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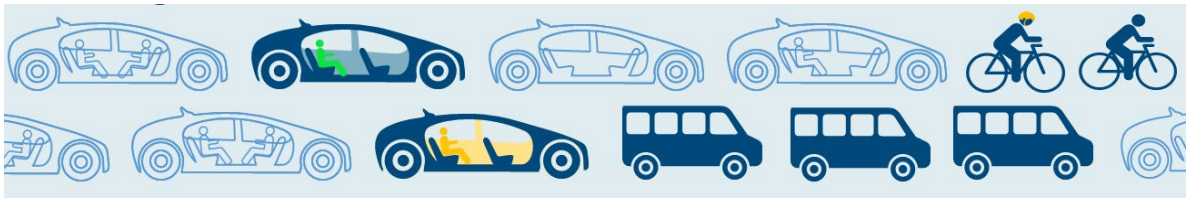
Automated Vehicles Consultation Paper 3: Analysis of responses



Analysis of responses to LCCP No 252/SLCDP No 171

26 January 2022

List of Abbreviations

AAIP: Assuring Autonomy International Programme, University of York.

ABI: The Association of British Insurers.

ALBUM: The Association of Local Bus Managers.

APIL: The Association of Personal Injury Lawyers.

BIBA: The British Insurance Brokers' Association.

BILA: The British Insurance Law Association.

BPA: The British Parking Association.

BVRLA: The British Vehicle Rental and Leasing Association.

CIHT: Chartered Institute of Highways and Transportation.

CPS: The Crown Prosecution Service.

DfT: Department for Transport.

DLG: Direct Line Group.

DPTAC: The Disabled Persons transport Advisory Committee.

EHRC: The Equality and Human Rights Commission.

FOCIS: Forum of Complex Injury Solicitors.

ICO: Information Commissioner's Office.

IHE: Institute of Highway Engineers.

IUA: The International Underwriting Association of London.

MIB: Motor Insurers' Bureau.

NFU Mutual: National Farmers Union Mutual Insurance Society.

NPCC: National Police Chiefs' Council.

OTC: Office of the Traffic Commissioner.

PACTS: The Parliamentary Advisory Council for Transport Safety.

RoSPA: Royal Society for the Prevention of Accidents.

SEStran: The South East of Scotland Transport Partnership.

SMMT: Society of Motor Manufacturers and Traders**.**

TfGM: Transport for Greater Manchester.

TfL: Transport for London.

TfWM: Transport for West Midlands.

Contents

A. Introduction

OVERVIEW

A.1 The Law Commission of England and Wales and the Scottish Law Commission have been asked by the UK government's Centre for Connected and Autonomous Vehicles (CCAV) to review the law relating to Automated Vehicles (AVs). Our final report, published in January 2022, sets out our recommendations for new laws to regulate the introduction and continuing safety of AVs on roads or other public places in Great Britain (GB).

A.2 This document, published alongside our final report, contains a full analysis of the responses received to our third (and last) public consultation held between December 2020 and March 2021. In July 2021, we published a short summary of the responses we received indicating the direction of travel on some key policy areas and next steps that we proposed to take. We conducted a further analysis of the feedback received during consultation and used this to develop our final report. This analysis contains quotations from stakeholders and detailed discussion of their views which informed the recommendations in our final report. We see this as providing important context to our conclusions.

A.3 Nothing in this document should, however, be taken as representing the decided views of either Law Commission. Our conclusions and recommendations are set out in our final report which should be read alongside this document.

A.4 We would like to thank all those who responded to our consultation. We are especially grateful to all consultees who contributed despite the pressures of COVID-19, whether by providing a written response or giving their views through virtual meetings and conferences.

A.5 All subsequent references to our consultation and "Consultation Paper" or "CP" relate to our third consultation, published in December 2020, unless otherwise specified. All chapter references in this document are to the full Consultation Paper rather than the summary.

OVERARCHING THEMES

A.6 As we identified in the summary,[1] the responses revealed some broader themes which we have used to build our final report. These were:

(1) Flexibility. Many stakeholders placed a strong emphasis on the ability to revise and update regulation for AVs. The uncertainties and fast evolution of automated driving technologies mean the legal system needs to be adaptable;

[1] Summary of responses to CP3, para A.13.

(2) The need for clear guidance about what is required to meet regulatory requirements, while focusing on outcomes in a technology-neutral way rather than prescribing in detail how these should be achieved;

(3) The importance of fostering a learning culture which monitors how vehicles operate in practice, and investigates and understands incidents;

(4) A prominent role for local transport authorities within the regulatory scheme. The deployment of AVs must support, rather than undermine, local transport strategies;

(5) The need to maintain harmony with international regulations, as well as with other policy in areas outside the scope of this review - such as connectivity, cybersecurity and infrastructure.

STRUCTURE OF THIS PAPER

A.7 This paper is divided into 16 Chapters:

(1) Chapter A is this introduction.

A.8 The next 15 Chapters (Chapters B to M) analyse the responses to the Consultation Paper. The questions are grouped by the Chapter in which they were published in the Consultation Paper.

B. Self-driving and human intervention

OVERVIEW

B.1 The Consultation Paper outlined two paths to automation. In Path 1, automated features are increasingly incorporated in vehicles sold across borders to a mass consumer market. Initially, these vehicles will continue to have a human in the driving seat. As the technology improves, the human would be able to cede the driving task to the automated driving system (ADS) in more circumstances. This contrasts with Path 2, where vehicles are deployed without a human driver in limited local contexts, followed by a gradual expansion of their range of use.

B.2 In Chapter 4 we considered how far a human may be required to intervene in Path 1 vehicles. We provisionally proposed that a vehicle should not be considered self-driving if it required a human to monitor the driving environment, the vehicle or the way it drives. The human in the driving seat should only be required to intervene in response to a clear and timely transition demand, not in response to any other event. While an ADS is engaged, we proposed that the human in the driving seat should be considered a "user-in-charge" rather than a driver.

B.3 The majority of consultees agreed with our approach. However, a significant minority expressed concern about approving a system unless it can come to a safe stop following a failed "transition demand".[2] Furthermore, many consultees called for further thought to be given to how long a user-in-charge needs to regain situational awareness following a transition demand before they can safely resume driving. We note a demand for greater clarity about the non-driving related activities a user-in-charge should be permitted to engage in.

B.4 In Chapter 4 we also noted that hearing loss is common, affecting around one in six of the UK population. This does not affect people's ability to drive. We said that a transition demand should be designed for all users, including those who cannot hear and who are not monitoring the car dashboard. Transition demand should therefore use haptic signals alongside visual and audio signals. Consultees overwhelmingly expressed views in favour of designing self-driving features to ensure that they can be used by people with hearing loss. A common theme was that AVs have the potential to bring significant benefits to people with disabilities and should be designed with this in mind.

[2] A transition demand is an alert issued by an ADS to the user-in-charge to take over the dynamic driving task from the ADS, communicated through visual, audio and haptic signals, which gives the user-in-charge a transition period within which to respond. Absent a response, the ADS performs a risk mitigation manoeuvre bringing it to a stop.

SELF-DRIVING AND HUMAN INTERVENTION

Q1: We provisionally propose that:

(1) a vehicle should not be self-driving if, with the ADS engaged, the user-in-charge needs to monitor the driving environment, the vehicle or the way it drives;

(2) it is nevertheless compatible with self-driving to require the user-in-charge to respond to a clear and timely transition demand which:

(a) cuts out any non-driving related screen use;

(b) provides clear visual, audio and haptic signals; and

(c) gives sufficient time to gain situational awareness;

(3) to be classified as self-driving, the vehicle must be safe enough even if the human user does not intervene in response to any event except a clear and timely transition demand.

Do you agree?

B.5 Of the 84 consultees who responded to this question, 50 (60%) said yes, six (7%) said no and 30 (36%) responded "other". In other words, a majority of respondents agreed with our approach and only a few opposed the proposal outright. However, many caveats and concerns were expressed about this issue.

A vehicle is only self-driving if it does not need human monitoring

B.6 The great majority of consultees agreed that a vehicle should only be classified as self-driving if it does not require to be monitored:

> *Given that a major rationale for the development of self-driving vehicles is the economic productivity benefits of using travel time for productive activities, it follows that a user-in-charge should not have to continually monitor the driving environment or vehicle.* [KPMG]

> *We agree that for clarity and for the avoidance of misunderstanding by the general public, the classification / description "self-driving" should only be used where no human environmental monitoring is required.* [National Farmers Union Mutual Insurance Society (NFU Mutual)]

> *If unable to perform activities such as reading safely whilst the vehicle drives, the user-in-charge would have very little else to do and could quickly become bored, drowsy or distracted. Either way, the user cannot be expected to maintain full awareness of the vehicle, driving and road situation.* [Urban Transport Group]

B.7 BLM Law, the International Underwriting Association (IUA) and Direct Line Group (DLG) noted that this definition of self-driving reflected section 8(1) of the Automated and Electric Vehicles Act 2018.

B.8 However, a few respondents thought that if a user-in-charge was responsible for some aspects of the journey, they should be responsible for all aspects:

As long as the driver has a duty to oversee operations, they are the responsible operator. [Motorcycle Action Group]

B.9 Wendy Owen of Bangor University also said that if the user-in-charge had any role to play in the driving task, the vehicle should not be considered entirely self-driving.[3]

Is a "clear and timely" transition demand compatible with self-driving?

B.10 A majority of consultees agreed that even if a user-in-charge was not monitoring the driving environment, they could nevertheless be expected to respond to a clear and timely transition demand. For example, KPMG noted that while a user-in-charge should not have to continually monitor the driving environment or vehicle:

> *It is also sensible that the user-in-charge would have to occasionally respond to transition demands given that the automated vehicle cannot realistically be programmed to manage all scenarios.*

B.11 Burges Salmon LLP also agreed:

> *We agree that it is not incompatible for an automated vehicle to request a handover to a human driver and indeed this would be a standard operational requirement (planned or otherwise) for example where conditions may approach the limits of a system's [operational design domain].*

B.12 Similarly, the Society of Motor Manufacturers and Traders (SMMT) said:

> *Insofar as the automated vehicle is within its operational design domain (ODD) and the ADS is activated, the user-in-charge does not need to monitor the driving environment and react to other road users and the conditions of the road.*
>
> *The user-in-charge, however, needs to remain receptive to a transition demand. We agree with the features of a transition demand described proposals (2)(a), (b) and (c).*

B.13 Five AI argued that this would be safe, as long as the vehicle was able to carry out a failure mitigation strategy, such as slowly stopping in lane:

> *To be classified as "self-driving", the ADS should either be able to carry out an appropriate minimal risk manoeuvre or an appropriate failure mitigation manoeuvre in response to circumstances where the ADS is designed to request that the user-in-charge intervenes, but the user-in-charge has not yet intervened. This is to ensure that the vehicle remains sufficiently safe until the user-in-charge intervenes, and to take into account the possibility that the user-in-charge may not intervene.*

A clear transition demand

B.14 There was discussion about what a clear transition demand should look like. Several consultees expressed concern that the user-in-charge may intervene unnecessarily,

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[3] Responding in a personal capacity.

or without sufficient thought. They therefore asked for a clear "offer and confirm" process. As Highways England said:

> *There is a risk that a user-in-charge who has completely disengaged from the dynamic driving task may intervene unnecessarily, thus making the outcome worse… . Automated driving systems should therefore be designed so as to prevent users-in-charge from intervening with the dynamic driving task until there has been a clear and unequivocal handover from machine to human by means of an 'offer and confirmation' process.*

Sufficient time to gain situational awareness

B.15 We proposed that the transition demand should be "timely". In other words, it must provide the driver with sufficient time to gain situational awareness before taking over driving. We said that this would depend on many factors, "including the complexity of the driving environment, whether it is day or night, and how engaging the non-driving activity proves to be".[4] However, we were not in a position to say what the minimum time should be, other than it should be at least 10 seconds.[5]

B.16 In all, 28 respondents raised concerns about this issue.[6] The CertiCAV team at Connected Places Catapult highlighted it as a "problematic area". Reed Mobility and National Engineering Policy Centre (NEPC) asked for a clearer definition of "sufficient time", while Transport for London (TfL) noted there were still "questions" about the definition.

B.17 Several consultees pointed to variations in the length of time needed to regain control. Richard Morris of Innovate UK noted what was "sufficient" would be "context and driver state dependent".[7] Pinsent Masons LLP said it would depend on the activity the individual was engaged in at the time, as well as anatomical and biological characteristics. Mills & Reeve LLP noted it could differ significantly, depending on environmental conditions and the temperament of the driver. ITS United Kingdom (ITS UK) mentioned the need to take into account the varying reaction times of different users, including those with disabilities.

B.18 It was noted that disengagement with the driving task may cause fatigue. More fundamentally, reduced driving time might eventually lead to skill degradation. The Urban Transport Group warned that "if they are only called upon to intervene on rare occasions, drivers may become de-skilled and less able to take the required action".

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4 CP3, para 4.91.

5 CP3, para 4.93.

6 This included Peter Whitfield of P Whitfield Consulting (responding in a personal capacity), Apollo Future Mobility Group, Zurich Insurance, ITS UK, Urban Transport Group, the Association of British Insurers (ABI) and Thatcham Research, the Association of Personal Injury Lawyers (APIL), Five AI, Kennedys Law LLP, the British Insurance Brokers' Association (BIBA), Mills & Reeve LLP, DAC Beachcroft LLP, DLG, the NEPC, Pinsent Masons LLP, Transport for West Midlands (TfWM), Reed Mobility, the Faculty of Advocates, Aviva Insurance, Highways England, HORIBA MIRA, the Assuring Autonomy International Programme, University of York (AAIP), the IUA, Bryan Reimer of the Massachusetts Institute of Technology (MIT) (responding in a personal capacity), the Motorcycle Action Group, CertiCAV team at Connected Places Catapult, Transport for London (TfL) and Richard Morris of Innovate UK.

7 Responding in a personal capacity.

B.19 DAC Beachcroft LLP felt that situational awareness could not be sufficiently regained within 10 seconds unless the user-in-charge was already monitoring the environment to at least some extent. Therefore:

> *Until the technology has improved to the point that a self-drive system is capable of driving itself without needing to resort to such a short transition demand period, it should not be classified as ADS but instead as ADAS.*[8]

B.20 Several respondents highlighted the need for more research. The IUA considered that more work was required to set out the parameters of safe transition demand. Similarly, Five AI said:

> *We consider what criteria the transition demand must meet to be sufficiently clear and timely would merit further study in order to set an evidence based benchmark. It seems possible that the appropriate criteria may vary depending on the nature of the environment (e.g. more complicated traffic situations, difficult weather conditions). We also agree that the effectiveness of the transition demand should be monitored in practice.*

B.21 Five AI argued that the minimum time should not be treated as part of the definition of self-driving. Instead, to retain flexibility, it should be dealt with by separate guidance or form part of the assessment of whether the vehicle is "safe enough".

B.22 Some consultees thought that time allowed should differ depending on the urgency of the situation. For example, HORIBA MIRA suggested a longer period following heavy rain than if a pedestrian was detected on the motorway.

Secondary activities

B.23 Several consultees commented that what constitutes sufficient time depends on the non-driving related activities the user-in-charge is allowed to undertake. For example, Bryan Reimer of MIT suggested that "sufficient" time should be computed in light of the typical permitted non-driving related activities (such as eating, texting or watching a film).

B.24 The joint response from the Association of British Insurers (ABI) and Thatcham Research suggested that there should be a specific list of permitted tasks:

> *There needs to be a specified list of permitted tasks, which is clear, common, and available to the public. This list of permitted tasks may vary by degree of vehicle automation and would need to be updated over time as vehicle capabilities evolve. Noncompliance, or engaging in a non-permitted task by the user-in-charge, may result in invalidation of insurance.*

B.25 Aviva Insurance also made this point.

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8 "ADAS" refers to Advanced Driver Assistance Systems.

B.26 Several consultees questioned the use of mobile phones, as they would not cut out on a transition demand.[9] TfL said:

> *Whilst the proposal addresses the cutting out of non-driving related screen use, to ensure that the user-in-charge responds swiftly to a transition demand, it does not address the fact that drivers currently engage in activities which are not permitted, such as using a handheld mobile phone. It is conceivable that the temptation will only increase if the vehicle is largely self-driving. How this can be prevented will need to form part of the transition demand assessment.*

B.27 There were calls for sleeping to be prohibited. The ABI and Thatcham Research suggested that driver monitoring should be mandatory in order to prevent this.

The need for a safe stop following a failed transition demand

B.28 In the Consultation Paper, we rejected the view that a vehicle should only be classified as self-driving if, following a failed transition demand, it was able to reach a "minimal risk condition" by coming to a safe stop. We thought that a minimal risk condition was too difficult to define, noting the lack of consensus about what constituted a safe stop on the motorway. Instead, we thought that the safety of a vehicle should be considered in the round, weighing up how frequently transition demands were made, how often users-in-charge failed to respond and the consequences if they failed.

B.29 Although a majority of consultees accepted this approach, a substantial minority disagreed. A wide variety of respondents felt that a vehicle shold only be classified as self-driving if, following a failed transition demand, the vehicle was able to achieve a minimal risk condition and at least be able to stop out of an active lane of traffic.[10]

B.30 As Mobileye, a subsidiary of Intel, said:

> *The user-in-charge should engage only after the vehicle has reached a minimal risk condition. The user-in-charge should not be expected to monitor regular driving activity nor to be receptive to a transition demand. In both scenarios the AV is dependent on the intervention of the user-in-charge and this dependency entails risks of personal injury and damage to property.*

B.31 Consultees thought it was important to maintain a clear boundary between SAE Level 4 (which could achieve a minimal risk condition) and SAE Level 3 (conditional automation).[11] IROHMS Simulation Laboratory at Cardiff University's School of Psychology (IROHMS Simulation Laboratory) said that, without this distinction, boundaries would be blurred:

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9 This included Five AI, Aviva Insurance and the Faculty of Advocates.

10 This included Cycling UK, Momentum Transport Consultancy, AXA UK, RAC Foundation, AAIP, South East of Scotland Transport Partnership (SEStran), TfL, Mobileye, Burges Salmon LLP, the Faculty of Advocates, BLM Law, Five AI, DAC Beachcroft LLP, the DLG, and KPMG.

11 We acknowledge the variation in what people understood each SAE Level to cover. We note in particular the work undertaken by Phil Koopman of Edge Case Research to communicate the capabilities of driving automation to the public: see, for example, https://edgecaseresearch.medium.com/a-users-guide-to-vehicle-automation-modes-4bdd49b30dc0.

> *This would cause confusion to manufacturers as well as end users. The distinctions between the two categories are important because they have tangible implications for responsibility/liability distribution.*

B.32 AXA UK feared that enabling Level 3 vehicles to be listed as a form of automated driving "would only entrench misconceptions about the capabilities of these vehicles and result in blurring responsibilities for users".

B.33 DAC Beachcroft LLP "reiterated the importance of a 'safety first' approach to the development of automated vehicles":

> *In the event that the user-in-charge does not intervene, the automated vehicle is only 'safe enough' if it is capable of performing a safe minimum risk manoeuvre that involves bringing the vehicle to a safe stop out of a live traffic lane.*

B.34 BLM Law disagreed "that coming to a gradual stop in lane should qualify as a satisfactory minimal risk condition". Instead, the RAC Foundation suggested that on a minimal risk condition on a motorway might consist of "the vehicle driving itself to the next motorway service area or off-ramp".

Responding to events in the absence of a transition demand

B.35 There is considerable debate over how far a human user should be expected to respond to "evident failures", "obvious circumstances" or "extraordinary external conditions" in the absence of a transition demand. In the Consultation Paper we noted the example given in the SAE Taxonomy, which is that at Level 3 the user can be expected to respond to a sudden tyre blow-out.[12] We also cited the debate within the German Bundesrat about whether important road signs or inclement weather were "obvious circumstances" to which the user should respond.[13] The concept of an "extraordinary external condition" has also been said to include the presence of an emergency vehicle, a minor collision, or a person throwing rocks from a motorway bridge.[14]

B.36 We commented that we had "grave reservations about all these examples".[15] They did not seem to be based on human factors research about what users can reasonably be expected to respond to. Instead, they could be used to blame human users for failures within the ADS.[16] We provisionally proposed that to be classified as self-driving, the vehicle must be safe enough even if the human user does not intervene in response to any event except a clear and timely transition demand.

B.37 The great majority of consultees agreed. As the ABI and Thatcham Research said:

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12 CP3, para 4.101.

13 CP3, paras 4.57 to 4.58.

14 CP3, para 4.107.

15 CP3, para 4.108.

16 CP3, para 4.111.

> *The… suggestion that the driver should respond to "extraordinary external conditions" such as soft brush collisions and emergency vehicles is incompatible with the suggestion that the user-in-charge can perform secondary tasks.*

B.38 Similarly, Kennedys Law LLP expressed surprise that a user could be expected to respond to a tyre blowout.

> *In this, as with most or all other emergency situations, the ADS should surely be better suited to handling the situation and bringing the vehicle to a stop safely.*

B.39 The SMMT agreed with the proposal in principle but warned against "stretching expectations to unrealistic levels". They gave the example of a small fire within the vehicle:

> *For example, a small fire inside the vehicle cabin may be very rare but entirely possible. In such situation, the ADS may not be affected (at least in the first instance) and as such there may not be a transition demand, but the vehicle itself may not necessarily be deemed safe enough to carry on in its journey. It is also imperative for the user-in-charge to immediately prevent the small fire from escalating. Despite there being no transition demand, with the presence of smoke and a burning smell it is reasonable to expect the user-in-charge to be aware of this obvious circumstance and the potential risks it may bring, and therefore retake control of the vehicle, pull up on the emergency lane and deal with the issue or seek assistance.*

B.40 The SMMT commented they understood "the spirit of proposal (3)" but suggested "its description needs to be clearer and more nuanced".

