

**RE  
MOT  
ED**

REMOTED gives  
streets back to  
people.

Less private cars means less emissions,  
accidents and more space to people and  
green building.

It delivers better quality of life.

We just need to re-organize traffic.

# REMOTED is a robotbus service operator

Short distance urban mobility service for transport operators and campus/factories including:

- Route definition with desired service level.
- Route deployment with (slow moving) self-driving vehicles.
- Remote control centre, remote agents/safety operators
- Maintenance, insurances, registrations, ticketing
- Monthly subscription fee

**All you need in a one package**



# Making the real impact

- **Good health:** Without private cars, citizens will use more active mobility and shared robot buses. *Self-drive is a safe drive, meaning less cars means less accidents and incidents.*
- **Green infrastructure:** Streets without cars gives more public space to people and green building. A tree absorbs an average of 10 kilograms CO2 per year for the first 20 years.
- **Reducing inequalities:** Better access to public transport improves accessibility and making it attractive also for senior citizens and people with disabilities. In addition, better public transport makes cities safer.
- **Sustainability:** Less cars means fewer emissions.
- **Less consumption:** Less private cars saves virgin raw materials.
- **Public-Private-People Partnership:** This is done together with industry, cities and people.



**UN Sustainable Development Goals**

# REMOTED delivers the overall service

## SERVICE DEFINITION

### Consumer expectations

- Safety
- Route
- Potential users
- Service level

### Business case

- Price
- Costs
- Operations

### Environments

- Urban
- Industry parks
- Holiday resort
- Hospitals

### Vehicle manufacturers

- Capabilities
- Quality
- Capacity
- ODD
- ADS

## SERVICE ROLL-OUT



- --- Manuals
- --- Roles
- --- Tools
- --- Storage
- --- Network



- --- Vehicle
- --- Ticketing
- --- Route mapping
- --- Journey planner



- --- Signs
- --- Traffic
- --- Connectivity
- --- Positioning
- --- Road maintenance

