INTERNATIONAL EVENT ON
DRIVING SCIENCE
DRIVER-VEHICLE SYSTEMS IN ADVANCED ENVIRONMENTS

Traffic Management of Automated Vehicles in Transition Areas

Anton Wijbenga
MAP traffic management (MAPtm)

MAP TRAFFIC MANAGEMENT

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MAP TRAFFIC MANAGEMENT

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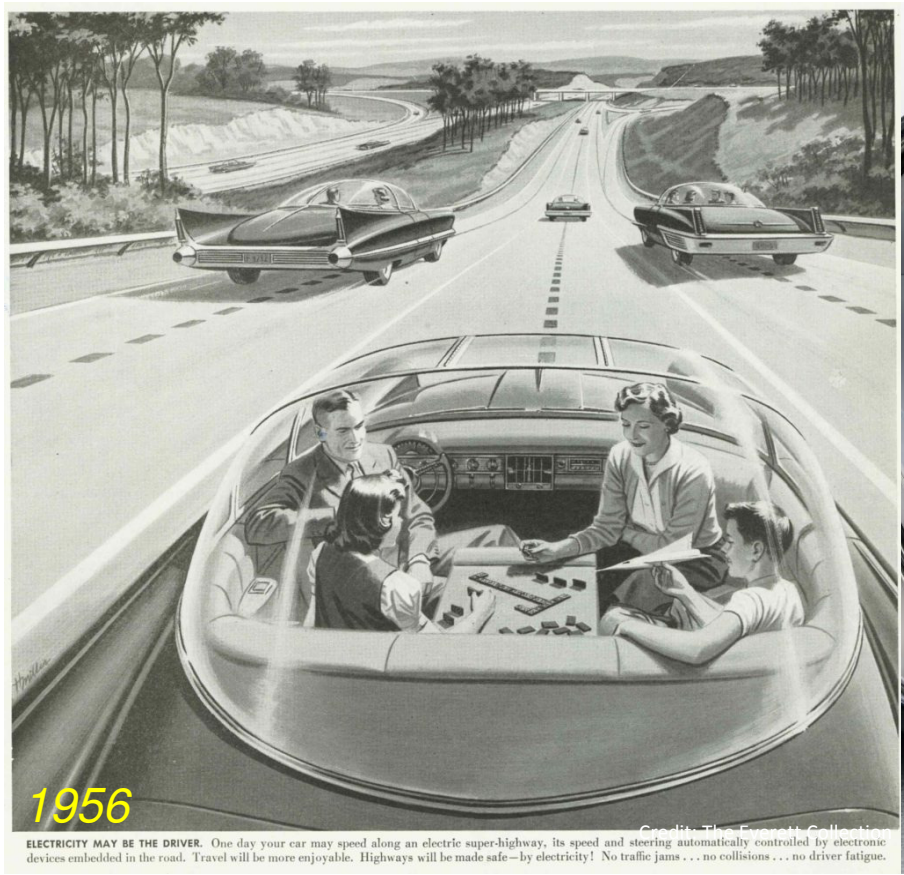
Founded in 2010, currently 23 employees and 4 operators.
Specialised in operational traffic management.

- Consultancy (knowledge, studies, expertise)
- Digital services (dashboards, applications, APIs)
- Operational services (monitoring, operators, assessment)

