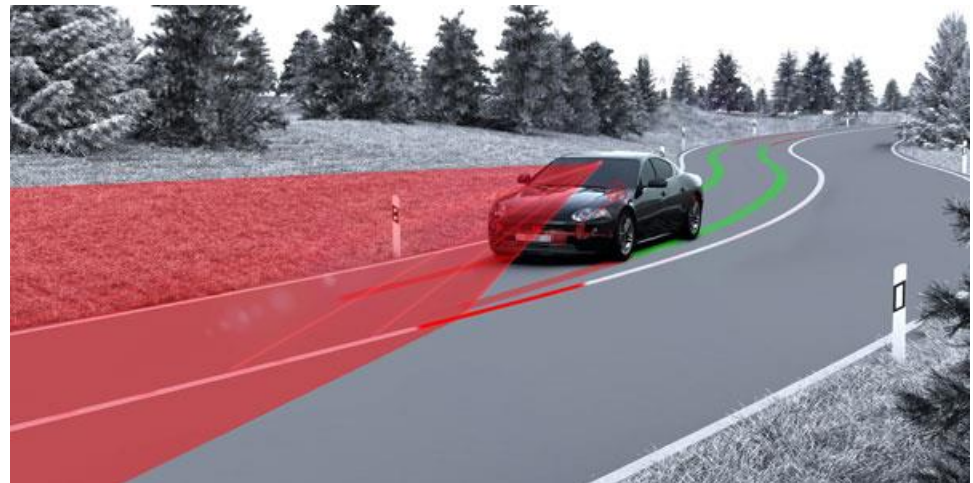
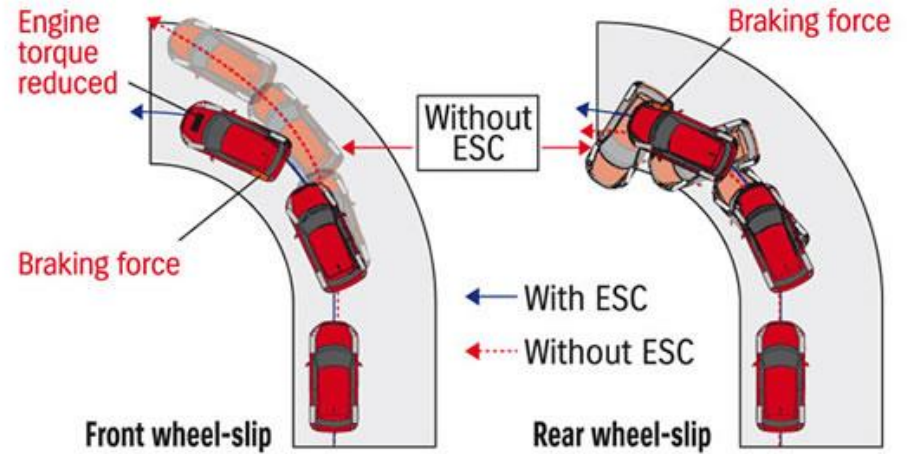
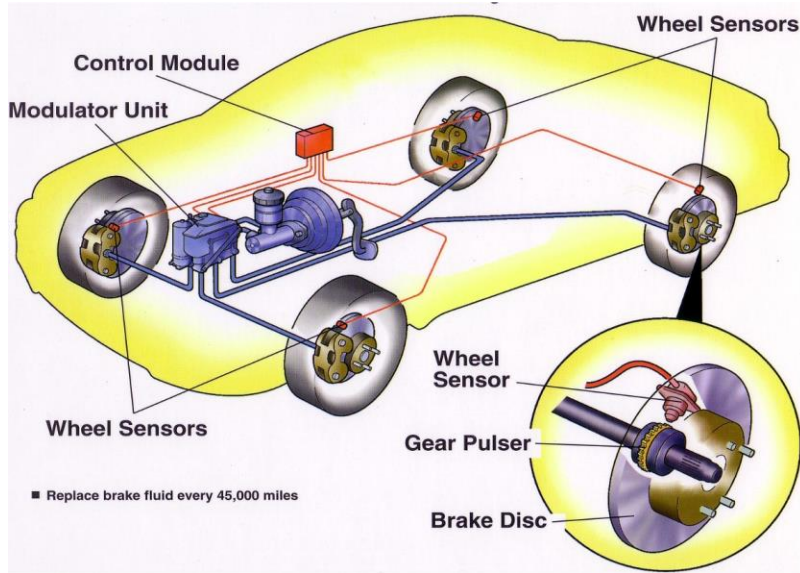


Prioritising the Safety Potential of Automated Driving


From Automated Driving...