"Safe enough"

B.41 In Question 1(3) we proposed that a vehicle should be "safe enough" even without human. Most of the concerns expressed centred around this phrase, which was describing it as "subjective"[17] and "vague".[18] Oxbotica said it was "a broad concept which leaves room for interpretation and cannot be tested". In its place, they asked for "a specific set of technical requirements that the ADS will have to meet even when the user-in-charge does not intervene".

B.42 We agree that the Government needs to set a standard for what is "safe enough" and return to this issue in the next chapter.

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17 DLG.

18 The Faculty of Advocates.

Transition demands and hearing loss

Q2: We welcome views on whether self-driving features should be designed to ensure that they can be used by people with hearing loss.

B.43 Many drivers of conventional vehicles suffer from hearing loss. In the Consultation Paper we expressed concern that transition demands might rely on auditory warnings, making self-driving inaccessible for some people. We sought views.

B.44 The overwhelming majority of respondents supported the view that self-driving features should be designed to ensure that they can be used by people with hearing loss. APIL said that haptic signals should be used in all systems, and not just available in specially adapted vehicles.

B.45 Several respondents noted that AVs have the potential to bring significant benefits to those with disabilities and should be designed with this in mind. As Oxbotica put it:

> *We believe that automated vehicles should be designed to improve people's lives. Accessibility should be one of the benefits that AV technologies can offer. People with hearing loss who are currently able to drive normal vehicles should find AVs an attractive alternative which will help to reduce the workload and which will introduce alert mechanisms that are adapted to their needs.*

B.46 Pinsent Masons LLP suggest that that over time, a legal obligation could be introduced to ensure that automated vehicles are designed in a way which is accessible for all.

B.47 The Disabled Persons Transport Advisory Committee (DPTAC) asked for further research into barriers transition demands may present to disabled people who are currently able to drive conventional vehicles. They counselled that if adaptations were made to a vehicle to accommodate a disabled person's needs then responsibility for the safety of the adaptation should remain with the ADSE and not pass to the entity making the adaptation.

C. How safe is safe enough?

OVERVIEW

C.1 In Chapter 5 we discussed what it means for an automated vehicle to be safe. The standard definition is that a thing is safe if its attendant risks are judged to be acceptable. However, people do not necessarily assess risks in simple numeric terms. They may be more tolerant of risks that are familiar, voluntary or accompanied by a clear benefit to them. People are less accepting of risks that are new, strange or imposed.

C.2 We considered a variety of safety standards, including the idea that an AV should be as safe as a competent and careful driver, and that it should be as safe as an average human driver. Given that most accidents involve drivers who are not being careful, there is a large difference between these two standards. We concluded that there was no single right answer. Balancing the different tests involves an element of political judgment, while applying the tests requires technical expertise.

C.3 In Consultation Question 3, we asked whether the Secretary of State, with the advice of a specialist regulator, should decide whether a vehicle is sufficiently safe to "safely drive itself". Responses were generally positive, with particular support for an expert specialist regulator. Several respondents suggested that the Secretary of State should be bound by the regulator's advice. Many of those who opposed the proposal were concerned that the Secretary of State may be swayed by factors other than safety. It was also highlighted that the decision-making process must be clear, transparent and consistent.

C.4 In Consultation Question 4, we asked which of three standards is the most appropriate in assessing the safety of automated vehicles: (a) as safe as a competent and careful human driver; (b) as safe as a human driver who does not cause a fault accident; (c) overall, safer than the average human driver. No standard received a majority of support; "safer than the average human driver" received the most positive responses, with 24 (27%). However, 38 (43%) of respondents selected "none of the above". Respondents stressed the importance of public acceptance, and many thought that this required machines to be safer than human drivers.

C.5 Consultation Question 5 sought views on how automated vehicles can be made as safe as reasonably practicable. In response, consultees stressed the importance of safety cases, standards, testing, ongoing monitoring and driver education which are all themes picked up elsewhere. Consultees also talked about adapting road infrastructure, with some suggesting that the benefits of connected technology had been overlooked.

C.6 Consultation Question 6 asked how AV regulators can meet their public sector equality duty. Suggestions included requiring ADSEs to provide evidence that no particular group will be disadvantaged by their system and incorporating equality considerations into the early stages of development and testing. Many respondents

advocated involving people with a diverse range of experiences, by requiring, for example, the regulator to consult with an advisory panel or with road users.

BALANCING POLITICAL AND TECHNICAL DECISIONS

Q3: We provisionally propose that the decision whether a vehicle is sufficiently safe to "safely drive itself" should be made by the Secretary of State, as informed by advice from a specialist regulator.

Do you agree?

C.7 Overall, there was support for the idea that the decision on whether a vehicle was safe involved both political and technical judgments. Out of 82 responses, 59 (72%) agreed with the proposal, seven (9%) disagreed and 16 (20%) made other comments.

C.8 Many respondents felt that the balance of power in the decision-making process should lie with the specialist regulator. Respondents also noted the need for a clear, transparent and consistent decision-making process. Those who rejected the proposal tended to do so on the basis that the decision should not be a political one as the Secretary of State may be swayed by factors other than safety.

Agreement

C.9 Some respondents noted that setting a safety standard involves an element of political judgment. As the Faculty of Advocates put it:

> *The decision of what is "safe enough" in the context of automated vehicles is quintessentially a policy decision rather than a legal or technical decision. It should be a decision made on behalf of the British public by suitably advised politicians and for which those politicians are accountable.*

C.10 Others agreed that there should be a balance between democratic accountability and specialist expertise:

> *Democratic accountability is ensured by having the Secretary of State making the final decision. A specialist regulator can provide the Secretary of State with the necessary information and insights about the specific technology.* [Nynke Vellinga of the University of Groningen][19]

> *The balancing of risk should rightfully sit with the Secretary of State for Transport, as this is unequivocally a political decision that should be informed by expert guidance. The AEVA 2018 accounts for this and AXA believes this is the correct approach. It is critical that the Minister can and does consider the full range of expert information available to him. Therefore, AXA agrees that an independent specialist regulator should be integral to this process.* [AXA UK]

> *We believe that advice from a specialist regulator is essential to ensure that there is a full understanding and appreciation of the actual capabilities of any*

[19] Responding in a personal capacity.

given vehicle but that ultimate responsibility and accountability rests as a government level. [Zurich Insurance]

C.11 Many respondents stressed the importance of a special regulator. As Amey put it, "the role of the regulator is key".

C.12 Thatcham Research, Aviva Insurance and the National Physical Laboratory all said that the Secretary of State should abide by the view of the specialist regulator. If the specialist regulator did not view the system as self-driving, the Secretary of State should not be able to decide otherwise. DAC Beachcroft LLP suggested that where the Secretary of State wished to deviate from the opinion of the specialist regulator, they should be obliged to publicly declare their reasoning for doing so.

C.13 SMMT thought that the Secretary of State's role should be a "mere formality":

> *The decision on whether a vehicle is deemed sufficiently safe to be classified as an automated vehicle and listed under the Automated and Electric Vehicles Act 2018 need not be based on political judgement but on the objective outcome of the approval and classification process proposed in Chapter 8 of the consultation paper. The Secretary of State's "decision" is a mere formality in the light of the objective outcome of the process.*

National or international level?

C.14 Several of those agreeing with the proposal mentioned the need for national discretion. As the Royal Society for the Prevention of Accidents (RoSPA) said:

> *This decision should be taken at a national level, rather than simply referencing a UNECE regulation.*

C.15 Logistics UK thought that, although minimum safety standards should be set at a UNECE level, the Secretary of State should have the option to impose higher standards.

C.16 HORIBA MIRA said that testing standards should be agreed internationally. However, "individual countries would be able to apply discretion is in making judgements on what test results are acceptable for their population". National decision-making could take account of current traffic risks, the prevalence of problematic edge cases, the expected economic and social gains of AVs and the willingness of the population to engage with the new technology. HORIBA MIRA commented:

> *All these considerations are inherently both political and regional in nature, and therefore best decided by individual governments.*

Clear framework for decision-making

C.17 Throughout, respondents mentioned the need for the decision-making process to be open, transparent and consistent. TfL noted that:

> *The advice from the specialist regulator will be key to informing this decision and we would expect this, as far as possible, to provide a degree of uniformity, noting the issues described in relation to measurement.*

C.18 The Urban Transport Group similarly said that the decision-making process should be "transparent and evidence based". Five AI noted that it was important for the process to be "transparent, consistent, and fair". In their view:

> *If the Secretary of State is the final decision maker, we consider it would be beneficial to clearly set out the factors that the Secretary of State can take into account in making the decision, their different weighting, and the extent to which the Secretary of State has discretion.*

C.19 Waymo also highlighted the need for consistency and objectivity:

> *The determination made by a specialist regulator should be based on objective criteria applied equally to all developers and manufacturers. We urge the Law Commission to specify what the process for providing that advice should look like.*

C.20 Mobileye highlighted that safety principles should be defined in advance:

> *Mobileye holds it essential that universal acceptable set of safety principles will be defined pre-deployment by the regulator. Mobileye believes that the regulator should specify in advance the values for the reasonable worst-case assumptions used by the ADSEs and then inspect and assess whether vehicles meet the designated level of safety.*

Disagreement: no political involvement

C.21 Some respondents wished to take the decision out of the hands of the Secretary of State altogether. Robert Houghton of Imperial College London said that a political figure should not be involved in the decision-making process, as they would not have expertise in the field. [20] Pinsent Masons LLP noted that:

> *The Secretary of State is ultimately just one person, who is politically appointed, and who is subject to various conflicting sources of pressure. We consider that a board of individuals, which may include the Secretary of State, may be better placed to make such a decision.*

C.22 There were concerns that the Secretary of State may be swayed by factors other than safety. Both the British Parking Association (BPA) and the Institute of Highway Engineers (IHE) cited decisions over smart motorways as an example of why the proposed system would not work in practice. They also expressed concerns about the ability of a specialist regulator to give useful advice if their funding and resources were limited.

[20] Responding in a personal capacity.

SETTING A SAFETY STANDARD

Q4: We welcome observations on which of the following standards is most appropriate when assessing the safety of automated vehicles:

(a) as safe as a competent and careful human driver;

(b) as safe as a human driver who does not cause a fault accident;

(c) overall, safer than the average human driver.

C.23 In Chapter 5, we considered a variety of safety standards. The most stringent was that an AV should be as safe as a competent and careful human driver. The least stringent was that an AV should be safer than the average human driver (that is, averaging the full range of drivers currently on the road from the safe to the distracted, drowsy, drunk, drugged or disqualified). We concluded that there was no single or easy test for whether a vehicle was safe. We asked for observations on the standards most commonly put forward.

C.24 89 respondents provided observations. Of these, 22 (25%) thought that the most appropriate standard was as safe as a competent and careful driver, and 24 (27%) thought that AVs should be safer than the average driver. Only five (6%) explicitly favoured a standard based on fault accidents. The remaining 38 (43%) did not think that the issue could be reduced to any of the options given.

Public acceptance

C.25 Many respondents noted that AVs will require public acceptance. The public may have higher expectations of AVs; following high-profile incidents, they may not be reassured by comparisons with human drivers:

> *It is true to say that the public will have much higher expectations of AVs compared to what they are willing to live with from conventional vehicles and human drivers.* [Urban Transport Group]

> *The public may not be wholly convinced or reassured by a comparison between automated driving systems and human drivers. We have already seen considerable press coverage around accidents involving self-driving vehicles and smart motorways. The public are likely to be suspicious and more critical of accidents involving self-driving vehicles than they are about human caused accidents.* [Forum of Complex Injury Solicitors (FOCIS)]

> *The power of the media to undermine consumer confidence in automated vehicles in the wake of incidents involving serious and / or fatal injuries should not be underestimated, and parallels can be drawn with the recent vehicle emissions scandal, which significantly undermined consumer confidence in diesel engines.* [DAC Beachcroft LLP]

C.26 Several consultees pointed out that human drivers and AVs make different mistakes, which undermines direct comparisons:

> *It will be important to consider that the mistakes made by an AV will be different to those made by a human driver so comparison to a hypothetical reasonable human may prove challenging.* [NEPC]

Human drivers and robotics will have different weaknesses which need to be considered when developing acceptable standards. [AXA UK]

We must be alert to the possibility that an automated vehicle may be liable to make mistakes that are entirely different to those made by careful and competent drivers and which may be hard to understand by the naïve observer. [Pinsent Masons LLP]

Standards must be quantifiable

C.27 The need for a quantifiable standard of safety was a common theme. Uber, for example, noted that:

Known safety targets (even if they remain fluid) can provide interim clarity for developers on their progress while also giving consumers a basis for appreciating that an AV is safe enough for their needs.

C.28 Similarly, the IUA commented:

It will be of the utmost importance that the definition of 'competent and careful driver' is clear and quantifiable in order to support manufacturers in their development of ADS. The quantification element could be in respect of incident frequency and severity rates, which could be used to benchmark the performance of automated vehicles.

C.29 Five AI also said that the standard must be one which can be "tested", noting that "how objective measures of the standard can be established requires further consideration".

The standard should not be too high

C.30 Several consultees referred to the dangers of setting the initial standard too high, which would slow down the deployment of automated vehicles and deprive the public of their benefit in the meantime. Five AI commented:

Ultimately, the aim should be to set clear blue water between the performance of an AV and the performance of a human. However, if too high a standard is set at the outset it will present an unachievable hurdle to obtain (and prove) pre-deployment. This would deny the public the productivity, transport cost and convenience gains AVs bring, and could restrict AV deployment to a limited number of domains and/or companies, reducing the benefit derived and market competition.

C.31 Five AI explained that accepting a lower minimum threshold of safety at the outset would allow the safety of AVs to improve as they gained more real-world experience.

C.32 APIL also noted that implementing a standard above "overall, safer than the average human driver" may "inhibit innovation and therefore fail to reduce collisions caused by human error".

As safe as a competent and careful human driver

C.33 Many consultees thought that we should demand a high standard of safety from AVs, equivalent to that of a careful and competent human driver.

> *RoSPA believes that automated vehicles must be as safe as a human driver in all situations. These vehicles must abide by traffic rules, avoid collisions and treat other road users with consideration. We do not believe that these vehicles should be deployed on our roads before they meet these standards.* [RoSPA]

> *A major selling point for investing in the development of automated vehicles is that they have the potential to make roads a safer place for all road users. It is our expectation that the minimum standards for assessing the safety of automated vehicles would be that they are at least 'as safe as a competent and careful human driver'.* [IUA]

> *Given that 94% of serious crashes were put down to "human error", this means only 6% of drivers involved in serious crashes were being competent and careful. Therefore, to accept anything less than competent and careful driving from an AV would not be in keeping with the proposed benefits of introducing AVs onto our roads. There is also the risk that if more accidents were allowed to happen, drivers would be dissuaded from believing that AVs are safe; this could result in significant long-term issues in take-up.* [DLG]

C.34 Similarly, Robert Houghton of Imperial College London thought that AVs should be "upheld to the highest safety standards" without "the flexibility one may afford a human driver".

C.35 Some respondents pointed out that, if AVs behaved like good human drivers, it would be easier to integrate them into a mixed road space. As First Group put it:

> *To minimise the adverse interaction between these vehicles the automated vehicles should be capable of matching the characteristics of the best drivers.*

C.36 Similarly, the Trustworthy Autonomous Systems Hub thought that requiring vehicles to reach the standard of a competent and careful driver:

> *will ensure that other road users and pedestrians do not have differential expectations of the standard of safety expected from automated and human driven cars.*

C.37 Some respondents saw this option as helpful for now, but thought that, as AVs develop over time, safety should increase. The Urban Transport Group said:

> *In the short term, AVs should at least be as safe as a competent and careful human driver. In the longer term, as technology evolves and as vehicles potentially learn and improve, we agree with the PACTS position that, ultimately, AVs should be required to improve safety, substantially, for all road users – whether inside or outside of the vehicle.*

C.38 It was also suggested that the other standards were too low or too uncertain, leaving this option as the most appropriate. Pinsent Masons LLP said:

> *The average human driver may not be competent and careful, and some accidents happen without the existence of any fault, meaning that these two standards are inappropriate. Additionally, the 'reasonably practicable' standard will be incredibly dependent on emergent technology and advances in technology. Therefore, a competent and careful driver, when considered contextually, could be the most appropriate standard for 'safe enough'.*

C.39 Kennedys Law LLP thought that lower standards would not satisfy public opinion:

> *It seems inevitable that public opinion would be severe and negative if a road accident causes injury, loss and/or death but the safety standards then applied to the AV are lower than those that would be applied to the same actions/behaviour by a human driver – and those actions/behaviours have led to any extent to the same injury, loss or death.*

C.40 BLM Law endorsed this standard because they agreed with the criticisms of the average driver standards set out in the consultation paper. They pointed out that most casualties involve only a small minority of (often poor) drivers, so a benchmark of "better than the mean" may be seen as too low. Furthermore, looking at averages as a whole could mask a redistribution of risks (possibly to vulnerable road users).

C.41 John Rainbird also had concerns about other options:

> *"as safe as a competent and careful human driver" embodies all that is explicit and implicit in The Highway Code and this document covers a wide range of scenarios.*
>
> *"a human driver who does not cause a fault accident" is too uncertain to serve as a standard - many miles of motoring need not encounter a potential fault accident situation.*
>
> *"overall, safer than the average human driver" encompasses the whole range of driver behaviour, some of which is at a very low standard.*

C.42 Alastair Shipman of Imperial College London chose this option as he viewed it as the "most stringent" and as a higher standard than the other two proposed options.[21]

Developments of the "careful and competent" standard

C.43 Some consultees suggested alternative versions of this standard. Thatcham Research suggested that the safety benchmark should be "as safe as a competent human driver, driving a vehicle fitted with the most advanced L2 driver assistance available in the UK, with those systems enabled". Zurich Insurance and AXA UK supported that view.

[21] Responding in a personal capacity,

C.44 Cycling UK suggested that the test should be that "they should never drive in a way that would result in a points deduction let alone an automatic failure) if a human driver drove in that way during a driving test."

> *We advocate this high threshold to ensure that the advent of AVs results in a step-change improvement in road safety, and not merely an incremental advance. Our current standards of road safety are intolerably poor compared with other transport networks (rail, maritime and aviation), and it is the most vulnerable groups (e.g. children, pedestrians, cyclists etc) who suffer most from these failures.*

C.45 George Kenneth Atkinson[22] suggested "as safe as a watchful, competent and careful driver" adding "possible other words to cover watchful are: attentive, observant or alert".

C.46 The RAC Foundation also suggested a modified version of this test – "as safe as a fully competent and careful human driver", which they felt was important for public confidence.

As safe as a human driver who does not cause a fault accident

C.47 This option received the lowest support, with just five respondents in favour of it. Those who favoured it saw it as easier to quantify than the "competent and careful driver" test, and more demanding than the average driver test. Nova Modus said:

> *It would take many years, and be a huge cost, to collect the driving data required to statistically prove AV systems are overall better than a select group of 'competent and careful' drivers.*
>
> *In addition to the long timeframe and substantial cost of collecting the data to prove statistically that AVs are 'overall safer than an average driver', this approach squanders an important opportunity to significantly improve road safety and reduce injuries and deaths.* [Nova Modus]

C.48 Similarly, ITS UK commented:

> *We believe that the public would demand much higher than average driving standards. What would be achieved by a competent and careful driver would need to be examined in detail, probably in court anyway, so the most practical approach is (b).*

C.49 George Economides of Oxfordshire County Council supported this option and noted that:[23]

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[22] George Kenneth Atkinson and his wife set up the Livia Memorial Fund in 1998 in the aftermath of their daughter's death, aged 16, that was caused by a driver convicted of death by dangerous driving. One of its objects is the annual award for the serious collision investigators and family liaison officers in the roads policing unit (RTPC) of the Met Police – The Livia Award for Professionalism and Service to Justice – which provides a platform to address road safety issues.

[23] Responding in a personal capacity.

CAVs in general should be compared to the public transport statistics rather than individual drivers, as the people trust another entity with their safety.

C.50 The CertiCAV team at Connected Places Catapult were of the view that this option could be combined with Option C (the average driver standard):

[Option B] is desirable but some compromise may be necessary to make it technically achievable. For example basing the definition of 'at-fault' on a machine-verifiable technical standard rather than existing law.

C.51 The CertiCAV team at Connected Places Catapult noted that "statistical acceptance criteria for metrics" may be useful going forward, and that Option A would be a "very high bar".

C.52 Richard Morris of Innovate UK also supported this option. He argued that, although he understood the limitations of this standard, "rejecting the 'does not cause a fault accident' choice on the basis of these limitations really is an example of perfect being the enemy of good".

Overall, safer than the average human driver

C.53 Of the three safety standards, Option C received the most support, with 24 respondents in favour. Mobileye expressed support for this option:

Mobileye's position is that the standard mentioned in C is the most appropriate standard. Evidence shows that the average for a human driver to be involved in an accident is once every 50,000 hours of driving. Mobileye believes that a good and realistic goal for an AV, is to be achieve a better average than a human driver.

C.54 APIL were also supportive, highlighting the benefits of Option C for both public perception and the AV industry:

The objective should be to improve the standard of safety that current applies. It will also be useful in demonstrating to the public, who will initially be cautious of the safety of automation, how beneficial automation will be in improving safety for road users by reducing human error. Implementing a higher standard than this will inhibit innovation and therefore fail to reduce collisions caused by human error.

C.55 The Chartered Institution of Highways and Transportation (CIHT) favoured Option C because it could be measured objectively:

CIHT would recommend that objective criteria e.g. vehicles miles driven (in real world and through simulated testing) would be beneficial in addition to a measure of how a self driving test would pass a human driving test.

C.56 Transport for Greater Manchester (TfGM) and TfWM supported Option C as it would improve safety standards. TfWM said:

Anything less than this would defeat the object of the replacing human drivers in the long term. Both A and B are fairly subjective in description and whilst a

certain level of error will always exist it is imperative that automated vehicles do not result in a continuation of current issues but in progress.