www.MAPtm.nl

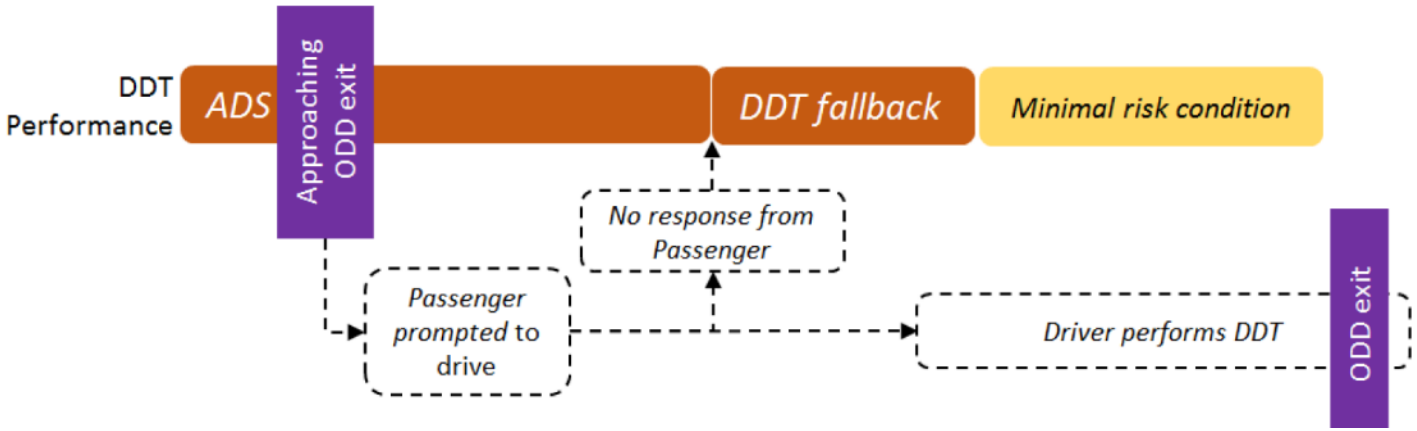
Automated driving is the dream!



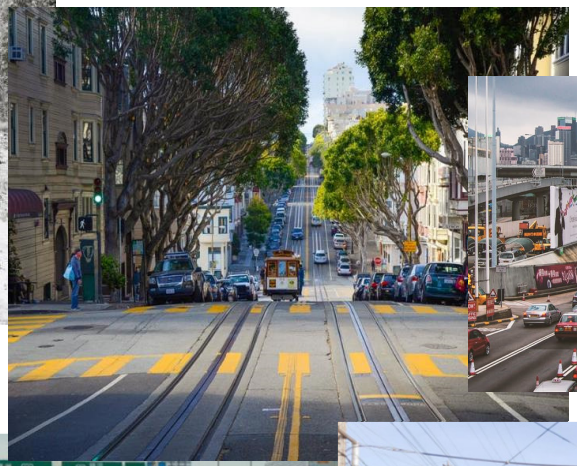
Operational Design Domain (ODD)

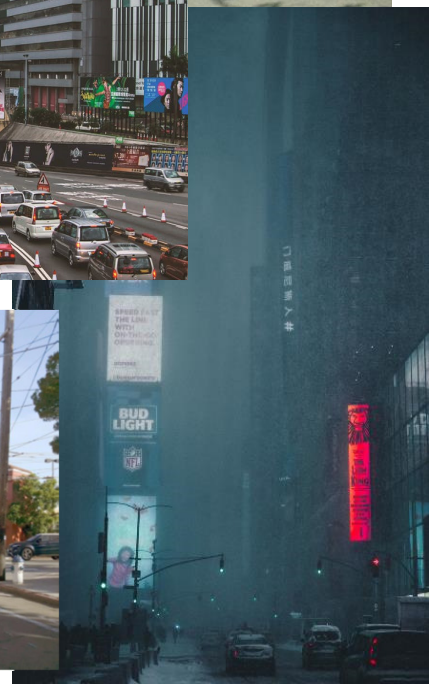
ODD is a description of the specific operating conditions in which the automated driving system is designed to properly operate, including but not limited to roadway types, speed range, environmental conditions (including weather, daytime/night-time), prevailing traffic laws and regulations, and other domain constraints

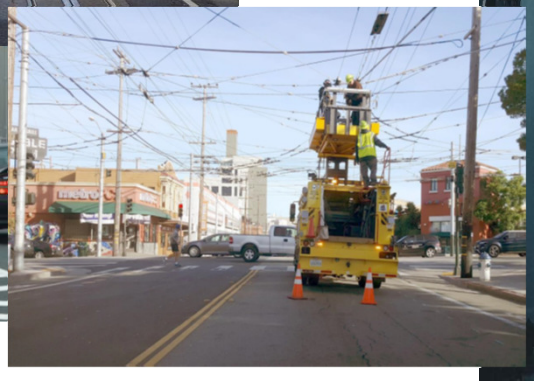
SAE, Taxonomy and Definitions for Terms Related to On-Road Motor Vehicle Automated Driving Systems J3016_201401



