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Whitepaper:

Intelligent Speed Assistance

A logical move for road safety, but driver tech education is still a critical need.

Our thanks to Dr Helen Wells, Director of the Roads Policing Academic Network for her contribution to this paper

Introduction

New vehicle type approval regulations are coming into force that will mandate a range of safety devices on most new vehicles sold from 2024. This includes intelligent speed assistance, which is otherwise known as a speed limiter. The complete list is set out on page 6 of this report.

Many of these systems have hitherto been available only on higher-end vehicles, and their use has been optional. New regulations will require that the systems must be active every time the vehicle starts.

These new systems promise to reduce casualties by reacting when the driver doesn't and reducing the ability of vehicles to exceed the speed limit. However, they will present challenges both in terms of their accuracy and the ability of drivers to use them correctly. There is concern about overreliance on the systems that will lead to reduced driver attention and an abrogation of responsibility as drivers become conditioned to believe that their vehicle will not allow them to do unsafe things.

This white paper discusses the 'why', 'what', 'how' and 'when' relating to the regulations and provides some potential considerations for future driver behaviour and driving offence enforcement.

The nature of casualty reduction, with its emphasis on the fatal four (speed, seatbelts, drink/drugs, distractions), will change. Speeding in relation to exceeding the posted speed limit will reduce but it will not regulate the use of inappropriate speed. Devices such as these will have no impact on those crashes caused by injudicious choice of speed by the driver that is nonetheless within the posted limit. This will require a new focus – driver education and appreciation in particular - but by careful planning and consideration now, casualty reduction can be maximised, and resources deployed effectively through to 2030 and beyond.

Why new type approval regulations?

The European Union (EU) – which at the time included the UK – has failed to meet its target of reducing casualties by 50% from 2010 to 2020. A new target to reduce global casualties by 50% from 2020 to 2030 has now been set out in the Stockholm Declaration, in conjunction with the World Health Organisation.

Following an assessment of the most likely methods of reducing fatalities and improving road safety, the EU Commission published a report for the European Parliament and the European Council in December 2016 entitled "Saving Lives: Boosting Car Safety in the EU". This has provided the basis for new legislation that covers type approval across the member states. New legislation was proposed in 2018 and enacted on 27 November 2019 in amended form.

