Towards Continuous External Assistance of Automated Mobility

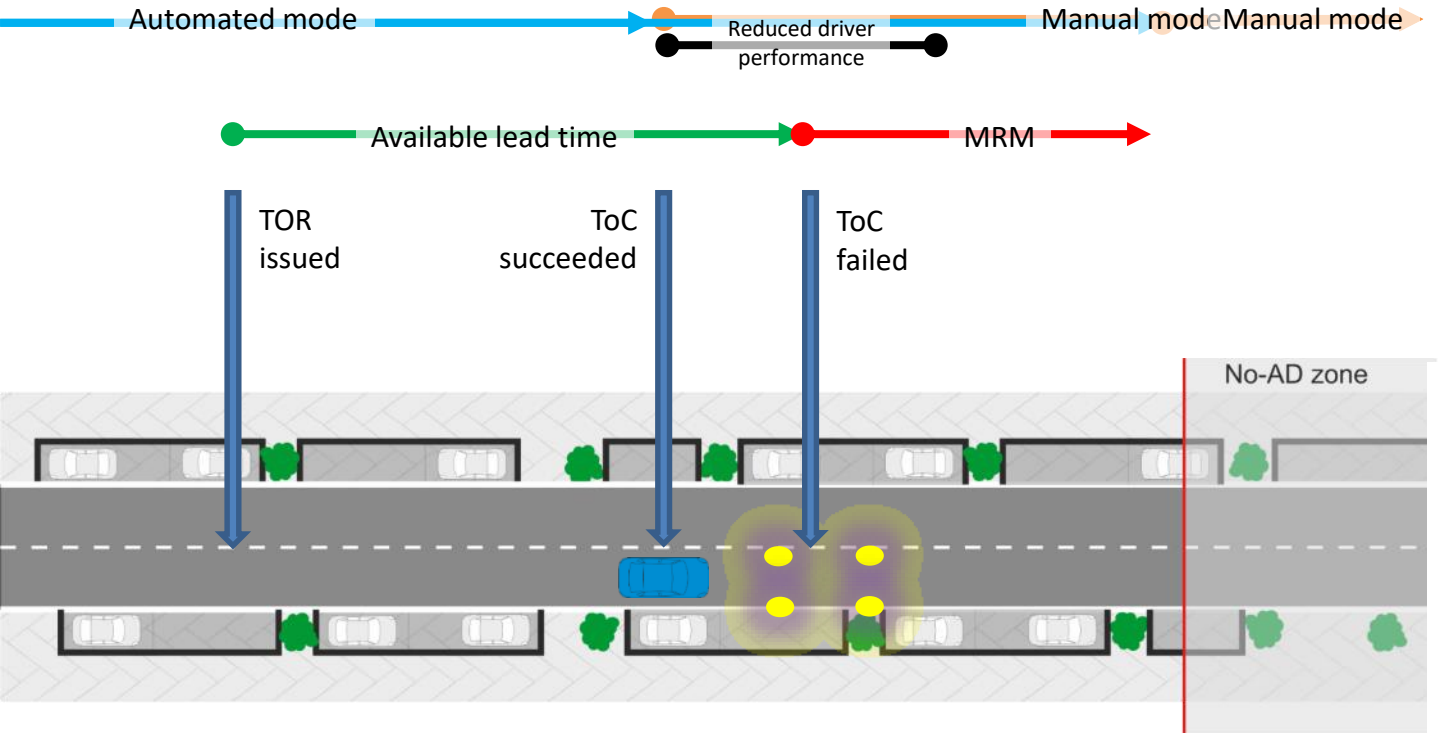
Dr. Jaap Vreeswijk
MAP traffic management (MAPtm)

TRAFFIC MANAGEMENT

www.transaid.eu
@transaid_h2020
www.linkedin.com/groups/13562830/
www.facebook.com/transaidh2020/

