ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Making Road Safety Pay

Building a safe road transport system for Britain

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

> The Department for Transport should join leading countries and develop a ten year 'Towards Zero' strategy for publication mid-decade. This strategy should identify performance goals for the reduction of road deaths and serious injuries and track the cost of serious road crashes on the roads for which individual authorities are responsible. A 'Towards Zero' Task Force should be established of stakeholders to provide the multi-disciplinary leadership required.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Contents

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Forewords

Lord Whitty, Chairman, Road Safety Foundation

As technology advances and understanding grows that we no longer need accept sudden, violent road death as such a significant cause of premature loss of life, international organisations such as the Organisation for Economic Co-operation and Development (OECD) have called for governments to focus on the economic cost of road crashes and move road deaths 'towards zero'. The strategies of other leading countries in road safety have changed and Britain too must adopt a 'towards zero' goal and design, plan and legislate in a way that will put safety on our roads on the same footing as safety in the air, sea or on rail. Dying or being seriously hurt on the roads should become as alien as it is at work or from using any other product or service.

Advancing technology means safety on the roads can be designed as a single system. Modern car and road design properly implemented and working together is capable of protecting us at a level which was unimaginable just two decades ago. It can also nudge us as drivers back inside a safe driving envelope when our human attention wanders. It cannot stop the wilful wrong doing of a minority. It cannot stop accidents that are genuinely accidents because they are so rare and so unpredictable. But it has the potential, after more than a century of motoring and more than 5 million Britons killed and seriously injured, to make road travel no more dangerous than any other risk in daily life.

Designing and implementing this 'Safe Road Transport System' means a new approach to sharing and accepting responsibility. Drivers must accept responsibility for driving safely. Vehicle manufacturers must accept responsibility for providing safe vehicles. Road authorities must accept responsibility for providing safe road infrastructure.

The cost of road crashes is currently in excess of 2% of GDP. This report addresses a missing discussion in Britain about how we can unlock financial incentives to reduce the scale of the huge social and economic loss and build a safe road transport system faster. How do we address the many market failures which prevent making 5-star drivers in 5-star cars on 5-star roads an economic proposition? Where are the quick concrete wins which are not just worthwhile in their own right but help build wider societal support for the reform and focus we need to make road safety pay?

This report concludes that the policies and actions likely to have quick additional impact are:

- New financial instruments which incentivise investment to reduce the costs of road crashes borne by business, families and NHS, emergency, and care services
- Promotion of safe driving in the high risk 17-25 group through incentivising telematics insurance
- Accelerating support for safe driving after 80 as this age group rapidly expands
- Targeted high return infrastructure safety investment on motorways and 'A' roads
- Regulation and promotion to achieve faster deployment of vehicles with active safety features

The government should formally adopt the 'towards zero' goal of advanced nations. It should help business, families and government departments make road safety pay.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Andy Watson, CEO, Ageas UK

Every single day in Britain there are serious car crashes, with thousands of people being killed or severely injured each year. As the third largest motor insurer in the UK, Ageas is only too aware of the impact of these crashes. We see the devastating effect on people involved, their friends and families, and all those who have to deal with the aftermath. While our customers can be confident that if they are in an accident, large or small, we will be there to support them, it would be wrong for us not to do what we can to reduce the chance of them being in a crash in the first place.

Ageas takes its responsibilities seriously. This is the third year that we have sponsored the Road Safety Foundation's EuroRAP report, an important piece of research that provides real insight into the safety of road infrastructure, showing just how critical road design and construction is for saving lives and preventing accidents.

Ageas is pleased that this year we have also been able to commission the Road Safety Foundation to produce Making Road Safety Pay. We asked the charity to undertake an analytical piece of research taking a comprehensive view of road safety in Britain with recommendations which could be turned into practical actions.

Making Road Safety Pay provides innovative ideas covering not just road infrastructure, but also drivers and vehicles. If other countries can be bold and set out to move the number of road deaths 'towards zero' there is no reason the UK cannot and the report sets out how a 'Safe Road Transport System' can be created in which all parties involved take responsibility and play their part.

Making Road Safety Pay has some exciting ideas for two groups of drivers at different stages of life: the under-25s and the elderly.

With an ageing population we need to take steps now to support people in later life to continue to drive safely and Ageas entirely supports its suggestion of a UK National Older Driver Strategic Plan to look at how best to achieve this. There is wide support for the creation of a taskforce to develop this plan among stakeholders.

As young drivers are disproportionately a danger to themselves and other road users, and as the Government continues to weigh up the pros and cons of introducing Graduated Driver Licensing, we will push for greater awareness of and uptake of telematics based motor policies, which can reduce crashes by almost a third. That is why Ageas has publicly called on the Government to implement the report's recommendation that Insurance Premium Tax be removed from such policies for under-25s for seven years while the market matures – a move which could save over a thousand lives and £500m.

Ageas will also be working closely with our corporate partners, such as Thatcham, to build on the road safety agenda and encourage debate linked to the other recommendations in the report. A greater investment in road infrastructure to ensure they achieve much higher standards. The encouragement of vehicles with active safety features, especially Autonomous Braking Systems. New ways of financing road safety measures to reduce the costs of crashes. All have a part to play.

In any other walk of life we would not accept death and injuries on the scale we see on our roads today, and Making Road Safety Pay shows the need for real action from everyone involved - Government, public bodies, car manufacturers, drivers and passengers, road designers and the insurance industry - to stop the devastation on our roads. I am proud that Ageas has supported it and would like to thank all those involved in its production.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Executive Summary

The cost of road crashes

Road crashes have a major human and financial cost to the UK. Hospitals record 40,000 serious injuries each year and 1,700 people were killed in 2013 devastating the lives of those involved and their families, friends and colleagues.

Crashes cost the British economy more than £30 billion annually, equivalent to 2% of GDP, with costs falling on families, businesses, the emergency services, NHS, long term care providers, highways authorities and many others. The costs of bodily injury rise in a normally growing economy at 25% per decade in real terms. Unlike other causes of death, road crashes tend to strike the young, healthy and productive.

The financial cost is borne by taxpayers and businesses through taxation and direct costs.

Motor insurance is a significant direct expense for many households and businesses which collectively costs the nation £10 billion a year. Around £5 billion of this goes towards bodily injury claims. Individual court settlements can reach £20 million.

Road safety is a global problem and the UK can learn much from other administrations. In Victoria, Australia, the Traffic Accident Commission not only compensates individuals for road crashes but also invests in programmes to reduce its claims costs. Victoria has become a global leader in road safety by funding interventions which are carefully evaluated in a financial environment for cost effectiveness. It invests at a rate 10-100 times greater than most authorities.

The same high return interventions in the UK are not pursued because those who could reduce the costs borne by others do not have the means to finance them. However, it does not require wholesale reform of institutions to link the interests of those who pay the costs of road crashes with those who could deliver reductions. This could potentially be achieved through well-constructed financial instruments such as social impact bonds (also known as pay-for-success bonds) that are currently being developed by the G8 Social Impact Task Force.

The Government should work with industries and charities to identify the financial cost of serious road crashes borne by individual authorities and by business and families. It should pilot innovative Social Impact Bonds ('Safety Bonds') to finance safety programmes which pay out to investors when lives and money have been saved.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

The 'Safe System'

In the last decade, international organisations and leading countries in road safety worldwide have endorsed the Safe System approach as a means of eliminating serious trauma on roads. The Organisation for Economic Co-operation and Development (OECD) has called for the Safe System approach to be pursued with a focus on reducing the economic costs of road crashes and ambitious targets which aim to push road deaths 'Towards Zero'.

The rapid development of new technologies is accelerating the pace at which the complementary actions needed to deliver safe driving in safe vehicles on safe roads can be achieved. For example, speed limits can now be based on the protection engineered into roads and vehicles: roadside and in-vehicle warning can tell drivers if they are exceeding a safe speed.

The vehicle industry has embraced the approach and some manufacturers have already set the goal that no-one will die in their vehicles. They are reaching accords with road administrations on the development of the complementary infrastructure on higher speed roads needed to achieve that.

The Department for Transport should join leading countries and develop a ten year 'Towards Zero' strategy for publication mid-decade. This strategy should identify performance goals for the reduction of road deaths and serious injuries and track the cost of serious road crashes on the roads for which individual authorities are responsible. A 'Towards Zero' task force should be established of stakeholders to provide the multi-disciplinary leadership required.

Safe driving

Two groups of drivers are at significantly higher risk than other drivers: under 25s and over 80s. There are actions which could reduce the costs these groups bear.

Young drivers

Road crashes are the leading cause of death and life changing injury amongst young people. In 2012, 32,400 reported crashes involved drivers under the age of 25 which resulted in 350 deaths and more than 4,100 seriously injured casualties. It is when a young person passes their test and starts to drive without supervision that they are at their most vulnerable. The policy challenge is to create initiatives that incentivise all young drivers to choose to drive safely, detect and penalise those who don't, and reward the majority who strive to stay safe.

Currently, safety conscious young drivers and their families can be faced with average annual insurance premiums of up to £2,000, largely to cover risk from a minority of unsafe young drivers. Telematics insurance has emerged in Britain as a significant new force which allows information on how well a vehicle is being driven to be monitored.

This option is now offered by all major insurers and some 20% of young drivers (or their parents) choose it. Telematics insurance not only results in lower insurance costs but provides engaging, positive feedback to the driver.

A package of measures to support young driver safety should incentivise the take up of telematics insurance and introduce other small, low cost improvements. The two year post-test probationary period should be extended to three years and the current hazard perception test should be reviewed to keep it in line with other recent digital and technological advances.

The Government should introduce a zero Insurance Premium tax (IPT) rate for insured vehicles fitted with a telematics unit for drivers under the age of 25 to signal societal support and defray the cost of installing and operating telematics insurance. This rate should be maintained for a minimum period of 7 years until the telematics insurance market is mature.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Older drivers

Being able to drive is a key part of older people maintaining independence. There is a large, fast growing demographic of older drivers who are driving safely or can be supported to drive safely to the benefit of themselves, their families and the economy. But, older drivers do face a number of challenges, including a reduced ability to judge speed and to read complex driving situations, and a natural decline in vision. This natural ageing process varies significantly across the older population. Most older drivers have substantial driving experience, are aware of their ageing, and are successful in self-regulating how, when and where they drive.

The USA has already begun planning to support the increasing population of older drivers in a national strategy starting with a review of needs and data. There are many ways in which increased support can be given - from better researched and targeted advice to the design of roads markings and new vehicle technologies which assist and protect older drivers.

Britain should develop a National Older Driver strategy beginning with the collation of data on driving after 80. The Government should establish a task force which includes representatives from charities and the insurance, roads and motor industries to review evidence and recommend practical support for older drivers and their families. Initiatives it could focus on include self-help, driver assistance technologies, and better in-vehicle protection and road design for older drivers.

Safe vehicles

The largest contribution to British road casualty reduction in the last decade has come from improvements in vehicle safety. The New Car Assessment Programme (NCAP), established with the support of the British, Dutch and Swedish governments, helped raise the crash test performance of new cars from a typical 2 or 3-star rating to 4 or 5-star rating. Each additional star improvement has been estimated to reduce deaths and serious injuries by at least 15%.

The majority of vehicles now on the roads have good passive safety with air bags and crumple zones. Looking forward, advances in active safety will deliver the major additional safety benefits. These systems seek to intervene before a crash occurs and are already being shown to reduce crash costs significantly.

NCAP provides 'market pull' to create demand for safer vehicles, which can be supported by leading governments, consumer bodies and the insurance industry. However, as new technology becomes proven in practice, there is also need for regulatory action to 'level up' safety performance on all vehicles. It is already clear from work on the claims reductions by US and British insurance research centres that the next technology to be mandated in new cars should be low speed autonomous emergency braking: research findings from Thatcham suggests it could result in a 25-40% reduction in claims in Britain.

Road deaths in the course of work are three times greater than all other workplace deaths combined. Business can play a significant role in reducing crash costs through informed fleet purchasing policies. It can manage safer driving in the course of work as part of executing the duty of care and reducing business costs.

Motor manufacturers should fit low speed Autonomous Emergency Braking (AEB) as standard on all new cars. The EU should mandate low speed AEB as standard on all new cars from 2017. Research should also be accelerated on the more demanding technology required for AEB at higher speeds. Insurers, the Confederation of British Industry and the Health and Safety Executive should promote the global NCAP's Fleet Buyers Guide to British business and proven management actions that reduce the cost of crashes in business fleets.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Safe roads

Half of Britain's road deaths are concentrated on Britain's motorways and 'A' roads outside cities. The Road Safety Foundation's (RSF) annual EuroRAP publication, published as a companion to this report, maps the rate of death and serious injury across more than 30,000 km of motorway and 'A' roads. This work is part of a global programme with results available for more than 70 countries.

Risk Mapping shows the rate of death and serious injury on a section of road which can be affected by safer drivers, safer vehicles or safer roads. The 'Star Rating' of a road, as with cars, measures the inbuilt safety of the road infrastructure. Most new cars sold in the UK reach a 4 or 5-safety rating; most 'A' roads achieve only a 1 or 2-star rating.

The Risk Mapping shows that the rate of death and serious injury on many road sections used by the same vehicles and drivers can vary by a factor of 10 or more. The risk of dying on a main road in the East Midlands is 70% higher than the West Midlands because more travel is on roads with lower star ratings. Work internationally suggests that, at the same level of traffic, crash costs broadly halve with each 1-star improvement. The annual economic loss from serious crashes per kilometre of main road in Britain is typically £100,000. The safest roads for an individual to drive on are typically motorways which typically have a 3 or 4-star rating at 75mph.

The Dutch Transport Minister was the first elected leader worldwide in 2010 to declare that their national network would be managed to achieve a minimum 3-star safety rating by 2020. The New Zealand government has adopted a goal of 4-star safety for 'roads of national significance' and the Swedish government is upgrading thousands of miles of single carriageway road to a 3- and 4-star standard. These goals are based on rational economic evaluation.

In Britain, there is as yet no announced goal for the safety performance of existing roads. There is, however, a major opportunity. The Government is legislating to transform the Highways Agency into a public corporation which will require oversight of safety together with an approved investment plan.

When strategic national roads become the direct responsibility of the public corporation, all roads with less than a 3-star safety rating need to be eliminated. Transparent minimum safety levels of 4-stars should be required for busy national roads such as motorways and a minimum 3-star ratings for all other trunk roads.

The Government should establish a long term goal to raise the safety of local authority 'A' roads to a 3-star minimum level to be achieved largely during maintenance and prioritising reductions in economic loss. Consistent with the safe system approach, the Government should establish a Road Safety Inspectorate with powers focused on supporting authorities in investigating persistent serious crashes on high risk roads and preparing rectification plans.

When national roads become the responsibility of the public corporation, transparent minimum safety levels of 4-stars should be adopted for the busiest national roads and minimum 3-stars for all other national roads to be achieved in the period 2020-2030.

The Government should establish a long term goal to raise the safety of local authority 'A' roads to a 3-star minimum level to be achieved in the period to 2030. To complement this goal, the Government should establish an independent Road Safety Inspectorate whose powers should be focused on investigating persistent serious crashes on stretches of high risk road and supporting the rectification plans of responsible road authorities.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Section 1
The cost of road crashes

ROAD SAFETY FOUNDATION
ageas
Commissioned by Ageas

Section 1 The cost of road crashes

There were over 1,713 road deaths reported in 2013. The total of all reported injury crashes totalled 183,670 and of these, 21,657 were recorded as serious by the Police.

Costs to the economy

Road crashes create considerable financial and economic costs as well as impacting on people's lives. The British economy loses more than 2% GDP in road crashes estimated at £34 billion[2].

The cost of road crashes is ultimately borne by families and business. The way the costs fall on family budgets, business bottom lines, the emergency services, the NHS and long term care services, highway authorities and others is diffuse and not well understood. The lack of transparency inhibits effective action. Hospital records, for example, carry double the number of serious road crash victims (around 40,000) as Police records[3].

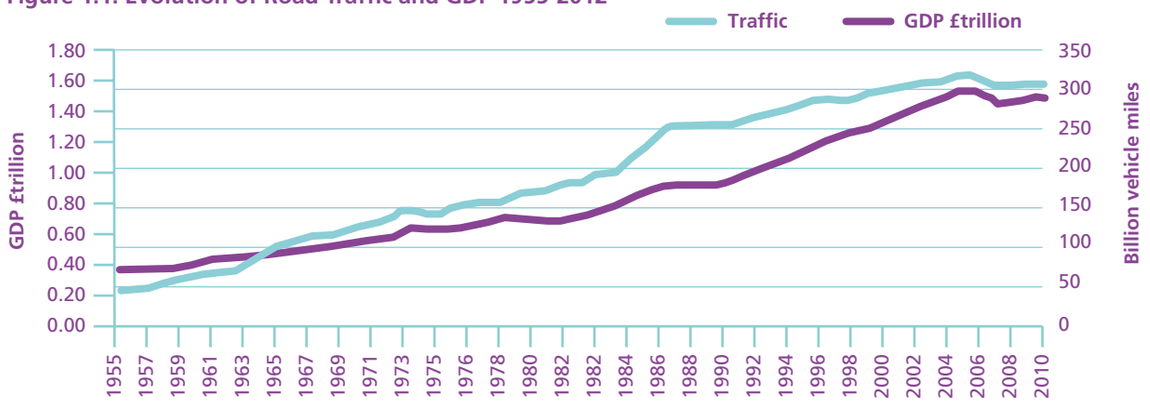
Unlike other causes of death such as heart failure, road crashes tend to strike the young, healthy and productive increasing costs to the economy.

Britain has been reducing serious crashes at a rate of 40% per decade. However, in a growing economy, this rate of reduction barely offsets the rising cost of death and injury at around 30% per decade. Based on accident data held by police, the Road Safety Foundation estimated the cost to the economy at £18 billion but applying Department for Transport research findings to correct for the known high rates of under reporting, it estimated the true economic cost as up to 2.3% GDP (£34 billion[2]). In Britain, ambulances, health and long term care are also largely free at the point of need which contributes to the difficulty in recording and estimating the true financial cost of road traffic accidents (RTAs).

Traffic volumes are highly correlated to GDP and the cost of motoring. Figure 1.1 shows the rise in total British road traffic[4] and GDP[5] from 1955 until 2010. Each extra mile travelled means an additional exposure to risk. However, internationally it has been observed that effective road safety actions can overtake a headwind of up to 5% annual growth in exposure.