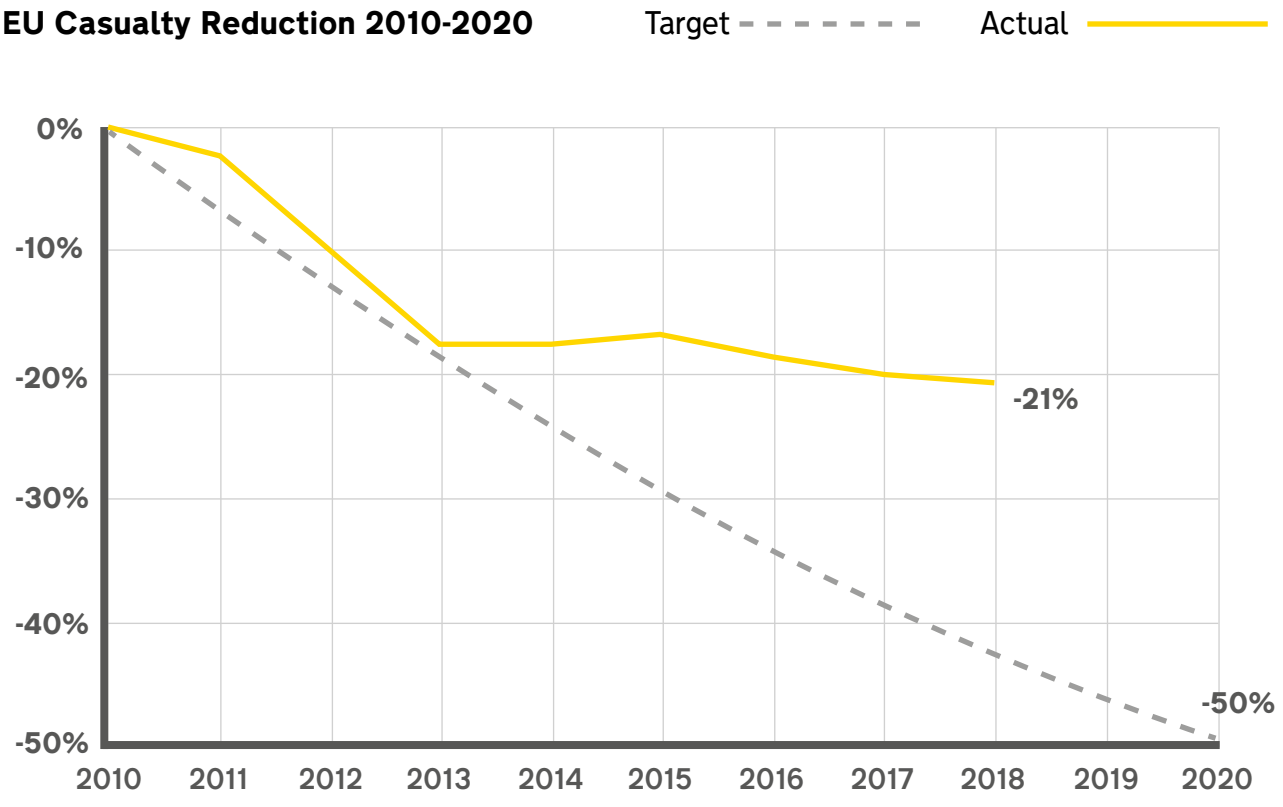
The Vehicle Compliance Agency (VCA) is the UK's regulator in relation to the type approval of all vehicles and, whilst EU type approval and UK type approval will undergo separate testing since the UK left the EU on 31st January 2020, it appears it will not remove the type approval requirements from the UK transport policy. Instead it is our current understanding from discussions with VOSA (The Vehicle and Operator Standards Agency) that agreements will be honoured with additional regulations in place to enable type approval to be applied to the same standards within the remaining 27 EU members and the UK.

These type approval requirements have been through wide consultation with road safety professionals and vehicle manufacturers including those below.

The European Transport Safety Council (ETSC) calculates that a 1km/h reduction in speed would save 2,100 lives per year across Europe and that effective intelligent speed assistance alone would reduce casualties by 20%.

ETSC Reducing speeding in Europe, pin flash report 36, February 2019; https://etsc.eu/reducing-speeding-in-europe-pin-flash-36/

EU Casualty Reduction 2010-2020



What technology is being mandated on new vehicles?

A suite of new regulations is coming into force; each is listed in the legislation. Some are technical, such as frontal protection systems, and will not be obvious to drivers. Others will be more familiar, such as the extension of seat belt warnings to rear seats and tyre pressure monitoring systems, and some will be quite new to most drivers, such as autonomous emergency braking, although these systems do already exist on some vehicles.

