Transition Areas for Infrastructure-Assisted Driving Preliminary Results

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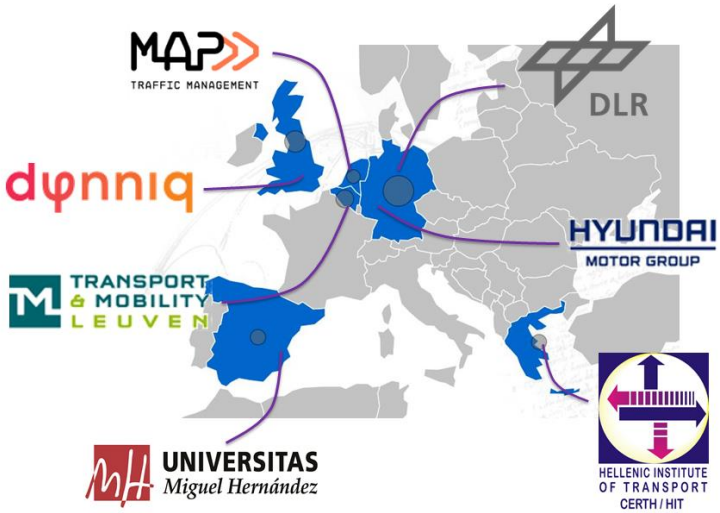
DB
Mercure HOTEL
DLR