The 2008 global financial crisis led to an unprecedented reversal of growth in GDP. This decline in GDP also coincided with a period of rising motoring costs. The resulting fall in traffic[4] and exposure delivered an unusual reduction in road casualties[6]. This decline in traffic ceased towards the end of 2013 as the British economy recovered (see Figure 1.2). Statistical work for this report suggests the crisis delivered a sustainable additional reduction in casualties in the order of 10%: for example, the oldest least safe vehicles that were scrapped have gone permanently. However, as the economy and traffic return to growth, actions on safety again have to overcome the normal headwind of growing exposure.

Figure 1.1: Evolution of Road Traffic and GDP 1955-2012



ROAD SAFETY FOUNDATION

ageas

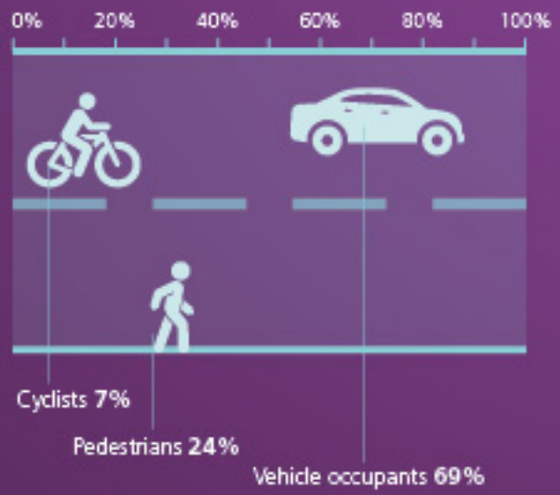
Commissioned by Ageas

An overview of British road deaths[1]

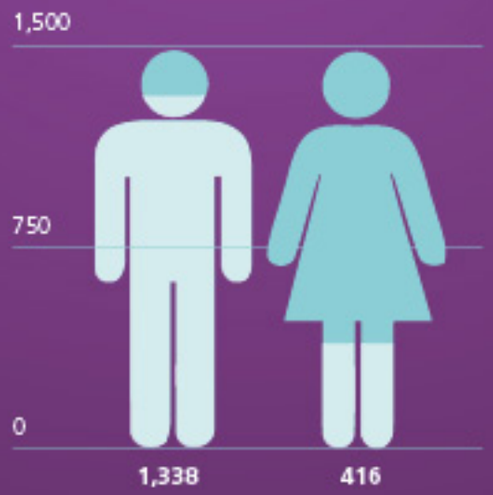
Key figures are given below for the total number of deaths in Britain. Those killed are overwhelming male (76%). The vast majority killed are car occupants (69%). The majority of deaths occur in rural areas. The vast majority die on single carriageways.

2012 road deaths by area type

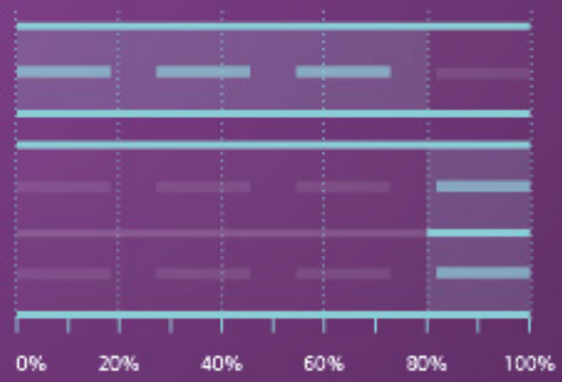
2012 road deaths by type of road user



2012 road deaths by gender



2012 road deaths by type of carriageway



Single carriageway **1,364** Double carriageway **328**

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

An overview of the cost of road crashes 2012

£34 BILLION

Annual economic cost to British economy in 2012: £34 billion (2% GDP).

£10bn

Financial costs of insured claims[1a] through motor insurance: £10 billion (1% of GDP)[b]

- cost of insured claims for bodily injury: £5bn
- legal costs settling claims: £1bn - £2bn

Average economic cost of a serious road crash:

- motorway £474,956
- rural road £463,703
- urban £288,984

£20m

Largest third party claim settled by British court: £20m+

£500

A typical private insurance premium

£1.7m

Economic cost of a death

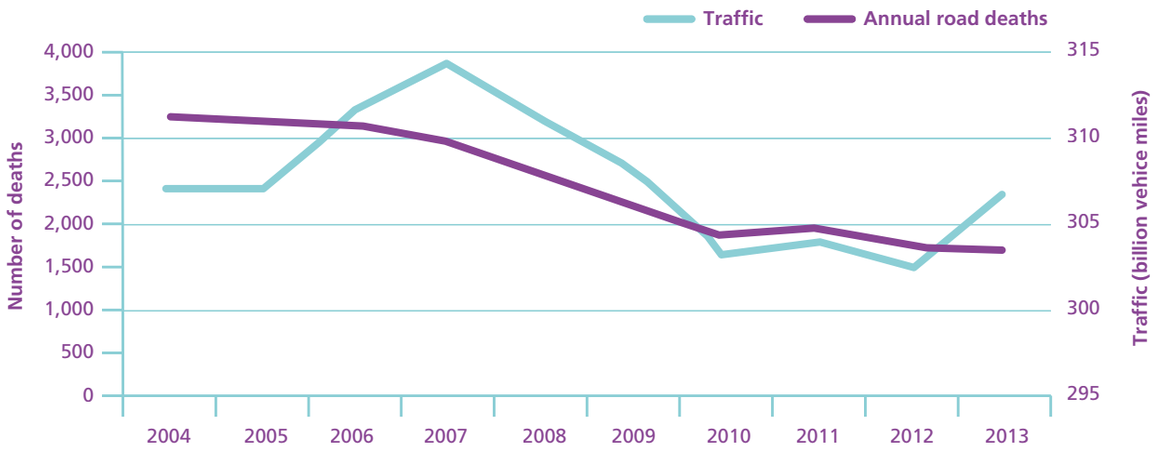
a. All numbers quoted are rounded for consistency
b. Motor insurance in Britain is an "at fault" regime. If a driver is at fault, policies typically pay a maximum of £10,000 for bodily injury, but cover up to £20m to third parties.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Figure 1.2: Road traffic and road deaths following the global financial crisis



Costs to consumers and business

Families and business incur very clear costs beyond the injury or loss of a loved one or employee. The most obvious cost is motor insurance which is a significant annual household expenditure, typically £500.

As central and local government taxpayers, businesses and families also pay for costs such as Police, Fire and Ambulance services; unrecovered NHS costs; long term care services; and all other uninsured costs that flow from road crashes from courts services to highway damage repairs.

Families and businesses also pay financial costs that are not covered by motor insurance or the taxpayer. For example, if the family member is injured while driving and is at fault then the family can face the costs of a lifetime of care only part of which may be covered by public services.

Businesses can face the loss of key employees or extended periods of absence from work and only some of these may be recouped through long term sickness policies (which in turn require other premiums to be paid).

In round terms, motor insurance costs equate to more than £10 billion (1% of GDP) and individual court awards have now reached £20 million.

Crash cost centres

Every year Britain suffers serious injury crash costs of £0.3 billion per year on motorways, £0.6 billion on national trunk roads, and £2.3 billion on local authority 'A' roads.

Defining 'crash cost centres' helps make the scale of economic loss from road crashes more transparent to local communities: the cabinet of every authority responsible for a network of roads should know and respond to the economic loss of the crashes that take place on their local network.

The Highways Agency network is Britain's single largest 'crash cost centre', with £0.7 billion of serious crash cost annually on its motorways and trunk roads (excluding the substantial resulting traffic delay costs).

The largest block of serious crash cost is on local authority roads. English local authorities lose £2 billion annually on their 'A' roads: a single local authority outside of a metropolitan area might typically be responsible for 300kms of 'A' road with 100-200 annual serious injury crashes carrying an economic cost in excess of £25 million.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Table 1.1: Cost of death and serious injury on motorways and 'A' roads (2008-2012 data, excluding roads in urban cores)

	Annual deaths	Annual serious crash cost £m	% of total GB main network crash costs
Highways Agency			
Motorway	93	300	9
Trunk	150	400	12
Total All Highways Agency	243	700	21
English local authorities	**514**	**2,000**	**62**
Scotland			
Motorway	7	20	1
Trunk	44	100	3
Local authorities	52	200	6
Total Scotland	**103**	**320**	**10**
Wales			
Motorway	3	6	0.2
Trunk	21	80	2
Local authorities	38	100	3
Total Wales	**62**	**186**	**5.2**
Total	**922**	**3, 206**	**100**

Making road safety make financial sense

Most countries tackle the costs of road crashes by defining distinct administrative budgets to handle the consequences of road crashes – budgets for police, for fire services, for ambulances, for health, for courts, for long term care and for roads. There are rarely financial incentives or opportunities for any of the individual budget holders to invest to reduce the costs of road crashes to another. For example, however much other budget holders may benefit, the Police bear only increased costs by increasing investment in enforcement; the Highway Authority bears increased capital and maintenance costs from investing in roadside safety fences.

Britain also has an insurance market which, unlike many overseas markets, has more than a dozen competing insurers. A single insurer would damage its competitive position if it acted alone to invest and reduce net claims cost: all other insurers would also benefit without bearing any costs. These "free rider" constraints mean in practice that action by insurers would have to be collective in some form: an example of collective action by insurers is the Motor Insurers Bureau which has invested effectively on behalf of all insurers to reduce the costs of claims from uninsured drivers.

Britain has a third party "at fault" insurance system for bodily injury. This means large insurance payouts for bodily injury are only made for some serious crashes and not all. If the claimant is not at fault, the payout may be up to £20 million. A payout to a claimant considered at fault is limited typically to

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

£5,000 or £10,000. The value of large insurance payouts involving bodily injury crucially depends on establishing fault and the support needed for those disabled. As a result, insurance companies pay £1 billion per annum in external legal fees[7] and perhaps up to a further £1 billion in internal costs resolving the more serious bodily injury cases.

The large value of the payouts and the range of possible financial outcomes means that perhaps more than a third of the total cost of bodily injury settlements is consumed in legal costs. These high legal costs are a key reason why a number of states in common law jurisdictions (eg Australia, New Zealand and Canada) have moved to no-fault compensation regimes and standard scales of compensation. Reducing delays and uncertainty for victims and their families at a distressing time is a further reason.

In Victoria, Australia the Traffic Accident Commission is required to pay the bodily injury costs resulting from road crashes. General commercial motor insurance covers other "bent metal" crash damage as in Britain. The financial costs of bodily injury are usually (but not universally) settled by a set scale. These costs are recouped from a levy in the annual licence fee thereby providing a direct line of sight of the financial and economic costs of bodily injury. The Commission therefore funds interventions which are carefully evaluated for cost effectiveness in a financial environment[8]. Its rate of investment in robust safety programmes is 10-100 times higher per capita than most authorities. As an emerging rule of thumb, safety projects which have a benefit cost ratio of 3 not only have an economic case for investment but also a financial case.

The new opportunity from social impact investment

The structure of Britain's competitive insurance industry together with the complexities of the NHS and long term care system means that it would be a lengthy, complicated path to introduce major organisational change.

However, it does not require time consuming reform of institutions to link the interests of those who pay the costs of road crashes with those who could deliver reductions. This could potentially be achieved through well-constructed financial instruments.

Worldwide, social programmes overseen by the public sector or philanthropy face the problem that financial and economic costs and benefits are often not well measured. The responsibilities for delivery are diffuse and difficult to coordinate. The outcomes required can be difficult to specify or monitor. Public sector programmes tend to be generated within the administrative control of a single entity and administered through a contract specified in detail. The availability of public investment capital is severely rationed. When investment decisions are made by authorities they tend to be more risk averse because of political criticism. Innovation and mid-course correction are more difficult.

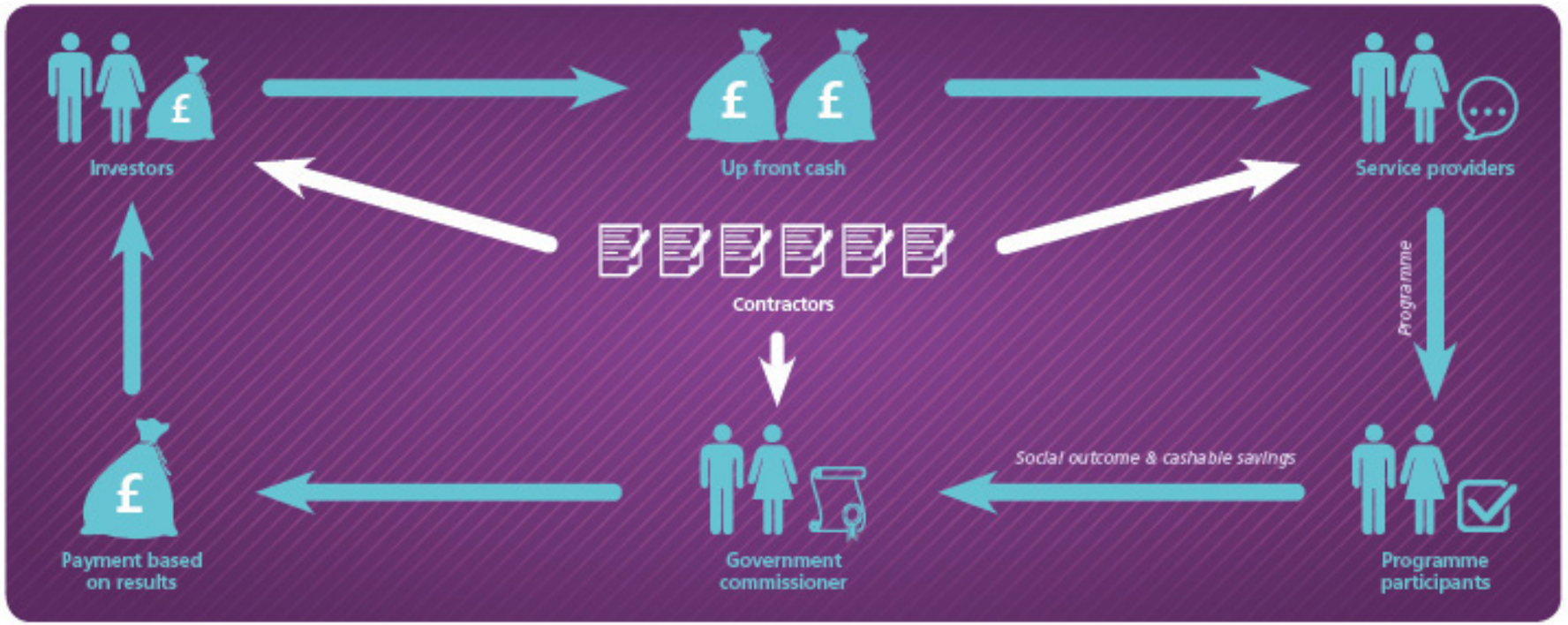
To address these problems, leaders of the G8 countries have established the Social Impact Taskforce[9] hosted by the UK's Cabinet Office. The Taskforce, chaired by Sir Ronald Cohen, has brought together government officials and senior figures from the worlds of finance, business and philanthropy from across the G8 countries to develop 'social impact investment'. The Task Force is exploring innovative ways to invest in improved social outcomes from public and philanthropic programmes and a full explanation of the approach is given at www.socialimpactinvestment.org.

The Taskforce has revealed there is a substantial appetite for social impact investment from banks, insurers, fund managers and philanthropy as with other ethical investment. One example of a fund is the Global Health Investment Fund established in 2013 by the Gates Foundation and JP Morgan[10]. This fund aims to advance the development of late-stage drugs, vaccines, and tools to increase the effectiveness of interventions to fight diseases such as malaria, tuberculosis, HIV/AIDS, and maternal and infant mortality. In this example, the Gates Foundation and Swedish government have agreed to accept a portion of the higher investment risk.

At this early stage in developing social impact investment, the appetite to invest vastly exceeds the well-constructed programmes available. Early pilot projects are small with high development costs and teething problems. Nonetheless, the portfolio of projects is growing. Cabinet Office has issued guidelines on how to develop the portfolio of projects highlighting:

- programmes of prevention which can address complex problems
- that government contributions should be made only when measurable success is achieved
- programmes should help greater involvement by charities and learning by service providers

Figure 1.3 How "Pay for Success" Bonds Work[12].



An example of a Social Impact Bond in practice: Peterborough Prison Rehabilitation Programme

In 2010 a small pilot began when the Ministry of Justice agreed to a Social Impact Bond to finance a rehabilitation programme for offenders leaving Peterborough Prison. An analysis of the full costs of reoffending across central and local government (police, courts, prisons, social services, victim support etc) showed the scale of financial and social savings that could be made if reoffending could be significantly reduced. Money to pay for the new rehabilitation programme was raised from 17 social investors – on the understanding that they would not receive any return unless there was a measured reduction in reconviction events, but would receive returns of 2-13% from the MoJ and Big Lottery Fund if it was successful. It provided the initial funding needed to set-up the programme until it was given an alternative funding arrangement in 2014.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

The emergence of 'pay-for-success' bonds or 'social impact bonds' has significant implications for preventing road trauma. Britain's loss of 2% GDP is echoed worldwide: the World Health Organisation estimates 1.2 million are killed annually placing the total health burden alongside malaria, tuberculosis and HIV/AIDS. A new universal development goal has been proposed to halve global road traffic deaths[13]. Philanthropies such as the Bloomberg Foundation and FIA Foundation have already committed substantial sums to road safety.

In the USA, the Obama Administration is promoting 'pay for success (impact) bonds' throughout Federal and state agencies including 'safety bonds'. The National Highway Traffic Safety Administration has published a full financial and economic analysis of the estimated $871bn annual cost to the USA of road crashes[14].

The UK based charity, the International Road Assessment Programme (iRAP), has developed and demonstrated worldwide robust and innovative measurement of infrastructure safety. It is currently working with Victoria's Traffic Accident Commission and the FIA Foundation to provide detailed correlations between the financial costs of claims and the effectiveness in interventions using Victoria's well evaluated AU$1bn investment programme of 'safer roadsides' and 'safer intersections'.

Such work is readily transferable to Britain where the majority of road deaths are concentrated on 10% of the major road network: 'run-off road' crashes are the major cause of death on major British roads (30%) and the major cause of serious injury is at intersections (36%). The creation of a British 'safer road infrastructure programme' is discussed further in Chapter 5.