C.57 Tata Consultancy Services also supported Option C as a minimum standard "which should be met and thoroughly validated against prior to productionising the software". They noted that, "if the standard were any higher, than this would deprive public from receiving the benefit of the deployment of AVs":

> *Additionally, it should be considered that the more the system is deployed, the better the system becomes by continuously learning. According to research conducted by RAND Corporation, if an autonomous vehicle performs 20% better than a human driver over 100,000 lives could be saved over the next 30 years.*

C.58 The Society for Motor Manufacturers and Traders similarly felt that setting too high a standard early on would "deprive society of the overall safety benefits for many years and result in needless casualties". They advocated a standard described as "a positive risk balance while avoiding unreasonable risks", which would be subject to continuous improvement:

> *We support the view set out in an industry-wide standard, ISO/TR 4804:2020, which suggests a meaningful threshold should be a positive risk balance while avoiding unreasonable risks. The acceptance criteria in determining a positive risk balance should be based on traffic accident statistics that are representative of relevant traffic types and scenarios.*
>
> *As the history of automotive has shown, continuous improvement and innovation in safety is a hallmark of the industry. Aided by data from in-use monitoring, it is expected that continuous improvement and innovation will result in automated vehicles that are even safer in the future.*

Using a "positive risk balance" as a starting point

C.59 Some respondents regarded the standard of safer than an average driver as a minimum. Cycling Scotland questioned what the purpose of AVs would be, if they were not safer. They viewed Option C as "the minimum required". Peter Whitfield took the view that:

> *"Safer than the average human driver" is a reasonable starting point but there is also the option to sit between this and "safe as a competent and careful human driver" by adding a stretch percentage e.g. 20% safer than average. This will help reduce casualties, increase confidence and provide a better economic case.*

C.60 The BPA felt that the standard should be "significantly" safer than a human driver:

> *Not just safer though, the benchmark should be significantly safer. This is essential not least because the sector promotes the safety angle to the public.*

C.61 Bryan Reimer of MIT suggested improvements over time:

Some modest degree of improvement over (a) (may be 5 – 10%) is a reasonable starting point. However, year by year this standard should increase as technology should allow us to be safer over time. Starting at 5% better and then asking for another 5% every other year, etc.

C.62 The IHE suggested that there should be a 75% reduction in casualties:

The AV industry has promoted its technology as being much safer than a human driver and promising a big saving in road casualties, so they should be held to that. An average reduction in casualties (per km) travelled on the same categories of road) of at least 75% should be required.

C.63 The Parliamentary Advisory Council for Transport Safety (PACTS) and TRL suggested that a predicted collision rate could be established:

A suggestion would be to seek to establish a predicted collision rate, for example one per X million miles or kilometres. This would need further clarification with respect to context because the injury-collision rate per mile travelled for human drivers is higher on rural roads and urban roads compared to motorways.

Only part of the picture

C.64 HORIBA MIRA sent a detailed discussion on safety thresholds, which viewed a comparison with average human drivers as part of the picture. They described "requiring AVs to be at least as good as the average human" as a "favourable approach". They thought this would allow a reasonably rapid adoption, although "it will result in controversy when AV incidents receive media coverage that is disproportionate to that for incidents caused by human drivers". However, measurement would only be feasible after deployment:

It has never been feasible to provide an accident rate comparison between a new transport system and its predecessor (e.g. railways versus canals, or aeroplanes vs railways) prior to that new transport system being deployed commercially on a wide scale. Therefore, it shouldn't be seen as feasible or reasonable to require a statistically valid comparison of accident rates for AVs and manual vehicles prior to AVs being approved. Furthermore, even if it eventually becomes feasible to make the comparison for all AVs versus all manual vehicles, it would be unprecedented to attempt to break down such a comparison by make and model, which would be necessary if such a comparison were to be used for the approval of individual AV types.

Therefore, the standard should be seen as "a guiding philosophy" rather than a test.

C.65 HORIBA MIRA also distinguished between metrics used to assess performance in each individual scenario, and a "holistic" analysis based on a vast range of scenarios. Thresholds could differ between the two.

For example, a metric derived from RSS could be used to assess whether the response to an individual incident was in line with a competent driver, and then the overall success rate could then be assessed against the performance of the average motorist to decide whether the vehicle is ready for deployment.

"None of the above"

C.66 In all, 38 respondents selected this option. Some expressed variations on the tests we proposed, as discussed above. Some worried that the tests were too low, or too difficult to measure. Others suggested a blend of tests, or alternative approaches.

All three standards are too low

C.67 Some respondents felt that all three safety standards were too low. TfL noted that:

> *Our Vision Zero approach to road safety aims to eliminate all deaths and serious injuries from London's transport network by 2041. To this end we would advocate for the highest level of safety possible. We would expect this to be safer than a competent and careful human driver and continually improving.*

C.68 TfL suggested that "road safety must start with pedestrian, cyclist and motorcyclist safety, rather than assuming motorway style conditions".

> *In 2019 in London, there were 3,147 deaths and serious injuries of pedestrians, cyclists and motorcyclists, versus 575 for car occupants. Automation has the potential to deliver a sea change in road safety for these vulnerable road users, and we aren't currently seeing the level of focus and ambition here that we would like.*

C.69 Momentum Transport Consultancy thought that AVs should aspire to eliminate collisions, not simply reduce them:

> *Human error has been attributed to causing nearly 90% of crashes. Of this number, over 40% of this fatality is attributed to alcohol consumption, drugs, distraction and fatigue. Therefore, humans should not be used as a yardstick as we are not trying to just reduce collision numbers with driverless cars, but eliminate it.*

C.70 SEStran felt that a higher standard than a "compete and careful human driver" was required. Sally Kyd of the University of Leicester felt AVs should not be allowed onto the roads until they were safer than both the average human driver and a competent and careful driver.[24]

C.71 KPMG noted that most drivers believe themselves to be safer than average, making average driving unacceptable to the public. They noted:

> *Ethics experts have put forward several reasons for why machines, more broadly, should be held to higher standards than humans – for instance, because an error in the machine's algorithm will be magnified through machine learning in a way that human error would not or because it is more challenging to rectify and overturn these errors in complex models or because machines are inherently limited in recognising something as new when their model does not hold.*

[24] Responding in a personal capacity.

C.72 Driverless Futures? also thought that the public would demand higher standards:

> *Some early research seems to support the view that a sizeable proportion of the public wants self-driving cars to be at least two orders of magnitude safer than conventional cars, akin to rail and air travel, which is what we would predict from risk acceptability in forms of transport involving novelty and a lack of control. People expect higher safety when they are putting their lives in the hands of others, and this may be further complicated with the addition of (possibly unaccountable) automation.*

C.73 Driverless Futures? noted that "a sense of justice and injustice will frame public risk perceptions":

> *Regulators might have targets for safety, but members of the public may legitimately disagree especially if the beneficiaries of safety improvements are predominantly the users of ADS rather than shared by all road users.*

C.74 Similarly, the Motorcycle Action Group feared that AVs could be safer overall while still increasing risk "to the non-robot motorcycling community, and other road users too".

Standards must be measurable

C.75 One criticism made of all three standards was that they would be difficult to measure. Oxbotica commented that none of the standards will be able to be fully tested, as "they cannot be accurately measured".

C.76 The National Physical Laboratory were of the view that one of the options could be acceptable "if there were agreed performance metrics attributable to each." Cycling UK noted concerns about the wide variance of potential interpretations of terms such as "below", "far below" and a "competent and careful driver".

Inappropriate to compare AVs and humans

C.77 Some respondents thought that it was not appropriate to compare AVs to human drivers. Wavye commented:

> *We believe it more important that we demonstrate our ADS is doing the right thing, not the "average human" response. We anticipate arguing this via a body of evidence in our safety case.*

C.78 IROHMS Simulation Laboratory deemed it "inappropriate to use any human performance as a criterion to define acceptable safety level for AVs":

> *The notion of "competent and careful human driver" could be problematic because there lack a universal measurement or standard. People who pass their driving test should be deemed "competent" in most countries but that's obviously too low a standard for AVs to achieve. What's more, "competent" and "careful" are more of holistic judgments directed towards the traits of a human driver rather than a specific behaviour but even a competent driver would occasionally have a lapse of attention or make mistakes.*

C.79 Oxbotica highlighted the importance of discussing safety within the "context of environment and location":

> *For example, it is possible to have an AV that is the world's safest driver in an underground tunnel, but is unable to cope with a simple car park environment - purely because it has been optimised for one place and not sub-optimised as a general purpose solution that should work anyplace, anytime and anywhere in the world.*

C.80 Scarlett Milligan, a barrister at Temple Garden Chambers, felt that all three standards presented problems due to "their ties to the actions and behaviours of humans".[25] Instead, the regulator should measure safety against technical standards:

> *A UK regulator would, no doubt, assess the safety and suitability of a CAV by reference to a number of technical standards, capabilities, and to the CAV's safety case. Those factors would, in turn, shed light on matters such as: the sort of driving tasks an ADS could or could not handle; how often transition demands would be issued, and in what scenarios; how a transition demand would take place (for example, the 'offer and accept' model); how much notice the system would give to a User in Charge before issuing a transition demand; and the possibility of a wholescale system failure occurring.*

C.81 Scarlett Milligan of Temple Garden Chambers thought these standards should be set out in guidance or a code of practice, which could be updated more frequently than secondary legislation:

> *It is highly desirable (and likely) that these considerations be codified, whether in guidance or in a code of practice; given the likelihood of rapid technological advancement in the early days of CAV technology, codification of these matters in secondary legislation seems likely to hinder regular updates.*

C.82 The Faculty of Advocates also suggested that the Secretary of State should publish a non-statutory safety standard:

> *We consider that the definition of the safety standard may therefore need to be more nuanced than can be achieved in a single sentence. We would tentatively propose that the definition and publication of the acceptable safety standard (against which the "sufficiently safe" decision is made) should be a duty placed on the Secretary of State rather than one to be enshrined in legislation.*

'Mixed' approach

C.83 Some respondents, such as the NEPC, approved of the idea to blend the four tests together as set out in the Consultation Paper. AAIP also agreed that a "blend of measures" would be appropriate. Similarly, Pinsent Masons LLP said:

[25] Responding in a personal capacity.

> *Given the variety of aspects and situations that need to be considered before one can reach the conclusion that an AV is 'safe', we consider that any measurements should involve a mixture of these standards.*

C.84 However, Five AI described this as "impracticable":

> *From an ADSE's perspective it needs to know what it is aiming for, and what evidence it needs to collate to prove that. From a regulator's point of view, it too needs to know what standard it is judging the ADS against and when the ADS has reached that standard. If more than one standard is used, what should the regulator's decision be if the ADS satisfies one standard, but not another? Using a blend of tests could lead to inconsistent decisions and a loss of trust in the system.*

C.85 Uber did not endorse a safety standard. Instead, Uber encouraged "the Commission and the broader UK government to expeditiously and on a rolling basis help inform all stakeholders – including develops, operators, and consumers – on safety expectations for AV technology":

> *As expertise in this area continues to grow, the UK government -- whether through the Commission, the Secretary of State, or otherwise -- can employ a variety of techniques to build public understanding of AV safety expectations, and to provide developers and operators with an initial sense of possible safety targets that will inform an eventual regulatory structure.*

C.86 Uber suggested that Government experts "can direct consumer and industry attention to emerging trends or practices"; "catalyse the exchange of safety approaches from different developers"; and "highlight salutary AV-related safety metrics and aspects of performance" that allow for meaningful comparisons.

AS SAFE AS REASONABLY PRACTICABLE

Q5: We welcome observations on how automated vehicles can be made as safe as reasonably practicable.

C.87 Within the UK, the most commonly used safety standard across all industries is that risks must be "as low as reasonably practicable". In Chapter 5 we discussed how this test had been interpreted by the courts and the Health and Safety Executive (HSE). We welcomed observations about how it would apply to AVs.

C.88 We received 78 responses to this question. In the great majority of cases, respondents mentioned themes picked up elsewhere in the report.

Pre-deployment safety cases, tests and standards (Chapter 7)

C.89 Respondents stressed the importance of the manufacturer's safety case, showing the steps taken to address each individual risk. As AAIP put it, manufacturers should provide "specific justifications on a case-by-case basis as part of the safety case". Many respondents also mentioned the need for robust testing, both by the manufacturer/developer and by independent third parties.

C.90 Industry representatives drew attention to the importance of standards, and to the need to develop new standards in some areas. For example, the National Physical Laboratory highlighted the needed for standards on training data and sensor performance testing.

C.91 Several respondents mentioned the need to define the operational design domain with care, and to consider all the risks that could occur within it. The Met Office, for example, provided a detailed discussion of how to deal with variable weather conditions, stressing the need to test and document how AVs dealt with different weather. They wished to see specific regulation of the performance of weather sensitive sensors.

C.92 We considered these issues in more detail in Chapter D of this analysis.

Ongoing monitoring (Chapter 10)

C.93 Respondents also highlighted the need for ongoing safety monitoring, as discussed in Chapter 10 of the Consultation Paper. This includes the need to monitor leading and lagging measures. For example, Reed Mobility recommended that there be "suitable in-service safety monitoring, picking up incidents, near misses, infractions etc. and with suitable procedures for recalls or updates to correct any issues as they emerge". Respondents such as Blackberry stressed the importance of "safe and secure" software updates. Many (such as DAC Beachcroft LLP) highlighted driver education.

Issues not discussed elsewhere

C.94 We were keen to use this question as an opportunity to pick up on issues which we had not considered in the Consultation Paper. The main additional issues related to roads and connectivity.

Roads, infrastructure and connectivity

C.95 Several consultees mentioned the implications for road infrastructure. Highways England said this was an important concern:

> *One of the issues for Highways England would be the practicalities, dependant on the technology being used by AVs. They would need to be able to accommodate and roadworks, congestion and other features on a road. For example, road signs: If AVs are 'reading' signs and signals on the road, road authority responsibilities would increase because the standard of the road may need to be much higher. If a sign blows over, we would be required to repair it immediately for AVs to be able to operate safely.*

C.96 Highways England noted that other sources of information may conflict with road signs, for example, with the potential to result in incidents.

C.97 Thatcham Research and the Association of British Insurers feared that our current approach to white lines on motorways could confuse AVs.

> *On many motorways, when roadworks are undertaken, the white dividing lines are tarred over. These marks usually remain after roadworks are complete and create a discernible contrast with the motorway. Current ADS sensors and cameras are programmed to look for contrast and we envision a situation*

where the ADS would be confused by these black lines. Additionally, we have also seen instances where new white lines are drawn, but the old ones are not removed. These cases may cause a lot of confusion for an ADS.

C.98 The Urban Transport Group also mentioned the importance of road environments, including well-maintained road surfaces and signage.

C.99 TfL thought that Connected Vehicle (CV) technology "could play a beneficial role in the development of the ecosystem":

> *We feel that this is an area which is currently receiving insufficient attention given its potential to improve safety and underpin the efficient operation of the networks of the future. For instance, vehicle to vehicle (V2V) communications would enable AVs to forewarn vehicles behind them of potential hazards and issues downstream. Similarly, vehicle to infrastructure (V2I) connected communications would enable highway authorities to receive real-time information on road conditions from AVs or connected vehicles and to then issue hazard warnings to AVs well in advance of the hazard.*

C.100 Momentum Transport Consultancy also commented that "policies must ensure that DVs are capable of V2Vehicle, V2 Infrastructure and V2 Human communication in and out of the vehicle". Similarly, the Met Office commented:

> *Consideration should also be given to how safety-critical information can be shared to ensure that all automated vehicles are able to benefit in real-time from knowledge gained during an incident involving an individual vehicle. We believe a minimum baseline of information should be defined and shared across platforms in an interoperable way and should include consideration of both mobility infrastructure and relevant data provision services.*

C.101 Kennedys Law LLP felt that consistent iconography, symbols and communications systems between vehicles would be useful. The Apollo Future Mobility Group emphasised the importance of "comprehensive digital traffic flow mapping information", as this:

> *can be used to inform AVs of relevant safety threats, for example pedestrians and animals in the carriageway, erratic behaviour from other vehicles, and forewarn the AV such that it can take smoother, more timely action.*

Other issues

C.102 The HSE raised a list of issues, including the position of occupants and the need for an override in an emergency. The HSE specifically mentioned the safety of "batteries and their housing", to prevent both fires and electric shocks.

C.103 The safety of batteries is clearly a concern for all electric vehicles. However, AVs will need additional power to run the ADS, plus backup if the main battery runs out of charge. As computing becomes increasingly sophisticated and power-hungry, consideration will need to be given to the energy demands of AVs.

Learning from other industries

C.104 Amey suggested that lessons could be learned from the airline industry "like ensuring systems have in built fail safe so that if one sensor fails the others can compensate". Craig Broadbent also suggested learning from aviation.[26] BPA said that the examples set by the airline and maritime sectors should be followed.

C.105 Five AI put forward the example of the European railway industry:

> *It would be valuable to consider the approach used in other industries (e.g. the European railway industry) of requiring operators to implement a Safety Management System (SMS) that has explicit structures in place to monitor performance and deliver continuous improvements to safety.*

C.106 TfL also mentioned looking to the rail industry for guidance.

Criticism of the "as safe as reasonably practicable" test

C.107 A few respondents expressed concern about applying a test based on keeping risks "as low as reasonably practicable". Burges Salmon LLP commented:

> *For the reasons set out in the analysis in the consultation paper of the origins and uncertainties relating to reasonable practicability - deriving from its origins in superseded early twentieth century mining legislation - and lack of statutory definition, its use (without defining it in statute) would create significant safety and efficiency problems. As a phrase it sounds attractively simple but it carries too much interpretational 'baggage'.*

C.108 BLM Law also had concerns about the standard, as it "lacks any measurable or practicable meaning, and may result in an inconsistent (and therefore illusory) standard".

Other road users

C.109 Some respondents noted that interaction with other roads users was important for assuring safety, particularly in respect of vulnerable road users. For example, GoBike objected to all of the proposals in the Consultation Paper on the ground that vulnerable road users such as cyclists, wheelchair users and pedestrians were in their view not taken into account. Paths for All agreed and made a general suggestion that AVs should benefit people and communities:

> *We consider that walking, wheeling, cycling and sustainable transport should be at the heart of our approach to this issue and that the adoption of the transport hierarchy included in Transport Scotland's National transport strategy is central to this.*
>
> *The legal framework that we develop must enhance the ability of people to travel actively and ensure that it does not make that a less attractive option.*

[26] An ex-aerospace engineer and automotive engineer.

THE PUBLIC SECTOR EQUALITY DUTY

Q6: We welcome practical suggestions for how AV regulators can fulfil their public sector equality duty.

C.110 We considered equality issues at various stages of this project. In Consultation Paper 2, Chapter 6 we considered how highly automated road passenger services (HARPS) could be made accessible to people with disabilities at each stage of the journey. In Consultation Paper 3, Chapter 4 we discussed how AVs could be designed for users-in-charge with hearing loss. In response, consultees raised the needs of users-in-charge with other disabilities. DPTAC, for example, asked about adaptations to vehicles.

C.111 In Chapter 5 we focused on how to ensure the safety of all road users, noting ways in which bias can creep into the design of vehicles and of other automated systems. It is particularly important to ensure that risks do not disproportionately affect groups on the basis of race, sex, age, disability and other protected characteristics.[27] We noted that AV regulators (as public authorities) are already subject to the public sector equality duty. When exercising their functions, regulators must have due regard to eliminating discrimination and advancing equality of opportunity for persons with protected characteristics.[28] We asked consultees for practical suggestions about this could be done.

C.112 This question received 73 responses, covering a variety of themes.

Equality issue to be addressed in the safety case

C.113 The most common response is that the ADSE should be required to address equality issues in the safety case. As Nova Modus put it:

> *From the perspective of equality of risk, Type Approval and in-use safety assurance must ensure that an AVs Safety Case and ODD make appropriate consideration of protected groups and vulnerable road users.*

C.114 FirstGroup made a similar recommendation:

> *A robust approach to the evaluation of safety cases, test scenarios and results will be required in order to eliminate bias.*

C.115 The SMMT recommended that the regulator require documentation of how inequalities have been identified, addresses and minimised. Oxbotica suggested that the new regulation should set out requirements for how the ADS can create equal access for all users.

C.116 PACTS and TRL said that equity "can initially be managed through the Safety Case, but over time should become part of an overarching set of regulation ethics principles". In particular, the ADSE should provide evidence that "pertinent safety

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[27] The protected characteristics are set out in s 4 of the Equality Act 2010: age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion or belief, sex, and sexual orientation.

[28] Equality Act 2010, s 149.

testing has been undertaken with all relevant road user (dependent on ODD)". Furthermore, "AV sensors must be able to reliably and repeatably identify all pedestrians (regardless of age, ethnicity, gender, stature, speed of movement etc)".

Testing against a sufficient range of scenarios

C.117 Alongside requirements for the safety case, consultees stressed the importance of ensuring a sufficient range of test scenarios. Five AI said:

> *A minimum scenario catalogue, rule set and minimum level of tests to identify unacceptable bias before deployment should be created. In doing so, consideration should be given to what characteristics of the relevant groups could potentially lead to unintentional bias (for example, skin colour, size, certain forms of attire) and these characteristics investigated to determine which might meaningfully influence risk, in order to direct resources appropriately.*

C.118 The Urban Transport Group also highlighted the importance of testing:

> *AV testing and regulation should be designed to ensure that nobody – inside or outside the AV – faces additional risk from the vehicles because of their gender, disability, ethnicity, size or age. Testing should involve a wide variety of scenarios and cover dealings with all possible road users.*

C.119 Similarly, RoSPA said:

> *Before these vehicles can be used on Britain's roads, there needs to be extensive testing to provide evidence that autonomous vehicles can identify individuals of all races and ethnicities in different daylight conditions, individuals wearing robes and skirts (if the system works by identifying leg movements) and individuals in different kinds of wheelchairs and mobility scooters.*

C.120 Several consultees mentioned the need for regulators to establish a database of scenarios for testing. BLM Law advocated:

> *a requirement for applicants to test against each scenario using defined demographic groups, for example, adult men, adult women, the elderly, children, a range of ethnicities, wheelchair users and users of other mobility scooters, cyclists, e-scooters.*

C.121 Similarly, HORIBA MIRA said:

> *This database could include data that helps ensure all groups are treated equally, e.g. by documenting types of religious or cultural clothing that AV developers may otherwise have been unaware of, or how road crossing behaviour of visually-impaired people aided by guide dogs may differ from 'typical' behaviour, such that these permutations are engineered for.*

Drawing on best practice elsewhere

C.122 Another theme was that regulators should draw on existing expertise. AAIP recommended that regulators work closely with the Equality and Human Rights Commission (EHRC):

> *Ideally, the joint work between AV regulators and the EHRC would: scope and identify where and how indirect discrimination could arise across the AV development and deployment lifecycle (it is not just a dataset issue); produce standardized guidance for OEMs and ADSEs on how best to mitigate indirect discrimination and optimize for equality, drawing on best practice in the field; establish how equality impact assessments can be integrated into the safety case and wider assurance framework for AVs.*

C.123 Burges Salmon LLP suggested following the example of the Office for Rail and Road, the Civil Aviation Authority and local transport licensing authorities, who make equality duties part of operators' "fitness" to hold relevant licences.