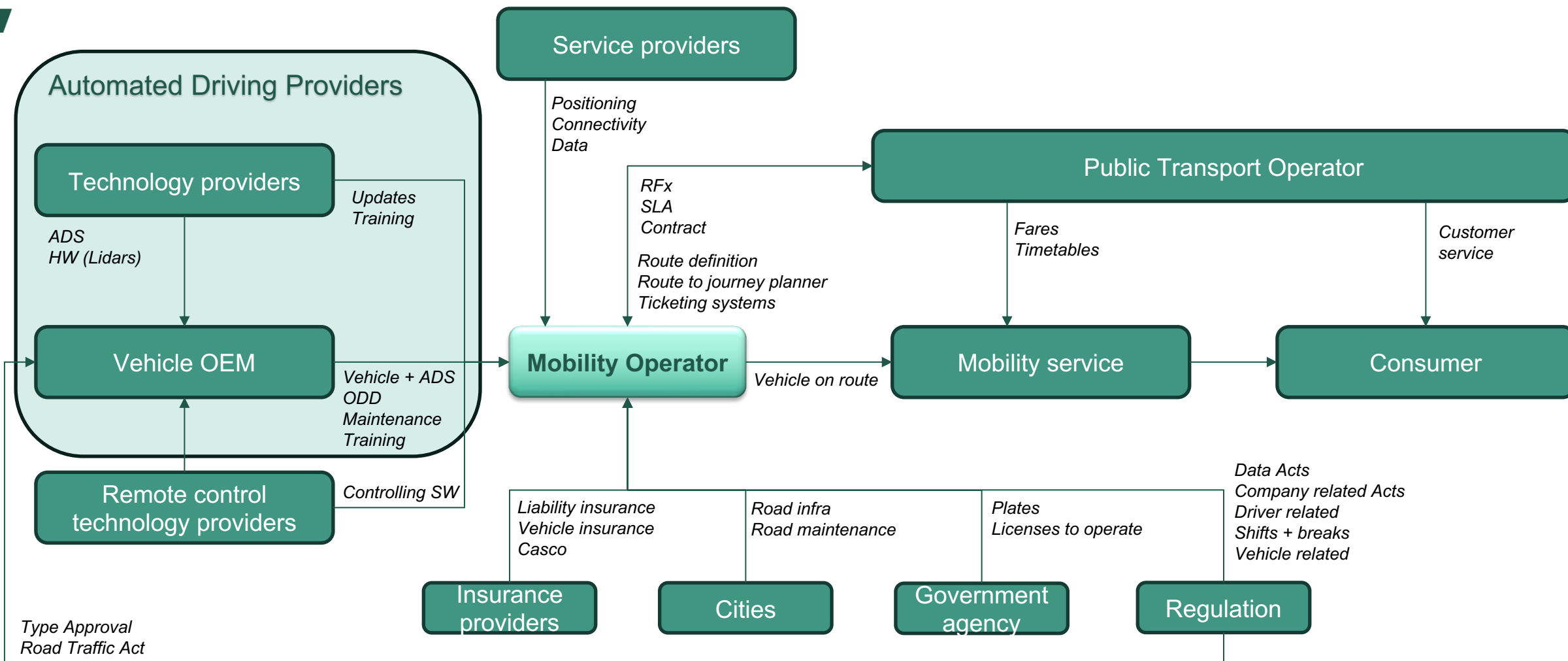


- --- Cleaning
- --- Charging
- --- Registration
- --- Insurance

## OPERATION



# Operational Landscape



# REMOTED Urban Mobility Solution Concept



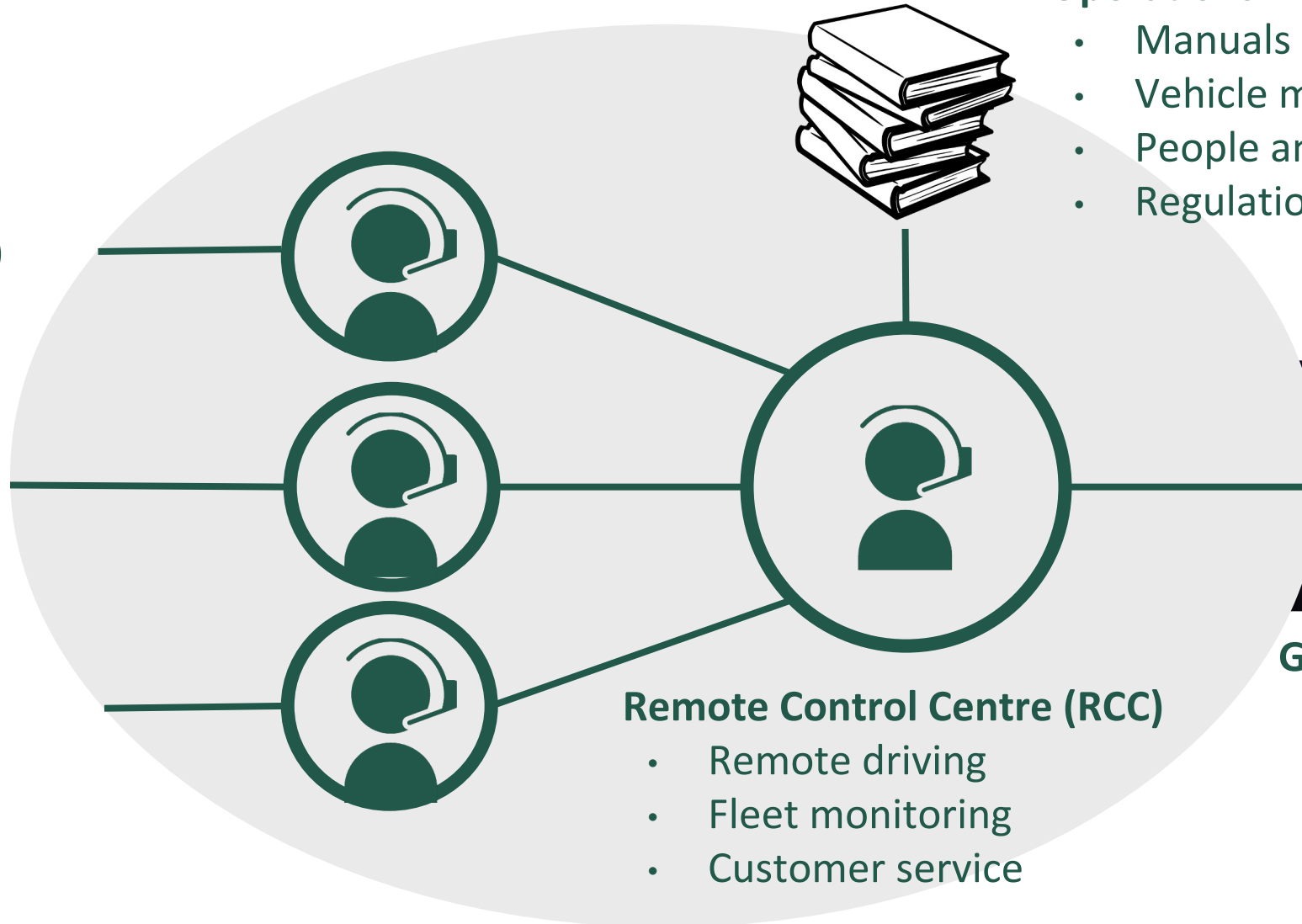
Campuses (B2B/B2G)



