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*Intelligent Transport Systems: a Tool or a Toy?*

# Autonomous Driving: Policy aspects

*Dr Nikolas Thomopoulos – Zilina, 22nd November 2016*

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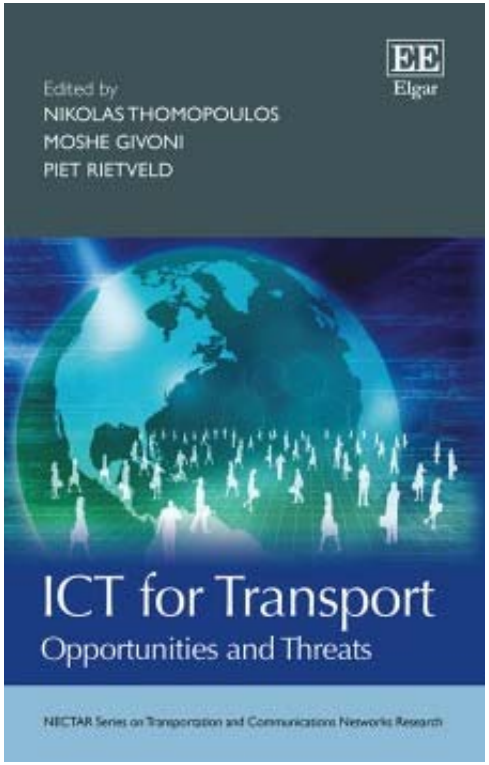
# THE AUTONOMOUS CAR:
# A BLESSING OR A CURSE FOR THE FUTURE OF LOW CARBON MOBILITY?

*An exploration of likely Vs. desirable outcomes*




Thomopoulos N., Givoni M (2015) The autonomous car – A blessing or a curse for the future of low carbon mobility? An exploration of likely Vs. desirable outcomes, *European Journal of Futures Research*, (3), 1-14

# Facts: AV potential

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Annual cost savings from the use of AVs have been estimated at:

**US$1.3 trillion** for the US

or

**75%** of **transport GDP**$_{US}$

or

**8%** of **GDP**$_{US}$

➔ global annual savings: **US$5.6 trillion**

*(Morgan Stanley, 2013)*

# AV: a game changer

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Given the fact that 54% of the global population lives in cities currently and is responsible for **64%** of total kilometres travelled or **10 billion trips daily**, along with the projection that 66% of the global population will live in cities by 2050 increasing urban kilometres travelled **threefold**, the AV is in every aspect a **game changer** that can modify beyond recognition our transport and mobility system and as a consequence our life.

**There are some challenges to address though…**

# Is the ‘peak car’ already here?

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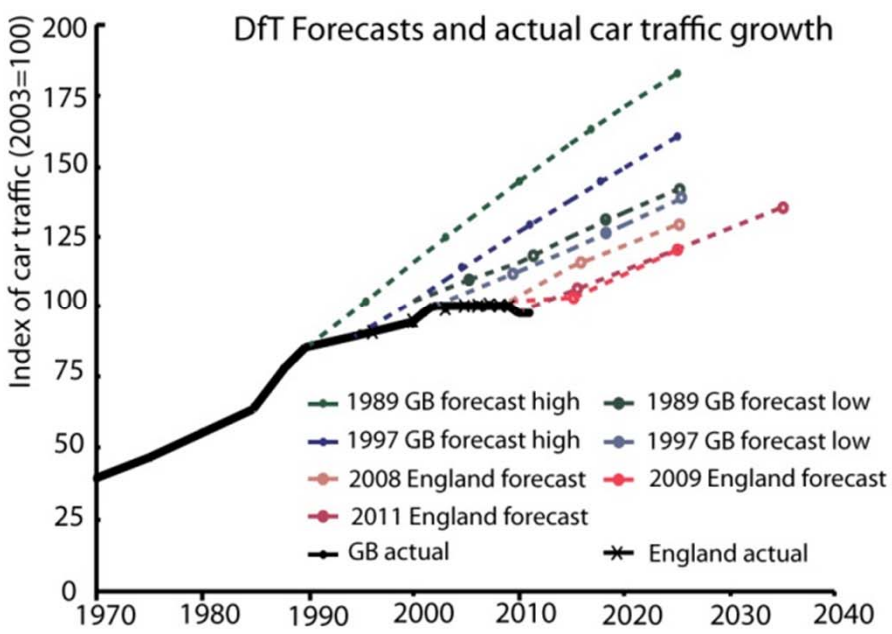


