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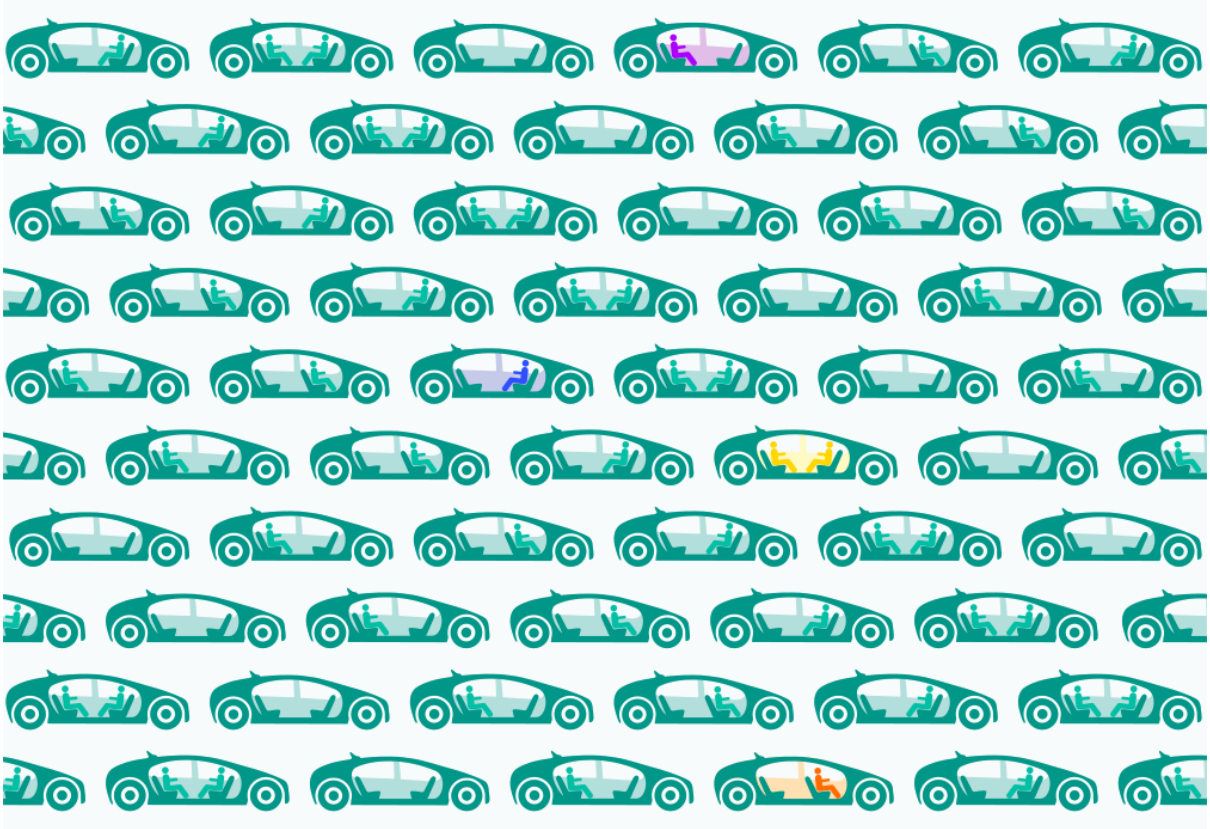
Automated Vehicles:

Summary of the Preliminary Consultation Paper



Summary of LCCP No 240 / SLCDP No 166

RESPONDING TO THIS PAPER

This is a summary of the full consultation paper, available on our websites at https://www.lawcom.gov.uk/project/automated-vehicles/ and https://www.scotlawcom.gov.uk/publications.

We are committed to providing accessible publications. If you require the summary or consultation paper in a different format, please call 020 3334 0200 or email automatedvehicles@lawcommission.gov.uk.

We seek responses by 8 February 2019.

Comments may be sent:

Using an online form at https://consult.justice.gov.uk/law-commission/automated-vehicles

However, we are happy to accept comments in other formats. If you would like to a response form in word format, do email us to request one. Please send your response:

By email to automatedvehicles@lawcommission.gov.uk

OR

By post to Automated Vehicles Team, Law Commission, 1st Floor, Tower, 52 Queen Anne's Gate, London, SW1H 9AG.

If you send your comments by post, it would be helpful if, whenever possible, you could also send them by email.

Responses may be made public

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Cover: Adapted from Department for Transport icon resources.

Figure at para 2.2: Adapted from the CCAV consultation "Remote Control Parking and Motorway Assist: Proposals for Amending Regulations and the Highway Code(1)" which is based on SAE J3016 standard(2).

Contents

Chapter 1: Introduction

1.1 The Law Commission of England and Wales and the Scottish Law Commission are conducting a three-year review to prepare driving laws for self-driving vehicles. This is a summary of the preliminary consultation paper.

1.2 We have been asked to review the UK's regulatory framework to enable the safe and effective deployment of automated vehicles. It is part of a package of reforms, which builds on the work of the Centre for Connected and Autonomous Vehicles (CCAV) and others.

1.3 We have three objectives. The key objective is safety. We consider how safety can be assured both before and after automated driving systems are deployed. Secondly, we aim to provide clear allocations of liability in both civil and criminal law. Finally, we wish to remove any unnecessary blocks which might delay the benefits of driving automation to mobility and productivity. Driving automation technologies can enable new ways for those with visible and non-visible disabilities to get around. We make tentative proposals for reform and ask questions.

1.4 **We seek responses by 8 February 2019 from all interested parties**. Details of how to respond are given above, the full preliminary consultation paper can be found at https://www.lawcom.gov.uk/project/automated-vehicles/

1.5 The next paper will consider Mobility as a Service applications of driving automation, reviewing the regulatory regimes which currently cover taxis, private hire vehicles and public service vehicles. Other papers will be informed by the responses we receive.

THE SCOPE OF THE REVIEW

1.6 Our terms of reference ask us to consider the legal regulation of automated road vehicles for passengers in England, Wales and Scotland. We have not been asked to consider:

(1) craft that move on water or by air (such as drones);

(2) robots which might travel on pavements or footpaths;

(3) freight; or

(4) issues relating to land use policy, employment or taxation.

1.7 Data protection and cyber security are not primarily a matter for us. Here, we intend to follow the work of others in the field, which will inform our thinking.

1.8 Our focus is on automated vehicles which are capable of "driving themselves". In other words, they can operate in an automated mode in which they are not controlled and do not need to be monitored by an individual, for at least part of a journey. This differs from driver assistance technology, which needs to be monitored by a human driver. That said, the distinction between assisted and automated driving is key to the review. We have therefore looked at both sides of the line.

1.9 For the purposes of this review, we have assumed that automated vehicles will operate on Britain's existing road network. Different rules might apply if, for example, automated vehicles were confined to dedicated roads.

CROSS REFERENCES TO QUESTIONS AND THE FULL CONSULTATION PAPER

1.10 This summary provides a brief policy background to each of our tentative proposals and questions. For tentative proposals we ask if you agree; for more open questions we simply seek your views. The discussion refers to the question number in square brackets, while the questions themselves are listed at the end of this summary (and again in Chapter 10 of the full consultation paper).

1.11 For this summary, we have tried to keep citations to a minimum. Consultees who wish to know more are referred to the relevant paragraphs of the full consultation paper. The full consultation paper then cites other material on the issue.

ACKNOWLEDGEMENTS AND THANKS

1.12 We are grateful to everyone who has contributed to this paper. A list of everyone who has worked on this paper can be found in Chapter 1 of the full consultation paper. A list of stakeholders we have met and conferences attended is in Appendix 2.

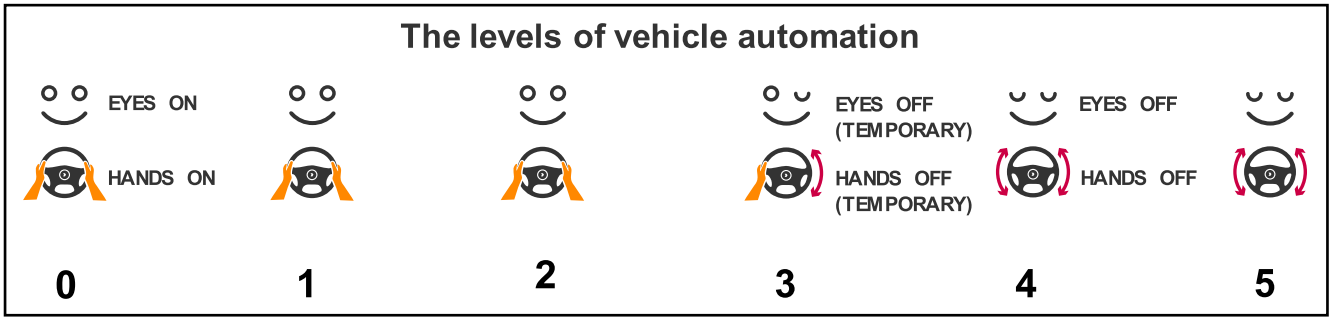
Chapter 2: Background

2.1 We start by introducing specialist terms, such as "SAE levels" and the "UNECE". We also outline four proposed new concepts which run through our proposals.

SAE LEVELS

2.2 The Society for Automotive Engineers International ("SAE") has produced a six-level classification system for automated vehicles, ranging from 0 to 5. These "SAE levels" are widely used by industry and policymakers to provide a common international language for automated driving. They are intended as analytical tools to describe the respective roles of human users and automated driving systems. However, they are merely guides to the discussion and do not define legal consequences.

We summarise the six levels below.



Level 0 – No automation. The human driver performs all aspects of all driving tasks, even when these are enhanced by warning or intervention systems.

Level 1 – Driver assistance. The driver assistance features can carry out either the steering or acceleration/deceleration.

Level 2 – Partial automation. The driver assistance features can carry out both steering and acceleration/deceleration. The driver is responsible for monitoring the driving environment and must remain engaged at all times.

Level 3 – Conditional automation. The driving automation features can perform all driving tasks but a human "fallback-ready user" is expected to respond appropriately to "a request to intervene". The fallback-ready user must be receptive to a handover request or to an evident system failure, but is not expected to monitor the driving environment.

Level 4 – High automation. The driving automation features can perform all the driving tasks within their "operational design domain" (for example, motorways only). There is no expectation that the human user will respond to a request to intervene. If the limits of the system are exceeded, the system will put the vehicle into a "minimal risk condition", such as a safe stop.

Level 5 – Full automation. This is identical to Level 4 except that the driving automation features are not limited by an operational design domain. Instead they are capable of performing all driving functions in all situations that a human driver could.

2.3 This classification depends on two terms of art, as explained below.

Minimal risk condition

2.4 The SAE define this as the condition to which the user or system brings the vehicle "to reduce the risk of a crash when a given trip cannot or should not be completed". For example, a minimal risk condition may entail "bringing the vehicle to a stop in its current travel path" or "a more extensive manoeuvre designed to remove the vehicle from an active lane of traffic". However, at present there are no standards for what might qualify as minimal risk.

