Automated Mobility

Positioning, Navigation and Timing meets Mobility

Anton Fuchs, COO

Pole position with satellite navigation:
Leading with precise time and exact location

www.virtual-vehicle.at

Assisted, automated and autonomous mobility

Basic (minimum) requirements

- Knowledge about environment, incl. infrastructure and other participants
- Knowledge about ego vehicle, incl. position and speed
- Knowledge about driver, incl. status

Assistance:
Supporting humans
ADAS (Adaptive Cruise Control, Lane Keeping Assist, etc.)

Automation:
sense-plan-act
Significant driving tasks in certain conditions, e.g. traffic jam assist

Autonomy:
sense-reason-plan-act-learn-improve
Capable of driving entirely on its own, e.g. robotaxi (SAE level 5)

virtual vehicle

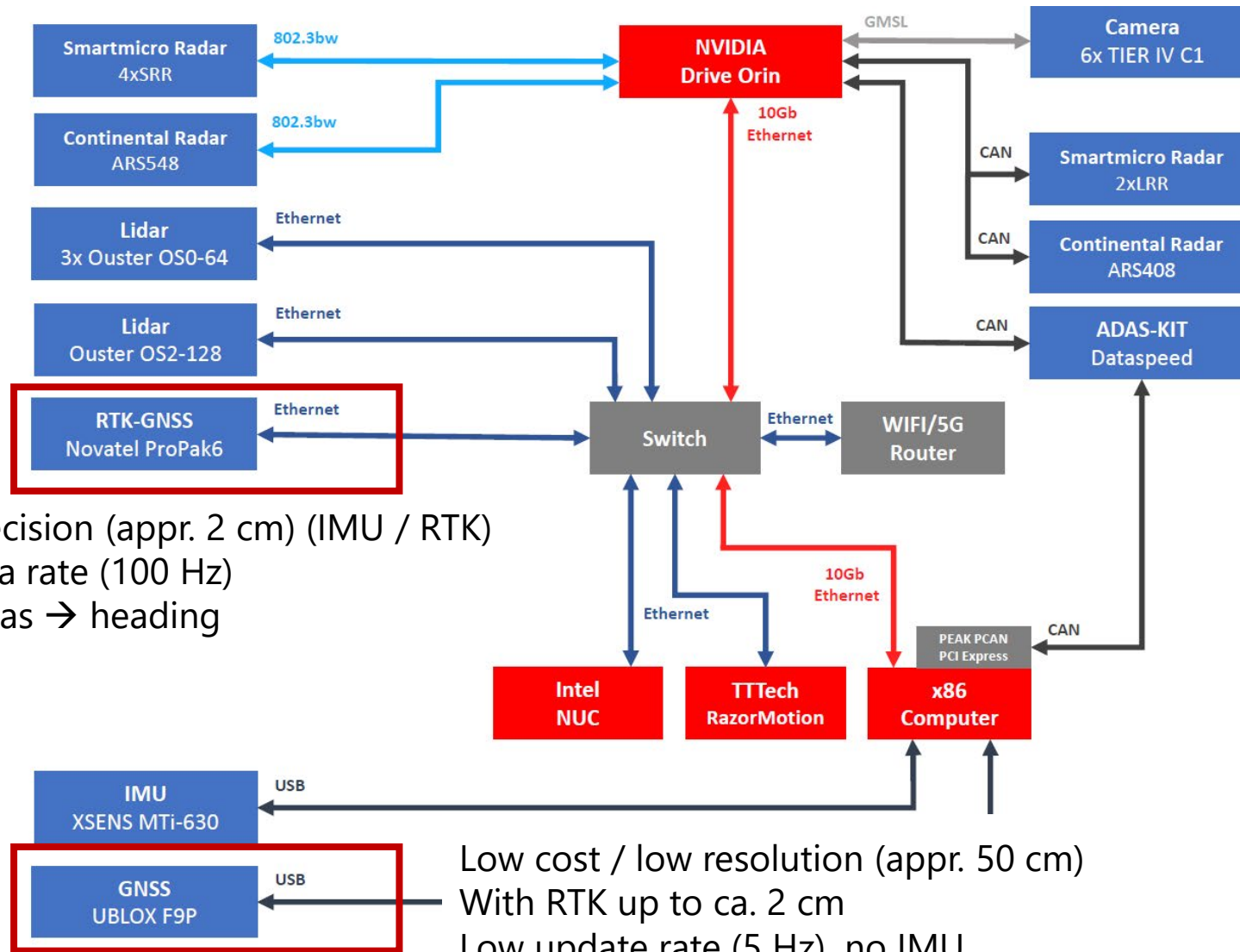# Automated Drive Demonstrators

- 2015 First automated ride on the motorway (A2-A9)

