campus in Northern Europe
- ▲ with Tallinn International Airport and Ülemiste shopping centre.

700+
smart businesses

36 ha
of surface area

20 000
people living, working
and studying daily

2023
district pilots on-demand
autonomous solutions for
inter-district commuting

2025
2 times fewer cars per
person in the district

2030
carbon neutrality, car
free district centre

2x
less personal vehicles
used inside the
district

70%
of people commute to
the district by public
transportation

2 ha
parking facilities

World's first autonomous hydrogen shuttle

Together with the University of Tartu, we have introduced a shuttle fueled by hydrogen to be used as an alternative to the regular electric shuttles.

Supercapacitors

A development project with Skeleton Technologies is in the works in order to use supercapacitors in the shuttle. This makes it possible to charge the shuttles within a few seconds, paving the way for 24/7 operations.



Alternative power sources
for maximal flexibility

EU Horizon 2020 REFLECTIVE

1.4M€ project grant received in 2021 - 2024

The goal is to introduce a L7 demonstration vehicle that meets the highest quality and safety standards with an affordable price making it an irresistible choice for any urban environment and use case. No such solution currently exists on the market and our primary aim is to bridge this gap.

Key partners in the project:



Steps towards autonomous
personal mobility

AuLo

▲ Sustainable

Autonomous Logistics help reduce the CO2 emissions by using electric autonomous vehicles 24/7 in their operational area according to clients necessities

▲ Flexible

Our parcel delivery process is contact free for the customer and flexible in choosing a suitable time for parcel pick-up or for sending. During down-time, the costs are also minimised by not having a driver that must be paid for their time.

▲ Modular

The parcel container is modular with automatic lifting legs, parcel companies can load the Auve parcel containers at their logistics centre and the last mile autonomous vehicles can pick up the container and deliver the parcels 24/7 in their operating area.

▲ Cost-Effective

The workforce costs are substantially lowered as the time to load the container would be similar or even less to the loading process of a parcel delivery van and the delivery van does not have to be unloaded to a respectable stationary parcel locker or require a person to drive door-to-door.



Steps towards autonomous
personal mobility

Modular platform

We aim towards creating a modular platform for the shuttle in order to be able to easily customise the design for various customer needs. This way we could provide autonomous services in different applications, such as waste transportation, parcel delivery, cargo transportation, street cleaning etc.



Steps towards autonomous
personal mobility

Cooperation development projects

Autonomous shuttle with
integrated solar panels

2020



Objective: Reducing the on-board energy consumption from the battery by obtaining some of the energy from the solar panels

Result: 10% of additional energy, possibility to run on-board computers from this energy

World's first autonomous
hydrogen shuttle

2021



Objective: Providing an alternative solution for reducing the project down-time due to charging times

Result: Prototype ready, continues projects to be started for series production

Autonomous
supercapacitor shuttle

Phase I 2021
Phase II 2022



Objective: Providing an alternative solution for reducing the project down-time due to charging times

Result: Vehicle ready, charging solution to be developed in Phase II

Core team



Väino Kaldoja Founder, investor

- ▲ Former CEO of SilberAuto, exclusive Daimler distributor
- ▲ A company with 25+ years of experience with the automotive industry
- ▲ Currently actively taking part in the product and service design process



Mari-Ly Klaat COO, Co-founder

- ▲ Wide experience with different EU and funding projects
- ▲ Strong background in engineering and finance



Johannes Mossov CEO, Co-founder

- ▲ Experience in custom vehicle manufacturing
- ▲ Extensive know-how from various manufacturing teams



Kauri Kõrm Head of Development

- ▲ Experience with technical project management and funding
- ▲ Background in organisational management
- ▲ Extensive experience as a navy senior non-commissioned officer



Taavi Rõivas Chairman of Supervisory Board

- ▲ Former Prime Minister of Estonia
- ▲ Experience with various start-up teams



Paula Adamson Head of Business Development

- ▲ Experience in B2B sales
- ▲ Background in industrial automation and mechatronics





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