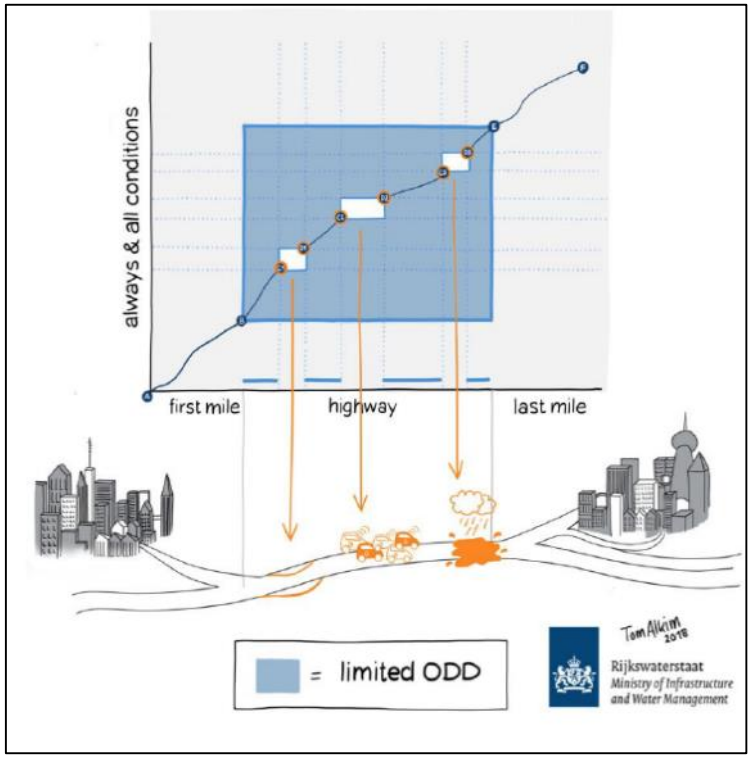
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723390

Definition: ToC, TOR & MRM



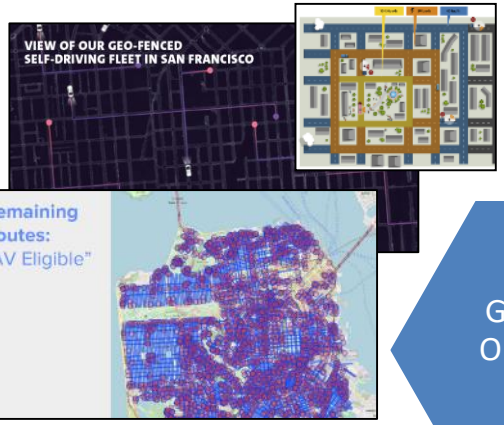
- ToC:
Transition of Control
- TOR:
Take Over Request
- MRM:
Minimum Risk Maneuver

Managing the ODD



- An ODD has boundaries and gaps.
- What happens if an automated **vehicle is unable** to solve the situation ahead?
- …what if, this happens not to a single, but to **several vehicles**?
- …what if, it **systematically** happens on the same spot or in similar circumstances?
- …what if, this **affects** traffic flow, traffic safety, etc.

Automated Driving Limitations



SAE INTERNATIONAL

SAE J3016™ LEVELS OF DRIVING AUTOMATION

Vehice AD functions & capabilities

Geo-Area / Operational Domain

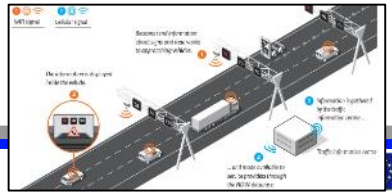
Road environment (access, intersections, behaviour)