Social impact investment can involve payment for the financial savings from an investment with a 'top up' from government for the wider economic savings that cannot be captured. The RSF report *Saving Lives, Saving Money*[15] previously found that the aggregate costs of road crashes to the economy at large were very well estimated by Department for Transport for general policy purposes. However, it recommended a more business-like approach to accounting for costs to public sector organisations. For example, the cost of enabling trained, equipped Police, Ambulance or Fire Service patrols to be deployed to a serious road crash is vastly in excess of the hourly wage rate of the officers involved as currently estimated.

Britain should mobilise safety charities, insurers, investors, government and authorities and pilot this innovative approach.

What should be done?

The Government should work with relevant industries and charities to identify the financial cost of serious road crashes borne across the public purse and by business and families.

It should pilot innovative Social Impact Bonds (Safety Bonds) to finance safety programmes which pay out to investors when lives and public money have been saved.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

How might a road safety bond work?

A specific infrastructure safety improvement or a safety programme that would lead to reduced crash costs is identified. Commonly this might be done by a highway authority but the programme could be identified by a hospital, charity, insurer or care provider. For example, local care services dealing with child head injuries or a hospital dealing with repeated serious crashes from a road.

The financial and economic costs are investigated.

A lead party, perhaps a local authority with road, health and care budgets, might agree what it would be willing to pay if its costs from crashes reduced, although other parties might top up payments. Social impact bonds have many variations.

Investors put money into the programme. They could be a charity, insurer, institutional investor, local authority or philanthropist, etc.

Using the investment provided, the authority, contractor or NGO is able to deliver the safety programme.

Crash costs are reduced. Investors receive payment only on success when the programme delivers measurable safety improvement such as a statistically significant reduction in crashes.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Section 2

The safe road transport system

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Section 2 The safe road transport system

What is the Safe System?

The design of railway and aviation safety systems ensures that all significant risk is eliminated: any weak link in the chain, such as pilot or driver error, is reinforced with fail safes. In the last decade, international organisations and leading countries in road safety worldwide have endorsed the so-called Safe System approach to reducing serious trauma on the road transport system[16].

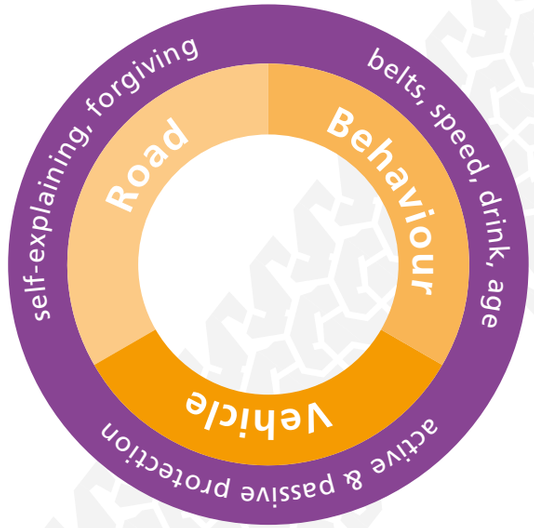
The concept that a safe road transport system can be designed and does not arise only from a series of promising ad hoc initiatives has enabled top performing countries like the Netherlands and Sweden to generate new initiatives and review underperforming initiatives. The approach means, over time, that road deaths can be reduced towards zero with priorities guided by real world potential to reduce overall risk.

Road transport used to be regarded as an "open system" in comparison to rail and aviation safety. The principle of a Queen's Highway open to all remains in law but the reality for 21st century motorised travel is different. Drivers must hold licences (with age related restrictions) and insurance to drive different vehicle types. Vehicles are subject to type approval and increasingly sophisticated mandatory equipment (eg electronic stability control). The legislation establishing "special roads" (ie motorways) in the 1950s began the process of extensive regulation of vehicle types, classes, lanes and speeds permitted on different highways. From parking control to pedestrian streets through to congestion charging zones and toll roads, 21st century roads and drivers are a managed system.

The fundamental design principle behind the Safe System is that the human body must not be subjected to crash energies that it cannot absorb; in simple terms, uncushioned impacts of more than 25 mph. Actions to affect the way we drive, the vehicles we drive or the roads we drive on can be taken separately or in combination towards that end. For example, fast moving traffic must be physically separated from vulnerable users such as pedestrians or cyclists or driven speeds must fall.

Figure 2.1 illustrates the 3 main components in the safe system – road, vehicle and road user behaviour – together with the main actions in each which reduce risk. The key risk factors in road user behaviour are drink-driving, seat belt and helmet wearing, excessive speed and age. The key factors in vehicle design are passive safety (eg airbags and crumple zones) and active safety (eg electronic stability control). The key factors in road engineering are how "self-explaining" the road ahead is (eg presence of curves, junctions) and how forgiving the road is in the event of loss of control (eg rigid objects close to the roadside).

Figure 2.1: The Safe System: Complementary Actions on Roads, Vehicles and Drivers



ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Developing the Safe System

The Safe Road Transport System is a concept which is easier to grasp for those used to systems of risk management. For example, it needs almost no explanation to those responsible for safety in higher risk environments such as mining or oil. The vehicle industry has embraced the approach and manufacturers such as Volvo and Toyota are already working towards the goal that no one will die in their vehicles, reaching accords with governments and road authorities in their home countries.

Modern car and road design properly implemented and working together is already capable of protecting us at a level unimaginable just two decades ago. In the last decade, the single most important contribution to the 50% reduction in British road deaths was improved vehicle 'passive safety' such as crumple zones and air bags. Currently there is advance from 'passive' to 'active' safety in which vehicle systems warn and even intervene to prevent or mitigate crashes. The features coming into service in the newest vehicles are reviewed in Chapter 4. Chapter 5 reviews how infrastructure safety performance can now be measured and managed particularly on higher speed roads where the vehicle working alone cannot cushion crash energies.

Despite progress, road crashes today remain far higher than other risks faced in daily life. Travel by road remains far riskier than other modes which have more modern legal frameworks to ensure customers are kept safe.

In advanced countries, after more than 100 years of motorisation, only poorly performing authorities will have 'black spots' on their networks with untreated clusters of crashes. Most deaths occur at sites where no-one has died before but have known high risks. For more than two decades, British professional guidelines have recommended 'proactive' (pre-emptive) programmes of treatment where road users face these known high risks[17].

Safe System design does not aim to remove all crashes. It aims to remove routine and predictable crashes that result in death or life changing injury.

The expected error rate of human beings in any medium stress environment is about 1 in 500 decisions[18]. The belief that, because nearly all crashes stem from human error, nearly all solutions can stem from achieving improved driver performance beyond that expected even of pilots is not tenable (see for example Dutch sustainable safety policy[19]). The consequences of routine, predictable human error should not be death or serious injury. Modern vehicle and road environment design must keep drivers inside a safe driving envelope: it should nudge road users back when human attention wanders (eg roadside or in-vehicle speed warnings).

The Safe System involves sharing and accepting responsibility for different parts of the road system. Drivers must accept responsibility for driving safely and have a responsibility to wear seat belts, be sober and obey traffic laws including the speed limit. Vehicle manufacturers must accept responsibility for providing safe vehicles and developing innovative technology. Road authorities must accept responsibility for providing safe roads. A Safe System requires holistic thinking from Government, road operators, the insurance industry, car manufacturers, charities and all stakeholders.

The Safe System will not stop the wilful wrong doing of a minority: enforcement remains key. As in rail and aviation safety, some rare and unpredictable accidents will remain.

However, if a road user is injured while obeying traffic laws and driving a 5-star vehicle on a 5-star road then the system must be reviewed. In Norway for example, every road death requires a public inquiry to establish, as in air and rail safety, what steps should be taken to prevent such a death from happening again. The approach has a strong emphasis on accountability and analysis.

The comparison between road safety and workplace safety is stark. There are 12 times more deaths on the roads than in the workplace. There are 4 times more people killed driving in work time than at the workplace[20]. The modern paradox is that the law requires road authorities to devote substantially more attention to avoiding their own employees being killed or injured working on roads than needs to be applied to ordinary members of the public.

The Safe System in practice

Despite the international adoption of the Safe System approach, the supporting tools and University and professional training courses are only slowly becoming available. The updating of professional knowledge in this field needs to be accelerated.

The search for Safe System measures which generate material reductions in risk has resulted in many new initiatives, many of which have already been, directly or indirectly, imported into Britain. Some examples are shown in Table 2.1.

For example, in 2013, the Department for Transport followed the Swedish government in issuing new guidance on speed limits[21] which more closely related the speed limit to the engineering protection provided by the road: today, the risk of an individual being killed or seriously injured on an average British 'A' road is 7 times higher than on an average motorway[22] even though speeds are higher. In Sweden, however, a general lowering of speed limits on minor roads was associated with a programme to raise protection standards (eg safety fencing and safe junction layouts) so as to permit higher speeds on thousands of kilometres of main road of greater economic importance.

In recent years, the demand for innovation generated by the 'Safe System' has resulted in the development of a number of initiatives and policies that have been effective in improving safety on our roads.

Table 2.1 Example of Initiatives Generated through the Safe System Approach

 Policy and investment goals which focus on measuring and raising the quantity of travel under safe system conditions which reduce the investment required to save a life.	 Separation of responsibilities for road infrastructure safety and road provision as in marine, aviation and rail safety.	 Speed limit reform based on the measured standards of protection that a road provides its users rather than the speed most drivers choose to drive.	 Safety equipment in cars to warn, prevent or mitigate crashes as they develop in the pre-crash phase using advanced electronics.
 Development of a 4-star single carriageway design which is as safe as a motorway.	 Crash friendly road furniture which is cheaper than conventional installations.	 An ISO standard for Road Safety Management engaging commercial fleet managers as a first priority.	 A formal agreement between vehicle manufacturer and road authority on safe vehicles and safe road infrastructure which can work in combination.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Road safety targets

The incoming Coalition Government launched a Road Safety Strategy in 2011[23] which, unlike the two previous strategies of successive governments, did not contain any specific performance goal to reduce deaths and serious injuries which could be tracked over the decade to 2020. The strategy was widely criticised for 'lacking ambition' by road safety organisations and former road safety Ministers across party lines[24].

The incoming government had been concerned in general that the practice of setting government "targets" had fallen into disrepute. However, the British practice of setting targets derived from evidence in road safety has been internationally regarded as so successful that it was emulated worldwide. Targets derived from examining the aggregate impact from key actions (eg potential impact of achievable higher rates of seat belt wearing; lower rates of drink driving; lower vehicle and infrastructure risk rates) helped guide investment in programmes and, when combined with leadership, motivated stakeholders to contribute.

The OECD have called for a focus on economic costs of road crashes and ambitious targets which aim to push road deaths 'Towards Zero[25]' as part of the pursuit of the Safe System approach. Setting clear performance goals is entirely consistent with the approach that modern enabling governments need to take and, for example, underpins initiatives such as Social Impact Investment.

What should be done?

The Department for Transport should join leading countries and develop a ten year 'Towards Zero' strategy for publication mid-decade. This strategy should identify performance goals for the reduction of road deaths and serious injuries and tracks the cost of serious crashes on the roads for which individual authorities are responsible. A 'Towards Zero' task force should be established of stakeholders to provide the multi disciplinary leadership required.

Definition of 'Towards Zero':

"Towards Zero means that we do not accept that any human being should die or be seriously injured on our roads. Realistically we understand that it is not practical to achieve zero serious injuries on our roads by the year 2020, but we do not accept any death or serious injury as inevitable. This vision can be achieved if the community as a whole makes a fundamental change in the way it thinks about road safety and what it is prepared to accept."

Source: Western Australia's proposed road safety strategy for 2008-2020, Towards Zero: Getting There Together; Organisation for Economic Co-operation and Development (OECD) (2008): Towards Zero: Ambitious Road Safety Targets and the Safe System Approach

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Section 3

Making safe driving pay

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Section 3 Making safe driving pay

Figure 3.1: Risk of Death by Age 2012[26]

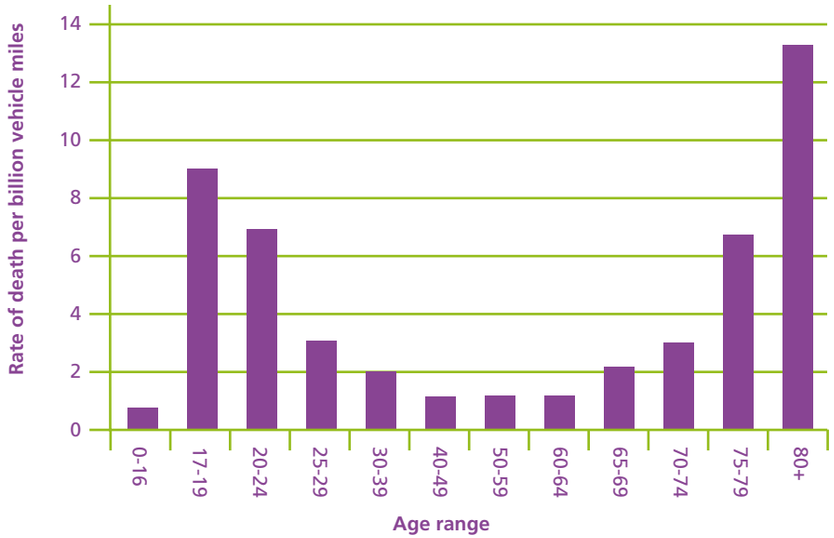
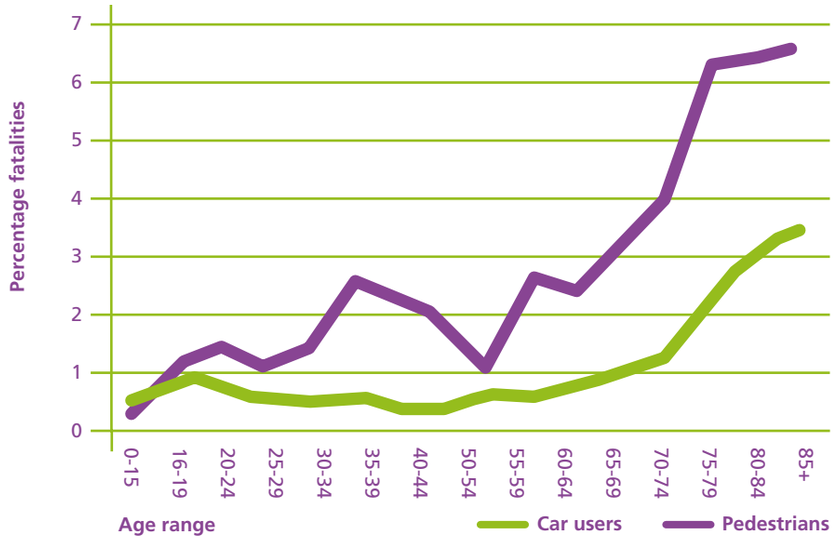


Figure 3.2: Fatalities vs. age range[27]



Which drivers generate high risk?

The safe system approach cannot prevent death and serious injury if drivers either choose to drive or are not able to drive normally. There are, however, policy initiatives and technologies that can be put in place to teach, nudge, support or enforce driving inside a safe 'envelope'. This section examines two groups of drivers: under 25s and the over 80 year olds who are much more at risk and worthy of specific public policy attention.

Figure 3.1 shows that 17-24 year olds are eight times more likely to be involved in a fatal crash than the safest 40-49 year old group. Drivers over 80 are over ten times more likely to be killed than the lowest risk 40-49 year olds. Figure 3.2 shows that the likelihood that a traffic accident injury will be fatal rises more than 4 times between the ages of 40 and 80. This is mainly because of increasing frailty with age.

British and international research consistently shows that older drivers have less involvement in crashes that involve other road users than do younger drivers.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Figure 3.3: Involvement of Pedestrians in Crashes by Age (2012)

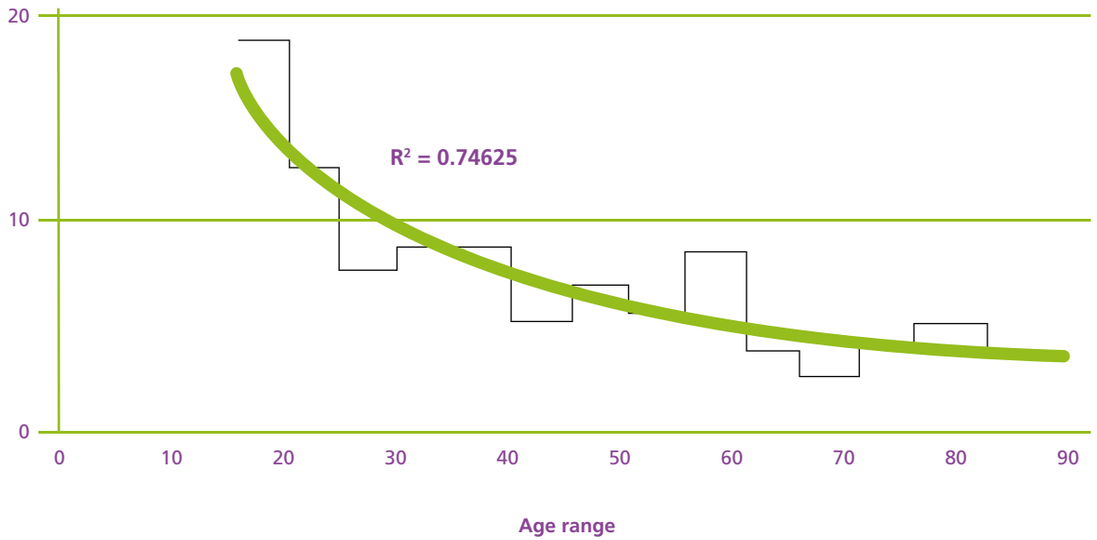


Figure 3.3 shows older drivers are much less involved in fatal pedestrian crashes than young and middle aged drivers.

At the two ends of the driving age spectrum, some young drivers are reckless and some older drivers have lost their safe driving skills. However, the majority of drivers within these demographics maintain a safe standard.

Young driver risk

Road crashes are the leading cause of death and life changing injury in young people. Box 3.1 gives key statistics including the greater risks and greater number of offences involving male drivers.

