

AUTOMATED DRIVING

Robert Bosch GmbH
Christian Scharnhorst

ERTRAC 20 Years Anniversary Conference
Brussels, 2023 July 6th



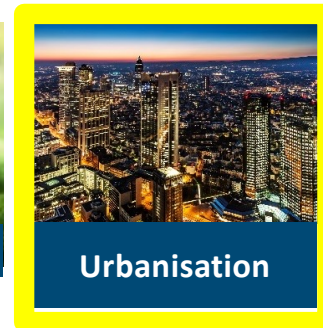
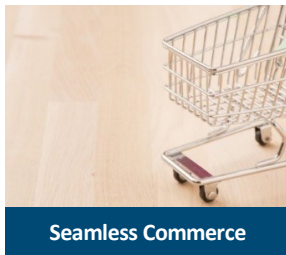
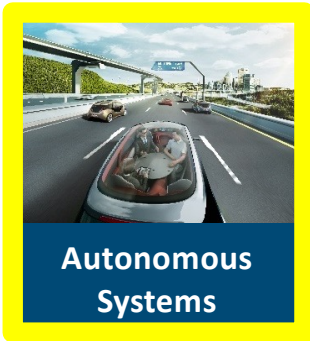
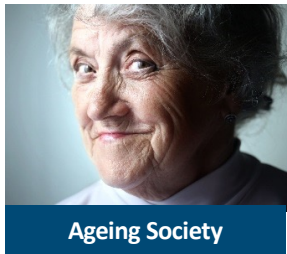
AUTOMATED DRIVING

The idea is not new and still appealing...

