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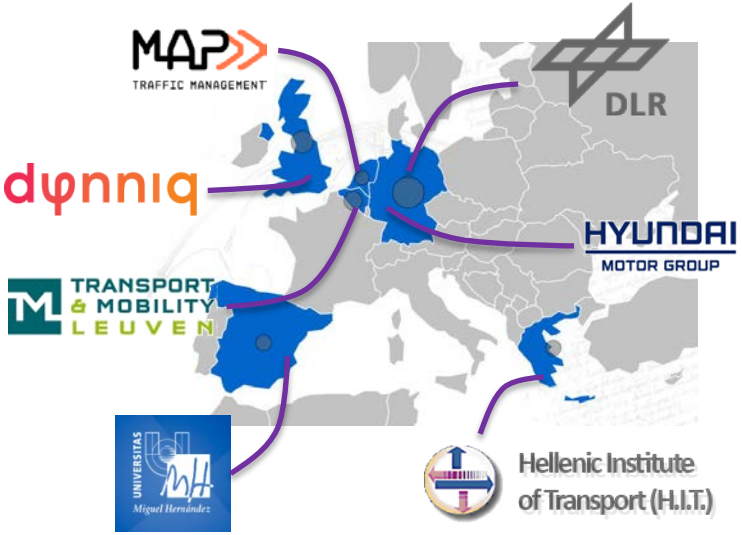
TransAID – Effects of Transitions Related to Highly Automated Driving on Traffic Systems

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

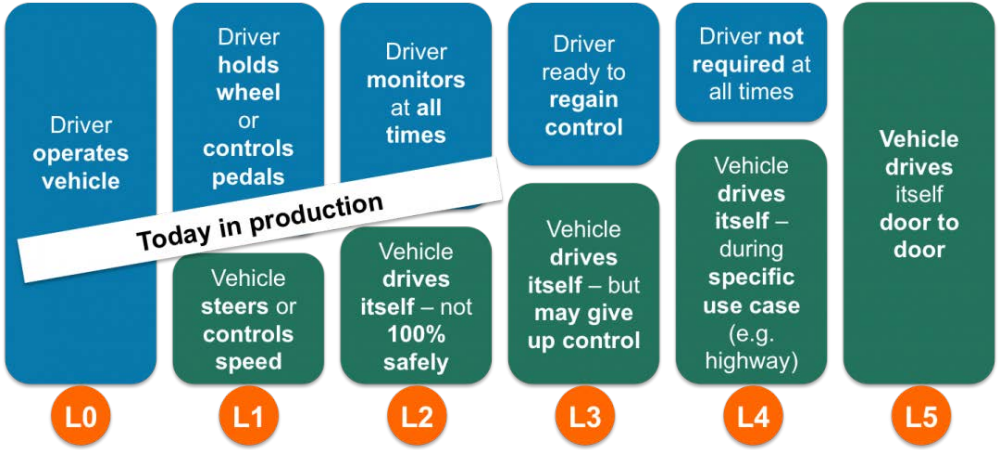
Project details

- ***Trans***ition ***A***reas for ***I***nfrastructure-Assisted ***D***riving
- 7 partners from 6 European countries (technology providers, automotive industry, academia, research)
- 12 associated partners
- Coordinator: Julian Schindler, DLR (julian.schindler@dlr.de)
- Start: September 2017 (36M)
- Budget: 3.8 M€



Automated Driving

- Automated driving reaches the market
- Vehicle systems able to drive in SAE level 3 are now reaching series production



Source: Six levels of automation. Videantis.
http://www.videantis.com/what-are-all-these-automotive-cameras-doing.html