Turning seventeen marks an important step towards personal freedom for many young people when they can apply for their provisional driving licence and learn to drive on public roads. In 2010/11, more than 40% of all 17 year olds both applied for a

provisional licence and went on to take the theoretical test at age seventeen notwithstanding the global financial crisis.

During the learning period of supervised driving tuition and practice, learner drivers are at their safest. However when they pass their test and begin driving solo as novice drivers, they are at their most vulnerable. In their early solo post-test driving novice drivers have not developed the foresight or experience to read reliably what is happening on the road ahead, or to identify and negotiate potential hazards that are approaching or even on top of them. In the first few days, weeks and months of driving solo, novice drivers make mistakes. Most learn quickly from their experiences and their accident risk diminishes.

ROAD SAFETY FOUNDATION

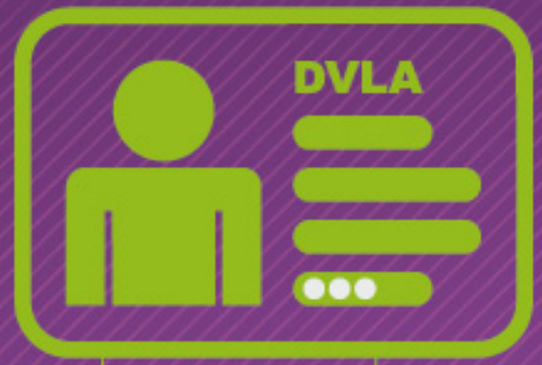
ageas

Commissioned by Ageas

Box 3.1: Young drivers[a] and novice drivers[b] facts

Road crashes are the leading cause of deaths and life changing injuries in young people

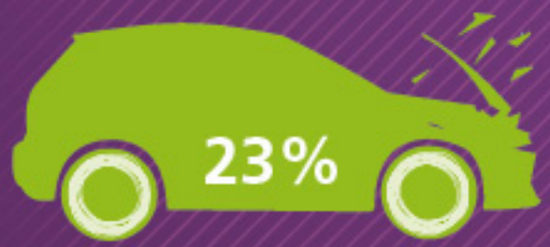
On average they drive about half the distance of older drivers and their fatal crash rate is 5 times that of 40-70 year olds



8%

8% of full driving licence holders are young drivers.

Many young drivers have received three or six penalty points. Analysis by RSF showed that there were typically 3 times more men with points than women at ages 17-19.



23% of novice drivers who pass their test between the ages of 17-19 have been involved in an accident at least once in their first year of driving compared with 12% who are over 25.

Research carried out for the Road Safety Foundation observed young male drivers with male passengers drive faster than when alone and slower carrying females.

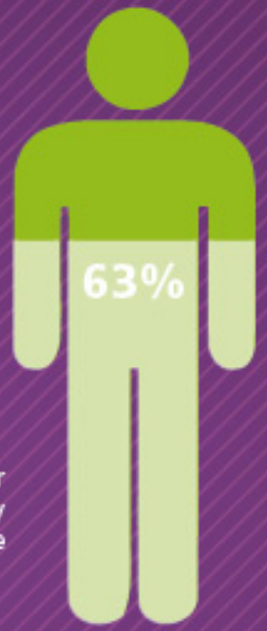
The pattern of offences by gender mirrors the higher involvement of novice male drivers in death and injury on the road.

Definitions: a Young driver – driving test passed and aged between 17 and 24. b Novice driver – driver with less than two years post-test driving experience

ROAD SAFETY FOUNDATION
ageas
Commissioned by Ageas

In 2012:

resulting in 4,100 serious injuries and 350 deaths



63% of all drivers under 25 killed or seriously injured were male

80% of passenger casualties of young drivers were aged 15-24

Male young car drivers in crashes were more frequently cited by police as 'Exceeding speed limit' and 'Travelling too fast for conditions' than women.

Around 14% of serious crashes occurred overnight between 8pm and 4am on Friday/Saturday and Saturday/Sunday.

4% of young drivers were cited as "impaired by alcohol" compared with 2% of older drivers. 80% of young drivers cited by the police as 'impaired by alcohol' were male.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

In-car technology measures the forces induced by braking, cornering, speed and acceleration in real time. Proprietary algorithms, or algorithms tailored for underwriters by market leading traffic safety companies, can differentiate how a vehicle is being driven.

The in-car unit can know the GPS location (ie road section) as well as time of day. Insurance companies use and interpret the data in different ways and collect very different volumes of data. Whatever the algorithms used, drivers who agree to have their day-to-day driving measured in real time by the device can earn insurance discounts which reward them for safe driving.

Improving the safety of young drivers

The challenge is to focus on policy initiatives that incentivise all young drivers to choose to drive safely, detect and penalise those who choose to drive recklessly (or without a driving licence) and reward the majority who strive to stay safe. Below we examine three initiatives aimed at increasing the safety of novice and young drivers that represent latest thinking and technology.

Telematics based car insurance

Currently, safety conscious young drivers and their families are faced with annual insurance premiums of around £2,000[29], in order to cover risk from a minority of unsafe young drivers. Telematics insurance enables driver behaviour to be monitored and information on how a vehicle is being driven to be transmitted to insurers. This offers the chance for much lower and affordable premiums to be awarded quickly to young safe drivers while financially penalising those who engage in unsafe driving behaviour.

Telematics technology not only provides young people with a financial incentive to drive safely, it provides opportunities to feedback and monitor their driving abilities and can provide an early warning for parents.

At least fifteen insurance companies offer telematics based insurance in Britain. All major insurers have some form of telematics offering and it has quickly become a familiar feature of the insurance landscape for young drivers with new brands such as ingenie and iCube. By mid-2013, industry sources suggest there were 300,000 active telematics policies. In terms of general motor insurance, these numbers are small but they account for more than 20% of all under 25s policies. Industry sources also suggest that in 2014, telematics based policies could reach around a quarter of young drivers.

Today, price comparison websites typically offer telematics products as the most competitive offer for under 25s with a typical 30% discount over the cost of conventional insurance (as the cheapest route to mandatory motor insurance, it also means the offering is likely to be appealing beyond those who choose to drive safely). A reduction in average claims cost of more than 25% is being reported by telematics insurers. The costs of providing telematics based insurance will fall if there is rising volume. Public policy needs to address how financial incentives can work to accelerate the introduction of this innovative technology which has high potential for further social and economic returns.

Encouraging and rewarding safe driving through real time monitoring of driving performance is a 21st century solution to the young driver safety problem. Incentivising its development and take-up has enormous road safety potential. However, currently, the costs of operating telematics systems are significant and are only cost justified for high risk groups with high premiums. Insurers need to continuously provide engaging feedback to young drivers.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Telematics insurance Case study - ingenie

ingenie, a telematics partner to Ageas, is a leading provider of this form of insurance to young drivers, its customers having collectively driven more than 210 million miles. Over 300 proprietary algorithms are used to profile driving, risk and feedback. The aim is positive mentoring while those that continually ignore warnings see upward adjustments in premiums - up to 10%. The telematics experience to date includes a reduction in fraudulent claims with 90% of stolen insured vehicles recovered within two hours.

Using only social media marketing, it offers initial insurance which it believes is 30% cheaper than conventional insurance. Its pricing still reflects postcode, occupation and vehicle and engine size.

Pricing does not include time of day factors – in particular, the proprietary risk evidence does not support weighting driving at night.

Policyholders get immediate feedback on their driving via a phone app with twitter-like feeds. Engagement is high – 93% of policyholders check regularly how their doing.

ingenie offers quarterly adjustments to premiums – 70% of policyholders earn discounts of up to 20% and a no claim bonus is offered for the second year so policies can be 50% cheaper than the starting premium after 12 months.

The very small minority who commit "licence losing events" are contacted and counselled and can respond well; less than 1% of all policyholders are refused further insurance.

ingenie reports a reduction in catastrophic claims and losses "significantly" smaller than usual for the 17-25 age group which some will not insure.

80% of the market is under 21's, mainly students.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

A tax incentive for using telematics insurance would not only help offset the operating cost and continuing development of the technology, it would permit public policy messaging and commercial marketing to raise awareness of the benefits of telematics insurance.

All motor insurance policies are currently subject to 6% Insurance Premium Tax. Zero rating the tax for telematics policy holders under 25 years old would send out a clear endorsement to parents and young drivers of the product and support the reduction of installation and operating costs. The tax incentive proposed has a benefit cost ratio of around 3 (see Annex 3.1).

Telematics and privacy

The most obvious downside of telematics insurance is that it requires some sacrifice of personal privacy. This is a much wider issue than telematics insurance. As technology advances, our personal data is used in new ways, some clearly good and some more doubtful. We face these issues daily as we shop online and give our information to hundreds of bodies and organisations - the NHS, supermarket loyalty cards, Facebook, Twitter.

We sacrifice personal data for sometimes big and often trivial advantage. Telematics insurance can be argued to be among the most benevolent in this respect - it helps save lives, disabling injury and significant sums of money. It helps young drivers gain sound skills for life. Contracts are freely entered into with regulated companies.

The young are the least concerned about the privacy issues and some do not even get the issue.

What should be done?

The Government should introduce a zero Insurance Premium Tax (IPT) rate for insured vehicles fitted with a telematics unit for drivers under the age of 25 to signal societal support and defray the cost of installing and operating telematics insurance.
The zero rate should last for a minimum 7 years until the telematics market is fully mature.

Strengthening novice drivers sanctions

Enforcement and sanctions will always have a role to play in keeping drivers safe on the roads. Today, around 10% of novice drivers are sanctioned for committing an offence during their probationary period and 2% have their licence revoked based on the 1995 New Drivers Act (licences can of course also be revoked under other legislation). This Act made novice drivers face the sanction, and expense, of re-sitting their driving test if they collected 6 points during their first two years of driving.

The sanction overall appears to have had a positive impact on novice driver behaviour without disadvantaging those who endeavour to drive safely[30]. There is therefore a basis to argue that the current novice driver two year post-test period should be increased to three years, an idea which has been under informal discussion within and outside government.

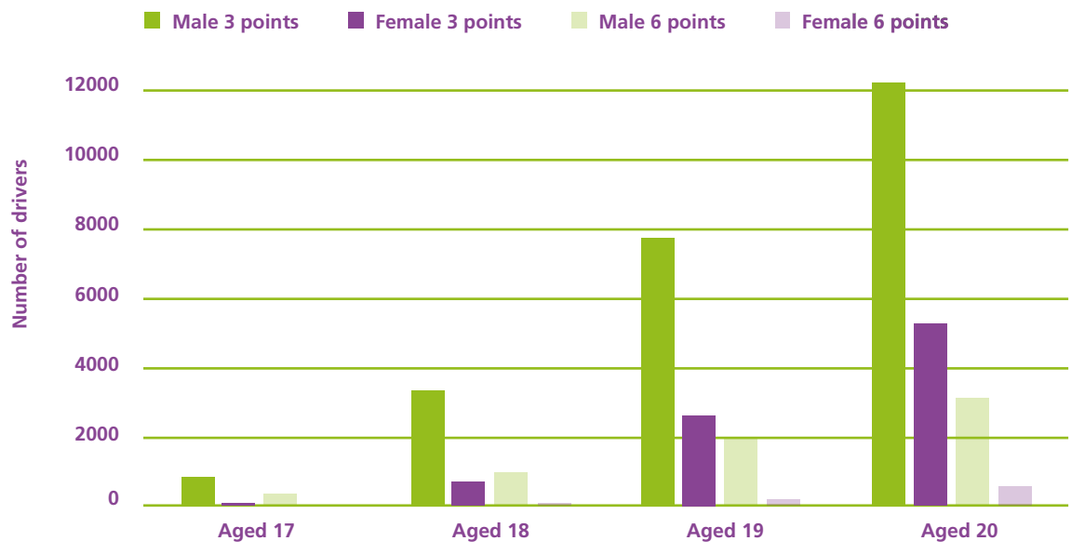
There is also evidence that 'distributed' learning' – that is learning and practice that takes place over a period of time – is superior to learning which is massed together. A minimum administrative requirement that 6 months elapses between acquiring a provisional licence and gaining a full licence is a further low cost measure which can help promote the importance that young drivers should gain as much supervised road experience as possible in varied conditions (including fast and heavy traffic; wet and night time conditions).

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Figure 3.4: Novice drivers aged 17-20 with three and six penalty points (2013)



What should be done?

The Government should consider increasing the novice driver probationary period from two years to three. It would impact on novice drivers who commit offences and not on the majority who do not.

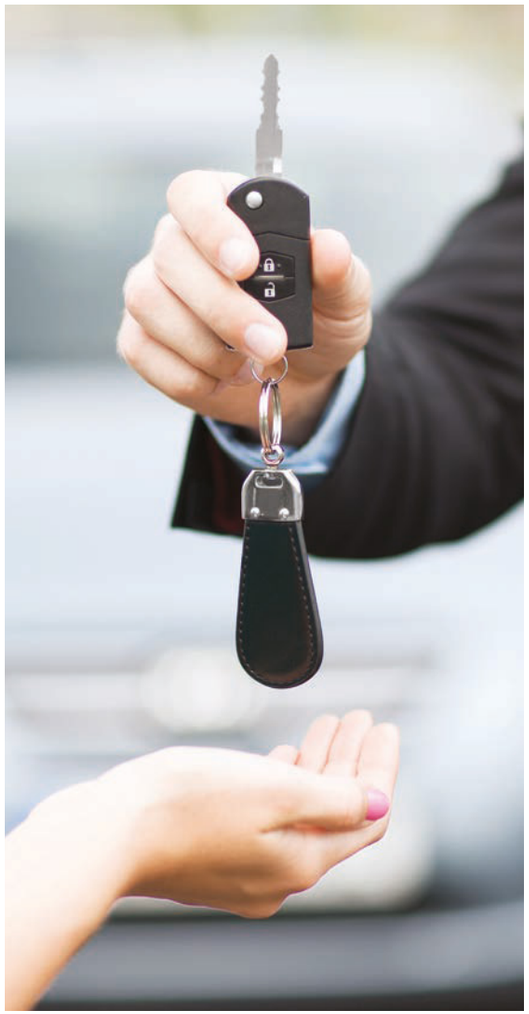
The government should introduce a minimum six months between the start date of a provisional licence and taking the on-road driving test.

Both these measures should only be promoted as part of a package to incentivise the take-up of telematics insurance with its regular positive feedback reinforcing safe driving.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas



Hazard perception testing

The current driving theory test consists of two components:

- Multiple choice questions based on knowledge and application of the Highway Code
- Hazard perception testing using 14 video clips showing everyday road scenes leading to a 'developing hazard' (with one clip including two developing hazards) which requires a response from the driver with earlier responses gaining higher scores.

The hazard perception test is criticised for being a relatively simple low cost PC based application which does not take advantage of modern technology. There is however evidence that teaching hazard perception works[31] with the test demanding all learners show some awareness of handling developing hazards on the road ahead. The challenge now is to improve and update the test to better prepare young people to drive safe.

There would be costs and challenges in any change: the test is a mass market service involving around 1.5 million tests annually across more than 300 test centres. The costs of improved graphics, interactivity and updated teaching materials are only part of the costs of change. Any radical overhaul requires re-training of Driving Standards Agency staff, driving instructors, training resources and many other implementation costs.

However, since the official hazard perception test was first introduced in 2002, online services have become universally accessible. Telematics insurance, as highlighted above, which monitors both careful and reckless driving is widespread and online learning programmes have been developed and refined dramatically. Therefore there is a strong argument in favour of updating the current test to keep it in line with recent digital and technological advances.

What should be done?

A decade after its introduction, the hazard perception test should be thoroughly reviewed to identify cost effective ways of improvement using advances in technology.

Research into continuous improvement of the test should be a priority for the Department for Transport's research budget and should engage the cooperation of the insurance industry in developing and managing the programme.

Older driver risk

The global financial crisis has forced us to recognise that, because we are living longer, we must work longer. Our attitudes and institutions are still evolving to deal with the consequences of a longer lifespan whether in employment, pensions, NHS services or age discrimination. There is a large, fast growing group of older drivers who are driving safely or can be helped to continue to drive safely to the benefit of themselves, their families and the economy.

The number of people aged 70+ will increase by more than half in a short period, from around 7.2 million now to 11.1 million by 2030. The 70+ population will more than double in the middle of the century, to an estimated 14.5-16 million in 2051. Older people aged 90+ will grow even faster, from 0.5 million now to 3.3-5 million by 2060.

As this older population expands so will the numbers who are licensed to drive. How we age differs markedly between individuals. We will need to distinguish better between how long we have lived ("chronological age") and how aged our bodies have become ("metabiological age"). When we look at groups, we need to shift focus from the over-70s to the over-75s and over 80s.

A significant proportion of the rapidly expanding 70+ age group will have driven all of their adult lives. Most will choose to continue to drive for as long as they are safely able to. Happily, there will be millions who are and will be able to do so. Their quality of life is greatly increased by the mobility that their car gives them.

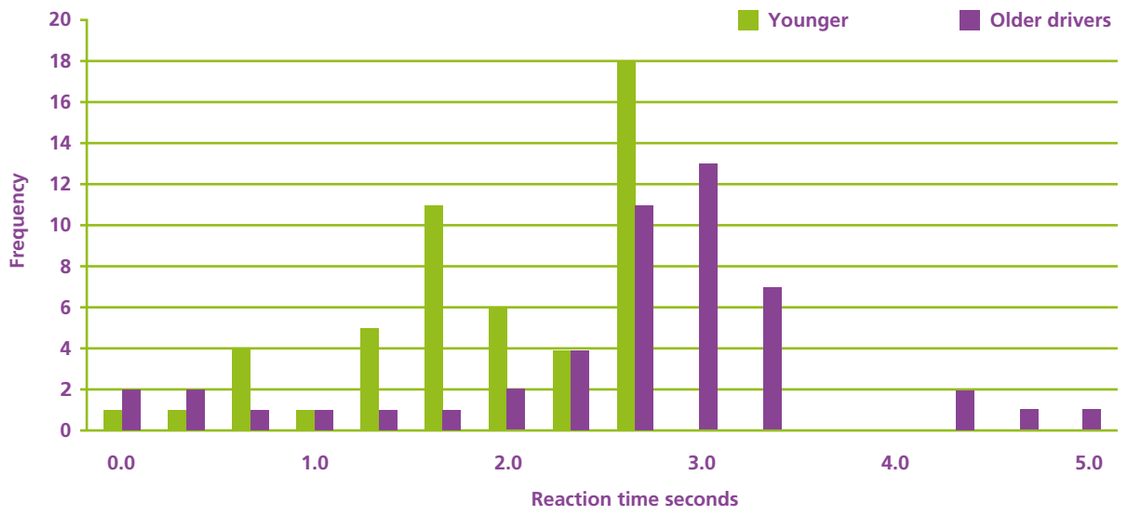
Fig 3.5 Frequency of 'at fault' car driver accidents for three types of accidents[33]

As we work longer, we need to be aware of the economic value of driving longer. Driving supports the phased retirement that is likely to increase in future. It supports childcare by grandparents for working parents. Being able to drive is a key part of maintaining independence, looking after oneself and the personal well-being which keeps the elderly healthy and fulfilled. Giving up driving can precipitate decline and reliance on others and expensive publicly funded services.