> *For example, the requirement in the rail context for Accessible Travel Policies and Disabled People's Protection Policies as conditions of licensing and role in enforcing them.*

C.124 Reed Mobility referred to the ethical principles published by the European Commission.[29] The RAC Foundation mentioned other studies of organisational bias:

> *This is powerfully covered by Syed (2019),[30] which discussed the value of staff diversity to maximise an organisation's potential for creativity and problem solving. Understanding data bias and implications for gender inclusive policy making is also covered by Criado-Perez (2020).[31]*

C.125 Meanwhile, the EHRC highlighted the need to comply with "the domestic (Equality Act 2010) and international (Convention on the Rights of Persons with Disabilities) frameworks":

> *Whilst the general duty of the PSED contained in s 149, Equality Act 2010 applies equally across Great Britain, specific duties vary across the three nations, which is relevant when considering the geographical remit of any new regulator. We would encourage the Law Commissions to consult our Technical Guidance on the PSED in England, Scotland and Wales for further advice on how public sector bodies and those exercising public functions should comply with their legal duties.*

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29 J-F Bonnefon and others, *Ethics of Connected and Automated Vehicles: Recommendations on road safety, privacy, fairness, explainability and responsibility* (European Commission, 2020) https://op.europa.eu/en/publication-detail/-/publication/89624e2c-f98c-11ea-b44f-01aa75ed71a1/language-en.

30 M. Syed, *Rebel Ideas: The Power of Diverse Thinking* (2019).

31 C Criado Perez, *Invisible Women: Exposing Data Bias in a World Designed for Men* (2020).

Involving people with protected characteristics

C.126 Guide Dogs said that "the best safeguard against unconscious bias" which could disadvantage people with sight loss would be to involve them early in the process:

> *We believe that AV regulators should look for meaningful involvement in the development process for AV systems from people with sight loss and other groups at particular risk from vehicles. The safety case presented to regulators should also include an assessment of how the operation of the system might affect groups with protected characteristics differently.*

C.127 The Urban Transport Group highlighted the need to consult:

> *Furthermore, equalities groups should be consulted and involved in trials throughout the process of testing and implementation. This should cover the full range of roles and interactions in relation to AVs – as users in charge, as passengers and as other road users encountering AVs (e.g. as a pedestrian).*

C.128 Another suggestion was to set up an advisory panel. Mills & Reeve LLP suggested that:

> *[A] consultation group, or advisory committee, with representatives from many different communities could assist with identifying scenarios that might not otherwise be considered. For example, wheelchair users might be able to explain problems that they encounter when moving through an environment also occupied by vehicles, in order to highlight situations that need to be catered for and tested.*

C.129 KPMG also suggested that a diverse range of communities should be included in decision-making:

> *the regulatory body should ideally be constituted with representatives from these communities through an explicit focus on this aspect during the recruitment process. At the very least, regular consultations with people from these communities should be built into the process.*

C.130 The Mid and West Berkshire Local Access Forum recommended involving vulnerable road users in discussions from an early stage, in order to identify potential risks of automated vehicles.

C.131 Taking a different angle, DPTAC recommended involving end-users:

> *Furthermore, consultation and engagement with potential end users of AVs will likely help inform a solutions-based approach where adverse impacts are identified.*

C.132 Anxiety UK highlighted the needs of passengers with anxiety:

> *Our concern is that those with anxiety will not wish to travel via AVs because of the fear that they cannot ask a person driving the vehicle to stop in the event of a panic/anxiety attack and needing to get off and obtain assistance. As such, we would expect regulators to consider this matter fully and have*

implemented a solution which would be acceptable to those with panic and anxiety and indeed those with other hidden disabilities. E.g. override facility installed in all AVs and this being widely publicised and explained to those with anxiety disorders.

Equality impact assessments

C.133 In Chapter 5, we explained that the public sector equality duty does not necessarily require regulators to conduct a formal equality impact assessment. However, several respondents thought that this should be done.[32] The Mobility and Accessibility Committee for Scotland said:

> *If Equality Impact Assessments (EqIAs) are carried out correctly, they are a robust process and provide an audit trail of who has been involved in the process. It is also a live document from the very beginning (concept stage) of the process right through until the end. Robust EqIAs can help inform any policy, strategy, design etc with continual engagement as the policy/process develops.*

C.134 DPTAC also recommended the use of equality impact assessments:

> *This duty can be fulfilled by undertaking an Equality Impact Assessment (carried out by suitably qualified person[s]) on as many relevant elements of AV operation and mechanical / electrical integrity as possible, to ensure that all potential and actual adverse impacts are identified and resolved.*

A pragmatic approach

C.135 Wayve suggested that regulators take a "pragmatic" approach. This would allow early AVs to be targeted at the most profitable passengers, even if the service was not accessible to all:

> *We do not see this equality duty applying uniformly to every transport service, rather applying to individuals' ability to access transport suiting their needs…. We also encourage regulators to take a pragmatic view of this equality duty. Getting any AV technology to market is an immense challenge, and this will require focussing on early feasible revenue streams which allow companies such as ourselves to become sustainable. We want to make our technology benefit society as a whole, but in order to do so we first need to provide this benefit to technically easier or more profitable segments of society.*

[32] See also responses from Peter Whitefield and TfWM.

D. Assessing safety pre-deployment

OVERVIEW

D.1 In Chapter 7 we focussed on the practicalities of assessing AV safety, drawing on a growing literature on the challenges of setting standards and developing tests. We explained that although standards are likely to play a crucial role in assessing AV safety, they are still developing. There is no single agreed "standard". Similarly, many testing methods are currently used to verify and validate the safety of AV, including simulation, track tests and public road trials. Each method has its own strengths and weakness.

D.2 We looked at how safety is regulated in other high-risk industries, including the rail, nuclear, oil and gas sectors. These sectors increasingly rely on a detailed "safety case", submitted by industry participants to the regulator, setting out a clear, comprehensive and defensible argument for why the system is safe. We concluded that a large part of any AV safety assurance system is likely to involve regulators assessing safety case documentation. However, it is important to maintain a flexible approval, drawing on a range of techniques.

D.3 In Question 7 we proposed that safety assessment should use a variety of techniques, Primarily, the Automated Driving System Entity (ADSE) should submit a safety case. Regulators should provide guidelines for what is in the safety case, audit the safety case and carry out some independent tests. There was widespread support for this approach, despite some differences of emphasis. Consultees differed in how to achieve a balance between prescription and flexibility; and in how much reliance to place on independent testing, as opposed to the manufacturer's own test data.

D.4 Question 8 asked whether authorities should consult with road user groups on the scenarios to be included in any test database. This drew strong support from road user groups, although developers emphasised that consultation should form only a small part of the overall process.

TESTING AND THE SAFETY CASE

Q7: We provisionally propose that:

(1) safety assessment should use a variety of techniques;

(2) manufacturers/developers should submit a safety case to regulators showing why they believe that the automated driving system is safe;

(3) regulators should:

(a) provide guidelines for what is in the safety case;

(b) audit the safety case;

(c) prepare guidance for manufacturers and developers on preferred standards; and

(d) carry out at least some independent tests.

Do you agree?

D.5 There was widespread agreement with this approach. Out of 73 respondents who answered the question, 56 (77%) agreed with the proposal in its entirety, 15 (21%) responded "other" and only two (3%) said "no".

Agreement

D.6 Many respondents highlighted the importance of using a variety of test methods:

> *There is no one 'perfect' method of testing meaning that a number of testing methods required. This is likely to include track testing, road tests and simulations.* [RoSPA]

> *The safety assessment should include evidence from both physical testing and testing in simulation in conjunction with the safety case, but not be prescriptive as to the mix*. [Five AI]

> *We strongly agree… IUA advocates for a variety of techniques to be utilised to establish safety assurance, including simulations, track testing and road testing as identified in the consultation paper.* [IUA]

> *We agree that the safety assessment should use a variety of techniques and would expect the regulator responsible for pre-deployment safety assurance to develop a robust system of assessment by using methods and expertise from conventional vehicles and developing entirely new elements and tests based on the new functionality and risks presented.* [TfL]

D.7 Mobileye suggested a "five pronged" approach to "pre-deployment verification testing" of automated vehicles. This would encompass:

> *(i) a data-driven test of the probability of failure of the perception system of the vehicle; (ii) testing of the driving policy on a simulator, going over selected scenarios; (iii) a "driver test" as conducted today with a human driver, performed by the regulator or a third party along selected route in real traffic; (iv) testing specific scenarios on a test track (for example, scenarios that require evasive manoeuvres, and emergency braking); (v) formal verification*

of a Safety by Design that has been approved by the regulator (RSS as a candidate).

D.8 In their joint response, PACTS and TRL stressed the importance of regulator's review of the safety case:

> *It is likely that this would need to be done by a team of experts including those with operational safety, systems safety, vehicle safety and cyber security expertise. The suite of BSi PAS standards can assist with this for operational safety and the ODD, but systems safety requirements are still largely undefined.*

The balance between prescription and regulation

Calls for clear standards

D.9 Views differed on how far regulators should prescribe standards. Several developers argued for clear standards, not only for the content of the safety case but also for the standard of safety AVs should meet. As Mobileye commented:

> *The regulator should not only provide guidelines for what should be in a safety case and assess them, but rather set a clear standard of safety and make sure that each vehicle presented stands up to this standard.*

D.10 Similarly, SMMT said:

> *Rather than requiring automated driving system entities (ADSEs) to submit a safety case that shows why they believe that their automated driving system (ADS) is safe, ADSEs should be required to submit evidence and documentation to show that their safety case meets specific requirements set by the regulator.*

D.11 The SMMT thought that these specific requirements should be based on UNECE developments:

> *We also urge harmonisation with the New Assessment/Test Methods (NATM) currently being discussed by the GRVA at the UNECE for the validation and certification of ADSs. NATM adopts a comprehensive multi-pillar approach that combines the use of a scenario catalogue with four validation methodologies (simulation/virtual testing, track testing, real-world testing, audit/assessment) and in-service monitoring and reporting.*

D.12 Other respondents also asked for clear guidance:

> *The guidelines for what is in the safety case should be very clear about what the minimum standards are as well as encourage manufacturers/developers to go above and beyond these.* [Urban Transport Group]

> *Measures, including best practice guidance, clear rules and training, would support the improved quality of safety cases for self-driving vehicles and ensure a more efficient audit for regulators.* [AXA UK]

D.13 CIHT went further, asking for regulation rather than standards:

CIHT prefers a regulatory approach as opposed to a standards approach, as standards can be used and interpreted in a variety of ways, whereas regulation aims to ensure compliance with specific requirements.

Calls for flexibility

D.14 Other respondents were concerned that the safety assessment should not be overly prescriptive. In particular, Waymo stressed that each developer "should be able to document its application of its chosen methodologies".

D.15 Similarly, Edge Case Research thought that regulators "should concentrate on ensuring that manufacturers have a coherent story to tell about safety rather than mandating what that story actually is". They suggested requiring manufacturers to:

(a) define what they mean by safe, (b) explain what reasoning is being used to argue they are safe, and (c) explain the basis of evidence to support that reasoning.

D.16 HORIBA MIRA commented:

The level of technical maturity and stability is unsuitable for prescriptive regulations, and therefore developers need flexibility to put forward a bespoke safety argument. This may change in the long-term future.

D.17 The Faculty of Advocates pointed to the "twin dangers" of too much and too little prescription:

The regulatory scheme must avoid the twin dangers of over-reliance on manufacturers' safety case claims (such as may have been the case with the Grenfell cladding) or specific tests (as with the diesel emissions scandal where manufacturers became focussed on achieving the best test performance regardless of real-world performance).

D.18 Several respondents argued for an "iterative" approach. Initially standards should specify outcomes rather than methods, but this would change over time:

It will be critical for these regulations to be outcome-based and revised iteratively. Over time, as more data becomes available, we might find that certain requirements can be relaxed or modified to improve efficiency. It is therefore important to recognise and strategically communicate that regulations will evolve over time, while still promising a certain level of stability and predictability. [KPMG]

As the technology changes and diversifies, we will acquire greater knowledge of what safety assessments work best. For these reasons, we also believe that assessment methods should be regularly reviewed and updated. [DAC Beachcroft LLP]

Putting a system in place that allows for an ongoing process of feedback and review will also be important to assist sector level iteration and learning. [RAC Foundation]

Independent testing

D.19 When we consulted in 2018, almost all consultees wanted some element of third-party testing. Many respondents continued to highlight the importance of independent testing. As TfL put it:

> *We would expect the regulator to undertake extensive tests of the vehicle in its entirety in both the real world and simulated environments.*

D.20 However, in this consultation there was more discussion of what it meant for a test to be "independent". Several commentators suggested that testing should not only be independent of the manufacturer but also maintain some distance from the regulator. The Faculty of Advocates said:

> *We would suggest that the regulatory scheme should provide for independence between the regulatory function and the independent testing function, with the testing function taking a "red team" approach to AV safety, providing a semi-adversarial forum for scrutiny of manufacturers' safety claims. This may assist in mitigating the problem of regulatory capture where regulators can be swayed by commercial priorities or the desire to facilitate innovative practices, rather than rigorously protect public safety.*

D.21 On a similar theme, BLM Law said:

> *We agree that the UK regulator must… carry out some independent testing, but consider that… a role exists for another organisation to carry out much of the independent testing... However, we would propose that in order to remain independent, any organisation involved in independent testing should not otherwise be available for commissioning by applicants in support of their safety cases.*

D.22 AAIP thought that the regulators would have insufficient resources to carry out tests. Instead, it should witness tests by others:

> *The regulator should not carry out the tests. Typically, regulators have insufficient resources to do this effectively. There is also a black box issue. Judging the performance/capability without understanding how this is achieved means that many potential issues will not be detectable. However, we would expect regulators (or technical experts working on their behalf) to witness tests.*

CONSULTATION WITH ROAD USER GROUPS

Q8: We seek views on whether an approval authority that intends to use a scenario database as part of the testing procedure should consult road user groups on the range of scenarios to be included.

D.23 In the Consultation Paper we discussed the use of simulation in AV safety assurance, highlighting various initiatives to develop scenario databases. The challenge is to include a sufficiently wide variety of scenarios, which accurately represent the operational design domain in which the vehicle will operate.

D.24 In response to Consultation Paper 1, many groups stressed that AVs should be tested in their dealings with all possible road users. The fear is that the smaller and more homogeneous the group responsible for collecting the scenarios, and the more remote that group is from the communities affected, the greater the chance that some scenarios could be overlooked.

D.25 In Consultation Paper 3, we asked if the regulator should consult road users on the range of scenarios included in its test database. Road user groups were strongly in favour, while others thought that the consultation should be extended to academics, insurers, the police and highways authorities. Industry participants tended to see advantages to consultation in increasing public acceptance and ensuring that issues were not missed. However, many stressed that consultation should play only a small part in the process of developing and selecting scenarios.

The case for consultation

D.26 Many respondents thought that it was important for road user groups to have a voice in developing test scenarios.

> *Vulnerable road user groups, including people cycling, should have a voice here and be included by default as one of the groups to be consulted.* [Cycling Scotland]

> *Scenario databases can be fairly limited in scope and generally do not include data on near misses or merely dangerous driving practices. Road user groups, especially vulnerable road users, will be able to supply many examples of near misses and risky behaviour to fill out the picture.* [British Motorcyclists Federation]

> *Yes, it makes sense to consult with as broad a range of road user groups as possible, drawing upon their expertise and lived experiences.* [Urban Transport Group]

> *Yes, this occurs within equivalent Safety Cases in other transport modes featuring safety-critical systems (such as level crossing risk assessments in the rail sector). A wide range of user groups should be considered and consulted.* [Wendy Owen of Bangor University]

> *We are broadly in agreement with the principle that, for most technologies, the more consultation and dialogue that is had during the planning and testing process, the better the outcomes during the deployment and operation phases. We therefore agree that road user groups should be consulted on scenarios. During this phase, it will be important to consider both motorised and non-motorised users.* [KPMG]

D.27 Several consultees felt that consultation should not be confined to road user groups. Others should also be consulted:

> *Agreed, but there should be further groups that are consulted. For example, academics interested in finding edge cases, insurance stakeholders interested in liability conditions, etc.* [Alastair Shipman of Imperial College London]

Academic researchers also need to be consulted as well as user groups. [IROHMS Simulation Laboratory]

We would suggest that the range of stakeholders invited to input be broadened, recognising this is new territory for everyone. We would suggest inclusion of the police, highway authorities and perhaps insurance companies, who would have a good database of accident scenarios. [TfL]

Whilst the involvement of road user groups would bring a useful perspective to bear, and might help in developing greater and more widespread confidence in the technology, experts in, for instance, road collision investigation, human factors, safe road engineering, road safety data analysis would be more likely to be able to provide appropriate feedback on the relevance of the scenarios proposed. [RAC Foundation]

D.28 John Rainbird went further and suggested public consultation.

Reservations

D.29 Many consultees agreed with consultation provided that it was only a small part of the process. Zurich Insurance emphasised that regulators should remain responsible for the process:

> *We agree with this on the basis that road user groups should be consulted on the types of scenarios to be included but it remains the responsibility of the approval authority to ensure that it provides an overall relevant, balanced and realistic combination of scenarios.*

D.30 Similarly, P3 Mobility said:

> *The approval authority will need to have a process to determine which scenarios should be included in the database and which could be covered by other, perhaps more severe, scenarios that already exist in the database.*

D.31 Several consultees emphasised the importance of systemic research studies:

> *The main source of information should be through collecting and analysing real-world driving data.* [HORIBA MIRA]

> *Ideally, collision precursor/ safety surrogate data should also be gathered through naturalistic driving or riding studies alongside real-world data collection from continuous vehicle monitoring of AVs.* [PACTS and TRL]

D.32 Mills & Reeve LLP agreed that consultation with road user groups could "provide depth and focus on issues that could otherwise be overlooked". Furthermore, it could support public recognition of proper accountability. However, "consulting with road users and to other groups could potentially lead to an ever-expanding requirement, eventually making approval impossibly complex, costly, and long".

D.33 Five AI agreed that "consultation may help elicit examples of situations that should be incorporated within scenarios". However, they thought that "the decision to include scenarios in a database should be based on risk in the intended domain (rather than

the lobbying of road user groups)". They were also concerned that road groups may not understand what is realistically achievable from a technical perspective. For example:

> *requiring an AV to detect if a cyclist had turned their head when coming up to a turn off would be unreasonably onerous technically at the present stage of AV technology development, and may not be a useful indicator that a cyclist is about to turn.*

D.34 Several insurers mentioned that some road user groups "may provide biased opinion".[33] As AXA UK put it:

> *User groups are liable to provide biased opinion rather than facts which may not be conducive to providing a strong scenario database.*

D.35 The CertiCAV team at Connected Places Catapult pointed out that the test may need to exclude some scenarios which road user groups see as important:

> *For example, if the manufacturer provides a strong, evidenced argument that two groups of road users will be treated identically by the system, testing two versions of the same scenarios with different road users would be inefficient.*

D.36 SMMT agreed in principle but stressed that scenarios used in the test must be relevant. Furthermore:

> *While using a range of scenarios could be useful in the assessment process, ultimately the safe operation of the ADS is what matters most and should therefore be prioritised ahead of potentially limitless scenario-based testing per se.*

D.37 Finally, Green Dino & robotTUNER expressed concern about testing limited scenarios which would always miss some aspects of driving:

> *We believe you have to measure the capability to mitigate risks that might occur in the future. This is different to handling scenario's.*

Updating the scenario database

D.38 Some consultees stressed that any scenario database would need to be updated on a continuing basis. As SMMT put it:

> *It is equally important that the database is kept up to date, with additional scenarios and refinement of existing scenarios captured over time.*

D.39 BLM Law said:

> *We consider that any database would need to be updated regularly rather than static. We imagine data obtained as a result of market surveillance could*

[33] See responses from ABI and Thatcham Research, and Aviva Insurance.

support an effective feedback loop whereby dynamic, and evolving, scenarios could be adopted and refined based on real world accident data….

By way of example, we would propose that any database should include a range of micro-mobility scenarios to account for the increased incidence of e-scooters, electrically assisted pedal cycles, and bicycles on British roads as a result of the COVID-19 pandemic.

E. Initial approvals and categorisation

OVERVIEW

E.1 At present, vehicle approval and driving are dealt with by separate systems of law. Vehicle approval is a largely international process: the UK is bound both by the Revised 1958 UNECE Agreement on Wheeled Vehicles, Equipment and Parts, and by a series of trade agreements with (for example) Japan, Korea and the European Union.[34] By contrast, driver liability and traffic management are largely a matter of domestic law.[35]

E.2 AV regulation involves making decisions about both vehicles and driver responsibilities. It must therefore fit with both legal systems. Our proposals are designed to be fully compatible with the UK's international obligations, while also allowing domestic decisions to take account of Britain's high level of road safety, driver laws and unique road environment.