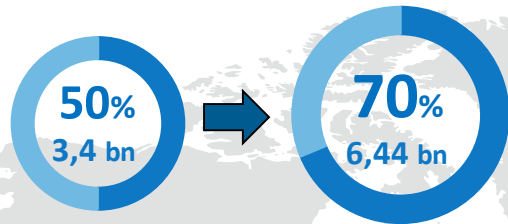


...but only gradually emerging

Megatrends driving mobility technology



Urbanisation represents challenges to quality of living



■ Urban Population
2014

■ Non-Urban Population
2050

share of urban
km travelled: ~2/3

urban travel will triple between
2014 and 2050

Challenges

traffic volume

noise

emissions

space scarcity

data security

regulation

parking space

CO₂

Opportunities

public transport

new vehicle segments

cycling

micro mobility

Light e-Mobility

ride-hailing

automated driving

electrification

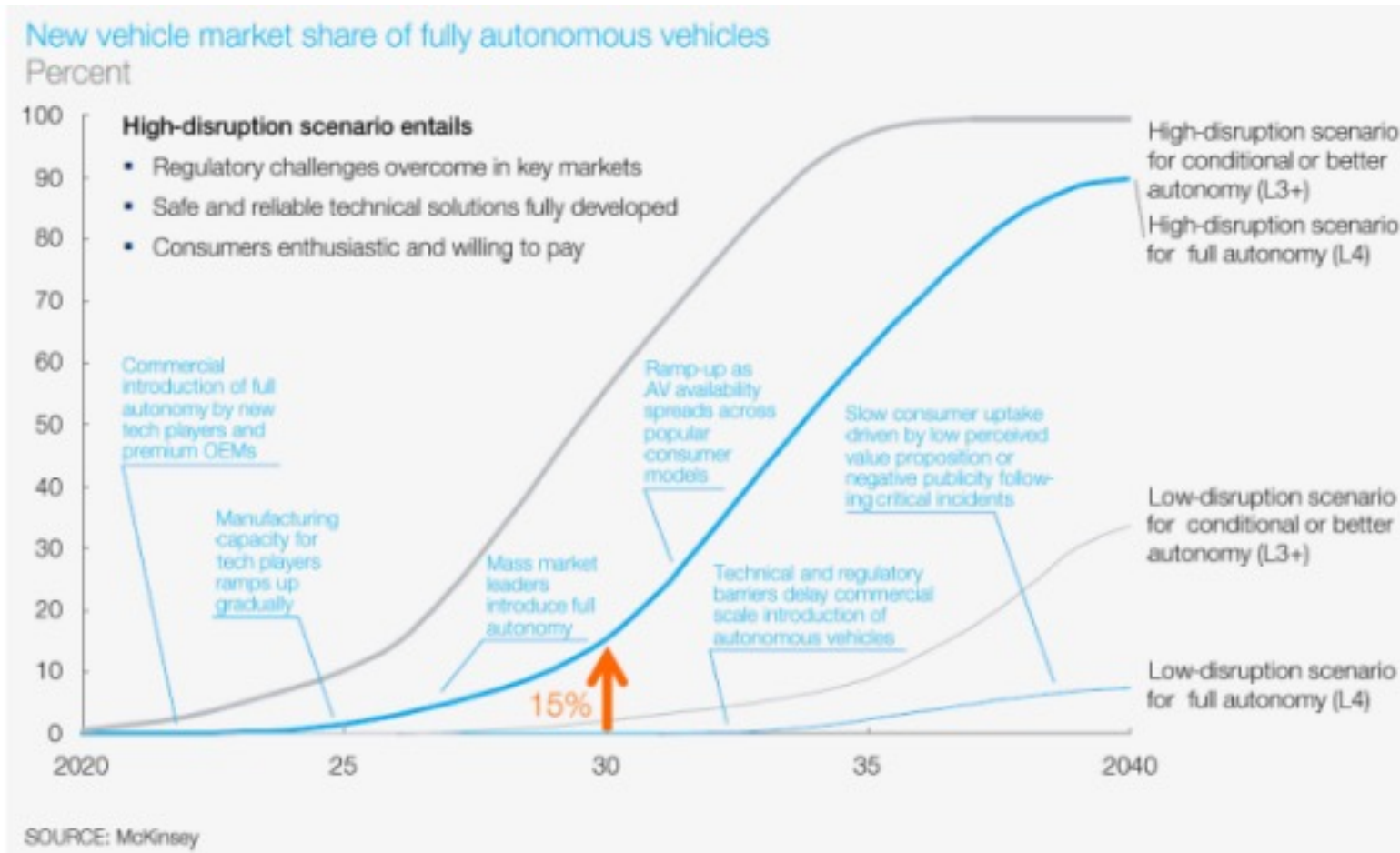
Intelligent last mile solutions

sharing services

Robo-Taxis and shuttles



High-disruption scenarios turned out to be too optimistic



Many enabling factors not settled until today

Technical, consumer acceptance and legal/regulatory barriers could hold back AV introduction

Challenge

Explanation

Technology



Technology hurdles for market are non-trivial:

- Failsafe software for immense number of situations
- Adequate degree of system redundancy
- Protection against cybersecurity threats

Consumer acceptance



Risk of Critical incidents affect consumer perception and slows

- Reliability more critical than other consumer products (e.g. smartphone)
- “Hindenburgmoment” could turn media support into hostility
- Unresolved degree of human trust to cede control to car

Law and regulation



Certification and state-of-the-art for autonomous car to be established

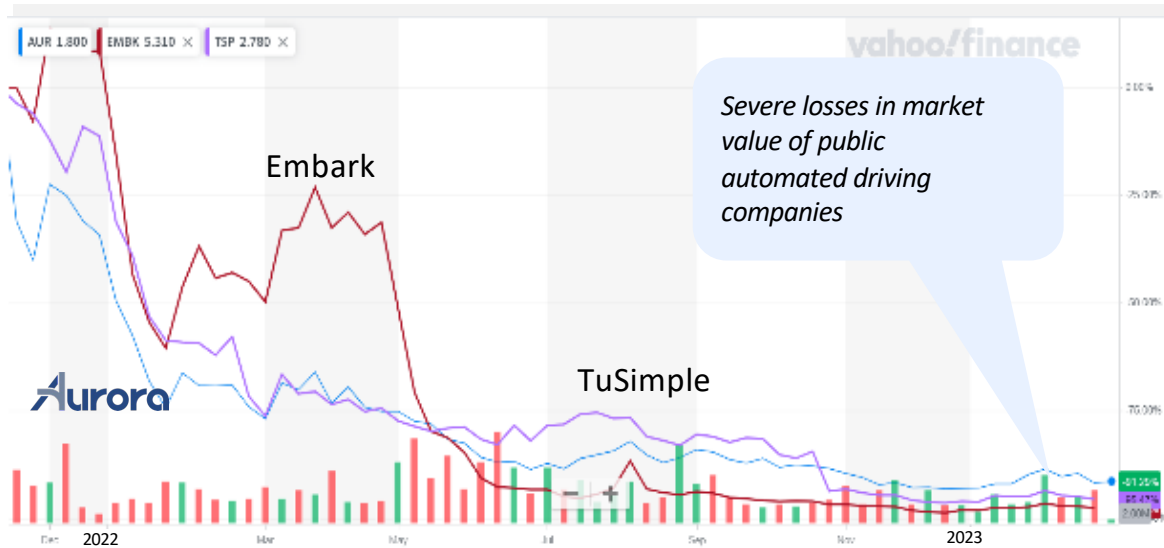
- Liability distribution between OEM, driver, data provider unclear
- Automotive regulation typically develops at very slow pace
- Ethical issues of automated decision making in an accident challenging