Automated Driving Limitations





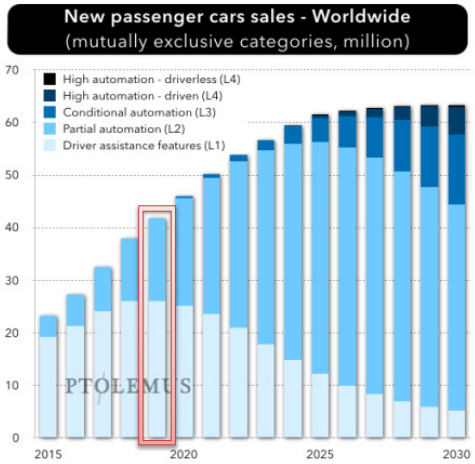


Why transition areas?

- Transition areas mark the boundaries of the ODD.

- What if an automated vehicle is unable to solve the situation ahead?
  - …what if, this happens not to single vehicles only, but to several?
  - …what if, it always happens on the same spot?
  - …what if, this interrupts traffic flow, traffic safety, etc.

- TransAID aims to:
  - Identify potential risks
  - Recommend solutions
  - Coordinate movements



TransAID Project Overview

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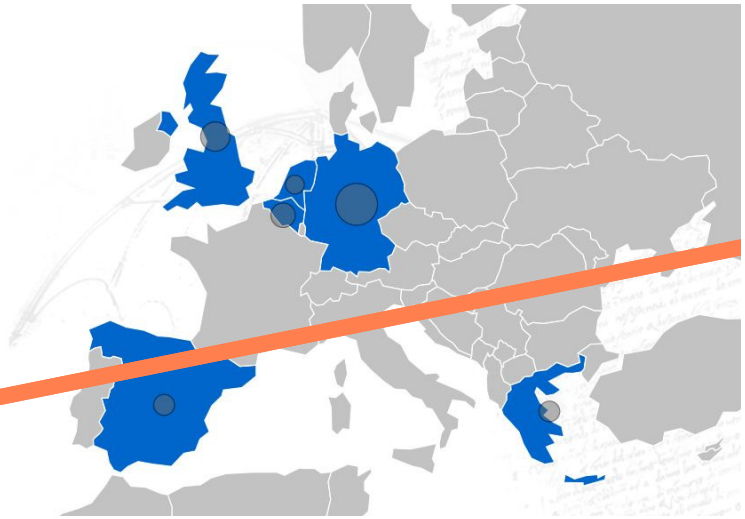
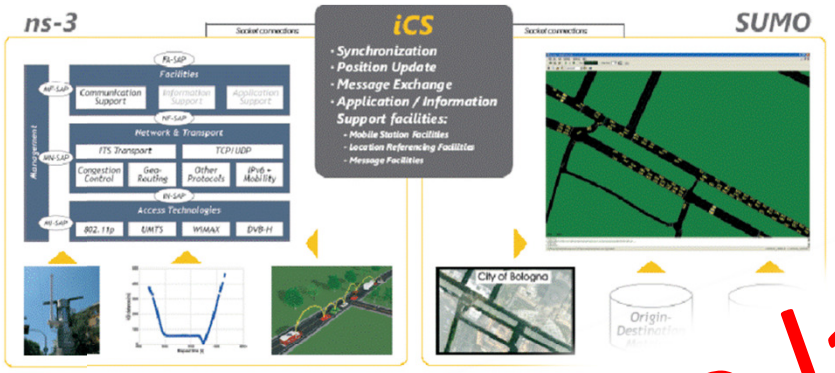
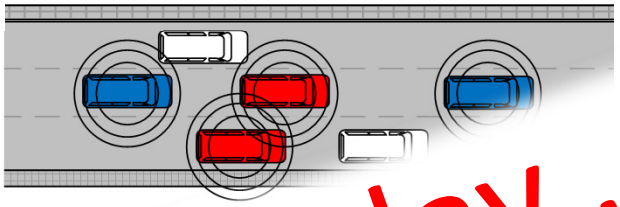
- TransAID (ART-05)
- Transition Areas for Infrastructure-Assisted Driving
- 01-09-2017 ~ 31-08-2020
- Budget: EUR 3.836.353,75
- Seven partners from 6 countries:
  DE, UK, BE, NL, EL, ES
- Website: www.transaid.eu