E.3 In Chapter 8 we proposed a two-stage process before AVs were authorised for GB roads. At Stage 1, manufacturers would have a choice. To place an automated driving system (ADS) onto the market:

(1) a manufacturer could apply for type approval at international (UNECE) level; or

(2) a manufacturer or developer could apply under a national ADS approval scheme for GB-only approval.

E.4 However, ADS approval alone would not allow the vehicle to "drive itself". Before a human user could take their eyes off the road and be free from liability for the dynamic driving task, a second "categorisation" stage would be needed. Here the entity behind the ADS (the "ADSE") would submit the whole vehicle to the UK regulator. The regulator would ask if the vehicle as a whole was able to meet the Government's safety standard, without being controlled or monitored by a human driver.

E.5 Chapter 8 asked questions about the details of this process. First, we proposed that, subject to exemptions for trials, unauthorised ADSs should be prohibited. Most respondents (86%) agreed.

E.6 We then asked about Stage 1. There was general support for the idea that a manufacturer should have a choice between international or domestic ADS approval. However, many consultees expressed concern that a developer might submit a system which was not fully embodied in a vehicle. We proposed specification about how an ADS is installed within the vehicle. Consultees replied that "installed" was the wrong terminology. A system should not be installed but integrated at the point of manufacture.

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[34] The regulation of vehicle standards is described in detail in CP3, Ch 6.

[35] Subject to the Vienna Convention on Road Traffic 1969, discussed in CP1, paras 2.48 to 2.54.

E.7 There was also majority support for Stage 2: that is a separate step to categorise the vehicle as self-driving. There were, however, misgivings about the outcome of the process. Rather than label vehicles as "driver assistance", "self-driving with user-in charge" or "self-driving without a user in charge", many consultees felt that the end result should simply be "self-driving" or "not self-driving".

E.8 Most consultees agreed that every self-driving vehicle should be backed by an "Automated Driving System Entity" or "ADSE". However, there were concerns that the requirements for financial standing should not exclude smaller players. Consultees stressed that ADSEs should be able to show financial standing through insurance rather than just capital.

E.9 We asked whether the regulator that classifies vehicles as self-driving should have power to allow their deployment in limited numbers, so as to gather further data on their safety in real world conditions. This received a mixed response. While some saw merit in the suggestion, others felt that unsafe vehicles would be deployed on public roads or (alternatively) that extra burdens would be placed on manufacturers.

E.10 There was little interest in appeals, which are seldom used this area. While most consultees thought that an appeals process was necessary, others suggested that manufacturers should simply "go back to the drawing board" and submit again.

PROHIBITING UNAUTHORISED AUTOMATED DRIVING SYSTEMS

Q9: We provisionally propose that:

(1) unauthorised automated driving systems should be prohibited; and

(2) this should be subject to an exemption procedure by which the Secretary of State may authorise unauthorised systems to be used in tests and trials.

Do you agree?

E.11 We made this proposal to "address a possible loophole in the current law, under which it might be legal to install an automated driving system, even if it does not meet national requirements".[36]

E.12 The great majority of consultees agreed that unauthorised ADSs should be prohibited. Of the 76 consultees who responded to the question 65 (86%) agreed. Only two (3%) disagreed and nine (12%) answered "other". However, respondents raised concerns as to how exemptions would be granted and how trials and tests would be conducted.

Agreement

E.13 Most consultees agreed with the proposal for the reasons we outlined:

> *We agree with the proposal and would recommend that suitable provisions (i.e prosecutions) are put in place to ensure that the temptation to use/make use of unauthorised systems will be mitigated.* [Logistics UK]

> *AXA strongly agrees that considering the risks from autonomous driving, all autonomous driving systems (ADS) should require authorisation and those unauthorised should be prohibited.* [AXA UK]

> *As with the pharmaceutical and medical devices industries, it makes sense to allow the use of unauthorised products only under controlled conditions, such as in order to test their functionality and safety.* [Mills & Reeve LLP]

Exemptions for tests and trials

E.14 Many respondents asked for more details about how the exemption procedure for tests and trials would work. While safety groups asked for strict legal, operational and safety criteria for trials, many developers thought that the current Code of Practice worked well. They thought it would be unduly onerous to require trials with safety drivers to undergo a new exemption procedure:

> *Broadly agree. However, the requirement for trials to gain an exemption from the Secretary of State under section 44 of the RTA should only be required for trials where there is not a conventional safety driver physically present in the vehicle and able to override via 'traditional' vehicle controls; otherwise there would be an excessively onerous burden on both trialling organisations and regulators with regard to relatively simple and safe trials. The above is in line*

[36] CP1, para 4.106.

with the guidance on 'Advanced Trials' within the Code of Practice. [HORIBA MIRA]

The existing framework for trials and testing - even advanced testing on public roads - seems to both work well, and be well respected internationally…. It seems clear any new exemption procedure will add additional bureaucracy, time and costs above the current situation which we consider unnecessary. [Novus Modus]

We propose that Developers who are not yet prepared to deploy their system in the market - because it is still under development - to be exempt from this regulation and instead subject to the existing Government Guidance from the CCAV's Code of Practice, and recommendations from BSI PASs, such as PAS 1881. [Oxbotica]

STAGE 1: A CHOICE OF INTERNATIONAL OR NATIONAL APPROVAL

Q10: We provisionally propose that:

(1) the Government should establish a domestic scheme to approve automated driving systems (ADSs) for use on roads in Great Britain (a "national ADS approval scheme");

(2) manufacturers should have a free choice to apply for approval under either the UNECE system of international type approvals or through the national scheme;

(3) developers should be able to submit an ADS for national approval, even if they are not responsible for manufacturing the whole vehicle.

Do you agree?

E.15 This question received a mixed response. Of the 74 consultees who responded, 33 (45%) agreed, six (8%) disagreed and 35 (47%) responded "other".

E.16 Most consultees agreed that the Government should establish a domestic scheme; and that manufacturers should have a choice to apply to it. However, many consultees thought that a developer should not submit an ADS for approval without taking responsibility for the whole vehicle.

Support for a national approval scheme

E.17 In the Consultation Paper we commented that a national scheme would be particularly useful for vehicles used in limited local contexts. This would allow Great Britain to pioneer new forms of automated passenger and freight services, without waiting for agreement between all the UNECE contracting states.[37] Many consultees agreed:

We favour having national approval in addition to international. We are unsure how international regulation will evolve, and we believe this would inhibit early AV deployments if it were the only route to regulated operation. We anticipate harmonisation between national and international regulation in time. [Wayve]

[37] CP3, para 8.23.

AXA agrees with the benefits outlined by the Law Commission of Great Britain establishing a national ADS approval scheme for vehicles within a localised context, particularly around creating an environment for new forms of Highly Automated Passenger Services (HARPS) to develop. Scheme standards and its process will need to be clear and unambiguous. [AXA UK]

E.18 The Office of the Traffic Commissioner (OTC) supported a domestic scheme to "allow appropriate flexibility and encouragement for innovation and would appear to align with some of the trials on which the commissioners have been briefed".

E.19 Reed Mobility agreed that on the basis that a domestic scheme could enable rapid progress by organisations wishing to develop and operate their automated vehicles on roads in Great Britain. However:

Care would therefore be needed to ensure that the domestic scheme was not seen as a 'light touch' that might place GB road users at greater risk when encountering vehicles operating an ADS approved by the domestic scheme.

Calls for consistency between international and national schemes

E.20 Several respondents highlighted the need for consistency between the international ADS approval route and any domestic scheme. There was concern that divergence between the two might compromise safety or result in unnecessary duplication if a manufacturer eventually decided to apply for both. As HORIBA MIRA said:

The UK domestic scheme should look to either accept UNECE approvals for systems/ components or to mirror them closely wherever such alignment is possible. This would minimise the duplication of effort for developers who wish to use both schemes (e.g. starting off in the UK but later seeking UNECE approval for wider deployment, or starting with some systems that have already been approved under UNECE regs for a lower level of automation and then seeking to add more advanced automation with the UK) and would aid efforts towards international standardisation. As such, the two approval mechanisms shouldn't be seen as entirely separate.

E.21 Similarly, ABI and Thatcham Research commented:

There needs to be a fine balance between ensuring that the type approval processes for vehicles allowed onto the UK roads are stringent enough, but also ensuring that they do not diverge too significantly from other markets given that the UK manufactures many cars for export as well.

E.22 Waymo highlighted that one path should not foreclose the other:

Waymo supports these proposals. National timelines for trialling and deployment have tended to be more mature than those set out by UNECE. The UK's Code of Practice is a good example of this in that the UK has been able to develop a national framework quickly and effectively. While both national and international paths for approval should remain open, one should not foreclose the other.

Approval should consider the whole vehicle

E.23 Most respondents who answered "other" disagreed with the third part of the proposal: "that developers should be able to submit an ADS for national approval, even if they are not responsible for manufacturing the whole vehicle". As Stellantis argued, "the performance of the ADS cannot be separated from the whole vehicle".

E.24 SMMT agreed with proposals 10(1) and 10(2). However, they asked for 10(3) to be rethought:

> *This is because in practice the performance of the ADS cannot be separated from the whole vehicle. The ADS outputs, given certain pre-defined inputs, cannot be contextualised without evaluating the vehicle performance. For example, the actuator and certain control units within the vehicle will be affected by the ADS – and the outcome in one vehicle brand may be slightly different to another.*

E.25 Similarly, AAIP said:

> *With respect to Q10(3), it is important to recognise that you cannot take an approved ADS, put it on an approved vehicle, and expect them to be approved together.*
>
> *Approval has to be for the ADS fitted to a particular vehicle. Each different vehicle to which it is fitted will require its own approval. The reason for this is that the characteristics of the target related to powertrain, brakes, steering, suspension and the mounting position of the sensors will have a large impact on the overall performance of the ADS. As a real example, even the type of paint used can affect radar performance depending on where the radar is mounted.*

E.26 The CertiCAV team at Connected Places Catapult added:

> *While the majority of the software and hardware that comprise an ADS may be portable between vehicles, most safety outcomes are dependent on vehicle-specific attributes (such as sensor mounting points which affect field-of-view and propensity to gather debris on the sensors, braking capability, controller/actuator calibration, vehicle dimensions, etc).*

E.27 Five AI said:

> *A self-driving system is highly sensitive to small changes. For example small adjustments of the control system will affect the vehicle dynamics, the position of the sensors and their field of view will affect the perception system. It should be considered whether the developer would have sufficient knowledge about the rest of the vehicle to be in a position to provide sufficient information to satisfy the requirements to obtain approval.*

E.28 Bryan Reimer of MIT thought that developers would need to submit in partnership with the vehicle manufacturer:

I would think they need to submit the package together or argue as to why the manufacturer systems are no longer relevant (e.g. after market retrofit). In the latter case Uber disabled the Volvo active safety systems. By doing this they would need to justify that they have done something better.

Disagreement

E.29 Those who disagreed with a national approval system feared that it could provide a less taxing route to approval or undermine the UNECE process. As Driverless Futures? said:

> *We fail to see the wisdom in two different approval systems. Such a structure could create inconsistencies. We see little potential for competitive advantage and a risk if the UK is not fully committed to a UNECE process. We urge the Commissions to pursue responsible, not deregulatory innovation.*

THE NATIONAL APPROVAL SYSTEM

Q 11. We provisionally propose that:

(1) an ADS approval scheme should be established through regulation under the Road Traffic Act 1988, without further legislative reform;

(2) an ADS should be defined as a combination of software, hardware and sensors, which can be installed in a "type" of vehicle;

(3) when an ADS is approved, the approval should be accompanied by specifications for:

(a) the type of vehicle in which it can be installed; and

(b) how the ADS is installed within the vehicle;

(4) where an ADS is installed in a pre-registered vehicle, an example vehicle should be submitted to the regulator for approval of the installation.

Do you agree?

E.30 This proposal also received mixed responses. Of the 67 respondents who answered, 33 (49%) agreed, six (9%) disagreed and 28 (42%) answered "other". Again, the main concern was that an ADS needed to be integrated with a vehicle at the manufacturing stage and could not just be "bolted on".

Agreement

E.31 Those who agreed generally welcomed the ability to approve small scale developments. As Five AI said:

> *Agreed. These provisions would cater for smaller scale deployments using small numbers of vehicles and would allow for deployments once the development of the ADS goes beyond the test/trial stage (where it may be exempted from these approvals). This would enable more bespoke deployments (e.g. in specific geo-restricted areas, campus locations) using small series vehicle production that could include modification of a base vehicle platform designed for such purposes.*

E.32 PACTS and TRL emphasised the importance of considering how the ADS was installed into the vehicle:

> *Yes. The ADS should be approved for a defined ODD so misuse of the vehicle is minimised/ eliminated. Approval also needs to consider the 'continual approval' of the ADS as it learns and is updated.*
>
> *Need to consider the competency of the person fitting the ADS and have evidence of ADS reliability, safety and functionality in each of the specified and approved vehicle platforms.*

Full integration with the vehicle

E.33 The main concern with the proposal was that an ADS should not be simply installed within a vehicle, but must be integrated during manufacture. As the ABI and Thatcham Research said:

> *Whilst we agree with the sentiment, "installed" is the wrong terminology. ADS need to be integrated into the vehicle at the point of manufacture. This is not technology which should be made available for retrospective or aftermarket fitment… If the entire system is not integrated at the same time by the manufacturer, there is increased risk of some adverse interaction between the ADS and the vehicle itself.*

E.34 Similarly, AAIP commented:

> *An ADS is not installed. It is weaved and integrated into all the other systems that exist. This is not about treating the ADS as a separate component and then bolting it on. The ADS needs to be absorbed into the warp and weft of the whole vehicle. Moving to autonomous systems requires changing the whole way we think about the vehicles.*

E.35 Consultees urged particular caution in this area. P3 Mobility said that "vehicle "type" needs careful definition". SMMT commented that "installation of an ADS in a vehicle is a very complex task, as it necessitates the fulfilment of all the requirements of other systems in a given vehicle".

Regulations under the Road Traffic Act 1988

E.36 A few respondents thought that the Road Traffic Act 1988 would not be a suitable basis for the national approval scheme. For example, James Marson of Sheffield Hallam University and Katy Ferris of the University of Nottingham said:[38]

> *The RTA 1988 is woefully out of date and is not fit for purpose in 2021. It requires a new, albeit consolidating piece of legislation which can accommodate new driver aids and technology. It is also necessary given Brexit and the inherent problems with retained EU law and the current confusion over which decisions and interpretations from the Court of Justice remain applicable in a post-Brexit UK.*

[38] Responding jointly in a personal capacity.

NATIONAL APPROVALS: AN APPEAL PROCESS

Q12: We invite observations on the appeal process in regulation 19 of the Road Vehicles (Approval) Regulations 2020, including:

(1) how it works in practice; and

(2) how well it is suited to the proposed national ADS approval scheme.

E.37 Most respondents did not feel as if they knew enough about the current appeals process to answer this question. Some, like Mobileye, felt that an appeals process was needed but did not elaborate:

> *Mobileye supports an appeal procedure for the type approval decision.*

E.38 Trustworthy Autonomy thought that the appeals process would need a new panel of experts:

> *If the appeal process under regulation 19 is to be used it must be ensured that the panel are sufficiently expert in automated driving systems to deal with the appeal.*

E.39 Others feared that an appeal process might undermine safety. They suggested that a developer or manufacturer should "go back to the drawing board", correct the flaws and submit again:

> *We do not believe that there should be an appeal process. Vehicle manufacturers should take the feedback from the approval process and return when the required improvements have been made. By having a process of early collaboration between vehicle manufacturers and approval authorities, it could essentially render the appeals process moot.* [ABI and Thatcham Research]

> *Vehicle manufacturers should take the feedback from the approval process and return when the required improvements have been made.* [Zurich Insurance]

E.40 Similarly, Oxbotica saw ADS approval as an ongoing process, in which "developers and manufacturers should be allowed to demonstrate compliance as part of a continuous improvement process".

STAGE 2: CATEGORISATION AS SELF-DRIVING

Q13: We provisionally propose that:

(1) once an ADS has received type approval at either international or domestic level, an Automated Driving System Entity (ADSE) would need to submit the vehicle to the UK safety regulator for categorisation as able to safely drive itself;

(2) the safety regulator should make a recommendation to the Secretary of State for how the vehicle should be classified;

(3) it should be open to the safety regulator to recommend that an ADS-enabled vehicle is classified in one of three ways: as not self-driving but driver assistance; as self-driving only with a user-in-charge; or as self-driving without a user-in-charge;

(4) the safety regulator should only recommend classification as self-driving (either with or without a user-in-charge) if it is satisfied that:

(a) an ADSE is registered as taking responsibility for the system;

(b) the ADSE was closely involved in assessing safety and creating the safety case; and

(c) the ADSE has sufficient funds accessible to the regulator to respond to improvement notices, to pay fines and to organise a recall.

Do you agree?

E.41 Of the 74 respondents who answered this question, 46 (62%) agreed, five disagreed (7%) and 23 (31%) answered "other".

Support for a two-stage process

E.42 A majority of respondents agreed that the safety assurance system for self-driving vehicles should be in two stages. Thus, following approval, the ADSE should submit the whole vehicle to the UK authorities to decide whether the vehicle could safely drive itself without being controlled or monitored by a human.

E.43 Burges Salmon LLP put the point as follows:

> *We agree with this second stage of the Law Commissions' two stage process. Separate to the issue of technical vehicle or system approval, the approval of an ADS to be competent to drive on UK roads and to comply with UK road rules is a matter for national law, as is the obligation on the Secretary of State to designate automated vehicles under AEVA. We agree with the Law Commissions that this approach reflects the current international approach to motor vehicle approvals and national approach to driving standards (including where appropriate mutual recognition of driving licences).*

E.44 Similarly, Driverless Futures? said:

As rightly pointed out by the Law Commissions' report, the current legal framework for defining a vehicle as capable of self-driving is inadequate. We welcome the suggestion of establishing a new legislative framework for classifying self-driving vehicles. Members of the public and a broad range of experts should be involved in developing this framework.

E.45 SMMT agreed with the proposal but stressed that "this second step of the process, i.e. classification, must not replicate the checks that have already been carried out in the first step, i.e. type approval"**:**

> *However, new documentation and tests for issues that are not covered by the type approval process may be required. We agree with proposal (3) if the additional assessment criteria (via either audit of documentation or additional tests) for the purpose of classification are clearly defined, measurable and proportionate to the level of automation being assessed and do not contravene international technical regulations adopted by contracting parties at the UNECE.*

E.46 SMMT commented that it would be acceptable to require a vehicle to comply with national traffic laws, so long as this was applied proportionately. It suggested, for example, that it would not be proportionate to require an ALKS-enabled vehicle to perform a lane change, as this is not what it was designed to do.

E.47 Some consultees suggested criteria for the regulator to consider. For example, the Faculty of Advocates thought that the regulator should consider how the ADSE would provide users with support:

> *Consideration should be given to requiring ADSEs to absolutely guarantee the length of support at the time of purchase to protect purchasers from being left with vehicles which are no longer supported. Consideration should also be given to how support is to continue to be provided in the event of the ADSE being wound up. We can foresee that, in the event of support ceasing, for whatever reason, without an effective contingency procedure, all of the previously supported vehicles would cease, overnight, to be capable of being lawfully driven.*

Q13(3): A three-part categorisation

E.48 Despite general support for the proposal, many respondents took issue with the idea that the outcome would be a three-part categorisation (driver assistance; self-driving only with a user-in-charge; or self-driving without a user-in-charge). Several respondents argued that the end result of the categorisation process should be "self-driving" or "not self-driving".

E.49 The first concern was that a vehicle which failed the categorisation test should not be automatically allowed as driver assistance:

> *We believe that if an ADS does not meet the standard of being classed as Automated, there should not be an automatic fallback to classification as Assisted. Substandard automation does not always equal competent assisted technology; therefore, this requires separate type approval. We believe the 3*

categories should be: a) self-driving only with a user-in-charge; b) self-driving without a user-in-charge; and c) not self-driving. [ABI and Thatcham Research]

It is essential that systems that fail to gain the highest approval as "self-driving" (two categories) do not enter service as driver assistance aids. This categorisation will be hard to understand and users would be confused and would over-rely on the features. [Peter Whitfield]

An ADS-equipped vehicle that does not meet the regulator's requirements for self-driving (with or without a user-in-charge) should not be able by default to be classified as providing driver assistance. Substandard automation is not necessarily the same as competent assisted technology, which should require separate type approval. [DAC Beachcroft]

E.50 The RAC Foundation agreed with the proposal but worried that users would not understand the implications of the various terms used:

Overall, we agree with the overall approach proposed in Q13, but suggest different terminology is used, to more clearly set out the significantly different requirements of human drivers in 'self-driving – with user-in-charge' and 'self-driving – without user in charge' vehicles.

E.51 SMMT pointed out that a vehicle might have several automated driving features. For example, a motorway pilot feature could be intended for use with a user-in-charge, while an automated valet parking feature could be intended for use without a user-in-charge. Thus, it was too simplistic to categorise the whole vehicle as either "self-driving only with a user-in-charge" or "self-driving without a user-in-charge". More nuanced outcomes were needed.

Q13(4): The requirement for an Automated Driving System Entity (ADSE)

E.52 There was general support for the concept of an ADSE. As Mills and Reeve LLP put it:

This is the correct approach as we need to ensure that the system can safely operate on UK roads and with recourse available to the UK regulators through an identified and sufficiently funded entity. It would be impractical to allow an internationally approved entity to safely drive under regulations where the regulator would have no way to monitor or control the system through a responsible ADSE.

E.53 However, consultees raised several concerns about how ADSEs would work in practice. Mills and Reeve LLP, for example, asked for more detail about how a collaboration between developers and manufactures would be regulated:

If the ADSE is a company established as a result of a partnership or collaboration of a manufacturer and developer for example, there will need to be specific regulations/legislation, dealing with how the parties will split responsibility and legal liability. Without legislation dealing with such concerns, the parties may take cover under contract law doctrines and seek to minimise their exposure and liability.