- No steering wheel
- No pedals
- Panorama Display

- Flexible test platform
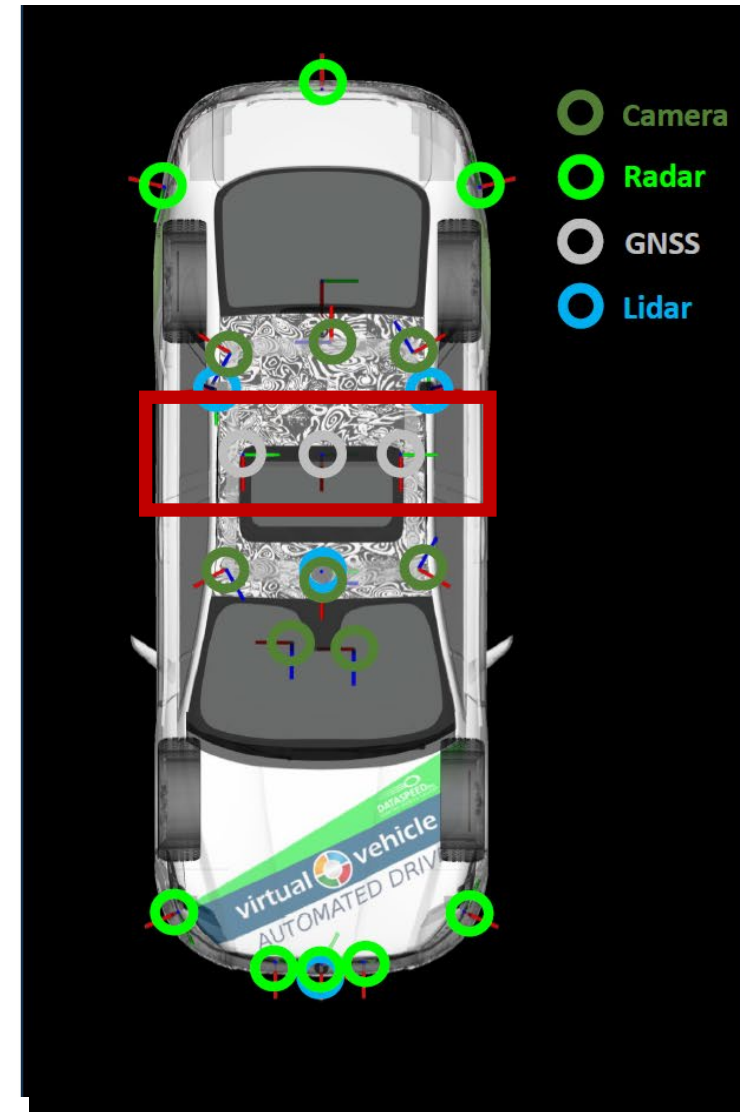- Innovative control

- Digital Twins
- Test Pipeline
- Deploy Pipeline

virtual vehicle

Automated Drive Demonstrator

High-precision (appr. 2 cm) (IMU / RTK)
High data rate (100 Hz)
2 antennas → heading

Low cost / low resolution (appr. 50 cm)
With RTK up to ca. 2 cm
Low update rate (5 Hz), no IMU

Use Cases – Project ESRIUM

EGNSS-enabled Smart Road Infrastructure Usage and Maintenance for increased energy efficiency and safety on European road networks

