THE FUTURE OF TRANSPORT

Opportunities to influence vehicle safety

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14 June 2016

Opportunities to influence vehicle safety

- Background – Changing world
- Vehicle design and casualty prevention
- EU General and Pedestrian Safety Regulations
- Cost benefit assessments and example of identifying potential benefits
- Conclusions

Opportunities to influence vehicle safety

Background: Changing world

The digital 'revolution'

- Internet, data and transport

Changing population characteristics

- Different travel (mobility) patterns
- Changing driver demographics
  - Ageing, obesity
  - Fewer young drivers
  - Reducing individual vehicle ownership

Changing vehicle fleet

- Advanced safety technologies (ADAS)
- Connected & Autonomous vehicles
  - Safety, Efficiency, Environment, Mobility
- Increasing diversity of vehicle types
  - More SUVs & light weight vehicles
  - More electric & hybrid vehicles

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Background: Autonomous vehicle testing

TRL 1959 and 1971

Google 2010 and 2015

Tesla 2016

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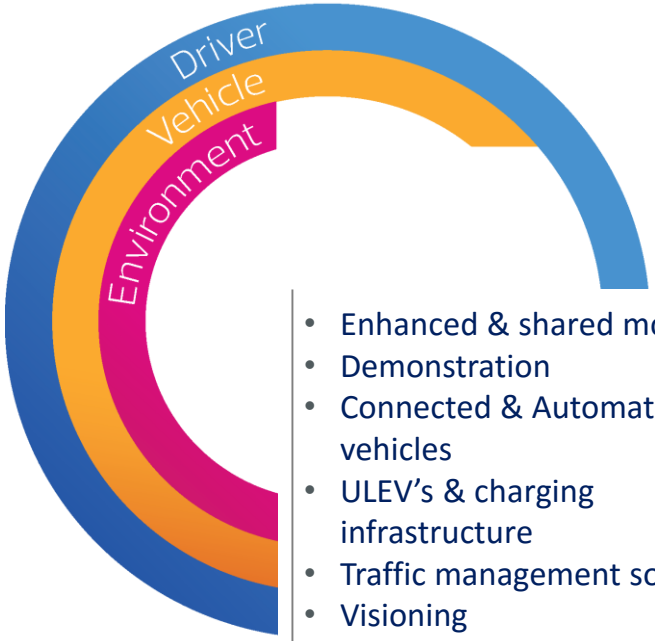
Background: Autonomous vehicle development



UK Smart Mobility Living Lab @ Greenwich

- Enhanced & shared mobility
- Demonstration
- Connected & Automated vehicles
- ULEV's & charging infrastructure
- Traffic management software
- Visioning
- Hardware
- Data science
- Physical & cyber security

- Freight
- Business case
- Policy
- Simulated environment
- Regulation
- Air quality
- Mapping
- Congestion
- Human factors & ergonomics
- Perception
- Behaviour

Projects using the Living Lab: GATEway MOVE_UK

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Background: Autonomous vehicle development

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Technology

US cinema chain AMC set to allow customers to text during films

14 April 2016 | Technology | 481

Most cinema chains ask people to switch their phones off during a film

Cinema chain plans to allow texting during films

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Background: Autonomous vehicle development