Q13(4)(c): "sufficient funds"

E.54 The most controversial issue is that the ADSE should have sufficient funds accessible to the regulator to respond to improvement notices, to pay fines and to organise a recall.

E.55 SMMT felt this needed to be more clearly defined:

> *For example, should the adequacy of its funds be proportionate to the automated driving system entity's (ADSE) market volume, size and maturity, or dependent on whether the ADSE is merely an ADS developer or also a vehicle manufacturer? Or would it be sufficient for the ADSE to have adequate insurance?*

E.56 Consultees feared that the requirement for sufficient funds would exclude smaller players. Mills & Reeve LLP, while generally supporting the proposals in Question 13, described them as "potentially burdensome" and "prohibitive" for smaller market participants. Yet:

> *Smaller innovators can often provide the most creative approaches to technological advancement.*

E.57 Similarly, Shoosmiths thought it "would inevitably stifle the development of new ADS technology by smaller, more innovative start up companies". Oxbotica said:

> *As written, this requirement would potentially place an unfair financial burden on smaller AV developers, versus existing, much larger, Tiers 1s and OEMs.*

E.58 Five AI argued that the funds required should depend on the sales model as well as the number of vehicles:

> *The assessment of sufficient resources (including access to sufficient funds if required) should be in the context of the proposed deployment/sales model, not just volume…. For example, a model sold to the mass market for any member of the public to use would require a different funding structure to offer adequate support compared with a limited number of units deployed via selected operators for a small scale service.*

E.59 Several consultees thought that the regulator should look for suitable insurance cover, rather than demand capital reserves:

> *We propose instead that the ADSE should be responsible for acquiring appropriate insurance.* [Oxbotica]
>
> *The regulator may also want to be satisfied that the ADSE has suitable insurance in place to cover any incidents that are reasonably foreseeable within the operational design domain of the automated vehicle.* [Reed Mobility]*:*
>
> *Another proviso might be to ensure that the ADSE carries Product Liability, D&O and Cyber insurance to prescribed limits.* [BIBA]

Disagreement

E.60 Six respondents disagreed with these proposals. Mostly, they did so on the basis that the technical step cannot be separated from the categorisation step. HORIBA MIRA said:

> *The intended level of automation (driving assistance, automated with user-in-charge, automated without user-in-charge) will be intrinsic to the testing undertaken within the type approval process…….It would therefore be absolutely essential that the level of automation is defined at the point of conducting the technical approval.*

E.61 The CertiCAV team at Connected Places Catapult said:

> *We disagree, as each mode of operation (self-driving categorisation) implies different requirements for vehicle design and functionality. Vehicles are unlikely to be suitable for a particular mode of operation unless they were designed for it. This means it is not possible to fully separate the two stages of approval.*

THE CATEGORISATION DECISION: A NEW LEGISLATIVE FRAMEWORK

Q14: We provisionally propose that a new legislative framework should provide regulation-making powers to specify:

(a) who should assess whether a vehicle is capable of self-driving;

(b) the procedure for doing so; and

(c) criteria for doing so.

Do you agree?

E.62 Of the 75 consultees who responded to this question, 67 responded "yes" (89%), one responded "no" (1%) and seven responded (9%) "other".

Agreement

E.63 Most respondents agreed that a new legislative framework would be appropriate, without giving reasons. Only a few respondents elaborated on their views:

> *We agree that whilst the AEVA 2018 is a good foundation for self-driving vehicles, it lacks the detail necessary for regulation-making purposes. For this reason, we agree that a new legislative framework should provide regulation making powers to specify the points raised above.* [DAC Beachcroft]

> *AXA is in agreement with the need for the legislation in AEVA 2018 to go further by providing regulation making powers to deal with the complex categorisation decision that needs to be made. Parliamentary oversight will be an important element of this process, given the significance of the regulation making powers it may be sensible for secondary legislation to be subject to the affirmative resolution procedure.* [AXA UK]

> *A new legislative framework will be essential to underpin the approvals framework under contemplation. Given the practice, technical and standards-*

based approaches to verification and validation, there is sense to ensuring that any framework has regulation-making powers to ensure that the approval process can adapt promptly. [Burges Salmon LLP]

The need for flexibility

E.64 KPMG supported new legislation but answered "other", believing that flexibility would be key:

> *While we agree that a new legislation specifying who should assess whether a vehicle is capable of self-driving, as well as the procedure and criteria for doing so, can help create some regulatory predictability and consistency, we believe that this principle needs to be balanced against the principle of flexibility, given that these technologies and how they should be governed will evolve over time. For instance, over time, as more data is collected in the UK and abroad, and different regimes develop in other countries, alternative procedures might emerge. Either way, however, the classification criteria for 'self-driving' could be specified in legislation since these are unlikely to change.*

E.65 Similarly, Mills & Reeve LLP said:

> *More flexible and agile forms of legislation could also be considered that can more readily track technology, or which focuses on achieving specific outcomes for the benefit of citizens and the environment, whilst giving businesses flexibility on how they achieve those outcomes.*

E.66 Richard Morris of Innovate UK said:

> *I am not so sure that the legislative framework should be specifying the criteria. The criteria are likely to be complex and evolving, and should not be constrained by the need to change legislation. In my opinion, the legislation should identify who has responsibility to decide and maintain the criteria, not what the criteria are.*

THE CATEGORISATION DECISION: AN APPEALS PROCESS

Q15: We seek views on whether new legislation should include provisions for appeals against a categorisation decision. If so, should these be similar to those in regulation 19 of the Road Vehicles (Approval) Regulations 2020?

E.67 This question generated relatively little response, as most consultees saw appeals as outside their expertise. Responses generally pointed to the need for an appeal process, or suggested that the current system would be adequate:

> *We would like to ensure there is a right to appeal for all future AV regulation.* [Wayve]

> *An appeal process is important…. There is a lot that will not be black or white, making technical arguments on benefits vs risks critical.* [Bryan Reimer of MIT]

Categorisation should be against a defined criteria. It would appear that if this is the case then the appeal decision as outlined in regulation 19 of the Road Vehicles (Approval) Regulations 2020 would be sufficient to accommodate such appeals. [The Association of Local Bus Managers (ALBUM)]

E.68 ABI and Thatcham Research and Zurich Insurance gave the same response to this question as they did for Question 12. The did not feel that an appeal process was appropriate for AV approvals. Instead, failures should result in the ADSE going "back to the drawing board" and applying again.

E.69 Among those who addressed the detail of Regulation 19, the main comment was that it only provided applicants with 14 days to appeal. It was suggested that this might not be enough time for developers to develop their case for approval:

> *Yes, we agree that the process should be similar but, given limited experience to date, are concerned that 14 days may not be enough time to gather evidence.* [Stagecoach Group]

> *If the provisions were to be similar to those in regulation 19, we would suggest that the person appealing a categorisation decision should have longer than 14 days to appeal after receipt of the notice. We favour a longer period due to the fact that the appeal notice in regulation 19 must be accompanied by such documents and further evidence as may be specified in the form and reasonably necessary to support the appeal.* [British Insurance Law Association (BILA)]

DEPLOYMENT IN LIMITED NUMBERS

Q16: We seek views on whether the regulator that classifies vehicles as self-driving should have power to allow their deployment in limited numbers, so as to gather further data on their safety in real world conditions.

E.70 Respondents were split on this issue. While some respondents saw benefits in a phased approach, others argued against it. There was widespread concern that phased deployment might allow unsafe vehicles to be, in effect, trialled on public roads. Alternatively, a limitation on numbers might undermine any trialling and approval process, placing an undue burden on developers and manufacturers. Some respondents highlighted that local authorities should be consulted if such limited deployments happen in their area.

The case for limited deployment

E.71 Those who argued for limited deployment saw it as a useful way to ensure safety. They often likened it to drug trials, where there are different stages of approval to gather data before the final decision:

> *This could be a good opportunity to demonstrate safety prior to widespread roll-out that could offer a real safety benefit when a more widespread deployment is authorised.* [P3 Mobility]

> *Without doubt, a risk based release of vehicles should be the basis of any self-driving approvals. We do not allow new drugs to be rolled out without a*

series of trials, each one less regulated and bigger than the previous, followed by a period of continued monitoring, once released and in general use. [Shoosmiths LLP]

The comparison with the pharmaceutical industry is helpful here. Pre-clinical and clinical tests and trials are carried out on a proposed new medicine in order to assess its safety and effectiveness in a controlled way. Close observation and monitoring permits any adverse outcomes to be identified quickly and addressed. Rigorous consent arrangements ensure that trial subjects are aware of any risks before they sign up. This is certainly not a fool-proof system, but it does offer a structured way to increase the level of risk to members of the public in a controlled way. [Mills & Reeve LLP]

E.72 Others agreed with the proposal but raised issues about how the limitation would work. For example, Wayve said:

We would like this to be subject to appeal, e.g., if this were used to prevent deployments for political purposes. We also would like this to be limitations on deployment numbers per use case (e.g., last mile delivery, different passenger modes), rather than per ADSE or for the industry as a whole.

E.73 Similarly, FirstGroup commented:

In the early stages of deployment this appears sensible - and perhaps also needs to consider control of where deployment is permitted and under what conditions. However this does raise the issue of quantity licensing which may not be appropriate for certain types of automated vehicles as it could represent a market distortion - for instance in public transport. There will need to be an appropriate exit mechanism to prevent such an adverse consequence.

The case against limited deployment

E.74 Two main arguments were made against limited deployment. The first was that it would encourage regulators to allow unsafe vehicles on the road, simply to gather data. The second was that safe vehicles would have their numbers restricted, placing a burden on ADSEs.

E.75 IROHMS Simulation Laboratory were concerned that unsafe vehicles might be deployed, damaging public confidence:

We have reservations regarding this proposition due to ethical concerns over using limited real-world deployments for the purpose of data gathering. Simulations and tests should be adequately conducted to a point where deployment presents no foreseeable risk. Framing the deployment in terms of data gathering to demonstrate safety will not inspire confidence. And any accidents that arise from this will disproportionately damage public confidence and in turn the credibility of the regulator.

E.76 Other consultees expressed similar reservations:

If it is not possible to garner sufficient data for a safety justification pre-deployment, then the regulator may be within their rights to either wholly refuse the deployment or to enable deployment under constrained operating boundaries (also including the number and range of deployment). [Wendy Owen of Bangor University]

If vehicles have been permitted to use on UK roads, then this should be on the basis that the full capability is understood via the testing and approval process and there should be no further testing on public roads. [Zurich Insurance]

E.77 By contrast, developers feared that safe vehicles would be permitted only in limited numbers:

Mobileye holds that if its position regarding the pre-deployment adoption of minimum safety performance requirements will be accepted, then limited deployment is unnecessary. [Mobileye]

Limiting deployment numbers could significantly disadvantage early movers and undermine the viability of certain business models. It also seems counterproductive to limit vehicle numbers to gather safety data, given that current statistics suggest fatalities occur every billion miles. [Oxbotica]

This proposal, which is akin to a probation period, defeats the purpose of a robust two-step approval and classification process. If the regulator is not convinced of the safety of the automated driving system (ADS), the ADS should not have been approved and classified as self-driving in the first place. [SMMT]

We believe a national scheme should allow for broad commercial deployment. Creating limits on numbers would impede this and would be akin to imposing a second pre-deployment trial phase. It would also create an added layer for decision-makers to govern and industry to comply with. We instead urge the Law Commission to place its emphasis on utilising meaningful data from ADSEs and manufacturers' trials in order to satisfy the necessary safety requirements to approve a deployment use case, while relying on existing authorities to request additional data as needed should a safety concern arise. [Waymo]

Local authorities should be consulted

E.78 Some respondents could see the merits of such a phased introduction, but only in consultation with local authorities:

Yes, provided this is done in consultation local transport authorities. Vehicles should, however, have undergone substantial testing prior to real world deployment. [Urban Transport Group]

Yes but local transport authorities should be consulted about this as we will be able to provide insight and expertise depending on the area. The regulator should also be aware that restricting numbers could be anti-competitive if one supplier can use their product and another cannot. [TfWM]

Yes, but only in locations that local authorities also consent. [George Economides of Oxfordshire County Council]

A formal scheme to set the safety threshold and monitor results

E.79 Several respondents emphasised that if phased employment were allowed, there would need to be a new regime to assure safety initially and monitor safety in use:

> *This step should only be taken in cases where the regulator can assure themselves of the inherent safety of the AV being deployed (i.e. as safe as a competent and careful human driver), and has a framework in place to monitor the safety of those vehicles in use.* [RAC Foundation]

> *Regulators… should have the power to deploy AVs in limited numbers only if the self-driving system has shown that it can meet a certain threshold through simulation testing and controlled environment testing.* [Tata Consultancy Services]

E.80 ABI and Thatcham Research said that all vehicles would need to meet safety assurance. Thereafter "a completely separate arrangement for monitoring vehicles deployed on UK roads would be required (i.e. a UK testing regime)".

F. Assuring safety in-use

OVERVIEW

F.1 In Chapter 10 of the Consultation Paper, we proposed a scheme for ensuring that automated vehicles (AVs) are safe once they are in use on the roads. We pointed to three reasons why in-use monitoring is particularly important. First, the technology is new and unproven. Secondly, AVs will develop as their software is updated. Finally, vehicles have relatively long lifespans, with the average car lasting just under 14 years. This means that the road environment will change around them.

F.2 We therefore proposed a new statutory in-use safety assurance scheme. We then asked whether the scheme should have powers to deal with the following challenges:

(1) collecting data to compare automated and conventional driving;

(2) regulating software updates;

(3) updating maps;

(4) communicating information to users; and

(5) cybersecurity.

F.3 We also asked questions about institutional arrangements. In particular, we asked whether the in-use regulator should be separate from the type approval authority, or whether both functions should be combined in a single body. We also asked about formal mechanisms to ensure that the regulator remains open to external views.

F.4 Overall, responses to the questions in Chapter 10 were positive. There was unanimous support for the creation of an in-use safety assurance scheme and very broad support for powers to deal with all the issues we discussed. On the institutional question, more people favoured separate bodies than a single body, to mirror the current division between the Vehicle Certification Agency (VCA) and the Driver and Vehicle Standards Agency (DVSA). We received a range of suggestions to ensure openness and transparency, from establishing an advisory committee to publishing records of meetings with lobbyists and interest groups.

A NEW STATUTORY SCHEME

Q17: We provisionally propose that legislation should establish a scheme to assure the safety of automated driving systems following deployment, giving scheme regulators enhanced responsibilities and powers.

Do you agree?

F.5 There was widespread support for a new legislative scheme to assure the safety of AVs while they are in use. Of the 65 people who responded to this question, 57 (88%) said yes and seven (11%) made other comments. No-one disagreed.

Agreement

F.6 Consultees agreed that it was not enough to assure safety before vehicles are put on the road. Safety would also need to be monitored in use, under real world conditions. This was partly because AVs are a new technology, with unknown effects – and partly because the driving environment changes:

> *The safety of these vehicles under real world conditions is yet to be known and both technology and regulation will evolve, an automated vehicle may well comply with driving rules when approved but quickly become out of step with regulation in the years that follow.* [AXA UK]

> *We need to track long term indicators to ensure that systems are operating within the bounds that they were approved or better. If they are not we need to revaluate if the benefits still outweigh the risks.* [Bryan Reimer of MIT]

F.7 The CertiCAV team at Connected Places Catapult pointed to a "very real possibility of vehicles being approved which are shown to be unsafe after deployment", especially for the first few generations of AVs:

> *It is important that there are mechanisms to require improvements, withdraw approval and update standards for future approvals based on operational experience.*

F.8 RoSPA commented that AVs are likely to have a relatively long lifespan: just because they comply with driving rules at the point of development, the same may not hold true a decade later.

F.9 Some consultees thought that standards should improve over time. BILA said that, important as an in-use safety assurance scheme would be, "provision should also be made for establishing an independent authority to revisit these safety standards periodically and advise the scheme regulators".

F.10 Momentum Transport Consultancy said that safety compliance should not only look at the vehicle interaction with the people in- and outside of the vehicle, but also at interactions with infrastructure:

> *Its interaction with the cloud and infrastructures is also crucial to the security protocols and therefore should fall under aspects for proper regulation.*

F.11 George Economides of Oxfordshire County Council stressed that traffic management for CAVs "will need to be very different to its current state to ensure smooth and safe operation".

F.12 Several consultees discussed the staffing and resources of the regulator. The Bar Council and BPA emphasised that the scheme would need adequate funding and personnel. Oxbotica pointed to the need to hire and retain staff who are "experts in AV software, especially Machine Learning and Artificial intelligence", as did AAIP. Wayve asked for collaboration between AV developers and regulators "to ensure it is practicable and effectively assesses AV systems".

F.13 Pinsent Masons LLP stressed the need to communicate with other regulators. Similarly, George Atkinson said that the regulator should have access to external databases such as the Department for Transport's (DfT's) casualty database and the police's Automatic Number Plate Recognition system. It should also be jointly responsible, along with the MOT authorities, for verifying that all safety modifications have been implemented.

Concerns

F.14 Some who answered 'yes' then gave substantial qualifications or caveats. The SMMT agreed in principle, on the ground that in-service monitoring and reporting would "foster continuous improvement of both technology and legislation". They thought that "data from a large number of deployed automated vehicles will be the most realistic way to assess the safety performance of an automated driving system (ADS) over a wide range of real world conditions". However, the SMMT concluded:

> *The spirit by which Chapters 10 and 11 of the consultation paper are written seems to suggest in-use monitoring's main purpose is to catch under-performing ADSs with a view to imposing punitive sanctions.*

F.15 The SMMT also urged the UK to follow approaches to data collection developed by the United Nations Economic Commission for Europe (UNECE):

> *We urge alignment with similar proposals under the multi-pillar approach to New Assessment/Test Methods currently discussed at VMAD at the UNECE. Divergence, for example in terms of the data elements that should be collected through in-use monitoring, is highly undesirable and makes compliance very costly.*

F.16 HORIBA MIRA argued a post-deployment safety assurance scheme should aim to confirm that the pre-deployment results and tests still hold true in use. In their view, the regulator should not have power "to remove a type-approved vehicle from the market unless there was a significant discrepancy or safety concern".

F.17 Waymo's comments were largely aimed at injecting as much objectivity as possible into the tests by which the political decision on "how safe is safe enough" is made. They argued this should be done by promoting "greater clarity around the process of providing advice to the Secretary of State for Transport on safety standards". It should therefore identify "who will provide the relevant advice and what the process will look like".

RESPONSIBILITIES AND POWERS

Q18: We provisionally propose that the enhanced scheme should give regulators the following responsibilities and powers:

(1) scheme regulators should be responsible for comparing the safety of automated and conventional vehicles using a range of measures;

(2) to do this the regulator should have power to collect information on:

> **(a) leading measures (instances of bad driving which could have led to harm) and**
>
> **(b) lagging measures (outcomes which led to actual harm);**

(3) regulators should have the power to require an ADSE:

> **(a) to update software where an update is needed to ensure safety and continued compliance with the law;**
>
> **(b) to keep maps up-to-date, where an AV relies on maps to ensure safety and compliance with the law;**
>
> **(c) to communicate information about an ADS to users in a clear and effective way, including where necessary through training.**

Do you agree?

F.18 Again, there was substantial support for this proposal. Out of 65 responses to this question, 51 (78%) consultees replied yes, only one replied no, and 13 made other comments. Below we consider responses to each limb of the question.

COMPARING THE SAFETY OF AUTOMATED AND CONVENTIONAL VEHICLES

Agreement

F.19 There was strong agreement with this proposal. In Shoosmiths LLP's view, the "importance of this comparative analysis cannot be understated as public confidence in ADS" will be affected by it. In the same vein, the SMMT said:

> *Comparing the safety of automated and conventional vehicles using a range of measures is integral to the principle of a positive risk balance that we support… However, the range of measures and their metrics must be clearly defined and agreed with industry and stakeholders.*

F.20 KPMG expressed a similar view:

> *We agree that this is crucial, in principle, because a key component of the use case for automated vehicles is predicated on their safety benefits vis-à-vis conventional vehicles. We also agree that specialist knowledge and expertise is required to conduct the analysis, and to the extent that the regulator will be an independent apolitical authority, it seems sensible that it should conduct analysis that is not influenced by political considerations.*

F.21 The joint response from the ABI and Thatcham Research argued that the regulator should have "a multi-disciplinary approach, including safety experts, consumer testing and insurers, with the aim of promoting and ensuring safety".

Concerns

F.22 Wayve expressed concern about detailed comparisons:

> *Top level population statistics have some merit, but we caution against granular comparisons. We do not see merit in deeper comparisons between human-driven and autonomous vehicles for regulatory purposes, though these have merit in supporting public acceptance.*

F.23 Reed Mobility wished to protect intellectual property rights:

> *It may be worth clarifying that the regulator would work in a way that would ensure that the IP of ADSE / CAV developer organisations was protected.*

F.24 Shoosmiths LLP and AAIP counselled that the data sources and methodology of the analysis should be kept under review. AAIP reiterated their view that being safer than the average driver is not an acceptable measure.

LEADING & LAGGING MEASURES

F.25 In Consultation Paper 3 we summarised the growing literature on how to compare the safety of automated and conventional vehicles in-use. This typically distinguishes between "leading measures" of poor driving not leading to harm, and "lagging" measures of actual harm, such as fatalities, injuries and collisions. We concluded that devising appropriate measures would require specialist, dedicated expertise over time. The legislation would need to provide regulators with a responsibility to devise measures and powers to collect the data.

