Towards Continuous External Assistance of Automated Mobility

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MAP traffic management (MAPtm)
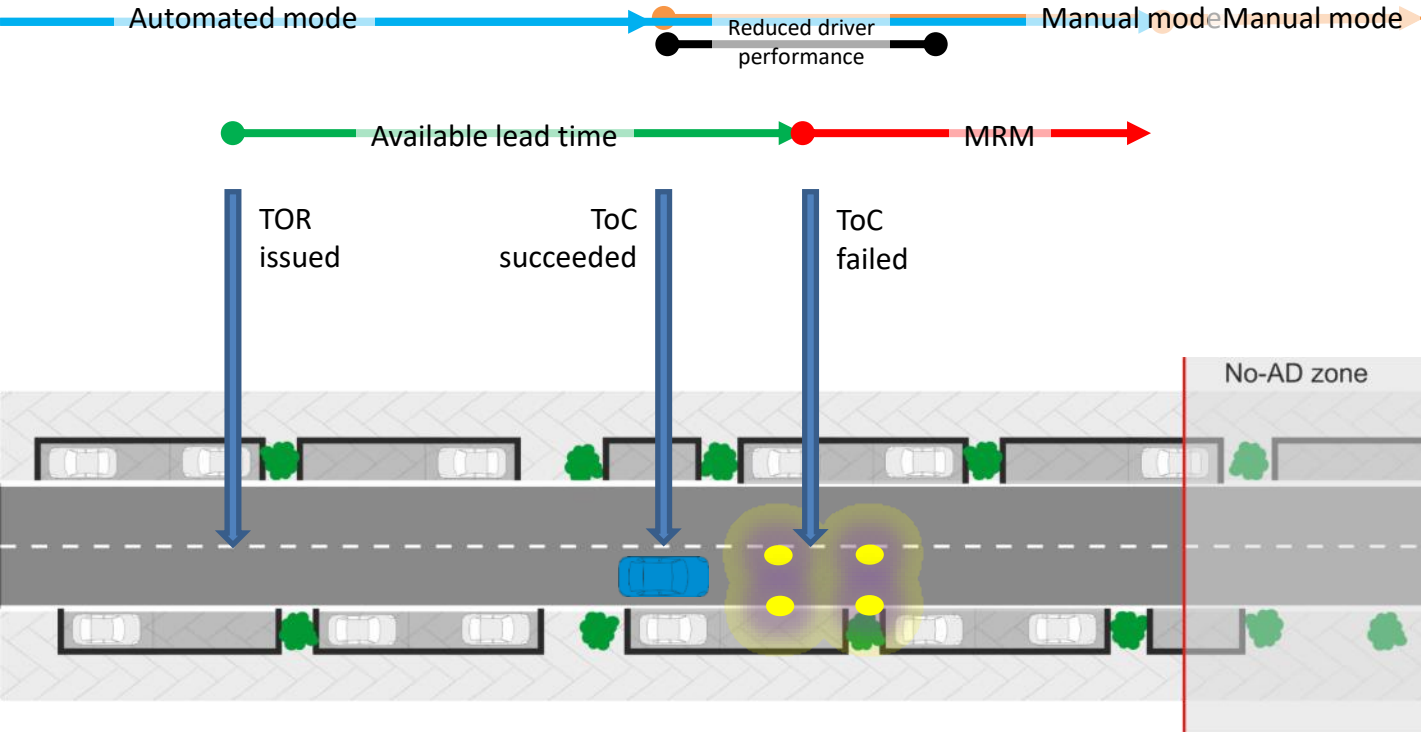

