Automated Driving:
The Technology and Implications for Insurance

Matthew Avery – Director of Insurance Research

The Story So Far: Advanced Driver Assistance Systems

ESC is an established life saver

- ESC equipped vehicles are 25% less likely to be involved in a serious or fatal crash in the UK

Other ADAS systems show potential…

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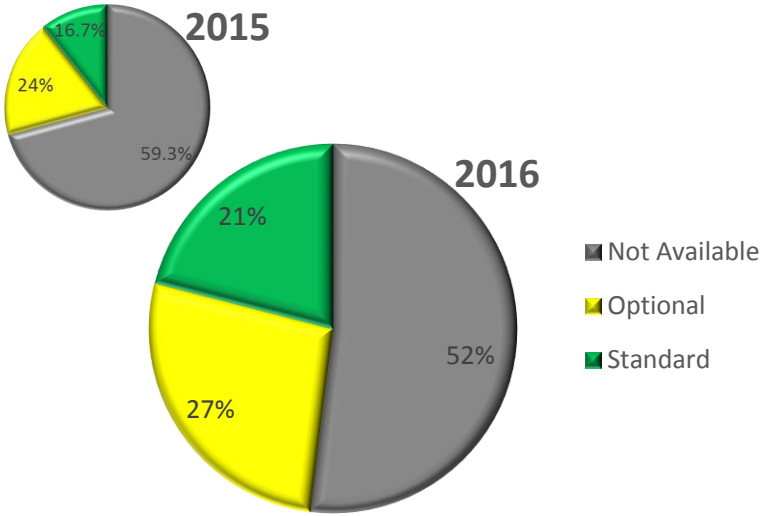
AEB: Should It Be Mandatory…?

- **Euro NCAP see a 38% overall reduction in real-world, *rear-end crashes*** for vehicles fitted with low speed AEB compared to a sample of equivalent vehicles with no AEB

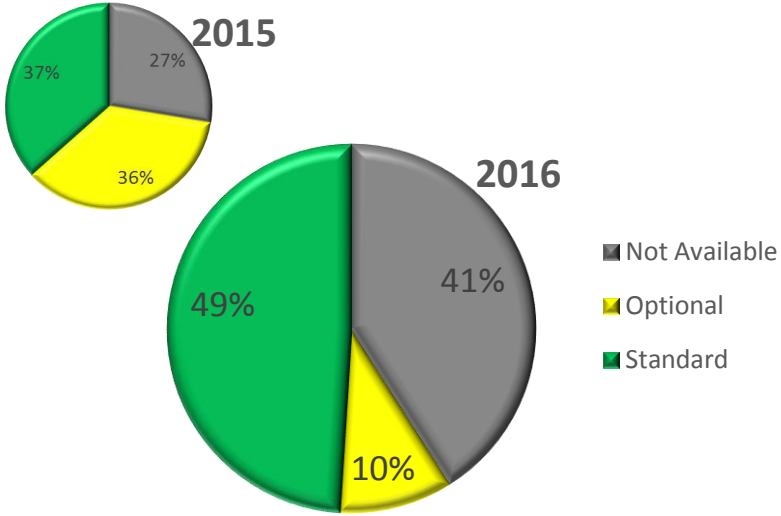
- Thatcham Research – now a world leading reference in AEB and ADAS system functionality and effectiveness

AEB Fitment Today

All new cars on sale in…



Forecast: New cars launched in…



Last updated: May 2016

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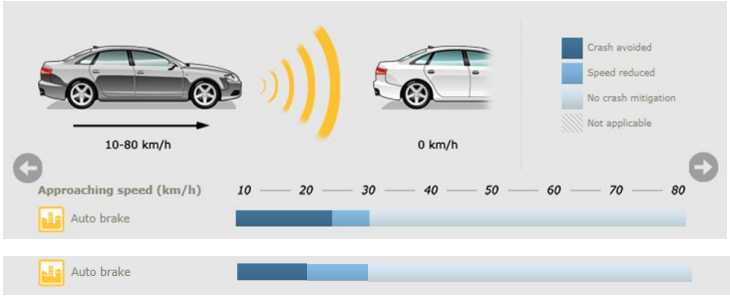
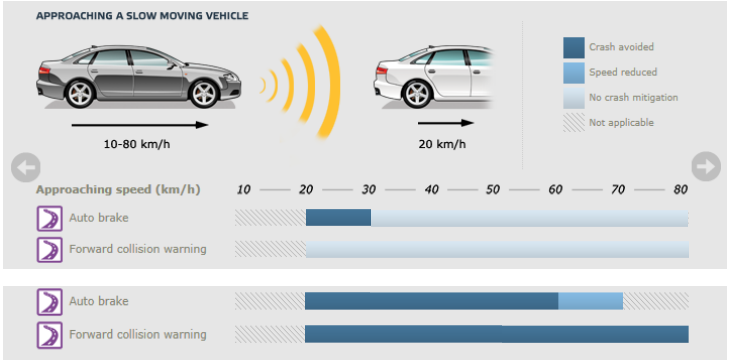
AEB Testing & Insurer Effect