F.26 There was widespread support for such data collection. Cycling Scotland, for example, thought that data collection would be needed, amongst other purposes, to assess "whether automated vehicles pose more of a risk to certain groups of road users". Cycling UK cited the rail industry, where investigation of near misses has been effective in avoiding potentially serious incidents. HORIBA MIRA said:

> *Leading measures should be collected to allow more data to become available sooner, and lagging metrics should be collected since these are generally the metric society will be more concerned about. As large volumes of lagging data become available, the leading data will become less significant for determining the safety, but leading data should still be collected to validate (or correct) original assumptions about how leading and lagging measures are correlated (e.g. how many lane boundary excursions equate to each serious injury on average), such that leading data is able to be more effectively used in subsequent approval programmes.*

F.27 However, consultees also pointed to the many difficulties associated with the exercise. As HORIBA MIRA put it:

> *A large volume of data would be needed to draw statistically-significant conclusions, bearing in mind the extreme variation in the real world; there should not be an impression that vehicles are passing and failing due to random chance or situations that are outside the developer's control.*

F.28 Several consultees (including AAIP and the IHE) noted that leading measures would be hard to collect. FirstGroup said it would be particularly difficult to collect data from conventional vehicles, so as to give an accurate comparison:

> *Using data from conventional vehicles will help in the instances where there has been a recordable incident of some form, but will not provide data on the far greater number of inconveniences, discourtesies, inefficiencies, near misses and minor incidents that fall outside that scope. So any record of leading measures will, by definition, be exaggerated in its impact but massively under-recorded in its incidence.*

F.29 Five AI cautioned against assuming that measures appropriate for conventional driving would necessarily be appropriate for AVs:

> *For example, studies have found harsh braking events are correlated with 'bad driving' in humans, which is why many insurance-based telematics systems monitor the incidence of such events and penalise drivers who display these driving characteristics frequently. Such instances in an AV may not be a similar indicator of 'bad driving'... For example… an AV may brake harshly to maintain its prescribed 'safety envelope' and other road users may take advantage of or even 'bully' AVs into braking harshly by not giving them sufficient space…*
>
> *Care will be needed to select leading measures that are relevant to AVs. Examples might include state changes such as the frequency of transition to a MRC, the use of an Emergency Manoeuvre (as specified in the ALKS regulation), or unstable lateral positioning within lane…*

F.30 The SMMT also expressed concern about potentially inappropriate measures, citing the problems associated with measuring "disengagements" in trials. These problems might extend to other measures:

> *Near-misses… to the extent that it is reasonable and feasible to collect such data, will also need to be contextualised. A well-performing ADS in an urban setting may have recorded an usually high number of near-misses but no accidents because it has successfully avoided swerving cyclists and pedestrians carelessly stepping out into the road.*

Data concerns

F.31 The SMMT also raised concerns with large scale data collection:

> *Data on near-misses must also not be transferred to any entity outside the regulator to prevent misuse; for example, as a basis for insurers to increase insurance premiums.*

F.32 In the Consultation Paper we suggested that comparisons might be made by "placing unobtrusive sensors on conventional vehicles in a variety of defined operational design domains".[39] The SMMT remarked that this "may not be entirely compatible with

[39] Consultation Paper 3, para 10.71.

privacy laws and may only exacerbate society's resentment against surveillance by authorities". The RAC Foundation stressed that any monitoring must be by consent:

> *If the individual is to be monitored they should be aware it is happening and it should be with their consent e.g. by their agreeing to the data being gathered and shared as part of accepting the terms and conditions of a telematic insurance policy. There should also be safeguards on how such information gathered to establish general patterns of behaviour should, or should not, be used in respect of the individuals from whom it is gathered.*

F.33 Many consultees mentioned the need to anonymise the data, including KPMG and Alastair Shipman of Imperial College London.

F.34 BPA raised the legal requirements for data sharing, under the Digital Economy Act 2017. Although the Act provides power to access driver data, BPA commented that "it needs workable Codes of Practice or procedures to enable it to function efficiently and effectively":

> *For example, we are part of a multi-agency data sharing project to reduce nuisance vehicles… and data sharing is proving to be a significant challenge. In this case would the regulators get it from police and/or local authorities? And would they have a duty to report the data or would the data be collected directly by themselves. The latter is likely to be costly and perhaps unrealistic.*

Collaboration between the regulator and ADSEs

F.35 Wayve thought that the regulator would need to collaborate closely with the automated driving system entity (ADSE):

> *We struggle to see how 3rd parties will be able to assess AVs without the deep understanding of AVs and the scale of data to support decisions. This suggests to us that ADSEs will need to collaborate closely with regulators and to some extent each other… . As an AV Developer we would like to work with regulators to define and monitor leading indicators of safety in particular.*

F.36 Similarly, FiveAI thought that the ADSE should devise suitable measures:

> *An ADSE/ADS developer could be encouraged to specify in their safety case what leading/lagging measures they will monitor as part of their safety monitoring, with the regulator then having the power to ensure the ADSE then monitors those measures.*

F.37 However, Driverless Futures? referred to the risks of "regulatory capture":

> *Leading metrics (including but not limited to near misses) will be a more important indicator of safety than actual damage, but such metrics should not be cherry-picked by developers.*

F.38 There was also concern about how the regulator would use the data. Burges Salmon LLP pointed to the difference between collecting statistics to identify trends or general problems and collecting information about particular infractions. They thought if mixed the ADSE may be less forthcoming with data:

If the two are mixed, this will logically produce defensive behaviours which will undermine the purpose of the analysis.

F.39 HORIBA MIRA wrote:

> *Developers should have confidence that once they've obtained approval, their product won't suddenly be removed from the market unless a serious defect or the use of 'defeat devices' is uncovered.*

F.40 Apollo Future Mobility Group was optimistic about data capture from road sensors. It thought that "comprehensive digital traffic flow mapping will enable the regulators to assess the performance of all vehicles on the road":

> *The environment monitoring will mean that human piloted vehicles, and AVs will be monitored, and reported on in an identical way. This will remove some of the variabilities inherent in broad statistical data, and will allow regulators to directly compare how a human driver, and an AV reacted to the same situation on the same piece of real road.*

F.41 Apollo Future Mobility Group argued that "it should be possible to access information instantaneously, meaning that the regulators can make recommendations as soon as a systemic concern becomes apparent".

F.42 Others, however, thought that data capture would be highly problematic. Oxbotica pointed to the costs of data sharing:

> *Any data-sharing requirements should not cause an increased computational burden for the ADSE. It is very expensive for an AV to continuously log data, and impractical to upload it, even over 5G.*

F.43 The International Telecommunication Union Focus Group on AI for Autonomous and Assisted Driving (FG-AI4AD) provided a detailed response, which went through the many problems with detecting and reporting on leading and lagging measures.[40] The response pointed out that although event data recorders and eCall are triggered by high-impact collisions, there are no current UNECE or EU requirements for AVs to detect other events:

> *There are currently no regulations, no standards, no testing procedures or even industry best practice for assisted or automated driving system detection of low-impact collisions, vulnerable road user collision, runover events or near-miss events.*[41]

F.44 FG-AI4AD commented that this leads to the "Molly problem", in which a young girl called Molly is crossing the road alone without eyewitnesses and is hit by an unoccupied AV. At present, there are no agreed standards for how the event is to be detected, or what data should be retained to investigate the incident. Far from allowing

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[40] We would especially like to thank Bryn Balcombe, Chair of the FG-AI4AD, for providing a detailed 110-page response to CP3.

[41] P 11.

sophisticated data collection, this raises the possibility that AVs may not be record any involvement in a collision.

F.45 A recent review of Connected and Automated Vehicle (CAV) safety benchmarking for BSI proposes that AVs should collect sufficient data to provide a "digital commentary" on the way they drove.[42] This would involve collecting and storing a full commentary of the perception, decision and reaction processes the vehicle underwent. In the Molly example, this would go further than merely detecting the collision. It would provide a record of when the vehicle detected Molly, how she was classified, how she was predicted to move and what decisions the vehicle made as a result.

F.46 It is clear that there are many unresolved problems about how ADSEs will collect and report data about actual collisions. Measuring near-misses is even more problematic. We return to this issue in Chapter 17, when we discuss the data AVs will need to record.

POWER TO REQUIRE AN ADSE TO UPDATE SOFTWARE AND MAPS

The need to specify outcomes rather than processes

F.47 There was widespread agreement that the regulator should have powers to require an ADSE to take corrective action to ensure continued safety and legal compliance. However, several industry consultees said that the regulator should not prescribe how this is done.

F.48 Five AI said that "It would be undesirable to empower the regulator to require the ADSE to take a specific action" if that action then caused a problem or drop in performance elsewhere. However:

> *It may be possible to fix the issue using one of a number of different approaches (for example, a software update, hardware change, process change (e.g. new calibration method), an ODD change (a new route) or an infrastructure aid change) and the ADSE may consider a different approach is better. For example, the ADSE may prefer to upgrade the sensor hardware on a vehicle rather than the software to fix an issue with an AV hesitating to merge into a lane. We do not consider it helpful to single these specific actions [ie updating software and maps] out; the focus should be on good problem solving processes.*

F.49 The SMMT made a similar point, focussing on "technology neutrality". Faced with a change in traffic laws, the SMMT agreed that it was the ADSE's responsibility to take appropriate action, but this might be done in a variety of ways:

> *Rather than the regulator requiring the ADSE to issue the necessary software and/or map updates, the regulator should ensure that the change in the law is properly communicated to the ADSE, who will in turn dispatch the necessary software and/or map updates. The penalties, or sanctions, associated with non-compliance with the law should be sufficient motivation for the ADSE to*

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[42] N Reed, B Balcombe, P Spence, S Khastgir and N Fleming, *A Review of CAV safety benchmarking and a proposal for a "Digital Commentary Driving" Technique,* (June 2021).

do the needful to remain compliant. This approach also upholds the principle of technology neutrality, as ADSEs may use a variety of technical solutions to ensure safety and compliance with the law – although most of these involve software, they do not necessarily involve maps all the time.

F.50 HORIBA MIRA said that a narrow focus might lead to unintended consequences:

> *Where updates are available, testing should not just confirm the defect is corrected but also that other effects haven't been introduced, e.g. a correction for failing to stop for dogs in the road would not be acceptable if it causes the vehicle to become overly cautious and hold up traffic by stopping for paper bags.*

F.51 The Faculty of Advocates saw the ability to update software as a vital aspect of the safety case:

> *Data or software being out-of-date should be treated as a fault condition by an ADS in the same way as the failure of a physical component. In our view, this requirement to ensure that software components of the ADS (including maps and other environmental data) are kept up to date will be a central part of the ADS safety case.*

F.52 In similar vein, Nova Modus said that failure to keep software and maps up to date should, if necessary, result in the withdrawal of a self-driving classification.

The particular challenges of updating maps

F.53 In Chapter 10 we noted that, while developers differ in their approach, some rely on high-definition digital maps to read the dimensions of the road and understand traffic regulations. We provisionally proposed that where maps are necessary for the safe and legal operation of an ADS, the ADSE should be under a legal obligation to keep maps up-to-date.

F.54 In response, several consultees said that some digital representation encoded so much information that the term "map" could be misleading. As the Faculty of Advocates put it:

> *The term 'maps' may be inadequate to capture the environmental data required by AVs to support their safe operation.*

F.55 ITS UK said that it was preferable to talk about Digital Traffic Regulation Orders rather than maps, and noted that DfT is doing exploratory work on this.

F.56 The ABI and Thatcham Research said that updating maps would be challenging as the data "are not centralised and may rely on local authorities, utility companies, infrastructure providers, etc". Peter Whitfield pointed to the need to take account of "roadworks, space allocation (cycle lanes etc) and one-way streets".

F.57 Driverless Futures? said that developers were not always explicit about their reliance upon mapping. They should be "forced to explain their dependence upon the connections with the outside world that their vehicles depend on". Similarly, RoSPA said that as "there is no agreed map industry standard, approval authorities will need

to rely on manufacturers to explain their system in their safety cases". Manufacturers "will need to show why their method of map integration is robust and why the system will be safe even if the map fails".

F.58 Richard Morris of Innovate UK thought that in future developers would become less dependent on mapping:

> *The cost of lidar scanning routes is large, and whilst practical for short distances, is not likely to be sustainable on a large scale, at least in the medium term. The evolving expectations to cope with sudden changes suggests that in future, AVs will become less reliant on maps, and use them more as humans do – just for simple route finding.*

Communicating updates to users

F.59 Consultees also used this question to comment on the many problems of keeping software up-to-date. RoSPA stressed the need to communicate with consumers:

> *The importance of installing software updates promptly after their release will also need to be communicated with the owner or operator of the vehicle, as these updates are likely to be crucial to safe operation of the vehicle. Although it may be relatively simple to implement a process for the update of vehicle software by an operator, the challenge will be communicating this need with users who privately own an automated vehicle.*

F.60 FOCIS said that the responsibility for ensuring that software updates are installed "ultimately [falls] to the UIC or registered owner". BIBA added that it "is important when we think about more vulnerable customers, including the elderly". DAC Beachcroft LLP argued that a failure to install software updates should render the ADS unusable:

> *We stand by our previous suggestion – that the ADS is rendered unusable if the owner refuses to comply after a reasonable number of warnings or period of time.*

F.61 KPMG made a similar point:

> *There may be a case for assigning different levels of urgency to software updates; the most urgent should require owners to install the software within a certain number of days on pain of the vehicle being temporarily disabled by the manufacturer until installation has taken place.*

F.62 Pinsent Masons LLP noted the lack of mobile coverage in some areas:

> *If these updates are so dependent on mobile networks, a question arises whether users may need to ensure (or even be obliged to ensure) that they live in an area which has suitable coverage before they purchase a vehicle (e.g. someone based in a predominantly rural area would not be able to purchase such a system).*

F.63 DPTAC made a similar comment, adding the example of destinations which do not have a postcode.

Recording software versions

F.64 Finally, consultees mentioned the need to record software versions. George Atkinson wrote that "all software modifications need to be kept and maintained on the Regulator's data base". Similarly, the ABI and Thatcham Research said that "software versioning should be clear and publicly available".

POWER TO REQUIRE AN ADSE TO INFORM AND TRAIN USERS

F.65 In Chapter 10 we explained that there are already laws to require manufacturers to provide consumers with safety warnings and to prevent misleading marketing. However, the institutional structures for enforcing these laws are diffuse. We also highlighted that AV technology is new and poorly understood by consumers. For AVs then, the For AVs, there is potential for consumer misunderstanding is greater which could, in turn, lead to endangering other road users. Therefore, further powers are needed. We provisionally proposed that the in-use safety assurance scheme should have powers to require ADSEs to communicate information about an ADS in a clear and effective way, including where necessary through training.

F.66 There was broad support for this proposal. AXA UK strongly agreed:

> *It is particularly critical that marketing material provided by manufacturers clearly states the limitations of the technology and how the user will need to interact with the technology to use it safely. While we recognise other agencies are in place to carry out the regulation of consumer and marketing materials, ensuring users understand the limits of the system and their responsibilities will be safety critical. Therefore, for the regulator to require an ADSE communicate information in a clear and effective way.*

F.67 The ABI and Thatcham Research said that in their view the manufacturer should "provide mandatory training through a vehicle's infotainment system and ensure the user is paying attention". They also noted that the system will "need to be able to identify new drivers that have not taken the training".

F.68 RoSPA said that, although AVs have the potential to reduce crashes:

> *If they are not used properly, they can also increase risk, especially if drivers over-rely on the technology. The way that systems are marketed will be important to manage user expectations.*

F.69 Pinsent Masons LLP asked for particular thought be given to how systems are described: "names, information and updates should not be confusing, misleading or difficult to understand (by reference to a reasonable person)". They also wished to see specific standards for training:

> *Regulations should provide some general guidance as to the minimum requirements that the training must meet. For example, we consider that providing training in the form of a written guide is not sufficient. It is important that the regulations are drafted so that the provision of training does not merely become a tick box exercise, as it may very well be key in ensuring the overall safety of AVs.*

Communicating with all drivers

F.70 The SMMT described ways to train those buying new cars at a variety of "touchpoints throughout the customer journey". These include written information at the pre-purchase stage, in-person communication during a visit to a dealer, and training through the vehicle infotainment system. They said that different people learn different ways, according to "personal preferences, age, gender, education and experience". Therefore, a multi-channel approach to delivering information and education should be pursued.

F.71 It is relatively easy for training to be made available to the first owner of a new vehicle. However, consultees pointed out that the need went much further than this. The SMMT mentioned car clubs, car rental agencies, and vehicles shared among family members. Here, sharing information about safe usage would be important but could be hard to regulate.

F.72 The SMMT suggested a general public awareness-raising campaign by government and its agencies. FOCIS also asked for a "sustained public education campaign as the technology moves closer to reality on our roads".

F.73 Similarly, Five AI said:

> *For example, it may be impractical to provide training to those who hire vehicles with ADS features from a car hire company. A combination of general education (through inclusion of information or requiring use of these systems as part of the driving test), clear information and specific training where appropriate could be used.*

F.74 AAIP also highlighted the problems posed by hire vehicles, and said that design must be intuitive:

> *Users should be told about the broad capabilities of the vehicles, but ideally the vehicles would be so intuitive that training would not be necessary for them to be used safely. This requirement for intuitively designed ADSs might mean legislation and mandatory standards are needed to reduce the variability in design from vehicle to vehicle.*

F.75 The CertiCAV team at Connected Places Catapult said that one option "could be to define a smaller set of allowable ODDs/features for HAVs (as has effectively been done for ALKS)". Failing this, they questioned whether there might be implications for consumer protection if, say, a manufacturer was able to require buyers of second-hand cars to pay for a training course.

F.76 APIL mentioned the need for new training after each software update:

> *If software updates automatically, it is crucial that a user is aware that the vehicle may react differently to the way it did previously. Software updates should be accompanied by information for the driver to educate themselves on potential differences they may experience as a result of an update.*

A new driving test?

F.77 In Chapter 10 we suggested that it was premature to consider changes to the current driving test or a new formal licence category. However, several consultees thought that this might be needed. DPTAC said that: "in principle, anyone who elects to use AV related vehicles should be required to pass a competency-based test (as an extension to a driving licence) in order to drive an AV." The British Vehicle Rental and Leasing Association (BVLRA) added:

> *One suggestion is that there is a new category of driver licence that shows that people have been trained and understand their responsibilities when it comes to autonomous vehicles and their responsibility as the User in Charge. This could support BVRLA members to ensure there is a qualified User in Charge which otherwise will be exceptionally difficult to assess.*

F.78 ITS UK drew on experience in other industries, notably aircraft, construction and medical equipment. Rather than leaving training to different manufacturers, "where branding and marketing can have safety consequences", they argued for a national graduated licensing scheme "with checks such that insurance is only valid if a driver's licence covers all the enabled functions of a vehicle". Their preferred solution is for:

> *a more formal national system to be developed, overseen by government, of graduated licensing/permits and a check such that insurance is valid only if a driver has permits covering all the enabled functions/services of the vehicle. To increase the acceptability of this approach, existing drivers could be granted a fully populated licence and the graduated approach introduced for new drivers from a certain date (this was the approach when graduated licencing was introduced for motorcycles). As automated vehicles become more common, driving schools will have access to them but, in the shorter term, specialist providers could run one-day courses.*

F.79 ITS UK pointed out that DVSA would need to maintain enhanced detailed data on drivers and on vehicles:

> *We do not underestimate the difficulty (and driver opposition?) to such developments and propose that policy and administrative work begins in parallel with technical system development.*

Concerns

F.80 Despite broad agreement, some consultees disagreed. Oxbotica said: "we disagree with (c) – this should be the role of the vehicle manufacturer or service provider."

F.81 FirstGroup wondered whether a training process would be practically feasible, given that it would require:

> *Changes to the way in which "user in charge" licenses would differ from "driving" licenses and impose on ADS manufacturers a duty to ensure that the keepers (and drivers) of automated vehicles were monitored and kept up to date, and these individuals contacted to be advised of new training and testing requirements. Presumably, failure to adhere to this process (by the individual) would lead to a loss of license and thereby invalidate insurance.*

Other problems include where an ADS supplier goes out of business - would that render that ADS system unusable?

APPROVING SOFTWARE UPDATES

Q19(1): Should scheme regulators be empowered to approve software updates that apply only within the UK, without requiring the manufacturer to return to the original type approval authority?

F.82 In Chapter 10 we gave the example of a vehicle which received type approval in Luxembourg, in a form which among other things certified that the vehicle complied with UK traffic law. What if an aspect UK traffic law changes? We invited views on whether it might be simpler and quicker for the ADSE to gain approval for updates consequent upon the law change from the UK regulator rather than return to Luxembourg.

F.83 Views were split on this issue. Out of 47 responses, 26 (55%) replied yes, 16 (34%) replied no, and five (11%) replied other.

F.84 A small majority thought that it made sense for UK regulators to have power to approve software updates which only apply in the UK. P3 Mobility gave this as the reason for their response, as did RoSPA.

F.85 However, the issue generated many worries. One concern was as to whether the vehicle in question would only run on UK roads or whether it might also be taken abroad. DLG said that one solution would be to build geofencing into the update. However, Highways England thought that even a country-specific update may interfere with the underlying software, leading to the possibility of an accident.

F.86 Pinsent Masons LLP summarised the competing arguments:

> *We therefore partially agree with this proposal. Such a decision needs to be made by balancing the need to keep systems up-to-date and not get slowed down by bureaucracy, but also by considering the overall safety of vehicles. Although we see the appeal in giving national approval in respect of updates, past experience warns us that not considering carefully the vehicle on the whole may have devastating consequences.*

F.87 Consultees were worried about undermining the UNECE approval process. HORIBA MIRA thought that the UK should only approve software updates that affected the second stage "categorisation" decision, not the original UNECE approval:

> *Where updates would invalidate the UNECE approval, the developer would have to go back to the original authority to certify it as a separate variant of the type. This is similar to how different versions of a type co-exist within the existing type approval system. It could result in a greater admin overhead initially, but would probably be clearer and simpler in the long run.*

F.88 The ABI and Thatcham Research described the process of international type approval as more stringent. They wished to preserve the process for now, while recognising the potential for delay:

Software that would materially impact the driving task should pass through an international type approval process as this process is more stringent. For this to happen, there must be specific definitions and agreement on what updates would "materially impact the driving task." A potential side effect, however, is that this may delay the process of the installation of critical safety updates and improvements and we require more clarity about the type approval process for software updates.

There should also be a UK-specific assessment to certify that these software updates continue to be in compliance with UK roads. If experience shows that this is unworkable in the future (too many software updates and a lengthy and laggard type approval process) then alternate authorities within the UK should be considered. However, at this time, we would still support an international type approval process.