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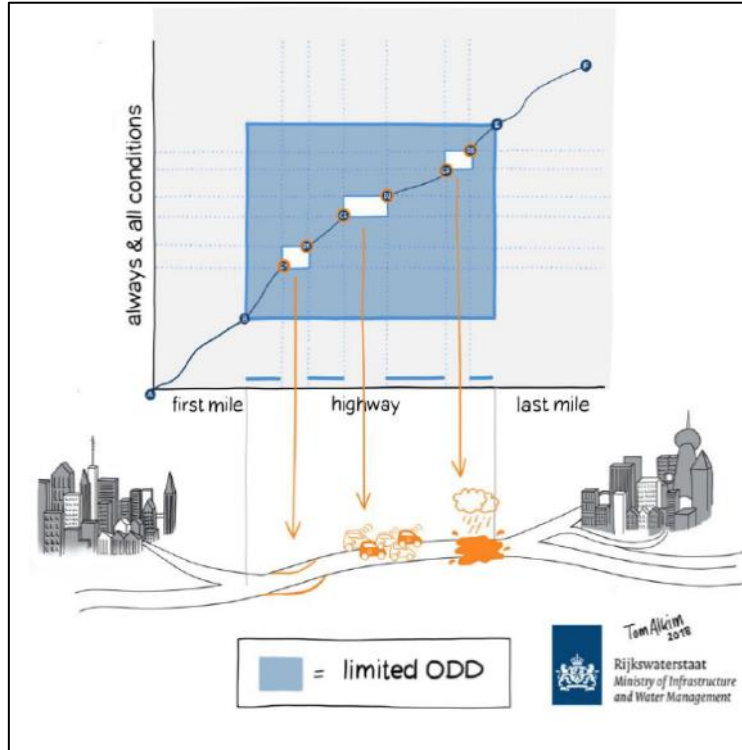www.facebook.com/transaidh2020/

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
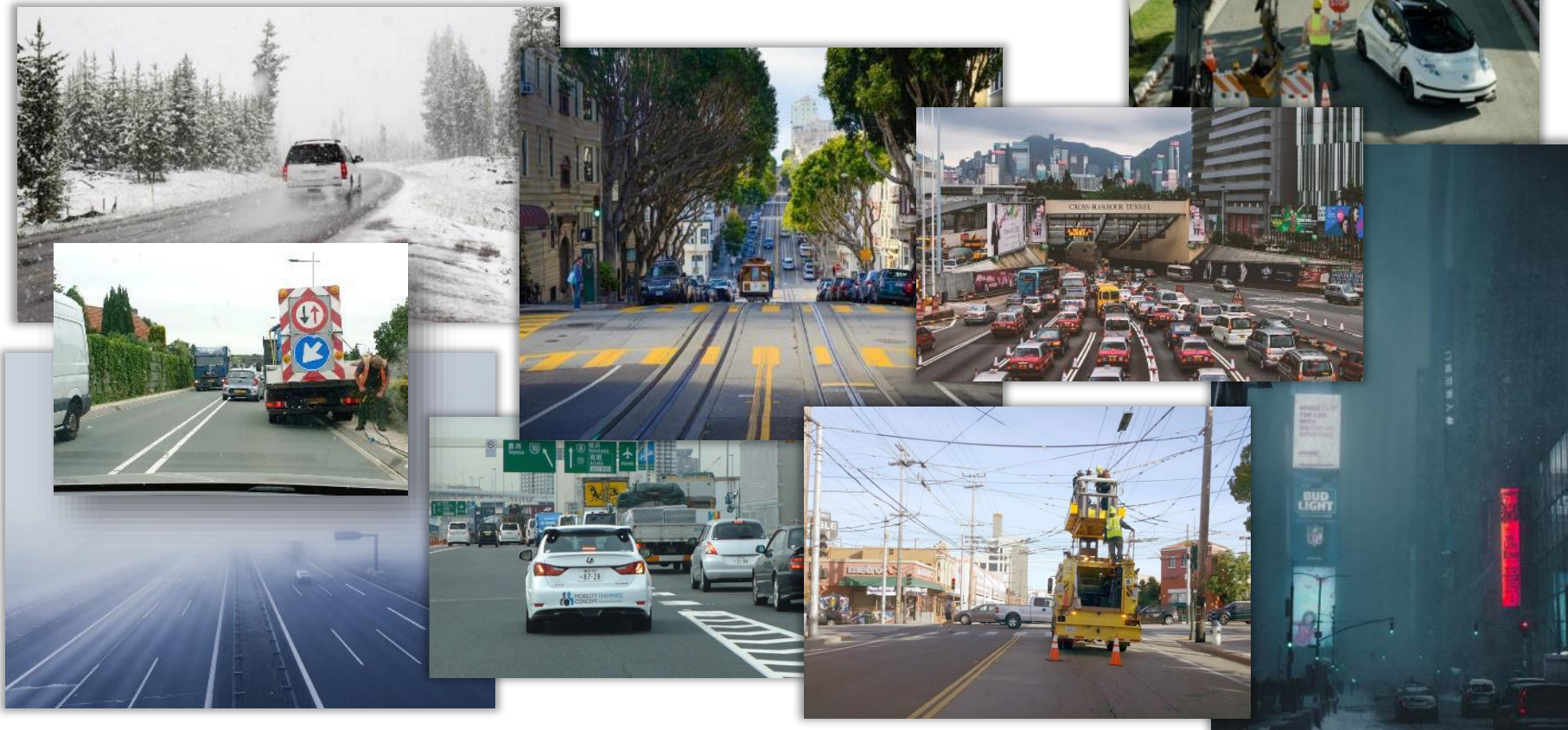
Question