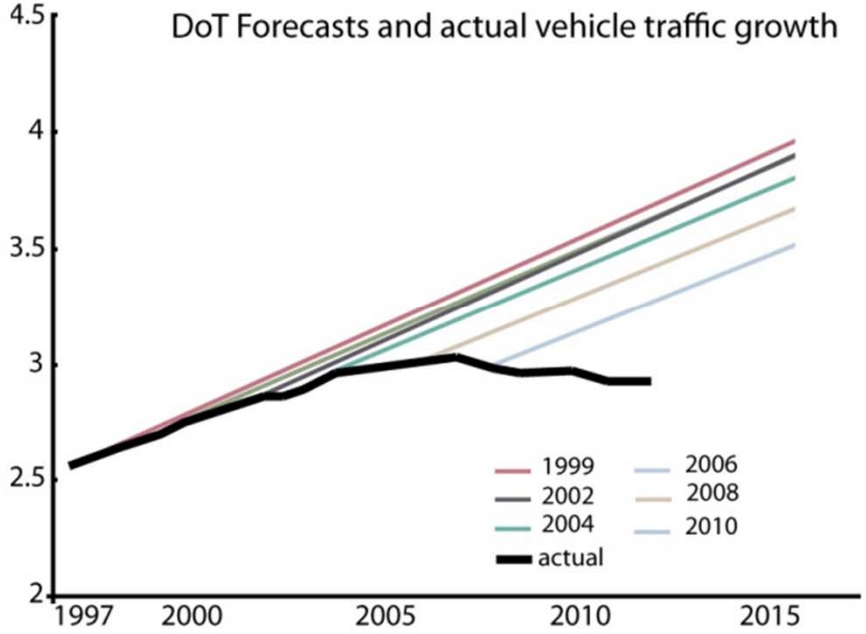


*Rode et al, 2014*

# Key challenge: Automation level

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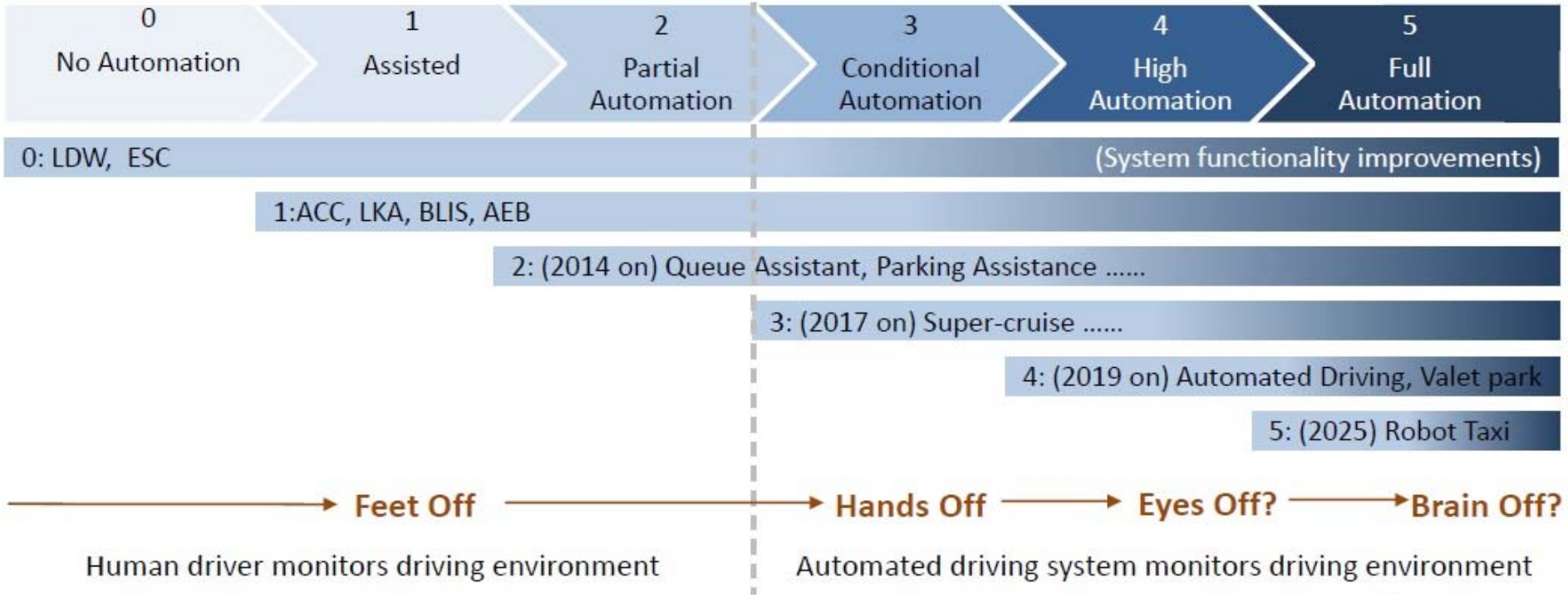
## The Autonomous Car Timeline