Public transport (B2G)



Factory logistics (B2B)



## Operations Management

- Manuals and Processes
- Vehicle maintenance
- People and competences
- Regulation

## Remote Control Centre (RCC)

- Remote driving
- Fleet monitoring
- Customer service

## Government

- Emergency
- Traffic mgmt
- Security



# Path to commercialization

## Technology pilots (- 2022)

- 8x6x1 = speed, seats, driver
- 4 - 6 weeks pilots
- Validating vehicles and technology
- Mainly driven by vehicle OEM's
- Horizon2020 funds

## Pre-commercialisation (2023-2024)

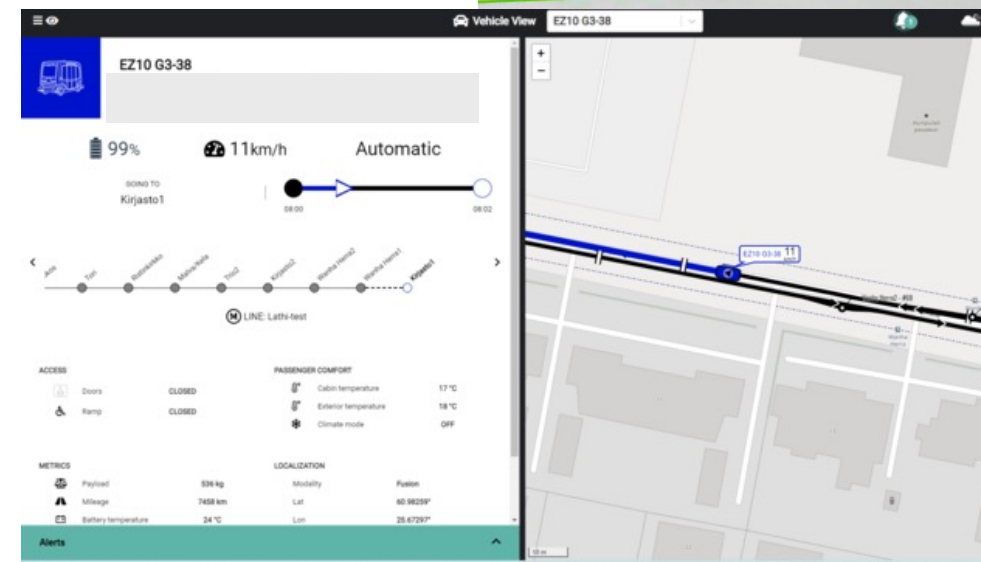
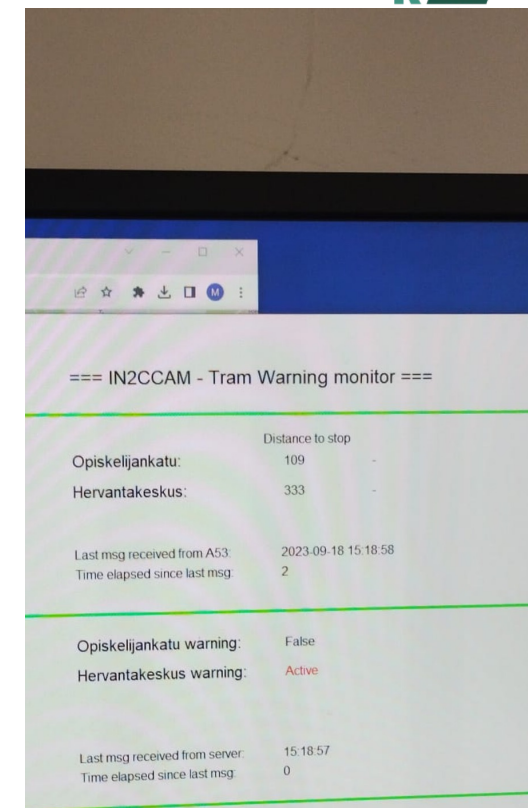
- 20x12x0.5 = speed, seats driver
- 6 - 12 months deployments
- Validating consumer experience
- Remote Control Centre
- HorizonEU, government funds
- License to operate, ticketing and payments