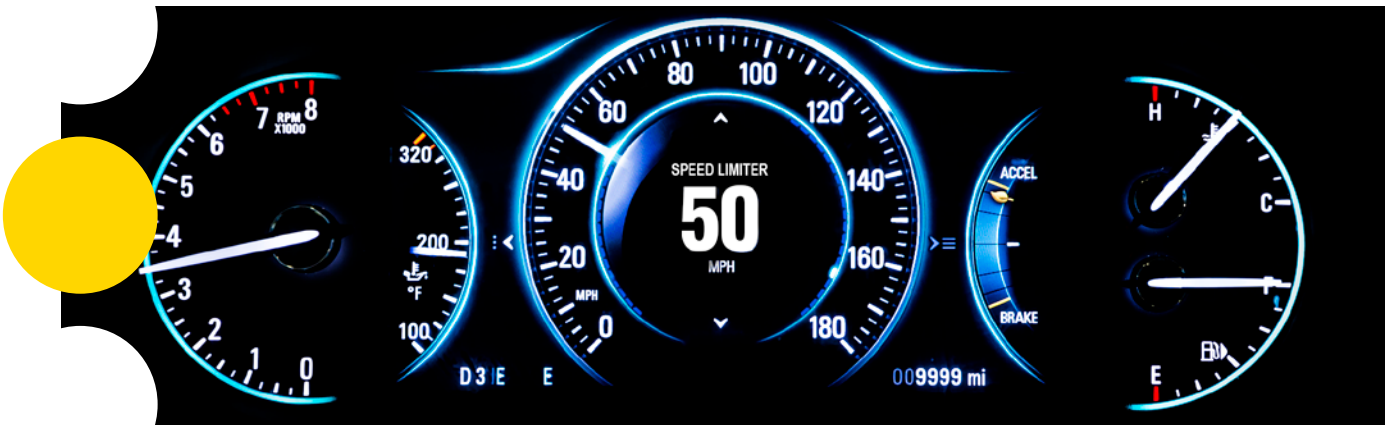
The regulations are designed to align some of the requirements for fully autonomous vehicles and those of 'driven' vehicles to ensure harmonisation in the future.

> There is a growing body of work on how people respond to/ interact with autonomous vehicles, not least the fact that they misunderstand the difference between 'assisted' and 'autonomous'. In terms of challenges, this is another big one to consider alongside drivers getting confused by systems and drivers overriding them.
>
> Dr Helen Wells

Most of the new technology will apply to all passenger and goods vehicles, requiring vehicles like vans, SUV's and pick-ups, which were exempt from some previous regulations, to be similarly equipped to cars. This is due to the increased number of such vehicles on the road, which has risen from 3% in 1996 to 14% in 2016.

Vehicles affected are Class M1, M2, M3 (all passenger carrying vehicles), Class N1, N2, N3 (all goods vehicles) and STUs (separate technical units*). Class L (motorcycles) will not be affected yet. There is provision to apply for exemption for very low volume vehicle manufacturers.

*STU, Separate technical units: a unit that may be fitted to one or more vehicles and may be a new unit to replace a previous unit on a model – where the unit alone may be tested, not the entire vehicle it is fitted to.



What are the key new mandatory systems?

Intelligent speed assistance
This means “a system to aid the driver in maintaining the appropriate speed for the road environment by providing dedicated and appropriate feedback”. This normally includes reducing engine power.

Advanced emergency braking system
This means “a system that can automatically detect a potential collision and activate the vehicle braking system to decelerate the vehicle with the purpose of avoiding or mitigating a collision”: also known as autonomous emergency braking (AEB).

Emergency lane-keeping system
This means “a system that assists the driver in keeping the vehicle in a safe position in relation to the lane or road boundary, at least when a lane departure occurs or is about to occur and a collision might be imminent”; i.e. it steers the car back in lane if a danger is detected.

Lane departure warning system
This means “a system to warn the driver that the vehicle is drifting out of its travel lane”, for example by lights, buzzers or vibrations.

Driver drowsiness and attention warning
This means “a system that assesses the driver’s alertness through vehicle systems analysis and warns the driver if needed”. For example, some cars have the coffee cup sign that illuminates when a deterioration in driver alertness is detected.

Driver distraction warning
This means “a system that helps the driver to continue to pay attention to the traffic situation and warns the driver when he or she is distracted”.

Reversing detection
This means “a system to make the driver aware of people and objects at the rear of the vehicle with the primary aim of avoiding collisions when reversing”, such as reversing sensors.

Tyre pressure monitoring system
This means “a system fitted on a vehicle that can evaluate the pressure of the tyres or the variation of pressure over time and transmit corresponding information to the user while the vehicle is running”.

Event data recorder
This means “a system with the only purpose of recording and storing critical crash-related parameters and information shortly before, during and immediately after a collision”.

Emergency stop signal
This means “a light-signalling function to indicate to other road users to the rear of the vehicle that a high retardation force is being applied to the vehicle relative to the prevailing road conditions”. For example, flashing rear brake lights under heavy braking.