Testing

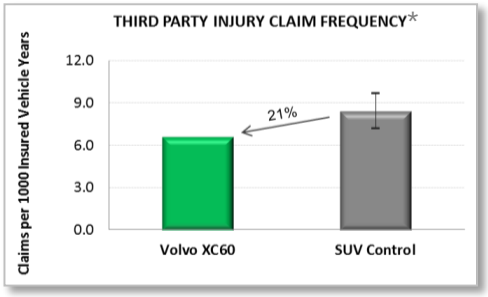
Low Speed

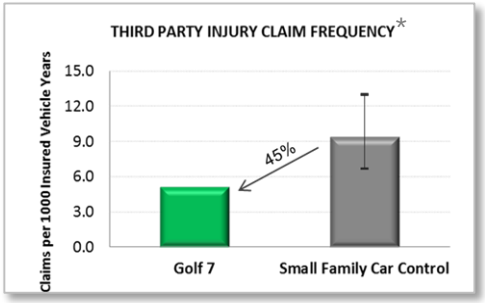


High Speed



Claims Data





*All Crashes

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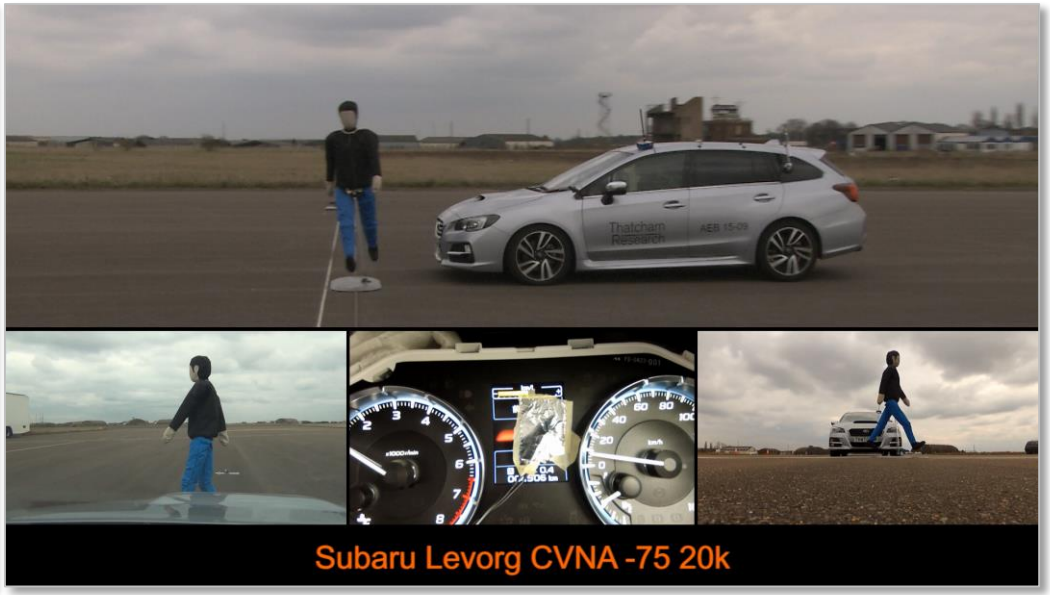
Frontal Impacts With Pedestrians

- UK DfT reports 398 pedestrian fatalities in 2013
- 13% of all road casualties

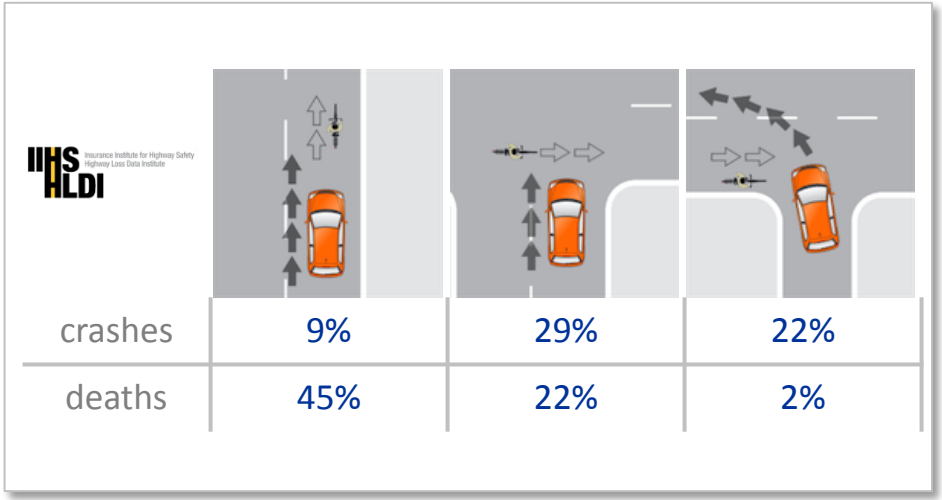
Test scenarios based on top 3 UK pedestrian collisions	
	CP1 Unobscured nearside walking adult
	CP2 Obscured running nearside child
	CP3 Unobscured farside adult



Testing to be introduced into Euro NCAP 2016

Frontal Impacts With Cyclists

- UK DfT reports long term fall in cyclist deaths, fluctuating 100-120 in last 6 years
- 109 cyclist deaths in 2013; 11% of all road casualties
- Pedal cycle traffic increasing: 13% higher than 2005-9 average