2.5 The minimal risk condition may be achieved either by the human user (in Level 3 systems) or by the automated driving system (in Level 4 systems and above). This is a crucial difference between Level 3 and Level 4. Level 3 systems rely on the human user to be the "fail safe". By contrast, Level 4 systems do not require a human user to intervene to ensure safety.

Operational design domain

2.6 The operational design domain refers to the conditions in which the vehicle is designed to function in automated mode. They are set by the manufacturer and include:

> the environmental, geographic, time-of-day, traffic, infrastructure, weather and other conditions under which an automated driving system is specifically designed to function.

2.7 Thus conditions may relate to a type of road (such as a motorway); a place (such as a city); a speed (such as under 12 km per hour); or weather (such as "not in snow").

SAE Levels and key distinctions

2.8 In the preliminary consultation paper we make a key distinction between SAE Level 2 and below and SAE Level 4 and above. Level 2 systems can be characterised as driver assistance: the automation is simply intended to assist a human driver, who remains fully responsible for performing the driving task. By contrast, at Level 4 and above, the automated driving system can effectively drive itself. It is not reliant on a human to be safe.

2.9 Between these two clear categories is Level 3, this has been described as the "mushy middle" of driving automation. SAE Level 3 has proved controversial. In Chapter 3 we consider when, if ever, the human user of a Level 3 system might engage in non-driving activities, such as reading emails.

THE INTERNATIONAL FRAMEWORK

2.10 Vehicle design and driving are subject to international regulation. For the purposes of this paper, the key organisation is the United Nations Economic Commission for Europe (UNECE). When the UNECE was established in 1947 its goal was to promote pan-European economic integration. However, it now administers treaties which extend far beyond Europe.

2.11 This consultation draws on the UNECE's work in administering two international agreements:

(1) The "revised 1958 Agreement" concerns vehicle standards.[1] It aims to reduce technical barriers to international trade in vehicles and vehicle parts. It has 53 contracting parties including the UK, EU, Japan, South Korea and Australia.

[1] The full title is the UNECE Agreement concerning the adoption of uniform technical prescriptions for wheeled vehicles and their parts. We use "the revised 1958 Agreement" as shorthand.

(2) The Vienna Convention on Road Traffic 1968 (the Vienna Convention) aims to promote road safety and facilitate international road traffic. The UK is in the process of ratifying the convention, which will take effect on 28 March 2019. The UK will then become the 76th contracting party.

2.12 The UNECE has permanent working parties to oversee the operation of these agreements. Working Party 1's responsibilities for road safety include administering the Vienna Convention while Working Party 29 focusses on vehicle standards. Both working parties are active in regulating driving automation.

NEW CONCEPTS

2.13 Our preliminary proposals are based on four key concepts.

A vehicle which "drives itself"

2.14 The Automated and Electric Vehicles (AEV) Act 2018 distinguishes vehicles which "drive themselves" from those which do not. Section 1 requires the Secretary of State to keep a list of all motor vehicles that are (in his or her opinion) capable of safely driving themselves, "at least in some circumstances". Once a vehicle is on the list, it is said to be "driving itself" if it is operating in a mode in which it is not being controlled, and does not need to be monitored, by an individual.

2.15 The Government has indicated that vehicles must be able to achieve a minimal risk condition to be listed. In other words, they must operate at SAE Level 4 or above.

2.16 While the AEV Act relates only to civil liability, we provisionally propose that the same definition of "driving itself" should be used in criminal law.

User-in-charge

2.17 Where a vehicle is listed as capable of safely driving itself, and the automated driving system is correctly engaged, the human user would not be a driver. They would no longer be responsible for the immediate driving task.

2.18 However, a human may still be called on to drive in certain circumstances. We therefore tentatively propose that an automated vehicle should have a person who is qualified and fit to drive, unless the vehicle is specifically authorised as able to operate without one. We refer to this person as the "user-in-charge".

Automated driving system entity (ADSE)

2.19 We tentatively propose that automated driving systems should only be allowed if they are authorised, either at an international level or domestically. We refer to the entity putting the system forward for authorisation as the ADSE. This will normally be the vehicle manufacturer or the developer of the automated driving system.

2.20 We suggest that the ADSE should have ongoing legal responsibilities to ensure that the systems are safe. The ADSE should also be subject to regulatory sanctions if the vehicle acts in a way that would amount to a criminal offence if done by a human driver.

Safety assurance agency

2.21 We tentatively propose a new agency to regulate the safety of the automated driving systems before they are permitted on the road. This might be a new Government body or a dedicated

unit within an existing organisation (such as the Vehicle Certification Agency or the Driver and Vehicle Standards Agency).

2.22 In Chapter 5 we ask if the agency should also have a range of responsibilities for driving automation following deployment. These include the provision of consumer information, market surveillance and roadworthiness testing.

2.23 In Chapter 7 we propose that where an automated driving system has acted in a way which would amount to a criminal offence if brought about by a human driver, the agency should investigate why the issue has arisen. It should then have a range of regulatory sanctions to deploy against the ADSE or others that may be responsible, including improvement notices, fines and withdrawal of approval.

Chapter 3: The human in the loop

3.1 At present, human drivers are subject to a wide range of legal obligations. Drivers using driver assistance features currently on the market continue to be subject to all their existing obligations. However, as vehicles become capable of "driving themselves", this will change. The human user will cease to be a driver - and eventually will become a mere passenger. In our preliminary consultation paper, we also place considerable emphasis on the rich body of research into human-machine interactions, often referred to as "human factors".

A NEW ROLE: THE USER-IN-CHARGE

3.1 While automated driving systems may rely on planned or unplanned handovers to human drivers in order to complete a journey, we see a possible need for an intermediate role: the user-in-charge. This would apply to a vehicle that can safely drive itself, but may require a handover if the vehicle leaves its operational design domain. Certain use cases, including provision of mobility as a service by fleet operators for example, would not necessarily require this role, and we discuss these further below.

3.2 The user-in-charge would not be a driver when the automated driving system is engaged. They may undertake secondary activities and would not be responsible for any driving offences. However, they must be qualified and fit to drive.

3.3 The main role of the user-in-charge would be to take over in planned circumstances or after the vehicle has achieved a minimal risk condition and come to a stop. Unlike the SAE category of "fallback-ready user", they would not be required to take over a moving vehicle at short notice to guarantee road safety. Appendix 3 summarises research which shows how problematic that can be.

3.4 As discussed in Chapter 7, the user-in-charge would also bear criminal liabilities for offences which do not arise directly from driving, such as those relating to insurance and maintenance, reporting accidents and ensuring that children wear seatbelts.

When would a user-in-charge be needed?

3.5 We envisage that, at least initially, some highly automated driving systems will be confined to motorways. A human driver would need to drive the vehicle to the motorway. The human would then be required to remain capable of driving again when the planned exit is reached. While on the motorway, the human in the driving seat would not be driving, but we think that they should remain fit to drive while the system is engaged.

3.6 The need for a user-in-charge is not confined to motorway-only systems. Even if the intention is to complete the whole route without a human driver, planned routes can alter; weather can change; and systems can fail. Although the vehicle would achieve a minimal risk condition, this may be far from ideal. Users in the car may be tempted to take over driving, to avoid being stranded in an inconvenient place. Alternatively, they may simply leave the vehicle wherever it has stopped, such as on double red lines. The cautious approach would be to require that there is a person qualified and fit to complete the journey.

3.7 We tentatively propose that it should be a general requirement for automated vehicles to have a user-in-charge in a position to operate the controls, unless the vehicle is specifically

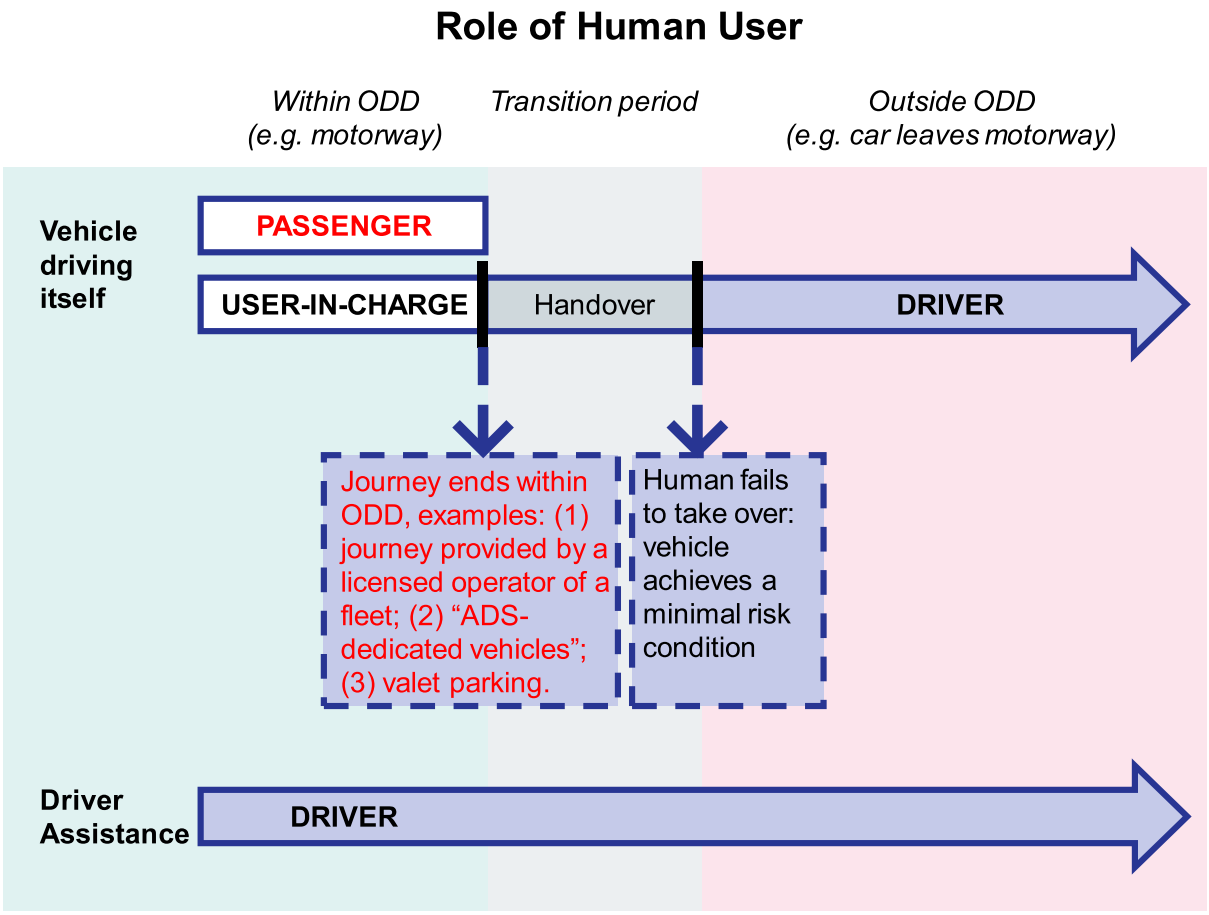
authorised as able to function without one (Consultation Question 1).[2] The user-in-charge may be inside or outside the vehicle.