What do you expect a CAV will do in case of a Minimum Risk Manoeuvre?
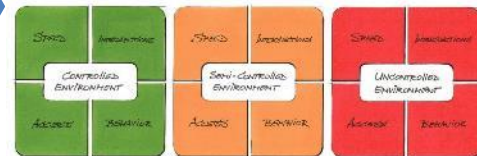
- Drive carefully
- Execute a diversion
- Stop in lane
- Park at safe harbour
- Other

Vehice AD functions & capabilities

Geo-Area / Operational Domain
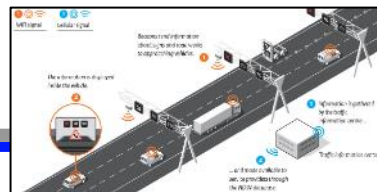
Road environment (access, intersections, behaviour)

Vehicle / System operational performance

Situational / environmental conditions

Physical infrastructure measures

Digital infrastructure measures

SAE J3016™ LEVELS OF DRIVING AUTOMATION

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.

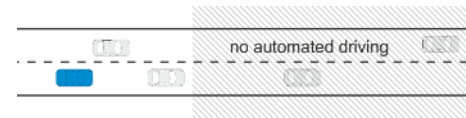5. Orchestration, distribution and scheduling.
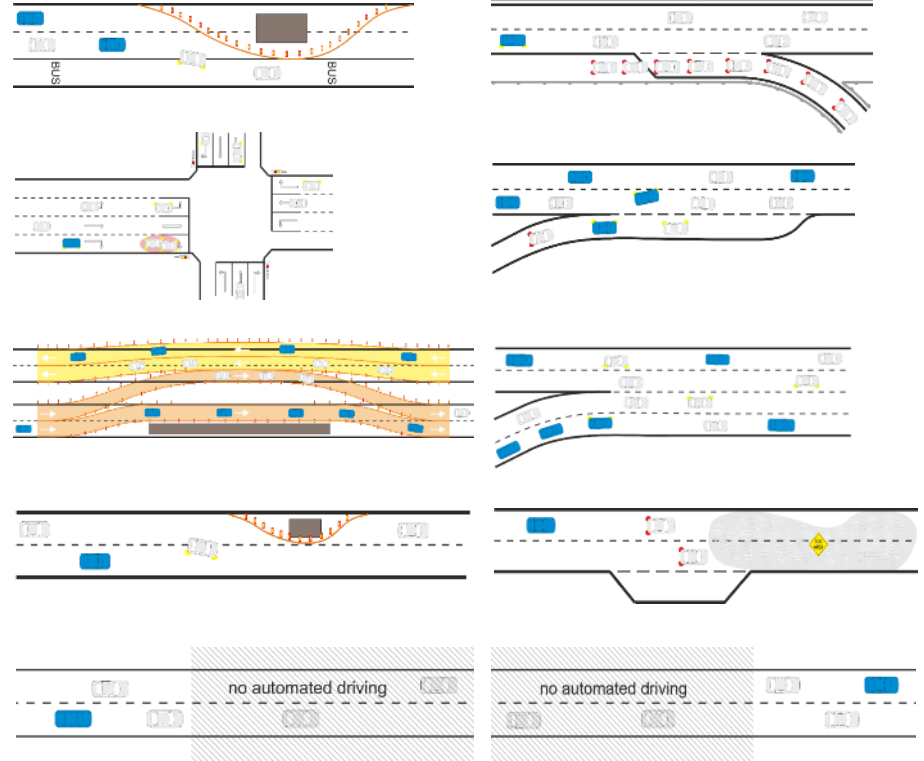
Question