Alcohol interlock installation facilitation
This means “a standardised interface that facilitates the fitting of aftermarket alcohol interlock devices in motor vehicles”: to be used after conviction for drink driving, for example.

One issue with all of these systems is that to ‘techno fix’ a problem you have to make it into a dichotomy or at least designate points of ‘safe’ versus ‘dangerous’ behaviour. Sometimes that’s just not an accurate reflection of the issue and we end up with a binary version of a subjective problem just so that we can render it technofixable. Who is deciding where that point is and how accurate is it? We reinvent the problem when we slap a gadget on it. And that’s before we get to the issues of the human response...

Dr Helen Wells

How they work

Intelligent speed assistance

This is a performance standard rather than a technical specification. The system must be in operation every time the vehicle master switch is activated, i.e. the car is started. The driver can deactivate the system if it is operating incorrectly. The system warns the driver that he or she is exceeding the speed limit and can use a variety of methods, including limiting power to gain compliance. However, the system is overridable, for example by pressing the accelerator to the floor.

> Will these systems cause drivers to be over-reliant on the limit as the demarcation of safe versus dangerous behaviour? 30mph in many situations is reckless and dangerous but techno-fixes are prone to giving you the thumbs up or a smiley face for driving at 29mph, regardless of how many people you may have mown down....
>
> Dr Helen Wells

This may be mitigated to some extent by other moves to have a 30kph/20mph speed limit in busy urban areas, as recently initiated in the Central London congestion zone by TfL and the Mayor of London (March 2020).

The system can use any or all the following methods to determine the speed limit: cameras that observe signs, map data or signals from infrastructure. Speed sign recognition and map data both occasionally encounter errors.

> Legitimacy and trust are key to any intervention that could have legal consequences, or that seeks to take some agency away from drivers.
>
> Dr Helen Wells

The last system is known as a co-operative intelligent traffic system or C-ITS. This allows vehicles to 'talk' to each other and the road signs to improve safety. It can set different speed limits for different categories of vehicles and promises to be the most accurate system.

The system uses either wifi or cellular technology and has been piloted for a decade as a research exercise, the most expansive section being the Rotterdam to Vienna corridor. The British test facility has been the A2/M2 corridor and three and a half years of testing concluded on 29 February 2020. Results have been extremely positive. The technology works and it is well developed and understood.

The EU C-Roads platform is underway to manage the outputs from the pilots and to harmonise the delivery specifications across 19 countries.

> The technology works, it works across borders, user acceptance is positive, they like it. It is now a chicken and egg situation, which is built first, the infrastructure or the cars that can use it?
>
> Gary Crockford MIET, A2/M2 Programme Co-ordinator, Department for Transport, (private discussions 2020)

VW has unilaterally decided to include the technology, branded Car2X on the mark8 Golf. This allows its cars to talk to each other now. Will others follow suit?

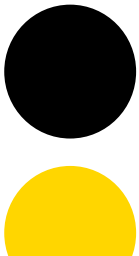
https://www.volkswagenag.com/en/news/stories/2018/10/car2x-networked-driving-comes-to-real-life.html

No system has yet been shown to be 100% accurate. The best systems are achieving 95% accuracy, hence the ability to switch off the provision if it is inaccurate.

> Just because a risk-based narrative means that a behaviour is fair game and that technology means it can realistically be enforced, does not mean that those who suddenly find themselves on the receiving end of it will accept its implications. De-responsibilisation – the resistance of responsibility – is perhaps to be expected in such circumstances.
>
> Wells, H., 2015. Getting around and getting on: self-interested resistance to technology in law enforcement contexts. Annual Review of Law and Social Science, 11, pp.175-192.

(See Appendix 2 p.13)
"Getting Around and Getting On: Self-Interested Resistance to Technology in Law Enforcement Contexts". Dr Helen Wells, School of Sociology and Criminology, Keele University

Intelligent speed assistance is fitted to an increasing number of new models and is already standard on the Ford Focus. The exact method of de-activation varies by manufacturer, e.g. the Ford SMax has a button on the door panel. In the Honda Jazz, it is accessed via a menu and the steering wheel controls. The exact system operating method may be buried deep in the owners-manual: as far as page 427 in one case.