The handover

3.8 Following a handover, the user-in-charge would become a driver, with all the responsibilities of a driver. The Association of British Insurers (ABI) has suggested that the handover should only be effective upon confirmation by the human driver. We agree and tentatively propose that the user-in-charge should only assume the responsibilities of a conventional driver once they have confirmed that they are taking over.

3.9 One complication is that an accident might be caused by events preceding a handover, even though the accident takes place following a handover. In such cases, it would seem fair for responsibility for the outcome to rest with the automated driving system. In the US, the draft Uniform State Laws provides that if a human driver takes over to mitigate a crash hazard caused by the automated driving system, "automated operation continues until the crash hazard is no longer present". We ask if the UK should adopt a similar approach.

3.10 The following diagram includes an illustration of how a user-in-charge can become a driver following a successful handover.



[2] Consultation Paper paragraphs 3.24 to 3.43.

The term "user-in-charge"

3.11 The term "user-in-charge" is simply a label. We welcome views on whether the term adequately conveys the meaning we intend it to have, as described above (Consultation Question 2).[3]

Should the user-in-charge be under any responsibility to avoid an accident?

3.12 The starting point is that while a vehicle is driving itself, with the automated driving system appropriately engaged, the user-in-charge would not be responsible for any problems arising from how the vehicle is driven. We seek views on whether there should be an exception to this principle, which would require a user-in-charge to take reasonable steps to avert a risk of serious injury if they become aware of that risk.

3.13 The rationale is that in some situations an effective intervention could prevent an accident. An example might be where a car edges forward through pedestrians, unaware that a casualty is lying on the ground under its path. If bystanders are shouting at the car to stop, and the user-in-charge is clearly aware of the problem, it would seem wrong for the user to do nothing.

3.14 The argument against this exception is that it risks blurring lines of responsibility. In highly automated vehicles, humans are not critical to safety. Instead, developers need to ensure that their automated driving systems are safe. Any suggestion that a human should intervene might reduce the importance of this principle. A second concern is that, in many cases, users-in-charge will lack the situational awareness to intervene effectively in an emergency. Their attempts to do so may make the situation worse.

3.15 Overall, the issue is finely balanced. We invite views (Consultation Question 3).[4]

WHEN WOULD A USER-IN-CHARGE NOT BE NECESSARY?

3.16 Many of the benefits of driving automation only arise when vehicles are able to travel empty, or with occupants who are simply passengers. For example, passenger-only vehicles would bring the benefits of automation to those unable to drive for reasons of age or disability.

3.17 There are several challenges to overcome before vehicles can operate smoothly without anyone able to assume control. These include dealing with unexpected weather conditions and diversions or complying with the direction of police officers. However, the consultation paper discusses examples where developers are working on these challenges, including journeys supplied by licensed operators of fleets of vehicles, valet parking and "ADS-dedicated vehicles" which cannot be operated by human drivers. We seek views on these and other examples (Consultation Question 4).[5]

3.18 At present, it is not possible to specify hard and fast rules about when automated driving systems can operate safely and effectively in the absence of a user-in-charge. Instead we tentatively propose new and flexible powers to approve automated vehicles as able to operate without users-in-charge, when new technologies become available (Consultation Question 5).[6]

3 Consultation Paper paragraph 3.45.

4 Consultation Paper paragraphs 3.47 to 3.57.

5 Consultation Paper paragraphs 3.59 to 3.77.

6 Consultation Paper paragraphs 3.59 to 3.77.

SECONDARY ACTIVITIES AND CONDITIONAL AUTOMATION

3.19 Where vehicles are driving themselves, all users, including the user-in-charge will be able to engage in non-driving related (secondary) activities such as checking emails.

3.20 The more difficult issue is whether drivers should ever be entitled to engage in secondary activities while using conditionally automated (Level 3) systems which rely on a "fallback-ready user" being receptive to a timely "request to intervene". The SAE explain that receptivity refers to responding to a stimulus: this contrasts with "monitoring", which involves sensing and processing information necessary for the safe operation of the vehicle.

3.21 The distinction is a fine one and can be problematic. A fallback-ready user who has received a request to intervene must respond quickly, possibly within seconds and possibly in circumstances of imminent danger. They need to be sufficiently alert to gain an immediate awareness of environment. In practice, Level 3 systems may be rare. They will probably be confined to low speed driving in restricted environments, such as traffic jams on motorways.

3.22 One approach to this issue is to treat Level 3 as a form of driver assistance. Unless an automated driving system can come to a safe stop without human intervention, the human driver would be legally responsible for monitoring the environment at all times. The laws restricting secondary activities would continue to apply. This provides a clear, simple rule: unless self-driving technology operates at higher levels of automation, drivers would retain all their current duties, under both civil and criminal law. The advantage of this approach is its emphasis on clarity and safety.

3.23 However, with sophisticated Level 3 systems, human drivers have very little to do - and the less humans do, the more their minds tend to wander. The concern is that drivers will daydream or fall asleep, despite warnings to the contrary. An alternative approach would shift from viewing secondary activities as mere distractions and see them as a way of managing drivers' attention.

3.24 In other words, drivers should be encouraged to undertake tasks which are appropriately demanding on their attention – engaging enough to keep the driver alert, but not so engrossing as to make it difficult for a driver to resume the driving task if they are required to do so at short notice. The international association for the automotive industry, OICA, has suggested that a driver may be able to use "infotainment" systems via a "vehicle integrated communication display". The display is controlled by the automated driving system so that, in the event of a take-over request, secondary activities terminate automatically.

3.25 The issue is a difficult one which may well depend on the exact details of the system and on evidence about how humans respond to it in practice. We seek views (Consultation Questions 6 and 7).[7]

[7] Consultation Paper paragraphs 3.80 to 3.96.

Chapter 4: Safety assurance pre-placement

4.1 At present, vehicles are subject to a sophisticated system of type approval before they may be placed on the road. As we describe in Chapter 4, the system is international. Standards are set by both the United Nations Economic Commission for Europe (UNECE) and the European Union (EU).

WHAT IS TYPE APPROVAL?

4.2 To gain type approval, a manufacturer must submit its components and systems for independent testing against UNECE standards. Once the components and systems have been approved, a manufacturer that wishes to sell a vehicle within the EU must then obtain an EU whole vehicle type approval (WVTA) certificate. Each EU member state has established one or more type approval authorities, giving manufacturers a choice of around 30 authorities to apply to. In the UK, the relevant authority is the Vehicle Certification Agency.

4.3 The type approval authority does not test the vehicle as such, but it does check that each component or system has the requisite approvals. Once a vehicle has received a WVTA certificate, it may then be sold anywhere within the EU.[8]

4.4 In practice, type approval for a car might involve testing around 70 components and systems. The Society of Motor Manufacturers and Traders notes that the process normally takes between 6 and 18 months, and costs between £350,000 and £500,000.

4.5 For each individual car, the manufacturer provides a certificate of conformity to confirm that it meets the specifications in the whole vehicle type approval. In the UK, before a vehicle is first registered, the certificate of conformity must be provided to the Driver and Vehicle Licensing Agency.

SETTING STANDARDS FOR DRIVING AUTOMATION

4.6 Within the UNECE, Working Party 29 is developing new regulations to cover advanced driver assistance functions, such as lane keeping and lane change. It is also discussing systems which operate at conditional or high automation. This includes “Category E” in which a user could (for example) drive and change lane on a motorway for extended periods. However, no timetable has yet been set to regulate Category E.

4.7 In the absence of specific UNECE standards, manufacturers may apply for “exemption approval”. The manufacturer must show that the new technology provides at least an equivalent level of safety or environmental protection compared to existing standards. Type approval authorities may then give provisional approval, which must be confirmed by either the European Commission or the Administrative Committee of the UNECE revised 1958 Agreement.

[8] The Government’s proposes to maintain a “common rulebook” on vehicle standards with the EU following Brexit: see *The Future Relationship between the United Kingdom and European Union* (July 2018), para 29. The consultation paper is written on the basis that EU whole vehicle type approval will continue to apply.

TWO DEVELOPMENT PATHS TO FULL AUTOMATION

4.8 To evaluate how well this system applies to automated driving systems, we have identified two broad paths to how automated vehicles might be introduced.

(1) On Path 1, motor manufacturers will add more and more automated features to mass market vehicles, sold across borders to consumers. Initially, these vehicles will continue to have a human in the driving seat, but the human will increasingly cede control to the automated driving system.

(2) On Path 2, the emphasis is on selling a journey rather than a vehicle. These vehicles will no longer need conventional driving seats. Instead, the automated driving system will carry out the full driving task. These vehicles will start operating in limited local contexts and will then gradually expand their range. For example, a company may start by providing an automated shuttle bus on a single route, which will then gradually extend to providing a more general private hire service within a city.

4.9 These two paths will eventually reach a single destination - fully automated driving. However, in the initial phases, they pose different regulatory challenges.

Type approval for Path 1 vehicles

4.10 The existing system of type approval works well for Path 1, in which automated driving features are added to conventional vehicles which are sold across borders to consumers. Here international regulation has three distinct advantages.

(1) Vehicle manufacturers are already familiar with the regulatory system. The automated function is treated as simply one more system within the vehicle.

(2) Manufacturers are able to obtain a single approval to allow them to sell the same vehicle design in many separate states. This saves costs and promotes trade.

(3) Consumers can use their vehicles to cross national borders, without encountering additional regulatory requirements.

4.11 The emphasis has been on systems designed for restricted roads, without pedestrians or cyclists, such as motorways. Motorways have relatively similar layouts worldwide, and only limited adaptations of the systems would be required for them to operate in different countries.

4.12 The UNECE has been taking the lead in this field, and is developing new standards and testing protocols for automated functions. The UK Government has been an active participant in this process and we expect this to continue. We do not perceive a need to develop UK-specific standards or tests for automated functions within new vehicles.

Type approval for Path 2 vehicles

4.13 Type approval works less well for Path 2, where automated driving systems are introduced in small numbers into highly localised settings. We identify two areas where a national system of safety assurance is needed.

(1) Type approval does not apply where a vehicle is modified *after* it has been registered. Some companies have outlined plans to buy standard vehicles and add an automated driving system. This would fall outside the scope of both EU requirements and the UNECE's revised 1958 Agreement.

(2) Under EU law, member states may give "national type approval" for vehicles which are produced only in limited numbers. For cars (with no more than 8 seats), this is possible where the production does not exceed prescribed numbers currently 100 vehicles, and from 1 September 2020, 250. For fully automated vehicles which are limited to tightly defined local areas, only small numbers of the vehicle may be produced. Here developers are likely to find national type approval more attractive than the complex and multi-layered process of EU or UNECE exemption approval.