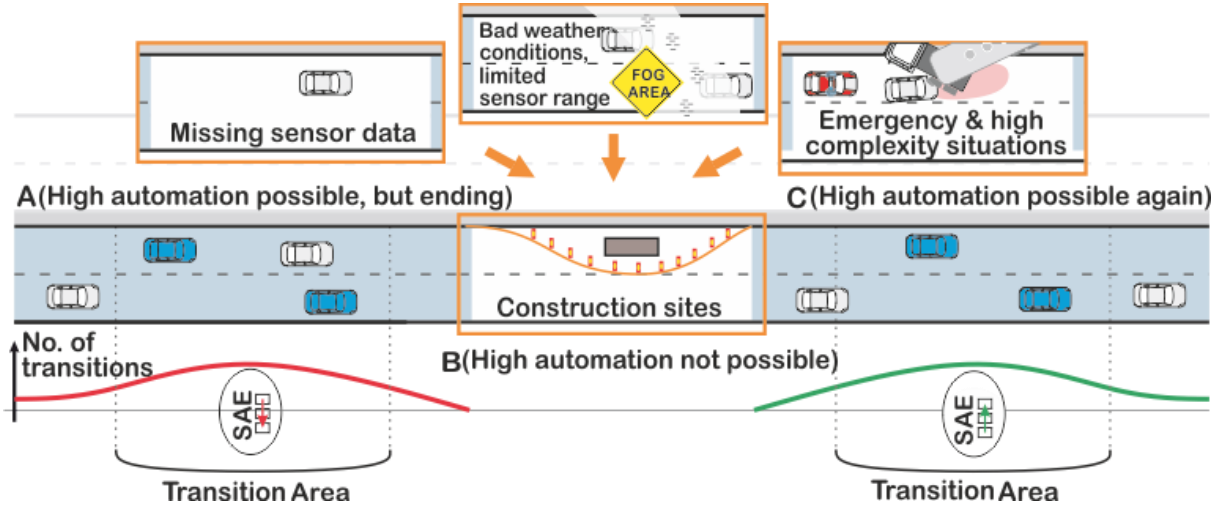
Project Overview



European H2020 project

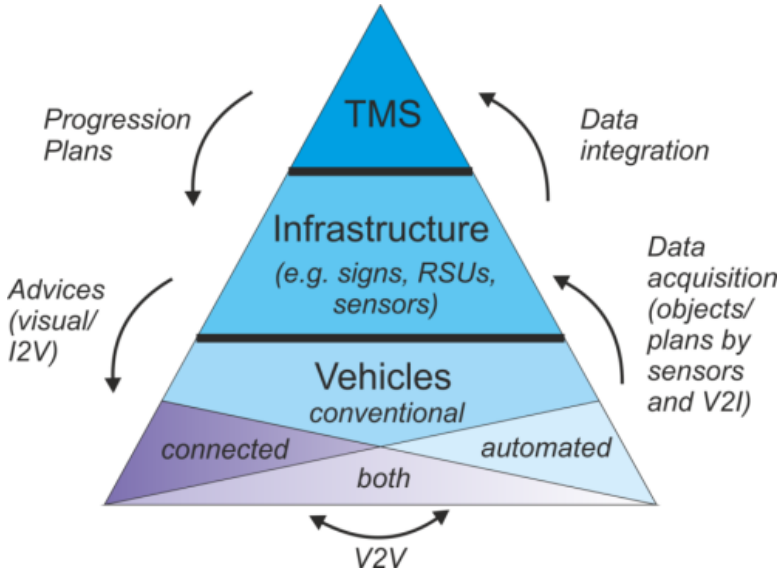
- ART-05-2016 - Automated Road Transport
- Period: 01-09-2017 ~ 31-08-2020
  COVID-19 Extension to 31-12-2020
  possibly to 28-02-2021
- Budget: € 3,836,353
- 7 partners + 12 associated partners

Definition: “Transition Areas”



“Transition Areas” are areas on the road where many highly automated vehicles (blue) are changing their level of automation due to various reasons.

Hierarchical approach

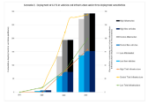


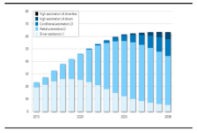
Traffic Management Service definitions

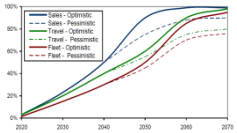
Performed literature studies, expert interviews and stakeholder workshops with surveys

→ Various parameters (environmental causes, vehicle behaviour, HMI, driver reaction, time …)

→ only limited data available







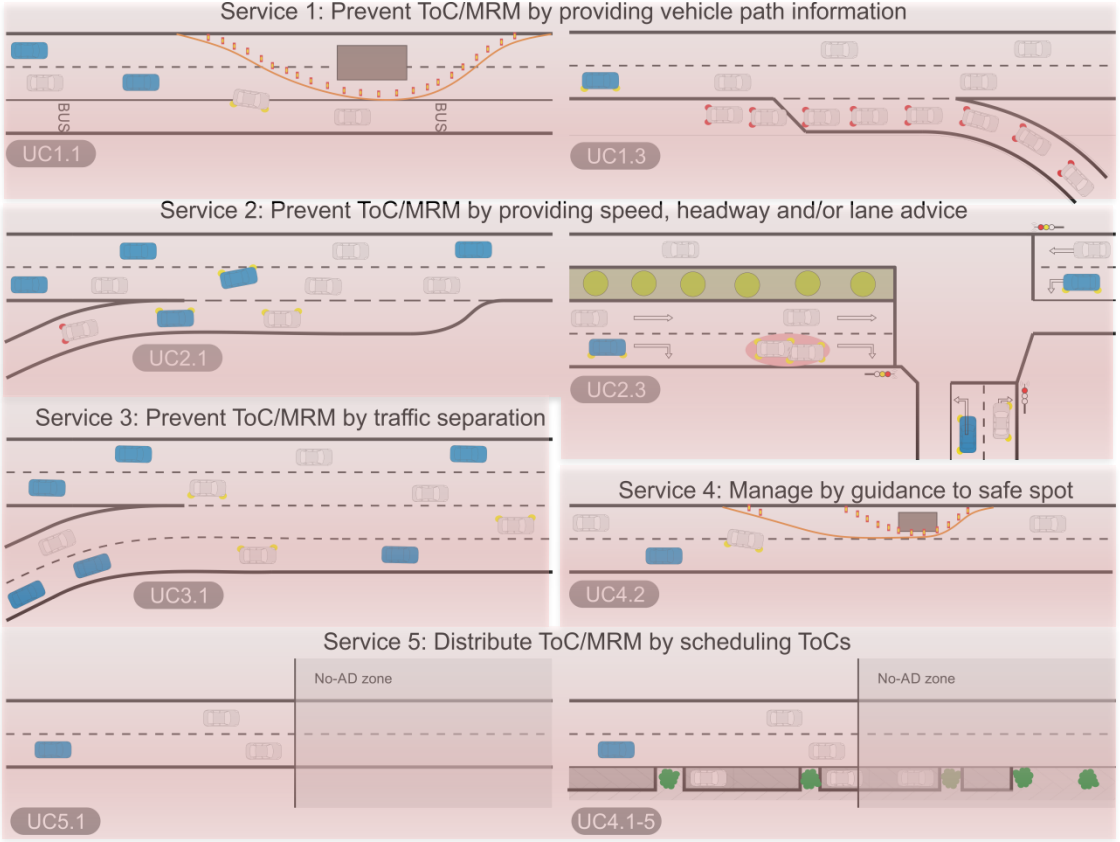
Prevent ToC/MRM

- By providing path information
- By providing speed / headway / lane advice
- By separating traffic