However, older drivers face a number of challenges:

- The physical consequences of any crash are much more likely to be serious to an elderly person due to substantially increased frailty.
- Older drivers have reduced ability to judge speed and read more complex driving situations. (Figure 3.5 shows the frequency of 'at fault' car driver accidents for three types of accidents)
- After the age of 50, in general, overall driving skills in executing manoeuvres declines slowly with increasing age up to 80[32].
- Vision and reaction times generally decline with age. (Figure 3.6 shows a distribution of reaction times from a Scandinavian study).

Figure 3.6 Distribution of hazard perception reaction times, older and younger drivers in Sweden and Norway[34]



However, compared with other age groups, older drivers tend to self-regulate their driving, avoiding times and places which they are not comfortable with. They are in general more careful and safety conscious. With more over 80 year old drivers than ever before, there needs to be more structured support to help keep this demographic and others safe on the road.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Improving the safety of older drivers

A UK National Older Driver Strategic Plan

The USA is tackling the issue of ageing drivers with its Traffic safety for older people – 5 year plan[35] which was published in December 2013. The plan will serve as a roadmap to ensure the safety of the USA's growing population of older drivers and passengers.

There is currently no similar plan for the increasing number of older drivers in the UK. A recent House of Lords Committee on Public Services and Demographic Change Inquiry[36] highlighted a general lack of UK thinking and planning for the growth of the older population 'The UK population is ageing rapidly, but we have concluded that the Government and our society are woefully underprepared'.

Taking the example of the USA, the UK Government should explore the possibility of implementing a similar strategy which focuses on supporting older drivers through collecting better evidence, the development of technology, information on self-help and better in-vehicle and road design and protection.

A number of driver assistance technologies that are newly mandatory or available on new cars may help keep older drivers safe and confident on the road particularly in lower speed environments. Car design is also being adapted to meet the needs of older drivers. Ford, for example, developed a "third age" suit that designers wear to simulate the problems facing older drivers and develop design features to overcome them. Crash protection in cars could be better focused on older people to reduce their susceptibility to serious injuries (eg seat belt design.)

Arguably the biggest factor in helping older drivers stay on the roads safely is ensuring the right support and assessment are available. Some local authorities provide driving assessments and, although there is anecdotal evidence they are successful, there is a little evaluation of the wide variety of offerings available. Some businesses are investing in ensuring support for the elderly to access their lower cost online services. In the same way, motor manufacturers need to ensure that their new technologies appeal to rather than deter older drivers. Similarly, insurers in the US are already offering discounts for older drivers completing simple visual exercises which aim to keep their peripheral eyesight healthy. Declining eyesight is an inevitable feature of growing old and impacts heavily on driving: older drivers must be encouraged to seek regular eye tests.

In short, it is essential that GPs, families, manufacturers, insurers and the driving and vehicle agencies adjust to a longer lifespan and steps are taken now to prepare for the future.

What should be done?

Britain should develop a National Older Driver strategy beginning with the collation of data on driving after 80. The Government should establish a task force which includes representatives from charities and the insurance, roads and motor industries to review evidence and recommend practical support for older drivers and their families. Initiatives it could focus on include self-help, driver assistance technologies, and better in-vehicle protection and road design for older drivers.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Section 4

Making safe vehicles pay

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Section 4 Making safe vehicles pay

The importance of vehicle safety and recent advances

As stated earlier, the largest single contribution to British road casualty reduction in the last decade has come from improvements in vehicle safety. The majority of vehicles on the road now have good passive safety with airbags and crumple zones. Looking forward, advances in 'active safety' such as electronic stability control (ESC) will deliver significant benefits. The continuing development of advanced technologies will help to avoid or mitigate much trauma on the roads.

Active safety systems seek to intervene in the pre-crash phase before the crash impact occurs so as to avoid the crash or reduce the severity of the impact. These advanced driver assistance systems use sensors, electronics and software to intervene and by the end of 2020, active safety systems will be incorporated into most vehicles on the road.

The contribution of these new systems where fitted is already impressive. Nonetheless, the national vehicle fleet has a slow turnover. The pace of improvement in new cars is offset by the long working life of vehicles before they are scrapped, typically around 13 years or more. For example, even though half the vehicles on the road in 2025 will have some basic form of self-steering capability, the other half will include the newer cars already on the road today.

The regulations governing vehicles sold in Britain are, as part of the single market, set at European level. Europe and the USA, also participate in a system of Global Technical Regulations hosted by the UN. This is converging unnecessary variations in type approvals for systems and components. It has been estimated that this convergence will reduce vehicle costs by around $1,000[37]: for example, from savings in the cost of manufacturing headlamp units to meet differing US and European specifications.

It took a century for the first billion vehicles to come onto the world's roads but the second billion is taking a decade as the world rapidly motorises with fast growing markets in Brazil, Russia, India, China and Mexico. The majority of vehicles worldwide are no longer produced in traditional countries like Britain. Despite this globalisation, Britain continues to play a significant role in the development of advanced vehicle safety through its industries, NGOs, charities and research establishments and this special contribution needs to continue.

The safety rating of vehicles

Box 4.1 explains how the British, Dutch and Swedish governments worked closely with consumer organisations to establish the European New Car Assessment Programme (Euro NCAP). NCAP crash tests the safety of new cars and the extent to which they protect the human body from serious trauma in representative lower speed crashes. By publishing transparent information on crash performance it has helped raise safety levels from 2 and 3-star to a typical 4- and 5-star level. Each increase of 1-star in car safety performance is estimated to be worth at least a 15% reduction in deaths[38]. The programme is being expanded worldwide, with programmes in 10 regions worldwide to date, coordinated by the British based charity Global NCAP.

NCAP raises safety through a combination of 'demand pull' and 'regulatory push'. The increased demand for the safest cars encourages manufacturers to develop safer vehicles and accelerates deployment; regulation can then assure that all new models achieve what most are already achieving. Typically, regulation assures competitive advantage is not gained by manufacturers reducing safety specifications on the lowest cost new vehicles in the market where small manufacturing cost differences affect margins (a practice found particularly in emerging markets.)

Families, companies and authorities can all respond to the information from NCAP. Leading manufacturers in Britain advertise their NCAP results. The results are widely available online and carried in the tables in car buying magazines. In 2014 Global NCAP published a Fleet Buyers Guide[39] to help companies exercise their duty of care to save both money and serious road trauma for their employees and others through purchasing policies requiring 5-star vehicles.

Box 4.1: European New Car Assessment Programme (Euro NCAP)

Euro NCAP was created by a partnership of leading governments in road safety (Britain, UK and Sweden) and European civil society led by autoclubs. The crash test results made transparent the safety standards being achieved by new cars in the showroom to tens of millions of consumers. Today the programme also includes British insurers through Thatcham Research.

At first, the star rating of crash test performance was controversial within the motor industry. All vehicles being sold met minimum legal requirements while NCAP's tests were more demanding and non-statutory. The test procedure and award of stars was novel and was challenged because the results could be stark and have serious commercial consequences. For example, the ageing mini metro was awarded just one NCAP star for vehicle occupant protection and was withdrawn from sale within months of the results being published.

However, NCAP successfully highlighted the difference between the best and worst designs in protecting vehicle occupants and pedestrians in the event of a serious crash. It encouraged rapid developments and built a market in safety as manufacturers and consumers became used to transparent star ratings that could be used to compare the safety standards of new vehicles.

Within a handful of years, the safety standards of new vehicles entering the showroom soared from a typical 2- or 3-stars to 4 or 5-stars. Today, manufacturers test their vehicles ahead of launch to NCAP protocols and use the results in their advertising.

EuroNCAP also measures pedestrian protection. In brutal impacts, injuries to the legs can be reduced by softer, wider bumpers and frontal shaping which avoids vertical fronts (eg a veteran Rolls Royce); injuries to the head can be cushioned by raising the bonnet on impact away from the rigid engine block beneath. However, the pace at which pedestrian safety ratings improved in the decade to 2010 was significantly slower than for occupant protection. The EU mandated basic pedestrian protection systems in regulations which were revised in 2009.

The pace and scale of the advance in European vehicle safety has however brought new challenges. With most cars sold in Europe achieving high passive safety ratings by the standards of the past, NCAP scales have been re-calibrated to provide greater discrimination. This recalibration has also been linked to an evidence based assessment so that consumers have independent advice on the safety benefit of new advanced systems such as Lane Departure Warning, Blind Spot Monitoring, Attention Assist, Autonomous Braking and Emergency Call which are being offered on new models.

ROAD SAFETY FOUNDATION
ageas
Commissioned by Ageas

Understanding of vehicle safety technologies

While the motor and insurance sectors are well aware of the emergence of safety features in modern vehicles, these technologies are less widely understood by the public and stakeholders in road safety. This is partly because everyday experience with many of them is limited given the typical vehicle owned is 5 years old. For example, while airbags, ABS and parking sensors are understood, electronic stability control became mandatory only in 2012. The marketing terms for similar features can also vary between manufacturers.

Box 4.2 summarises the safety technologies in modern vehicles and gives a qualitative assessment of their importance in reducing total serious bodily injuries. These technologies are further described in Annex 4.1. Some technologies have particular importance for a group of road users eg adaptive lighting and elderly drivers; pop-up bonnets and pedestrians.

Box 4.2 Safety technologies in the vehicle fleet		Actual or expected safety value		
Safety feature	**Key technology**	**High**	**Medium - high**	**Medium**
ABS Mandatory 2008	Anti-lock braking			
Traction Control	Power train control			
Adaptive and cornering lighting	Steering, speed and yaw sensors			
Intelligent Seat Belt Reminders	Seat occupancy sensors			
Parking Sensors	Proximity sensors			
Reversing Autonomous Emergency Braking	Proximity sensors / cameras			
ESC Mandatory 2012	Control system to anti-lock brakes			
Brake Assist Mandatory 2011				
Airbags Introduced late 1980s, essential for good NCAP rating	Momentum sensor			
Seat Belt Pre-tensioners	Momentum sensor			
Adaptive Cruise Control Researched from 1980s, Introduced 2002 approx	Control system; Long range radar			
Attention Alert Including Forward Alert, Drowsiness Alert, Speed Alert	Long range radar; steering sensor			
Blind spot monitoring Introduced 2007	Proximity sensor			
Low Speed Autonomous Emergency braking	Proximity sensor control			
Pedestrian Autonomous Emergency Braking	Short range radar / camera control			
High speed Autonomous Emergency Braking	Long range radar / camera			
Junction Autonomous Emergency Braking	Short range radar / camera			
Road departure Autonomous Steering	Long range radar / camera			
Night Vision Enhancement				
Lane Departure Warning Type approval 2012	Camera and interrogation system			
Lane Keeping	Camera and interrogation system			
Pop up bonnets	Pedestrian impact sensor			

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Key recent emerging vehicle safety technologies

With the fast developing advances in technology lives can be saved by ensuring that the regulatory system responds equally quickly. In recent years the regulators in USA, Europe and Australia have responded well once reasonable evidence on a successful new technology has been established. There are currently important new technologies which need to be moved as quickly as possible to universal deployment.

Low speed Autonomous Emergency Braking:

Vehicle technology targeted at city driving has quickly emerged as one of the most important technologies in reducing the cost of crashes. Cameras and lasers build a picture of the road ahead and control software continuously tracks the distance, direction and speed of multiple objects in the vehicle's path. If the car is set to collide, emergency braking will be applied. At lower speeds (less than 20 mph) a collision may be prevented altogether. At higher speeds (less than 30mph), the impact will be considerably reduced.

A small study[40] in the USA first suggested the general scale of reduction in bodily injury claims (50%) and damage claims (25%) for vehicles fitted with this technology. In 2012, analysis of claims by the British Insurers Research Centre, Thatcham Research led the industry to lower the insurance rating of vehicles fitted with technology. This research shows vehicles fitted with this technology are reducing claims by 25-40%[41]. In February of this year, the Association of British Insurers called for motor manufacturers to fit AEB as standard on all new cars in the UK market.

High speed Autonomous Emergency Braking:

This technology is targeted at higher speed driving and often linked to Adaptive Cruise Control (which keeps the driven vehicle at a safe distance from the car being followed– see Annex 4.1). High Speed AEB will automatically apply emergency braking if an impact with a slowing or stopping car is detected and if the driver has not taken enough action.

Pedestrian Autonomous Emergency Braking:

This technology, which is being introduced by manufacturers such as BMW, Volvo and Mercedes, provides full avoidance of impact with pedestrians at low to medium speeds. The technology again uses cameras and radar technology.

Autonomous Emergency Braking is an effective and affordable technology which is already widely offered on 30% of new vehicles. It saves lives as well as saving consumers' money on their insurance premiums more than proportionate to the cost of the technology

The current success of Autonomous Emergency Braking should stimulate the industry to accelerate development of these to prevent and mitigate the range of crashes which could be affected. AEB should now join other advanced safety system technologies by becoming mandatory for new vehicles in 2017.

What should be done?

Motor manufacturers should fit low speed Autonomous Emergency Braking (AEB) as standard on all new cars. The EU should mandate low speed AEB as standard on all new cars from 2017. Research should also be accelerated on the more demanding technology required for AEB at higher speeds. Insurers, Confederation of British Industry and the Health and Safety Executive should promote the global NCAP's Fleet Buyers Guide to British businesses and proven management actions that reduce the cost of crashes in business fleets.

Roads that cars can read

In 2011 and 2013, Euro NCAP and EuroRAP (see Chapter 5) jointly published two reports in their Roads that Cars can Read series. Whereas the EU focuses its attention on longer term research initiatives, the two consumer bodies sought to help focus the separate roads and motor industries on more immediate benefits from increased cooperation on technologies such as sign recognition and lane keeping. Vehicles in the showroom today can read lane markings and detect and read important signs (lane markings have been referred to as the "rails of the self-steering car"). However, the quality of these basics of road infrastructure provided by road authorities even on the most major highways can leave much to be desired.

Following the agreement between the Swedish national authority responsible for roads and Volvo, the two consumer organisations proposed that the roads and vehicle industries should agree a quality standard for the most important lane markings and signs that would work for both drivers and vehicles across Europe. They proposed focus on the 10% of roads of economic importance outside cities where most deaths and most road travel takes place. Subsequently, a working group of roads and motor industries proposed[43] a basic "150 x 150" quality standard for lane markings (150mm width with a reflectivity of 150 millicandela) that could be implemented during normal maintenance cycles.

The initiative underlines that moving from "driver assistance systems" to "self driving vehicles" is a long term project. For decades, vehicles with advanced technologies will have to share the road with vehicles that do not have this equipment. Roads are managed by 1,000 authorities in Europe alone: even signs and markings covered by more than half a century of international conventions (eg STOP signs) are patchily implemented. However, in terms of making safety pay, the future can be supported by low cost steps to level up the quality and consistency of signs and road markings during normal replacement cycles. This not only brings immediate benefits to human drivers but also to equipped vehicles.

Another example of innovative vehicle technology is the development of the eCall system. Emergency services worldwide are organised on the principle that rapid response matters. The eCall system initiates that rapid response. When an airbag deploys, it is no longer necessary to use a phone to dial 999. The vehicle immediately contacts the emergency services using the GSM network and initiates a protocol that already includes reliable data about the crash, practical details of the vehicle involved and the GPS location.

The eCall system has been operating in a number of countries for over a decade. The case of eCall again illustrates a major problem in implementing any new technology system effectively which requires multi-sector cooperation and strategic planning of digital switchovers. Countries can be overwhelmed by the institutional change required or wait until the benefits become more obvious. In Britain, while new vehicles will now be equipped with eCall technology by law, complementary plans for public 999 answering points have yet to be developed.

What should be done?

The Highways Agency is the market dominant roads agency in Britain. In 2015 the government plans it will become a Corporation with aspirations to deliver world class standards. It will become one of Europe's largest roads companies with the potential not only to set the pace in Britain but internationally. Working in partnership with the motor industry and other market leading European road companies, the new Highways Corporation should support proposals to survey the quality and consistency of its road signing and marking on major road networks and determine the programmes needed to bring its network up to the standard needed to support reliable operation of the vehicles that will be on the road in 2025[44].

Government should set out a framework for the roll-out of eCall in the UK.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

The opportunity for business to reduce its costs

Estimates vary but the rate of serious crashes during the course of work is 50-100% higher than crashes during other driving. Around one third of all serious crashes take place in the course of work. The number of deaths from road crashes during the course of work is three times greater than the total number of all other deaths at work[45].

Employers have substantial opportunities to reduce the costs of road crashes and at the same time improve efficiency and safety. There is however often little awareness within firms that employers have a duty of care beyond ensuring that their drivers have a licence and the vehicle has a MoT. Furthermore, few realise the importance of management control of this aspect of their business operation.

A number of companies and industries, such as pharmaceutical companies, energy companies, home delivery companies and others including Royal Mail with significant car and van fleets have focused on reducing the costs and limiting reputational damage associated with a high level of road crashes. Many have been willing to share their experience in the Driving for Better Business[46] initiative. Box 4.3 describes the experience of early adopters: Tesco.com and Arval.

What should be done?

Insurers, the Confederation of British Industry, the British Chambers of Commerce and the Health and Safety Executive should vigorously promote actions to British business that companies can take to manage down their crash costs.

With user chooser company car schemes, employers should ensure that, at the very least, their employees have information about the EuroNCAP safety rating of cars. Preferably, they should be encouraged to purchase vehicles with higher EuroNCAP ratings.