Advanced emergency braking system

This is being introduced in two phases. Phase one detects objects and moving vehicles and phase two provides enhancements to detect pedestrians and cyclists. The system is overridable by the driver and may be switched off by a series of actions. It reverts to active every time the vehicle is started.

Emergency lane-keeping system and lane departure warning system

These systems work together and are designed to avoid overlap. They should not prompt the driver separately and concurrently or in a confusing manner where one action triggers both systems. These actions must be separate from those required to switch off the advanced emergency braking system. Again, they revert to active every time the vehicle is started.

> Devices that are automatically 'on' when you start the vehicle are potentially more likely to be used. Having to actively switch it off every time means some people won't bother. Likewise, we would probably find most people wouldn't bother/remember to switch it ON if the default was OFF.
>
> Dr Helen Wells

Driver drowsiness and attention warning, and driver distraction warning

These systems work together and are designed to avoid overlap. They should not prompt the driver separately and concurrently or in a confusing manner where one action triggers both systems.

Reversing detection, emergency stop signal and tyre pressure monitoring systems

These are well-proven technologies, already offered on many cars for several years, and which will become mandatory.

Event data recorder

This is new to many cars, although it has been used on police and emergency vehicles for many years. Data is recorded on a closed loop. In the case of an accident, the data on the loop is stored. This can then be analysed in order to improve vehicle safety. The data recorded includes the precise vehicle type, variant and version and which active safety features are present. The legislation is worded such that data may only be used anonymously. However, it would be difficult to argue against it being obtained by collision investigators with the correct authorities after a serious collision as it would include high-quality data that could be used in evidence.

Alcohol interlock installation facilitation

This allows the fitment of an after-market device that requires an alcohol-free breath sample before driving can commence. There is no mandatory requirement for this system in the UK (although Durham Constabulary has been piloting a voluntary scheme). They are more frequently used in continental Europe.

> These interventions don't target the addiction or the motivation so as soon as you take them off, the subject reverts to their original behaviour. They need to be looked at as part of a package of interventions that involves treatment and support.
>
> Dr Helen Wells

When will vehicles be fitted with this technology?

The implementation dates for the new regulations vary according to the vehicle classification and the safety feature. The earliest implementation date is 6 July 2022 by which date all cars and light vans sold must have tyre pressure monitoring systems and safety belt reminders. Heavy vehicles must have advanced emergency braking systems.

By 7 July 2024 most of the systems mentioned in this report must be fitted to all passenger and goods vehicles sold. This includes intelligent speed assistance.

By 7 July 2026 driver distraction systems must be fitted and the advanced emergency braking must recognise pedestrians and cyclists as well as larger objects.

The type approval regulations for new vehicles generally come into force two years before the date at which the system is required to be fitted on all vehicles sold new. Once a vehicle has been type approved those systems must be fitted whenever it is sold, even if that is before the date when they are required on all new vehicles.

E.g. any vehicle type approved after 6 July 2022 must have intelligent speed assist fitted, even though it will be sold before the 2024 date that applies to all cars.

The full implementation schedule is contained in the legislation listed by system and vehicle type.

EU legislation 2019/2144 type approval requirements for motor vehicles:
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R2144&from=EN

The effect on the driver and other road users

These systems represent the compromise between the best technology available and the accuracy of that technology. Initial proposals were for these systems to be 'always on' but the ability to deactivate them has been built in as it is understood they will error from time to time. We are unsure if the best estimate of 95% accuracy means that in 95% of journeys the system works as it should, or could it mean that for 5% of every journey the system is inaccurate? The effects on driver behaviour and trust in the systems is very different if one in twenty speed limits are wrongly detected.

There are a number of research sources that indicate that drivers will not know how to operate the systems as well as might be hoped.