## Commercialization (2025)

- 50x20x0 = speed, seats, driver
- 3 to 8 years contracts
- Validating business performance
- Operating routes under commercial terms
- Regulation and homologation

# Remote management: Not a walk in a park

- Main focus: Problem solving which require competence
  - Skills: IT systems, English, logical, decision making
- Operations manual(s) - “SOP”
  - General: Remote management centre
  - Team lead
  - Remote management agent
- Various kinds of tools offered by vehicle OEMs to monitor and control the vehicle
- Several service-related tools by various vendors
  - Fleet management
  - Camera surveillance (interior/outside)
  - In-house apps, like Tram Warning Monitor
  - Automated Passenger Count
  - Contact to the vehicle
- Situational awareness
- Connections to traffic management, 112 etc.





# Business driven take aways

1. In the beginning, automation will increase costs. Vehicles are expensive and roll-out takes more time and effort comparing to traditional cars. **Cost savings comes with 1:4 remote agent and vehicle ratio.**
2. **Several new vehicle manufacturers and models entering to markets.** Mass production and clear homologation will reduce prices and make the service more attractive.
3. **As little country specific regulation as possible.** One EU wide homologation process/practice for self-driving shuttles and buses.
4. Can a **remote management centre control automated vehicles which are in another country?** I would say "it depends". Remote Management centre will be a network rather than a single entity.
5. **Can anyone become an Operator?** Self-driving vehicles may be dangerous in wrong hands. It requires practice and experience.

# Human aspects: Self-drive is a safe drive

- **SHOW (show-project.eu)**
  - The biggest CCAM shuttle and bus project in Europe
  - 70 partners in 13 countries
- **Facts**
  - 175 759 km travelled in 20 cities in Europe
  - 1 accident (= hard break led to an injury of a safety driver)
  - 2 066 conflicts



