# The German LL and its Use Case in the PoDIUM Project

## Webinar "The German LL in the PoDIUM Project: Preliminary Results from the Use Case "Cooperative Corridor Management in the City of Ulm involving Multi-connectivity"'

Priv.-Doz. Dr.-Ing. Michael Buchholz
Ulm University

December 3rd, 2024

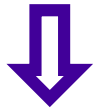
Co-funded by the European Union

# General facts and figures

- PODIUM = PDI connectivity and cooperation enablers building trust and sustainability for CCAM
- Call Identifier: HORIZON-CL5-2021-D6-01-03B
- 26 Partners
- 8 MS Countries
- Total Budget in €: 12M
- 36M Duration: 2022-2025

# Scope

Enable connected & cooperative automated mobility in real traffic conditions



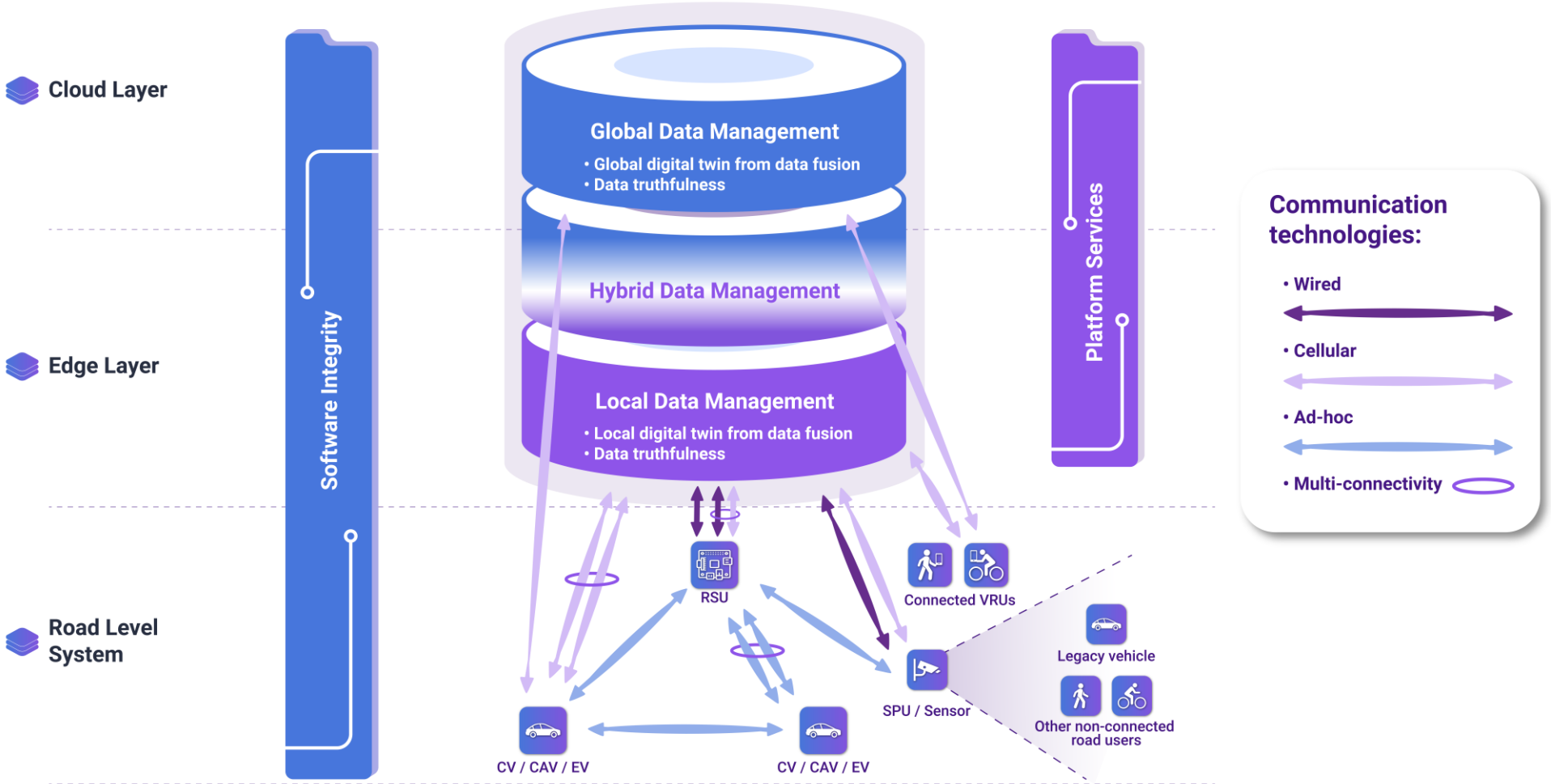
- **Advance Multi-access Edge Computing** (MEC) as an enabler of new use cases (UCs) and services.
- **Data fusion** (locally generated and distributed computed data) to build **enhanced environmental models** towards digital twins.
- **Extend C-ITS messages** for enabling advanced CCAM use cases.
- **Ensure software integrity, trust and truthfulness of CCAM data**, their exchange and their processing.
- **Integration of Vulnerable Road Users** (VRUs).
- Demonstration of **urban and highway use cases in 3 Living Labs** (5G SA testbeds, mmWave).