...to Autonomous Driving



Levels of Driving Automation

	SAE Level	Name	Steering, acceleration, deceleration	Monitoring driving environment	Fallback performance of dynamic driving task	System capability (driving modes)
Human monitors environment	0	No automation the full-time performance by the human driver of all aspects of the dynamic driving task, even when enhanced by warning or intervention systems				
	1	Driver assistance the driving mode-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the dynamic driving task.				Some driving modes
	2	Partial automation the driving mode-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the dynamic driving task				Some driving modes
Car monitors environment	3	Conditional automation the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task with the expectation that the human driver will respond appropriately to a request to intervene				Some driving modes
	4	High automation the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task, even if a human driver does not respond appropriately to a request to intervene				Some driving modes
	5	Full automation the full-time performance by an automated driving system of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver				All driving modes

Source: Adapted from SAE Standard J3016 (SAE, 2014).

Regulatory framework: 1968 Vienna Convention



EU Regulatory Framework

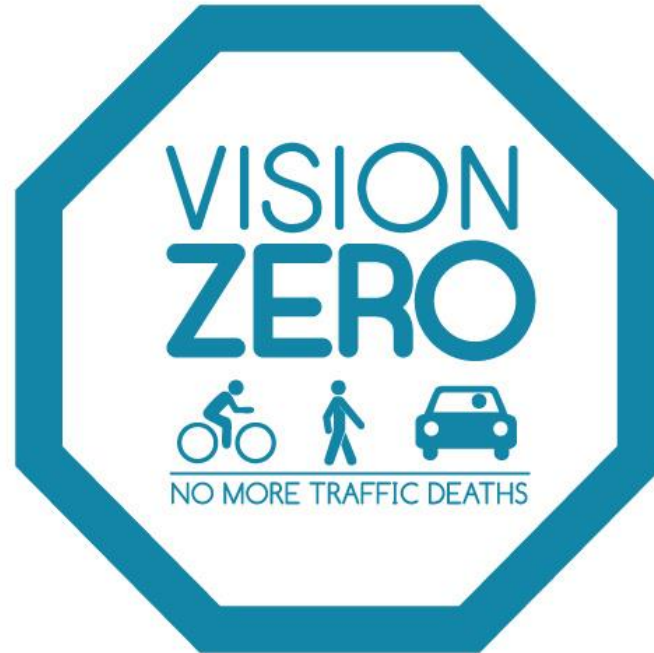
- Gear 2030 and Roadmap
- EU Vehicle Safety Regulations
- Motor Insurance Directive
- ITS Directive
- Infrastructure Safety Directive
- Data Protection Directives
- Others...?

A Driving Test for Automated Vehicles



Potential safety benefits

1) Reaching Vision Zero in 2050?



ERTRAC: « safety and the potential to reduce accidents caused by human error » is one of the main drivers for higher levels of automated driving

2) Less Chance for Human Error



3) High Risk Group Support?