Where company cars are provided, employers should stipulate EuroNCAP cars with high star ratings and ensure that they have in place policies which manage the driver, the journey and their response to crashes. Simple measures such as fatigue management, rules on alcohol use and banning the use of mobile phones whilst driving all help.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Box 4.3: Driving for better business

Case study: Tesco and Arval UK[47]

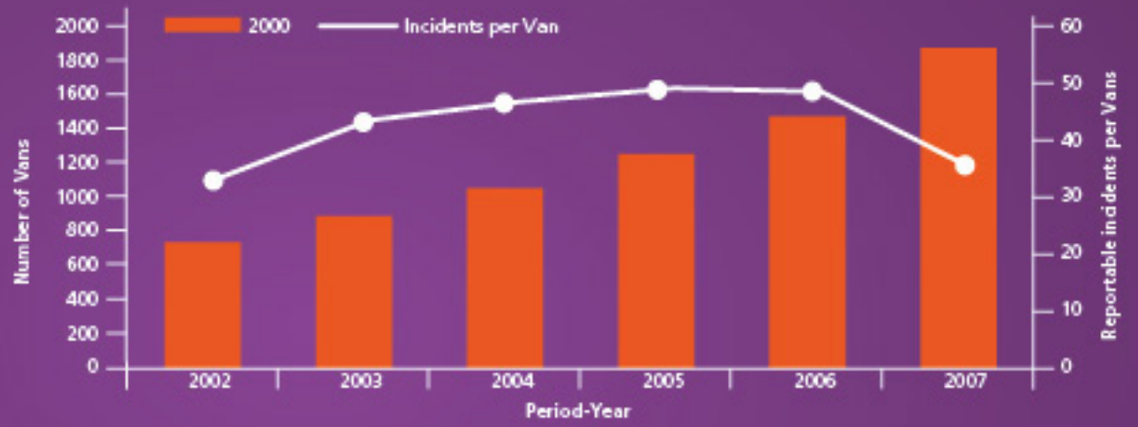
The experience of Tesco.com has been widely shared. With around 8,000 drivers of 2,500 vans, the number of costly and brand damaging crashes in their customers' neighbourhoods was increasing year on year. In 2007, there were an average 50 reportable incidents per van per year.

In 2005 Tesco.com reviewed its duty of care provided for its drivers (CDAs) and recognised that it had not provided the level of training and duty that it would ideally provide. This started a top to bottom review of its training and working practices.

A series of steps were taken to improve recruitment, training and other processes. These included up-skilling managers, thorough checks on driving licences and training. Telematics units were installed in vans to monitor driving. Speeding became a disciplinary offence with dismissal for infractions above 10mph. As a result of all these initiatives, crash damage costs per vehicle fell by up to 40%.

Tesco reported that a key insight for the company was the recognition that the role of its delivery drivers was more complex than "just driving" and also involved a critical interface with the customer and the general public which impacted upon the company's brand. The company reported that drivers feel more valued and, as a result, that their attitude and culture has helped drivers' daily dealing with customers.

Arval UK is a leading vehicle leasing and fleet management company, it manages more than 115,000 vehicles in the UK, leasing around 85,000 cars and light commercial vehicles.



With specialist teams dedicated to businesses of all sizes; from start-ups to FTSE 100 companies and internationally managed accounts, Arval provides a comprehensive range of products and services to its fleet customers including safety management advice. However its own internal road safety management programme is exemplary.

It implemented the 'Drive4Life' platform six years ago and the initiative has produced tangible benefits.

In 2005 Arval's crash ratio was 43%. Bent metal costs alone amounted to almost £150,000 with third party claims of £70,000. The company self-insures so these crash costs had immediate impact on the company's bottom line. An analysis of incidents revealed that low speed crashes were most prevalent, making up 28% of all incidents.

By the end of 2012, following the introduction of a wide range of road safety initiatives including improved management, the provision of NCAP 5-star vehicles and fitting reversing sensors to all cars, Arval's crash repair costs had dropped to £44,000. The incident ratio is an impressive 19% and the incidents which occur are less serious and less costly to the company.

The number of employees committing speed-related offences highlights one example of progress made. In 2003, offences numbered 159. By 2007, the figure had dropped to 32, despite the increasing number of cameras on the roads. In 2012, the figure stood at 21.

Source: Arval UK and Driving for Better Business.com.

ROAD SAFETY FOUNDATION
ageas
Commissioned by Ageas

Section 5

Making safe roads pay

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Section 5 Making safe roads pay

Figure 5.1: Annual serious crash cost per km by road type

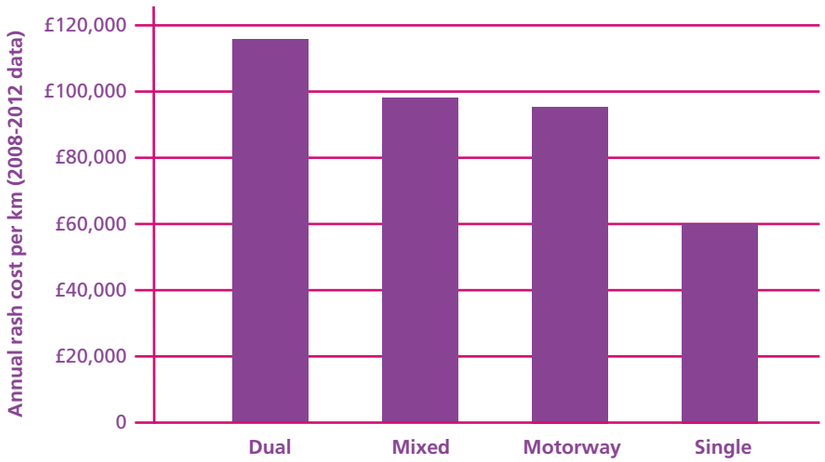
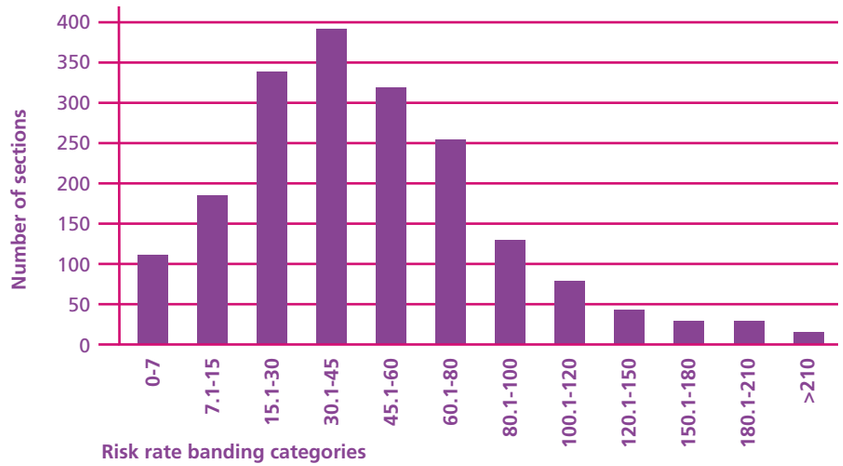


Figure 5.2: Number of road sections by risk rate on motorways and 'A' roads



Investing in safe roads

Britain's road deaths are not randomly distributed across the road network. Half of road deaths are concentrated on just 10% of the network - a targetable network of motorways and 'A' roads outside urban cores. A third of deaths are in urban areas with a concentration in London. Targeting infrastructure safety investment to concentrate on reducing economic loss is therefore relatively straightforward because only a minority of deaths, around 15%, are dispersed across 'B' roads and unclassified rural roads.

Urban road infrastructure safety, led by Transport for London, has progressed in the last decade with political leadership supported by professional, evidence based evaluation. It is the safety of the motorway and 'A' road network which has yet to find its proper place in British road safety programmes.

Figure 5.1 shows the typical economic loss, from serious road crashes only, on an average kilometre of motorway or 'A' road (excluding costs such as traffic delays). The economic loss is similar at around £100,000 per annum regardless of who is responsible for the road or the type of road or how much traffic uses it . As exposure falls, the risks rise. For example, the average single carriageway 'A' road is 7 times more risky than a motorway but carries broadly 1/10th of the traffic.

The International Road Assessment Programme (iRAP), the UK based charity, maintains a database of around 70 effective safety engineering countermeasures and the reductions of risk that can be expected by implementing each[48]. For example, the costs of roundabouts; traffic signals; safe right turning lanes; roadside rumble strips; safety fencing; strengthening of verges to provide safe recovery zones etc. The Highways Agency has contributed estimated UK costs for each of these countermeasures.

In the UK, research by the Road Safety Foundation[49] has found that only a third of highway authorities use evaluation of economic costs and benefits when considering schemes. It is also found that those

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

authorities typically estimated only a first year rate of return and rejected schemes achieving less than 100% per annum. The extraordinarily high 100% per annum threshold reflects that generating very high return schemes is straightforward.

Even so, a first year rate of return for an infrastructure safety scheme hides the scale of the lost opportunity during its economic life. A safer junction layout such as a new roundabout or safe turning bay for right turns will deliver reductions in deaths or serious injuries not just in the first year but year after year – typically for decades. In a decade, a 10 mile stretch of main road will on average host 30 deaths and serious injuries (and hundreds of other injury crashes).

Strategies that address known risks on long stretches of road over time (eg installation of roadside safety fence) are also more statistically sound and have lower unit costs than piecemeal local responses to a crash after it has occurred. The Safer Road Infrastructure Programmes of the Traffic Accident Commission in Victoria described in Chapter 1 illustrates the type of systematic and proportionate economic response Britain should be pursuing.

The Road Safety Foundation has sought to investigate why aspirations to manage infrastructure safety on the network remain so low given the high costs to the local economy. It is clear that Cabinets within local authorities rarely ask for a business case for safer roads to be prepared and evaluated on a comparable basis to other local authority programmes. There is however an appetite for better training, guidance and tools.

The austerity measures of recent years have put pressure on highways budgets. However, whatever budgets are available can be focused more sharply by stronger focus on economic costs as the OECD has argued. Highways expenditure is in excess of £5bn per annum. Typically, it is possible to improve infrastructure safety by planning that these improvements are carried out during essential maintenance. For example, the Highways Agency installs missing sections of roadside safety fence while repairing worn out motorway road surfaces. The Government of Catalonia recently announced support for plans to undertake a prioritised £30m programme of infrastructure safety improvements to be implemented over time during maintenance[50].

The safety rating of roads

In 2002, after the success of developing the New Car Assessment Programme (NCAP) for vehicles, the same partnership of governments (Britain, Netherlands and Sweden), charities and NGOs established the first Road Assessment Programme (RAP) in Europe. The new consistent approach to measuring the safety of roads developed with research institutions in Britain, Australia, United States and elsewhere was quickly adopted worldwide. Today, more than 70 countries have had independent RAP safety ratings on all or part of their major road networks. The international cooperation has assessed risk on more than 250,000 kms of road globally[51].

The safety of roads is measured in two main ways:

- Risk Mapping measures the rate of death and serious injury on individual road sections. It shows the rate of serious crashes which results from the way we drive, the vehicles we drive in and the roads we drive on.
- Star Rating measures the inbuilt safety of the infrastructure component just as star rating for vehicles measures their inbuilt safety. Star rating of roads focuses on the 4 main ways people die on the roads – running off the road; at junctions; in head-on crashes; and being hit as a pedestrian or cyclist.

The Road Safety Foundation has published Risk Maps annually showing the rate of death and injury on British roads since 2002. The 2014 GB results are published in parallel with this report[52]: two figures from that report are reproduced here. Figure 5.2 below shows the distribution of risk across the network. It shows a 'normal' distribution with a long tail of higher risk sections, many 20 times or more risky than better performing sections. There is a straightforward business case to eliminate these very high risk sections as well as bring the typical (median) performance much closer to what is being achieved on better performing sections. The transparency provided by RSF's independent annual Risk Mapping has encouraged many British authorities to act on higher risk roads. However, most British road authorities have yet to adopt explicit goals to manage the risks on their networks. As stated, the key to tackling road deaths is no longer to treat black spot 'clusters' but to pre-emptively remove sites of known high risk.

Figure 5.3 shows the significance of infrastructure risk by comparing the overall risk of death and serious injury across the motorways and 'A' roads of different English regions. The risk of death and serious injury in the East Midlands is 70% higher than in neighbouring West Midlands, a degree of variation which is much greater than often seen between different countries. The key statistic explaining the variation is that it is, on average, 7 times riskier to travel a mile on an 'A' road than a motorway. The population of the East Midlands travels fewer miles on less risky motorways and, in addition, it travels more on single carriageways that are much riskier than those in the West Midlands.

Figure 5.3 also helps illustrate two key features of the 'safe system' approach adopted in Sweden. The first is that prioritising the reduction of deaths means increasing the amount of travel on safe roads rather than just the length of safe roads. The second is the need to rethink the design and operation of major roads: innovative single carriageway designs in Sweden are achieving risk rates similar to their motorways by focusing on reducing the risk of run-off, junction and head-on injuries.

Figure 5.3: Regional variation in death and serious injury rate

Commissioned by Ageas

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Managing roads infrastructure to an explicit safety performance

Most new cars sold in Britain now reach a 4 or 5-star safety rating. Most 'A' roads achieve only a 1- or 2-star infrastructure safety rating. Above 40mph, the car alone cannot protect people being injured in killed on the roads.

British motorways typically achieve a 3 or 4-star rating but have widespread problems with run-off protection. Work by RSF has shown that the rate of motorway deaths and serious injury from run-off crashes doubles on sections where protection is inadequate.

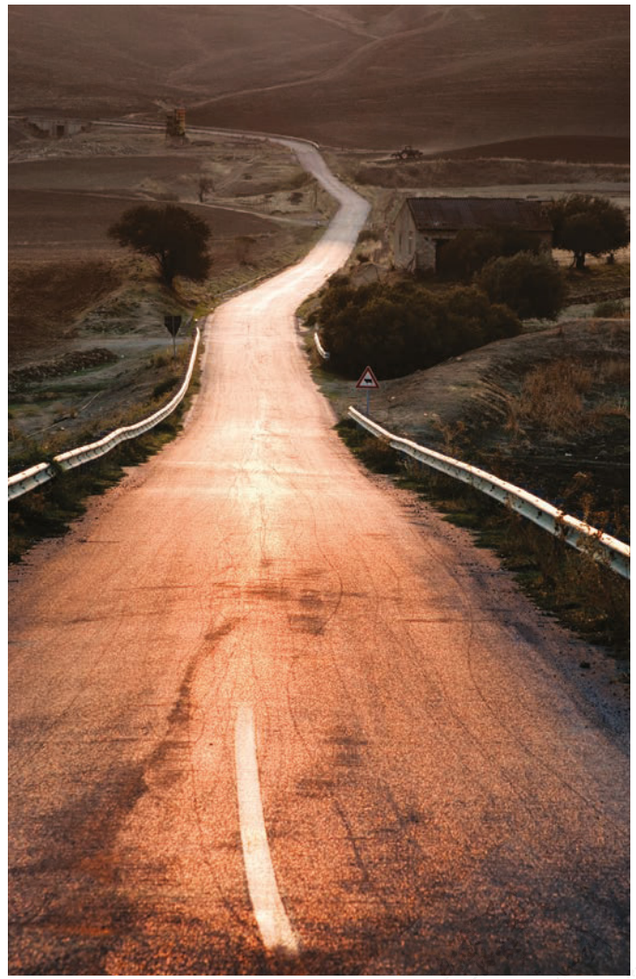
Dual carriageways commonly achieve a 3-star rating but have problems with both run-off protection and safe junctions. Dual carriageways have double the rate of serious crashes seen on motorways.

The Dutch Transport Minister was the first elected leader worldwide in 2010 to declare that their national network would achieve a minimum 3-star safety rating by 2020, a declaration which has been endorsed by successive Dutch Governments. The New Zealand government has now adopted a goal of 4-star safety for 'roads of national significance': the responsible Minister receives reports of the star rating of the road and car with every fatal crash report. The Swedish government is also upgrading thousands of miles of single carriageway road to a 3 and 4-star standard.

In Britain, there is as yet no announced vision or goal for the safety performance of existing roads. As Sweden has shown, large scale procurement of safety could reduce costs substantially: the unit cost of installing 100 metres of safety fence at a site of known high risk after a crash is much greater than the unit cost within a programme treating all similar risks.

Two steps are required to reduce the cost of road crashes to the economy and benefit from the high returns. As a first step, Department for Transport should follow other leading governments and set explicit safety levels for the safety of national infrastructure which is under its own direct control.

Britain's market dominant road operator is currently the Highways Agency which the Government proposes to transform into a Government-owned company[53]: the legislation to achieve this has been introduced into Parliament. The new Government-owned Corporation needs to be required to take responsibility for the safety of the roads infrastructure under its direct management with independent metrics set for the infrastructure safety performance it should achieve. These independent metrics should be benchmarked against other leading countries such as the Netherlands.



ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Moving to a roads corporation requires:

- Strong independent external oversight and audit of safety performance
- Internal controls and personal accountability for safety at Board level
- A Safety Performance Specification from Department for Transport which is transparent to the public and Parliament
- An approved Roads Investment Strategy that includes a programme of high return interventions focusing on infrastructure safety so as to achieve a reduction of bodily injury costs borne by society and the economy.

The new Corporation's focus during the first 5-year period could include:

- Elimination of high risk 1 and 2-star national routes (eg Netherlands)
- Upgrading motorway and dual carriageway safety where English crash cost density is highest to a minimum 4-star (eg New Zealand)
- Maximising the amount of travel on safe roads (eg Sweden).

In summary, transforming the Highways Agency into a Corporation could enable a reduction in the loss of life on the network and the associated costs borne by families, business and government itself. With the focus proposed, the public, Parliament and stakeholders would be able to see measurable and transparent improvements in infrastructure safety as well as benefit from lower insurance costs and lower public costs for emergency services, health and long term care.

The second step that needs to be taken is to give greater support to local authority infrastructure safety programmes. There are over 100 highway authorities in Britain and many are relatively small. The senior professional responsible for infrastructure safety may have many other responsibilities.

The government should consider establishing a long term national goal to raise the safety of 'A' roads to a minimum 3-star level and prioritise reductions in economic loss from serious road crashes on this network.

All other modes of transport have independent safety inspectorates even though the loss of life is far greater on roads. The government should therefore establish a Road Safety Inspectorate with powers focused on supporting national and local authorities in investigating persistent serious crashes on high risk roads and preparing rectification plans.

What should be done?

When national roads become the responsibility of the public corporation, transparent minimum safety levels of 4-stars should be adopted for the busiest national roads and minimum 3-stars for all other national roads to be achieved in the period 2015-2025.

