# Enhanced Traffic Management Procedures in Transition Areas

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TRANSPORT & MOBILITY LEUVEN

TransAID

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# Scope and background

- Different SAE levels, (C)AVs, legacy vehicles, … share the road

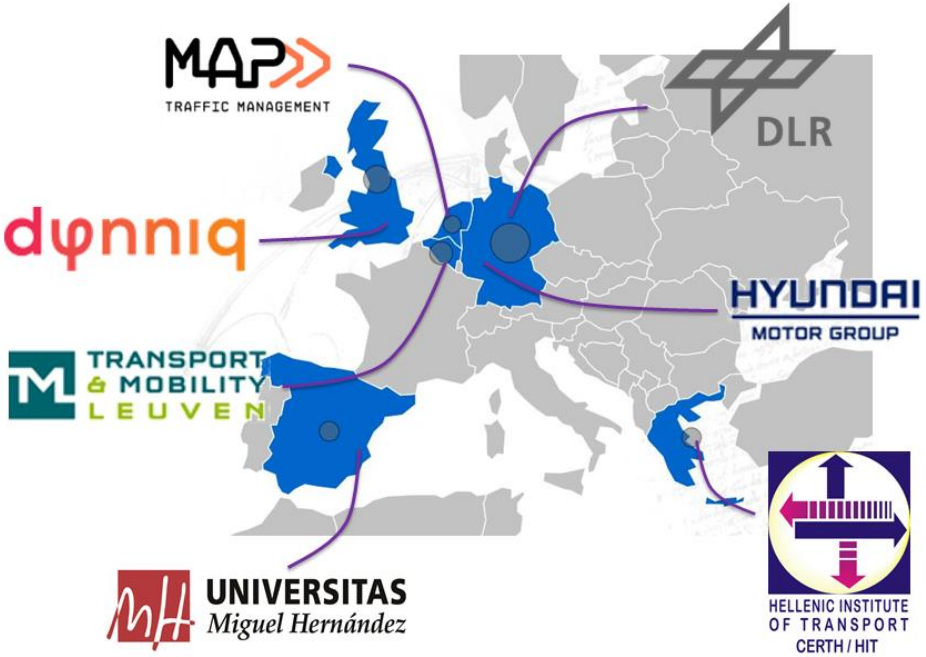
- Missing sensor inputs, highly complex situations, adverse weather, …
  - Current limitations of automated driving may require a change of level

  → **Transition Areas**

- TransAID focuses on:
  - Realistic driver/vehicle behaviour and V2X communications
  - **Hierarchical traffic management procedures for transition areas**
  - Field tests in The Netherlands and Germany
  - Guidelines and roadmap for stakeholders (OEMs, authorities, cities, …)

# The TransAID project

- Horizon 2020 ART-05-2016
- 36 months (09/17-09/20)

