

SmartRail-ekosysteemi

Yhteiskehittämisellä kohti kansainvälisiä
markkinoita!

SmartRail –ecosystem

Škoda Group vision:

We keep people, cities and business moving. Connected, safe and unhindered.



Over 5 500
electric
locomotives



837
metros



Over 1 100
low-floor trams

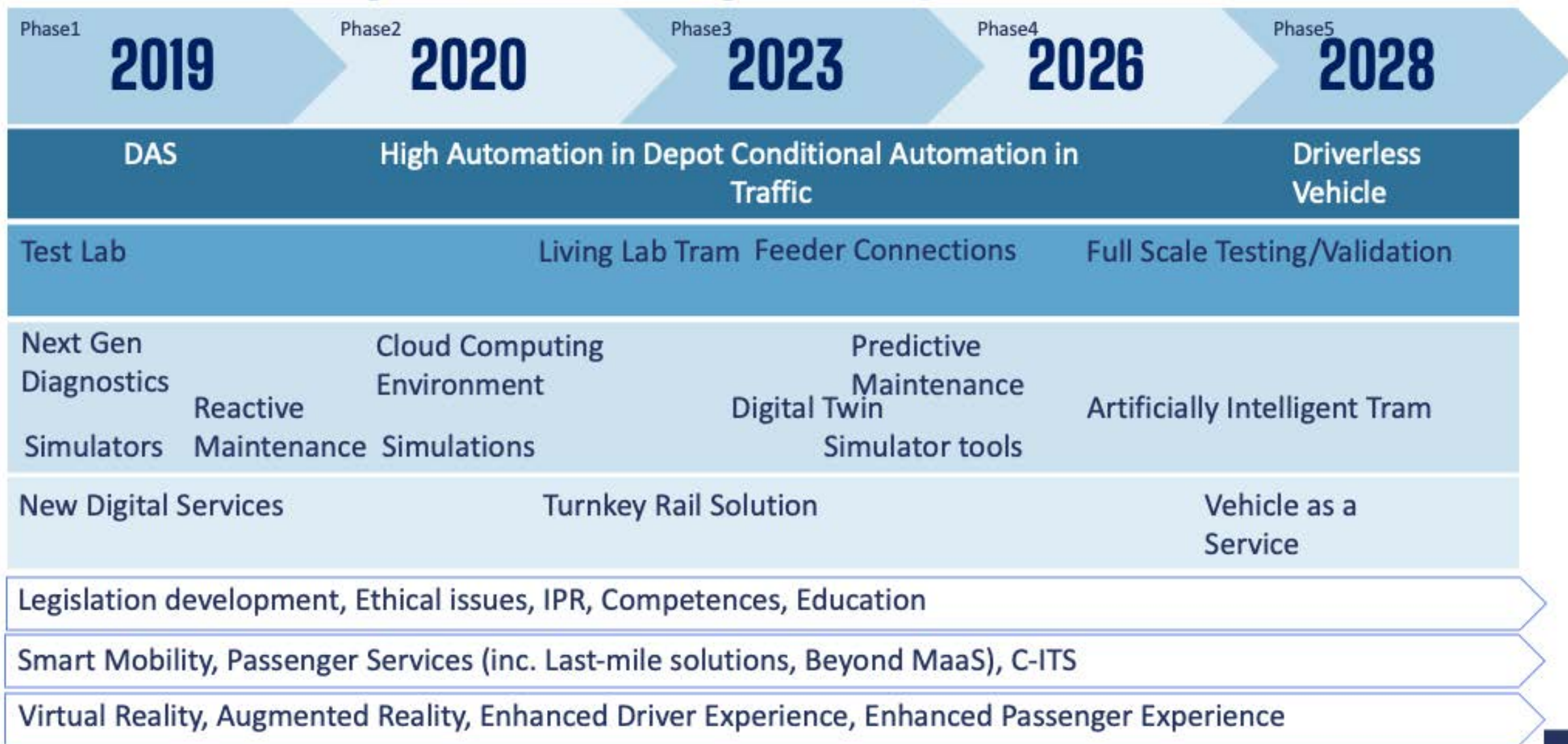


1290 commuter