Vehicle / System operational performance

Situational / environmental conditions

Physical infrastructure measures

Digital infrastructure measures



TransAID

Assisting Automated Driving

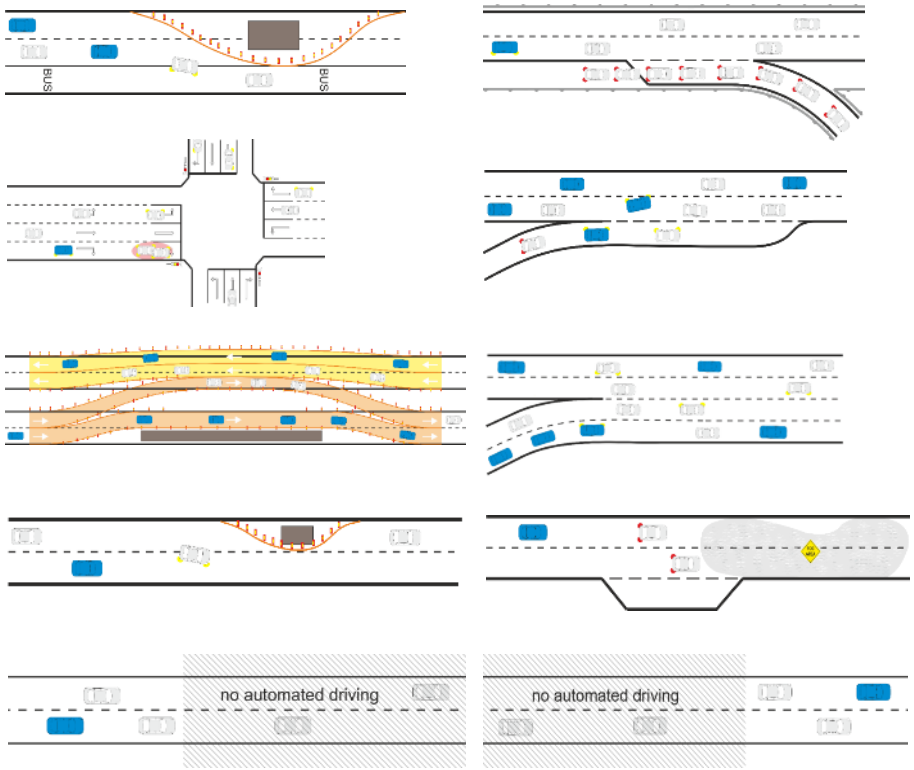
- **Sense** and build environmental awareness
  - Situational support: provide relevant information (prevent)
    - E.g. digital map, objects/obstacles, (dynamic) regulations

- Ability to **plan** action(s)
  - Operational support: provide an (alternative) action (prevent)
    - E.g. path information, speed, headway, merge or lane advice

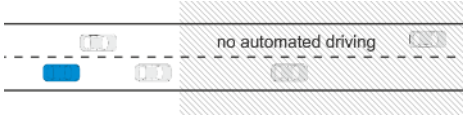
- Ability to perform **act**ion(s)
  - Tactical support: arrange favourable conditions (manage)
    - E.g. routing, orchestration, scheduling of ToC/MRM

TransAID services and use cases

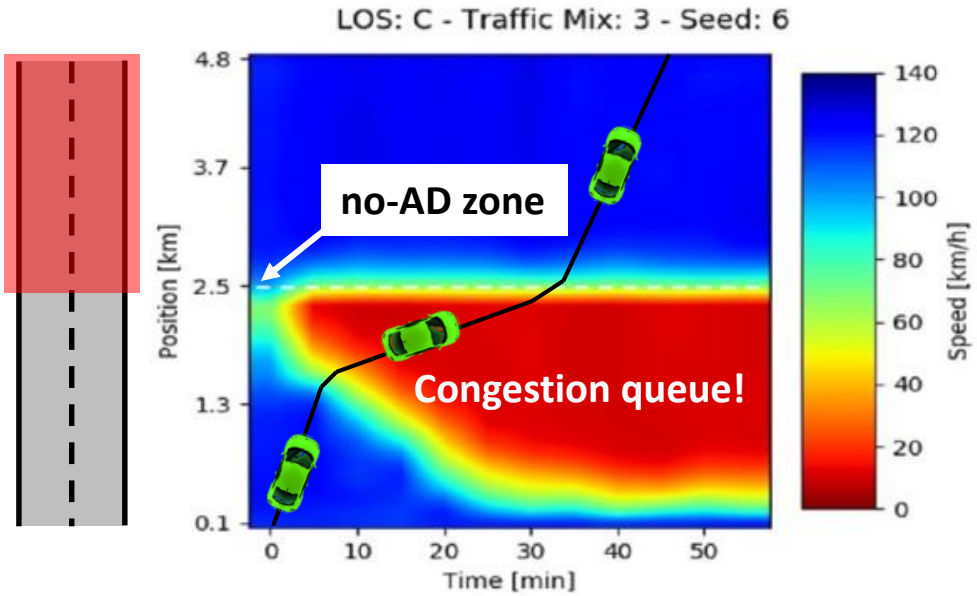
1. Provide vehicle path information.
2. Provide speed, headway and/or lane advice.
3. Traffic separation.
4. Guidance to safe spot.
5. Orchestration, distribution and scheduling.