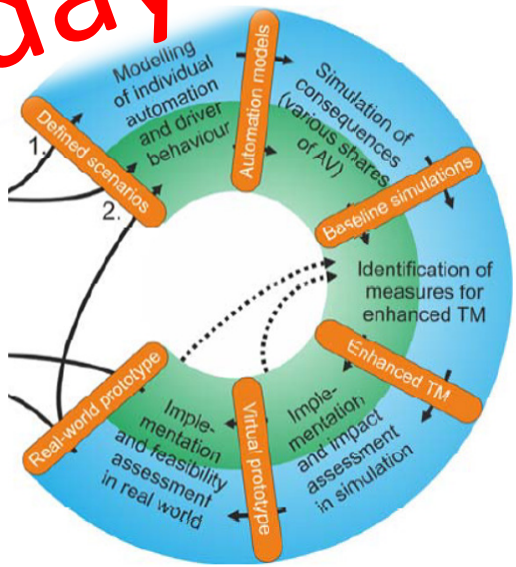


MAP TRAFFIC MANAGEMENT · DLR · HYUNDAI MOTOR GROUP · dynniq energising mobility · CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS · TRANSPORT & MOBILITY LEUVEN · UNIVERSITAS Miguel Hernández

TransAID Approach





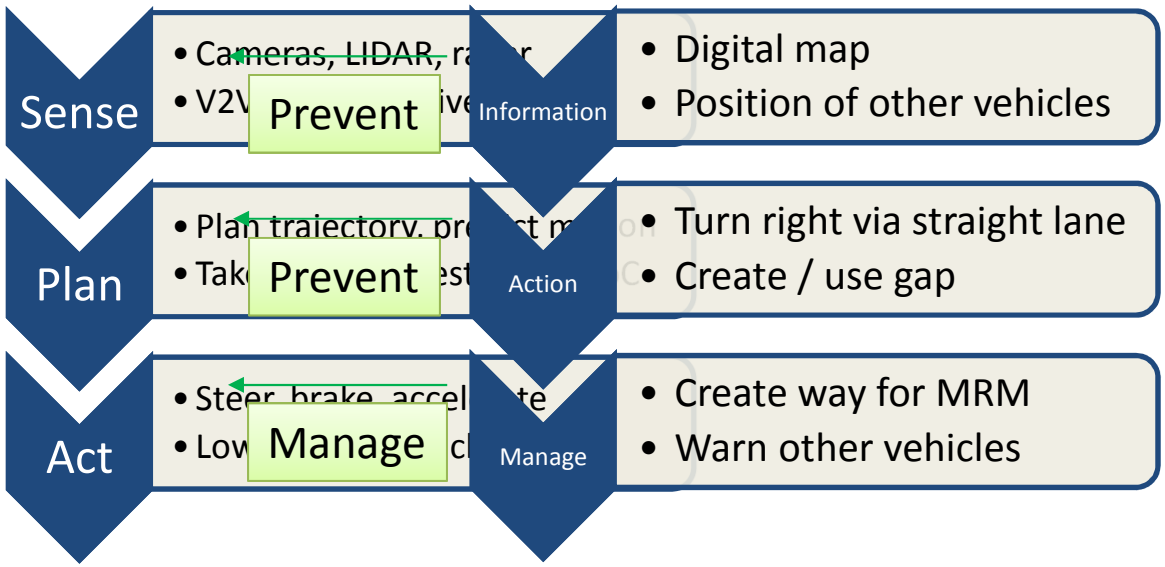


See demo later today…

Analysing…

- What are the problems in this situation?
- What are the solutions?
- To what extend do you expect that automated cars will solve the situation?
- What behaviour do you expect of oncoming traffic? And if it is an automated vehicle?