> The systems on vehicles now, for assisted driving, are really good if you use them correctly. But they're not infallible, and the driver has to maintain alertness and be in the loop.
>
> Matthew Avery, Research Director at Thatcham

> Research suggests that people wildly overestimate the effectiveness of driver-assistance features. Thatcham Research surveyed 1,500 people in seven countries in 2018 and found that 70 percent believed you could buy an autonomous car, and 11 percent would be tempted to nap, watch a movie, or read the paper while using a driver-assistance feature. Undercover researchers with MIT found in 2017 that not all car dealers accurately describe new features' abilities or limitations to customers. Studies by the Insurance Institute of Highway Safety suggest many drivers don't understand the range of features like adaptive cruise control, which can adjust vehicle speed when it detects another vehicle ahead. The research also suggests that, without specific instruction, drivers can't actually tell when a feature like lane-keeping assistance is actually on.
>
> Wired (online technology magazine)

https://wired.me/science/transportation/auto-safety-features-speak-same-language/

Advanced emergency braking fitted to some existing vehicles has a sensitivity control. If it is too sensitive, vehicles can slow down unexpectedly when drivers change lanes or when approaching to pass a cyclist, but if the settings are too low (not as sensitive) the vehicle will brake later and harder. Some drivers are already unable to operate their air-conditioning, so how will they successfully operate these complex safety systems that are turned on at the start of every journey?

Will the intelligent speed assist be accurate enough? Will drivers stop looking for speed limit signs and then be driving too fast when a limit has been lowered? This system will rely upon map data, so it could be hampered as such data can take well over a year to update on some mapping systems. Conversely, if a limit is raised, there will be some drivers who don't know how to increase the speed of their vehicle, which will cause frustration to those drivers behind and perhaps increase the likelihood of injudicious overtaking.

Commercial drivers, particularly delivery drivers, pose a specific question. It is assumed that most do not buy new cars, yet they drive new vans for deliveries and their first experience of these systems may be in a works vehicle. What training will be given? How will they react?

These are all valid concerns arising from the 5% error rate and lack of driver competence that must be balanced with the 95% accuracy, improved speed compliance, enhanced braking and lane- keeping that these systems will deliver.

Concern has been raised amongst behavioural academics that these systems may cause drivers to stop concentrating; giving the systems too much control by surrendering driver decision making and ceasing to use the systems as driver aids. Device and system names need to be considered carefully – to ensure they don't overly mislead the driver to believe they might offer more autonomous support than the reality of the journey needs.

> There is a risk of over-reliance and the implication that the limit must always be safe, so drivers stop making subjective assessments of the driving situation and just become passengers when it comes to speed. Furthermore, systems can be overridden in some circumstances - and drivers who don't trust or like them will find lots of occasions when they decide they need to do just that.
>
> Dr Helen Wells

The effect on driving offence enforcement

The intelligent speed assistance (ISA) effectiveness on driving behaviour and speed compliance will depend on the percentage of cars fitted with the technology, the percentage of drivers who have the system switched on and the error rate of the technology. The accuracy of the systems will continue to improve over time.

More and more new cars are being fitted with this technology, but often only on the higher specification models or as cost options. This will change for new vehicles from 7th June 2024.

There will come a point when the volume of vehicles travelling within the speed limit will regulate all vehicles on any busy road to comply via the 'Pace Car' effect.

The number of vehicles with new safety systems, and hence those designed to automatically adhere to the speed limit, has been calculated alongside the total number of registered vehicles. This prediction does not take account of market variations but assumes the average growth in vehicle numbers over the last decade is maintained at 600,000 per annum, with new sales of around 2.7 million vehicles per annum (UK). Vehicle sales fluctuate annually: the effect of national economic performance, the end of fossil fuel vehicle sales in 2035 and the rate of purchase of new vehicles will not result in a linear graph and this chart should be amended as new data comes to light.

Around 2029 or 2030, one-third of all registered vehicles will have intelligent speed assist fitted. Will this be sufficient to limit all busy roads to the posted limit?

