TECHNICAL AND LEGAL CHALLENGES OF AUTOMATED DRIVING

AIDA BUDAPEST COLLOQUIUM 23.11.2018

DR. NICOLE LEIFELD

BOSCH

I – TECHNICAL CHALLENGES

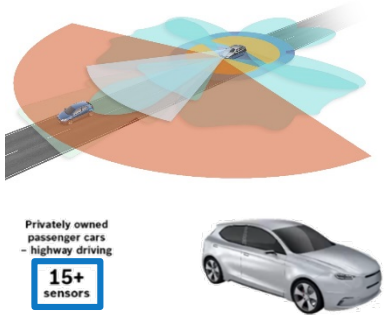
The Path to Automated Driving

Continual and complex challenges

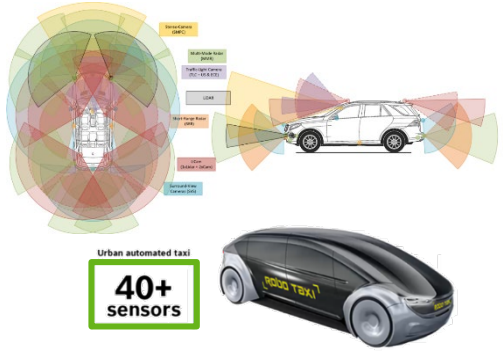
Sensor set: Powerful, performant and integrated

Link Tesla

Evolution (e.g. L3 Highway)



Revolution (e.g. L4 Urban)



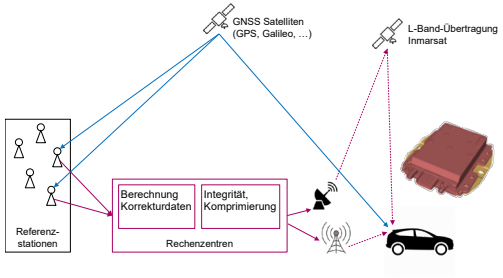
Validation and **verification**: Reliable release concept

Real-life validation

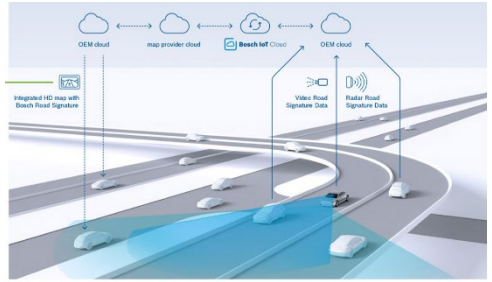
Virtual validation

Localization: Absolute and relative positioning

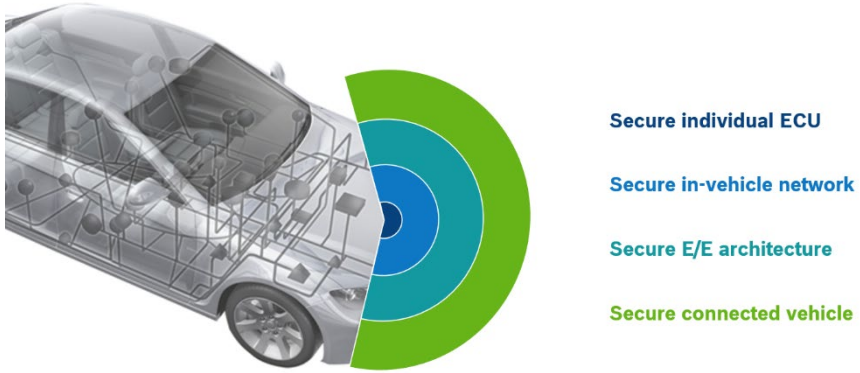
Absolute localization (GNSS signal)



Relative localization (Road signature map)



System security: Invincible and up-to-date



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The Path to Automated Driving