4.14 At present, developers who wish to make changes to their vehicle design may apply for a special vehicle order under section 44 of the Road Traffic Act 1988. This allows the Secretary of State to authorise exceptions or modification to the normal regulations for "new or improved" types of vehicle or those constructed for "tests or trials". Although applications are made through the Vehicle Certification Agency, the decision is a matter for the Minister.

A new safety assurance system

4.15 We tentatively propose that the UK should set up a new safety assurance scheme for automated driving systems which are installed either as modifications to registered vehicles or in vehicles manufactured in limited numbers. It would replace the current powers of the Secretary of State to make special vehicle orders in respect of highly automated vehicles, by providing a more structured process. We also tentatively propose to remove a potential loophole, by preventing any vehicle from being modified to include an automated driving system unless that system had been authorised at either national or international level (Consultation Question 8).[9]

4.16 We seek views on how far the new safety assurance system should be based on self-certification and how far it should involve third party testing (Consultation Question 10).[10] Several jurisdictions intend to rely on self-certification. In California, for example, manufacturers must certify that they have conducted test and validation methods to ensure safety. Similarly, the National Transport Commission of Australia has argued that pre-market testing would be unduly resource-intensive and time-consuming at this early stage. However, the choice is not necessarily binary. Self-certification could require the manufacturer to undertake specified tests; or could be supplemented by some limited independent testing, either in simulation or on roads.

4.17 We also ask how the new safety assurance agency could best work with local agencies to ensure sensitivity to local conditions (Consultation Question 11).[11]

9 Consultation Paper paragraphs 4.100 to 4.104.

10 Consultation Paper paragraphs 4.110 to 4.115.

11 Consultation Paper paragraphs 4.116 to 4.120.

Chapter 5: Regulating safety on the roads

5.1 Pre-placement testing can only go so far to ensure automated vehicles are safe. It will also be necessary to monitor vehicles once they are on the roads.

5.2 The law provides public authorities with extensive powers to regulate road safety. However, responsibilities are split. For example, local authority trading standards departments regulate consumer information; the Driver and Vehicle Standards Agency (DVSA) regulates roadworthiness tests and recalls; and the police investigate incidents. In Chapter 5, we consider if these institutional arrangements are suited to the challenges of driving automation.

CONSUMER INFORMATION AND MARKETING

5.3 Human factors research highlights that once people grow used to machines they tend to over-rely on them. Furthermore, people find passive monitoring difficult: the less they are required to do, the more they lose concentration. This means that drivers may over-rely on advanced driver assistance systems which give the impression of self-driving.

5.4 These problems can be partially offset when assisted drivers understand the limits of the automation features they are using and know what they are looking for. By contrast, if a vehicle is hyped during marketing, subsequent warnings to keep one's hands on the wheel are likely to prove ineffective.

5.5 Consumers receive information about driving automation features from several sources, including marketing, test drives and the owner's manual. The message given at each stage needs to reinforce an accurate view of what a feature can and cannot do. Assisted drivers need to know, for example, if a lane-keeping function cannot steer around a parked vehicle partially blocking the lane, or if adaptive cruise control cannot gauge the speed of a motorcycle in front. The terminology used to describe a feature should be accurate, so that consumers are not encouraged to over-rely on the technology.

5.6 Under the Unfair Commercial Practices directive, traders are forbidden from making misleading statements or omissions about consumer products. Although the law is adequate, the institutional structure for enforcing the law is suboptimal. Trading standards enforcers may lack a detailed understanding of driving automation. They may also assume, wrongly, that if a named function has received type approval at EU or UNECE level, the name given to the function has also been approved.

5.7 We ask if the new safety assurance agency that authorises automated driving systems before they are allowed onto the road should also be responsible for consumer information - either for all driving automation (including driver assistance) or for higher levels of automation (where vehicles are capable for driving themselves) (Consultation Question 12(1)).[12]

MARKET SURVEILLANCE AND RECALLS

5.8 The DVSA monitors the safety of vehicles, to see if they present a serious risk requiring rapid intervention. If so, they can withdraw or recall the vehicle. The Vehicle Safety Branch within DVSA works closely with vehicle manufacturers to oversee recalls in practice.

[12] Consultation Paper paragraphs 5.30 to 5.32.

5.9 These powers appear sufficient to ensure that if automated vehicles generate safety concerns, they can be recalled or withdrawn from the market. However, safety concerns about automated vehicles may emerge in different ways from concerns about conventional vehicles. Where vehicles drive themselves, concerns may arise from breaches of traffic laws, following police reports that automated vehicles were (for example) speeding, failing to stop for red traffic lights or driving in a dangerous way. Others may arise from accidents. This suggests that it may be helpful to have a single expert organisation which can draw on all these sources of information.

5.10 We ask if the new safety assurance agency that authorises automated driving systems should also be responsible for market surveillance and product recalls (Consultation Question 12(2)).[13]

ROADWORTHINESS TESTS

5.11 Most vehicles over three years old are required to undergo an annual roadworthiness test (known, colloquially as an "MOT"). At present, there are no tests for driving automation. Instead cars with advanced driver assistance systems may need to disable the function before the vehicle can be tested.

5.12 In the future, new tests for automated features will need to be developed. We ask if the new safety assurance agency should have responsibility for setting standards and testing procedures for the roadworthiness of automated vehicles (Consultation Question 12(3)).[14]

DRIVER TRAINING

5.13 Humans who interact with driving automation may require different skills from conventional drivers. We have considered whether the UK could introduce new driving permits, either for drivers using driver assistance features or for users-in-charge of highly automated vehicles. Although new permits are compatible with the 1968 Vienna Convention on Road Traffic, they are not currently compatible with EU law.

5.14 In initial discussions, it was suggested that many of the problems could be dealt if insurers offered discounts for users who receive voluntary training. We ask if drivers using advanced driver assistance systems need additional training. If so, can this be adequately provided on a voluntary basis, through incentives offered by insurers? (Consultation Question 13).[15]

ACCIDENT INVESTIGATION

5.15 The UK currently has specialist accident investigation branches to investigate the causes of aviation, maritime and rail accidents. However, accidents on the roads are investigated by coroners and the police. There is debate over whether the UK should have a road accident investigation branch to consider high profile road accidents (including those involving driving automation).

5.16 The advantages of a road accident investigation branch (AIB) are:

[13] Consultation Paper paragraphs 5.30 to 5.32.

[14] Consultation Paper paragraphs 5.30 to 5.32.

[15] Consultation Paper paragraphs 5.54 to 5.55.

(1) the AIB could develop high levels of technical expertise and pool data over many individual incidents; and

(2) unlike a police investigation, an AIB investigation would aim to understand the causes of an accident, rather than ascribe blame. This is likely to encourage a more open climate and allow stakeholders to co-operate without fear of exposing themselves to prosecution.

5.17 The argument against an AIB is that many police and coroner units have built up considerable experience investigating road incidents and their reports effectively address the root causes of the accident. The Government is currently taking steps to increase the resources available to the police to understand driving automation and analyse the reasons for road accidents.

5.18 We seek views on how accidents involving driving automation should be investigated. In particular, is a new organisation needed or should specialist expertise be provided to the police? (Consultation Question 14).[16]

SETTING AND MONITORING SAFETY STANDARDS

5.19 It is generally accepted that automated driving systems should be at least as safe as human drivers - with some people arguing that they should be safer.

5.20 It will not be possible to know for sure how the safety of automated driving systems compares with that of human drivers until the systems are on the road. This is partly because it could take billions of miles of test driving to provide a sufficient statistical sample to show a safety difference. It is also because we will not fully understand how automated driving systems will interact with other road users until the systems are deployed.

5.21 We tentatively propose that the Government should set a standard of how safe highly automated driving systems need to be, compared with human drivers. The new safety assurance agency should then compare the accident rate of highly automated driving systems with that of human drivers on the road (Consultation Question 15(1)).[17] We seek views on the technical challenges this poses (Consultation Question 16).[18] We also ask whether a similar exercise is needed for advanced driver assistance systems (Consultation Question 15(2)).[19]

[16] Consultation Paper paragraphs 5.58 to 5.71.

[17] Consultation Paper paragraphs 5.78 to 5.85.

[18] Consultation Paper paragraphs 5.86 to 5.97.

[19] Consultation Paper paragraphs 5.78 to 5.85.

Chapter 6: Civil liability

LIABILITY UNDER THE AUTOMATED AND ELECTRIC VEHICLES ACT 2018

6.1 The Government has already taken steps to provide a quick and smooth path to compensation for death, personal injury or property damage caused by an automated vehicle. Under the Automated and Electric Vehicles (AEV) Act 2018, where an accident is caused by a vehicle which is driving itself under the terms of the Act, the insurer is directly liable for the damage. Once the insurer has settled a claim with the injured party it may then reclaim damages from other parties liable for the accident, such as the vehicle manufacturer.

6.2 Our provisional view is that the AEV Act provides the necessary statutory basis for providing compensation to victims where automated vehicles cause damage. However, we seek views on whether further guidance or clarification is required on three aspects of the Act, as set out below (Consultation Question 17).[20]

CONTRIBUTORY NEGLIGENCE

6.3 The intention of the AEV Act is that where an accident was to any extent the fault of the injured party, the normal principles of contributory negligence will apply: compensation will be reduced to the extent that the court thinks just and equitable.

6.4 However, the way in which the AEV Act achieves this result is rather complex and requires the court to compare the case before them to two imaginary situations. We seek views on whether this aspect is sufficiently clear, or whether further guidance or clarification is needed (Consultation Question 17(1)).[21]

THE MEANING OF CAUSATION

6.5 For the new liability to apply, the accident must be caused by an automated vehicle. There is some debate about how far causation implies some element of fault. For example, if an automated vehicle swerves to avoid an erratic cyclist and hits a parked car, would the insurer be liable for the accident even though the fault lay entirely with the cyclist? Where the cyclist has insufficient money to meet a court judgment, the insurer's right to recover against the cyclist would be ineffective.

6.6 We see merit in leaving the meaning of causation to the courts to resolve on a case by case basis, applying principles developed to deal with issues of civil liability. The courts have long experience of dealing with causation issues to provide fair, common-sense outcomes. That said, we understand insurers' desire for greater certainty, so that they can price insurance and avoid lengthy or costly litigation. We seek views on whether further guidance or clarification is needed (Consultation Question 17(2)).[22]

[20] Consultation Paper paragraphs 6.13 to 6.59.

[21] Consultation Paper paragraphs 6.13 to 6.59.

[22] Consultation Paper paragraphs 6.13 to 6.59.

DATA RETENTION

6.7 In the event of disputed claims, insurers will normally use vehicle-collected data to verify that the vehicle was in the alleged location, was driving itself, and that the alleged damage took place. The problem is that automated vehicles generate a large amount of data, possibly too much to store. This leads to questions of what data needs to be preserved if insurers are to be in a position to defend claims, especially those brought a long time after the alleged incident.