Which TransAID service for infrastructure-assisted driving do you consider to be most realistic?

- Provide vehicle path information
- Provide speed, headway and/or lane advice
- Traffic separation
- Guidance to safe spot
- Orchestration, distribution and scheduling

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

Without traffic management

With traffic management

LOS: C - Traffic Mix: 3 - Seed: 6

no-AD zone

Congestion queue!

LOS: C - Traffic Mix: 3 - Seed: 6

no-AD zone

No more congestion!
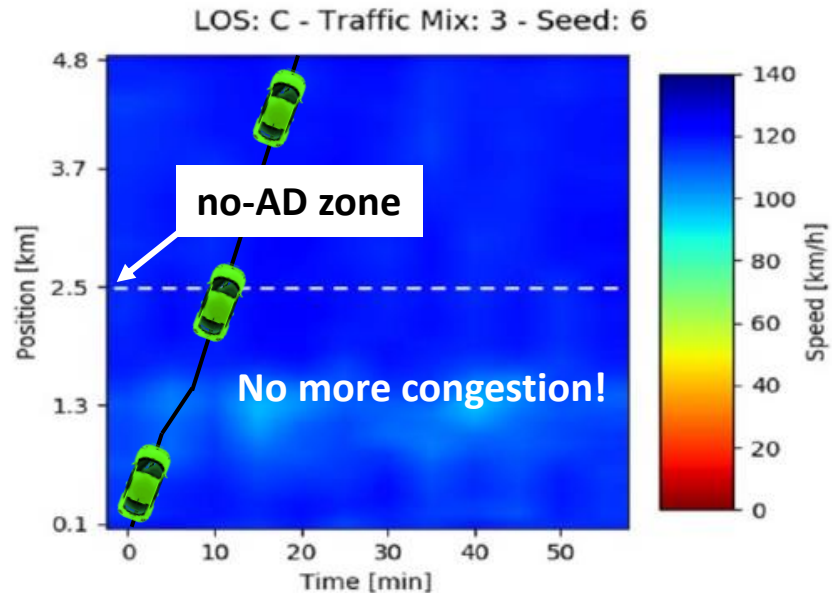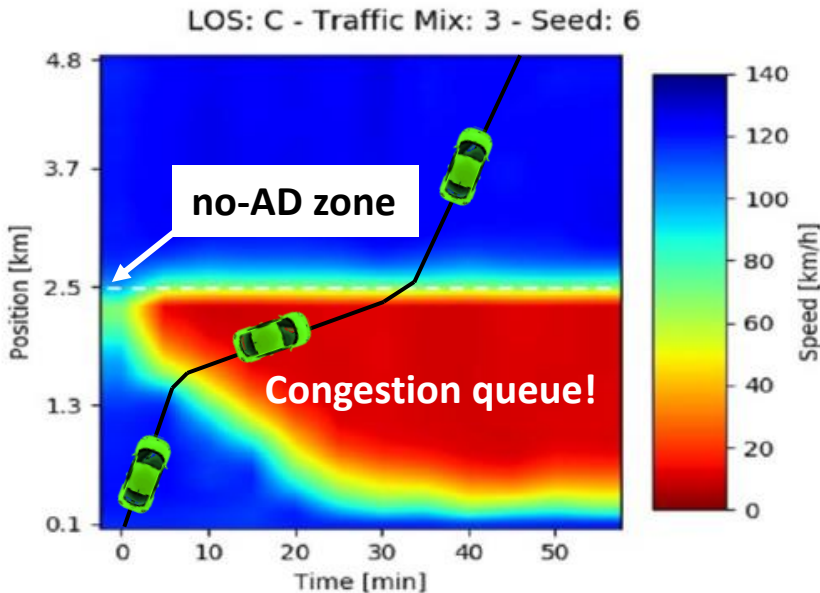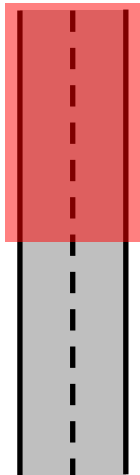
Example use case 1.3 (queue spillback at motorway exit ramp)

