



EGVI
European Green
Vehicles Initiative



TransAID

Julian Schindler



This project has received funding from
the European Union's Horizon 2020
research and innovation programme

TransAID

« Transition Areas for Infrastructure Assisted Driving »

European H2020-MG-2014-2015 project

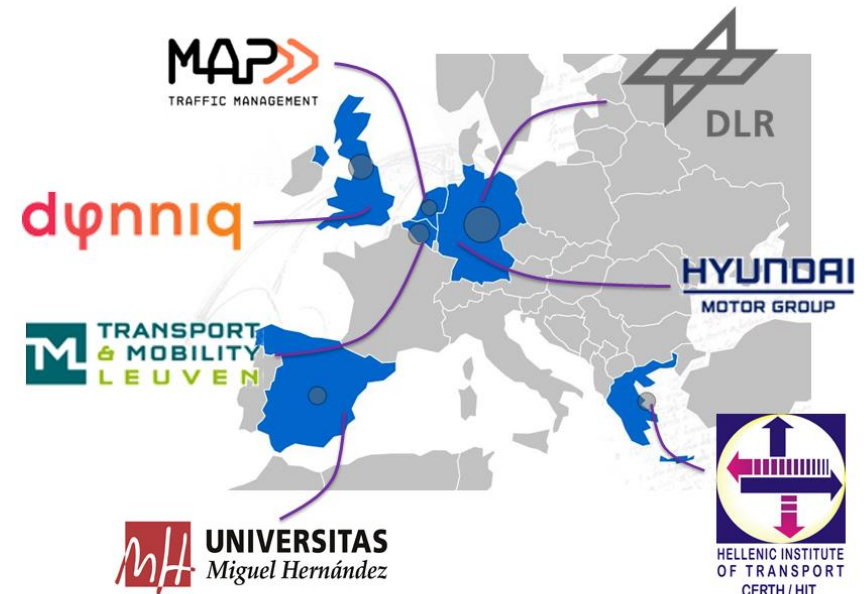
- ART-05-2016 - Automated Road Transport
- Period: 01-09-2017 ~ 31-08-2020
- Budget: € 3,836,353
- 7 partners + 12 associated partners

Main objective:

To develop and demonstrate

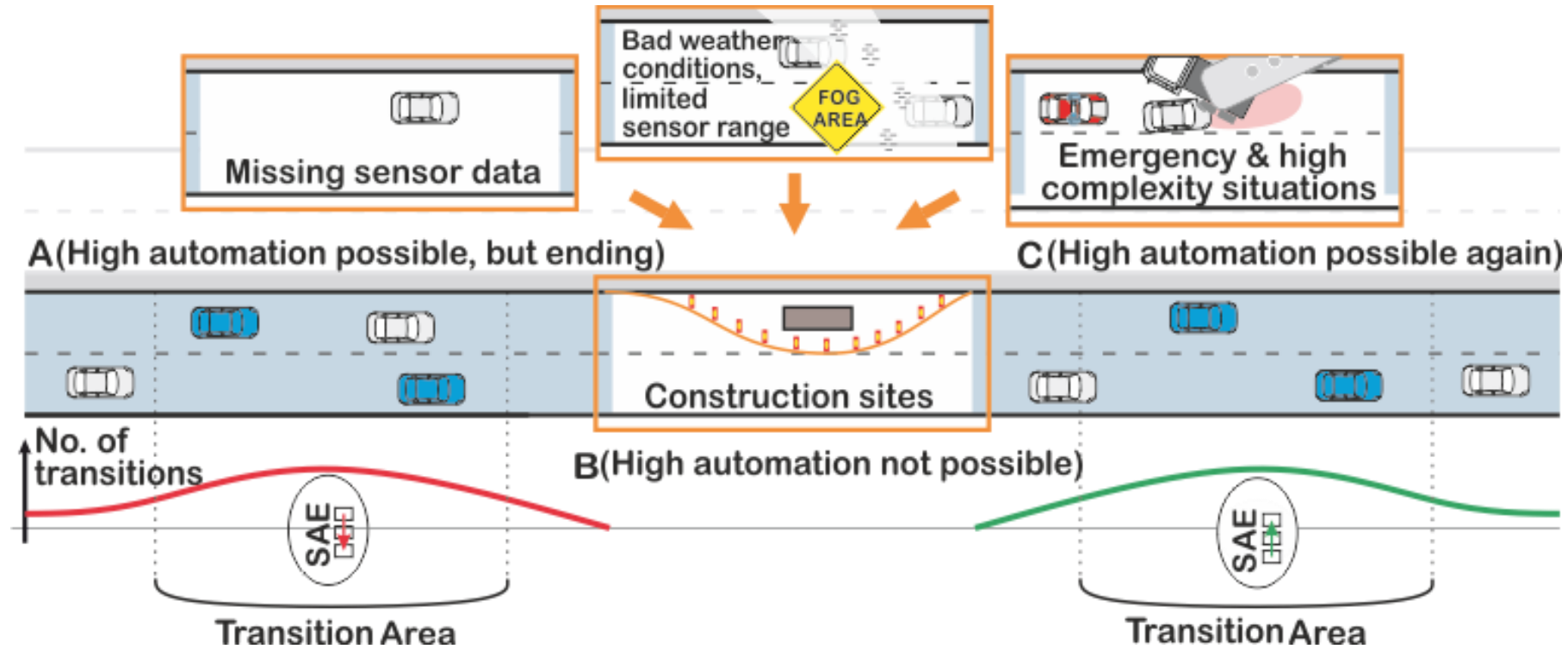
- infrastructure-assisted traffic management procedures,
- protocols and
- guidelines