trains and
passenger
carriages



14 800
cable cars
and buses

SmartRail –ecosystemTechnology roadmap

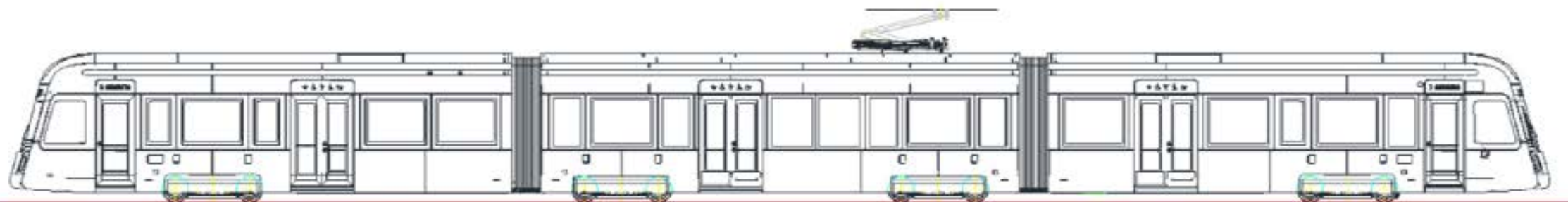


SmartRail –ecosystem

DATA-Evoluutio Tampere Raitiovaunu

2018

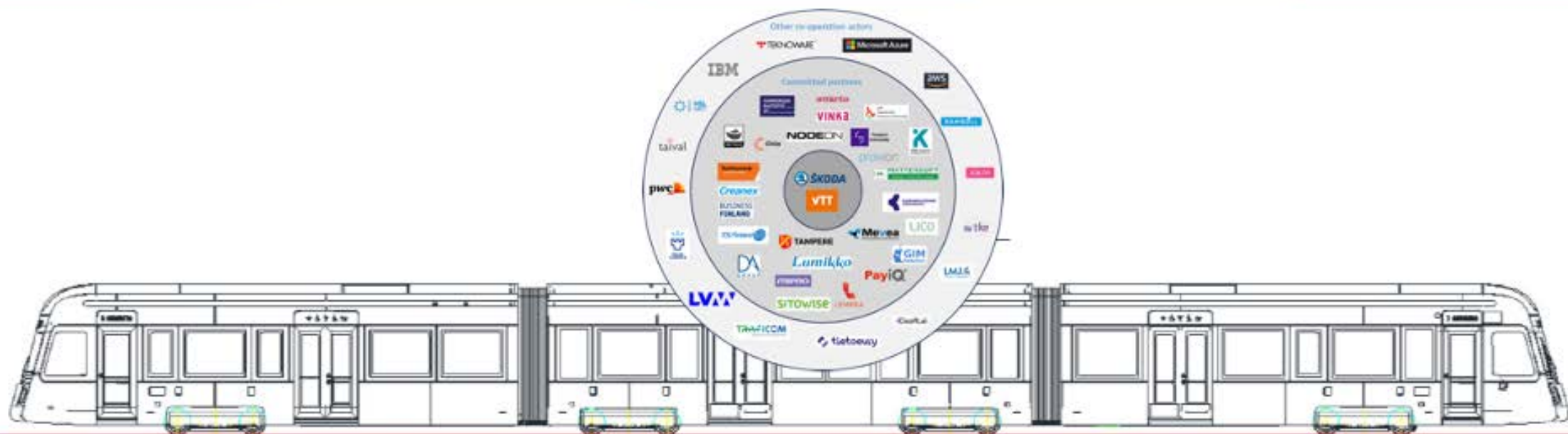
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SmartRail –ecosystem