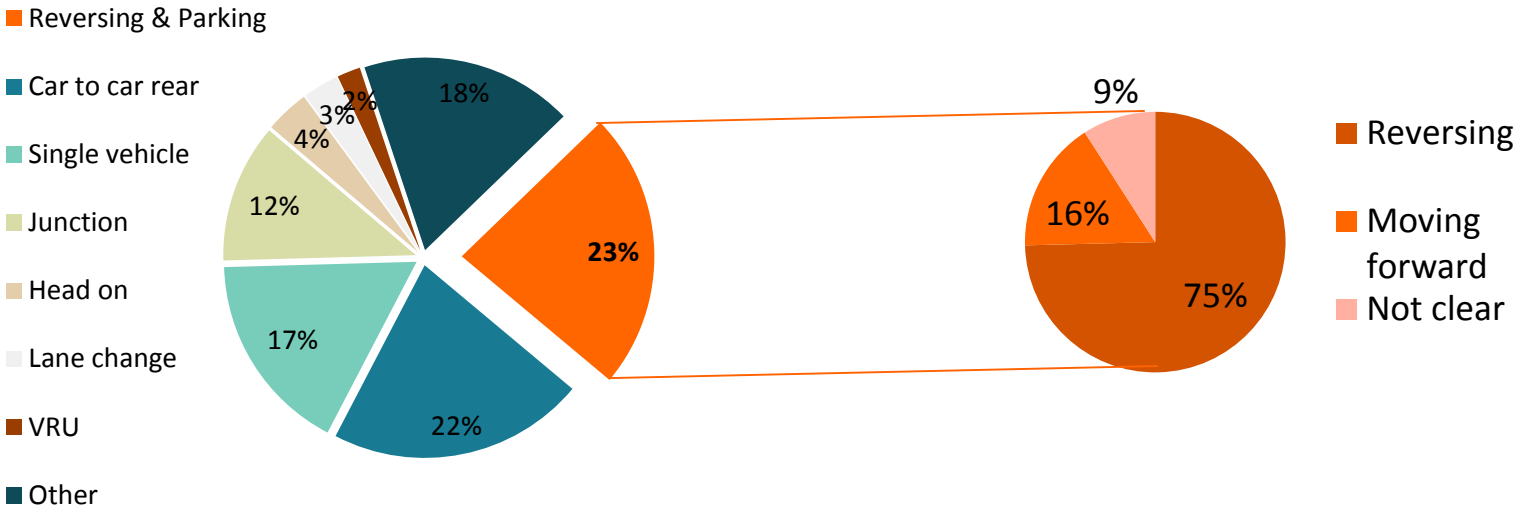


crashes	9%	29%	22%
deaths	45%	22%	2%

Thatcham developing testing for Euro NCAP; to be introduced into Euro NCAP 2018

Vehicle Evolution – Parking Collisions

- In the UK, 23% (725 out of 3,107 cases) of claims related to parking collisions
- 71% of parking collisions (516 out of 725 cases) occurred during reversing



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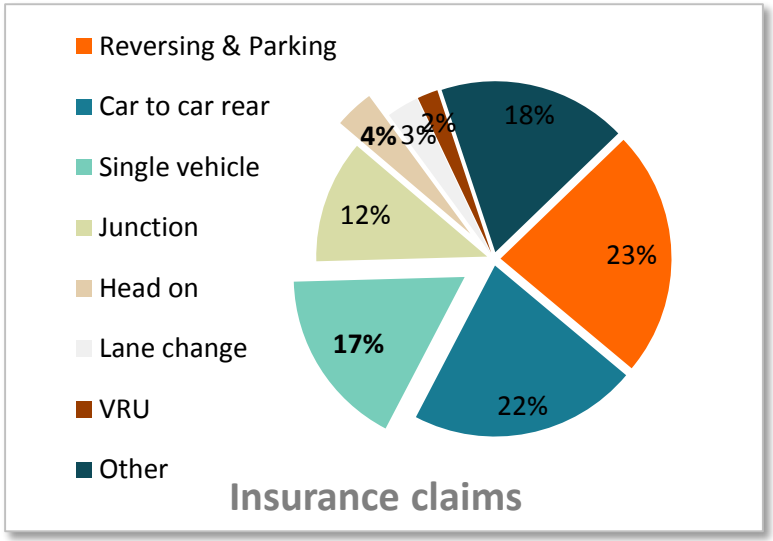
Vehicle Evolution – Automated Steering

- LDW/LKA systems widespread in the market
- 20% of KSI relate to single vehicle crashes
- Sophisticated Lane Guidance Systems now available
- Run off road and across lane capabilities



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Evolution of Automated Systems

Car of the Future

- Active safety
- Passive safety
- Mixed materials
- Powertrain complexity

Crash of the Future

- Frequency
- Personal injury cost
- Accident damage/cost
- Product liability

Repair of the Future

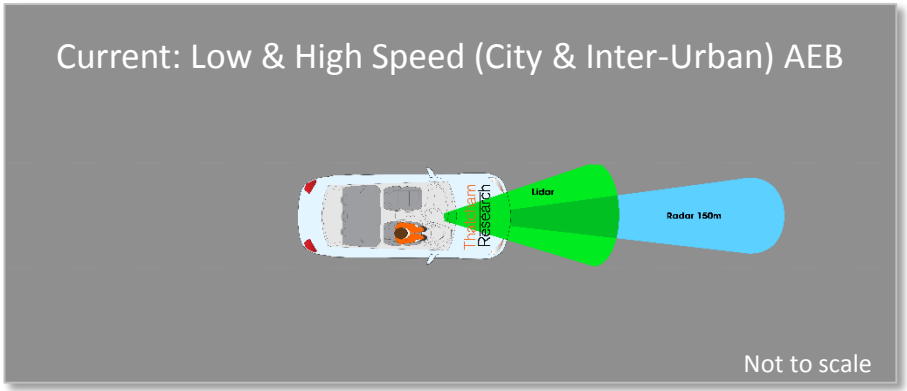
- Severity
- Cost
- ADAS repair
- EV & hybrid repair
- New & mixed materials