for smooth coexistence between automated, connected and conventional vehicles especially at *Transition Areas*.



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Definition: “Transition Areas”

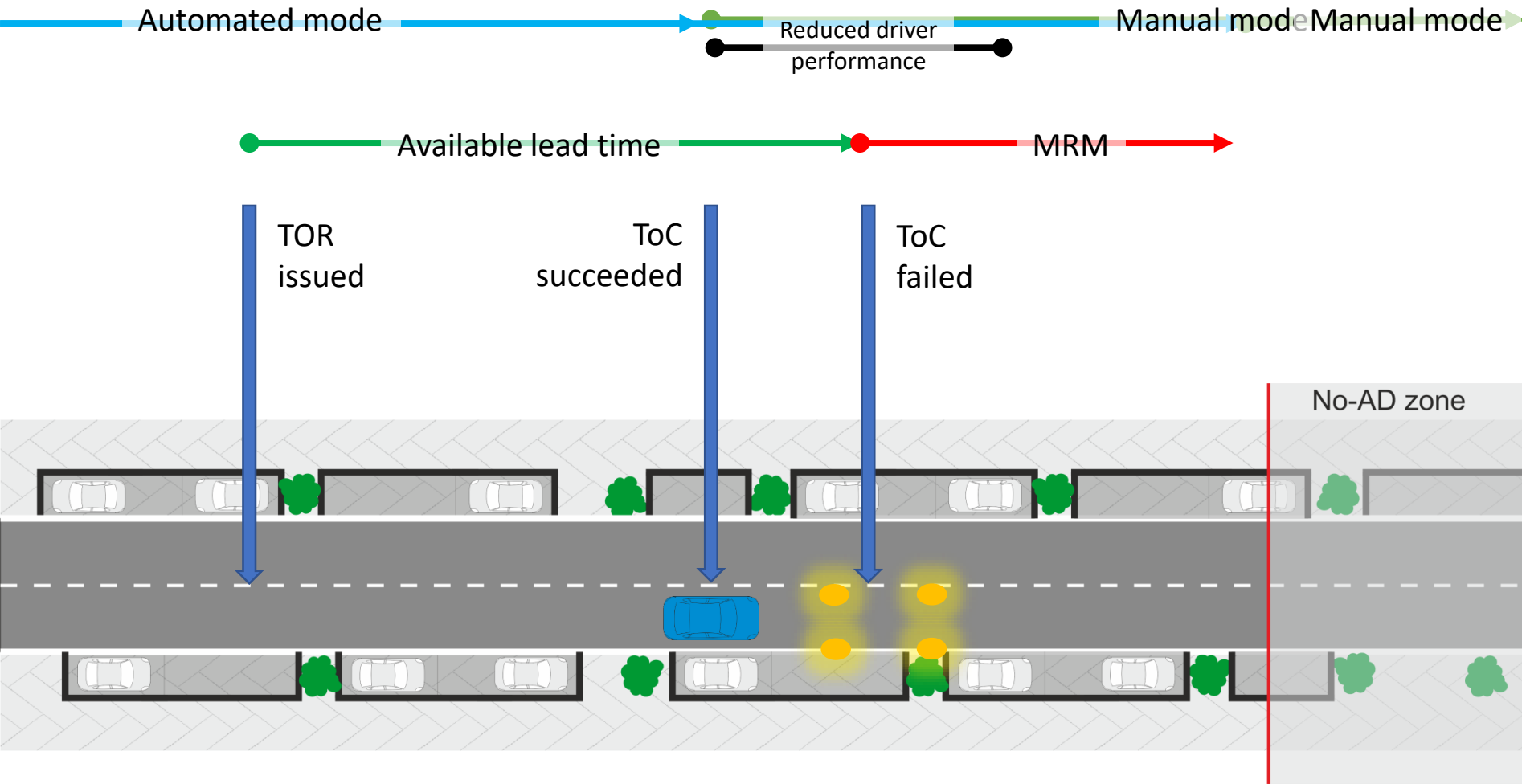


“Transition Areas” are areas on the road where many highly automated vehicles (blue) are changing their level of automation due to various reasons.



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Definition: ToC, TOR & MRM



- ToC: Transition of Control
- TOR: Take Over Request
- MRM: Minimum Risk Maneuver



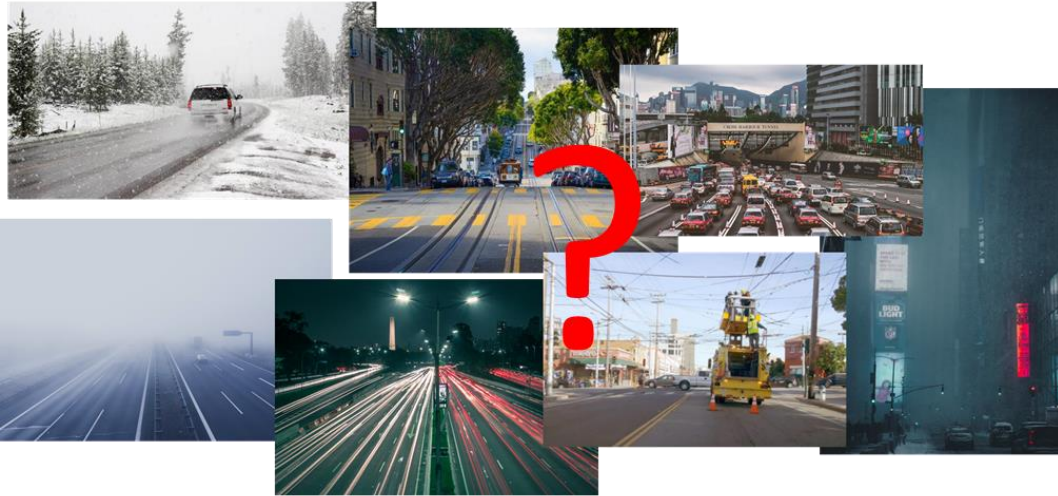
Objectives

- 1) Evaluation and **modelling of current automation prototypes** and their drivers' behaviour.
- 2) **Assessment of the impact of Transition Areas** on traffic safety and efficiency. Generate requirements on enhanced traffic management procedures
- 3) Development of **infrastructure-assisted management procedures and protocols** to control connected, automated and conventional vehicles at Transition Areas.
- 4) Definition of **V2X message sets** and communication protocols for the cooperation between connected/automated vehicles and the road infrastructure.
- 5) Development of procedures to enhance the **detection of conventional vehicles** and obstacles on the roads and to inform/influence conventional vehicles.
- 6) **Integration, test and evaluation** of the TransAID infrastructure-assisted traffic management protocols and procedures in a **simulation** environment. Validation and demonstration of them by means of **real world** prototypes at test sites.
- 7) Provision of a **guideline/roadmap** to stakeholders regarding the requirements on traffic infrastructure and traffic management in order to cope with Transition Areas considering mixed traffic