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NEWS

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Technology

UK Department for Transport set to allow drivers to text at the wheel

Most countries now permit the use of smart devices with 'autopilot' driving

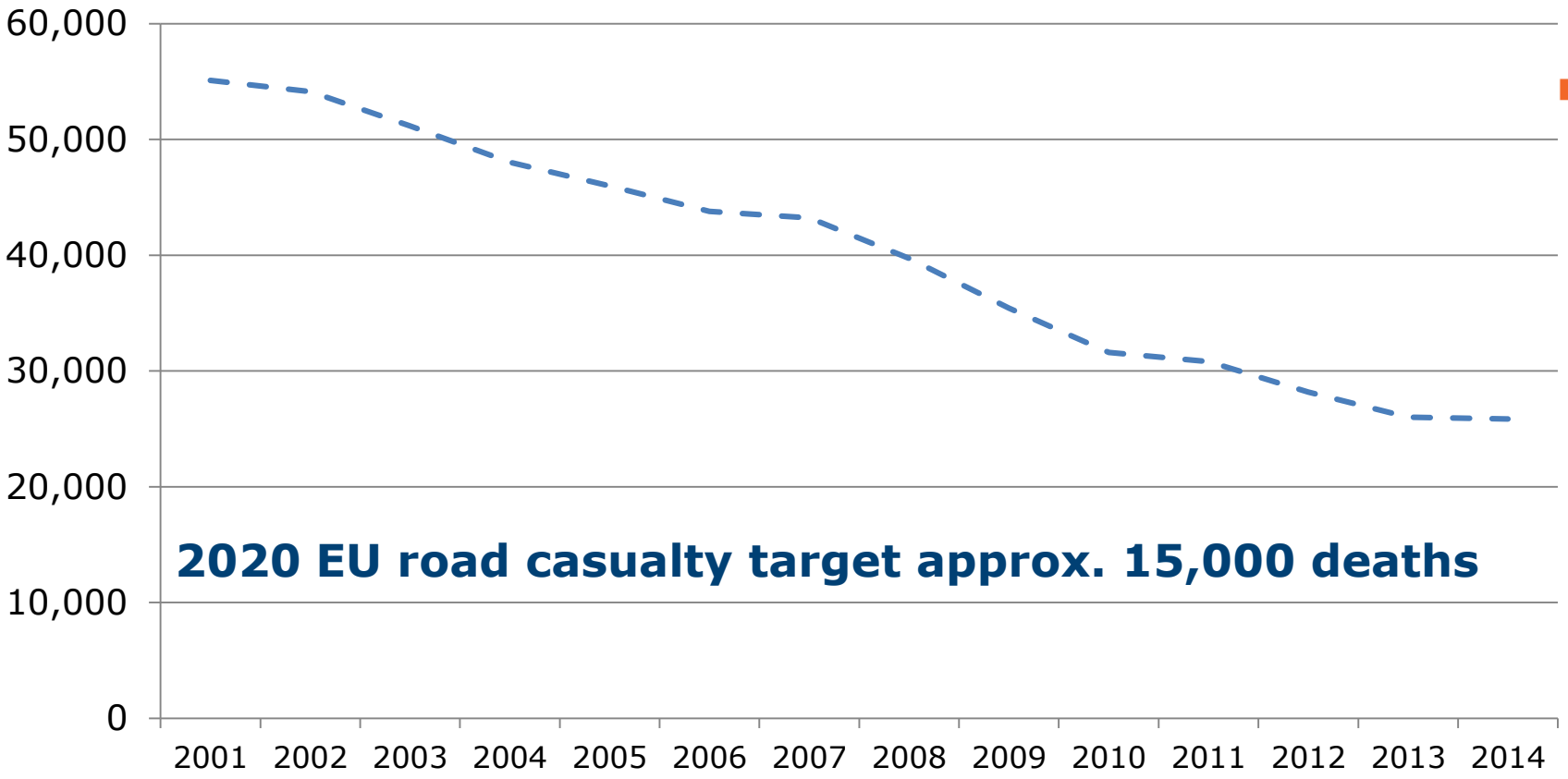
DfT plans to allow the use of smart devices in autonomous cars

"Richard Cuerden's creative media"

Opportunities to influence vehicle safety

Vehicle design and casualty prevention

Road fatalities in EU28



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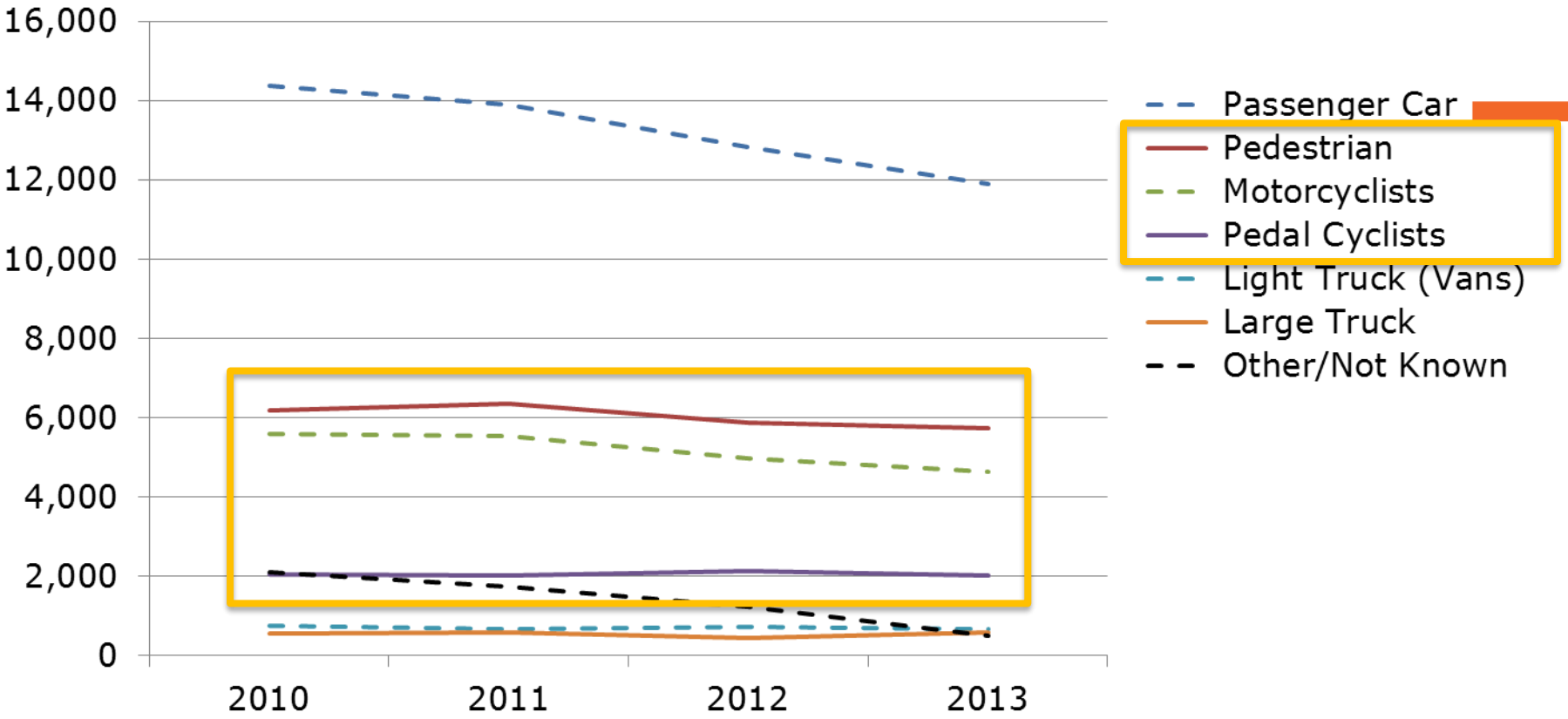
Vehicle design and casualty prevention