Source: Audi

System Limits

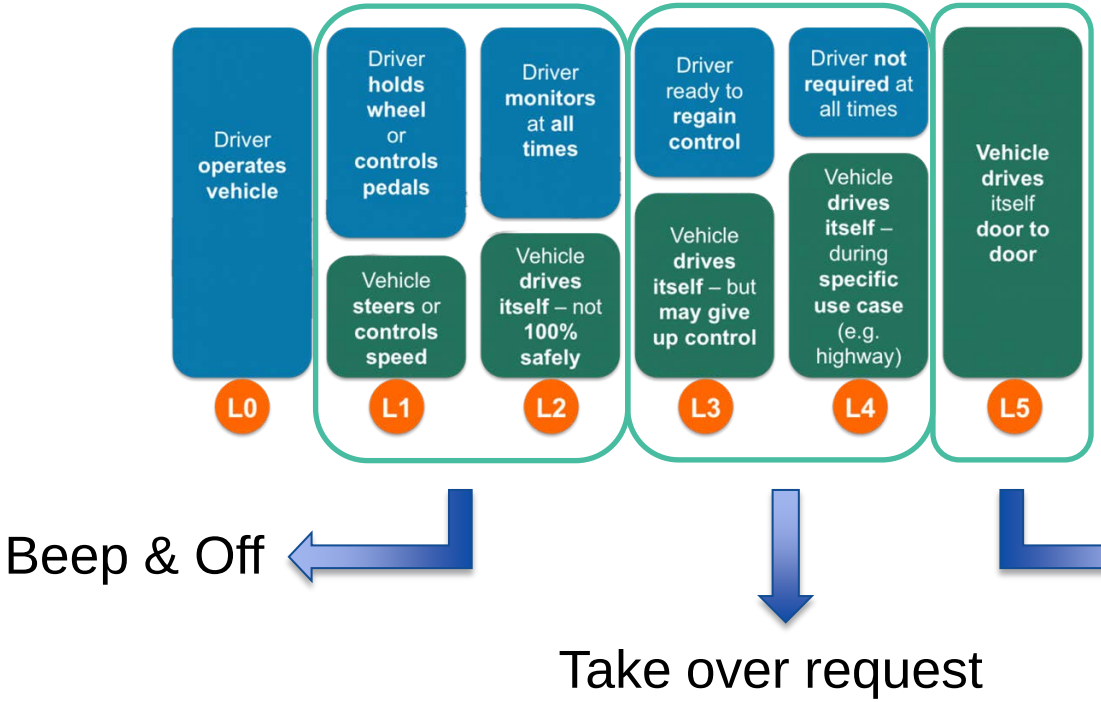
- Independent of the SAE level, there will be situations where the system reaches its limit
  - Reaching end of supported use case/area
  - Hardware or software failure
  - Situation not understood
  - Required action not possible
  - Required action not allowed
  - Required action not allowed without confirmation

…

Source: NDR

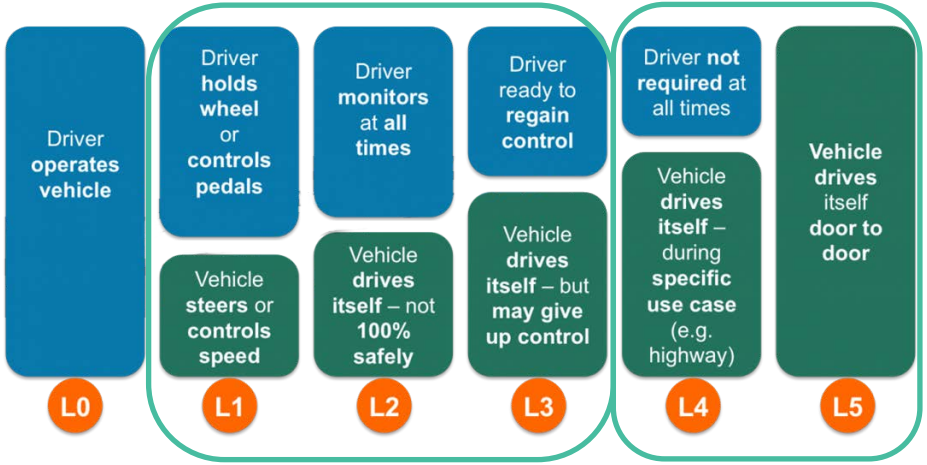
Source: KenoshaNews

Transition of Control to the “Driver”



- Steering wheel existing?
- Pedals?
- Other control device?
- Passengers able to drive?

Driver does not take over control…



Uncontrolled!