**Impacted entities/processes**

**Physical**: MEC, wireless networking, RSUs, OBUs, VRUs, etc.

**Digital**: Traffic Management Centre, Environmental perception, Digital Twins, C-ITS messages, Trust and Truthfulness, etc.

# The overall PoDIUM architecture

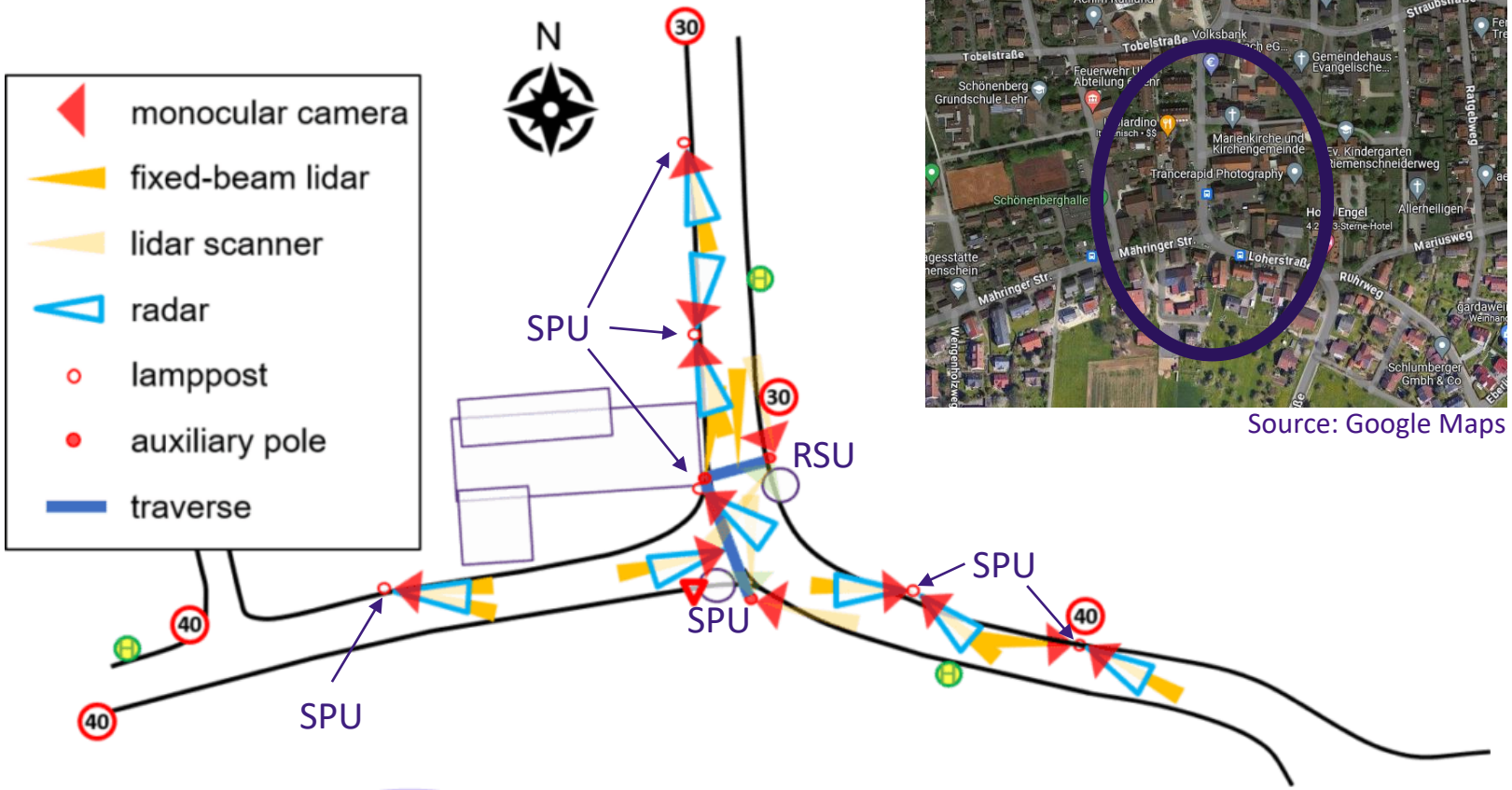


# LL Overview and Sensor Setup

Pilot installation:
- in centre of suburb Ulm-Lehr
- infrastructure sensors built up in previous projects.
- Sensors operated by UULM, radars provided by BOSCH