Assisting Automated Driving



+ when a ToC is not preventable, but predictable → spread the ToCs in time and space

TransAID services and use cases

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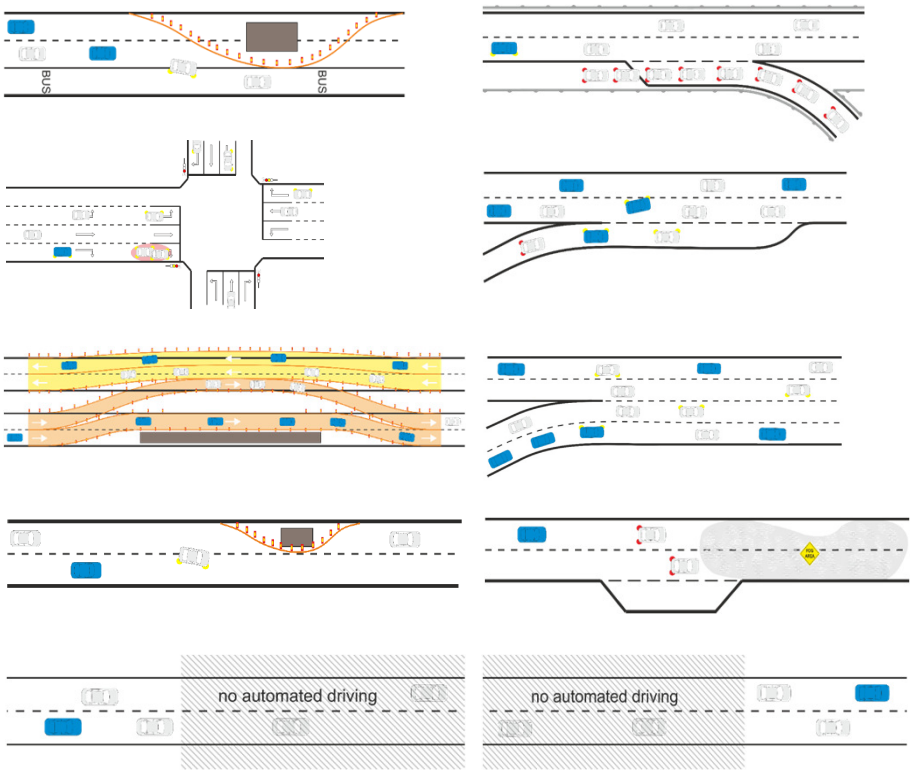
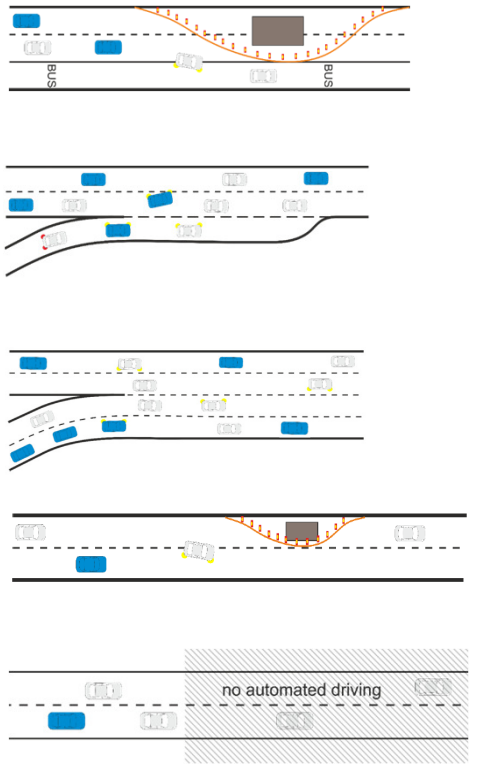
1. Prevent ToC/MRM by providing vehicle path information.
2. Prevent ToC/MRM by providing speed, headway and/or lane advice.
3. Prevent ToC/MRM by traffic separation.
4. Manage MRM by guidance to safe spot.
5. Distribute ToC/MRM by scheduling ToCs.