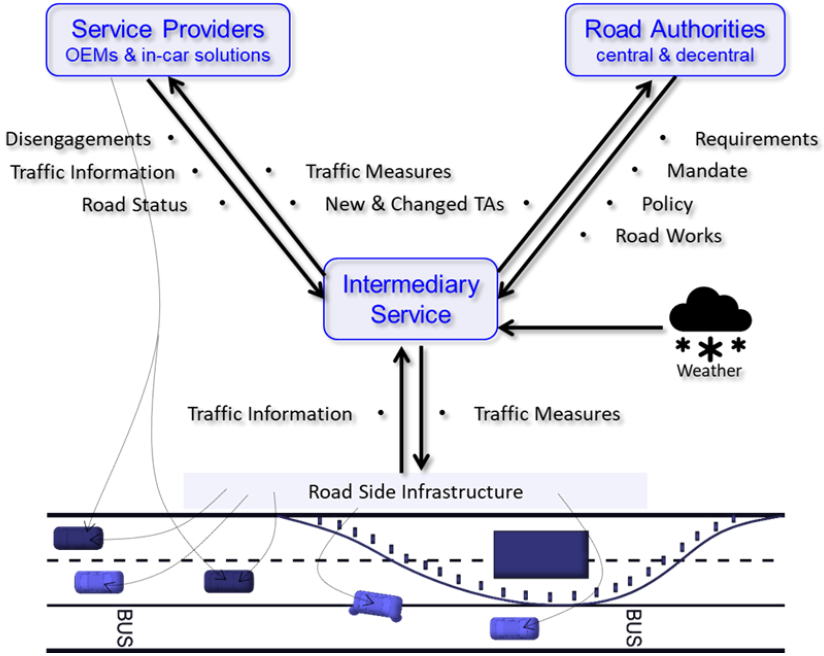


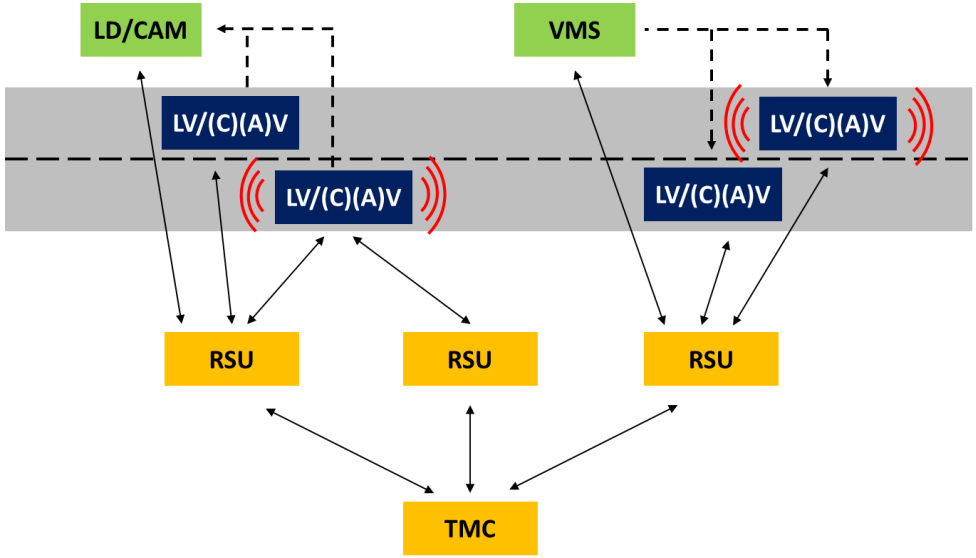

Associated partners: Attikes Diadromes, Car2Car-Communication Consortium, DGT, ECTRI, EURECOM, Huawei, IKUSI, ITS Niedersachen, Region of Central Macedonia, Rijkswaterstaat, TRL, and University of Twente.

# SotA of traffic management

- **Main topics**
  - General approaches
    - Coordinated network-wide traffic management
    - Using KPIs, hierarchical controls via layered architectures, TMaaS
  - Cooperative systems
    - V2X / VANETs / C-ITS
  - Machine learning techniques (AI)
    - Traffic light control and congestion / queue length predictions
- **Conclusion**
  - No (readily available) implementations of more advanced TM schemes
  - Focus on solving partial problems with specific measures