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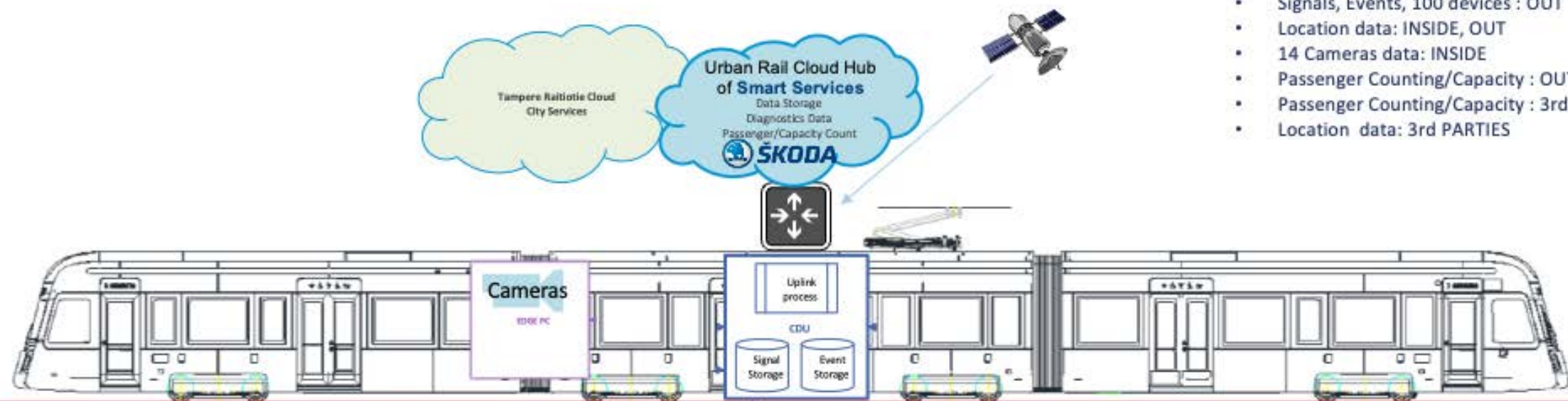


SmartRail –ecosystem

DATA-Evoluutio Tampere Raitiovaunu

2018

2019



- Signals, Events, 100 devices : INSIDE
- Signals, Events, 100 devices : OUT
- Location data: INSIDE, OUT
- 14 Cameras data: INSIDE
- Passenger Counting/Capacity : OUT
- Passenger Counting/Capacity : 3rd PARTIES
- Location data: 3rd PARTIES

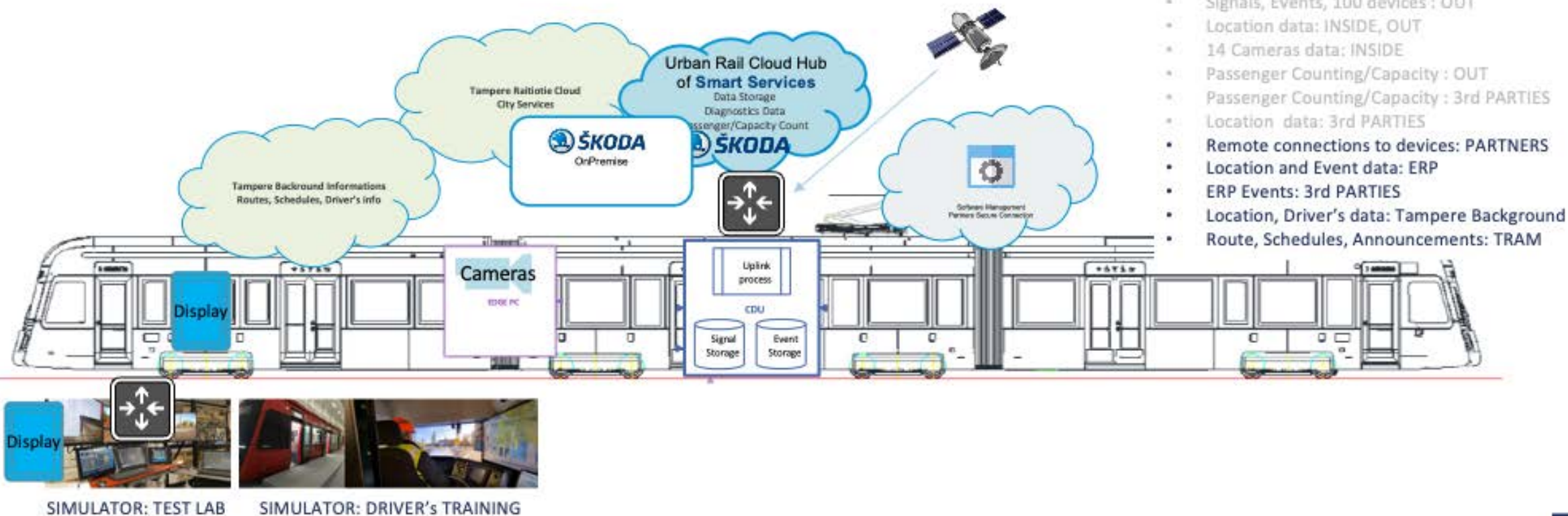
SmartRail –ecosystem

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- Remote connections to devices: PARTNERS
- Location and Event data: ERP
- ERP Events: 3rd PARTIES
- Location, Driver's data: Tampere Background Route, Schedules, Announcements: TRAM