Without traffic management
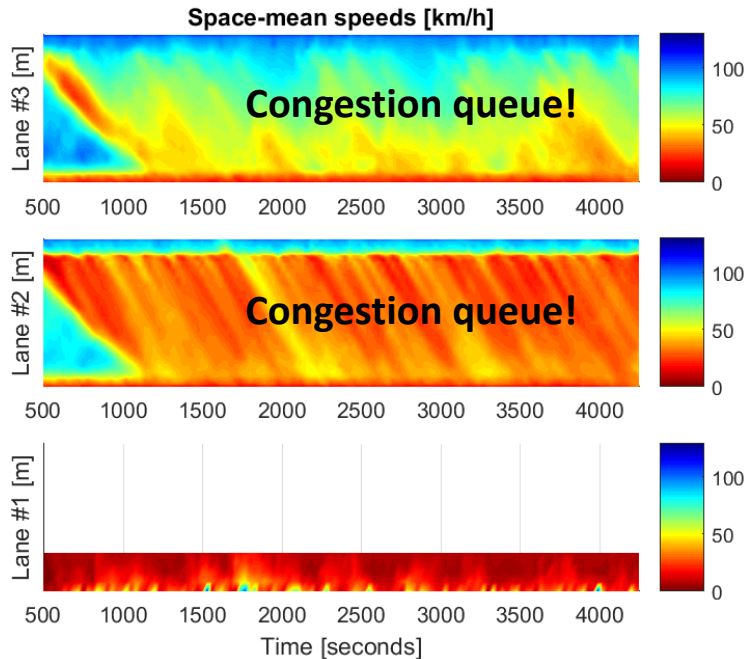
With traffic management