Our team

- Smarter road usage, road maintenance, and increased road safety
- Infrastructure-assisted ADAS/AD functions
- Simulation-based development using digital twins
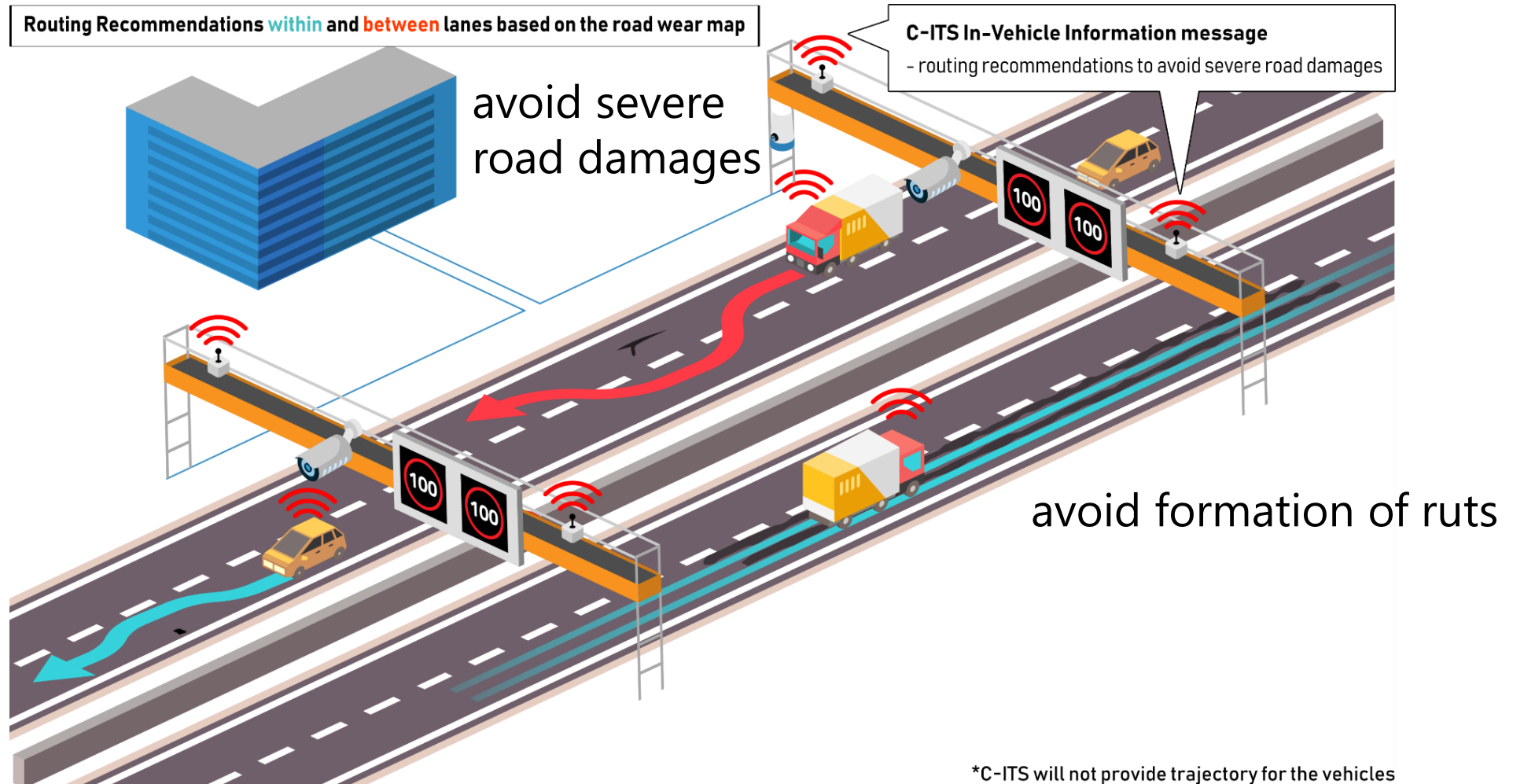- Real-life implementation and tests

Routing recommendations provided via C-ITS messages

Routing Recommendations within and between lanes based on the road wear map

avoid severe road damages

C-ITS In-Vehicle Information message
- routing recommendations to avoid severe road damages

avoid formation of ruts

*C-ITS will not provide trajectory for the vehicles
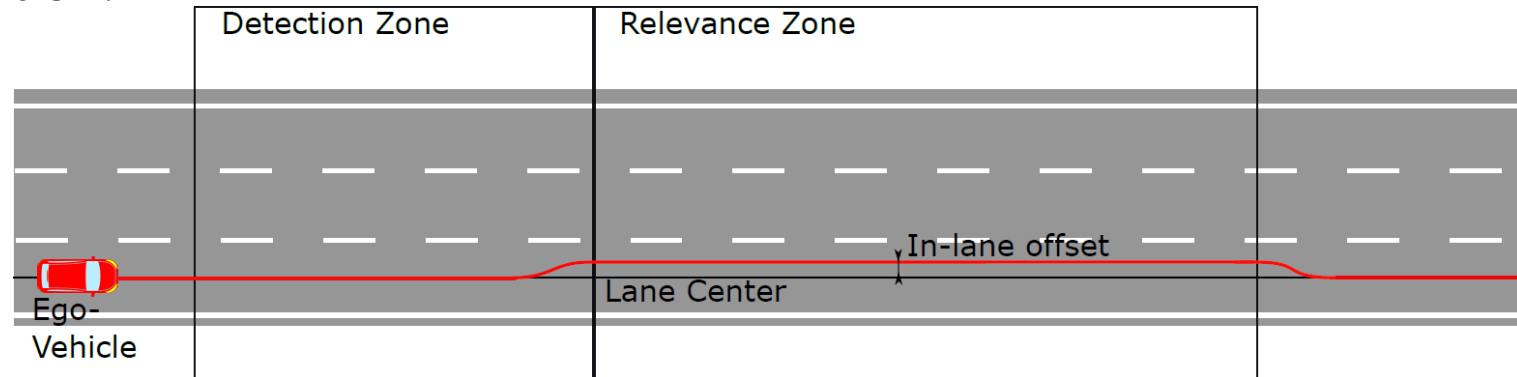
Source: ASFINAG