Adaptation to the new systems may cause drivers to stop fighting the limits and accept them, so they drive at 30mph rather than 33mph. This will be a helpful step towards casualty reduction.

But which vehicles will not have the devices? Older and less safe cars are obvious assumptions. Are these perhaps more likely to involve casualties to both the car occupants and vulnerable road users when they collide?

Will people looking for thrills or freedom seek out cars without limiters? There is a precedent for this. When moped power was restricted in 1977, the pre-restriction mopeds, such as the Yamaha FS1E, were sought after and commanded high prices.

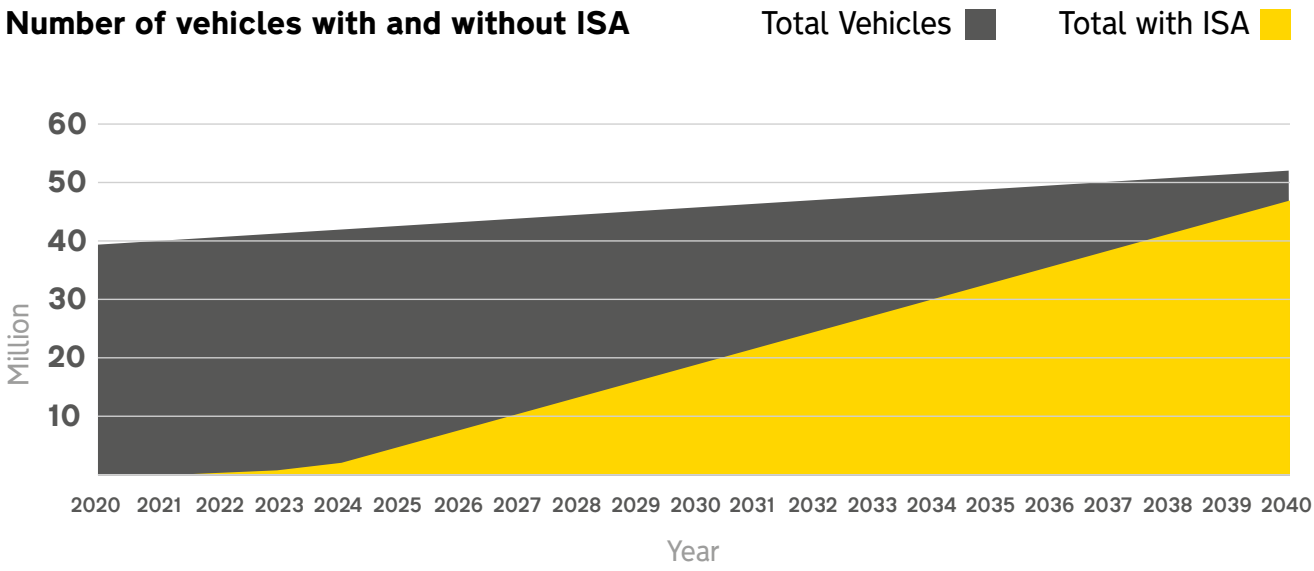
Most new cars are bought by companies and changed regularly, therefore most vehicles will have the new features fitted, but it is likely there will be a subculture of drivers holding on to unrestricted vehicles, plus a cohort of preservationists of older vehicles.

What is clear is that from 2024, the volume of speeding motorists being prosecuted will start to fall, and as the years progress, they will fall dramatically from current levels. This will require a re-think of the enforcement strategy for casualty reduction.

The police will also need to adapt. Whilst excessive speed (above the limit) may theoretically be eliminated, inappropriate speed (within the limit but inappropriate for the circumstances) will continue to be an issue and may actually increase with this technology as drivers become more passive and allow the vehicle to drive to the limit. There is more subjectivity to a charge of dangerous or careless driving, making them harder to prove.

Dr Helen Wells

Number of vehicles with and without ISA



Conclusion

The introduction of this suite of mandatory safety systems presents an obvious opportunity to reduce collisions. But there are risks of which perhaps the greatest of all is the driver.