International Categorisation of Autonomy

*(A.Miller, 2015)*




# Key challenge: Transition period

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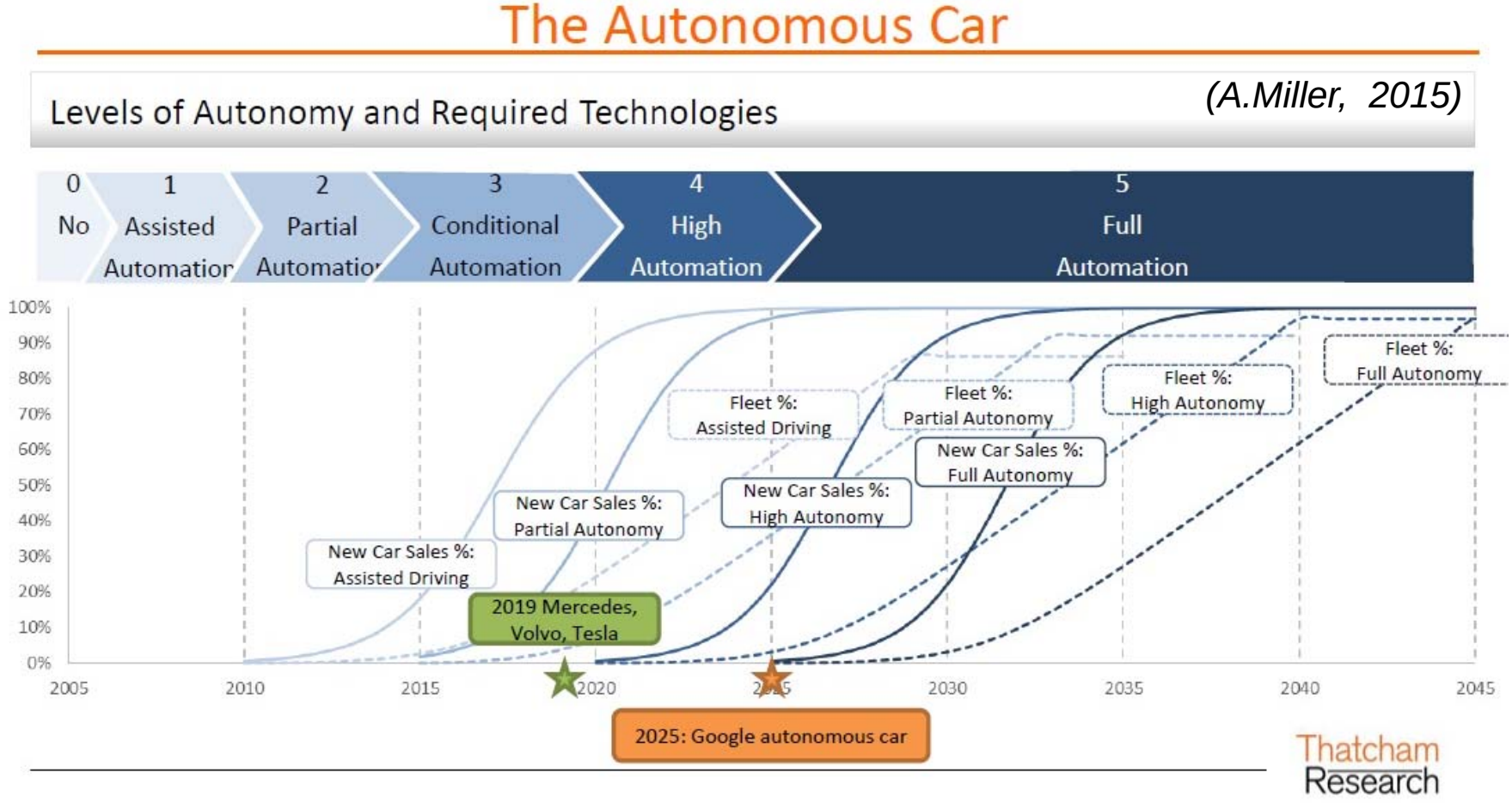
## The Autonomous Car