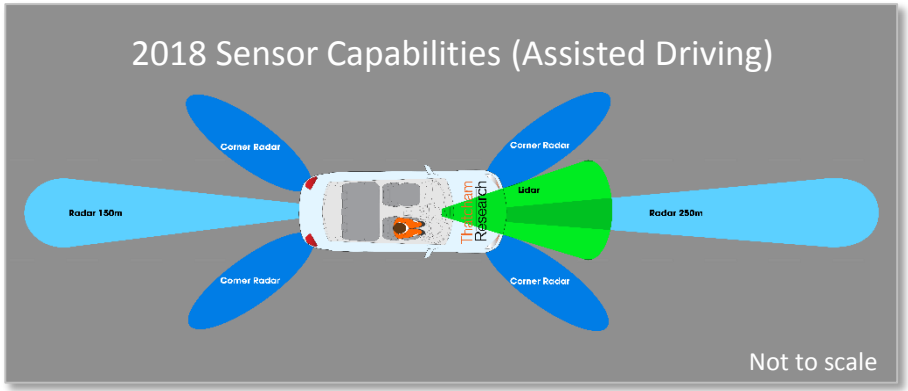
Driver of the Future

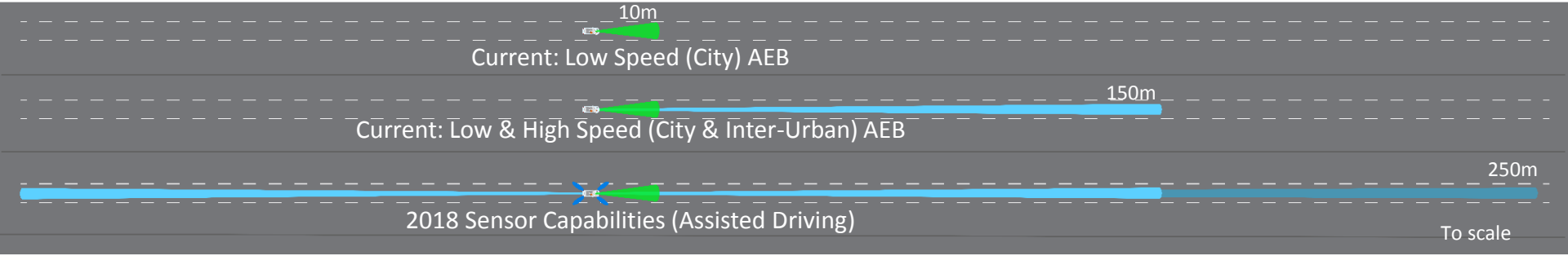
- Driver out of loop
- Skill level under manual driving
- Interaction with ADAS
- Liability

Defining the Technological Route to Automated Driving

Sensor Development







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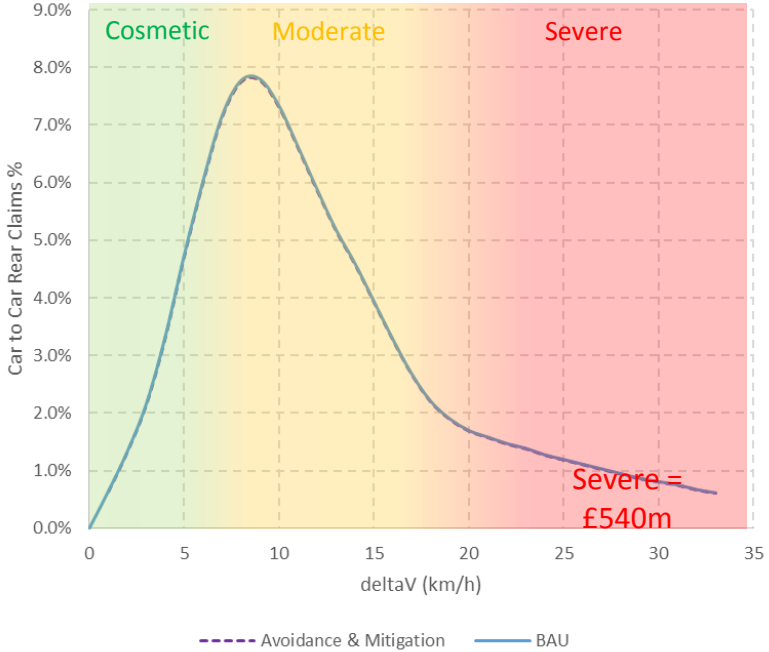
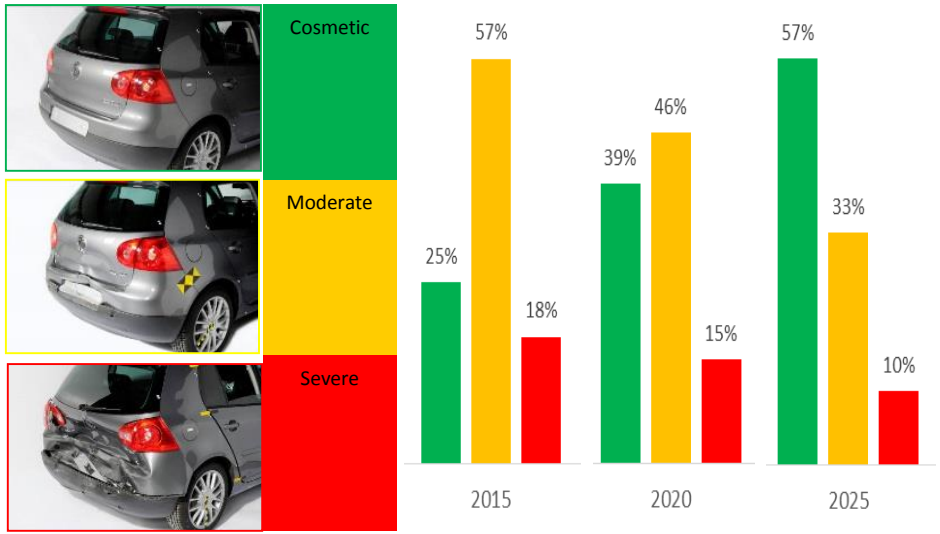
Ten Year Prediction of Crash Severity

Speed Reduction in Rear-End Crashes



Accident Damage Distribution



Source: Kullgren A, Dose-response models and EDR data for assessment of injury risk and effectiveness studies, *Proceedings of IRCOBI conference*, Bern, Switzerland, 2008. Strandroth J, et al . Head-on collisions between passenger cars and heavy goods vehicles: Injury risk functions and benefits of Autonomous Emergency Braking , Proceedings of IRCOBI conference, 2012.