Firstly, it is by no means clear the drivers will know how to safely use the new equipment. It is a common complaint from new owners of technologically advanced vehicles that they do not receive a sufficient handover or briefing from motor dealers or vehicle leasing companies about how to use them. There is undoubtedly a need to re-skill existing drivers, even those with many years' experience.

Secondly, there is the risk that the systems will induce a false sense of security. Drivers, like any system operators, can become lazy and (in this case) surrender decision making to the vehicle and fail to identify risky situations themselves. In effect, they become a passenger in the driving seat.

Thirdly, as this report has demonstrated, some of these technologies have alarmingly high error rates. If the voice activated search engine on your computer works correctly for 95% of the time, it can be a useful labour-saving device. A critical safety feature on a vehicle travelling at 70mph, which is prone to error on one in every 20 activations is an altogether different matter.

The basic instruments of a vehicle on British roads changed very little in the 50 years to 2010 but the last decade has witnessed a dramatic transformation. Drivers taking delivery of top of the range cars today are confronted by a very unfamiliar, yet highly technologically complex device. It is no exaggeration to say that their complexity exceeds those of even rudimentary aircraft or trains, yet pilots and locomotive drivers receive regular, regimented retraining and assessment.

As our vehicles become ever more complex and their safety features more intrusive, and as the pace of change of those features increases inexorably, it is time to open the debate about licensing arrangements for drivers. Many have felt for a long time that it is simply not sufficient to allow a driver to rely throughout their adult lives on a test they took, quite possibly, in their teens.

We believe that the introduction of these compulsory safety measures provides an ideal opportunity to reopen the debate about the future regime for lifelong driver training. We are convinced that some re-education is necessary to ensure that the changes that will be rolled out over the next four years will deliver on their ambition to improve road safety. We look forward to taking part in that necessary debate.

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About Dr Helen Wells

Helen has a degree, Masters and PhD from Keele University. She spent a period of time working in a Magistrates' Court and as a Community Safety Officer, but has been a lecturer in Criminology at Keele since 2007.

Dr Helen Wells has been researching roads policing topics for the last 20 years and has completed work for a variety of local, national and international funders on topics including distracted driving, ANPR, speed cameras, uninsured driving and Police and Crime Commissioner attitudes to roads policing. She is author of the 2012 book 'The Fast and the Furious: Drivers, speed cameras and control in a risk society' published by Ashgate and based on her PhD research. She is also the Director of the Roads Policing Academic Network, an interdisciplinary network of over 90 academics from Universities in the UK and beyond who have an interest in roads policing issues.

Appendices

Appendix 1: References to Co-operative Intelligent Transport System (CITS)

- European ITS Regulations Link page (https://ec.europa.eu/transport/themes/its_en)
- The Cooperative, connected and automated mobility (CCAM) platform (https://ec.europa.eu/transport/themes/its/c-its_en)
- C-Roads - The Platform of harmonised C-its deployment in Europe (https://www.c-roads.eu/platform.html)
- InterCor Project (of which the A2M2 Corridor is part) (https://intercor-project.eu/)
- The UK Transport Technology Forum (https://www.ttf.uk.net/)

Appendix 2: Getting around and getting on: Self-interested resistance to technology in law enforcement contexts

- "Getting Around and Getting On: Self-Interested Resistance to Technology in Law Enforcement Contexts"
  Dr Helen Wells, School of Sociology and Criminology, Keele University (https://www.annualreviews.org/doi/pdf/10.1146/annurev-lawsocsci-120814-121639)

About Drivetech.

Drivetech is the world leader in fleet risk and safety management, and driver training. It is also the UK's largest provider of driver offender retraining courses. With a track record built over the last 25 years, Drivetech now delivers fleet consultancy, driver assessment and training services in over 95 countries, in 35 languages through over 40 partners. Our fleet solutions improve driver safety, reduce fleet running costs and ensure compliance with legal and duty of care responsibilities. Our customers range from companies with small fleets through to large corporate customers where driver training is a core activity, an understanding of their sector required and a clear return on investment is demanded.

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