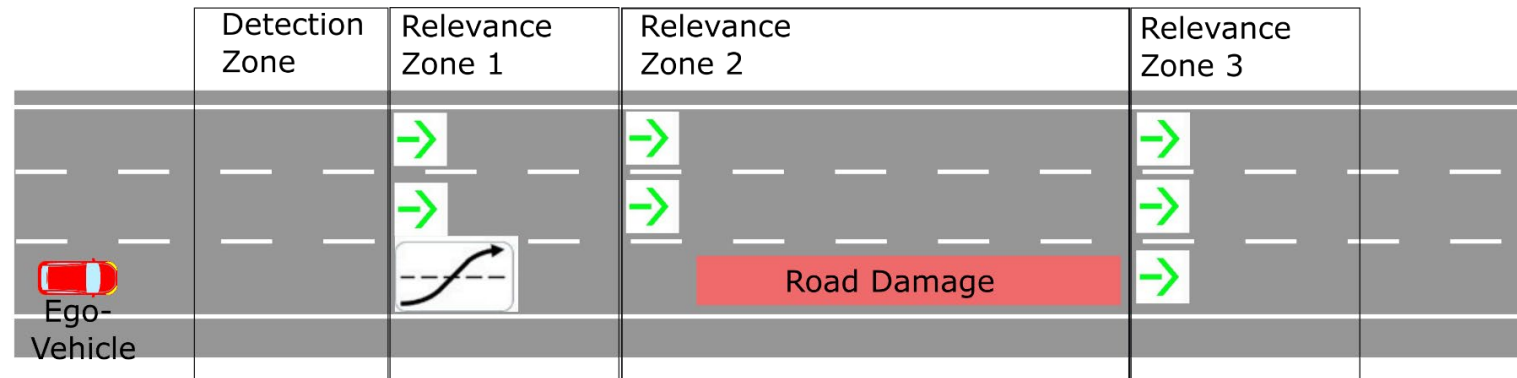C-ITS: Cooperative Intelligent Transport Systems
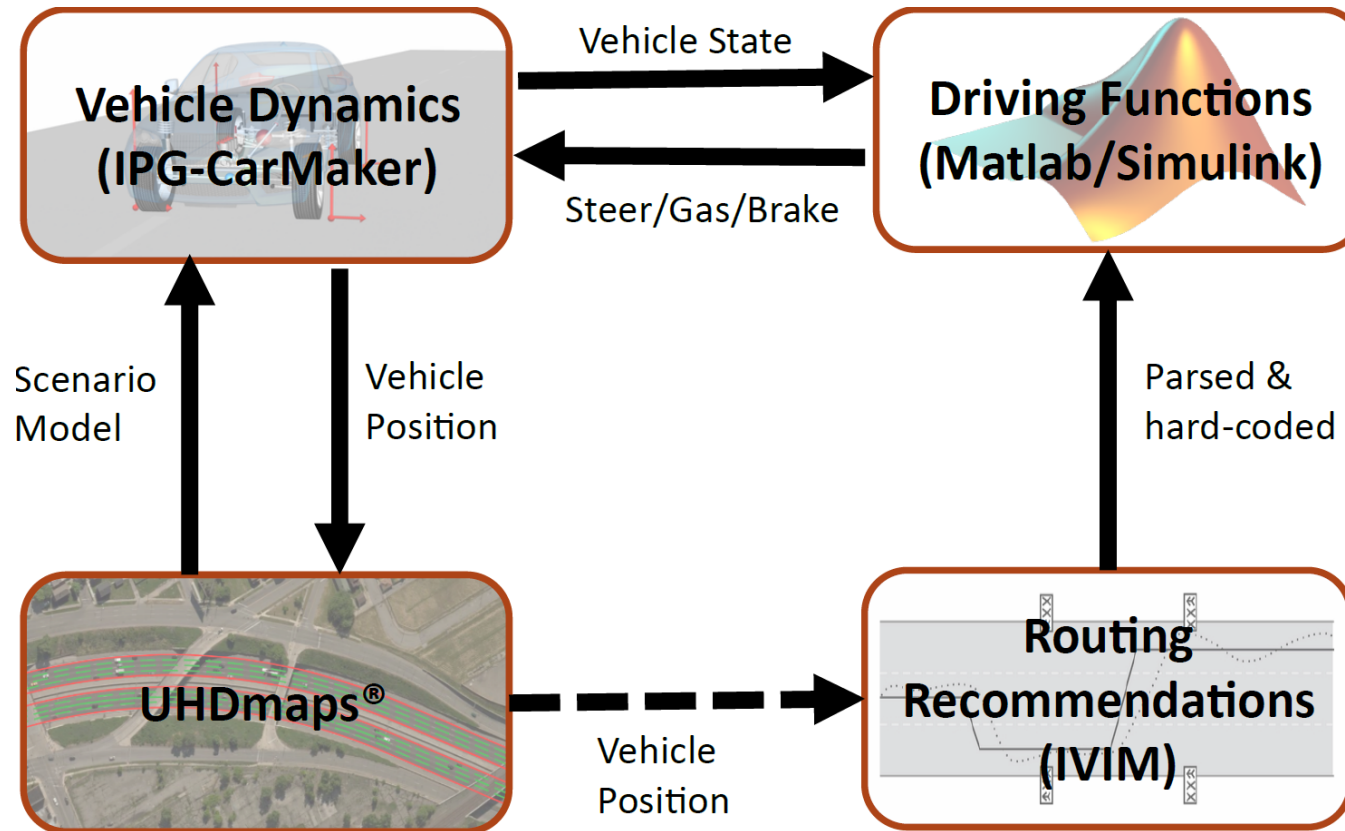
GNSS-based use cases
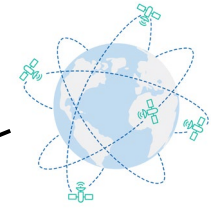
In-lane offset recommendation:
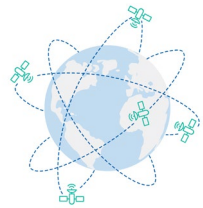
Lane change recommendation:

Co-simulation architecture

IVIM: In-Vehicle Information message
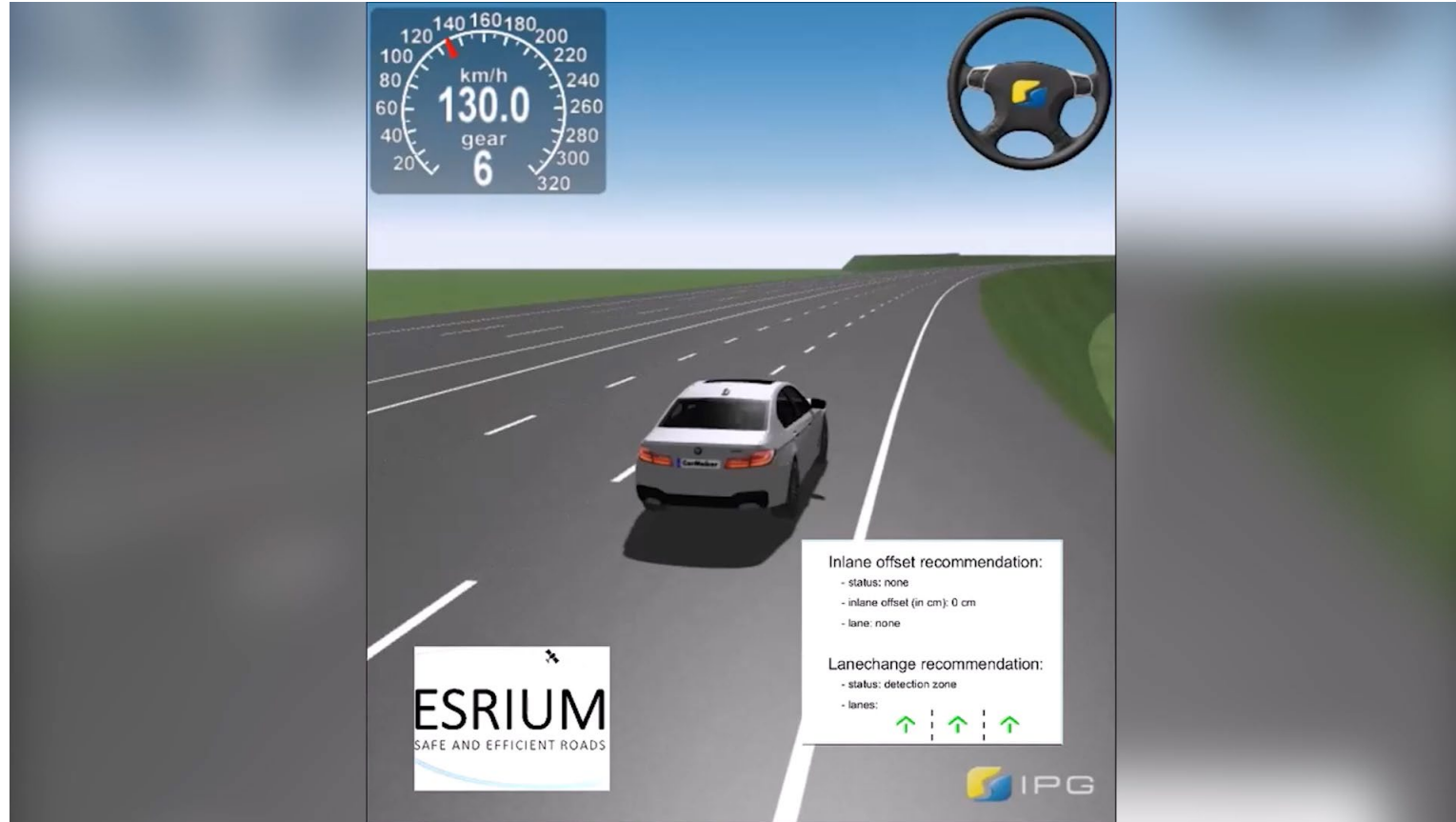
Simulation utilizing UHD Digital Twin