Road fatalities in EU28



The downward casualty trend is mainly associated with cars

Progress for VRUs (pedestrians, motorcyclists and cyclists) is not as good

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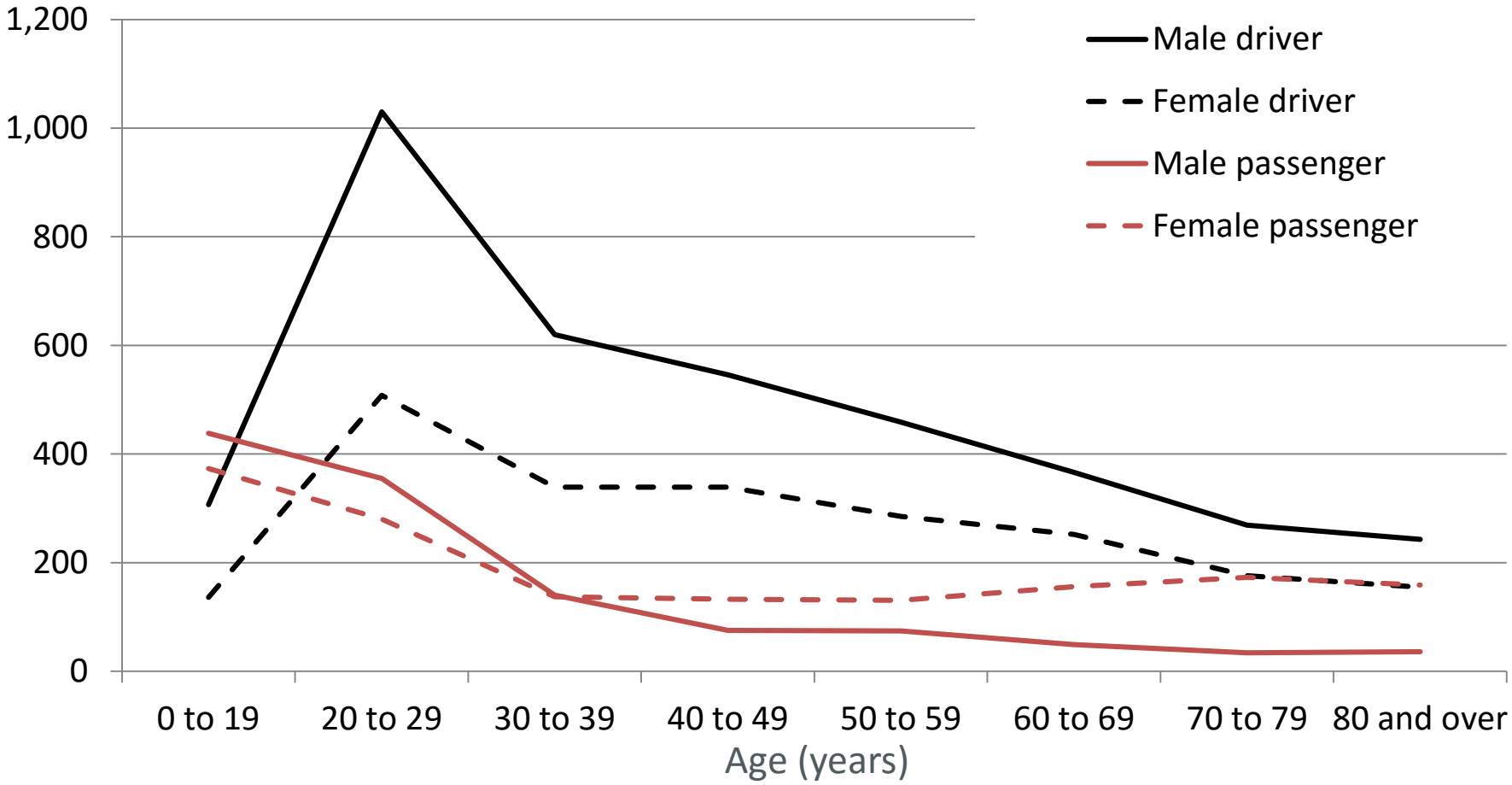
Vehicle design and casualty prevention