SmartRail –ecosystem

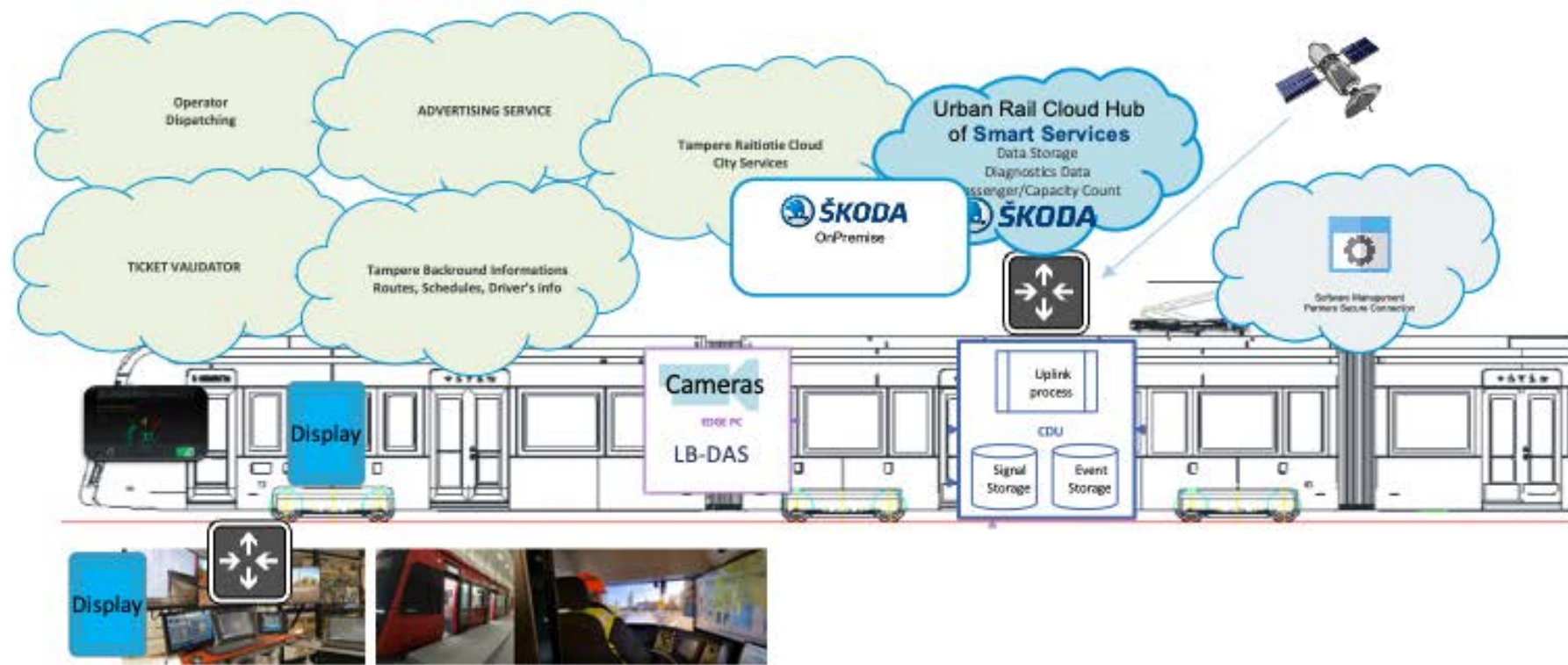
DATA-Evoluutio Tampere Raitiovaunu

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- Location, Driver's data: Tampere Background Route, Schedules, Announcements: TRAM
- Tram location, Maintenance status: OPERATOR
- Passenger information: TRAM
- Track Switch Loop From Infra: TRAM
- Location based on TRACK POINTS: TRAM
- Door handling on STOPS: TRAM
- Speed Limits to Driver's display: TRAM
- Ticket Validator: INSIDE, OUT
- Advertising services: INSIDE, OUT