Delta V = change of energy in a crash (not approach speed). Simple e.g. car travelling at 30km/h hits a stationary car; delta V is approx. 15km/h; complex calculation allows for many factors including vehicle stiffness, rebound etc.

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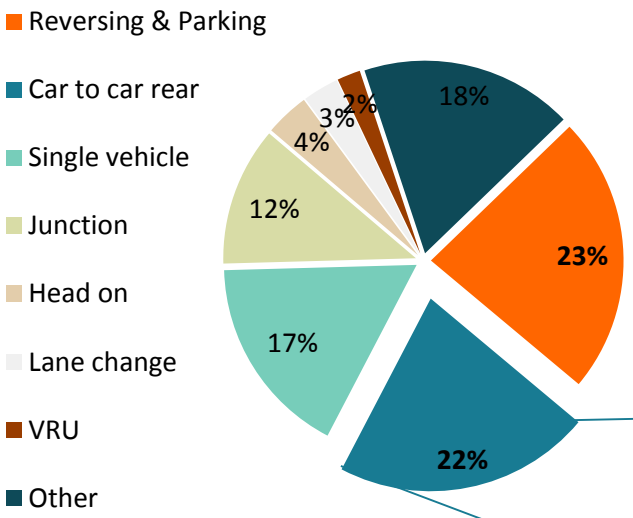
Addressing Crash Types: What Next?



- But what about other crash types?
- ADAS systems will address other crashes too…
- What about Automated Driving – here by 2020?

Damage claim distribution from Insurer member data

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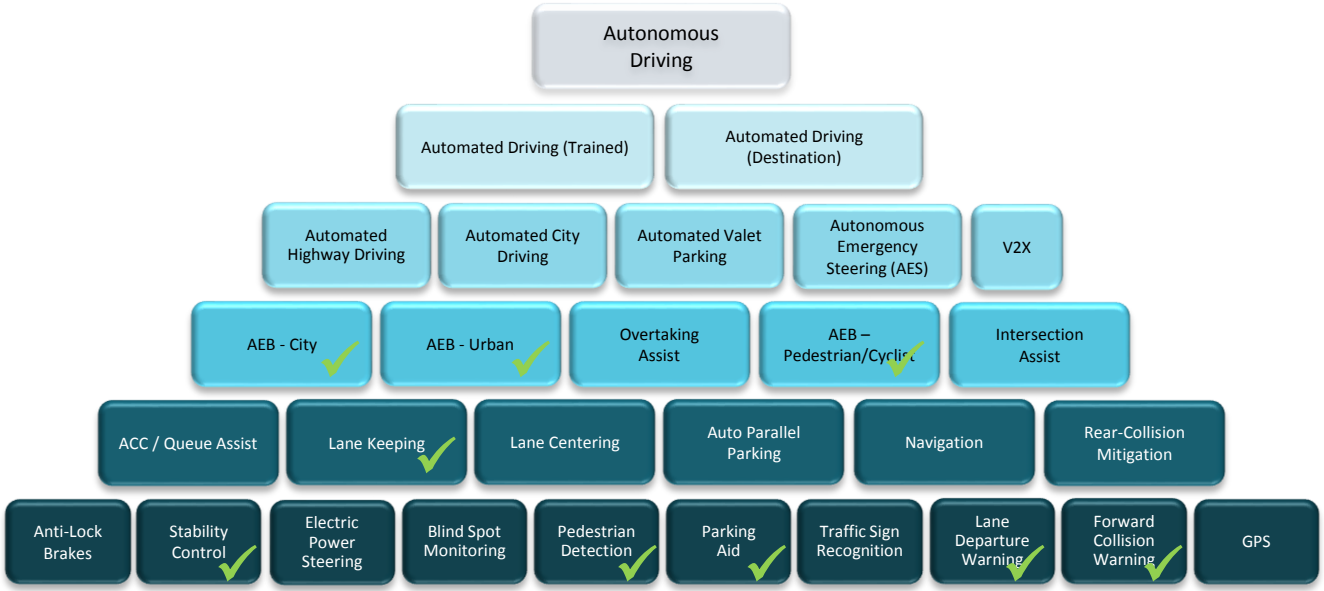
ADAS Building Blocks

Thatcham Influence on Testing Procedures – *towards Automated Driving*



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UK Government Investment

£19 million: VM, stakeholder and Insurer research projects

Lutz Pathfinder pod

Milton Keynes pavement trials

2 seater, electric powered pods

If successful, 40 pods

+ Jaguar Land Rover and Ford autonomous car “challenges” on public roads (Coventry)