Demanding situations

TECHNICAL CHALLENGES

LED traffic lights

Reflections

Bridges and tunnels

Frontlighting

Interrupted structures

UNINTENDED USE

Monitoring of steering wheel touch

Monitoring of driver presence & attendance

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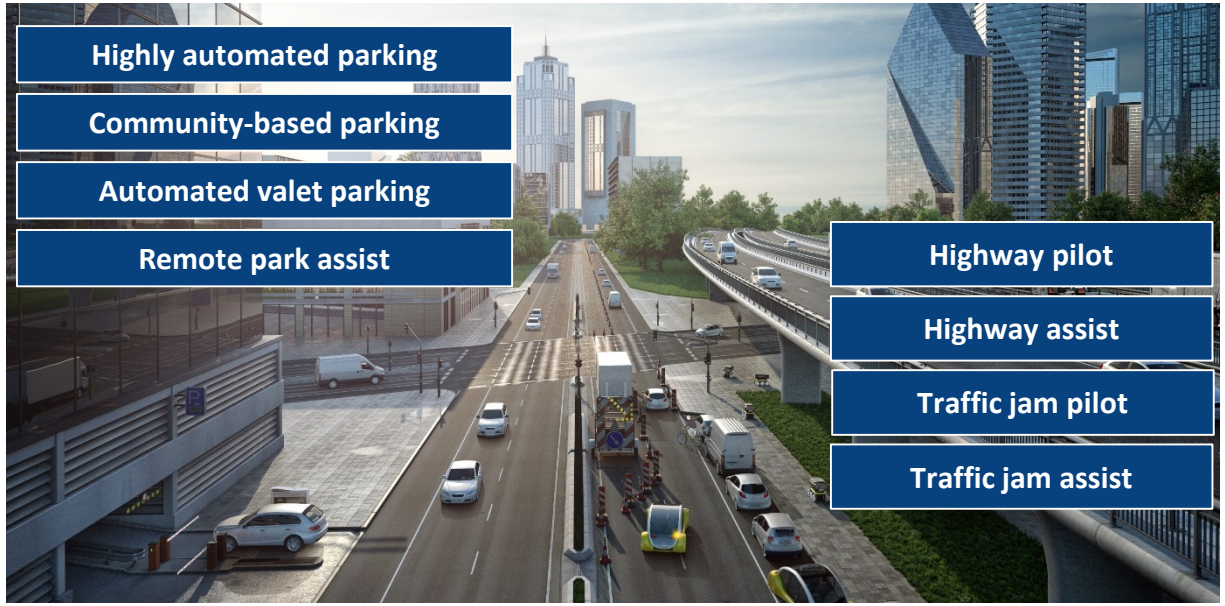
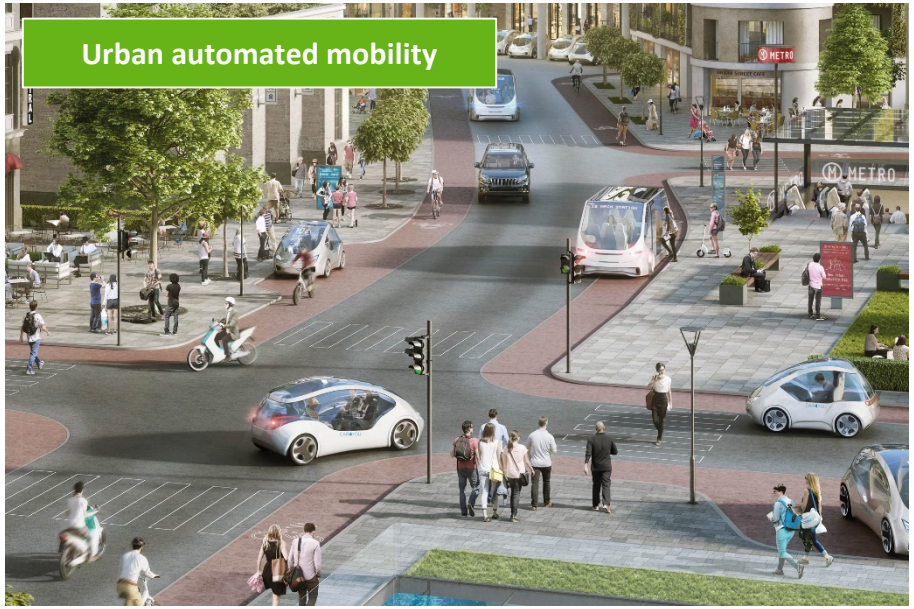
The Path to Automated Driving