SmartRail –ecosystem

DATA-Evoluutio Tampere Raitiovaunu

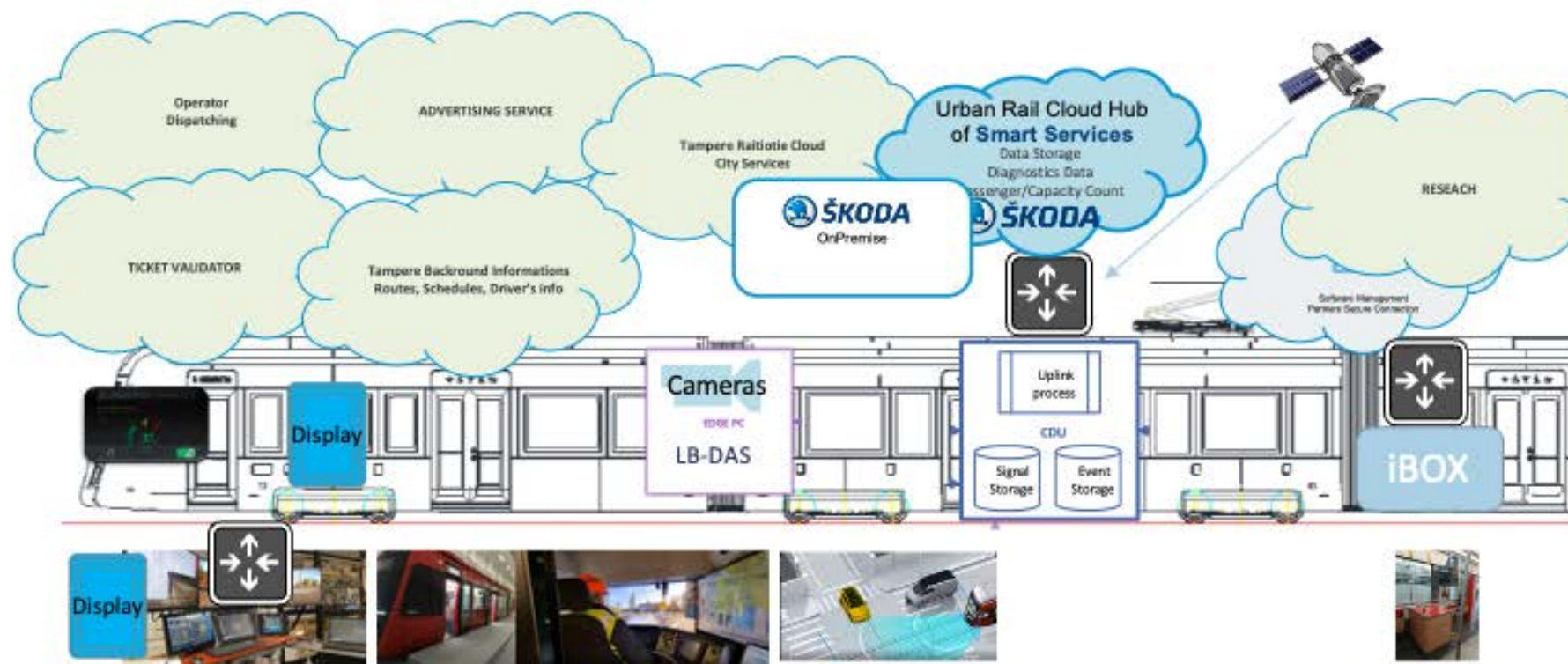
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2020

2021

2022



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- Advertising services: OUT
- Point Cloud around Routes: TRAM
- 3D-Environment of Route: TRAM