Intermediary service

- Connecting RAs and OEMs cooperate by linking *traffic management* and *fleet management*:
  - Generate trust
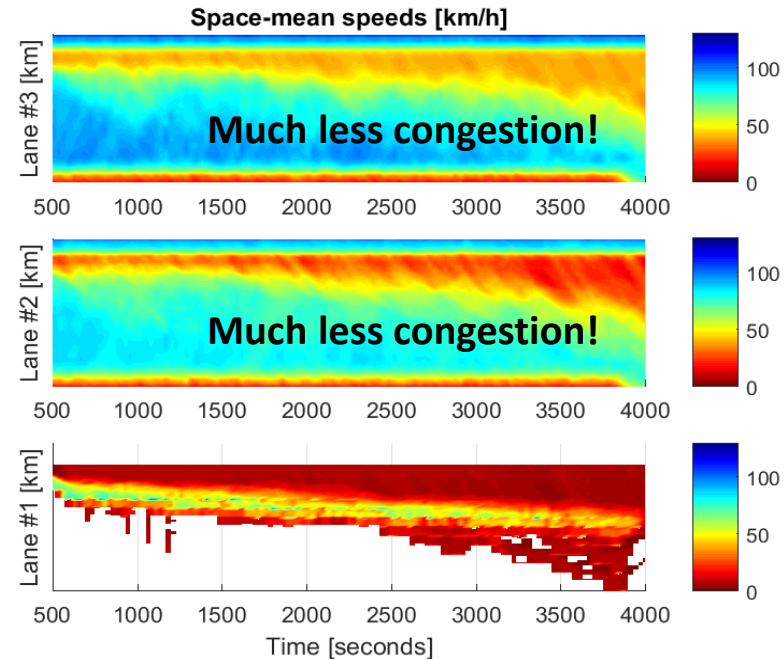 - Create understanding
  - Align measures (space, time, type)

- Single point of access, possibly mandated by both RAs and OEMs.

- Apply across road authority borders (incl. those without a TMC).

Service Providers
OEMs & in-car solutions

Road Authorities
central & decentral

Disengagements
Traffic Information
Road Status

Traffic Measures
New & Changed TAs

Mandate
Policy
Road Works

Intermediary Service

Weather

Traffic Information · · Traffic Measures

Road Side Infrastructure

BUS   BUS
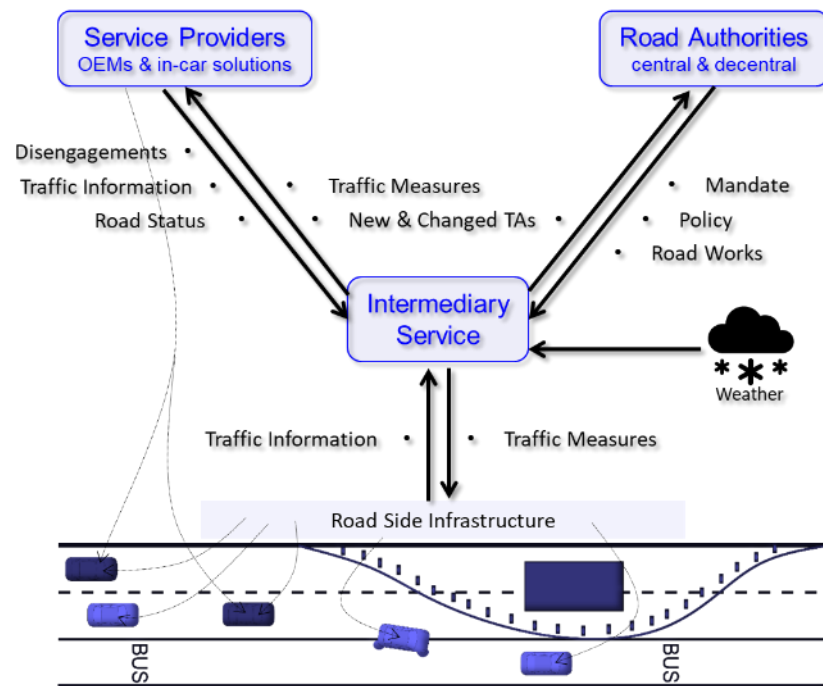
Remote monitoring & control centres

- 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.

TransAID

Vision

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

Question

What do you expect of remote control?

- Extended environmental awareness
- Mission management
- Autopilot assistance
- Remote driving
- Other

Question

Remote monitoring and control centres should be owned and operated by:

- Vehicle manufacturers
- Fleet owners
- Road authorities
- Qualified entity
- Other

Thank you for listening!

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