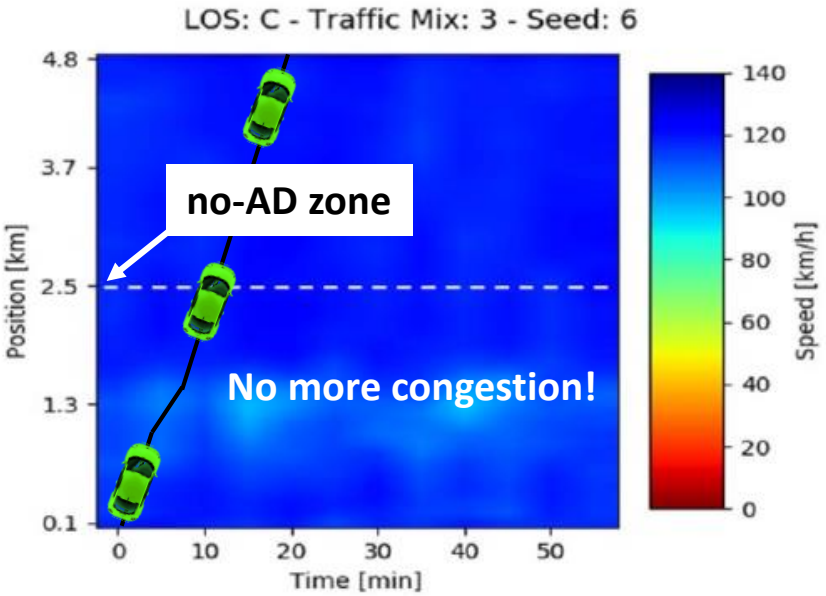
Example use case 5.1 (Distribute the TORs within a dedicated TOR area)