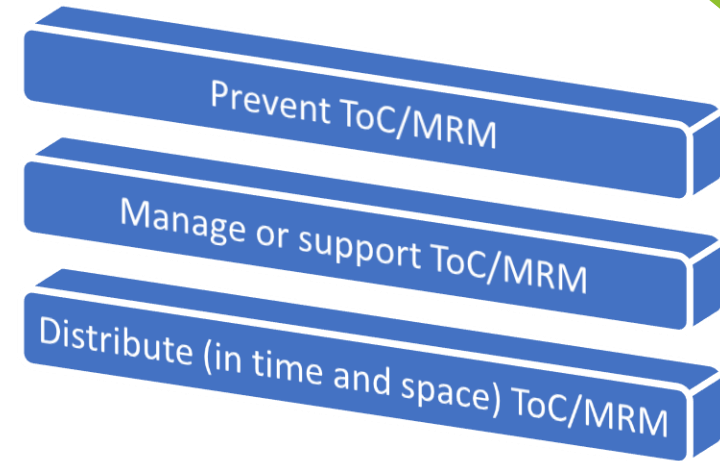
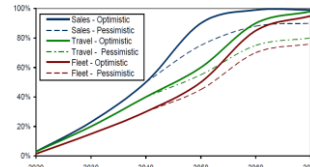
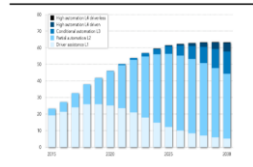
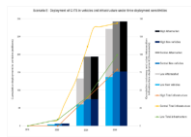
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Troublesome first steps: Scenario and timeline definition



Performed literature studies, expert interviews and stakeholder workshops with mentimeter surveys

- Various parameters (environmental causes, vehicle behaviour, HMI, driver reaction, time ...)
- only limited data available



Mix#	Year	LV	LV-A	CV-1	CV-2	AV-L3	AV-L4	CAV-L3	CAV-L4	AD*
1	2025	90%	6%	4%	-	-	-	-	-	10%
2	2030	85%	6%	4%	2%	2%	-	1%	-	15%
3	2035	80%	6%	4%	3%	3%	1%	2%	1%	20%
4	2040	70%	6%	4%	4%	5%	4%	4%	3%	30%
5	2045	60%	5%	3%	4%	9%	6%	8%	5%	40%
6	2050	50%	5%	3%	4%	12%	8%	12%	6%	50%
7	2055	40%	5%	3%	4%	15%	12%	15%	9%	60%
8	2060	15%	5%	3%	4%	22%	11%	22%	10%	70%



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Scenarios

Prevent ToC/MRM

Providing path information

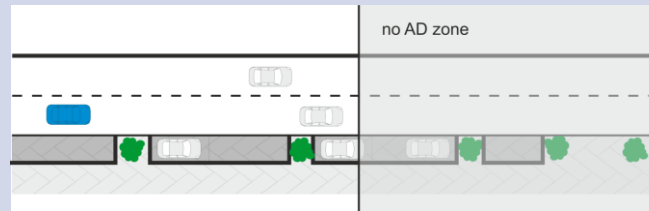
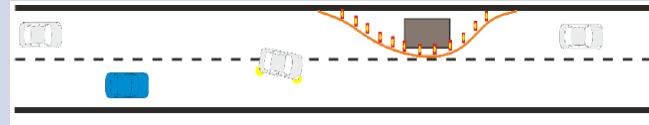
Temporarily change lane category