The degree to which these barriers materialize can serve as signposts for the rate of adoption

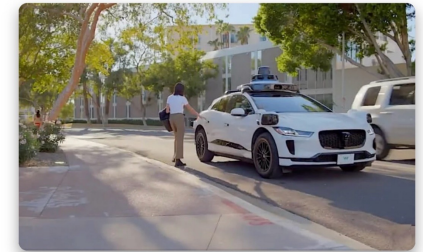
Realism reflected in public and private company news flow

2022: Disillusionment for Full Automation



Whistleblower Says GM's Cruise Isn't Taking Safety Seriously Enough

Anonymous employee claims team didn't feel service was launch-ready, "but there is fear of admitting this because of expectations from leadership, investors."
By Adam Ismail



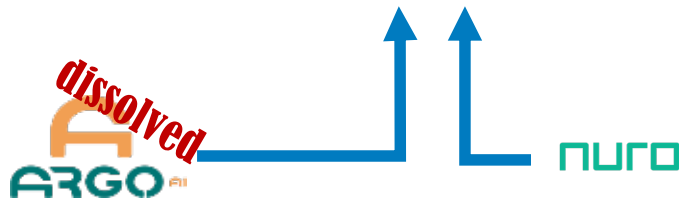
Waymo One's Shift to Full Autonomy Only Confirms Uncertain Future for Self-Driving Cars

Even After \$100 Billion, Self-Driving Cars Are Going Nowhere

They were supposed to be the future. But prominent detractors—including Anthony Levandowski, who pioneered the industry—are getting louder as the losses get bigger.

By Max Chafkin +Follow
October 6, 2022, 4:01 AM UTC

Why the Argo Shut Down Is a Bad Sign For America's AV Future



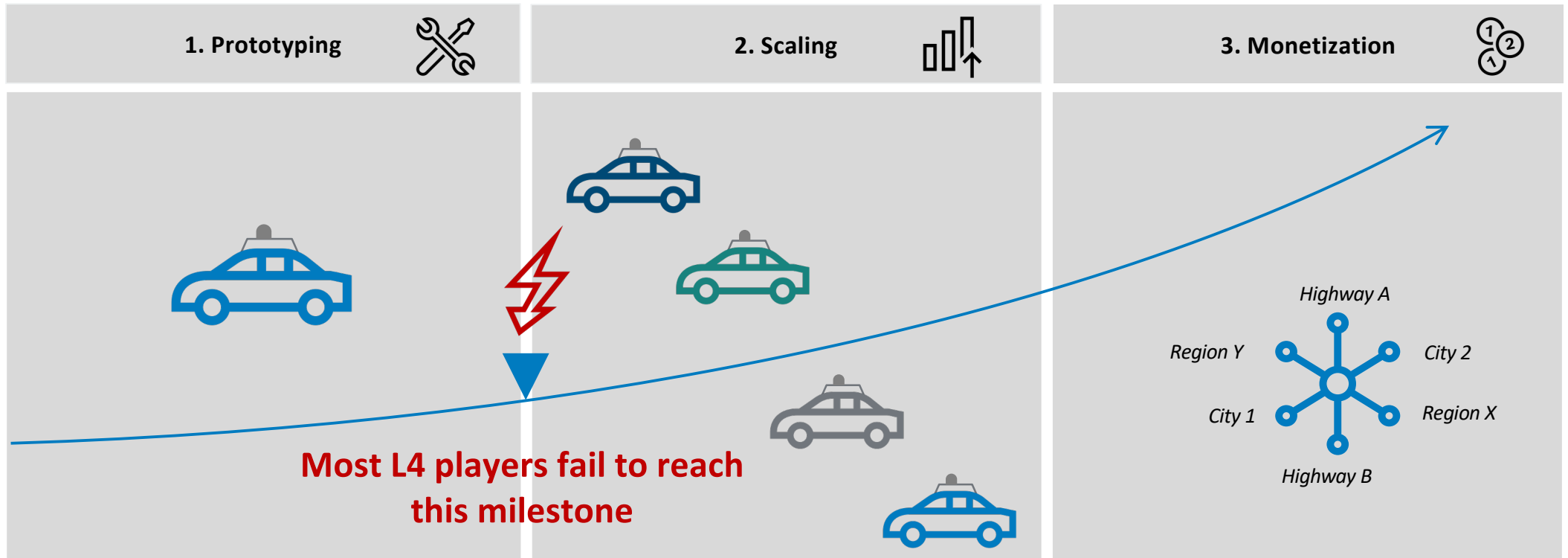
Autonomous delivery startup Nuro lays off 20% of workforce