Meridian Shuttle

Greenwich

Milk float style vehicle

Various scenarios

11 partners

Venturer

Bristol

BAE Systems Wildcat

Starting 2016, for 36 months

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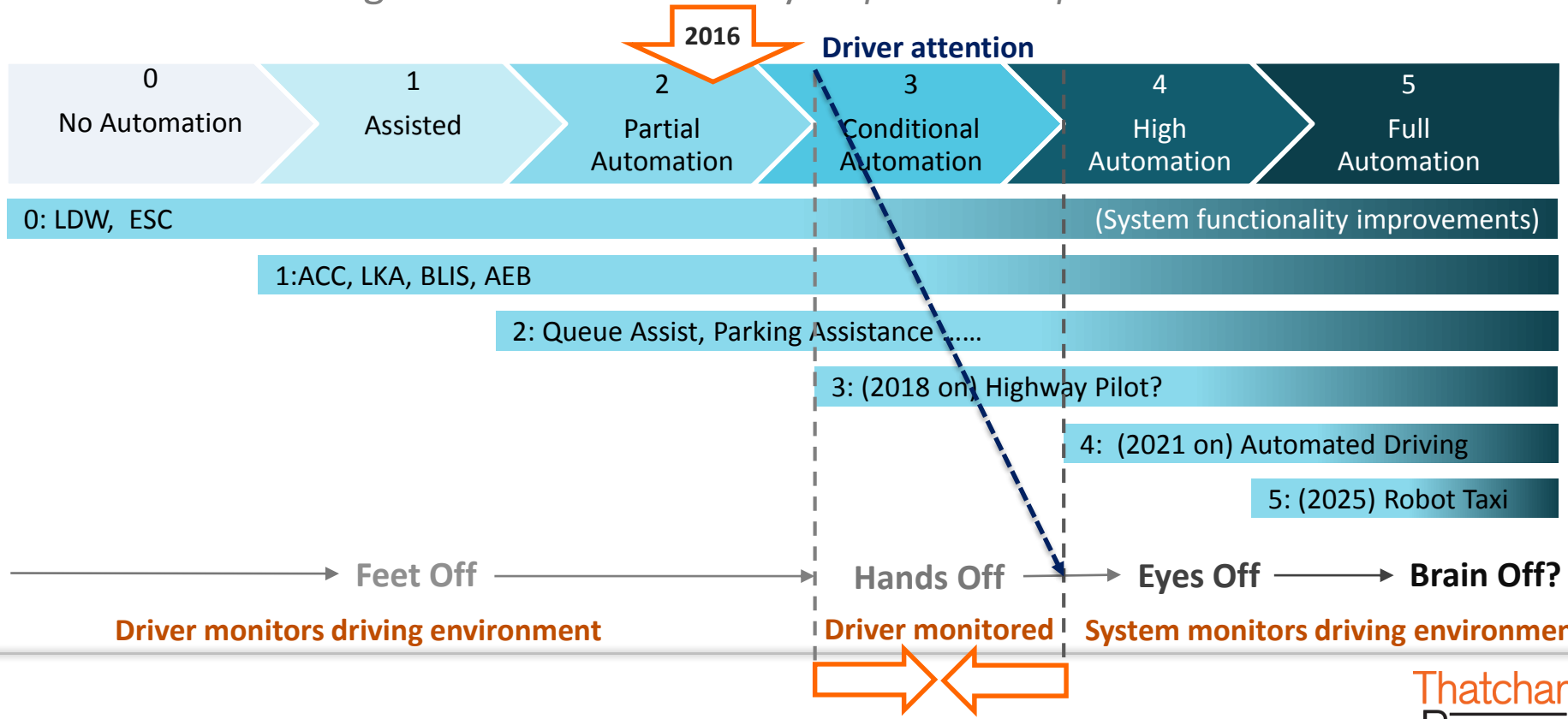
The Autonomous Car Timeline

International Categorisation of Autonomy – *open to interpretation*



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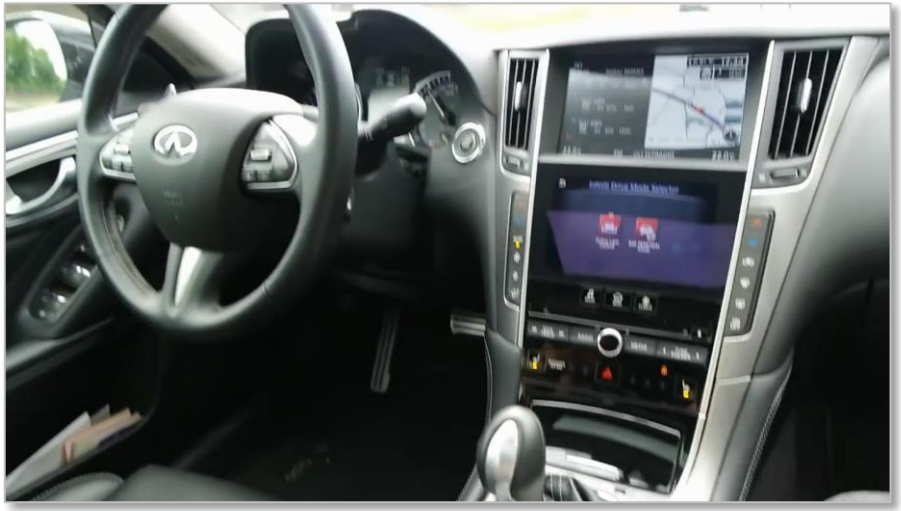
Tesla and Infiniti Autopilots

Level 2+ today – Driver Support Systems?

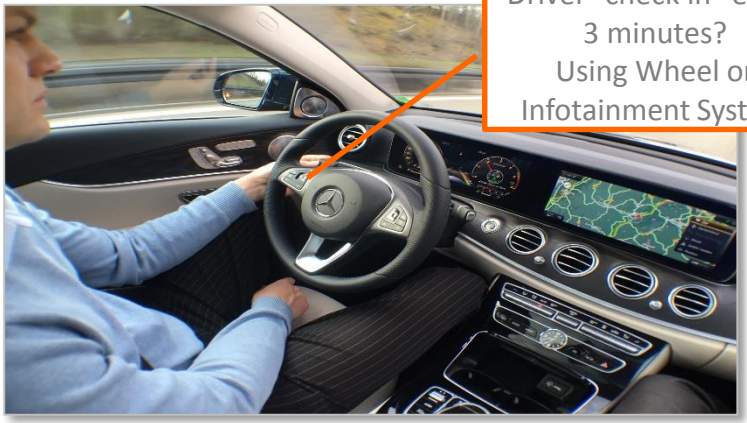
Tesla Model S

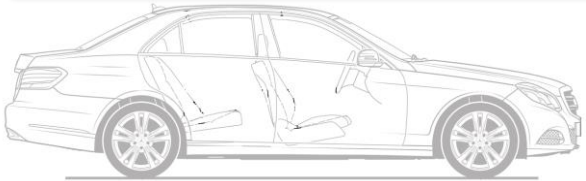


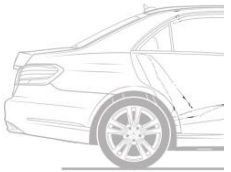
Infiniti Q50

ECE R79 Steering – ACSF 2018 on

Level 2+?