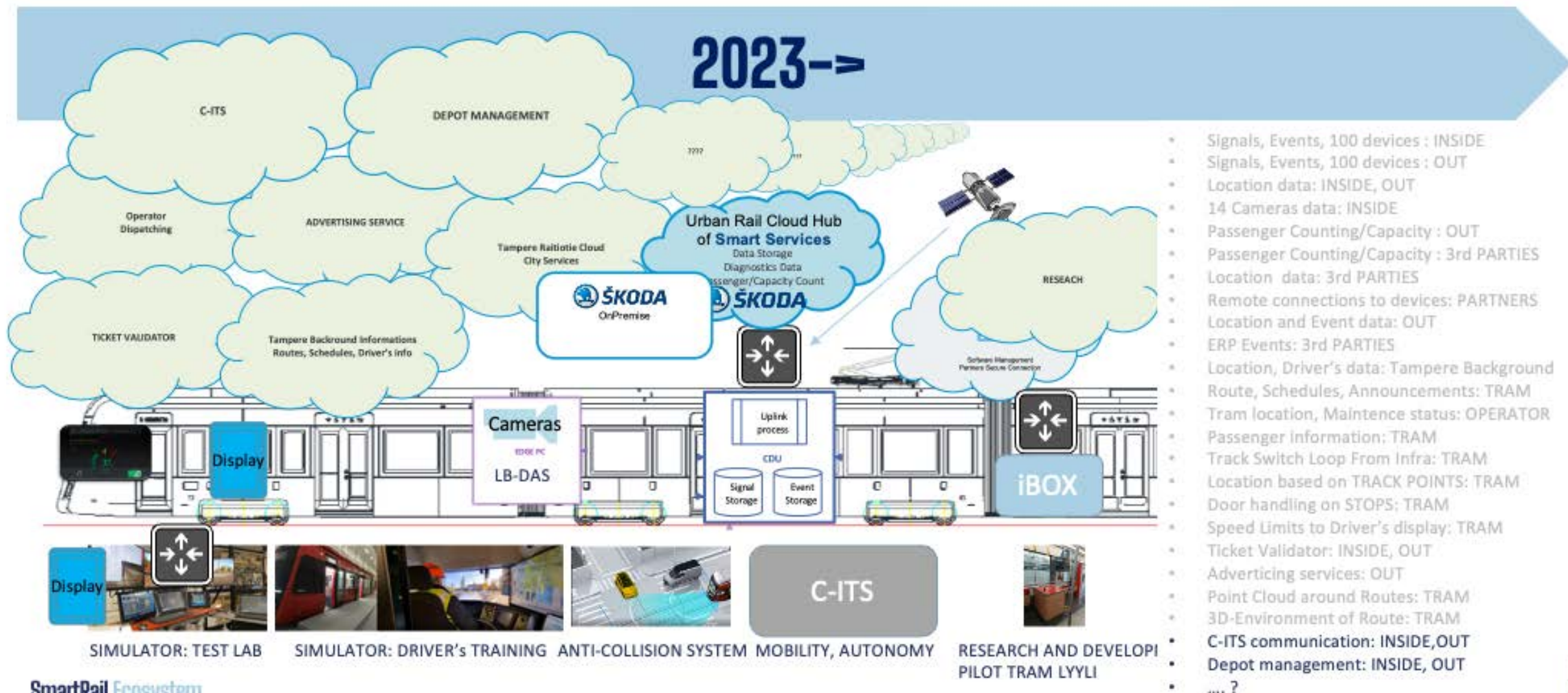
SIMULATOR: TEST LAB

SIMULATOR: DRIVER'S TRAINING ANTI-COLLISION SYSTEM

RESEARCH AND DEVELOPMENT PILOT TRAM LYYLI

SmartRail –ecosystem

DATA-Evoluutio Tampere Raitiovaunu



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- 3D-Environment of Route: TRAM
- C-ITS communication: INSIDE,OUT
- Depot management: INSIDE, OUT
- ?