6.8 Discussions are currently taking place with insurers and at EU level to standardise the data that needs to be stored following an accident. These measures are likely to work well where the system detects that a collision has taken place. However, the appropriate data may not be stored when the incident does not involve a direct collision and the automated driving system is unable to detect that the accident has occurred.

6.9 The time limits for bringing a claim under the AEV Act follow civil law principles. Generally, a claimant who has suffered personal injury must bring an action against the insurer within three years from the date of the accident or from the date of their knowledge of the claim. However, in some cases the limitation period may be much longer (for example, where the claimant was a child at the time of the accident).

6.10 We ask whether any potential problems arise from the need to retain data for long periods to deal with possible claims. If so, should a claimant only be permitted to bring a claim under the AEV Act if they have notified the police or the insurer about the alleged incident within a set period? How long should that period be? (Consultation Question 17(3)).[23]

SECONDARY CLAIMS AGAINST MANUFACTURERS

6.11 The right to claim against an insurer under the AEV Act is designed to compensate the victim quickly and efficiently. It is not intended to allocate final legal responsibility for the accident. Where the automated driving system is defective, the insurer may bring a secondary claim against the manufacturer or supplier, either under the Consumer Protection Act 1987 or in the tort of negligence (or, in Scotland, delict). The thinking is that the insurer will often be in a better position than the injured party to bring these more difficult, possibly contested claims.

6.12 In Chapter 6 we review the law in this area. We also look briefly at possible claims against the retailer in contract law. On balance, we do not see a general review of manufacturers' or suppliers' liability as a priority at this stage. Litigation over manufacturers' or other suppliers' liability is likely to play only a relatively limited role in compensating victims, setting standards or allocating blame for defective automated vehicles. This is because:

(1) The main avenue for providing compensation will be through insurers, under the AEV Act. Litigation against manufacturers will then be a commercial matter for the insurer.

(2) The main means of setting standards will be through regulation. If the system passes relevant testing (and there is no impropriety by the manufacturer), it is unlikely that the courts would themselves seek to impose a different, more stringent standard.

(3) The main means of allocating blame will be through the criminal justice system. The relatively low level of damages for deaths, coupled with the difficulties of obtaining

[23] Consultation Paper paragraphs 6.13 to 6.59.

aggravated or punitive damages, means that civil litigation will not be an important form of accountability.

SOFTWARE SOLD WITHOUT A PHYSICAL MEDIUM

6.13 We identify one area which could usefully be reviewed: namely the application of product liability to over-the-air software updates. Under the Consumer Protection Act 1987, compensation can be sought for defective software which is incorporated within a physical medium, such as a vehicle. However, there is some uncertainty over the status of "pure" software, sold separately from any physical product. This could become an issue where the update and vehicle are produced by different entities.

6.14 We ask if there is a need to review the way in which product liability law applies to defective software supplied for installation into an automated vehicle, where the supplier does not provide any physical product (Consultation Question 18).[24] We also ask if any other areas of product or retailer liability need to be addressed (Consultation Question 19).[25]

[24] Consultation Paper paragraphs 6.61 to 6.116.

[25] Consultation Paper paragraphs 6.61 to 6.116.

Chapter 7: Criminal liability

7.1 The regulation of road traffic relies heavily on criminal offences. A background paper to this project analyses 71 offences which may be committed by a driver. Drivers' legal responsibilities are not confined to the driving task. They also relate to the driver's condition; insurance; the roadworthiness of the vehicle; reporting accidents; and even the conduct of passengers (such as ensuring that children wear seatbelts). A major element of this review is how to reallocate these responsibilities.

7.2 In Chapter 7 we discuss:

(1) The need to remove offences which are incompatible with automated vehicles.

(2) What should happen when a vehicle which drives itself acts in a way which would now be regarded as a criminal offence. We provisionally propose legal clarification that the user-in-charge would not be liable for the offence. Instead, where the fault lies with the automated driving system, the entity behind the system should be subject to a system of regulatory sanctions.

(3) The obligations of the user-in-charge to be qualified and fit to drive.

(4) Other obligations of the user-in-charge, including those relating to insurance and roadworthiness, and duties following an accident. Further papers will discuss where these responsibilities should fall in the absence of a user-in-charge.

(5) Aggravated offences involving death or serious injury to other road users.

ARE ANY OFFENCES INCOMPATIBLE WITH AUTOMATED DRIVING?

7.3 We found no offences which completely prevent automated driving. However, a few offences might prevent particular types of automation.

7.4 Regulation 107 of the Road Vehicles (Construction and Use) Regulations 1986 prohibits leaving on a road a motor vehicle which "is not attended by a person licensed to drive it" unless the engine is stopped and the parking brake applied.

7.5 This does not necessarily require a licensed person within the vehicle. A vehicle may still be "attended" by a person who is near the vehicle or in a remote-control centre. However, Regulation 107 would appear to be incompatible with some forms of highly automated vehicles, either where the vehicle is empty and not remotely controlled, or where the only passengers in the vehicle are not licensed to drive it. We seek views on whether Regulation 107 should be amended, and whether other offences raise similar issues (Consultation Questions 20 and 21).[26]

7.6 The consultation paper also considers Regulation 104 of the same regulations, which provides that no person shall drive a motor vehicle on a road without proper control of the vehicle or a full view of the road ahead. In our view, this provision does not necessarily require a driver.

[26] Consultation Paper paragraphs 7.5 to 7.11.

Instead, it simply provides that if a vehicle has a driver, the driver must have proper control and a full view. However, we welcome observations on this point (Consultation question 21).[27]

OFFENCES RELATING TO THE WAY THE VEHICLE IS DRIVEN

A "safe harbour" for human users

7.7 Many offences arise directly from the way the vehicle is driven. Examples include dangerous driving, driving without due care and attention, failing to comply with traffic signs or exceeding speed limits. In our provisional view, when the automated driving system is engaged and conducting the entire dynamic driving task, complying with traffic law should be the legal responsibility of the automated driving system entity, not the human user.

7.8 We have already explained that the user-in-charge should not be regarded as a driver while the vehicle is driving itself. However, under the current law the concept of a driver is flexible. Without legislative amendment it could be interpreted too widely. We tentatively propose legislation to clarify that a user-in-charge should not be considered a driver for purposes of criminal offences arising from the way that a vehicle is driven when in automated mode (Consultation Question 22).[28]

7.9 Rather than being classified as a driver, we envisage that a user-in-charge would be subject to specific criminal provisions. These would include requirements to be qualified and fit to drive. They might also include the requirement to take reasonable steps to avert a risk of which the user is subjectively aware (discussed in Chapter 3). We ask if consultees agree that users-in-charge should be subject to these specific criminal offences (Consultation Question 23).[29]

A new system of sanctions for automated vehicles

7.10 If human drivers are no longer responsible for dynamic driving offences committed when a vehicle is driving itself, what should happen if such a vehicle carries out a manoeuvre which (if done by a human) would amount to an offence? It is Government policy that automated driving systems should observe the standards enforced by road traffic offences. However, infractions may still occur.

7.11 The National Transport Commission (NTC) in Australia notes that "existing road traffic penalties are clearly aimed at influencing the behaviour of human drivers". Without adaptation, they are unlikely to be effective when applied to manufacturers. Instead, a new enforcement system should treat infractions as a means of improving safety.

7.12 The NTC recommends that every automated driving system (ADS) should be backed by an Automated Driving System Entity (ADSE). The entity would apply for authorisation and would be subject to a range of regulatory sanctions if things go wrong. We tentatively propose a similar system (Consultation Question 9).[30] Manufacturers or developers who wish to gain regulatory approval for an ADS would need to stand behind the system. In other words, each ADS listed as able to drive itself would need to be backed by an ADSE. In the event of failures or infringements, the ADSE would be subject to regulatory sanctions such as improvement notices, fines and withdrawal of approval.

27 Consultation Paper paragraphs 7.10 to 7.11.

28 Consultation Paper paragraphs 7.14 to 7.19.

29 Consultation Paper paragraph 7.21.

30 Consultation Paper paragraphs 4.105 to 4.107.

SPEEDING: AN EXAMPLE

7.13 We use speeding as an example of how such a procedure might work.

7.14 Although the ADS would be programmed not to exceed speed limits, speeding offences may still occur, for a variety of reasons. For example, the highway authority may have failed to communicate a temporary speed limit; the person responsible for the vehicle may have failed to update the software (or may have uploaded unauthorised software); or the system may be faulty.

7.15 Under the current law, if a speed camera detects a vehicle driving at 37 miles an hour in a 30 mile an hour area, the police serve "a notice of intended prosecution" on the registered keeper. We tentatively propose that if a vehicle was driving itself at the time of the speeding, the registered keeper should be required to say so, and to provide the relevant data to the police (Consultation Question 24).[31] The police would then investigate why the speeding infringement occurred. The issue might be resolved by liaising with the Highway Authority to provide better traffic signs. Alternatively, a prosecution could be brought against the owner for failing to update software or for installing unauthorised software.

7.16 If the problem appears to lie with the software itself, we think that the issue should be submitted to the new safety assurance agency. The agency would then investigate what has gone wrong. The agency would have power to impose a range of graduated sanctions on the ADSE, including improvement notices, enforceable undertakings, fines, suspension and (in the most serious cases) withdrawal of ADS approval.

7.17 Speeding is only one example. We ask if a similar approach should apply whenever an ADS causes a vehicle to behave in a way which would be an offence if brought about by a human driver.

OBLIGATIONS OF THE USER-IN-CHARGE TO BE QUALIFIED AND FIT TO DRIVE

7.18 Users-in-charge may be called on to drive, either following a planned handover or after the vehicle has achieved a minimal risk condition and come to a stop. They therefore need to be qualified and fit to drive. We tentatively propose that it should be a criminal offence for a user-in-charge:

(1) not to hold a driving licence for the vehicle;

(2) to be disqualified from driving;

(3) to have eyesight which fails to comply with the prescribed requirements for driving;

(4) to hold a licence where the application included a declaration regarding a disability which the user knew to be false;

(5) to be unfit to drive through drink or drugs; or

(6) to have alcohol levels over the prescribed limits.

7.19 We ask if consultees agree (Consultation Question 25).[32]

[31] Consultation Paper paragraphs 7.23 to 7.35.

[32] Consultation Paper paragraphs 7.37 to 7.45.

IDENTIFYING THE USER-IN-CHARGE

7.20 In Chapter 3 we tentatively proposed that a user-in-charge should be in a position to operate the controls. In the immediate future, this means, broadly, "in the driving seat". If there is no one in the driving seat, we ask if there should be a new offence of being carried in a vehicle which requires a user-in-charge and does not have one (Consultation Question 26).[33]

7.21 As vehicle design changes, the concept of a driving seat will change too, with a wider variety of controls. This might include controls outside the vehicle. We intend to look in more detail at remote control in a later consultation.