Vehicle Automation: Evolution and Revolution

Additionally to **parking** and **highway driving**…





… **fully automated functions for shared vehicles.**

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Automated Driving

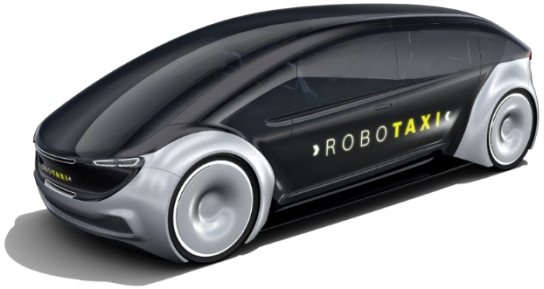
Business use cases - Consumer and Industrial

Privately Owned Automated Cars Highway

High system complexity
Low vehicle utilisation

Price driven
Consumer Grade System

Robotaxi



Very high system complexity
High vehicle utilisation

Function driven Industrial Grade System

II – LEGAL CHALLENGES

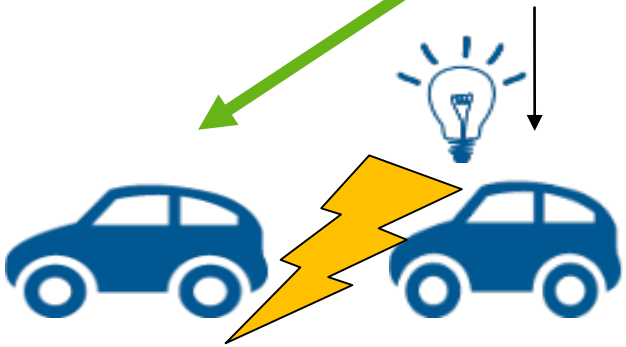
Legal Challenges

Who pays in case of an accident? – owner liability

Insurance Company of the manufacturer

recourse

Mandatory insurance



Injured party

Owner („Halter“)
of a vehicle with AD system

Deutscher Verkehrsgerichtstag

56. Verkehrsgerichtstag (2018):

„No change of the liability system (owner, driver and manufacturer) is required for driving with conditionally and highly automated driving systems.“

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Legal Challenges

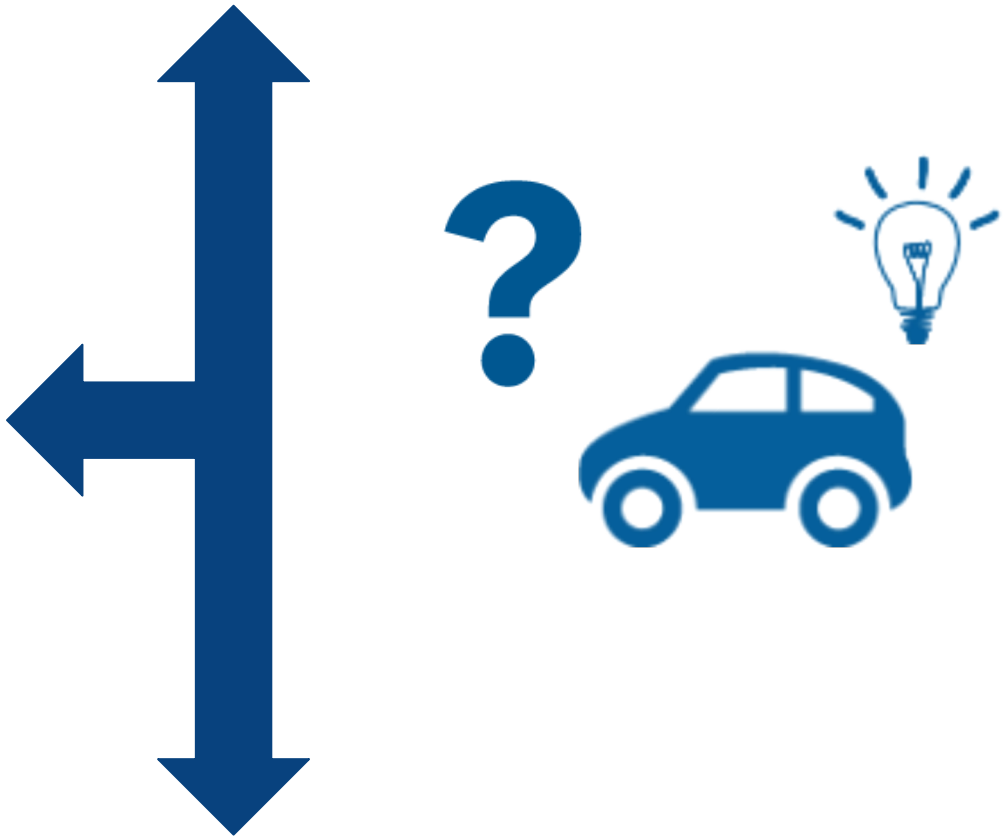
Who pays in case of an accident? – product liability