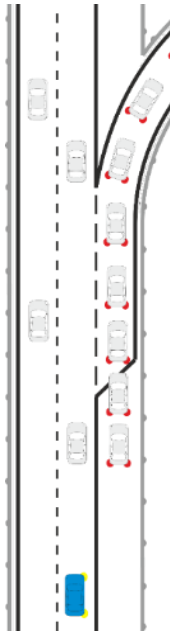
Without traffic management



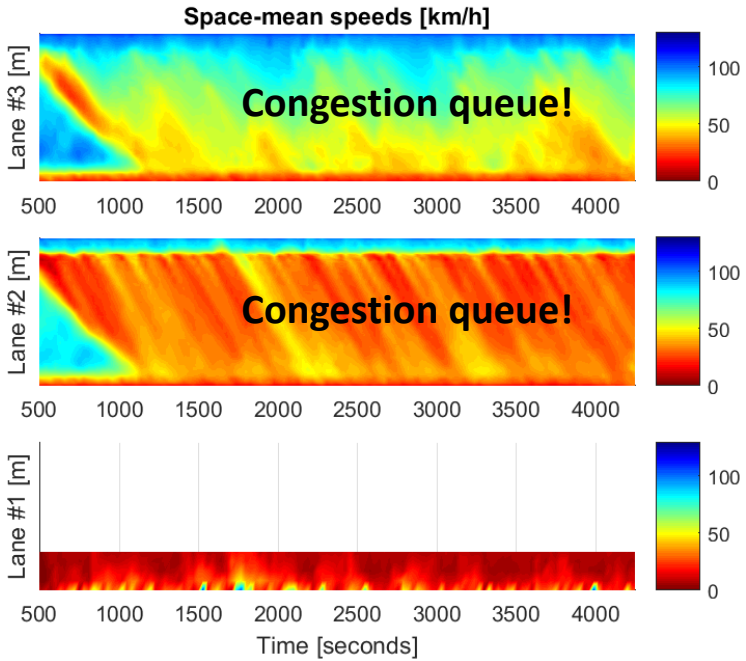
With traffic management



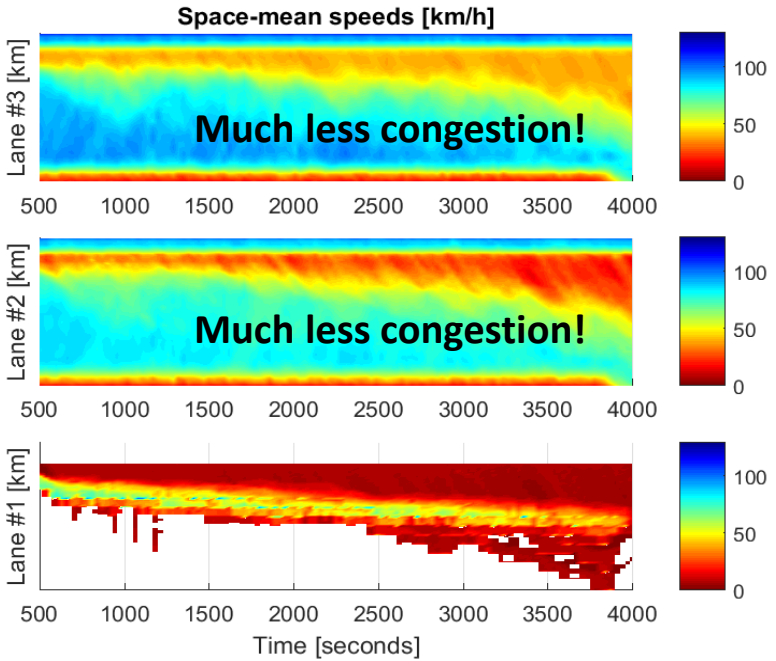
Example use case 1.3 (queue spillback at motorway exit ramp)



Without traffic management

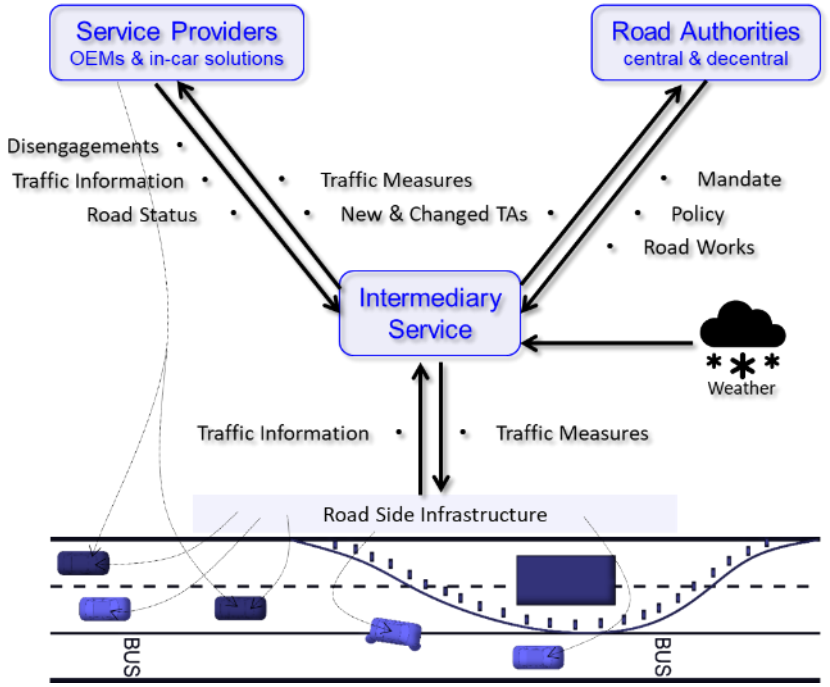


With traffic management



Intermediary service

- Connecting RAs and OEMs cooperate by linking *traffic management* and *fleet management*:
  - Generate trust
  - Create understanding
  - Align measures (space, time, type)
- Single point of access, possibly mandated by both RAs and OEMs.
- Apply across road authority borders (incl. those without a TMC).