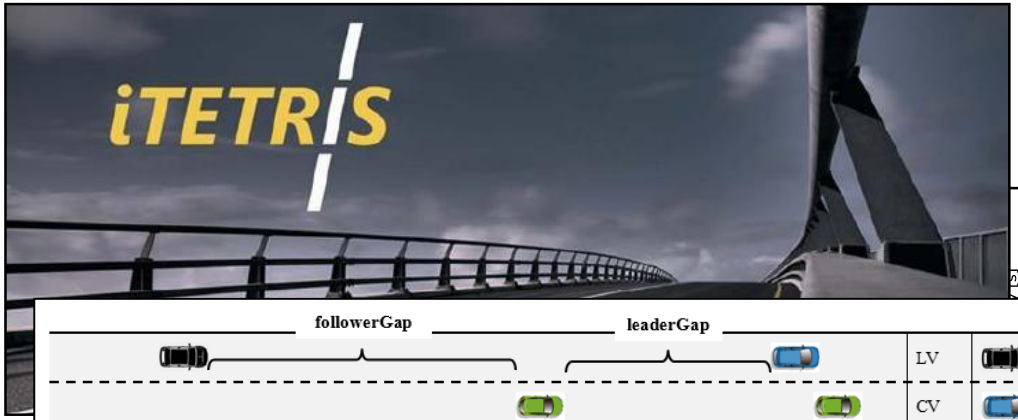
# Intermediary service provider



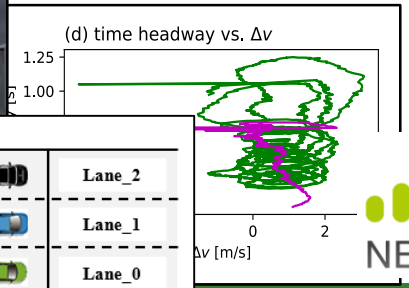




High- and low-level
traffic management operations

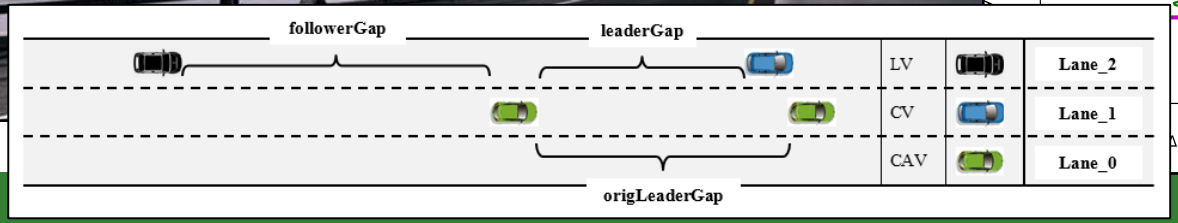
# Simulation environment



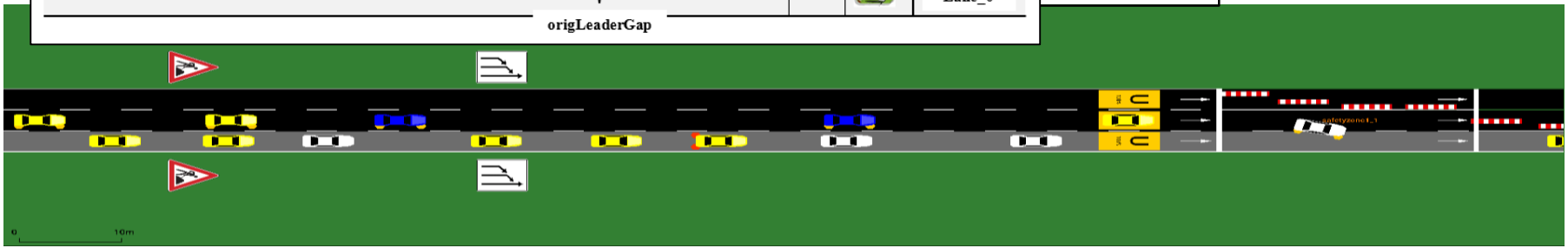

SUMO
Simulation of Urban MObility




python

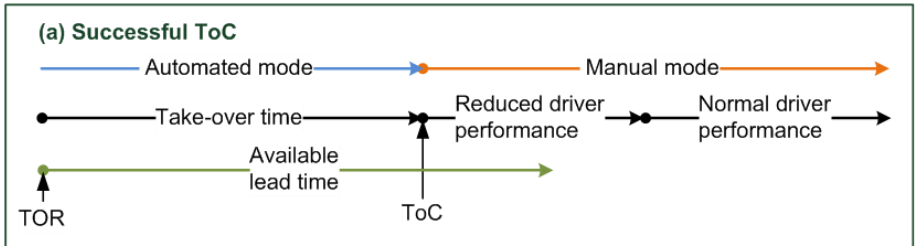


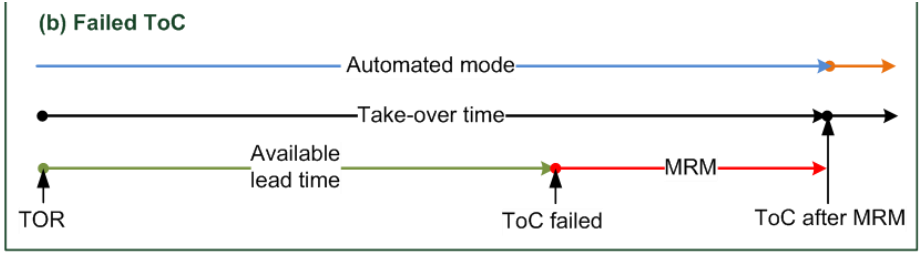

ns-3
NETWORK SIMULATOR



# When AD is not possible/allowed

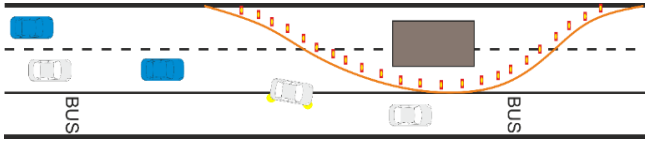