Injured party

Owner („Halter“)
of a vehicle with AD system

Legal Challenges

Behaviour related law – Acting



<u>Beginning Level 3</u> the Regulations in the national Traffic Road Acts are now addressed to the system (not the driver)

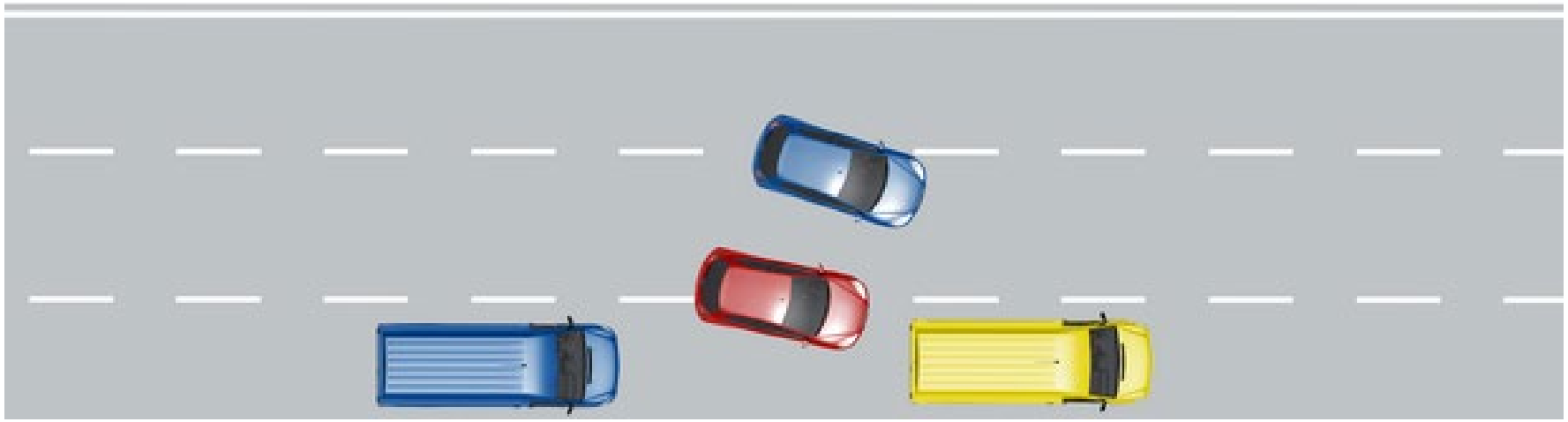
→ ***„Translation"*** of the Road Traffic Acts into technical language for programming by engineers

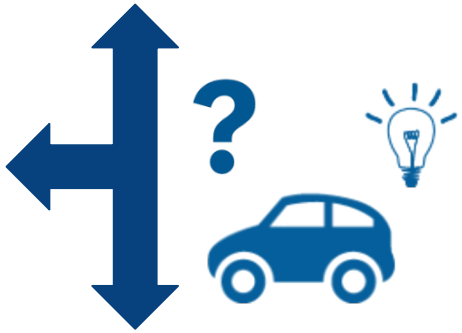
→ Road Traffic Acts are not fit for technical systems

- Provisions not relevant for the respective domain
- Vague legal terms
- Technical challenges

Legal Challenges

Behaviour related law - Reacting





- ✓ Avoid unethical decisions
- ✓ Avoid personal damage in favour of damage to property or infringement of the Road Traffic Act Provisions
  - 4 minor damage vs. 1 severe damage?
  - How to handle “non classifiable” information?
  - How to handle probabilities?