The Government should establish a long term goal to raise the safety of local authority 'A' roads to a 3-star minimum level to be achieved in the period to 2030. To complement this goal, the Government should establish an independent Road Safety Inspectorate whose powers should be focused on investigating persistent serious crashes on stretches of high risk road and supporting the rectification plans of responsible road authorities.

ROAD SAFETY FOUNDATION
ageas
Commissioned by Ageas

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Section 6
Conclusion and summary of key recommendations

ROAD SAFETY FOUNDATION
ageas
Commissioned by Ageas

Section 6 Conclusion and summary of key recommendations

This report has been prepared as a contribution to the future development of road safety in the UK. It presents a holistic view of the UK's safe road transport system and highlights practical actions where further progress can be made.

The report has focussed on the core theme of making road safety pay. It has looked at how new solutions across the three pillars of safe driving, safe vehicles and safe road infrastructure could reduce serious injuries on the UK's roads and deliver financial and economic benefits.

The annual economic cost of road crashes to the British economy is more than £30 billion and more than 1,700 people were killed on the roads in 2013. Our overarching recommendation aims to ensure that the UK joins leading countries in moving road deaths 'Towards Zero'. That goal makes best sense, as the OECD has argued, if humanitarian aims can combine with focus on the economic costs.

Led by Government, we believe the strategy should set clear performance goals for the reduction of road deaths and road crashes. Road travel should not be riskier than any other daily activity we undertake. Road crashes should not be excluded from the laws that apply to travel on other modes, to consumer products or the workplace.

Developing a 'Towards Zero' strategy can be overseen and monitored by a multi-disciplinary taskforce comprised of stakeholders across the road system to ensure that a commitment to improving road safety is seen as a shared responsibility amongst all stakeholders.

The report is an initial step towards changing the focus of road safety towards crash cost reduction. It will require further work over the next decade to develop a number of the following recommendations.

Key recommendations:

1. 'Towards Zero' strategy. The Department for Transport should join leading countries and develop a ten year 'Towards Zero' strategy for publication mid-decade. This strategy should identify performance goals for the reduction of road deaths and serious injuries and track the cost of serious road crashes on the roads for which individual authorities are responsible. A 'Towards Zero' task force should be established of stakeholders to provide the multi-disciplinary leadership required.

2. Financial instruments for road safety. The Government should work with industries and charities to identify the financial cost of serious road crashes borne by individual authorities and by businesses and families. It should pilot innovative Social Impact Bonds ('Safety Bonds') to finance safety programmes which pay out to investors when lives and money have been saved.

3. Young drivers and Telematics. The Government should introduce a zero Insurance Premium tax (IPT) rate for insured vehicles fitted with a telematics unit for drivers under the age of 25 to signal societal support and defray the cost of installing and operating telematics insurance. This rate should be maintained for a minimum period of 7 years until the telematics insurance market is mature.

4. Safe driving above 80. Britain should develop a National Older Driver strategy beginning with the collation of data on driving after 80. The Government should establish a task force which includes representatives from charities and the insurance, roads and motor industries to review evidence and recommend practical support for older drivers and their families. Initiatives it could focus on include self-help, driver assistance technologies, and better in-vehicle protection for older drivers.

5. Vehicle technology. Motor manufacturers should fit low speed Autonomous Emergency Braking (AEB) as standard on all new cars. The EU should mandate low speed AEB as standard on all new cars from 2017. Research should also be accelerated on the more demanding technology required for AEB at higher speeds. Insurers, Confederation of British Industry and the Health and Safety Executive should promote the global NCAP's Fleet Buyers Guide to British business and proven management actions that reduce the cost of crashes in business fleets.

6. Minimum safety ratings for strategic roads. When national roads become the responsibility of the public corporation, transparent minimum safety levels of 4-stars should be adopted for the busiest national roads and minimum 3-stars for all other national roads to be achieved in the period 2015-2025.

7. Minimum safety ratings for Local Authority 'A' roads. The Government should establish a long term goal to raise the safety of local authority 'A' roads to a 3-star minimum level to be achieved in the period to 2030. To complement this goal, the Government should establish an independent Road Safety Inspectorate whose powers should be focused on investigating persistent serious crashes on stretches of high risk road and supporting the rectification plans of responsible road authorities.

Other recommendations

Novice driver probationary period

- The Government should increase the novice driver probationary period from two to three years. This would mainly impact novice drivers who choose to drive recklessly with little adverse impact on the majority who drive safely. The tightened penalty points sanction should only be introduced in combination with the incentive of financial rewards to drive safely with telematics insurance.

Minimum learning period

- The Government should introduce a minimum six months between the start date of a provisional licence and taking the on-road driving test.

Hazard perception test

- A decade after its introduction, the hazard perception test should be thoroughly reviewed to identify cost effective ways of improvement using advances in technology. Research into improvement of the test should be a priority for the Department for Transport's research budget and should engage the insurance industry in developing the programme so that the new data and experience from telematics insurance is fully captured.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Adaptation of roads for older drivers

- Road operators and designers need to be briefed that older drivers are becoming the norm and not the exception. There is a conflict to be addressed between increasing the complexity of traffic management and the inclusiveness of the network.

Driver assistance systems

- Driver assistance systems that make the driving task less stressful and which help compensate for older drivers' declining abilities should be encouraged.

Focus crash tests for older drivers

- EuroNCAP should examine how tests for crash protection in cars could be better focused on older people to reduce their susceptibility to serious injuries.

Roads that cars can read: the quality and consistency of road signs and markings

- The Highways Agency is the market dominant roads agency in Britain. In 2015 the Government plans it will become a Corporation with aspirations to deliver world class standards. It will become one of Europe's largest roads companies with the potential not only to set the pace in Britain but internationally. Working in partnership with the motor industry and other market leading European road companies, the new Highways Corporation should support proposals to survey the quality and consistency of its road signing and marking on major road networks and determine the programmes needed to bring its network up to the standard needed to support reliable operation of the vehicles that will be on the road in 2025.

eCall

- The Government should publish a framework for the national roll-out of eCall.

Employer's duty of care

- With user chooser company car schemes, employers should ensure that their employees have information about the NCAP safety rating of cars. Preferably, they should be encouraged to purchase vehicles with higher NCAP ratings.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

References

1. DfT (2014) Reported Road Casualties in Great Britain: main results 2013 report
www.gov.uk/government/uploads/system/uploads/attachment_data/file/324580/rrcgb-main-results-2013.pdf
(retrieved 17th September 2014)

2 DfT (2013) A valuation of road accidents and casualties in 2012
www.gov.uk/government/uploads/system/uploads/attachment_data/file/244913/rrcgb2012-02.pdf
(retrieved 17th September 2014)

3 DfT (2012) Hospital admissions as a result of road accidents
www.gov.uk/government/statistical-data-sets/ras55-hospital-episode-statistics-hes
(retrieved 17th September 2014)

4 DfT (2013) Road Traffic Statistics
www.gov.uk/government/collections/road-traffic-statistics
(retrieved 17th September 2014)

5 ONS (2013) Long-term profile of Gross Domestic Product (GDP) in the UK
www.ons.gov.uk/ons/rel/elmr/explaining-economic-statistics/long-term-profile-of-gdp-in-the-uk/sty-long-term-profile-of-gdp.html
(retrieved 17th September 2014)

6 DfT (2013) Reported road casualties Great Britain: annual report 2012
www.gov.uk/government/statistics/reported-road-casualties-great-britain-annual-report-2012
(retrieved 17th September 2014)

7 RSF (2011) Saving Lives, Saving Money. The costs and benefits of achieving safe roads
http://roadsafetyfoundation.org/media/11070/saving%20lives_saving%20money.pdf
(retrieved 17th September 2014)

8 Newstead et al (2011) Final Evaluation of the $130M Safer Roads Infrastructure Program (SRIP1) May 2011, Interim Evaluation of the Safer Roads Infrastructure Program Stage 2(SRIP2), Aug 2011 and Interim Evaluation of the Safer Roads Infrastructure Program Stage 3 (SRIP3), Monash University Accident Research Centre, Melbourne, Victoria.

9 GOV (2014) Social Impact Investment Taskforce
www.gov.uk/government/groups/social-impact-investment-taskforce
(retrieved 17th September 2014)

10 MIE (2013) Bill & Melinda Gates Foundation, JPMorgan Chase, and other funders invest $94 million in a global investment fund for advancing health
www.missioninvestors.org/news/bill-melinda-gates-foundation-jpmorgan-chase-and-other-funders-invest-94-million-in-a-global
(retrieved 17th September 2014)

11 GOV (2013) Social impact bonds
www.gov.uk/social-impact-bonds
(retrieved 17th September 2014)

12 Cabinet Office (2013) Social Impact Bond Model
data.gov.uk/sib_knowledge_box/knowledge-box
(retrieved 13th October 2014)

13 UN (2014) Introduction to the proposal of the open working group for sustainable development goals
sustainabledevelopment.un.org/content/documents/4518SDGs_FINAL_Proposal%20of%20OWG_19%20July%20at%201320hrsver3.pdf
(retrieved 17th September 2014)

14 NHTSA (2014) The Economic and Societal Impact Of Motor Vehicle Crashes, 2010
www-nrd.nhtsa.dot.gov/Pubs/812013.pdf
(retrieved 20th October 2014)

15 RSF (2011) Saving Lives, Saving Money. The costs and benefits of achieving safe roads
http://roadsafetyfoundation.org/media/11070/saving%20lives_saving%20money.pdf
(retrieved 17th September 2014)

16 Organisation for Economic Co-operation and Development (OECD) (2008). Towards Zero: Ambitious Road Safety Targets and the Safe System Approach. OECD Publishing
www.internationaltransportforum.org/jtrc/safety/targets/08TargetsSummary.pdf
(retrieved 17th September 2014)

17 CIHT (1999) Rural Safety Management
www.ciht.org.uk/en/publications/index.cfm/-rural-safety-management-1999 (retrieved 17th September 2014)

18 TRL (2005) Estimate reviewed by Professor Rod Kimber

19 RWS (2000) Sustainable safety: A new approach for road safety in the Netherlands
www.ocs.polito.it/biblioteca/mobilita/SafetyNetherlands.pdf
(retrieved 17th September 2014)

20 HSE (2014) Statistics on fatal injuries in the workplace in Great Britain 2014
www.hse.gov.uk/statistics/pdf/fatalinjuries.pdf
(retrieved 17th September 2014)

21 DfT (2013) Setting local speed limits
www.gov.uk/government/publications/setting-local-speed-limits
(retrieved 17th September 2014)

22 RSF (2013) Measuring to Manage: British EuroRAP results 2013
www.roadsafetyfoundation.org/media/29903/measuring_to_manage_spread.pdf
(retrieved 17th September 2014)

23 DfT (2011) Strategic framework for road safety
www.gov.uk/government/publications/strategic-framework-for-road-safety
(retrieved 17th September 2014)

24 PACTS (2011) Letter to the times
www.pacts.org.uk/2011/07/letter-to-the-times/
(retrieved 17th September 2014)

25 Organisation for Economic Co-operation and Development (OECD) (2008). Towards Zero: Ambitious Road Safety Targets and the Safe System Approach. OECD Publishing
www.internationaltransportforum.org/jtrc/safety/targets/08TargetsSummary.pdf
(retrieved 17th September 2014)

26 DfT (2013) Table NTS0605, National Transport Survey
www.gov.uk/government/organisations/department-for-transport/series/national-travel-survey-statistics
(retrieved 17th September 2014)

References

27 DfT (2013) Table RAS30028, Reported road casualties Great Britain: annual report 2012
www.gov.uk/government/statistics/reported-road-casualties-great-britain-annual-report-2012
(retrieved 17th September 2014)

28 McKenna, Waylen & Burkes (1998) Male and Female Drivers – How Different Are They? University of Reading
www.roadsafetyfoundation.org/media/11338/male_and_female_drivers_-_how_are_they_different.pdf
(retrieved 8th October 2014)

29 AA (2014) AA British Insurance Premium Index
www.theaa.com/newsroom/insurance/bipi/british-insurance-premium-index.html#tabview%3Dtab2
(retrieved 13th October 2014)

30 TRL (2013) TRL Report PPR673. Novice Drivers: Evidence Review and Evaluation: Pre-driving education and training, Graduated Driving Licensing and the New Drivers Act

31 McKenna (2012) Young driver challenges
www.thepsychologist.org.uk/archive/archive_home.cfm/volumeID_25-editionID_217-ArticleID_2134-getfile_getPDF/thepsychologist/0912pmck.pdf
(retrieved 15th October 2014)

32 Rabbitt, Carmichael, Shilling & Sutcliffe (2002) Age, Health and Driving. University of Manchester
http://roadsafetyfoundation.org/media/11317/aa_foundation_fdn32.pdf
(retrieved 8th October 2014)

33 Carter et al (2007) DfT Road Safety Research Report 75 'Fatal Vehicle-occupant Collisions: An In-depth Study'
www.getintogear.info/resources/view-document/fatal-vehicle-occupant-collisions-an-in-depth-study/
(retrieved 13th October 2014)

34 Levin et all (2009) VTI Report 656A. Older car drivers in Norway and Sweden Studies of accident involvement, visual search behaviour, attention and hazard perception
www.vegvesen.no/_attachment/202960/binary/393296?fast_title=Older+car+drivers+in+Norway+and+Sweden.pdf
(retrieved 13th October 2014)

35 NHTSA (2013) Traffic Safety for Older People – 5 year plan
www.nhtsa.gov/staticfiles/nti/older_drivers/pdf/Older_People_811873.pdf (retrieved 18th September 2014)

36 Lords Select Committee (2013) Ready for Ageing
www.parliament.uk/business/committees/committees-a-z/lords-select/public-services-committee/report-ready-for-ageing/
(retrieved 18th September 2014)

37 Trans-Atlantic Business Council
www.transatlanticbusiness.org/

38 Lie & Tingvall (2002) How Do Euro NCAP Results Correlate with Real-Life Injury Risks? A Paired Comparison Study of Car-to-Car Crashes
www.euroncap.com/files/TIP_paper_2002---ea163391-0c67-4ad8-ae24-a176e39352f8.pdf
(retrieved 13th October 2014)

39 Global NCAP (2014) Global NCAP Fleet Safety Guide and Safer Car Purchasing Policy
www.globalncap.org/wp-content/uploads/2014/04/FleetBuyersGuide.pdf
(retrieved 18th September 2014)

40 Hulshof et al (2013) Autonomous Emergency Braking Test Results. Thatcham Research
www.euroncap.com/files/AEB-Test-Results-ESV-2013---0-a837f165-3a9c-4a94-aefb-1171fbf21213.pdf
(retrieved 13th October 2014)

41 Hulshof et al (2013) Autonomous Emergency Braking Test Results. Thatcham Research
www.euroncap.com/files/AEB-Test-Results-ESV-2013---0-a837f165-3a9c-4a94-aefb-1171fbf21213.pdf
(retrieved 13th October 2014)

42 EuroRAP/Euro NCAP (2011) Roads That Cars Can Read: A consultation paper.
www.eurorap.org/media/130623/20110629-roads_20that_20cars_20can_20read_20june_202011.pdf
(retrieved 18th September 2014)

43 EuroRAP/Euro NCAP (2013) Roads That Cars Can Read: A Quality Standard for Road Markings and Traffic Signs on Major Rural Roads. www.eurorap.org/media/186774/roads_that_cars_can_read_2_spread.pdf
(retrieved 18th September 2014)

44 EuroRAP/Euro NCAP (2011) Roads That Cars Can Read: A consultation paper.
www.eurorap.org/media/130623/20110629-roads_20that_20cars_20can_20read_20june_202011.pdf
(retrieved 18th September 2014)

45 HSE (2014) Statistics on fatal injuries in the workplace in Great Britain 2014
www.hse.gov.uk/statistics/pdf/fatalinjuries.pdf
(retrieved 17th September 2014)

46 ROADSAFE (2007) Driving for Better Business
www.drivingforbetterbusiness.com/about/default.aspx
(retrieved 18th September 2014)

47 ROADSAFE (2007) Case Study – TESCO
www.drivingforbetterbusiness.com/casestudies/tesco.aspx
(retrieved 18th September 2014)

48 iRAP Methodology
http://irap.org/en/about-irap-3/methodology (retrieved 18th September 2014)

49 RSF (2011) Saving Lives, Saving Money. The costs and benefits of achieving safe roads
http://roadsafetyfoundation.org/media/11070/saving%20lives_saving%20money.pdf
(retrieved 17th September 2014)

50 RACC (2014) Press Conference, Barcelona. 17th July 2014

51 ViDA. Software to save lives
http://vida.irap.org/en-gb/home
(retrieved 18th September 2014)

52 RSF (2014) How Safe Are You On Britain's Roads?: British EuroRAP Results 2014
www.roadsafetyfoundation.org/library-homepage/library-items/how-safe-are-you-on-britain%27s-roads-2014-eurorap-results.aspx
(retrieved 3rd November 2014)

53 GOV (2014) Transforming the Highways Agency into a government-owned company
www.gov.uk/government/consultations/transforming-the-highways-agency-into-a-government-owned-company
(retrieved 18th September 2014)

ROAD SAFETY FOUNDATION
ageas
Commissioned by Ageas

Annex 3.1: Indicative estimation of costs and benefits from zero Insurance Premium Tax (IPT) rate

All assumptions in this business case are based on reasonable working estimates of the Road Safety Foundation following information received from insurance industry sources.