Example: Drive Pilot up to 130km/h = 36m/s
Radar has 200m range, 100m used on target verification
Leaves approx. 3 seconds to bring driver back into loop; 10 seconds required
Level 3 poses increased risk of crashes?

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Volvo Drive Me

Level 4

- First large scale trials of production ready Automated Driving
- Test routes in London and Gothenburg
- Complex network of sensors, cloud-based positioning systems and intelligent braking and steering technologies
- 2017: trials with first prototypes
- 2019: 100 customer cars
- Production cars available 2021

Automated Driving – Good for Insurers?

- How will drivers understand and use these systems?
- Level 2, Level 3 or Level 4?
- Is the driver required or not?
- What will regulations allow – ECE R79 ACSF
- AD – better than ADAS+?

- Automated Driving Insurance Group – Thatcham/ABI and Members
- Information and position around liability and functionality
- CoF – Modelling the future risks
- Development of rating procedures to test/rate AD functionality – Level 2,3,or 4
- Future proofing Group Rating to accommodate AD functionality

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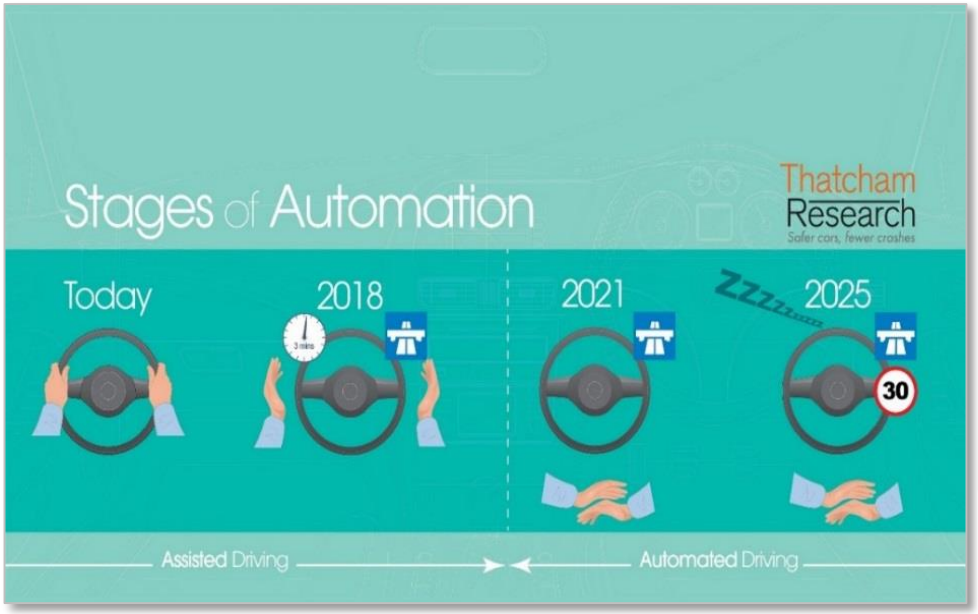
ADI Group - Make Up and Objectives

- Insurance Industry input into DFT consultation on Automated Driving
- Insurance position on liability

- Industry stance on SAE Level 3 vs Level 4 autonomy – Influence in Geneva Reg 79 (Steering) ? – *ADIG PAPER*
- Industry position in the provision of data recording related to automated driving- *DSSA PAPER*
- Develop coordinated international insurance viewpoint to influence policy making- *GDV*

Claim of the Future

From Assistance to Automated Driving



Assisted

- systems that support the driver with steering, acceleration and braking either separately or in combination but where the driver is ultimately in control and clearly responsible.
- E.g. Highway Autopilot systems

2018

Automated (Restricted)

- systems that can take full control of the driving task for parts of a journey under restricted conditions
- E.g. Geo fenced Motorways

2021

Automated (Full)

- systems that can control the vehicle for the entire journey from door to door only requiring the operator to specify a journey
- Full set of road types without restriction
- Such a vehicle may or may not have controls to allow manual operation