Reported number of KSI car users, Great Britain, 2014



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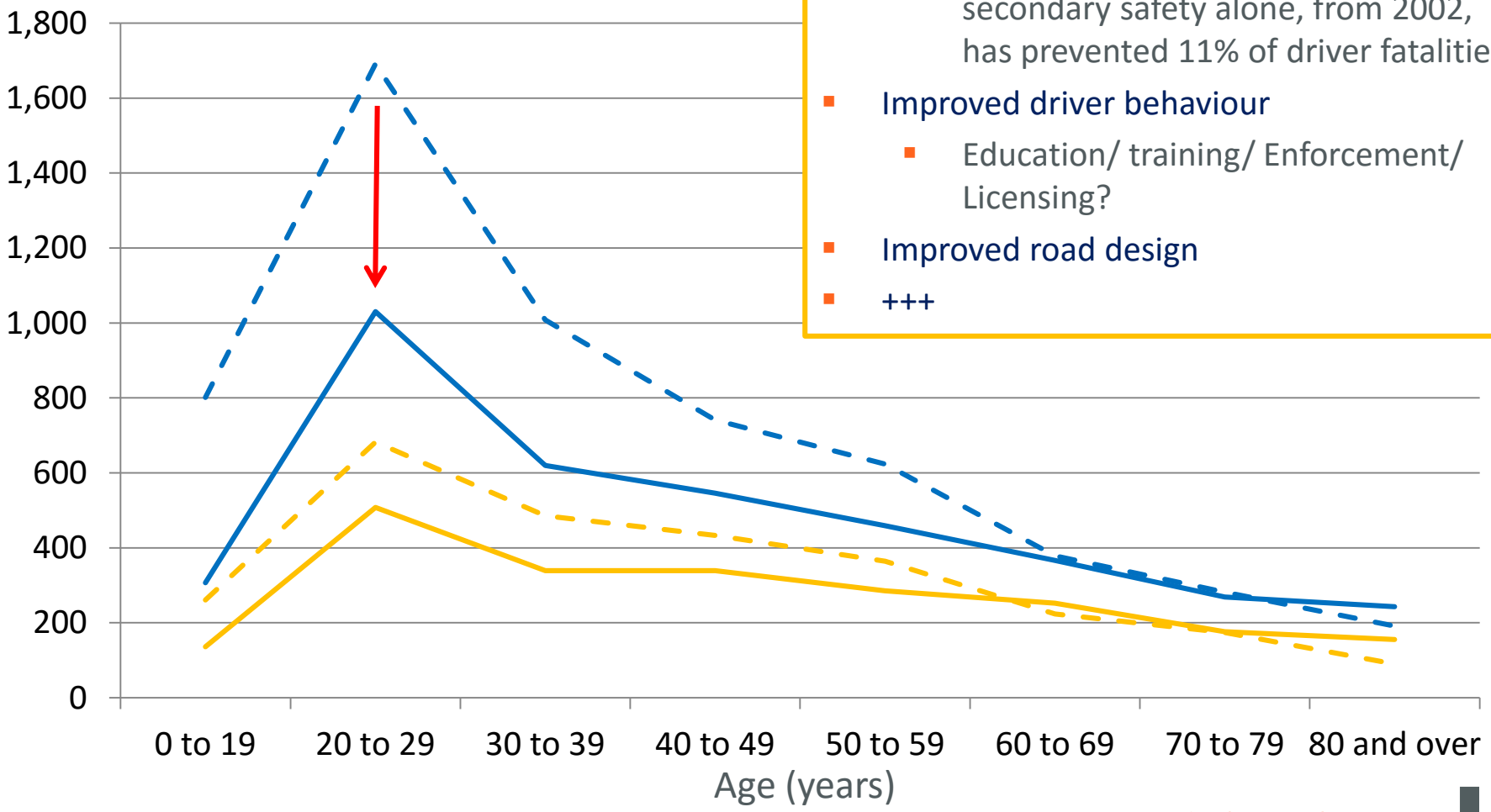
Vehicle design and casualty prevention

Reported number of KSI car driver

Car driver casualty reduction:

- Largest reduction for younger males
- Changes in exposure
  - Less driving by younger people?
- Improved vehicle safety
  - Cuerden et al. (2015) estimated that secondary safety alone, from 2002, has prevented 11% of driver fatalities.
- Improved driver behaviour
  - Education/ training/ Enforcement/ Licensing?
- Improved road design
- +++



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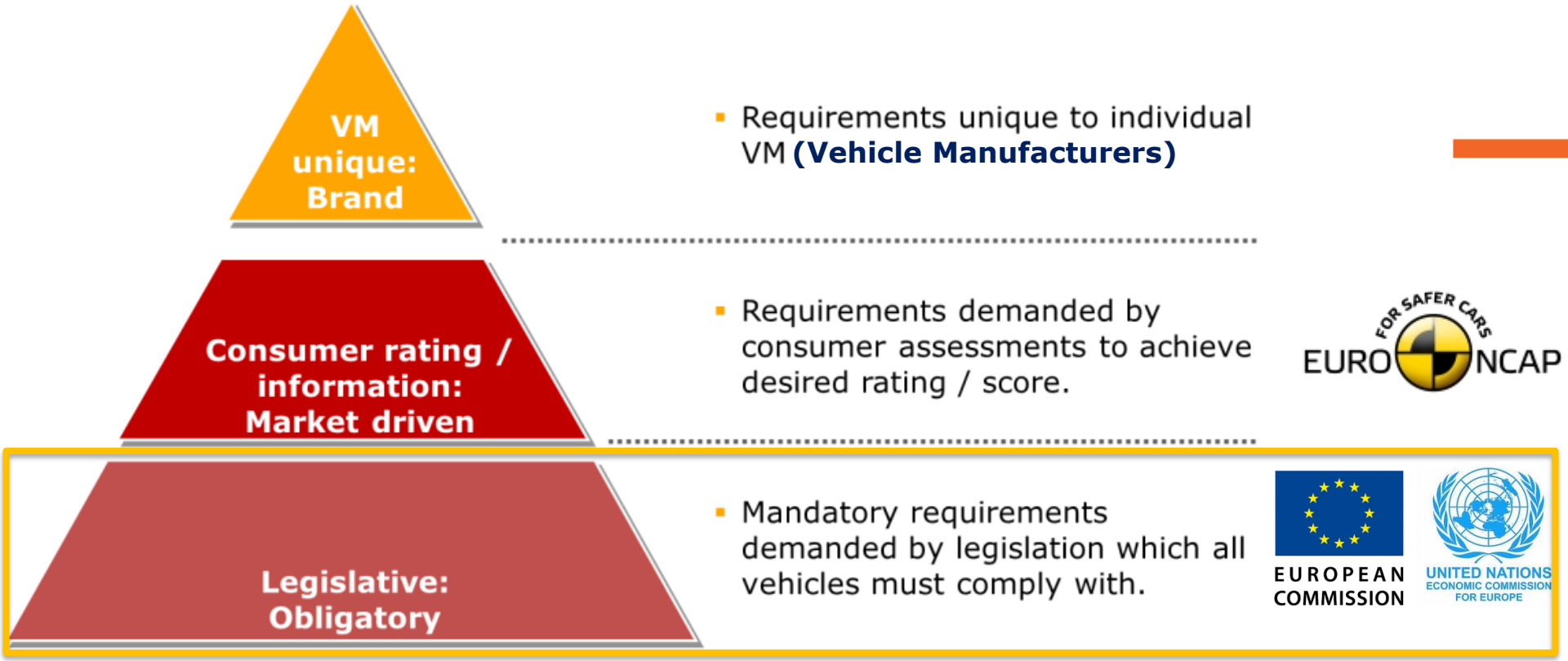
Vehicle design and casualty prevention



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General and Pedestrian Safety Regulation

- **General Safety Regulation (GSR) EC 661/2009 published 2009**
  - Type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units
  - Includes
    - Implementation of UN Regulations
    - DRL, ESC, tyre pressure monitors (cars)
    - LDW and AEBS (trucks and buses)
- **Pedestrian Safety Regulation (PSR) EC 78/2009 published 2009**
  - Type-approval of motor vehicles with regard to the protection of pedestrians and other vulnerable road users
  - Includes the following VRU passive safety requirements
    - Legform to front of car
    - Adult and child headform to bonnet
    - Monitoring of upper legform and adult head to windscreen tests

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General and Pedestrian Safety Regulation

The TRL study published in 2015:

- Provided advice to the Commission regarding the **feasibility, costs and benefits of 50 potential measures** that could be included in the GSR or PSR
- **The investigation was based on existing evidence** identified in a review of the literature and through stakeholder consultation
- The output is **indicative cost-benefits, which differentiate those measures** that are likely, moderately likely or unlikely to provide a benefit consistent with the cost of implementation
- Helped the Commission to **prioritise possible future amendments** to the GSR and PSR to improve vehicle safety

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General and Pedestrian Safety Regulation

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General and Pedestrian Safety Regulation

Measures being taken forward include ….

