Rijkswaterstaat
Ministry of Infrastructure and the Environment

What about the infrastructure

Smart Systems for the Automobile of the Future Brussels, 22-23 September 2016

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Agenda

- Lets automate!
- Vehicle – Driver – Road
- Looking into the systems
- Challenges
- Safety at stake
- Developments

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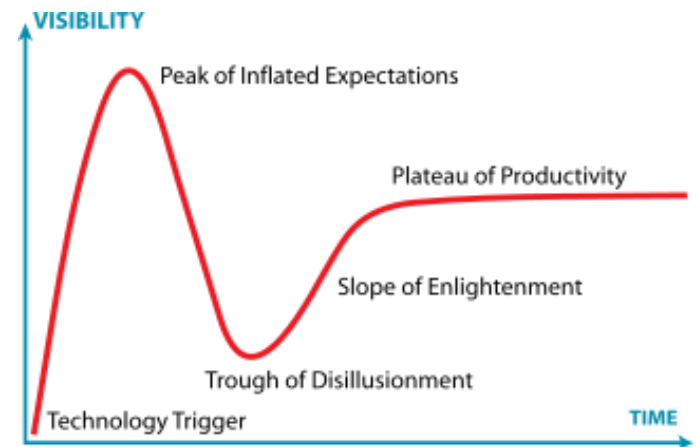# Everybody loves automated vehicles

Declaration of Amsterdam:

- Safer
- Cleaner
- Easier

Strengthen the economy of Europe

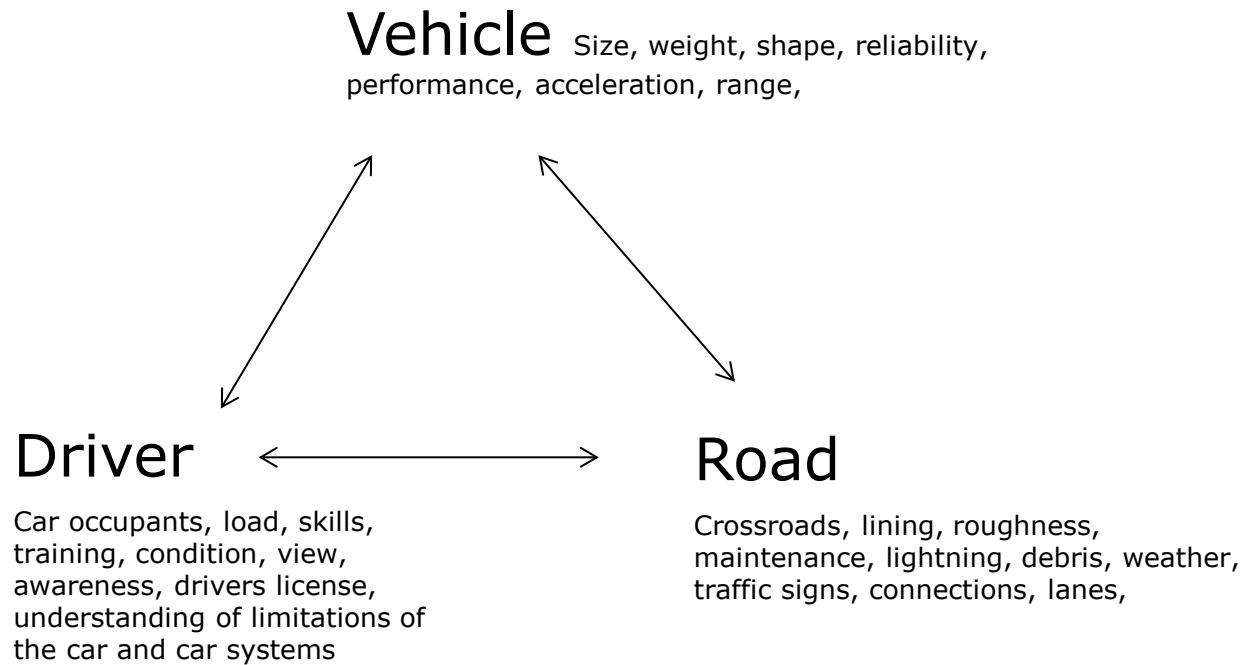*Remove barrieres, legal consistency, learning by experience*

In practice every country sees it self as guide for the others.

Other reason: empty road?

Vehicle – driver - road

Vehicle Size, weight, shape, reliability, performance, acceleration, range,

Driver

Car occupants, load, skills, training, condition, view, awareness, drivers license, understanding of limitations of the car and car systems

Road

Crossroads, lining, roughness, maintenance, lightning, debris, weather, traffic signs, connections, lanes,

Vehicle - Assistance systems

Main question:
What does the car (or system) see?

Lateral assistance

- Visibility : quality of road markings, weather
- Road works: temporarily lining
- Meaning : different use of lane markings across Europe
- Does the system know when it is not seeing thus not working as expected

What can be expected from the road authority of the user?

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Vehicle Assistance systems

Main question:
What does the car (or system) see?

Lateral assistance
*   Blind spot: very fast vehicles and small vehicles might not be recognised in time

Questions?
Under what circumstances can the driver expect the system to work?
What is fast or small?
Who is at risk?
Who defines the minimum shape?

Vehicle Assistance systems

Main question: What does the car (or system) see?