SmartRail –ecosystem

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Results so far

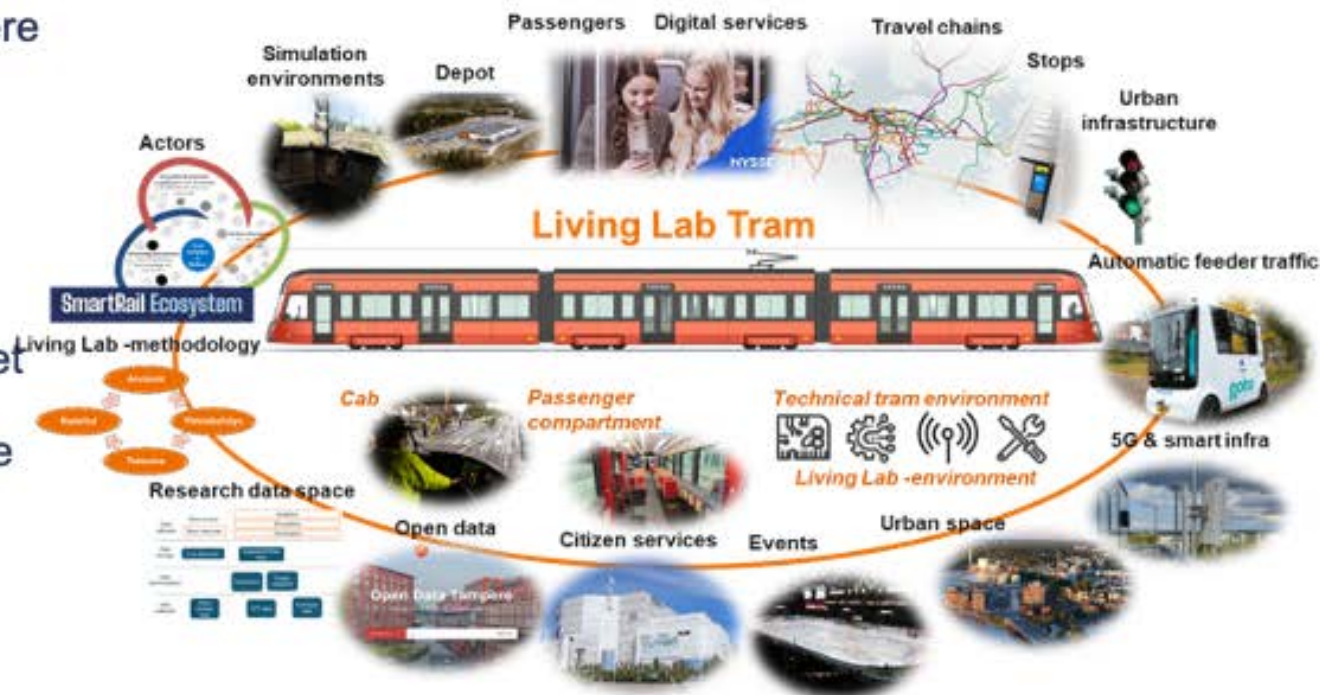
- 600 000 000 Rows of signals delivered from CDU to Cloud / Month
- Realtime datastreams from TRAM to Customers
- Over 20 External datasources or Stakeholders connected to TRAM in order to keep systems running
- Over 60 people have had connection directly to tram remotely (During COVID time commissioning).
- Data from/to over 2000 devices/sensors, 240 Cameras, Backoffice systems, passengers (about 40 000/day).
- Daily data usage through Fleet Gateways 1,3 TB.



Tram data usage widely around partners and customers (TAMPERE RAITIOTIE, TAMPERE CITY, Passengers)

SmartRail Ecosystem Ongoing projects

- **Lyyli Living Lab (Pilot Tram)**
Testing environment for different technologies and research activities in real TRAM. Offered by Tampere Raitiotie.
- **Maintenance operations**
Maintenance activities based on data, predictive and proactive operations.
- **Mobility services**
SmartRail 3rd innovation phase starting. Main target is on urbanites mobility services and connections between public transport vehicles in order to enable development and testing area towards safe and autonomous transport operations..
- **Anti-collision system**
Object detection system as a part of Anti-Collision system
- **Monitoring the life time of car body**
Online measurement system that predicts the carbody fatigue life time.
- **Ecosystem-based operations model**
Continuous development of ecocsystemic business and strengthening ecosystem health