# Simulation utilizing UHD Digital Twin

Validation and Demonstration

Test Site: A2 Motorway between Graz and Laßnitzhöhe

- 3 lanes
- about 8 km
- 2 RSU (roadside units)
- several traffic sensors

Test Scenario Flow:

- Automated vehicle starts near Raaba
- First an IVIM with an in-lane offset recommendation is received
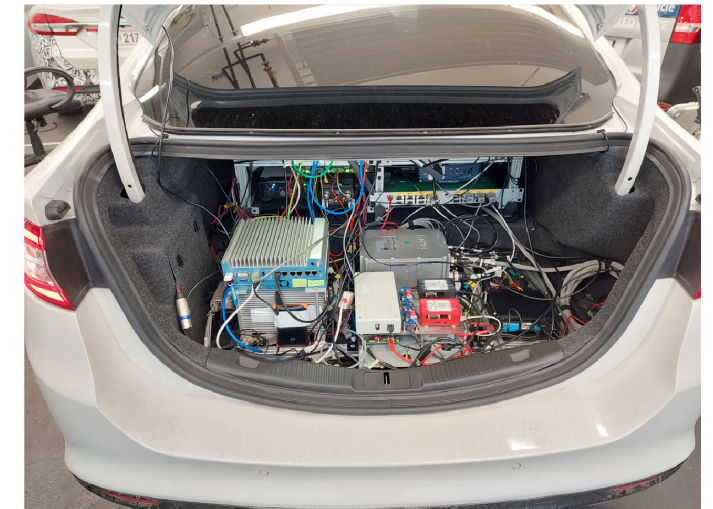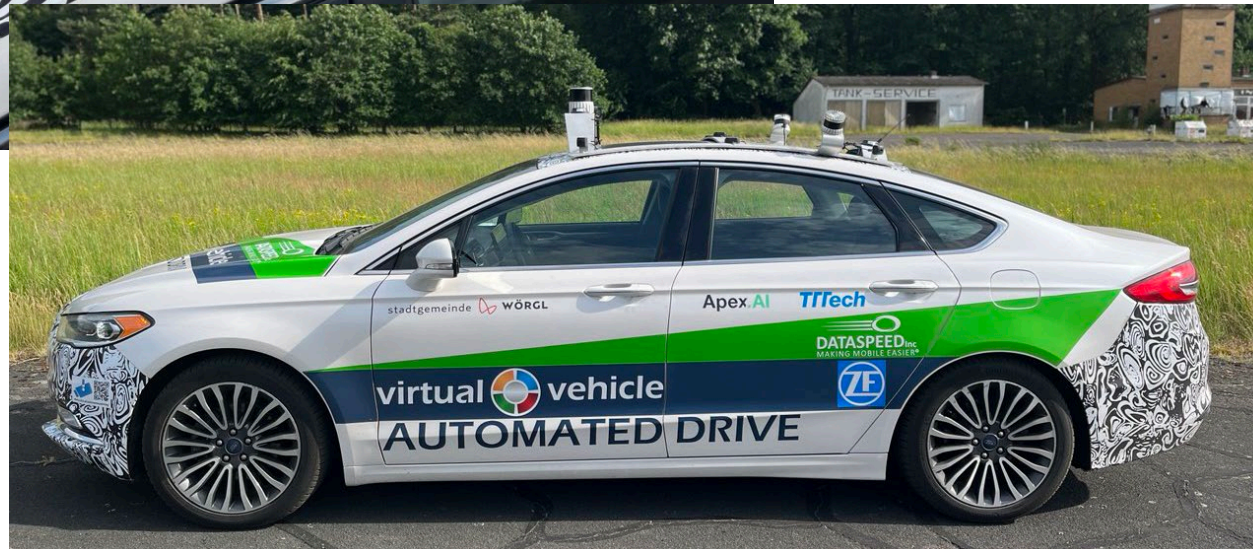- Second an IVIM with a lane change recommendation is received