- Automated Emergency Braking (AEB)
- Emergency Braking Display
- Intelligent Speed Assistance
- Lane Keeping Assist
- Driver Distraction/Drowsiness Monitoring
- Seat Belt Reminder (all seats)
- Frontal Impact Crash Programme
- Side Impact Crash Programme
- Rear Impact Crash Programme
- Alcohol Interlock Device Installation
- Crash Event Data Recorder
- Tyre Pressure Monitoring
- Truck Front End Design Programme
- Truck Rear Underrun Protection
- Truck Lateral Protection
- Bus Fire Safety Programme
- Pedestrian/Cyclist Detection
- Head impact on A-pillar/windscreen
- Reversing Detection

Potential to ‘bundle’ measures with shared functionality

- **Technologies: Cameras, sensors**
- **Complimentary measures, i.e. Lane Keep Assist and Driver Distraction/Drowsiness Monitoring**

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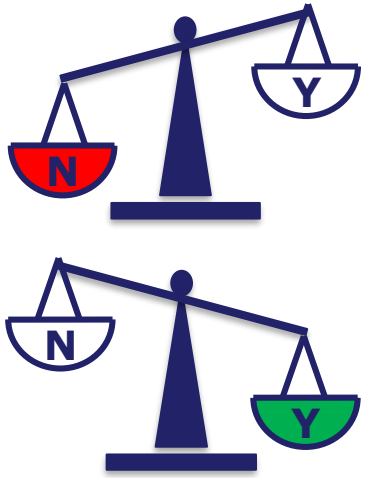
Cost benefit assessments

Costs

- Where possible, identify the costs to the industry of meeting new Regulations, including:
  - An assessment of market readiness and feasibility of technologies
  - Maturity of testing requirements – repeatability and reliability

Benefit



- Identify the EU28 road casualty target population
- Evaluate the effectiveness of each measure(s)
- Calculate the likely casualty prevention
- Monetise casualty savings

Competitiveness assessment and ‘fitness checks’

- Could Regulation damage the EU vehicle manufacturers competitiveness?
- Does it meet the EC’s Regulatory Scrutiny Board (RSB) guidelines?
- Will it be relevant in 5 or 10 years?

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Cost benefit assessments

To quantify the **benefits** requires an evidence base. Targeted in-depth collision investigations can:

- Accelerate the identification of the countermeasures
- Provide a real world assessment of the effectiveness of each measure

TRL RAIDS team

Acknowledgement:
The UK's Department for Transport

Road Accident In-Depth Studies (RAIDS) Programme

- Crash and injury causation
- Road and environment design
- Vehicle safety design
- Road user behaviour
- Evaluation of safety measures
- Assessment and indentification of future countermeasures

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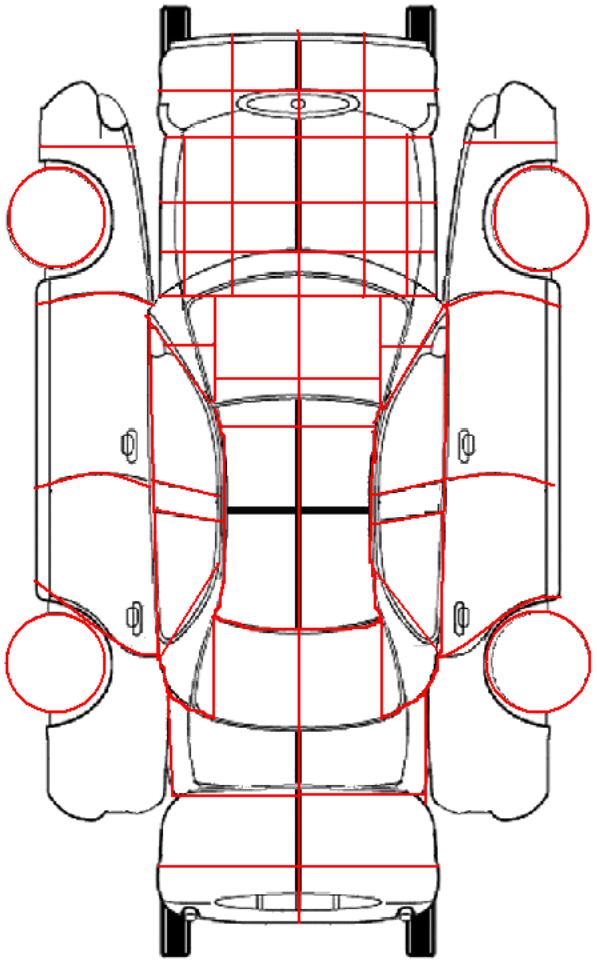
Cost benefit assessments

Example of quantifying the benefits

Head impact on A-pillar/windscreen

Causes of pedestrian injuries

- 34 police fatal files were analysed:
  - A pedestrian accident with a car registered in 2000 or later
  - Post mortems were available
  - Good quality photographs were available showing the damage to the car
- The post mortems were coded using the Abbreviated Injury Scale (AIS)
- AIS 2+ (serious) injuries were attributed to the part of the car or ground that caused the injury