Kirsten Korosec
@kirstenkorosec / 8:56 am PST • November 18, 2022



The challenge to scale and monetize most promising biz-cases

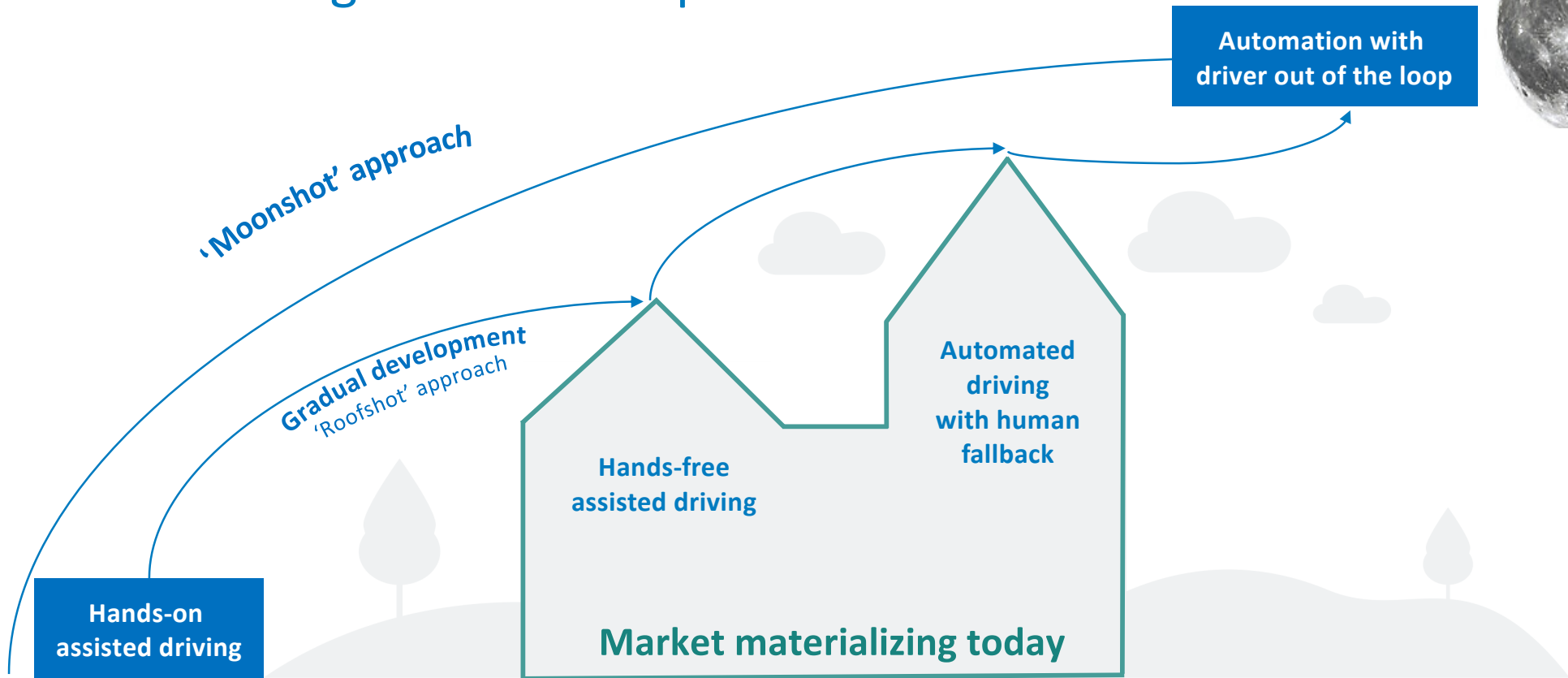
High investments on the way to monetization



Even advanced AD players discovered that highly effective scaling is key

Approaches to ultimate target “highly automated driving”