TransAID services results

Positive	No change	Negative
• Safety (45% to 70%) (larger reductions for less traffic and more AVs)	• Efficiency • Emissions	
• Safety (~ 75%) (especially for higher demand, LOS C)	• Efficiency - slight improvement • Emissions - slight decrease	
For higher shares of AVs (>25% level 2 & 3) in combination with LOS B or C • Efficiency	• Efficiency	• Safety
Separating traffic can outperform uncontrolled merging when **cooperative manoeuvring** is applied		
• Efficiency • Safety • Emissions	Improvement diminishes in case of congestion	
• Greatly smoothened disturbances • Efficiency • Emissions • Safety		



Service 5 Result

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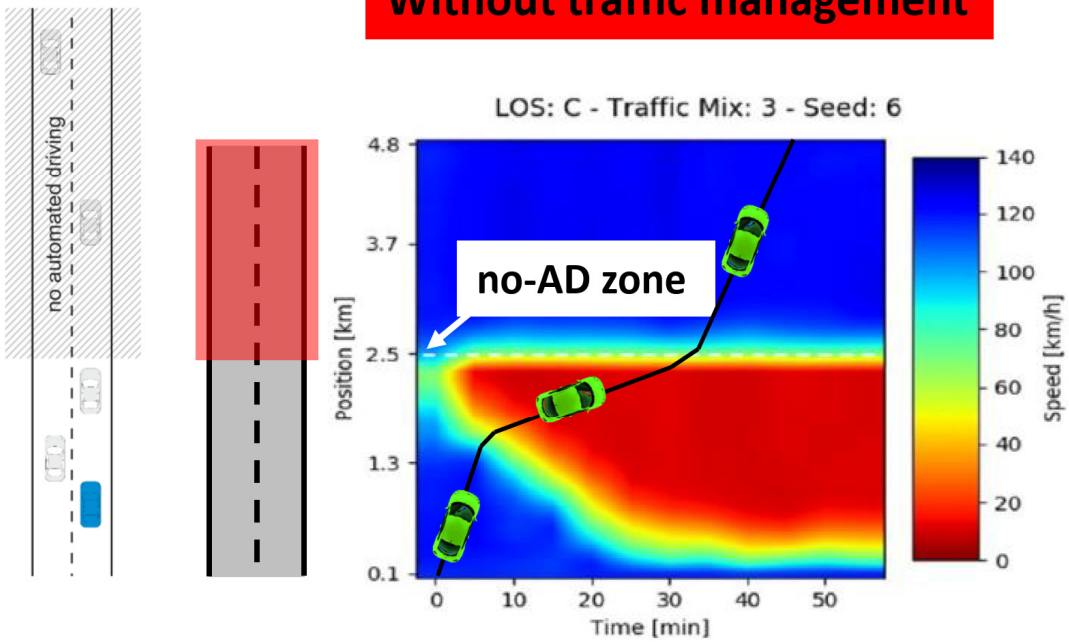
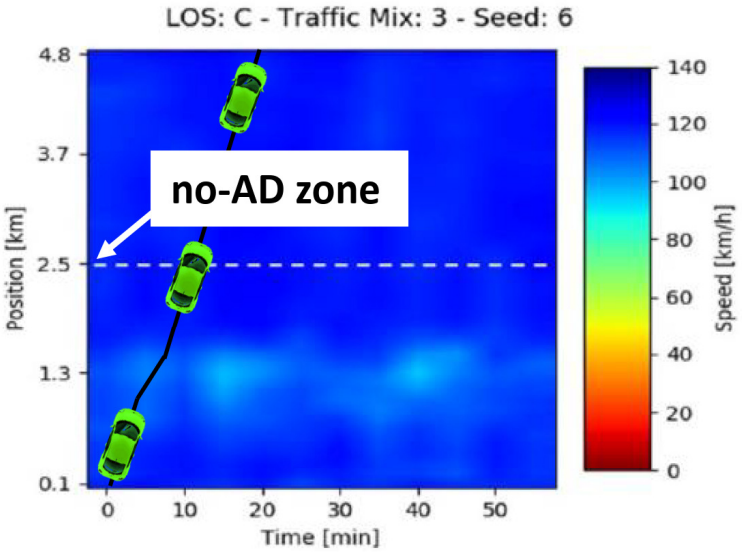
Without traffic management