- Take-over request (**TOR**) issued by the car
- Transition of Control (**ToC**) from car to driver
- Minimum-Risk Maneuver (**MRM**) by the car



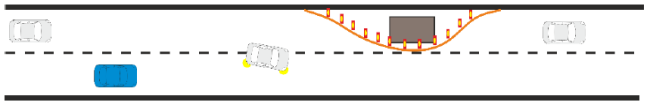



# First selection of services / use cases

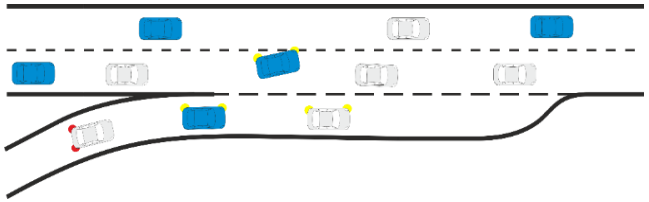
**Prevent ToC/MRM by providing vehicle path information**



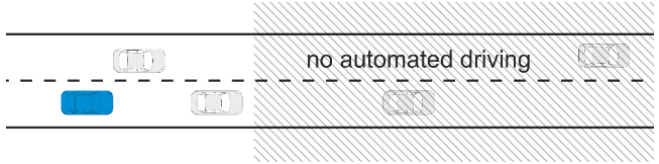

**Manage MRM by guidance to safe spot (urban & motorway)**



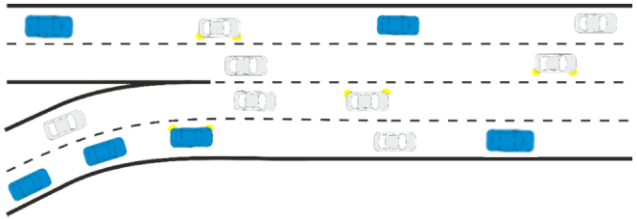
**Prevent ToC/MRM by providing speed, headway and/or lane advice**