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Cost benefit assessments

Example of quantifying the benefits

Head impact on A-pillar/windscreen

- Child crossed from between parked cars from the right of the vehicle
- The car impact speed was **20-24 mph**

Pedestrian

- Pedestrian was a 10 year old girl
- Height 138 cm
- Massive head injuries

Collision avoidance

- A pedestrian Automated Emergency Braking system could not have prevented the collision
- Edwards et al. (2015) reported that **20% of pedestrian fatalities could be prevented with AEB systems**

Edwards et al. (2015) Assessment *of integrated pedestrian protection systems with Autonomous Emergency Braking (AEB) and passive safety components* - Traffic and Injury Prevention, Vol. 16, Suppl. 1, 2015

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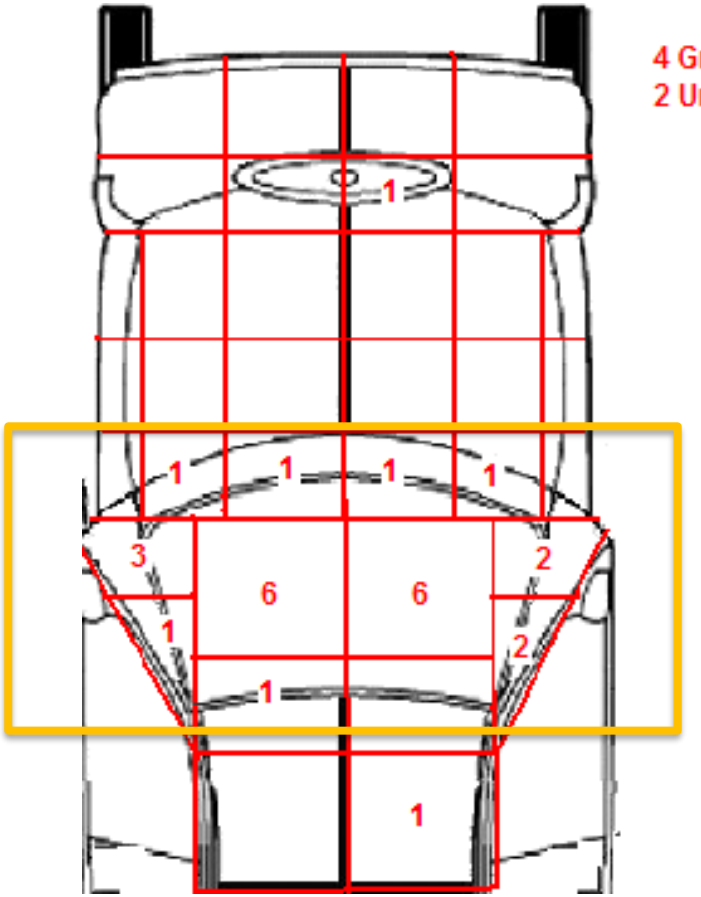
Cost benefit assessments