Treasury Revenue Forgone

Assuming or taking:

- Approximately 20m motor insurance policies in the UK market
- Current volume of telematics policies: 300,000. Of these, approximately 250,000 are under 25 year olds (20% of a total under-25s market of 1.25m)
- There would be a natural market growth of 40,000 policies per annum
- The VAT exemption will encourage marketing activity based on the tax relief and societal approval, which will induce an additional annual growth of 35,000 under-25 telematics policies per annum
- An average telematics insurance premium of £1,000
- IPT Rate at 6%

=

Then:

- In the first year, the gross cost of the tax incentive to Treasury in lost IPT would be:

	£1000	average premium
X	0.6	IPT
X	325,000	current under 25s with telematics +anticipated growth
=	£19.5m	

- We would expect there to be 245,000 additional policies in place induced by the tax relief and associated marketing after the 7th year
- This lost IPT would rise to £46.5m in the 7th year with 775,000 under-25s policies in place (based on an annual growth of 75k policies per annum over 7 years) which is broadly two thirds of under-25s (62% penetration)

Expected total lost IPT over 7 years = £231m

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Reduction in road crashes & personal injuries

Assuming or taking:

- Serious crash reduction of 30% for telematics policy holders
- Under-25s account for 22% of 20,000 serious crashes annually
- The policy induces and retains an additional 35,000 policy holders in year 1 and 245,000 in total by year 7

=

Then:

- In the first year, we would expect a reduction of 37 serious crashes:

	20,000	Serious crashes annually
X	0.22	Under 25's segment of serious crashes
X	0.3	Serious crash reduction for telematics policyholders
X	35,000	Additional annual growth
/	1,250,000	Total under 25s market
=	37	

- On the normal ratios*, this means a reduction of 2,590 personal injury crashes in year 7 and 25,900 damage crashes

* A working shorthand is that there are 10 times as many serious injuries as deaths; 10 times as many slight injuries as serious; and 10 times as many damage only crashes as slight injuries.

Cost savings

Assuming or taking:

- £0.4 million as the average cost for a serious crash causing death or serious injury (this assumes that serious crashes involving young people are no more expensive than the average notwithstanding longer long term care costs)**; and
- All slight injury and damage crash costs equal to serious crash costs

=

Then:

- It would be reasonable to expect that the economic cost saved in year 1 would be:

	37	Reduction of serious crashes
X	0.4	Average cost for a serious crash
X	2	Total value of crashes taking into account killed, serious injury, slight injury and damage crash costs
=	£30m	

- In year 7 the economic cost saved is £207m

Expected total cost saving: £829m

** Source: DfT, 2014. Average value of prevention per reported casualty and per reported road accident: Great Britain, latest available year https://www.gov.uk/government/statistical-data-sets/ras60-average-value-of-preventing-road-accidents

Annex 3.1

Summary of assumptions and expectations

Year	Total policies	Lost IPT (£m)	Policies induced	Killed/ seriously injured saving	Economic Cost saved (£m)	Present Value Cost (£m)	Present Value Benefit (£m)
1	325,000	19.5	35,000	37	30	19	29
2	400,000	24	70,000	74	59	22	55
3	475,000	28.5	105,000	111	89	26	80
4	550,000	33	140,000	148	118	29	103
5	625,000	37.5	175,000	185	148	32	125
6	700,000	42	210,000	222	178	34	144
7	775,000	46.5	245,000	259	207	37	163
TOTAL		231			829	199	699

Note: figures have been rounded

Net Present Value based on Treasury discount rate of 3.5%

Present value of benefits:
£699 million

–

Present value of costs:
£199 million

=

Expected saving to the economy:
£500 million

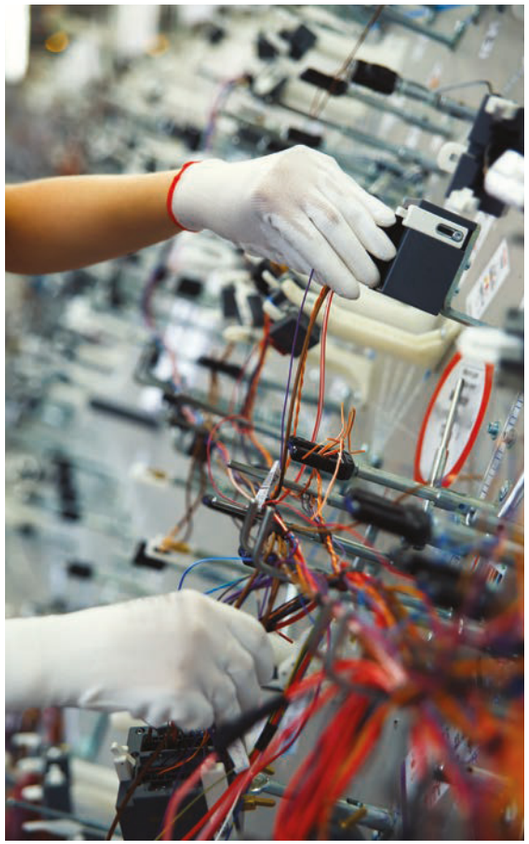
Expected Benefit Cost Ratio: Above 3

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Annex 4.1: The evolution of advanced vehicle technologies



1. By end-2020, most vehicles on the road in high income countries will have active safety features well beyond ABS. By 2025, half of vehicles on the road are expected have some form of self-steering. All the technologies described in section 4 of this Report are in the showroom now and used on public roads today. These advanced driver assistance systems use sensors, electronics and software to intervene in response to an event out of the ordinary.

2. As set out in Box 4.1, active safety systems seek to intervene before the crash impact occurs so as to avoid or mitigate the consequences. For example, electronic stability control – often called "the greatest invention since the seat belt" - became a legal requirement in Australia in 2009, the USA in 2010 and in Europe in 2012. Many of the driver warning and assistance technologies already deployed in high and mid-range vehicles - such as autonomous emergency braking, lane departure warning, blind spot monitoring, speed alert, sign recognition and other forms of attention alert – will be the norm by 2020.

3. ABS. The first mass application of electronics to vehicle safety was ABS (anti-lock braking system). ABS was introduced widely in the 1980s and became near universal well before it was mandated in vehicle regulations by the EC in 2007. It will become mandatory for new motorcycles in 2014. Although there had been decades of research into anti-lock braking systems (aircraft landing systems had long used them), there was hesitation (in the USA in particular) before permitting a computer rather than a driver to take the decision on when to apply and release the brakes in skidding conditions.

4. ESC. Once ABS became accepted as a technology, the advance of traction control systems to deliver metered power to the wheels to avoid wheel spin was a logical step. This was followed by the development of Electronic Stability Control (ESC) using the same core technology to meter the application and release of the brakes and help, within the laws of physics, to keep the vehicle heading towards where the steering wheel was pointing.

5. Loss of control is a major feature of serious crashes. The introduction of ESC has been estimated to have reduced total [serious] crashes by around [10%] in fitted vehicles. ESC is far from universal on the typical 5-year old vehicle. Older vehicles, commonly driven by young drivers, rarely have this technology and so it has yet to yield its full potential as the national fleet is renewed.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Technologies which focus on alerting attention

6. A number of driver assistance technologies focus on alerting driver attention. These include:

   i. Intelligent Seat Belt Reminders. Deaths and serious injuries are highly skewed towards those not wearing seat belts. Seat belt reminders were widely introduced after advances that made it possible both to detect which seats were occupied and for the car to become increasingly insistent in its reminders. Survey evidence shows city seat belt wearing rates with seat belt reminders meeting NCAP standards were 97.5% compared with 85.5% where no reminder was fitted: mild reminders achieved 93.2%. (Traffic Injury Prevention. 2008 Oct; 9(5):446-9)

   ii. Blind Spot Monitoring. These systems warn through a flashing light in side mirrors when a vehicle is close and may not be visible in side mirrors which are often imperfectly set. The monitoring technology used can be radar or cameras.

   iii. Drowsiness Alert. In normal driving, drivers make continual small steering adjustments to keep the vehicle on a safe path. Drowsy drivers have periods with little steering input followed by sudden and exaggerated corrections as the driver regains attention. Drowsiness alert monitors the use of steering wheel and gives a warning alert.

   iv. Forward Alert. The long range radar senses when the vehicle is closing too quickly on the vehicle in front and an alert is sounded. For example, a vehicle in front may have stopped or slowed sharply to turn right or there may be a queue on a motorway.

   v. Speed Alert. The vehicle compares the driven speed with the speed limit or a preset maximum speed and gives an alert when it is exceeded. Speed limits are either those recorded on a digital map (typically using the SatNav) or read directly from the roadside by a sign recognition system.

   vi. Lane Departure Warning. Cameras read the lane markings and when a vehicle drifts rather than turns out of a lane, it gives both audible warning and a vibration through the steering wheel (as if a vehicle had been driven over a rumble strip).

Recent technologies which exert control

7. Largely in the last decade, a number of technologies have been introduced which, like ABS and ESC, take control of the vehicle in specific circumstances. The key technologies are:

   i. Brake Assist. Brake assist systems are designed to sense emergency braking and help the driver achieve the maximum braking force. The maximum braking force which the vehicle is capable of is not always applied or applied early enough in a crash. The research eg US research, reflected in some European advertising, suggests that 'brake assist' may be more helpful to women. 'Brake Assist' was made mandatory for new vehicles sold in the EU from [2009] as a part of a package of measures to improve pedestrian safety.

   ii. Adaptive Cruise Control. Cruise controls which allow drivers to maintain a constant speed have been a common feature on cars for half a century, particularly in the USA. Adaptive cruise control (ACC) entered the market on upscale vehicles a decade ago and is now available on bestselling vehicles such as the Ford Focus. ACC permits the driver to set both the maximum speed and minimum headway which governs when the vehicle system will brake and accelerate based on feedback from its long range radar. The system is well suited to motorway driving. Desk studies have suggested that if only 10% of the fleet is operating adaptive cruise control it can have the same flow smoothing effect as a 'controlled motorway' (see Section 5) where drivers are asked to stay in lane and maintain a set speed as on the intensely trafficked sections of M25 and M42.

   iii. Lane Keeping. Lane keeping technologies are designed for higher speed inter-urban highway driving and address an issue, more prevalent than might be thought, of vehicles drifting out of lanes. Current lane keeping systems, using camera technologies to read lanes, gently begin to adjust steering so that the driver can sense they must continue the course correction. It is estimated that half the vehicles on the road by 2025 will have some form of self-steering such as lane keeping.

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

iv. Intelligent Speed Adaption. This technology goes further than speed alert and prevents the vehicle from exceeding a set speed. Unlike conventional speed limiters, these systems can respond to rapidly changing speed limits (either by reading roadside signs or from SatNav data) and ensure the vehicle always stays within the speed limit. Research evidence shows that a significant segment of drivers (in the region of a half) welcome the assistance given by systems once they have day to day experience of them, not least because drivers can avoid fines for speeding unintentionally.

v. Low Speed Autonomous Emergency Braking. This vehicle technology targeted at city driving has quickly emerged as one of the most important technologies entering service in reducing the cost of real world road crashes.

Relatively inexpensive cameras and lasers build a picture of the road ahead. The control software and algorithms continuously track the distance, direction and speed of multiple objects in the vehicle's path. If the car is sure to hit something in front such as another vehicle, a pedestrian, cyclist or an object, emergency braking will be applied. At lower speeds (less than 20 mph) a collision may be prevented altogether. At higher speeds (less than 30mph), the impact will markedly be less serious.

A small US study first revealed a 50% reduction in bodily injury claims and a 25% reduction in damage for vehicles fitted with the technology. In 2012, analysis of claims by the British Insurers research centre Thatcham Research led the industry to lower the insurance rating of vehicles fitted with technology. British claims research from Thatcham shows vehicles fitted with this technology are reducing claims by 25-40%.

vi. High Speed Autonomous Emergency Braking. This technology based on radars and camera technology is targeted at high speed driving and is often linked to the Adaptive Cruise Control which keeps the driven vehicle at a set distance from the car being followed. High Speed AEB will automatically apply emergency braking if an impact with a slowing or stopping car is detected and if the driver has not taken preventative action. This technology can avoid or mitigate high speed crashes leading to death and serious injury.

vii. Pedestrian Autonomous Emergency Braking. This technology, just being introduced by manufacturers such as BMW, Volvo and Mercedes provides full avoidance of impact with pedestrians at low to medium speeds. The technology again uses cameras and radar technology. It is potentially an important future road safety technology.

Future intervention technologies are also in development which will build the core architecture required for the intelligent autonomous vehicle. These include, in the near term, Road Departure Autonomous Steering which detects that the vehicle is about to leave the road in either a straight ahead or curve and intervenes to avoid the crash; and Junction Autonomous Emergency Braking, in which sensors in the vehicle detect a crossing vehicle and apply AEB – this applying to cross junctions and turning off or onto a main road. Other capabilities will be built on these, and in conjunction with the other capabilities for the range of driving scenarios will provide the safe driving building blocks for partially and then fully autonomous vehicles.

Public acceptance and legal liability

8. The general public acceptance that electronic systems should activate when all else has failed, as with airbags and seatbelt pre-tensioners, has moved on. The explanation by celebrity racing drivers, for example, helped win acceptance that technologies such as ESC can perform better than any human being in emergency driving situations requiring split second reactions.

9. As the degree of automation increases, the public acceptance and legal liability issues of advanced systems need to be better addressed alongside issues such as data ownership and privacy. For example, who owns the data in on-board vehicle units describing how a vehicle has been driven and where it has been driven?

10. Public acceptability is likely to continue to be an incremental process as each advance proves itself in practice. Similarly, a high profile accident which is caused by a clear system failure or a hacked device could well stall development.

The key to the roll out of the more advanced vehicle electronics in the last two decades has been the principle that the driver always remains responsible and that the electronics provide

assistance. For example, with Adaptive Cruise Control, It is the driver who must choose to engage the adaptive cruise control system. It is the driver who chooses the maximum speed and minimum headway which governs when the vehicle system will brake and accelerate based on feedback from its long range radar. The lightest touch on the brakes will disengage the system. Pressing the accelerator will override the system selected speed.

11. Similarly, Intelligent Speed Adaption is an example of a technology which is controversial when proposed as a mandatory system by proponents but which wins support providing the driver can choose when and how to use it.

12. The number of driver assistance systems available is increasing significantly. Some systems make driving more comfortable and help avoid bumps and scrapes rather than bodily injury, for example parking sensors or automatic parking systems. For manufacturers and consumers, the more genuinely useful applications that an installed component can be used for, the better. An airbag that is unused is still insurance worth paying. But a camera, sensor or sub-system that is used for several applications (eg blind spot monitoring; parking assistance; lane departure warning) is more attractive economically.

The autonomous car

13. The accumulation of all the technologies that already exist might suggest that the self-driving or autonomous car is technologically close. There have been major initiatives to develop autonomous or 'self driving' cars since the 1980s. However, extraordinary technical innovation has been matched by an inability to address the institutional change that would be required. The Prometheus project in Europe and the Automated Highway Systemref programme in the USA both left the institutional issues largely unaddressed.

14. The first of these is that the risks that individuals (and so the law) will accept are very different depending on who is in control of the vehicle. The second is that vehicles run on roads which, unlike airways and railways, are operated completely independently of vehicle manufacturers to quality standards that are lax in comparison.

15. To be acceptable, although it can seem disproportionate, it is likely that driverless cars will develop risk levels that are closer to air and rail. The sheer scale of trillions of annual miles of global travel means that extraordinarily improbable crashes will occur on a daily basis.

16. Today, there are US states (eg California, Florida, Nevada) that have legislation that facilitate trials of robotic vehicles on public roads. Other states have rejected proposals for legislation (eg Texas). A common formulation likely to be adopted in Britain and more widely internationally was first adopted in Michigan and requires a driver in the driving seat able to take control at all times.

17. The well reported self-driving Google car uses dozens of laser scanners to build a three dimensional picture of its environment linked to digital maps and Streetview. With rules, logic and learning, the vehicle has been shown to be capable of negotiating a test urban and rural network safely. As with research vehicles of earlier generations, it is difficult to be confident what the limitations and residual risks are.

18. Manufacturers like Mercedes and Toyota have well developed programmes of technological development based on incremental change. Given the rapid pace of this incremental change, many in the industry believe individual advances in motor industry programmes such as mapping and technologies from the Google car will simply be absorbed once they prove practical and economic.

19. In Europe, the pre-competitive cooperation programme EUCAR sets out a path for the development of future systems which provides a road map for manufacturing industry. The organisation ERTICO provides a broader framework for the development of intelligent transport systems of all types for road, vehicle and public transport systems. These technical cooperations frequently outpace the institutional frameworks to deploy them (eg emergency call technology, eCall, where cars are required to be equipped to call 999 automatically with GPS positioning in the event of an airbag deploying but European emergency call handling centres are commonly are not organised or equipped to handle these calls).

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas

Commissioned by Ageas

Ageas

Ageas UK is a leading provider of award-winning Personal and Commercial insurance solutions in the UK. Ageas UK distributes its Non-Life products through a range of channels including brokers, intermediaries, affinity partners and the Internet, as well as through its retail strategy and its wholly or partially-owned companies trading as Ageas Insurance, Ageas Protect, Ageas Retail, Tesco Underwriting and Ageas's Retail brands which include AutoDirect, Castle Cover, CoverDirect, Done Deal, Express Insurance, the Green Insurance Company, Kwik Fit Insurance Services and RIAS.

Insuring around nine million customers overall, Ageas works with a range of partners and is recognised for delivering consistent and high-quality customer experiences. The company is the third largest motor insurer in the UK based on number of vehicles insured and also specialises in non-standard motor insurance to cater for a variety of vehicles including classic cars, classic motorcycles, kit cars and high performance vehicles.

The Road Safety Foundation

The Road Safety Foundation is a UK charity advocating road casualty reduction through simultaneous action on all three components of the safe road system: roads, vehicles and behaviour.

The charity has enabled work across each of these components and several of our published reports have provided the basis of new legislation or government policy.

For the last decade, the charity has focused on leading the establishment of the European Road Assessment Programme (EuroRAP) in the UK and internationally. Since the inception of EuroRAP in 1999, the Foundation has been the UK Member responsible for managing the programme in the UK (and, more recently, Ireland), ensuring the UK provides a global model of what can be achieved.

The Foundation plays a pivotal role in raising awareness and understanding of the importance of road infrastructure at all levels through:

- Regular publication of EuroRAP safety rating measures which can be understood by the general public, policy makers and professionals alike;
- Issuing guidance on the use of EuroRAP protocols at operational level by road authorities in order for engineers to improve the safety of the road infrastructure for which they are responsible;
- Proposing the strategies and goals that the Government should set in order to save tens of thousands of lives and disabling injuries.

The Road Safety Foundation is a founder member of the FIA Foundation and frequently works with other FIA members in Britain and abroad. We also work closely with other road safety organisations including the RAC Foundation, AA, IAM, RoadSafe, PACTS and professional bodies such as ADEPT.

ageas

ageas.co.uk
twitter @AgeasUK

ROAD SAFETY FOUNDATION

roadsafetyfoundation.org
twitter @SafeRoadDesign

ROAD SAFETY FOUNDATION

ageas

Commissioned by Ageas