2025

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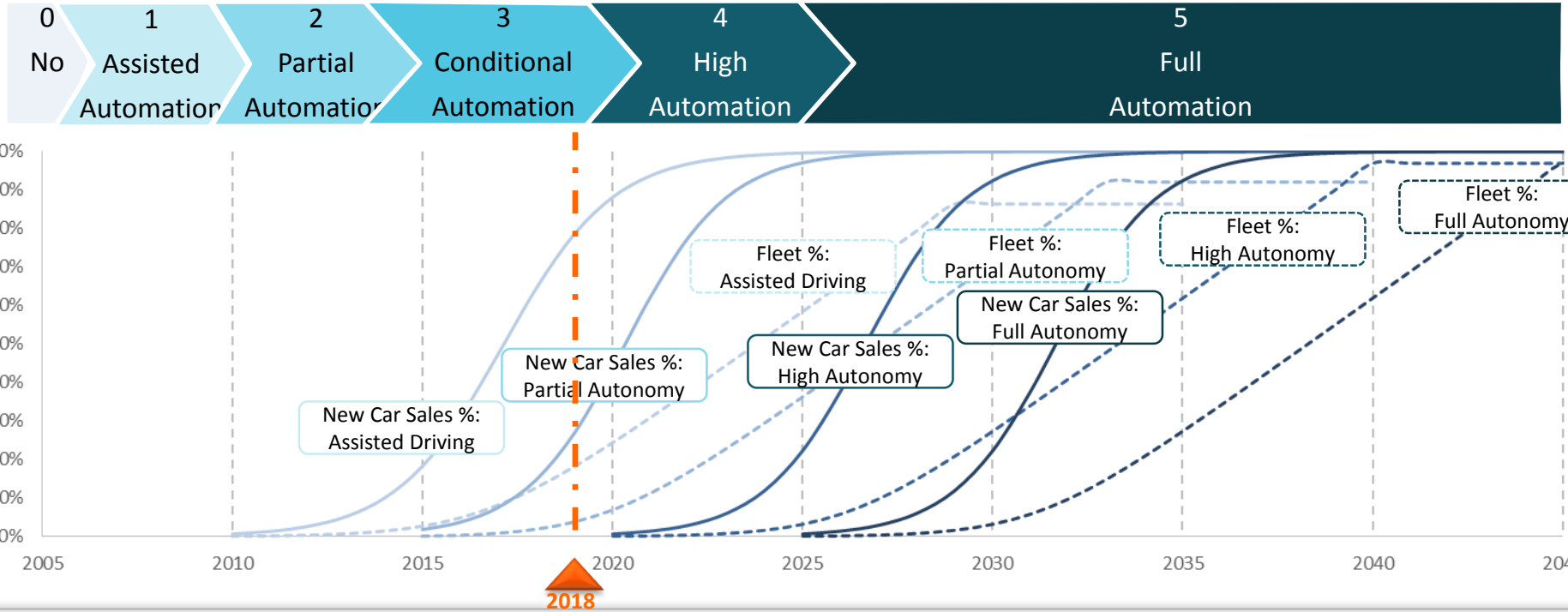
The Autonomous Car

Levels of Autonomy – When will it happen?



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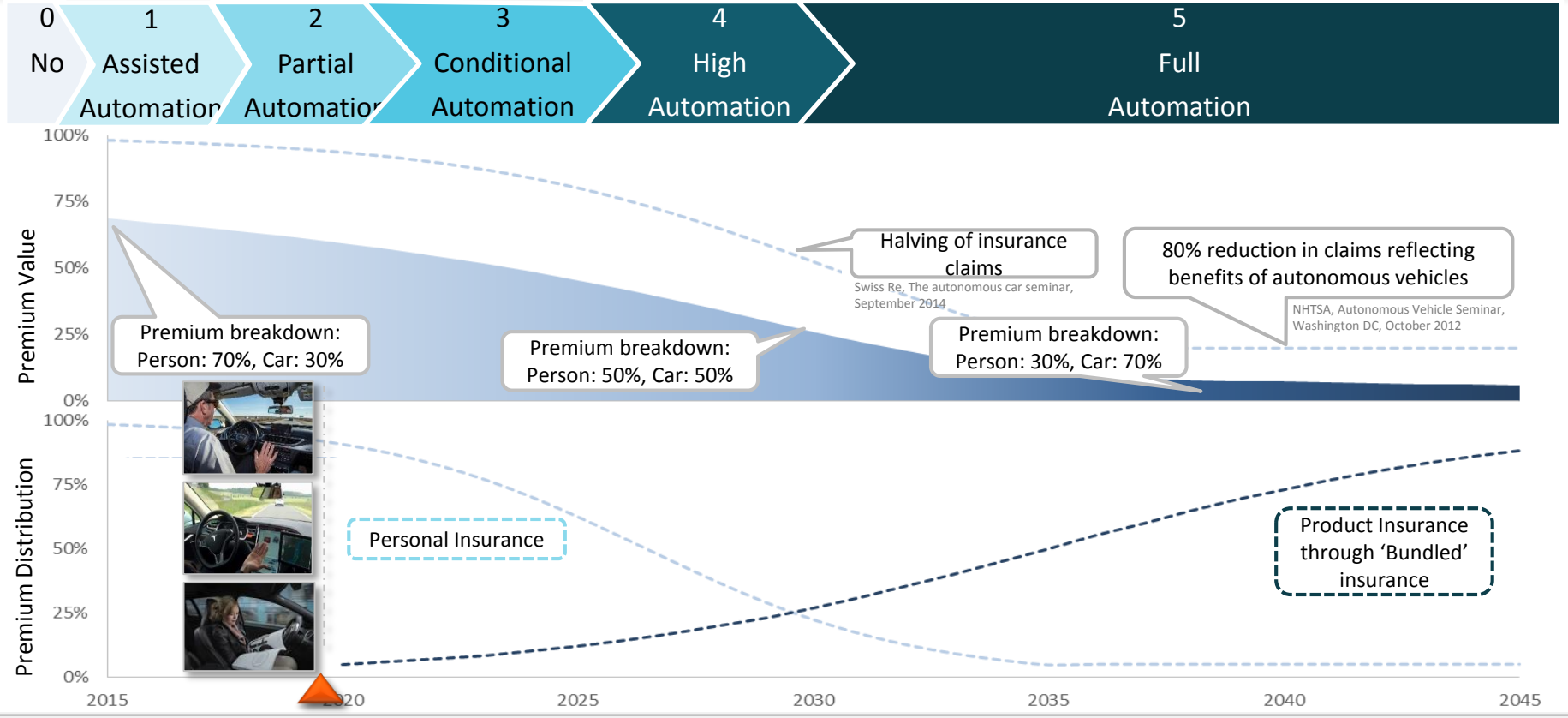
The Autonomous Car

Insurance Model Risks for the Autonomous Car: Premium Value & Personal to Product Liability



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