Multi-connectivity:
- Cellular 5G test network (cm wave, FR1) including MEC server operated by Nokia,
- extended by 5G mm wave (FR2);
- ITS-G5 operated by UULM;
- extended by 60-GHz WiFi (UULM together with UDE)

Involved traffic participants:
- Connected and automated test vehicles (CAVs) operated by Bosch and UULM,
- VRU connected via smartphone (5G FR1 only) by Nokia





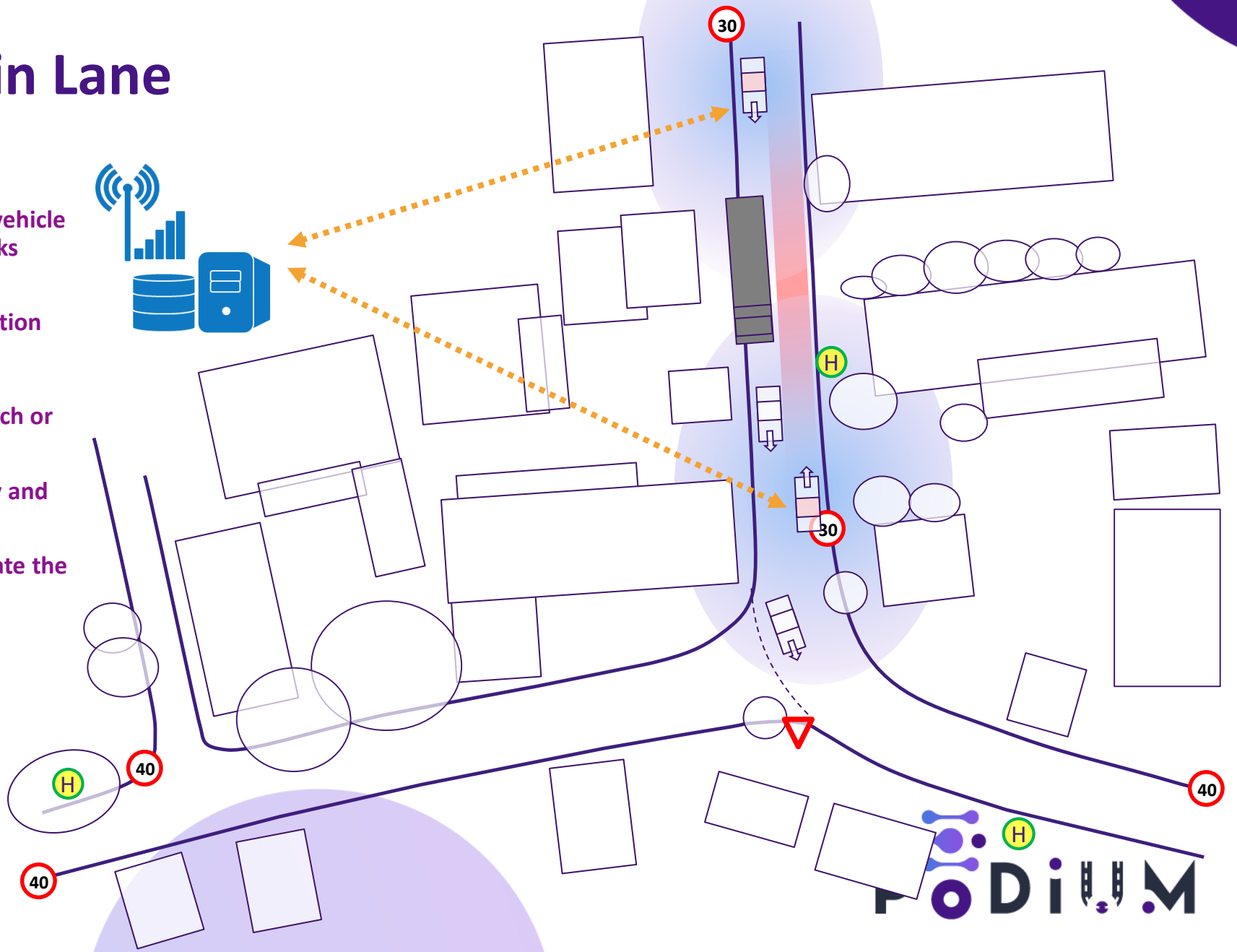


Source: Google Maps

Use Case: Cooperative Corridor Management in the City of Ulm (UC1)