Changes to Driver training
will be needed

Potential safety challenges

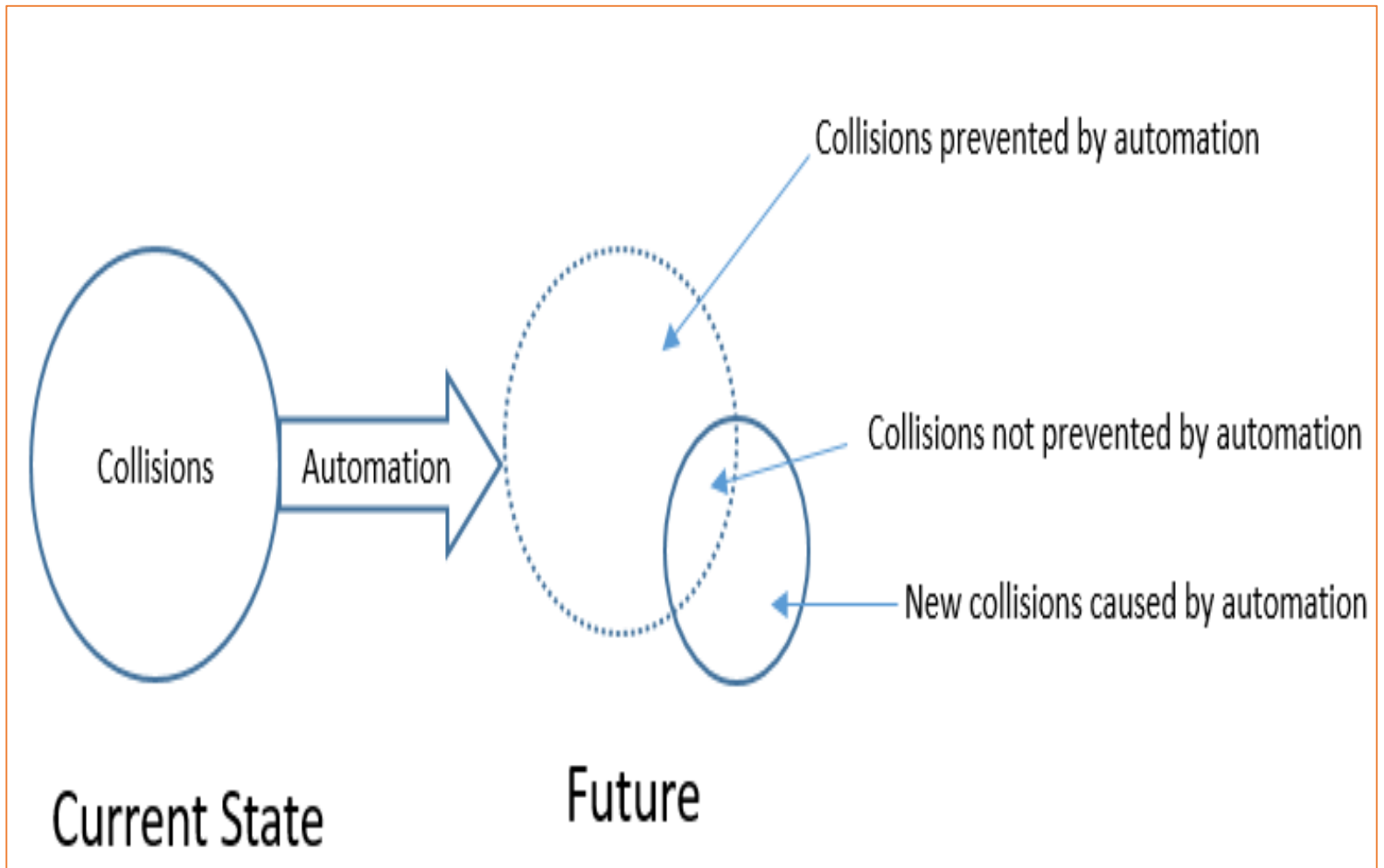
Evidence of Safety benefits?

- “Self-driving vehicles were involved in more crashes per million miles travelled than conventional vehicles.”* Sivak, University of Michigan (2015)
- “Self-driving cars were involved in fewer crashes than normal cars especially for more severe crashes.” Blanco Virginia Tech (for google)

We need more research especially in real-world driving

We need full openness and transparency in disclosing collision data

New Collision Types?



Automated vs. Non-Automated

- Safety impacts during the transitional phase?