Automated Drive Demonstrator

GNSS

Antenna
C-ITS
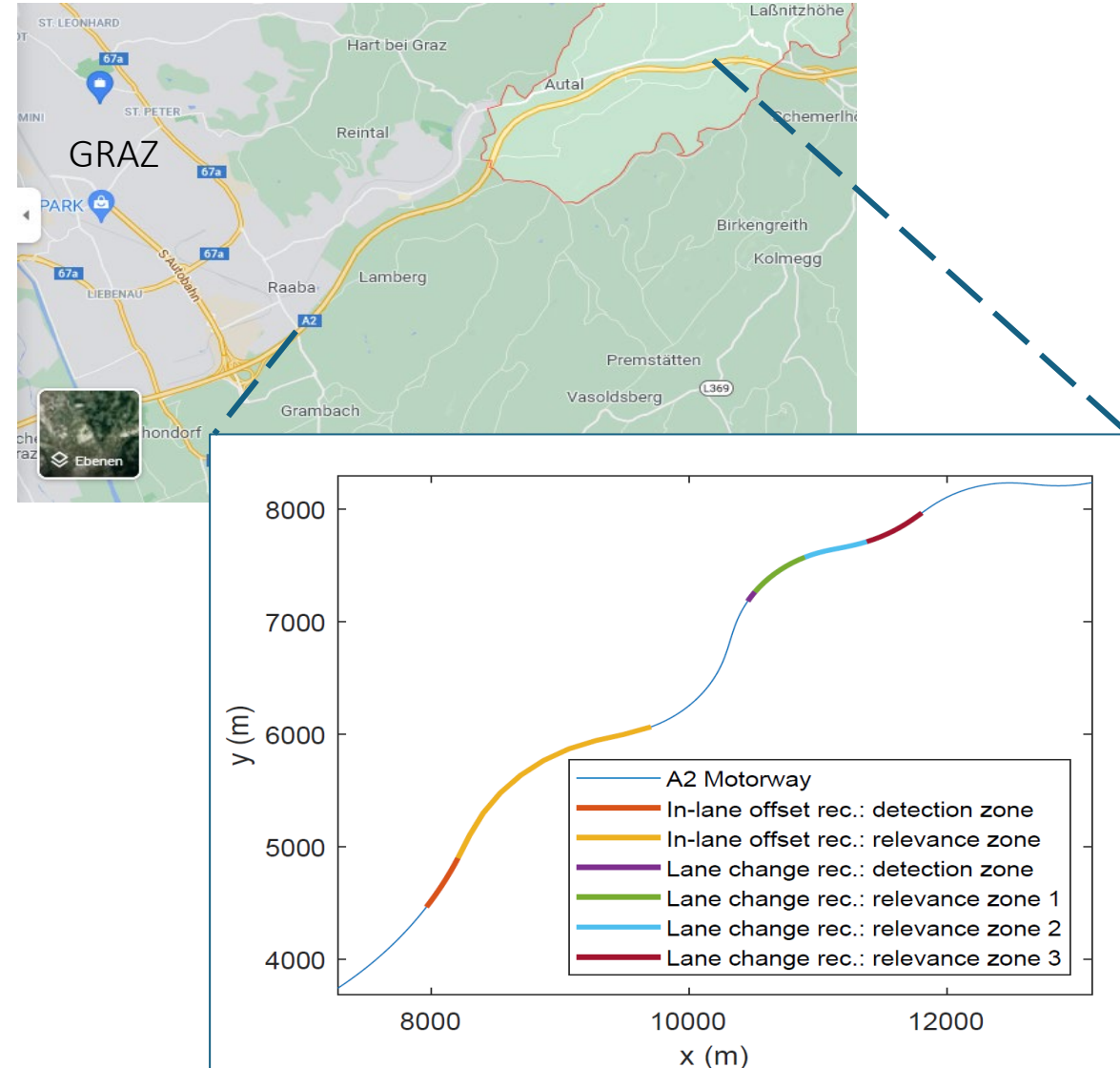
vehicleCAPTAIN

Cooperative Intelligent Transport Systems (C-ITS)

Compact, modular and flexible platform
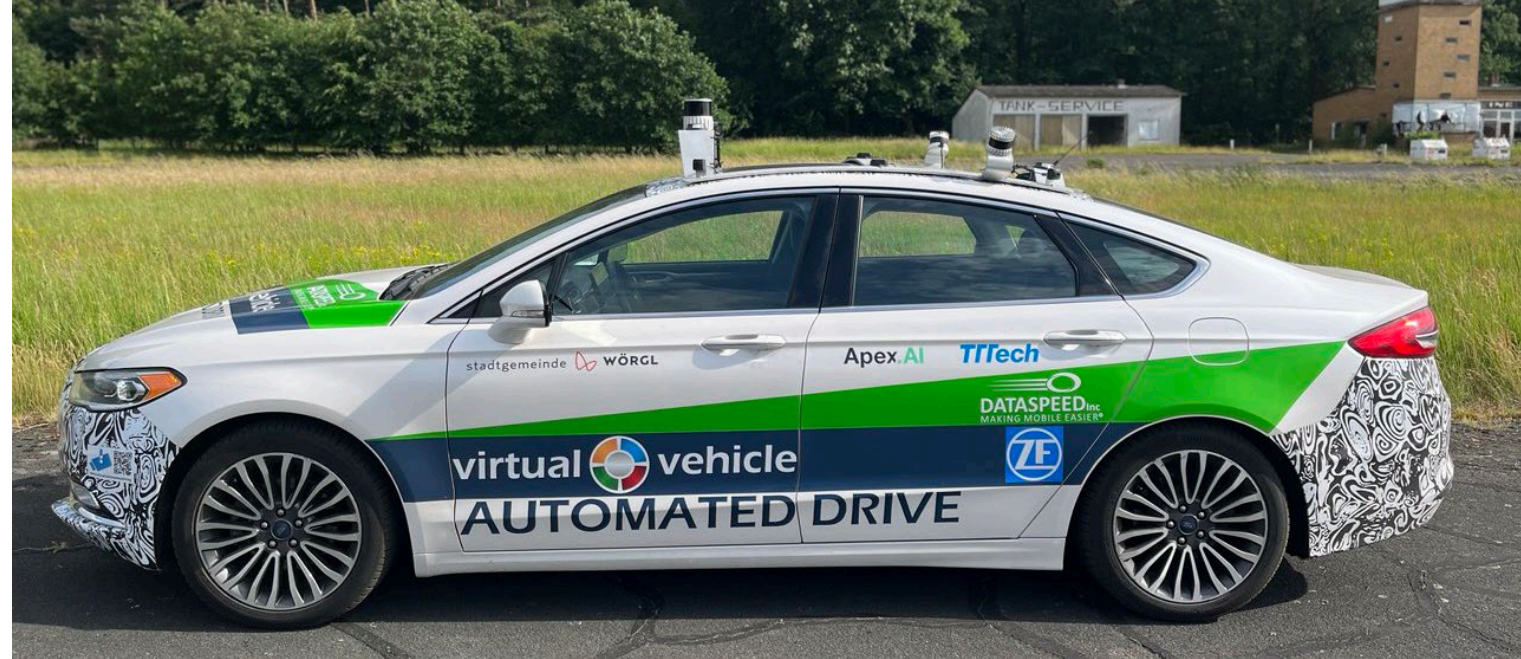

virtual vehicle

Use Case 1 – Demonstration in-lane offset message

Use Case 1 – Demonstration lane change message

- Reliable positioning, navigation, timing: basic requirement for automated and autonomous mobility
- Based on that, a variety of future safety-, efficiency-, comfort-relevant functions will be implemented for road and rail mobility

Test vehicle HW-setup and interfaces