Example of quantifying the benefits

Head impact on A-pillar/windscreen



4 Ground
2 Unknown

Acknowledgement:
Euro NCAP

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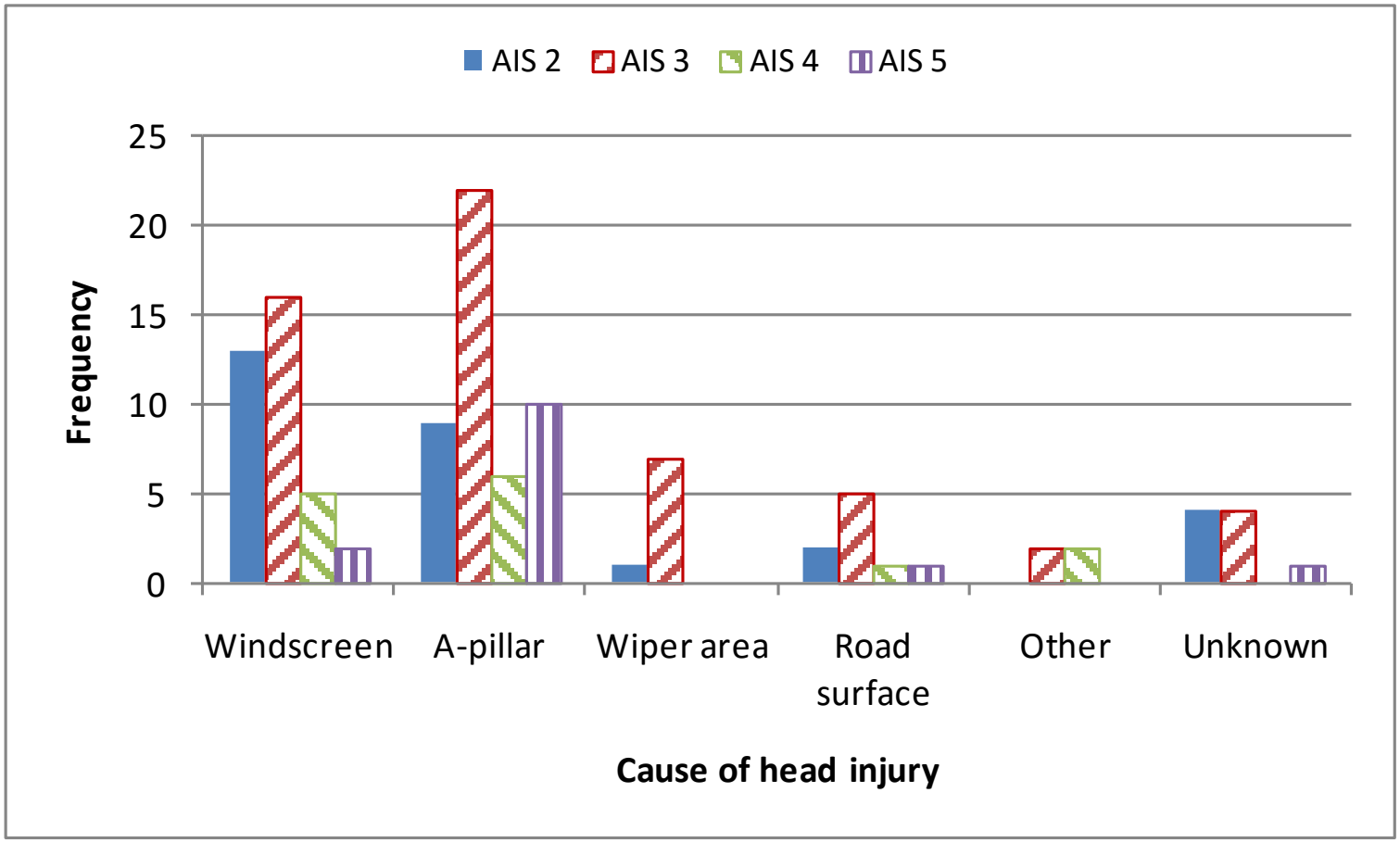
Cost benefit assessments

Example of quantifying the benefits

Head impact on A-pillar/windscreen



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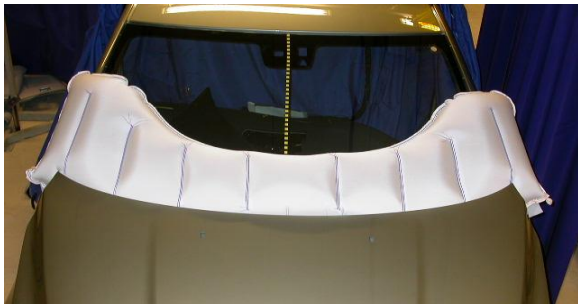
Cost benefit assessments

Example of quantifying the costs

Head impact on A-pillar/windscreen



Option 1: Industry data

- Vehicle manufacturers and suppliers provide information with respect to the research and development, design and additional manufacturing and/or material costs.

Option 2: Break-even approach

- Monetise the annual pedestrian (and pedal cyclist) casualty savings across the EU28, based on the injuries prevented.
- Divide this, by the number of new vehicles sold in the EU28 in the same year.
- Assess whether the additional cost per car is proportionate and reasonable.

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Conclusions

Regulation must be relevant and cost-effective and reflect:

- The rate of change of the make-up of the fleet – the ***evolution of vehicle and safety technologies is unprecedented***
- The changing road user demographics and journey characteristics, with ***an ageing population*** and ***different mobility trends***

These will effect road collision risk and injury characteristics and today's ***Regulations must be 'future proof '***

Encourage a Safe System (integrated) ***approach***

- e.g. AEB and improved crashworthiness are complimentary
- Bundle measures which share technologies

Preventing future road casualties must include a ***vehicle safety strategy for pedestrians, pedal cyclists and motorcyclists***

- Approx. 50% of road deaths in the EU28

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Conclusions

Need better real world road collision evidence

- UK RAIDS, Germany GIDAS, Volvo in-depth accident study + others
- ***Propose a new EU in-depth road collision study***, where the data would be ***freely available to help democratise safety and remove commercial barriers to saving lives***

Future amendments to the GSR and PSR will be recommended to the European Parliament in 2016, based on the ***outcome of a cost benefit assessment***, and potentially including:

- Pedestrian head impact on A-pillar/windscreen
- Automated Emergency Braking for cars (incl. pedestrian)
- Intelligent Speed Assistance
- Driver Distraction/Drowsiness Monitoring
- Safety-Belt Reminder (all seats)
- Alcohol Interlock Device Installation
- HGV Direct Vision standards
- + others

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Thank you
Any questions?

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