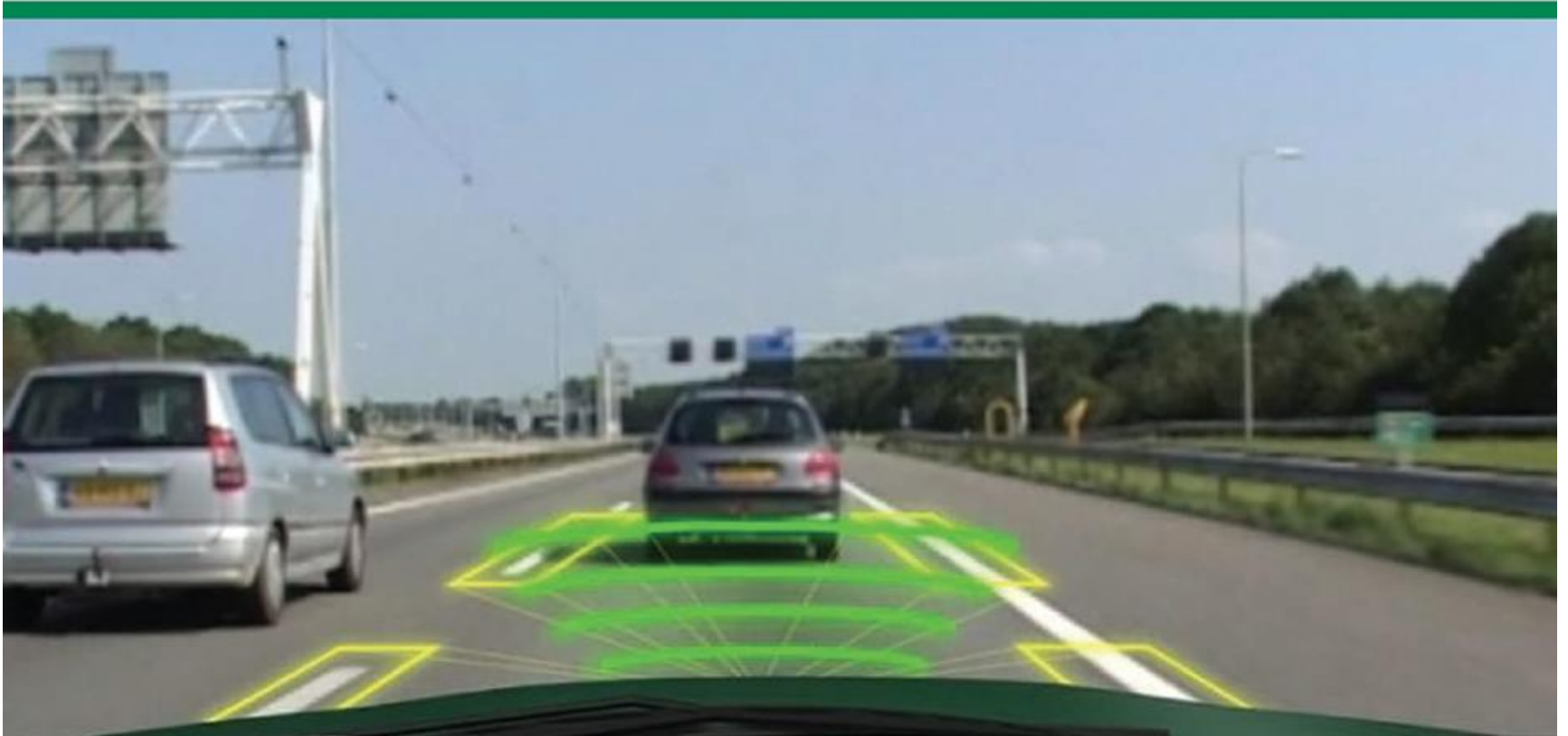
Automated and Unprotected Users



Infrastructure

ROADS THAT CARS CAN READ

A Consultation paper



Driver engagement and re-engagement

- Driver interaction with the vehicle should be standardised

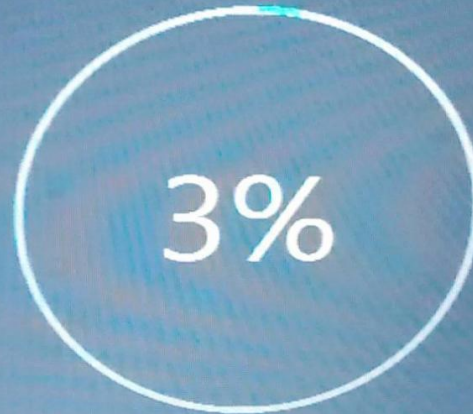


FOUR

QUESTIONS

Upgrading Windows

Your PC will restart several times. Sit back and relax.



Copying files 11%

Installing features and drivers

Configuring settings

FIRST QUESTION

**WHAT HAPPENS
IF THE SYSTEM
LETS US DOWN?**



SECOND QUESTION

**WHO SHALL
MAKE THE
(UN)ETHICAL
CHOICES?**





THIRD QUESTION

**HOW TO BUILD
TRUST?**



FOURTH QUESTION

**HOW TO
MAINTAIN
TRUST?**

- 1. What happens if the system lets us down?**
- 2. Who shall make the (un)ethical choices?**
- 3. How to build trust?**
- 4. How to maintain trust?**



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