# Human aspects: Self-drive is a safe drive

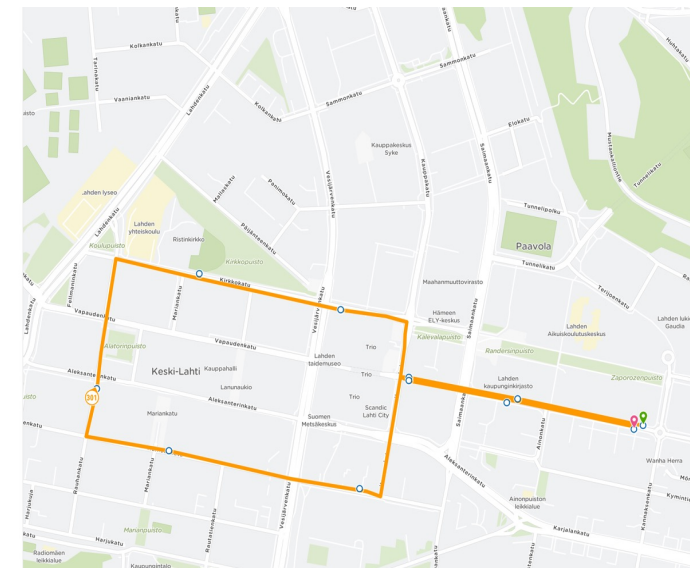
- In 2023, REMOTED operated three routes in urban environment at Tampere and Lahti
  - Driven more than 25 000 KM
  - Served 6 000 Passengers
  - 90% level of automation
  - Zero accidents
  - **2 313 Hard breaks**
- **An average drive is app. 1.5 km**  
 ➔ **16 000+ drives**



301  
Wanha Herra → Wanha Herra

Pysäkit Aikataulu Häiriöt

Wanha Herra	14:00
322118	Seurava 15:00
Kaupunginkirjasto	1 min 11:18
322117	Seurava 14:02
Kauppakatu	3 min 11:20
418818	Seurava 14:04
Kaupunginsairaala	8 min 11:25
322114	Seurava 14:00
Hämeenkatu	11:31
418518	Seurava 14:15
Rauhankatu	11:35
418618	Seurava 14:20
Ristinkirkko	11:40
326717	Seurava 14:25
Kirkkokatu	11:45
418718	Seurava 14:30
Kauppakatu	11:48
418918	Seurava 14:33
Kaupunginkirjasto	11:52
322116	Seurava 14:37
Wanha Herra	12:00
322119	Seurava 14:45



# The human side of the story

- **People (esp. car owners) with negative expectations for automated shuttles**
  - Aggressive tone of the voice in the beginning, but relative fast fading away
  - The most positive users are baby boomers (senior citizens) and mothers with small kids, GenZ and Millennials
- **Road traffic enforcement actions are needed**
  - **Road rage:** I will teach you and now I test your brakes!
  - **Passing our vehicle on yellow lines**
  - Returning too close to a CCAM
  - **Wrongly parked cars**
- **Some people are testing vehicle safety systems by running to front of the CCAM.**



# There is still a need for a human touch

In some cases, there is still need for human-being in a vehicle, but not driving the bus.

Instead, there is a need for a someone who is helping and guiding people (especially senior citizens).