Reach safe state

➔ "Graceful Exit"

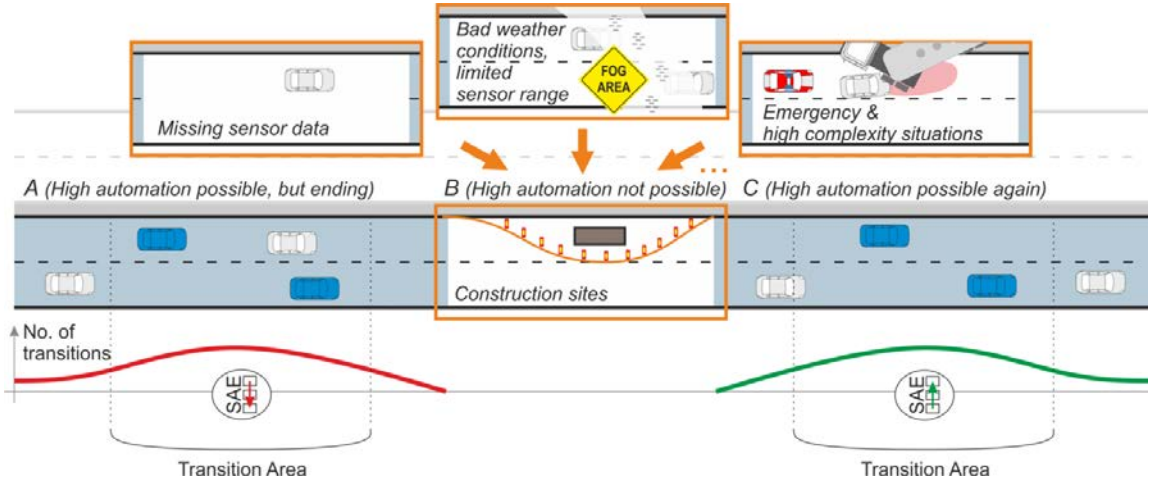
➔ Minimum Risk Maneuver

- Stopping
- Emergency lights
- Go to emergency lane

TransAID Research Questions

What happens…

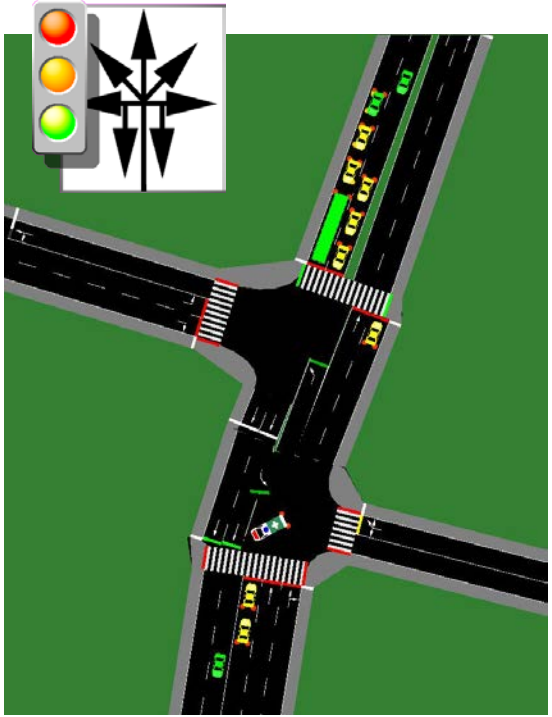
- …if always happening on the same spot?
- …if penetration rate of systems increases?