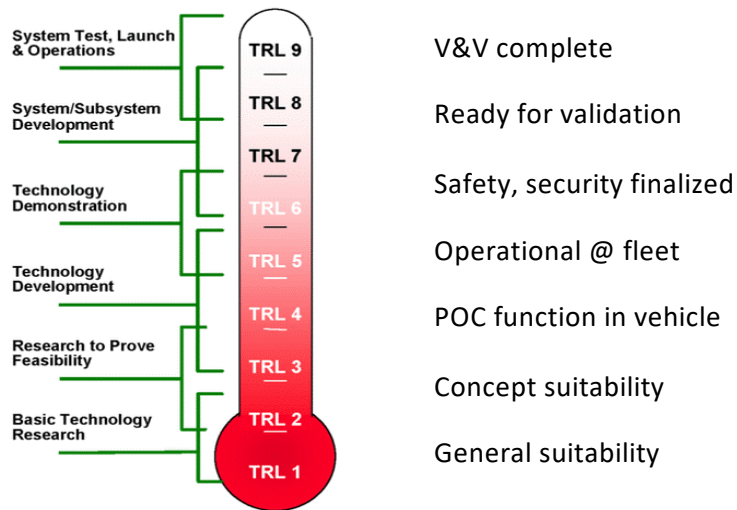
Moonshot vs. gradual development



Technological maturity as prerequisite for commercialization

Depending on use-case, various levels reached

Technology Readiness Level (TRL)*
for HAD (L3 & L4)



* TRL - Adopted from NASA

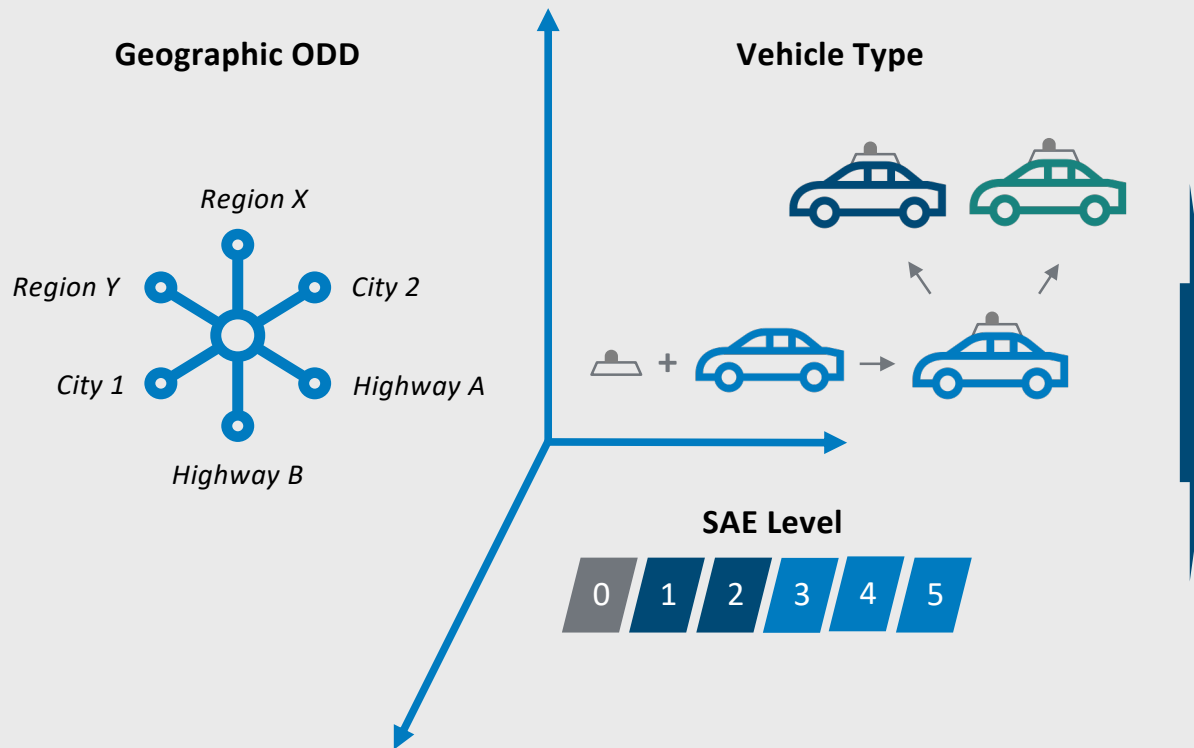
AVP



First released L4 application in EU



Scalability becomes key with gradual approach



Success factors

- Scalable and modular architecture
- Re-use of data
- Scalable reliable maps
- Simulation capability
- Release concept

User journey – passenger car