Remote monitoring & control centres

- For the foreseeable future, safe and comfortable L4 autonomous mobility applications in mixed traffic (i.e. without steward or fall-back on board), will rely on a **remote supervisory services**:

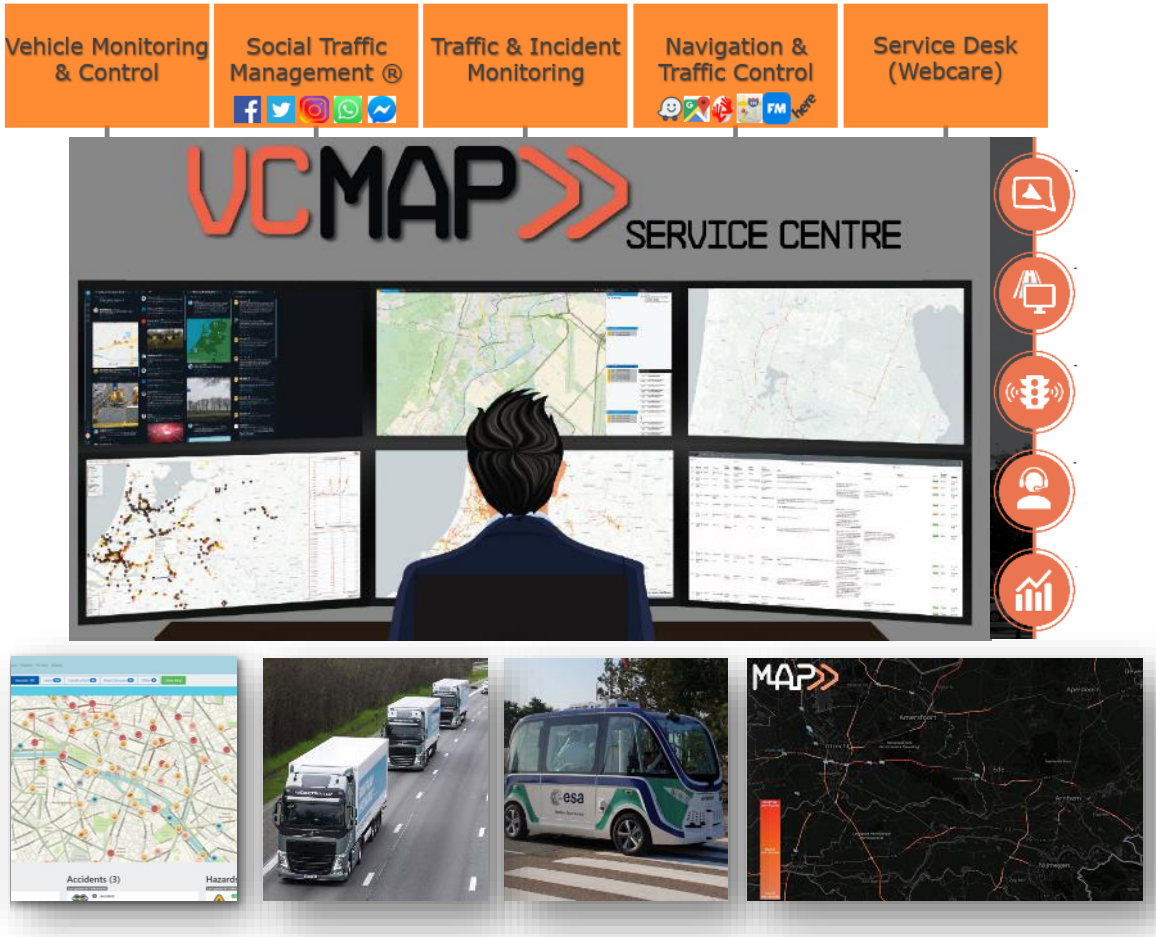
Functional (safety), telemetry, technical surveillance	Service scheduling, vehicle dispatch & routing	Support the sense-plan-act stages of the ADS	Status of network traffic, road works and incidents

Infrastructure segment information and guidance	Facilitate stakeholder interaction and manage clearance	1st and 2nd line help desk services & escalation protocols

- The presence of operators in a control room also contributes to the **public acceptance** of autonomous vehicles.

Vision

- Cross-domain service centre
- Integrating related operational processes
- Stakeholder intermediary
- (applied) University-level operators
- Multi-brand, multi-application, anywhere
- ISO certified
- Scalable



Thank you for listening!

Dr. Jaap Vreeswijk
MAP traffic management (MAPtm)
jaap.vreeswijk@maptm.nl

www.transaid.eu
@transaid_h2020
www.linkedin.com/groups/13562830/
www.facebook.com/transaidh2020/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723390