Cooperative lane changes

Speed & Distance information

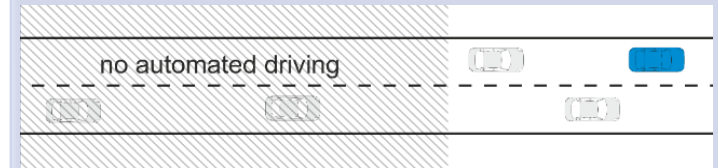
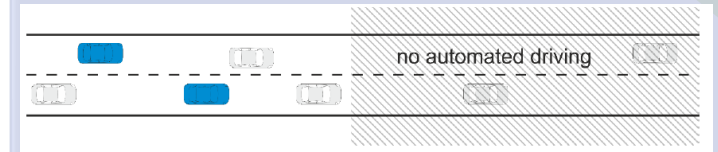
Temporal traffic separation

Manage or support ToC/MRM



Find safe spot for stopping without harming traffic

Distribute (in time and space) ToC/MRM



Distribute transitions of control to flatten effects



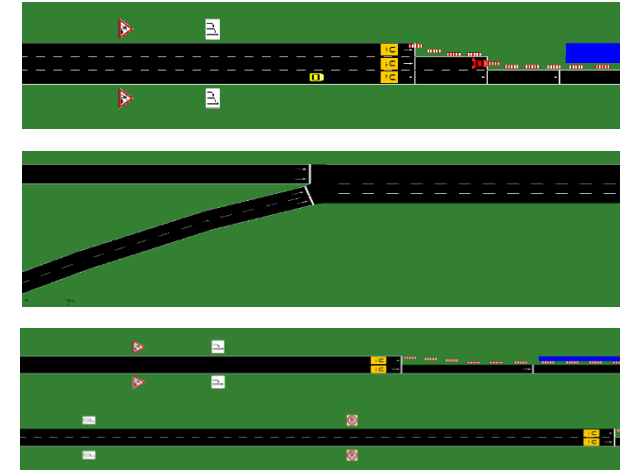
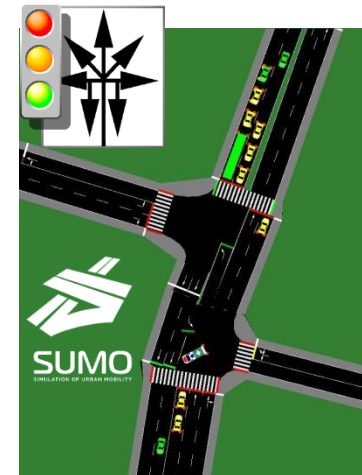
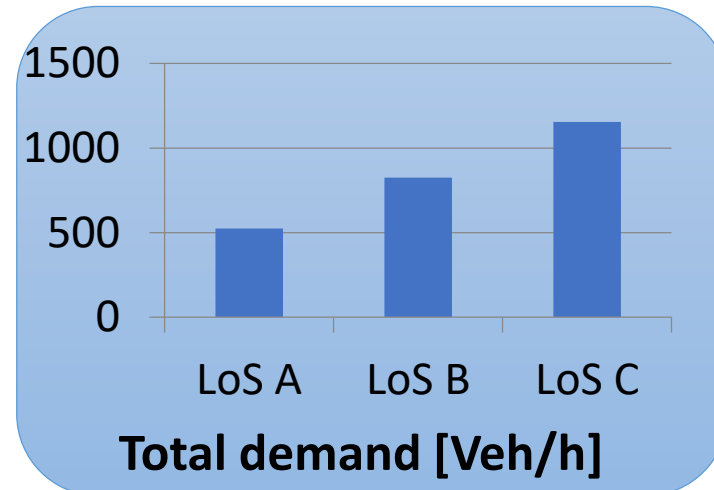
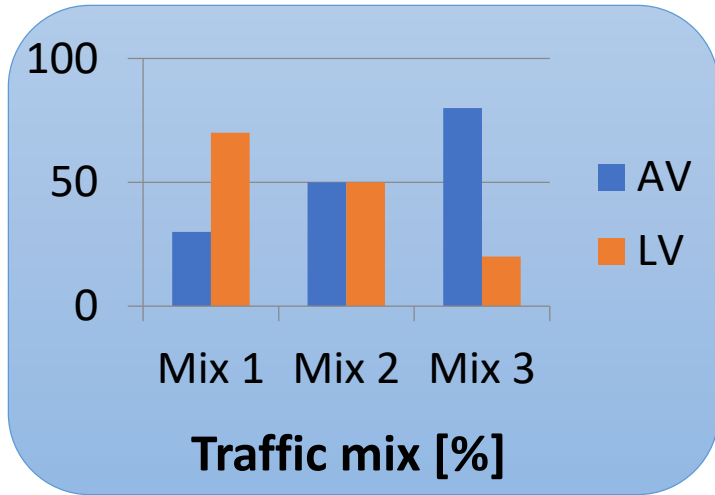
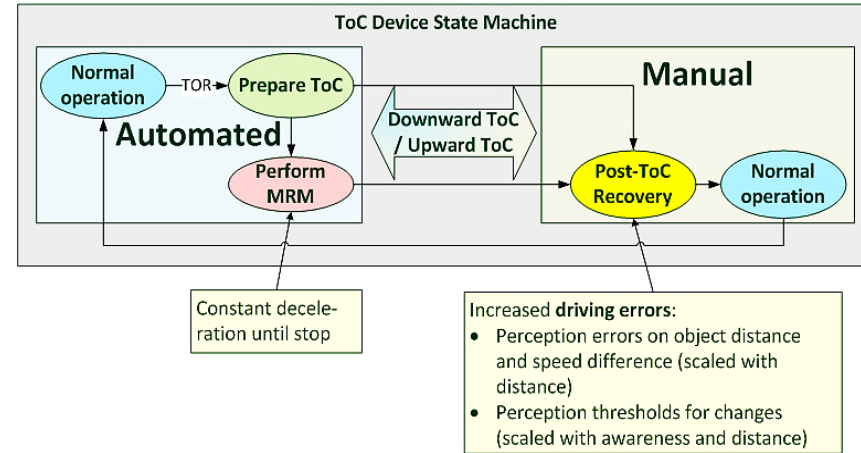
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Objectives #1 & #2: Modelling and First Impact Assessment