Legal Challenges
Further issues

Legal Challenges
Public dialogue and change of law

Public dialogue

- Accidents with involvement of automated vehicles will happen!
- → a realistic safety expectation of the general public can only be reached via a public dialogue with the manufacturers of AD systems

Potential changes

- Change of Road Traffic Acts to integrate technical systems as „drivers“
- Ethical and legal discussions for the behavior in critical situations

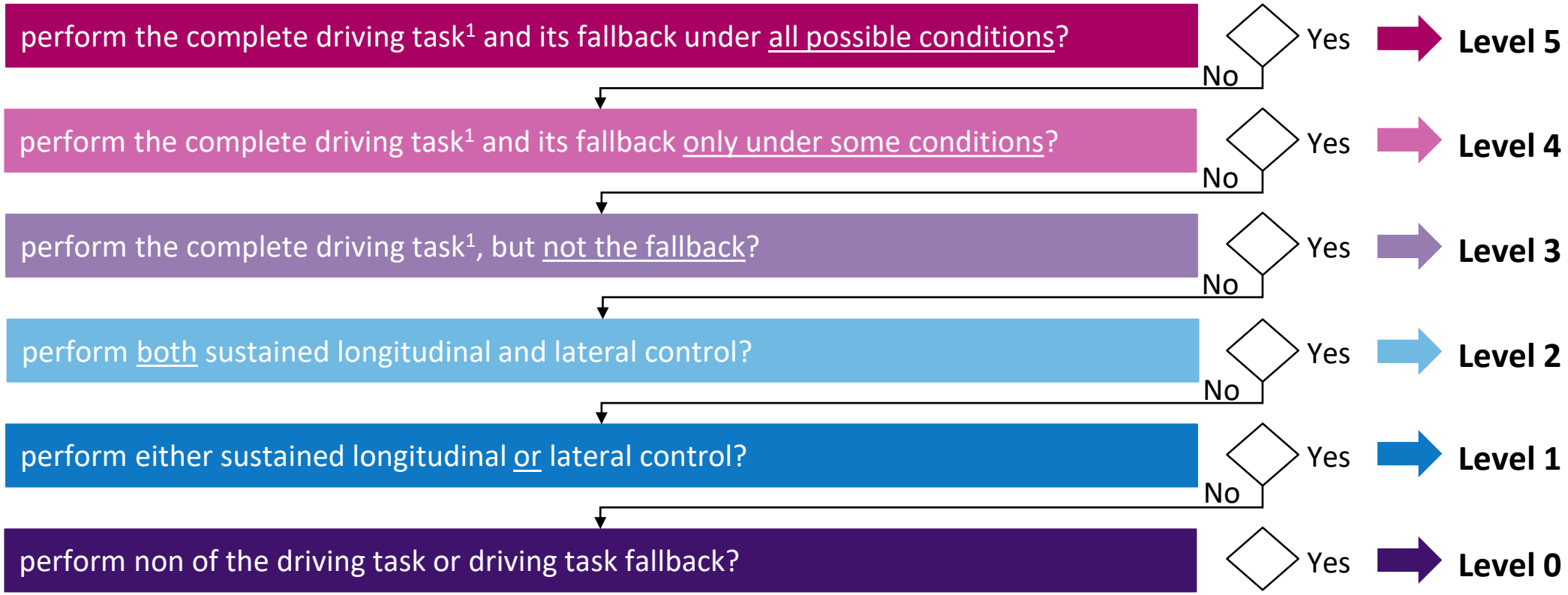
QUESTIONS?