# Scenario 1: Obstacle in Lane

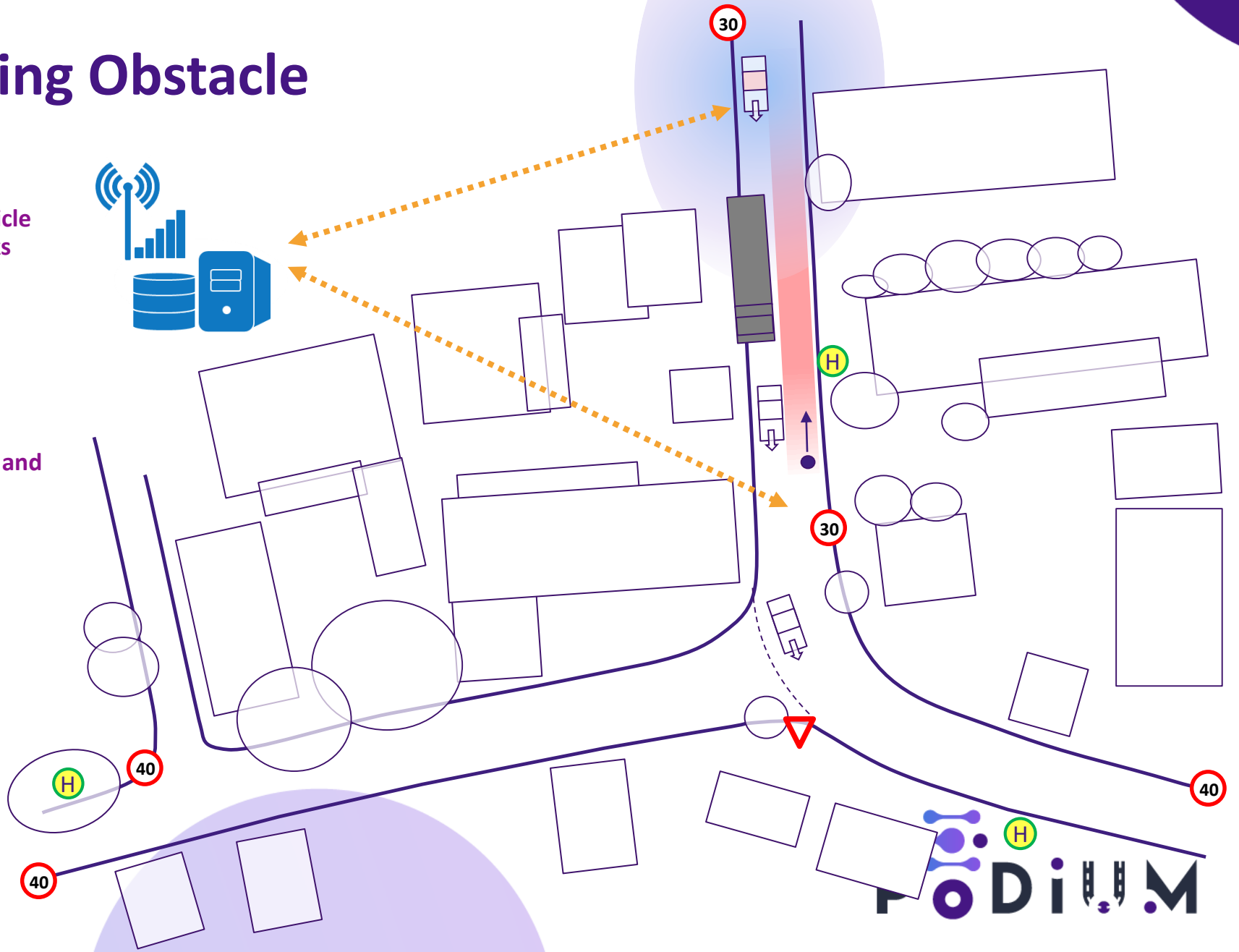
- Vehicle from the north drives around obstacle, vehicle from the south assists with perception and blocks oncoming traffic
- Variants with and without infrastructure perception
- Cooperative planning on MEC server by Bosch
- Each role of the vehicles can be provided by Bosch or UULM
- Scheduler from UDE provides multi-connectivity and schedules messages on appropriate channels
- Bosch CAV can use function offloading to calculate the vehicle trajectory planning on the MEC server




- Vulnerable Road User
- Non Connected Vehicle
- Connected Automated Vehicle
- Ad Hoc Managed Corridor
- AD Vehicle (limited) FoV

# Scenario 2: VRU Passing Obstacle

- VRU from the south drives past an obstacle, vehicle from the north assists with perception and blocks oncoming traffic
- Only with infrastructure perception
- Cooperative planning on MEC server by Bosch
- The vehicle can be provided by Bosch or UULM
- Scheduler from UDE provides multi-connectivity and schedules messages on appropriate channels
- Nokia provides the VRU connectivity and app




- Vulnerable Road User
- Non Connected Vehicle
- Connected Automated Vehicle
- Ad Hoc Managed Corridor
- AD Vehicle (limited) FoV

# Thank you!

PoDIUM

Co-funded by
the European Union

@PoDIUM_EU

PoDIUM Project

podium-project.eu