1. Modelling of AV/CAV behaviour

- Longitudinal Control (ACC, C-ACC)
- Lateral Control (Lane Keeping, Lane Change)
- Transition of Control

2. Impact Assessment



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Objectives #3, #4 & #5:

Management procedures, message sets & obstacle detection

Providing path information

Temporarily change lane category

Cooperative lane changes

Speed & Distance information

Temporal traffic separation

Find safe spot for stopping without harming traffic

Distribute transitions of control to flatten effects

CAM

DENM

Extensions needed

MCM

CPM

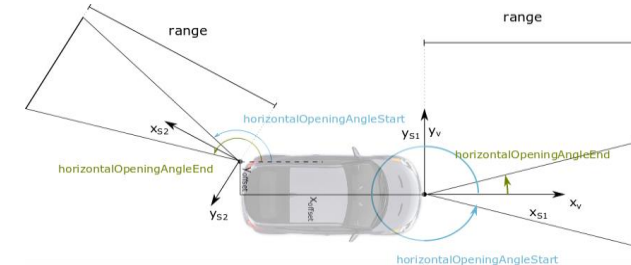
Proposal

Optimization

MAPEM

IVIM

Approach: standard-compliant, backward compatibility and interoperability.



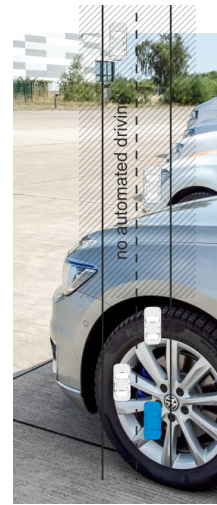
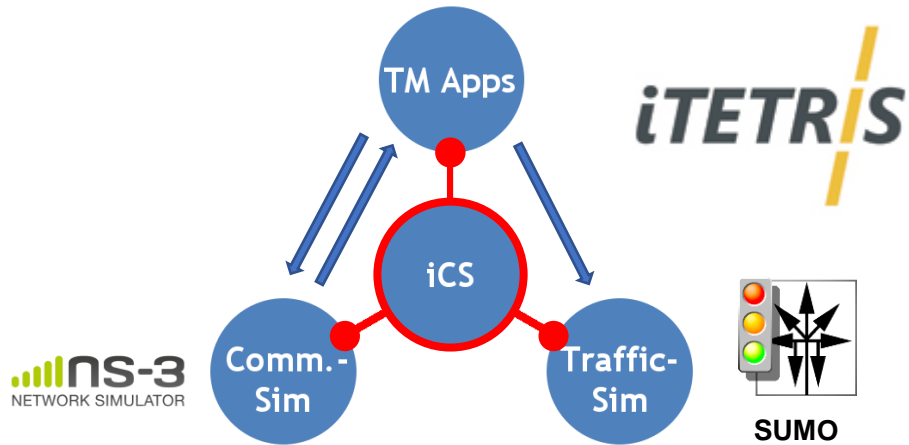
Detection of obstacles & Sensor data sharing



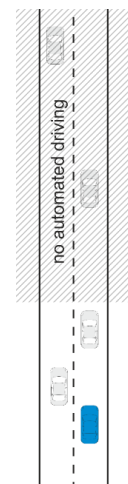
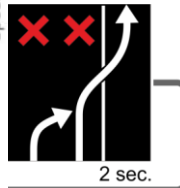
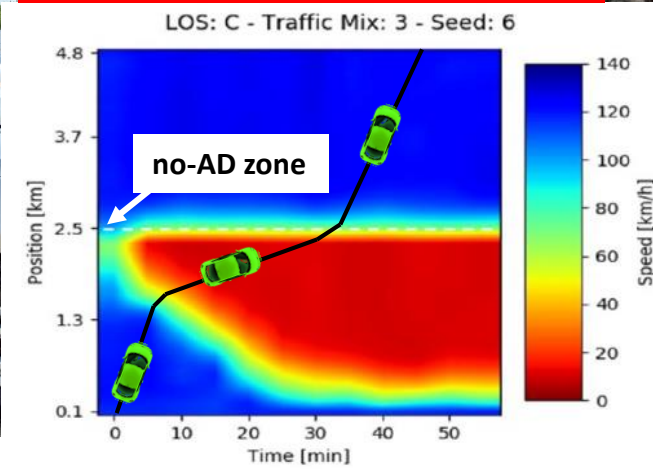
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Objective #6:

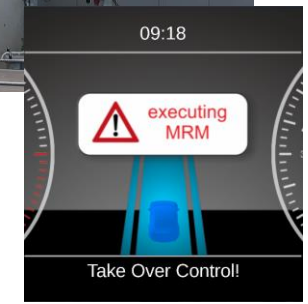
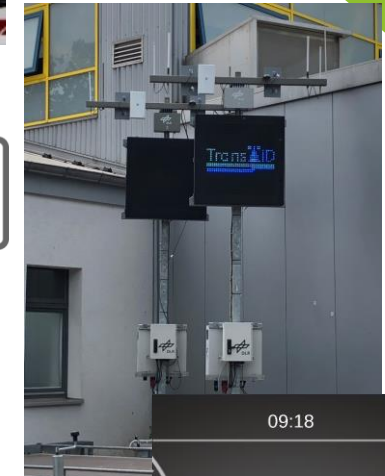
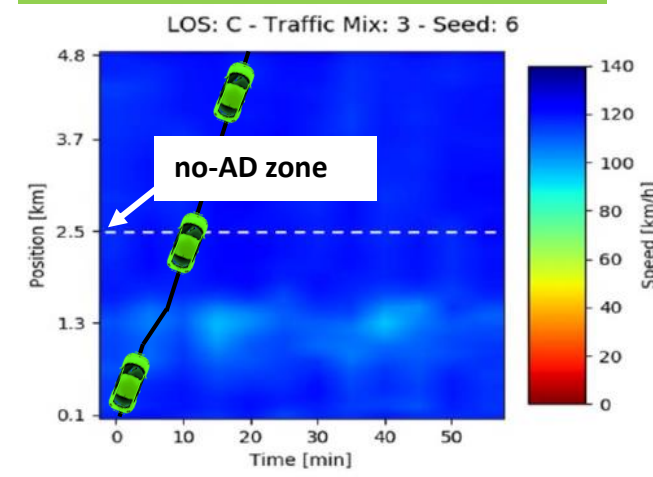
Test & Evaluation in Simulation & Real World