*(A.Miller, 2015)*




# Key challenge: Safety benefits

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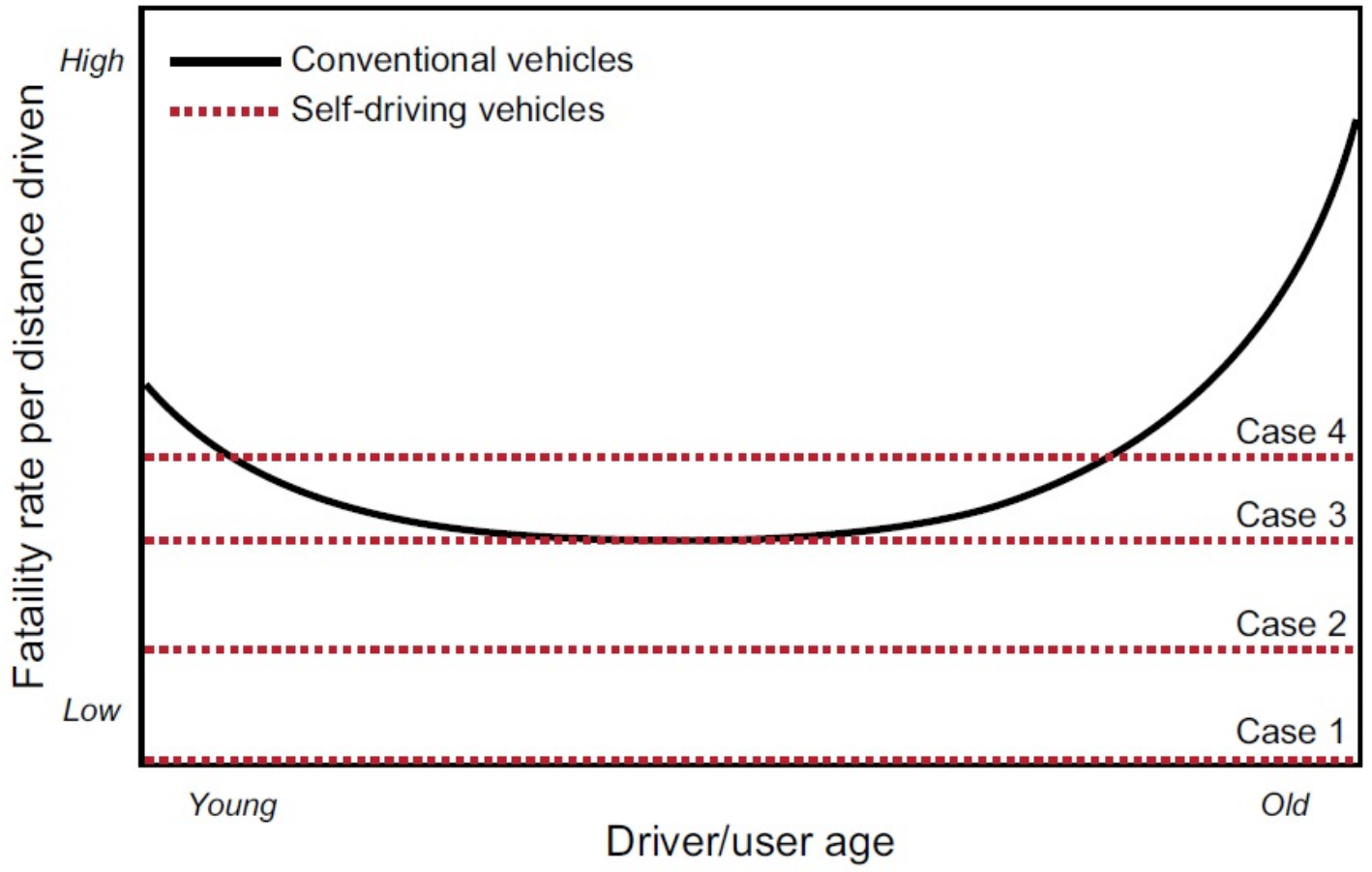