SmartRail Ecosystem Ongoing projects

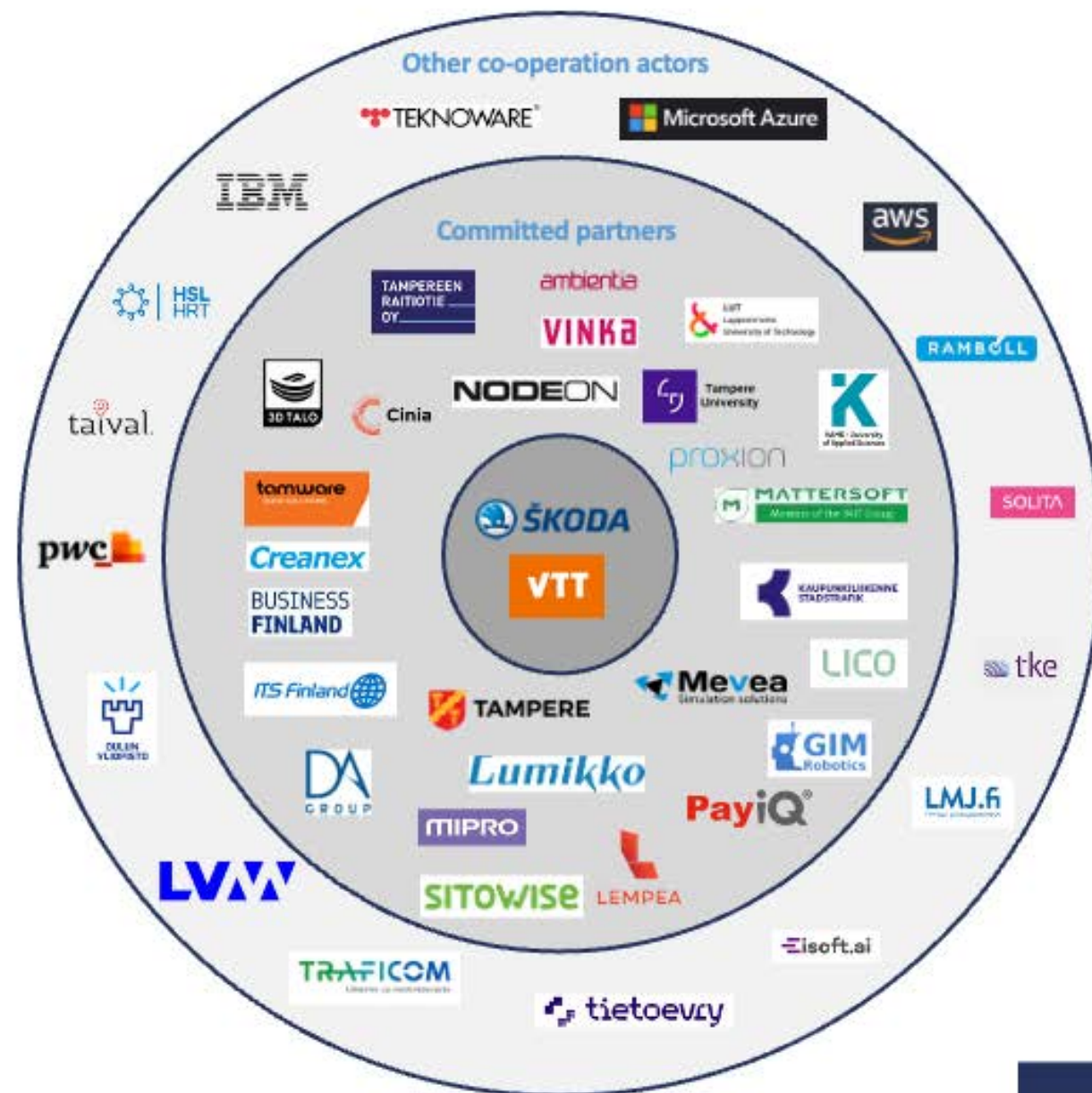
- **Multipurpose Simulator**
Driver's training and simulator tools for testing and developing new solutions to Tram or it's surrounds.
- **Automated depot concept**
Safety analysis and requirements of Autonomous Depot operation.
- **Passenger counting/monitoring system based on neural network solution**
Coming to Tampere Trams by using Tram's camera feeds and weight sensors located in bogies.
- **Urban Rail Cloud**
Cloud based solution for distributing the data to different stakeholders.
- **Electric Map Assistance**
Driver's assistance system for speed limits and doors control on stops. Statuses shown on driver's display helping driver to make right decisions.
- **Bogie and Track observation**
Based on vibration and wheel measurement data, system predicts maintenance activities of the track and wheels as well as gives feedback to driver about effect of driving style (comfort level)
- **Door systems**
Requirements of the door systems when moving towards autonomous Tram operations.
- **Composite materials**
Use of composite materials for reducing weight of the structures.
- **HVAC system**
Using of UV light and different filters for cleaning air inside the Tram.
- **Accurate positioning systems**
Different methods for determinating Tram's location. Radar, GNSS, Following mapped points on track, LIDAR pointcloud.
- **Virtual Reality tool**
Virtual Reality as a tool for designing accessible public transportation services

SmartRail Ecosystem in future

Open, growing ecosystem – new actors are welcome if true interests to collaborate exists.

So far:

- Conversations with over 60 actors
- Approximately 20 committed partners





Kiitos!

Lisätietoa SmartRail-ekosysteemistä

Škoda-Transtech Oy

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