Without traffic management



With traffic management



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Objective #7:

Roadmap/Guideline development

Stakeholder consultation results

Mentimeter survey results

Simulation results

Real-world feasibility results

Communication standardization

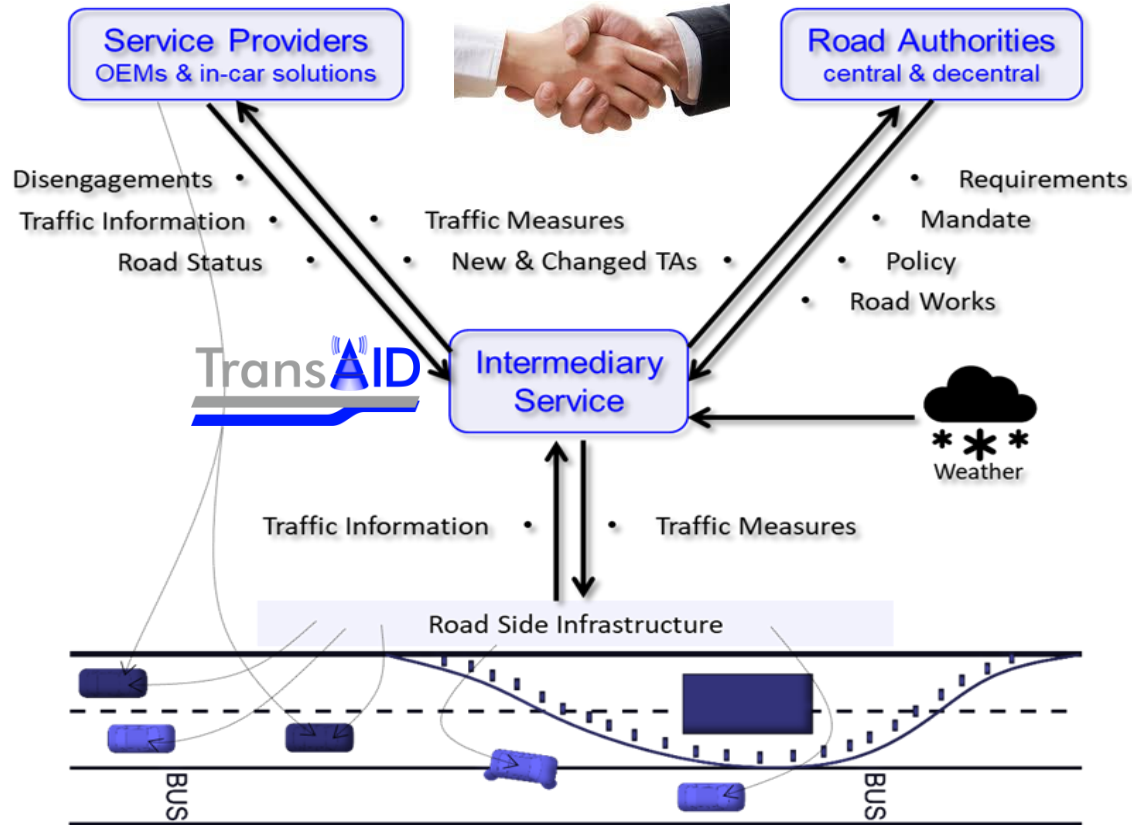


Roadmap &
Guidelines for stakeholders
(road authorities, cities,
OEMs, standardization bodies,
legislation entities...)



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Approach: Intermediary Service



- Automation-ready networks
- Smooth introduction of automated vehicles
- Less congestion
- Lower emissions
- More safety
- Better comfort



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Thanks for listening!

FORUM ISTS2020

Forum on Integrated and Sustainable Transportation Systems

29 June - 03 July 2020 // Delft - The Netherlands



Please join us at our final event!

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