*Shivak and Schoettle, 2015*

# Liability: Redistribution of crash severity

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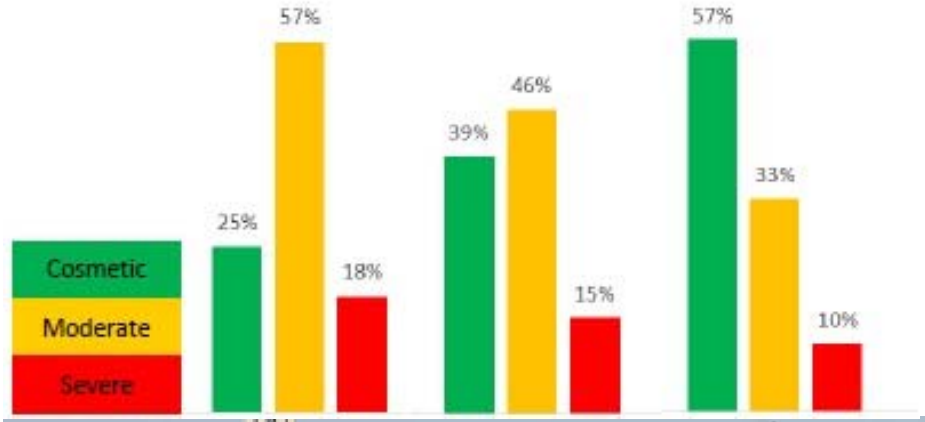
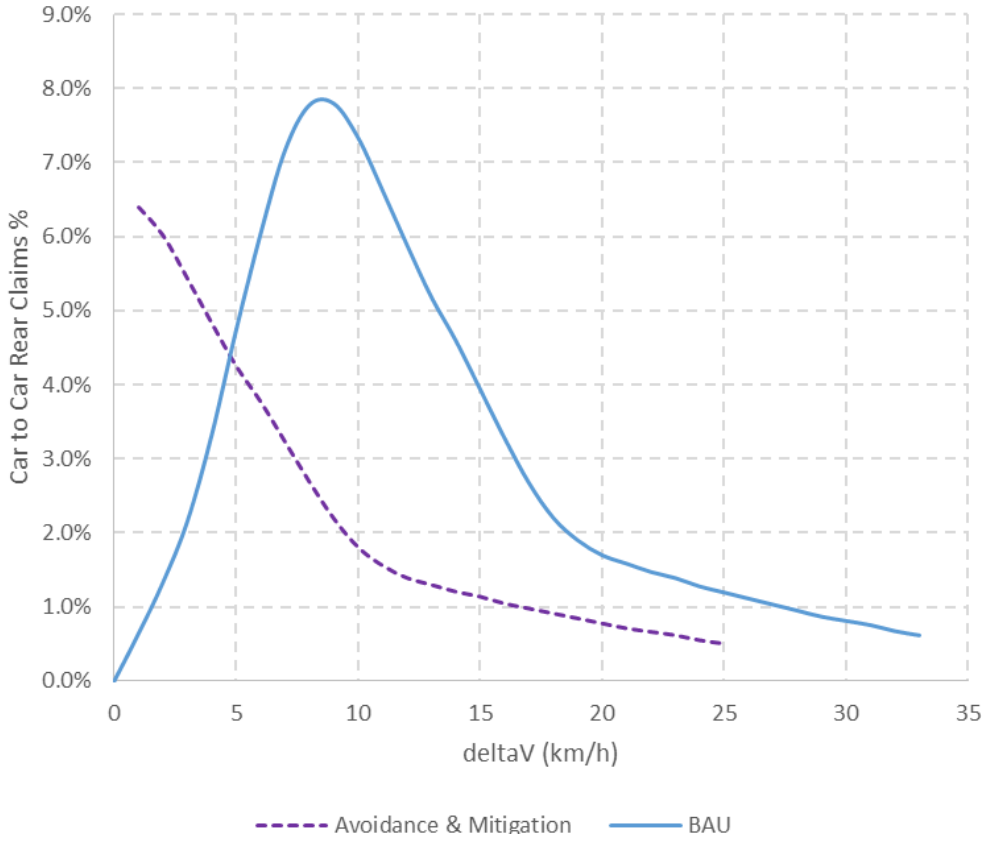
Illustrative prediction for AEB effect on rear-end crashes