OTHER OBLIGATIONS OF THE USER-IN-CHARGE

Obligations under the current law

7.22 Under the current law, many responsibilities are placed on drivers which do not arise directly from the way the vehicle is driven. In some cases, the legislation specifies that liability is on the "driver" (such as the duty to report accidents or to ensure children are wearing seatbelts). In other cases, liability is imposed on the "user", but the courts have interpreted the concept of a user primarily with a human driver in mind. These include responsibilities to carry insurance and to make sure that the vehicle is roadworthy.

7.23 We tentatively propose that legislation should be amended to clarify that users-in-charge:

(1) are "users" for the purposes of insurance and roadworthiness offences; and

(2) are responsible for removing vehicles that are stopped in prohibited places (Consultation Question 27).[34]

7.24 We seek views on whether the offences of driving in a prohibited place should also be extended to anyone who sets the controls to require an automated vehicle to undertake a prohibited route (Consultation Question 28).[35]

7.25 Similarly, we tentatively propose that a user-in-charge should be responsible for:

(1) duties following an accident;

(2) complying with the directions of a police or traffic officer; and

(3) ensuring that children wear appropriate restraints.

7.26 We ask if consultees agree (Consultation Question 29).[36]

New positive duties of users-in-charge

7.27 It has been suggested to us that users-in-charge could be under other positive duties which are specific to driving automation and have no direct equivalent in current law. For example,

[33] Consultation Paper paragraphs 7.37 to 7.45.

[34] Consultation Paper paragraphs 7.48 to 7.65.

[35] Consultation Paper paragraphs 7.59 to 7.61.

[36] Consultation Paper paragraphs 7.71 to 7.88.

a user-in-charge could be obliged to take over driving on a planned take-over. Another possible duty might relate to setting and checking the route, so that it would be a criminal offence to require a vehicle to exceed its operational design domain, when the vehicle is driving itself.

7.28 We intend to return to these issues in further consultations.

WHAT IF THERE IS NO USER-IN-CHARGE?

7.29 In Chapter 3, we discuss ways in which automated driving systems might be able to operate in the absence of a user-in-charge. These include journeys supplied by licensed fleet operators, valet parking and "ADS-dedicated vehicles" which are not designed to be driven by humans (and are therefore particularly suited for use by disabled persons for example).

7.30 A future consultation paper will consider how duties to insure and maintain highly automated vehicles might apply in the absence of a user-in-charge. Where a licensed fleet operator provides mobility as a service, we think that insurance and maintenance obligations should fall on the licensed operator. In other cases, we see a need to review the responsibilities of a registered keeper to insure and maintain a vehicle, and to remove vehicles left in inappropriate places.

7.31 In Chapter 7, we consider three legal obligations which might prove challenging for automated driving systems, in the absence of a user-in-charge. These are duties following an accident; complying with the directions of a police officer; and ensuring that children wear seatbelts. We welcome comments on how these challenges might be met (Consultation Question 30).[37] We also ask if there is a need to reform the law in these areas as part of this review, to pave the way for automated driving systems to operate without a user-in-charge (Consultation Question 31).[38]

AGGRAVATED OFFENCES

7.32 At present, there are eight criminal offences of causing death or serious injury through driving. The trend is towards increasing both the spread of offences and the level of sentences, to meet demands for public censure and accountability. However, these offences would not apply in the absence of a human driver. The consultation paper therefore examines how far offences of manslaughter or (in Scotland) culpable homicide would apply where wrongdoing associated with automated vehicles causes a death.

7.33 As discussed below, we have identified two possible gaps in the law. The first is where death or serious injury is caused by interference: for example, a mischief-maker might paint over white lines, move road signs or interfere with sensors. The second is where the death or serious injury is caused by wrongdoing within the organisation that developed the system.

Death or serious injury caused by interference

7.34 In England and Wales, interfering with roads or vehicles is prohibited under section 22A of the Road Traffic Act 1988. The offence can be committed in three ways: by causing anything to be on or over a road; by interfering with a motor vehicle; or by interfering with traffic signs or other equipment. The act must be:

[37] Consultation Paper paragraphs 7.71 to 7.88.

[38] Consultation Paper paragraphs 7.71 to 7.88.

(1) done “intentionally and without lawful authority or reasonable cause”; and

(2) in such circumstances that it would be obvious to a reasonable person that doing so would be dangerous.

7.35 There is uncertainty about whether a breach of section 22A is a sufficient basis for unlawful act manslaughter. Although there has been a conviction for this the decision has been criticised as wrong in law.

7.36 We seek views on whether there should be a new offence of causing death or serious injury by wrongful interference with vehicles, roads or traffic equipment, contrary to section 22A of the Road Traffic Act 1988 (Consultation Question 32).[39] As this review is only concerned with automated vehicles, we limit the question to where an automated vehicle is involved in the chain of causation between the act and the death or injury.

Death or serious injury caused by developer wrongdoing

7.37 We have considered how the law would apply if a death or serious injury was caused by wrongdoing within the organisation that manufactured or developed an automated driving system. Possible wrongs include:

(1) claiming to have conducted tests which have not been conducted;

(2) suppressing poor test results;

(3) installing “defeat device” software, so that an automated driving system performs better in tests than in real life; or

(4) disabling safety critical features.

7.38 In the case of a death it might be possible to bring a prosecution for corporate manslaughter. Under the Corporate Manslaughter and Corporate Homicide Act 2007, an organisation is guilty of corporate manslaughter if the “way in which its activities are managed or organised”:

(1) causes a person’s death; and

(2) amounts to a gross breach of a duty of care owed by the organisation to the deceased.

7.39 There is also a third requirement: failings by “senior managers” must be a “substantial element” of the breach.

7.40 There are two main problems with using corporate manslaughter in these circumstances. First, the offence only applies to death, not serious injury. Secondly, it may be difficult to apply to large multi-national companies. As Celia Wells points out, most companies convicted of corporate manslaughter have been small or medium-sized, where individual directors are intimately involved in day-to-day decisions. By contrast, in large companies with complex management structures, senior managers may be insulated from making such decisions.

7.41 We seek views on whether the Law Commissions should review the possibility of one or more new corporate offences, where wrongs by a developer of automated driving systems result in

[39] Consultation Paper paragraphs 7.92 to 7.123.

death or serious injury (Consultation Question 33).[40] If so, there are several possible models to follow, including a general duty of safety and corporate offences of "failure to prevent".

[40] Consultation Paper paragraphs 7.113 to 7.123.

Chapter 8: Interfering with automated vehicles

8.1 Many concerns have been expressed that automated vehicles will encourage people to commit new forms of mischief and crime. Examples include standing in front of an automated vehicle to obstruct its movement; spraying paint or mud over its sensors; deliberately obscuring signs or white lines; or hacking into the software to cause it to crash.

8.2 Many of these behaviours can be applied to conventional vehicles and are already covered by the criminal law. As we explore in Chapter 8, it is already a criminal offence to:

(1) interfere with vehicles or traffic signs in a dangerous way;

(2) obstruct free passage along a highway;

(3) damage vehicles without lawful excuse;

(4) tamper with vehicles;

(5) take a conveyance without authority;

(6) interfere with a vehicle with the intention of theft or unauthorised taking;

(7) take an unauthorised tow or ride; or

(8) hack into a computer.

8.3 We seek views on whether any new criminal offences are required to cover interference with automated vehicles (Consultation Question 34).[41] Even if behaviours are already criminal, there may be advantages to providing a new label, to clarify that some forms of interference with automated vehicles are unacceptable.

8.4 Chapter 8 identifies three specific gaps or uncertainties in the current law, set out below.

TAMPERING WITH SENSORS

8.5 Under section 25 of the Road Traffic Act 1988, it is an offence to tamper with a vehicle's brakes "or other mechanism" without lawful authority or reasonable cause. The word "mechanism" in is not defined, though it has been held to include exposed ignition wires. We consider that sensors would be considered part of the mechanism, though the issue is not entirely certain.

8.6 We ask if it is necessary to clarify that the term "mechanism" includes sensors (Consultation Question 35).[42]

TAKING A CONVEYANCE WITHOUT AUTHORITY

8.7 In England and Wales, it is an offence to take a conveyance without authority under section 12 of the Theft Act 1968. However, the offence:

41 Consultation Paper paragraphs 8.1 to 8.58.

42 Consultation Paper paragraphs 8.28 to 8.31.

(1) only applies to vehicles which can carry a person; and

(2) does not apply to vehicles which are constructed or adapted for use only under the control of a person not carried in or on it.

8.8 This contrasts with the law in Scotland, where the offence of taking and driving away without consent applies to any motor vehicle.

8.9 We ask if the offence of taking a conveyance without authority should be extended to all motor vehicles, including those which do not carry a person, or which can only be controlled by a person outside the vehicle (Consultation Question 36).[43]

SCOTLAND: OFFENCES OF INTERFERING WITH VEHICLES AND TRAFFIC SIGNS

8.10 In England and Wales, section 22A(1) of the Road Traffic Act 1988 covers a broad range of interference with vehicles or traffic signs in a way which is obviously dangerous. In Scotland, the equivalent provision is section 100 of the Roads (Scotland) Act 1984 ("section 100"). This covers depositing anything on a road or inscribing or affixing something on a traffic sign, but does not cover interfering with vehicles or moving signs.

8.11 The fact that section 100 does not cover interfering with vehicles does not leave as much of a gap in the law as first appears. This is because section 25 of the Road Traffic Act 1988 applies in Scotland. It covers tampering with vehicle brakes or another part of its mechanism. However, section 100 does not apply to moving a traffic sign, even if this would raise safety concerns.

8.12 We ask if section 22A of the Road Traffic Act 1988 should be extended to Scotland (Consultation Question 37).[44]

[43] Consultation Paper paragraphs 8.32 to 8.39.

[44] Consultation Paper paragraphs 8.6 to 8.12.

Chapter 9: Adapting road rules

9.1 Finally, Chapter 9 looks at how to adapt current road rules to the way in which automated vehicles will make driving decisions. We also consider issues of transparency and ethics. In our preliminary consultation paper, the material discussed in this section is referred to as "machine factors" to reflect broader questions raised by artificial intelligence in the context of driving.

CREATING A "DIGITAL HIGHWAY CODE"

9.2 Driving rules have been developed to be interpreted and applied by human drivers. Even apparently straightforward road rules are subject to many implicit exceptions, based on "common sense" driver behaviour, personal value judgements and prosecutorial discretion.

9.3 We consider the challenges of taking these "analogue" legal rules and developing them into a much more precise "digital highway code" to govern the actions of highly automated vehicles. We seek views on how regulators can best collaborate with developers to create road rules which are sufficiently determinate to be formulated in digital code (Consultation Question 38).[45]

9.4 We use three practical examples to address broader questions about when automated vehicles should be allowed (or required) to depart from road rules. These relate to when automated vehicles may mount the pavement; exceed the speed limit; or edge through pedestrians.

SHOULD AUTOMATED VEHICLES EVER MOUNT THE PAVEMENT?