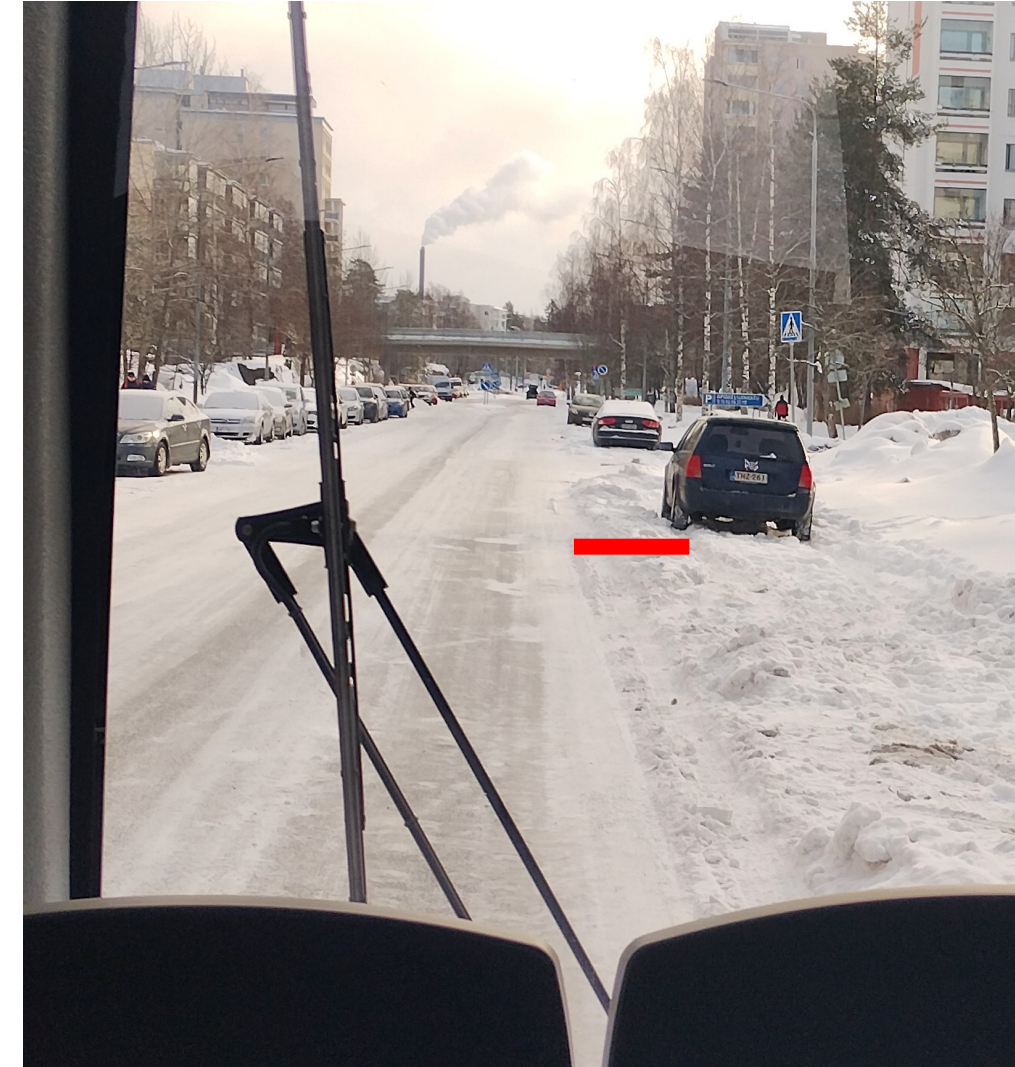
Senior citizens value route mode over on-demand.

Don't forget socio-economics aspects and CCAM's can bring clear benefits.



# Road maintenance

- **Self-driving vehicles requires special attention to road maintenance during seasons. For each season, we modify the driving lines a bit.**
- **Winter: Together with city road maintenance unit, review the route and agree maintenance actions.**
  - Snow benches: Keep them low
  - Snow on windy day narrows the road
  - When snowing, remove the snow from road
  - Parked cars when cleaning streets....
- **Spring:** More attention to maintenance by keeping lidars and cameras clean
  - Dust and sand when the snow is melting



# Human factor: Key take aways

- **Self-drive is a safe drive: CCAM's will save lives in cities.**
- **For senior citizens and people with disabilities, there is a need for human-being in a vehicle, but not for driving the bus.**
- **There will be incidents and accidents, but they are not caused by automated vehicles.**
- **CCAM's can deliver better customer service in first/last mile drives in "feeder mode" → Improving accessibility to high-capacity public transport lines (Cities/Rural areas).**

# Human behaviour is interesting.

Statistics show that automation makes fewer mistakes than humans on the road.

Meanwhile, people accept and forgive human-made mistakes but expect zero accidents/incidents from automated vehicles.





A series of horizontal white bars of varying lengths on the left side of the slide, creating a staircase-like effect.

That's all folks!

Mika Rytönen  
mika@remoted.fi