THANK YOU.

BACKUP

Nomenclature
Which SAE-Level?

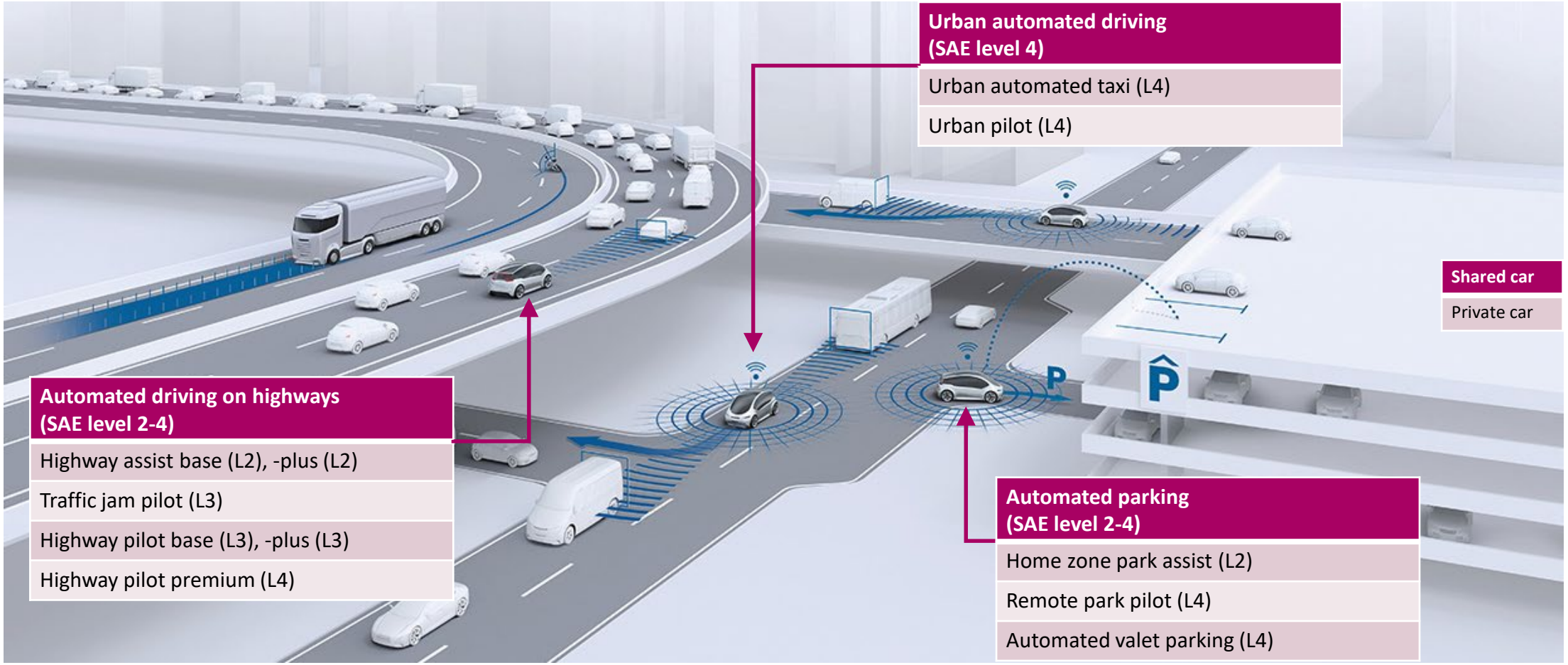
Does the system



1: complete driving task includes monitoring of the complete environment

Nomenclature

Functions of automated driving and Level



Urban automated driving (SAE level 4)

- Urban automated taxi (L4)
- Urban pilot (L4)

Automated driving on highways (SAE level 2-4)

- Highway assist base (L2), -plus (L2)
- Traffic jam pilot (L3)
- Highway pilot base (L3), -plus (L3)
- Highway pilot premium (L4)

Automated parking (SAE level 2-4)

- Home zone park assist (L2)
- Remote park pilot (L4)
- Automated valet parking (L4)

Shared car

- Private car

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