9.5 Under the current law, it is an offence for a vehicle to drive on a pavement. Section 34(4) of the Road Traffic Act 1988 recognises an exception for "saving life or extinguishing fire or meeting any other like emergency". However, in England and Wales a similar offence under section 72 of the Highway Act 1835 does not include any such exceptions.

9.6 Initial discussions have raised three reasons why an otherwise careful human driver might mount the kerb in an urban environment. These are:

(1) *to avoid an accident*, such as where a vehicle swerves to avoid a child unexpectedly running out into the road or a motor-cycle which has lost control on a bend;

(2) *to allow any emergency vehicles to pass*. Although Highway Code Rule 219 advises drivers to "avoid mounting the kerb" in these circumstances, it does not prohibit it; and

(3) *to pass a vehicle coming in the other direction on a narrow street*. Although this is undesirable, it may sometimes be necessary to allow traffic flow.

[45] Consultation Paper paragraphs 9.6 to 9.27.

9.7 We ask whether highly automated vehicles should be programmed to mount the pavement in these or any other circumstances (Consultation Question 39).[46]

9.8 We also ask whether it would be acceptable for a highly automated vehicle to be programmed *never* to swerve onto the pavement, even to avoid a person on the road (Consultation Question 40).[47] The logic behind such programming is that an automated vehicle only has to drive safely within the rules. When faced with a person running out on the road it should simply brake. It should not potentially endanger innocent passers-by on the pavement, simply to avoid a person who is at fault.

9.9 However, the UNECE Resolution on the deployment of highly and fully automated vehicles states that automated driving systems should "endeavour to safely tolerate errors" of other road users to minimise their effects. This suggests that simply complying with strict rules would not necessarily discharge developers' responsibilities to prioritise road safety. Even if the other road user is at fault, the automated driving system should act to avoid a collision.

SHOULD AUTOMATED VEHICLES EVER EXCEED SPEED LIMITS?

9.10 Guidelines issued by National Police Chiefs Council[48] stress that the police have discretion about how to enforce speed limits. In broad terms, the guidelines indicate that a fixed penalty notice is only appropriate when the speed exceeds the limit by at least 10% plus 2 miles per hour.

9.11 This raises the question of whether the "10%+2" tolerance should also apply to automated vehicles. There are three main policy arguments for allowing automated vehicles to be programmed to exceed the limit, provided that they remain within the tolerance:

(1) exceeding the speed limit might sometimes be in the interests of safety, for example to overtake a vehicle as quickly as possible to avoid a collision;

(2) some tolerance might prevent overly sharp breaking, for example, on reaching a lower speed limit sign;

(3) it has been suggested by some (and disputed by others) that exceeding the speed limit might sometimes be helpful to maintain traffic flow.

9.12 The issue is controversial and we have not yet reached any conclusions. We welcome your views (Consultation Question 41).[49]

WHEN MIGHT IT BE APPROPRIATE TO EDGE THROUGH PEDESTRIANS?

9.13 One of the most difficult challenges faced by automated vehicles is how to cope with groups of pedestrians blocking their path. The concern is that if automated vehicles always stop, and pedestrians know that they will always stop, they may take advantage of this.

9.14 Existing trials reveal many examples of pedestrians stepping in front of automated vehicles. Pedestrians may also fail to give way, making it difficult for a vehicle to leave the car park.

46 Consultation Paper paragraphs 9.6 to 9.37.

47 Consultation Paper paragraphs 9.6 to 9.37.

48 Formerly the Association of Chief Police Officers.

49 Consultation Paper paragraphs 9.40 to 9.47.

One study even suggested that without "a credible threat of a non-zero probability of causing some collision", it would be impossible for the automated vehicle to make any progress at all.

9.15 A human driver who has right of way might edge forward through pedestrians crossing in front in some circumstances. However, this would not be acceptable where, for example, a group of pedestrians surround a casualty lying in the road. Contexts which might be clear to a human driver may be less intelligible to an automated driving system.

9.16 This raises questions about whether it would ever be appropriate for an automated vehicle to drive towards a pedestrian, so that a pedestrian who does not move faces the risk of being touched and possibly injured. If so, what could be done to ensure that this is not done inappropriately? We welcome views (Consultation Question 42).[50]

TRANSPARENCY AND ETHICS

9.17 There is considerable media interest in how automated vehicle will handle ethical decisions, particularly in life and death situations.

Trolley problems

9.18 Developers and policy makers have told us that they are often asked about "trolley problems". This term refers to a philosophical thought experiment which asks participants how they would react to a runaway trolley on a changeable track that is about to kill five people on the track. In surveys, most people say it is morally right to divert the trolley to an alternative track, where it would kill only one person. However, participants are more concerned about deliberately pushing someone in front of the trolley to stop the trolley in its track.

9.19 The phrase has become a short-hand for ethical dilemmas about how to act in life and death situations where some harm is inevitable. These dilemmas often raise issues about self-sacrifice and the relative value of different human lives. Society accepts that drivers act in the heat of the moment. However, people are more concerned about how programmers will weigh up competing philosophical considerations when they make similar decisions in advance.

9.20 By contrast, developers often find many trolley problems unhelpfully hypothetical. As one commentator put it, trolley problems invite us to imagine a robot so poor at driving that it must kill someone, but so sophisticated that it can weigh "the relative moral considerations of killing a child versus three elderly people in real time".

9.21 Clearly, the last-minute judgements of trolley problems are rare. However, at a more general level, ethical trade-offs are integral to policy decisions about road safety. Automated vehicles, like other systems, will need to assess the risks of each manoeuvre against the risks of its alternatives. As risk assessment involves calculating the "cost" of an accident against the likelihood of it occurring, each outcome must be assigned some sort of cost, though not necessarily in a monetary form.

Transparency

9.22 The Law Commissions have not been asked to adjudicate on ethical outcomes. However, there are arguments that these issues should be transparent, to build trust in automated vehicles.

[50] Consultation Paper paragraphs 9.49 to 9.55.

9.23 We welcome views on whether developers should disclose their "ethics policies" (Consultation Question 44).[51] The sort of information we have in mind are the values associated with human lives compared to other undesirable outcomes (such as property damage); and the approach to dealing with high-risk scenarios, such as a child running out between parked cars. We are interested to hear how far this information can be published, and how far it might be considered confidential.

9.24 We also seek views on other areas where transparency could be beneficial (Consultation Question 45).[52] This might include, for example, the approach taken to wildlife or pets. For example, how would the vehicle react to a dog running across the road? Other possible issues relate to route choices. To what extent have these been influenced by public traffic management systems or by commercial considerations?

Bias

9.25 A further concern about automated vehicles is that even if the decisions taken by automated driving systems are correct overall, they may involve bias against a particular group. Automated driving systems are only as good as their training data. The challenge is to provide sufficient training data across a wide enough pool of road users to reduce the risk of biases in the way that a system detects and classifies objects and scenes and learns behaviours.

9.26 We ask whether there should be audits of datasets used to train automated driving systems, to reduce the risk of bias in the behaviours of automated driving systems (Consultation Question 43).[53]

ANY OTHER ISSUES?

9.27 Finally, we ask if there are any other issues within our terms of reference which we should consider in the course of this review (Consultation Question 46).[54]

[51] Consultation Paper paragraphs 9.76 to 9.88.

[52] Consultation Paper paragraphs 9.68 to 9.74.

[53] Consultation Paper paragraphs 9.68 to 9.74.

[54] Consultation Paper paragraphs 9.91 to 9.93.

Chapter 10: Consultation Questions

This is a list of the questions in the preliminary consultation paper. Paragraph references are to that paper.

CHAPTER 3: HUMAN FACTORS

A new role in driving automation: the "user-in-charge"

Consultation Question 1 (Paragraphs 3.24 - 3.43)**:**

Do you agree that:

(1) All vehicles which "drive themselves" within the meaning of the Automated and Electric Vehicles Act 2018 should have a user-in-charge in a position to operate the controls, unless the vehicle is specifically authorised as able to function safely without one?

(2) The user-in-charge:

(a) must be qualified and fit to drive;

(b) would not be a driver for purposes of civil and criminal law while the automated driving system is engaged; but

(c) would assume the responsibilities of a driver after confirming that they are taking over the controls, subject to the exception in (3) below?

(3) If the user-in-charge takes control to mitigate a risk of accident caused by the automated driving system, the vehicle should still be considered to be driving itself if the user-in-charge fails to prevent the accident.

Consultation Question 2 (Paragraph 3.45)**:**

We seek views on whether the label "user-in-charge" conveys its intended meaning.

Consultation Question 3 (Paragraphs 3.47 - 3.57)**:**

We seek views on whether it should be a criminal offence for a user-in-charge who is subjectively aware of a risk of serious injury to fail to take reasonable steps to avert that risk.

When would a user-in-charge not be necessary?

Consultation Question 4 (Paragraphs 3.59 - 3.77)**:**

We seek views on how automated driving systems can operate safely and effectively in the absence of a user-in-charge.

Consultation Question 5 (Paragraphs 3.59 - 3.77)**:**

Do you agree that powers should be made available to approve automated vehicles as able to operate without a user-in-charge?

When should secondary activities be permitted?

Consultation Question 6 (Paragraphs 3.80 - 3.96)**:**

Under what circumstances should a driver be permitted to undertake secondary activities when an automated driving system is engaged?

Consultation Question 7 (Paragraphs 3.80 - 3.96)**:**

Conditionally automated driving systems require a human driver to act as a fallback when the automated driving system is engaged. If such systems are authorised at an international level:

(1) should the fallback be permitted to undertake other activities?

(2) if so, what should those activities be?

CHAPTER 4: REGULATING VEHICLE STANDARDS PRE-PLACEMENT

A new safety assurance scheme

Consultation Question 8 (Paragraphs 4.102 - 4.104)**:**

Do you agree that:

(1) a new safety assurance scheme should be established to authorise automated driving systems which are installed:
   (a) as modifications to registered vehicles; or
   (b) in vehicles manufactured in limited numbers (a "small series")?

(2) unauthorised automated driving systems should be prohibited?

(3) the safety assurance agency should also have powers to make special vehicle orders for highly automated vehicles, so as to authorise design changes which would otherwise breach construction and use regulations?

Consultation Question 9 (Paragraphs 4.107 - 4.109)**:**

Do you agree that every automated driving system (ADS) should be backed by an entity (ADSE) which takes responsibility for the safety of the system?

Consultation Question 10 (Paragraphs 4.112 - 4.117)**:**

We seek views on how far should a new safety assurance system be based on accrediting the developers' own systems, and how far should it involve third party testing.

Consultation Question 11 (Paragraphs 4.118 - 4.122)**:**

We seek views on how the safety assurance scheme could best work with local agencies to ensure that is sensitive to local conditions.

CHAPTER 5: REGULATING SAFETY ON THE ROADS

A new organisational structure?

Consultation Question 12 (Paragraphs 5.30 - 5.32)**:**

If there is to be a new safety assurance scheme to authorise automated driving systems before they are allowed onto the roads, should the agency also have responsibilities for safety of these systems following deployment?