**Distribute ToC/MRM by scheduling ToCs**

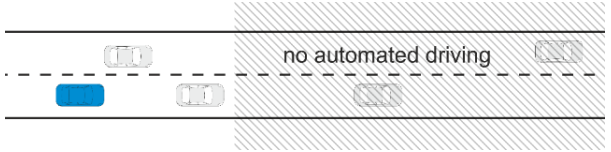



**Prevent ToC/MRM by traffic separation**

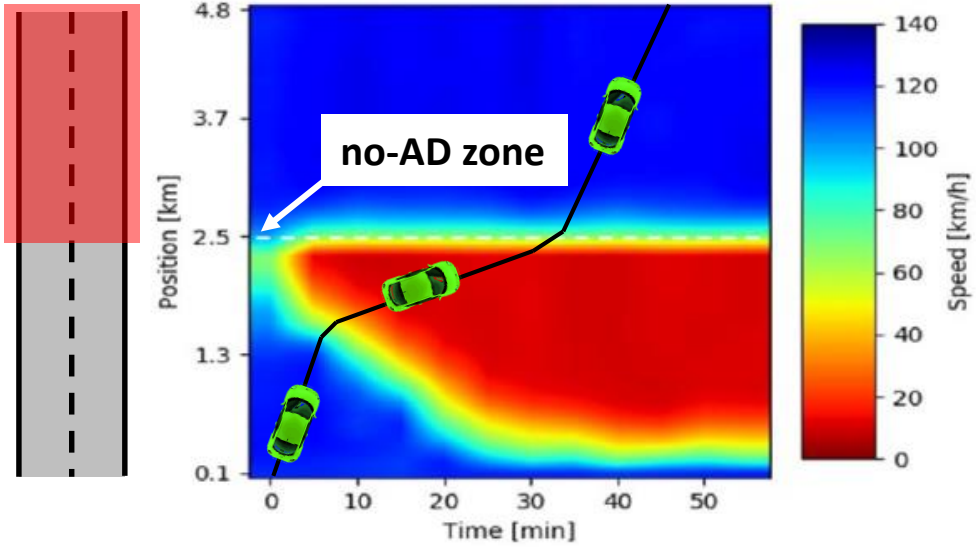


*(with traffic conditions (LoS) and vehicle mixes)*

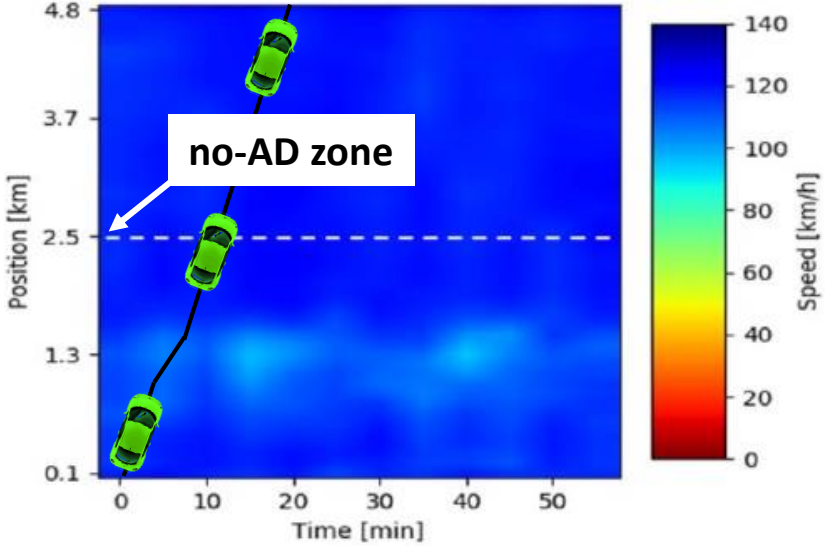
# Ex. Distribution of TORs




**Without traffic management**

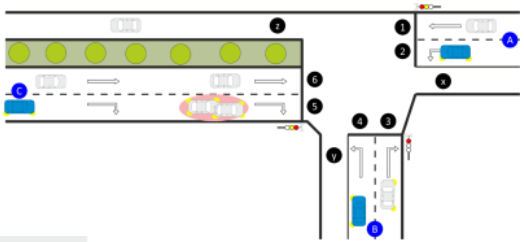


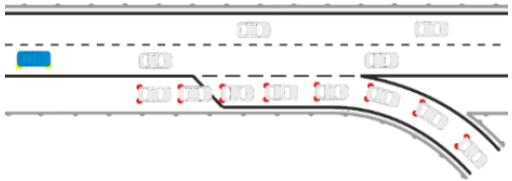

**With traffic management**

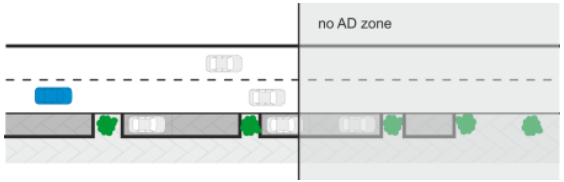


# Main results and outlook

- **Smoother** traffic flows (higher average speeds and throughputs) + lower emissions ($CO_2$)
- **Safer** conditions (less time-to-collisions < 3 sec)
- Insights lead to:
  - New/modified use cases
  - Incorporation of realistic **V2X** communications








**Deliverable D4.2**

# Let’s stay in touch

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