Manage or support ToC/MRM

Distribute (in time and space) ToC/MRM

Investigated Use Cases

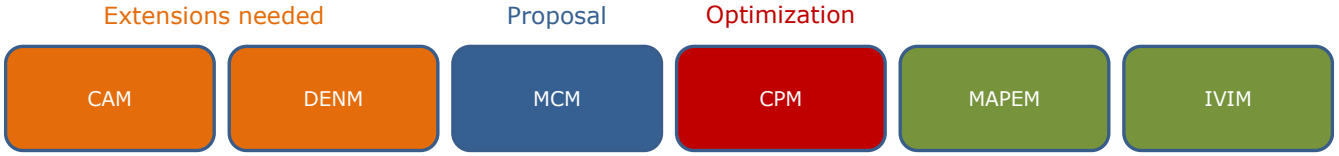


Each use case tested in several scenarios

→ Sum of approx. 50 scenarios

Enabling Technologies

- V2X message set definition to support TM measures

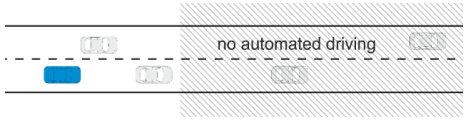


- Cooperative sensing: study and evolution of CPM generation rules.
  - Look-ahead mechanism and redundancy mitigation technique in ETSI TR 103 562.
- Cooperative manoeuvring:
  - Definition of V2I-aided approach, V2X message flows and V2X MCM generation rules.
- Design and evaluation of techniques for improved V2X comms reliability:
  - V2X message compression, DCC reliability analysis, broadcast acknowledgement.
- Signalling for informing conventional vehicles

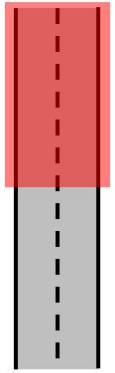
Simulation Results

- Increased traffic efficiency (higher average flow and speed) and safety (higher time-to-collisions), decreased emissions (less CO_2)

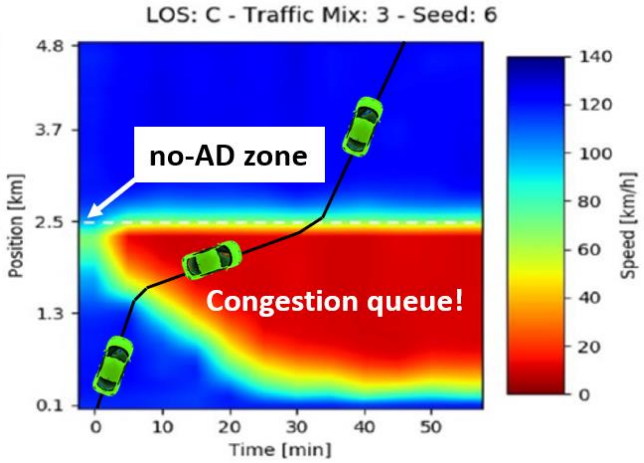
➔ *Depending on fleet mix and traffic demand level (LOS A through D)*



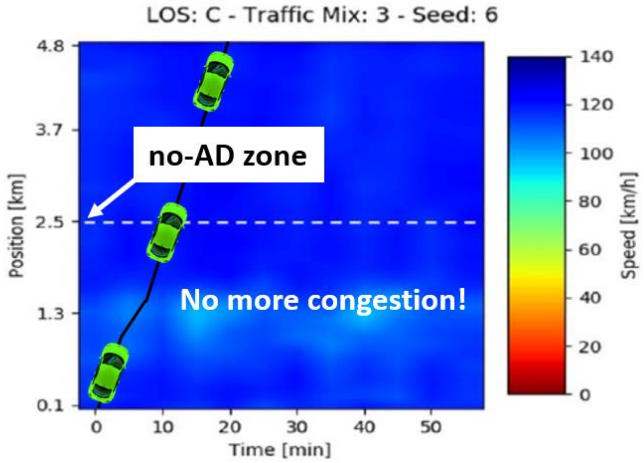
UC 5.1: Distribute TORs within dedicated TOR area