If so, should the organisation have responsibilities for:

(1) regulating consumer and marketing materials?

(2) market surveillance?

(3) roadworthiness tests?

We seek views on whether the agency's responsibilities in these three areas should extend to advanced driver assistance systems.

Driver training

Consultation Question 13 (Paragraphs 5.54 - 5.55)**:**

Is there a need to provide drivers with additional training on advanced driver assistance systems?

If so, can this be met on a voluntary basis, through incentives offered by insurers?

Accident investigation

Consultation Question 14 (Paragraphs 5.58 - 5.71)**:**

We seek views on how accidents involving driving automation should be investigated.

We seek views on whether an Accident Investigation Branch should investigate high profile accidents involving automated vehicles? Alternatively, should specialist expertise be provided to police forces.

Setting and monitoring a safety standard

Consultation Question 15 (Paragraphs 5.78 - 5.85)**:**

(1) Do you agree that the new safety agency should monitor the accident rate of highly automated vehicles which drive themselves, compared with human drivers?

(2) We seek views on whether there is also a need to monitor the accident rates of advanced driver assistance systems.

The technical challenges of monitoring accident rates

Consultation Question 16 (Paragraphs 5.86 - 5.97)**:**

(1) What are the challenges of comparing the accident rates of automated driving systems with that of human drivers?

(2) Are existing sources of data sufficient to allow meaningful comparisons? Alternatively, are new obligations to report accidents needed?

CHAPTER 6: CIVIL LIABILITY

Is there a need for further review?

Consultation Question 17 (Paragraphs 6.13 - 6.59)**:**

We seek views on whether there is a need for further guidance or clarification on Part 1 of Automated and Electric Vehicles Act 2018 in the following areas:

(1) Are sections 3(1) and 6(3) on contributory negligence sufficiently clear?

(2) Do you agree that the issue of causation can be left to the courts, or is there a need for guidance on the meaning of causation in section 2?

(3) Do any potential problems arise from the need to retain data to deal with insurance claims? If so:

  (a) to make a claim against an automated vehicle's insurer, should the injured person be required to notify the police or the insurer about the alleged incident within a set period, so that data can be preserved?

  (b) how long should that period be?

Civil liability of manufacturers and retailers: Implications

Consultation Question 18 (Paragraphs 6.61 - 6.116)**:**

Is there a need to review the way in which product liability under the Consumer Protection Act 1987 applies to defective software installed into automated vehicles?

Consultation Question 19 (Paragraphs 6.61 - 6.116)**:**

Do any other issues concerned with the law of product or retailer liability need to be addressed to ensure the safe deployment of driving automation?

CHAPTER 7: CRIMINAL LIABILITY

Offences incompatible with automated driving

Consultation Question 20 (Paragraphs 7.5 - 7.11)**:**

We seek views on whether regulation 107 of the Road Vehicles (Construction and Use) Regulations 1986 should be amended, to exempt vehicles which are controlled by an authorised automated driving system.

Consultation Question 21 (Paragraphs 7.5 - 7.11)**:**

Do other offences need amendment because they are incompatible with automated driving?

Offences relating to the way a vehicle is driven

Consultation Question 22 (Paragraphs 7.14 - 7.19)**:**

Do you agree that where a vehicle is:

(1) listed as capable of driving itself under section 1 of the Automated and Electric Vehicles Act 2018; and

(2) has its automated driving system correctly engaged;

the law should provide that the human user is not a driver for the purposes of criminal offences arising from the dynamic driving task?

Consultation Question 23 (Paragraph 7.21)**:**

Do you agree that, rather than being considered to be a driver, a user-in-charge should be subject to specific criminal offences? (These offences might include, for example, the requirement to take reasonable steps to avoid an accident, where the user-in-charge is subjectively aware of the risk of serious injury (as discussed in paragraphs 3.47 to 3.57)).

Consultation Question 24 (Paragraphs 7.23 - 7.35)**:**

Do you agree that:

(1) a registered keeper who receives a notice of intended prosecution should be required to state if the vehicle was driving itself at the time and (if so) to authorise data to be provided to the police?

(2) where the problem appears to lie with the automated driving system (ADS) the police should refer the matter to the regulatory authority for investigation?

(3) where the ADS has acted in a way which would be a criminal offence if done by a human driver, the regulatory authority should be able to apply a range of regulatory sanctions to the entity behind the ADS?

(4) the regulatory sanctions should include improvement notices, fines and suspension or withdrawal of ADS approval?

Responsibilities of "users-in-charge"

Consultation Question 25 (Paragraphs 7.37 - 7.45)**:**

Do you agree that where a vehicle is listed as only safe to drive itself with a user-in-charge, it should be a criminal offence for the person able to operate the controls ("the user-in-charge"):

(1) not to hold a driving licence for the vehicle;

(2) to be disqualified from driving;

(3) to have eyesight which fails to comply with the prescribed requirements for driving;

(4) to hold a licence where the application included a declaration regarding a disability which the user knew to be false;

(5) to be unfit to drive through drink or drugs; or

(6) to have alcohol levels over the prescribed limits?

Consultation Question 26 (Paragraphs 7.37 - 7.45)**:**

Where a vehicle is listed as only safe to drive itself with a user-in-charge, should it be a criminal offence to be carried in the vehicle if there is no person able to operate the controls.

Responsibilities for other offences

Consultation Question 27 (Paragraphs 7.48 - 7.65)**:**

Do you agree that legislation should be amended to clarify that users-in-charge:

(1) Are "users" for the purposes of insurance and roadworthiness offences; and

(2) Are responsible for removing vehicles that are stopped in prohibited places, and would commit a criminal offence if they fail to do so?

Consultation Question 28 (Paragraphs 7.59 - 7.61)**:**

We seek views on whether the offences of driving in a prohibited place should be extended to those who set the controls and thus require an automated vehicle to undertake the route.

Obligations that pose challenges for automated driving systems

Consultation Question 29 (Paragraphs 7.71 - 7.88)**:**

Do you agree that legislation should be amended to state that the user-in-charge is responsible for:

(1) duties following an accident;

(2) complying with the directions of a police or traffic officer; and

(3) ensuring that children wear appropriate restraints?

Consultation Question 30 (Paragraphs 7.71 - 7.88)**:**

In the absence of a user-in-charge, we welcome views on how the following duties might be complied with:

(1) duties following an accident;

(2) complying with the directions of a police or traffic officer; and

(3) ensuring that children wear appropriate restraints.

Consultation Question 31 (Paragraphs 7.71 - 7.88)**:**

We seek views on whether there is a need to reform the law in these areas as part of this review.

Aggravated offences

Consultation Question 32 (Paragraphs 7.92 - 7.123)**:**

We seek views on whether there should be a new offence of causing death or serious injury by wrongful interference with vehicles, roads or traffic equipment, contrary to section 22A of the Road Traffic Act 1988, where the chain of causation involves an automated vehicle.

Consultation Question 33 (Paragraphs 7.113 - 7.123)**:**

We seek views on whether the Law Commissions should review the possibility of one or more new corporate offences, where wrongs by a developer of automated driving systems result in death or serious injury.

CHAPTER 8: INTERFERING WITH AUTOMATED VEHICLES

Consultation Question 34 (Paragraphs 8.1 - 8.58)**:**

We seek views on whether the criminal law is adequate to deter interference with automated vehicles. In particular:

(1) Are any new criminal offences required to cover interference with automated vehicles?

(2) Even if behaviours are already criminal, are there any advantages to re-enacting the law, so as to clearly label offences of interfering with automated vehicles?

Tampering with vehicles

Consultation Question 35 (Paragraphs 8.28 - 8.31)**:**

Under section 25 of the Road Traffic Act 1988, it is an offence to tamper with a vehicle's brakes "or other mechanism" without lawful authority or reasonable cause. Is it necessary to clarify that "other mechanism" includes sensors?

Unauthorised vehicle taking

Consultation Question 36 (Paragraphs 8.32 - 8.39)**:**

In England and Wales, section 12 of the Theft Act 1968 covers "joyriding" or taking a conveyance without authority, but does not apply to vehicles which cannot carry a person. This contrasts with the law in Scotland, where the offence of taking and driving away without consent applies to any motor vehicle. Should section 12 of the Theft Act 1968 be extended to any motor vehicle, even those without driving seats?

Causing danger to road users

Consultation Question 37 (Paragraphs 8.6 - 8.12)**:**

In England and Wales, section 22A(1) of the Road Traffic Act 1988 covers a broad range of interference with vehicles or traffic signs in a way which is obviously dangerous. In Scotland, section 100 of the Roads (Scotland) Act 1984 covers depositing anything a road, or inscribing or affixing something on a traffic sign. However, it does not cover interfering with other vehicles or moving traffic signs, even if this would raise safety concerns. Should section 22A of the Road Traffic Act 1988 be extended to Scotland?

CHAPTER 9: "MACHINE FACTORS" – ADAPTING ROAD RULES FOR ARTIFICIAL INTELLIGENCE DECISION-MAKING

Rules and standards

Consultation Question 38 (Paragraphs 9.6 - 9.27)**:**

We seek views on how regulators can best collaborate with developers to create road rules which are sufficiently determinate to be formulated in digital code.

Should automated vehicles ever mount the pavement?

Consultation Question 39 (Paragraphs 9.6 - 9.37)**:**

We seek views on whether a highly automated vehicle should be programmed so as to allow it to mount the pavement if necessary:

(1) to avoid collisions;

(2) to allow emergency vehicles to pass;

(3) to enable traffic flow;

(4) in any other circumstances?

Consultation Question 40 (Paragraphs 9.6 - 9.37)**:**

We seek views on whether it would be acceptable for a highly automated vehicle to be programmed never to mount the pavement.

Should highly automated vehicles ever exceed speed limits?

Consultation Question 41 (Paragraphs 9.40 - 9.47)**:**

We seek views on whether there are any circumstances in which an automated driving system should be permitted to exceed the speed limit within current accepted tolerances.

Edging through pedestrians

Consultation Question 42 (Paragraphs 9.49 - 9.55)**:**

We seek views on whether it would ever be acceptable for a highly automated vehicle to be programmed to "edge through" pedestrians, so that a pedestrian who does not move faces some chance of being injured. If so, what could be done to ensure that this is done only in appropriate circumstances?

Avoiding bias in the behaviour of automated driving systems

Consultation Question 43 (Paragraphs 9.68 - 9.74)**:**

To reduce the risk of bias in the behaviours of automated driving systems, should there be audits of datasets used to train automated driving systems?

Transparency

Consultation Question 44 (Paragraphs 9.76 - 9.88)**:**

We seek views on whether there should be a requirement for developers to publish their ethics policies (including any value allocated to human lives)?

Consultation Question 45 (Paragraphs 9.76 - 9.88)**:**

What other information should be made available?

Future work and next steps

Consultation Question 46 (Paragraphs 9.91 - 9.93)**:**

Is there any other issue within our terms of reference which we should be considering in the course of this review?