With traffic management



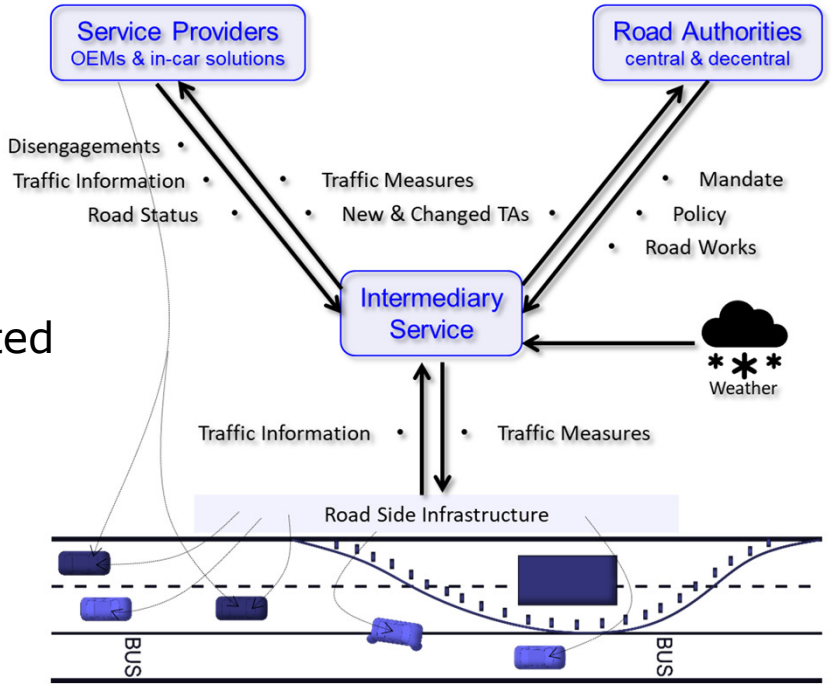
Stakeholder consultation summary

- Services and measures are received positively.
- Connectivity is needed for higher levels of AD.
- ODD definition very complex (e.g. sensor capabilities).
- Cities have a high interest in ODD specs from OEMs.
- The ODD will always have limitations.
- The necessity for infrastructure classification (ISAD). (e.g. matching ODD)

- Dedicated lanes for AVs should only be deployed in a dynamic way.
- For the time being, AVs are expected to have more conservative behaviour than manually operated vehicles.
- Much discussion needed on liability, traffic regulation, cooperation.

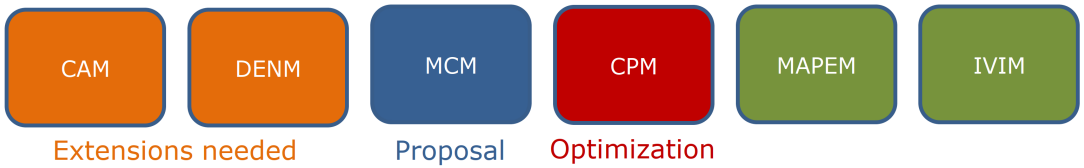
Intermediary service

- RAs and OEMs cooperate through an intermediary service:
  - Generate trust
  - Create understanding
  - Align measures (space, time, type)
- Single point of access, possibly mandated by both RAs and OEMs.
- Consolidate knowledge / experience.
- Apply across road authority borders
  - including those that have no TMC



Roadmap – recommendation topics

- TransAID will deliver…
  - …results on all services regarding: traffic efficiency, safety and emissions.
  - …a *Guidelines and Roadmap* report which will contain recommendations for road authorities.
  - …new ITS-G5 message sets and extensions / optimisations.



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Any questions?

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