Longitudinal assistance:

ACC (Adaptive Cruise Control),

FVCMS (Forward Vehicle Collision Mitigation),

SRB (Speed Reduction Braking)

MB (Mitigating Braking) operating range 30KM/u, - 100km/u

Limitations: Target vehicle: Travelling minimum 30km/u,

Width target vehicle: 1,4 meter, lateral displacement: 0,5m

Questions

What can the driver know on system limitations?

Who is at risk?

Vehicle Assistance systems

Main conclusions:

Specifications of when the systems will work are largely unknown to the driver

Road operator and other users are fully unaware of the limitations of these systems.

Expectations":

The user of these systems will get used to the system working correctly, he cannot judge when it run into its limitations

The user will get "lazy" and inattentive.

The combination of systems will increase this effect.

Obstacle recognition

VIDEO · BY GUY BIRCHALL | 15th September 2016, 9:46 am

THIS footage captured the horrifying moment a driver died when his Tesla smashed into a road sweeper on autopilot.

Dealing with temporally signs

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Challenges for automated vehicles : debris

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Maps, road side information

Issues:

- Detailed maps for automated cars are not provided by road operator
- No direct link to communicate changes to the infrastructure
- Information on debris, weather, incidents, road works, road blocks

Conclusion (1): automation is far from easy

Safety of car users, other road users, and road workers is at stake

Needed
- More openness from industry on the working conditions of the in-car systems
- Awareness among drivers on limitations of assistance systems
- Required training or licencing drivers
- Temporally approval of assistance systems

Conclusions (2)

Needed :

- New forms of cooperation with map providers
- EDR: to learn from accidents open unhindered access for investigation
- Road side communication: urgently required, with more and more sensor equipped cars

Idea's:

- Definition of minimum service level (fi controlled road) could help
  - Smart road: a road that monitors the users, detect abnormalities and warns the drivers of debris, broken down cars, traffic jams, animals, people on the road.
- Changes to infrastructure to facilitate new developments could be needed

Example of a smart road

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Changing to the infra structure?

Getting the driver back in the loop, possible consequences for infrastructure design, Example Gothenburg Sweden.
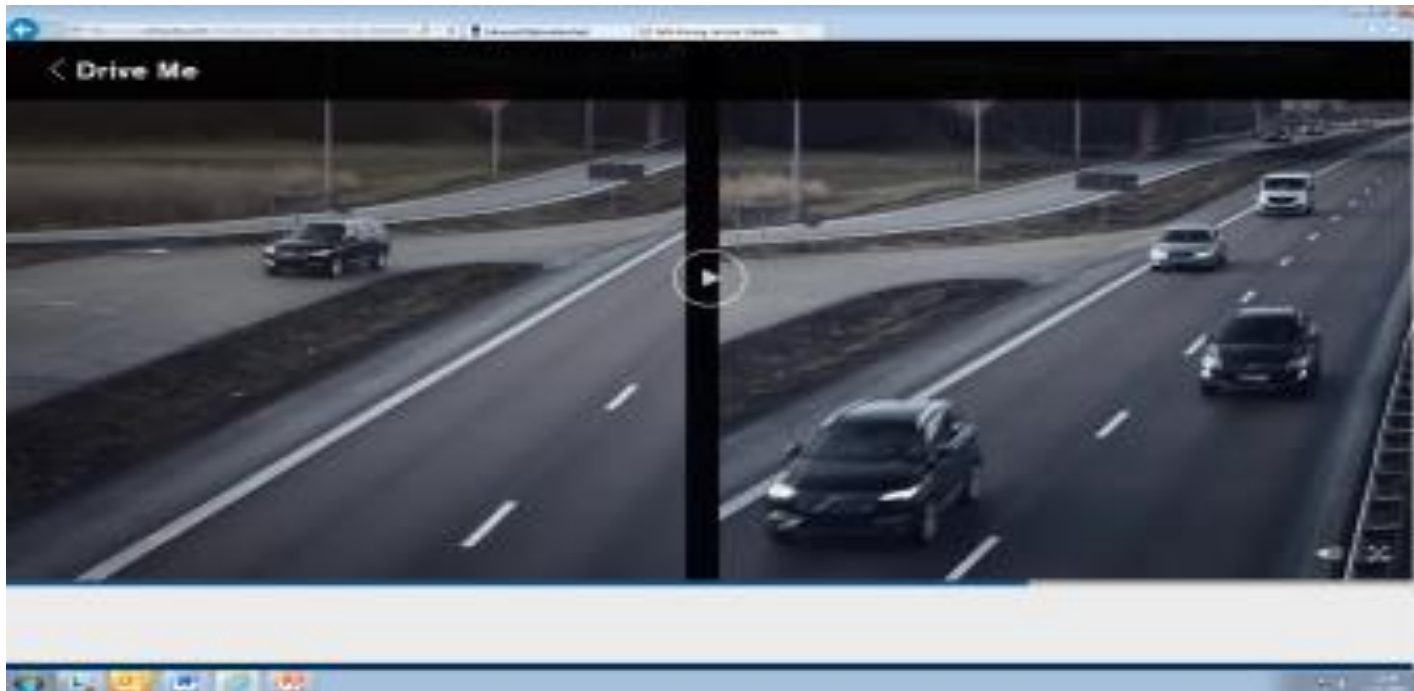
Finally

Realistic expectations, addressing the need for a dialogue between road operator and vehicle developers

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Thanks for your attention,
Questions?
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