Without traffic management



With traffic management



Necessity of complex simulations

- Adding V2X communication to the simulation can significantly impact results, depending on sensitivity of TM algorithm
- Computational overhead of communication simulation also significant
  - ➢ Trade-off computation time vs. realism of simulation

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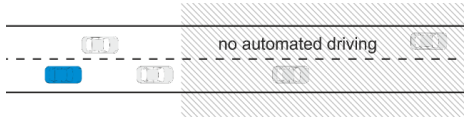
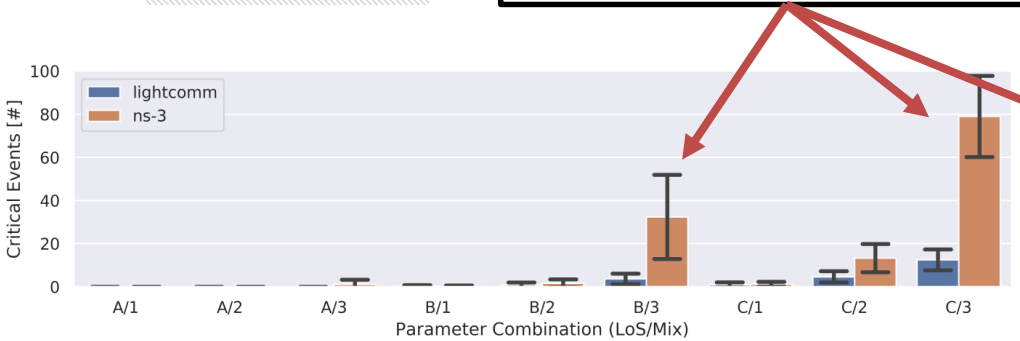
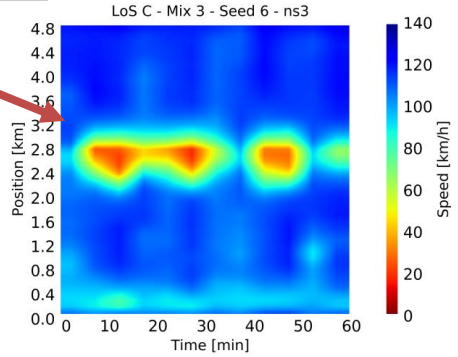
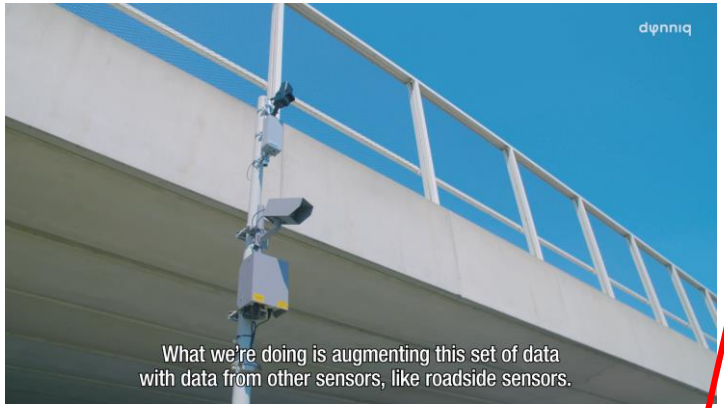


ToC scheduling sensitive to communication errors





Field trials



From project to market

- Stakeholder consultations
  - Gather feedbacks on the project choices (selected use cases, scenarios, modelling solutions, implementation approaches) as well as on the achieved results.
  - 3 Main stakeholder workshops; 2 International liaison activities; 4 additional stakeholder consultation events
- Little is known about managing mixed traffic. However, transition areas are recognized as a prospective problem.
- Connectivity was recognized as a key enabler to extend the Operational Design Domain (ODD) of automated driving.
- TransAID traffic management allowing the road infrastructure to provide additional information to CAVs was recognized as a valid approach.
- Defining and sharing information about the ODD / vehicle capabilities and ISAD / infrastructure capabilities is highly recommended.
- Roadmap & Guidelines – under construction 

expected soon[tm].

Thanks for watching!

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