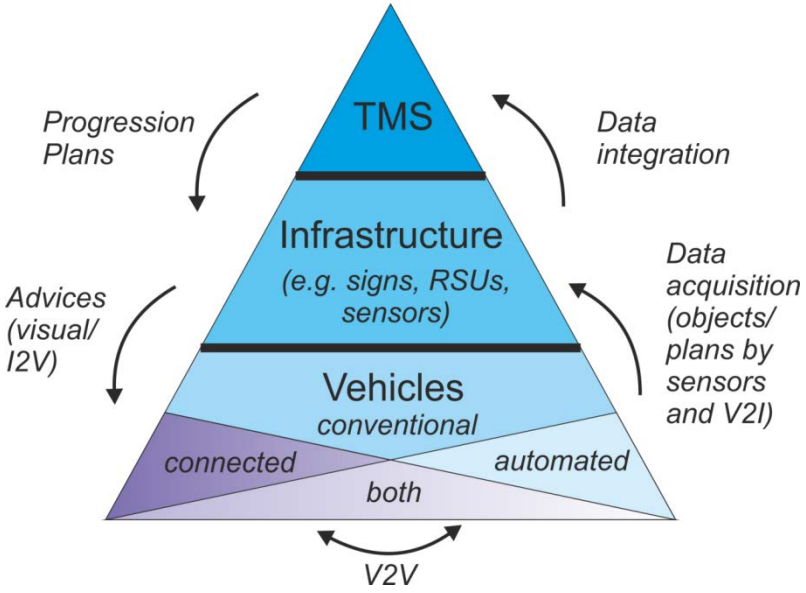
Baseline Simulations

- Modelling of automated vehicles‘ behavior
- Different SAE levels
- Different Minimum Risk Maneuvers
- Different penetration rates of each system
- Different road topologies

→ Leads to rough ideas of possible future problems



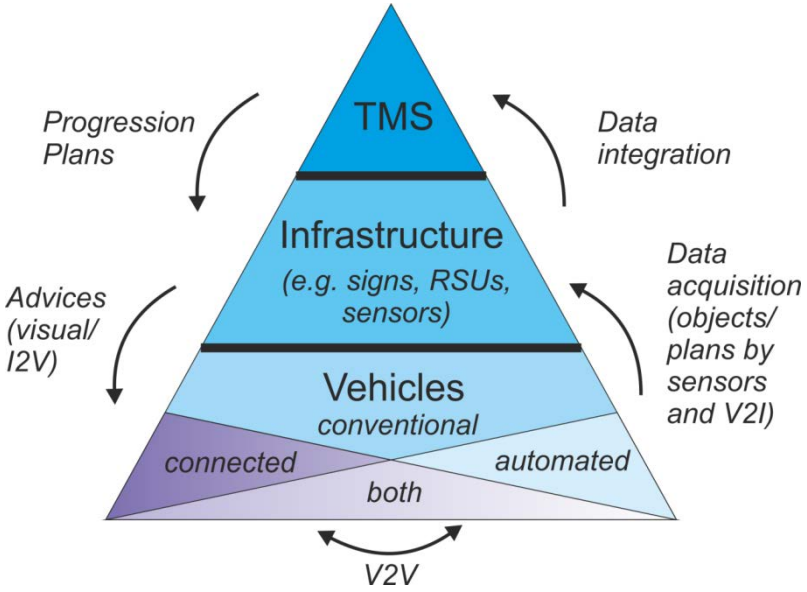
Finding solutions: Hierarchical Traffic Management



Development of Traffic Management Measures

- For the transition performing connected automated vehicle:
  - Early advises
  - Advising stopping areas
  - Advising maneuvers
  - Maximizing safety

- For the others:
  - How to avoid problems
  - Maximizing safety and efficiency
  - Individual (V2X) vs. general advices (Traffic lights, Variable Message Signs)



Example Use Cases

Vehicle sensor capabilites?

Infrastructure sensor capabilities?

Vehicle communication capabilites?

Infrastructure communication capabilities?

Vehicle system capabilities?

Traffic lights?

TMS capabilities?

Available time to transition of control?

Variable Message Signs?

Number of Lanes?

Vehicles around?

Special Minimum Risk Area available?

Penetration rate of different systems?

TransAID Procedure

Baseline Simulations

Development of Traffic Management Measures

V2X message sets for connected vehicles

Signalling to conventional vehicles

Vehicle automation development

System Simulation

Feasibility assessment in real world

Interaction with Stakeholders

Your input is very much appreciated!

OEMs

Cities

…

Road Authorities

Infrastructure Providers

Thanks for your attention!

transaid.eu

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Traffic simulation
SUMO:
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Questions? Inputs?

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