*A.Miller - Thatcham Research, 2015*

# Benefits

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| | |
|---|---|
| **Users** | Travel time is not driving time, so disutility decreases and comfort increases |
| | Travel time may be used for other work/leisure activities |
| | AVs can allow the integration of culturally diverse users in cities globally |
| | AVs can enhance demand for travel allowing passengers of any age to reach their destination safely |
| | Transport related social exclusion may be eliminated |
| **Government** (local/national) | Increased safety due to less accidents (mainly in the era when only AVs will be on the roads) |
| | More parking space will become available and it may be used for other purposes by city authorities |
| | If AVs are eco-friendly, there could be reduced air pollution and lower energy use from the transport sector |
| | Accessibility can improve for all travellers, including the elderly and disabled |
| **Businesses** | Significant business opportunities will arise for automotive manufacturers, particularly for conventional ones which decide to enter this innovative market |
| | Expanding databases and innovative use of Big Data will allow the emergence of business opportunities and new business models, creating value for stakeholders |
| | Logistics and supply chain business will reduce (congestion, time) costs through eco-driving , better route planning, V2x communication and platooning |

# Threats I

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| | |
|---|---|
| **Users** | High cost of 'smart' infrastructure (V2I) to accommodate AVs |
| | Congestion may increase if the aggregate number of journeys increases |
| | Cost of emerging mobility patterns can lead to social exclusion of certain groups if high |
| | Identifying and assigning responsibility for car accidents may become more fuzzy |
| | 'Digital divide' can lead to increased social exclusion |
| | Better use of travel time may increase travel time e.g. daily commute, resulting in higher aggregate energy demand at local and national level |
| | Widespread use of AVs can reduce walking and cycling, increasing obesity |
| | Unintended consequences will arise (privacy, hacking, surveillance, data management) |
| **Government** (local/national) | The adjustment period when both conventional human driven and autonomous cars co-exist on roads could impose more car accidents |
| | Deciding on the optimal route will be a challenge particularly during extreme events and principles may differ across cities complicating inter-urban journeys |
| | Emergence of diverse technologies by competing actors may lead in lack of coordination and common legislation |
| | Reduced employment demand for drivers and car technicians, increasing government costs for retraining and/or unemployment benefits |

# Threats II

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| | |
|---|---|
| **Businesses** | Better use of travel time may increase travel time to travel through routes with greater journey comfort leading to increased congestion. |
| | Development of competing technologies by diverse actors may lead to inefficient use of resources and the evolution of competing standards internationally. |
| | Vehicular communication network needs high transmission capacity equipment and proper penetration rate to achieve optimal transport performance. |

*(Thomopoulos and Givoni, 2015)*

# Key challenge: Future outlook

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- support and enhance local trials ➔ deployment

GATEway CityMobil2

- evaluate findings socially and spatially ➔ new methods
- share knowledge and best-practice ➔ new business models
- decarbonise fuel ➔ resource efficiency
- develop common local/global frameworks➔policy packaging

So the future could be **shared, green, autonomous**

**Q&As**

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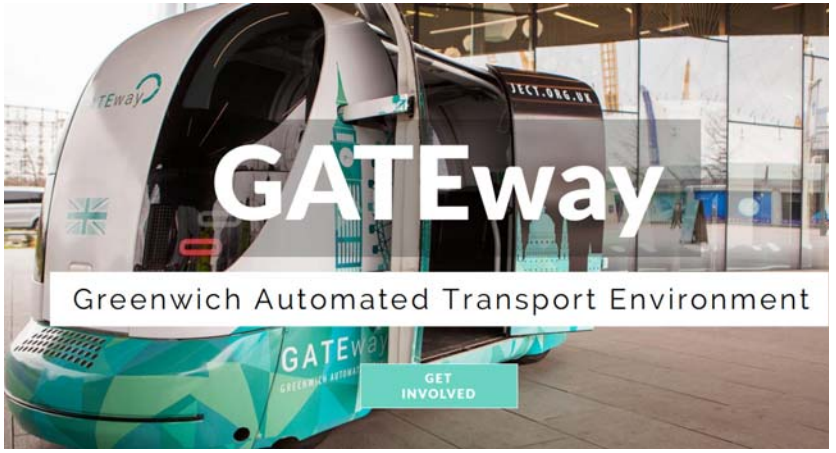
# Thank you

*N.Thomopoulos@greenwich.ac.uk*





**The Business School**

University of Greenwich
Greenwich Campus
Old Royal Naval College
Park Row
London SE10 9LS

**Enquiry Unit**

Telephone: 020 8331 9000
E-mail: courseinfo@gre.ac.uk



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