F.89 Several consultees argued that manufacturers should only be required to return to the original type approval agency for fundamental changes. As Burges Salmon LLP said:

So long as a particular software update does not affect the fundamental "type" of vehicle approved such that the vehicle can be said to no longer conform to its approved type, there should be no requirement to return to the type approval authority.

F.90 Similarly, Reed Mobility said:

It may be helpful to ensure the scheme regulations permit developers / manufacturers to update software without needing to seek approval for the whole vehicle (unless essential to do so).

F.91 Bryan Reimer of MIT also thought that only the most significant changes would need prior approval:

It's going to be hard to have all software changes approved. It is probably more important that they are all registered so that the regulator can look back to assess performance is within the approved bound and have data if something goes wrong.

F.92 Stellantis and Renault said if an extension of type approval were needed, they would declare the update to the original type approval authority. If not, no approval would be required.

F.93 The Bar Council also disagreed on the ground that approving software updates is likely to become a routine part of type approval authorities' work. If, in practice, it leads to delays and backlogs, the position can be reviewed.

CYBERSECURITY

Q19(2): Should the scheme also deal with cybersecurity?

F.94 In Chapter 10 we explained that cybersecurity lay outside our remit. However, we thought it important to assign a clear institutional responsibility for cybersecurity. We asked if the in-use scheme should be responsible for this area.

F.95 The overwhelming majority of consultees thought that the in-use safety assurance scheme should be responsible for cybersecurity. Out of 54 responses, 49 (91%) said yes, three said no and two replied other.

The case for including cybersecurity within the scheme remit

F.96 Most consultees pointed to the importance of maintaining cybersecurity. As BlackBerry wrote in a detailed response on this issue:

> *Based on BlackBerry's experience, it is fundamentally almost impossible to separate safety and security in automated vehicles…. The issues of safety and security must be considered in tandem as cybersecurity is the most important building block in ensuring safety of automated vehicles.*

F.97 In BlackBerry's view:

> *New vulnerabilities to vehicle cybersecurity are discovered daily. There are multiple entry points for cyber actors to attack road transportation, and many attractive targets for threat actors.*

F.98 Insurers were particularly concerned about the risks associated with cybersecurity, As the IUA explained, if could affect their solvency:

> *When providing insurance products for automated vehicles, it will be of the utmost importance for all insurers to consider the potential for cyber risks to impact upon their solvency.*

F.99 The Motor Insurers' Bureau (MIB) gave two examples of threats: fraud and terrorism. The first might involve deceptions such as altering the data on an "innocent" vehicle in such a way as to suggest that it was at the scene of an accident when in fact it was nowhere near. As regards terrorism, there is the possibility of a vehicle being hacked and configured so that it is controlled remotely, allowing it to be used as a weapon without danger to those operating it.

F.100 The Trustworthy Autonomous Systems Hub raised issues about the scope of the Network and Information Systems Regulations 2018:

> *At the moment AVs fall within the definition of Intelligent Transport Systems (ITS) under the ITS Directive but the associated cybersecurity issues are not subject to the Network and Information Systems (NIS) Regulations 2018, as the scope of an essential service in the road transport sector under the Regulations covers only road authorities (see Paragraph 7 Schedule 2). Given the seriousness of the ramifications of a cyberattack targeting AVs, it should*

be reviewed whether there is a need to expand the scope to also cover the key service providers in the AV sector.

F.101 The ABI and Thatcham Research suggested that something similar to the IT Information Sharing and Analysis Centre (IT-ISAC) might be considered. IT-ISAC being a for profit organization of companies whose aim is to enhance cybersecurity by sharing threat information and collaborating on effective security policies and practices.

Alternative approaches

F.102 Only the SMMT, Stellantis and Renault disagreed with giving responsibilities to the new regulator. The SMMT said that UN Regulation 155 on Cyber Security and Cyber Security Management System adequately covers cybersecurity: the "UK should fully apply [it] instead of considering a scheme that at best duplicates, or at worst undermines, it".

F.103 Logistics UK recognised the powerful threat of cybersecurity failures but thought that, given the speed of technological advances, it may not be feasible for the scheme regulator to embrace this issue. Instead, they suggest that "consideration needs to be given to a joint venture: a lead authority on UK cybersecurity and this scheme's regulator".

ONE BODY OR TWO?

Q20: Should the authority administering the scheme to assure safety while automated vehicles are in use be kept separate from type approval authorities (as is already the case)? Alternatively, should both functions be combined in a single body?

F.104 Under retained EU law, type approval authorities and market surveillance authorities must function independently. However, Great Britain now has freedom to decide its own policy. In Chapter 10 we sought views on whether the in-use scheme should be separate from the type approval authority or whether the two should be combined in a single body.

F.105 In response, more consultees favoured separate bodies than a single body. However, the issue was not clear cut. Out of 64 responses, 29 (41%) were in favour of a separate bodies, 15 (23%) favoured a single body and 20 made other comments.

The arguments for separate bodies

F.106 Those who favoured separate bodies gave two main reasons: that the functions are sufficiently different to require two entities and that it would avoid conflicts of interest. Consultees also said it was desirable to have equivalent structures to EU member states, and that demarcation issues could be overcome by collaboration.

Different functions

F.107 Many consultees commented that type approval and in-use monitoring are different functions. For example, Pinsent Masons LLP argued that the current position of having two distinct bodies (presently, VCA and DVSA) should remain as the basic framework. They argued that "the two should have different priorities and different

powers, more specifically tailored to the tasks they perform and responsibilities they hold".

F.108 This was echoed by DLG, who said that each "will have separate issues to consider and expertise to develop". ALBUM said that the roles require different competency skills, and "if an organisation is too large dealing with differing powers they can lose focus".

F.109 The ABI and Thatcham Research said that UK safety assurance applies to pre-market assessment: "a completely separate arrangement for monitoring vehicles deployed on UK roads (eg a UK testing regime) would be required".

Avoiding conflicts of interest

F.110 Consultees also raised concerns about the regulator responsible for approving vehicles also having responsibility for the in-use safety scheme. Many of these consultees felt that a separate in-use scheme regulator could act as an independent check on approvals. The NEPC said that their "strong opinion is that the safety scheme administrators and type-approval authorities should be kept separate to ensure that safety considerations are not compromised by the pressures often seen in type approval".

F.111 Dean Hatton of the National Police Chiefs' Council (NPCC) said that "the conflict of interest argument is a powerful one".[43] Similarly, the RAC Foundation said that having "separate organisations involved in the type-approval and safety assurance process reduces any potential conflicts of interest". Allied to this, Logistics UK said that having separate bodies "retains a line of demarcation which can ensure open and full transparency".

Keeping in line with EU position

F.112 P3 Mobility said that maintaining two separate bodies will keep this country "in line with" the requirements of Regulation 2018/858. They argued this would "ensure that GB remains equivalent in organisational structure to EU member states".

Collaboration

F.113 Several respondents commented on the need for the two bodies to collaborate with each other. The RAC Foundation said: "collaboration where appropriate should be encouraged, and built into role purposes". One of the members of the IUA, whose first preference was for a single body, urged that, if the authorities were separate, "consideration be given to developing a close working relationship" between them.

Answer may change over time

F.114 Some respondents mentioned that the appropriate answer may change over time. A range of consultees (including AXA UK, Pinsent Masons LLP, HORIBA MIRA and KPMG) saw value in keeping with the current split between VCA and DVSA for now, but keeping the issue under review.

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[43] Responding in a personal capacity.

Arguments for a single body

F.115 The main reasons for favouring a single body were efficiency and to prevent issues from "falling into the gaps" between two entities.

F.116 Mills & Reeve LLP put the case for a single body as follows:

> *First, there will be development of expertise within the organisation that is likely to be difficult to replicate across two separate organisations, especially in the early years of deployment. Second, some tasks may be difficult to allocate easily in one or other set of tasks – such as implementation of software updates and changes to reflect changes to road rules. Third, knowledge and experience developed through the post-deployment safety assurance system will need to guide and inform pre-deployment assessment, and in our view, this would be done best by having both roles within the same organisation. Finally, we see setting up two separate organisations with a similar range of expertise would lead to unnecessary duplication and cost.*

F.117 The Bar Council made similar arguments, at least in the early phase:

> *The advantage of such an approach is that it would bring together expertise and would stop problems from falling between demarcation lines. The number of technical, legal and policy specialists in this area is still small, and it makes sense to concentrate their expertise. Moreover, this is an area where much of the apparent safety (when considered on initial approval) will be predicated on the availability of rolling software updates after deployment, so it makes sense for one authority to combine both functions to ensure full accountability.*

F.118 Highways England thought that having two separate bodies has the potential to increase operating costs, extend decision making times and "lead to confusion and misaligned objectives".

F.119 Wayve thought that initially a single body would "enable learning faster about this new technology". Furthermore, it would provide a "single source of accountability and expertise for initial approval and ongoing use". While Wayve noted that it might eventually be appropriate to separate the responsibilities for the sake of "robust governance", they thought the time was not yet ripe for that.

F.120 Amey and BIBA both saw advantages in holding all the data within the same organisation. In BIBA's view, "data collected while vehicles are in use will help inform subsequent approval decisions".

F.121 Burges Salmon LLP responded "other", on the basis that there is "no unarguably optimal answer to this question". However:

> *Repeat experience in many contexts shows that creating more avoidable interfaces and splits of responsibilities in complex regulatory systems tends to create greater risk of disconnects and regulatory dissonance or inconsistency.*

Liaising with other agencies

F.122 DCA Beachcroft LLP mentioned the need to ensure that any new regulatory powers are aligned with other regulators' powers, such as those of the Information Commissioner. Logistics UK mentioned the need to collaborate with those responsible for road infrastructure.

REMAINING OPEN TO EXTERNAL VIEWS

Q21: What formal mechanism could be used to ensure that the regulator administering the scheme is open to external views (such as duties to consult or an advisory committee)?

F.123 In all 56 respondents answered this question, of whom 26 favoured an advisory committee and 14 supported a duty to consult, with some arguing for both.

Arguments for an advisory committee

F.124 Those who favoured an advisory committee pointed to the range of expertise that could be included. The Urban Transport Group said:

> *It makes sense to draw upon the expertise of road user and safety groups, provided that a range of views are sought and that no single group of road users is allowed to dominate over others.*

F.125 Similarly, Mid and West Berkshire Local Access Forum advocated including vulnerable user groups, as did FOCIS.

F.126 DPTAC commented:

> *In the first instance, the establishment of a professional body consisting of the manufacturing sector, agencies with a service provision for enabling technology for AVs (eg SatNav), and users of AVs would most likely be very helpful. This could take the form of a working group to enable discussions to take place to progress issues, which need to be resolved as they arise.*

F.127 Nova Modus recommended that there may be a role for academic involvement, so as to:

> *Maintain awareness of future technology in ADS developments (e.g. sensors with enhanced range, machine learning analysis of software, equipment, driving behaviour) and improved virtual testing of AVs (e.g. by simulation - Bristol Robotics Lab and WMG).*

F.128 Cycling UK also cited academics as a useful source of expertise.

Other mechanisms

F.129 Consultees mentioned also mentioned a variety of other mechanisms to ensure openness and transparency

F.130 KPMG thought it important to record meetings without outside interests:

Various organisations and commissions, for example Transparency International and the Committee on Standards in Public Life have been examining the UK's lobbying landscape to solve the problem of regulatory capture more broadly. We believe some of the recommendations in these reviews could be applied specifically to the regulatory body that is being developed for automated vehicles, such as publishing registers of interest as open data and meeting information, and advising bureaucrats, regulators and legislators to keep a record of meetings with lobbyists or interest groups. The obligation to put meetings on the public record will not only incentivise regulators and stakeholders to uphold standards of integrity in these meetings, but also incentivise regulators to consult more broadly.

F.131 Highways England also referred to a variety of ways of embedding transparency into processes, including undertaking Regulatory Impact Analyses.

F.132 HORIBA MIRA recommended that members of the public should be able to report unacceptable behaviour which they witnessed:

> *There should be a means for members of the public and industry to raise concerns to the approval authority. For example, if vehicles appear to be breaking laws or acting antisocially (e.g. clogging up roads by cruising at low speeds between paid journeys), such intelligence should be able to be collected.*

F.133 Stagecoach Group considered that "there needs to be independent oversight of the regulator by way of review and audit". DLG suggested that the regulator "should report into another body (for example, the Transport Select Committee) to ensure regulator accountability". George Atkinson wrote:

> *Just as the HM Inspectorate reports on the effectiveness of policing and other bodies so the Regulator should come under similar scrutiny. Further, the Regulator will be of great interest to a Parliamentary Select Committee, their presence and actions closely monitored and challenged by road safety organisations.*

F.134 Craig Broadbent said that a whistleblower system should be available "against deliberate hiding of uncomfortable facts" and that board members' terms should be time-limited ("10 years would seem reasonable with two terms").

G. Investigating traffic infractions and collisions

OVERVIEW

G.1 In Chapter 11 we considered two challenges. The first was how to deal with breaches of traffic rules. The second, was how to learn from collisions so as to promote a safety culture.

G.2 In both cases we proposed a move away from the current emphasis on the criminal prosecution of human drivers. Instead, we proposed that the in-use safety assurance scheme should investigate breaches of traffic rules and apply a flexible range of regulatory sanctions. This drew general support, with three quarters of respondents agreeing with the proposal.

G.3 We also highlighted the need to learn from collisions in a way that promotes a culture of safety. We proposed a small specialist investigation unit to analyse data on collisions involving automated vehicles. It would also investigate the most serious, complex or high-profile collisions and make recommendations to improve safety without allocating blame.

G.4 Finally, we touched on how to adapt road rules for automated vehicles. Our first consultation paper (CP1) noted that AVs will need to abide by current road rules but that blind obedience to rules can cause problems. After analysing responses to CP1, we concluded that it would not be appropriate for the Government to attempt to turn the current highway code into algorithms for AVs. A digital highway code that sets precise values for every instance is not possible. Expecting regulators to anticipate all possible scenarios in advance would place an impossible burden on them.

G.5 However, we did think it possible to provide for a more structured dialogue between developers and regulators. To this end we proposed a forum for collaboration on the application of road rules to self-driving vehicles. This proposal had overwhelming support from consultees. Of the 75 respondents, 71 (95%) supported the proposal. Four respondents had queries about how it would function, but no one disagreed.

INVESTIGATING TRAFFIC INFRACTIONS

Q22: We provisionally propose that a statutory scheme to assure AVs in-use should:

(1) investigate safety-related traffic infractions (such as exceeding the speed limit; running red lights; or careless or dangerous driving);

(2) investigate other traffic infractions, including those subject to penalty charge notices;

(3) if fault lies with the ADSE, apply a flexible range of regulatory sanctions.

Do you agree?

G.6 In Consultation Paper 1 we proposed that the human in the driving seat should no longer be liable for any dynamic driving offences committed when a vehicle is driving itself. This led to the question of what should happen if a vehicle carries out a manoeuvre which (if done by a human) would amount to an offence.

G.7 In response to Consultation Paper 1, there was widespread agreement that if a prohibited manoeuvre appears to have been caused by an ADS, the police should refer the matter to a regulator for investigation. The regulator should apply a range of regulatory sanctions to the ADSE, including improvement notices, fines and (if necessary) withdrawal of authorisation.

G.8 In Question 22 we provisionally proposed that the in-use scheme should investigate all traffic infractions which appear to have been caused by an ADS, even those which are not related to safety. We highlighted that although contraventions such as the wrongful use of bus lanes may not be safety critical, they are against the public interest and evidence that something has gone wrong with an ADS. We noted that most systems of market surveillance are not confined to safety in a narrow sense. They also consider other ways in which products may infringe the public interest.

G.9 There was strong support for this proposal. Of the 73 respondents who answered, 54 (74%) agreed, three (4%) disagreed and 16 (22%) answered "other".

Agreement

G.10 Amongst consultees there was widespread support.

> *APIL agrees with this proposal because AVs should not be permitted to break ordinary traffic laws and regulations. There must be an effective mechanism to deal with AVs that fail to abide by existing traffic laws and a statutory method to take up traffic infractions with the manufacturers of the AV in question in order to rectify the issues. It would be incorrect to assume that the criminal code would apply to ADSEs in the same way as it would a driver of a normal vehicle. A flexible range of regulatory sanctions would be appropriate to deal with traffic infractions.* [APIL]

> *AXA agrees that the statutory scheme should investigate traffic infractions and if fault lies with the ADSE the police should refer the matter to the regulator for investigation. A flexible range of regulatory sanctions will be necessary, including improvement notices, sufficient fines, recalls and withdrawal of authorisation.* [AXA UK]

G.11 Many consultees agreed that the scheme should extend to all traffic infractions, not just those which were safety critical. As FirstGroup said:

> *A bus service held up by an automated vehicle which has strayed over the bus lane marking may have a significant adverse impact on up to 100 people, and this needs to be taken into consideration. Except in unavoidable emergency situations (as explored elsewhere in the consultation) such an infringement should not be treated any more lightly than a safety critical one.*

G.12 The SMMT also agreed, provided that the process adopted "a collaborative approach involving national and/or local enforcement bodies":

> *The in-use safety assurance agency, or the police, should inform the ADSE of the traffic infractions, present the supporting evidence and request the identified problems to be resolved. This does not mean the ADSE could avoid being issued a penalty charge notice if the traffic offence is proven to be the fault of the ADS. Failure, or continuous failure, to resolve the identified problems should result in appropriate, or escalating, sanctions.*

Learning from infractions

G.13 Several respondents highlighted that the proposed system could provide regulators with valuable safety information. Lessons learned could be fed back into the initial safety assurance process:

> *We agree that investigating both safety-related and other traffic infractions, including those subject to a penalty charge notice, is appropriate. This investigation would help build a picture of why certain infractions are occurring and provide the understanding to remedy them, improving both safety and compliance. This has the potential not just to relate to a single operator but also to drive improvements across the entire CAV ecosystem.* [TfL]

> *Yes. In use monitoring needs to align with behavioural rules and identify anything that goes beyond these rules. Breaches need to be categorised and investigated – in the same way as a collision would be investigated. Learning should be fed back into the development of rules, scenarios generated for validation and safety goals.* [PACTS and TRL]

Creating a collaborative "no blame culture"

G.14 Several respondents saw this system of regulation as promoting a no-blame safety culture. Encouraging transparency and openness would allow developers and regulators to collaborate and would reassure the public:

> *We support this as a mechanism to create a transparent no-blame culture for safety in use.* [Wayve]

> *We firmly believe that there needs to be a very open and collaborative approach to such matters otherwise there will be a lack of confidence and trust from the driving public and other road-users.* [Zurich Insurance]

G.15 To this end the ABI and Thatcham Research stressed that the emphasis should not be on the sanctions but rather on collaboration, trust and openness:

> *This needs to be an open and transparent arrangement to promote vehicle manufacturer safety upgrades and to build trust, rather than solely focusing on sanctions.*

Relying on reports from the police and local authorities

G.16 In Consultation Paper 1 we gave speeding as an example. A speed camera detects a vehicle driving at 37 miles an hour in a 30 mile an hour area and the police serve a notice of intended prosecution on the registered keeper. We proposed that if a vehicle was driving itself at the time, the registered keeper would provide the relevant data to the police. If the problem appeared to lie with the software, the police would submit the issue to the in-use regulator.

G.17 There was widespread agreement with this approach. In Consultation Paper 3 we said that these proposals remain part of our proposed scheme.[44] They would not only apply to speeding but to the range of dynamic driving offences and civil penalties.

G.18 Many consultees stressed that the scheme should rely on reports from the police and local authorities in this way:

> *Yes, but only if by investigate you mean process and act upon reports from other agencies, such as local authorities and the police. Otherwise, it would be an impossibly large task, particularly if it covers non-safety-related infractions, such as driving in a bus lane or blocking a box junction.* [IHE]

> *Yes, but on referral from a policing or enforcement body.* [Dean Hatton of the NPCC]

> *In order to avoid any overlap between the enforcement powers of local police forces and any regulator(s) – with duplication of effort – we would propose that infractions should continue to be investigated by police in the way, with a power to make referrals to the regulator(s) as appropriate.* [BLM Law]

G.19 Consultees also highlighted the importance of working with local authorities and the police before designing the system:

> *We would consider it essential for the practicalities of this proposal to be discussed in detail with the police and other enforcement agencies ahead of any final recommendation.* [TfL]

> *Consider creating a data standard across both local authority and police data to ease collation. How would a local authority know if an AV was in self-driving mode when a parking contravention takes place? Issuing Penalty Charge Notices would need to be consistent across all local authorities.* [BPA]

[44] CP3, para 11.18.

G.20 However, a few consultees thought that the ADSE should be required to report legal breaches to the regulator. Burges Salmon LLP said:

> *We remain of the view as expressed in our previous responses that the ADSE should have obligations to report legal breach incidents (especially where they relate to safety) as the ADSE is responsible for the ADS. This would be analogous in some ways to how transport operators and commercial fleet operators would be required to report under Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR) as well as industry-specific reporting obligations in the likes of the rail, marine and aviation industry.*

G.21 Burges Salmon LLP thought that only some incidents should be investigated:

> *There should be a threshold or level of discretion for regulators and investigation authorities as to when incidents merit investigation and as to the extent of investigation. This may mean for example that in early phases of deployment most incidents are investigated but as AV volumes increase, full investigations are utilised only for those incidents with the most complexity or severity or breadth of impact. Mandating that every reported incident is investigated could otherwise become unwieldy and overly burdensome if not impossible in practice. This would reflect the investigatory remit and discretion of the likes of the HSE, the ORR and the RAIB and other investigation branches.*

Imposing sanctions on other parties

G.22 Pinsent Masons LLP thought that the regulator should have the power to sanction other parties who may also have been involved in an incident:

> *if the fault results due to an external factor, we may be in a situation where no one will be held responsible which is not desirable, or where even if someone if held responsible no real changes are implemented (e.g. some TROs will continue to not be available in digital form). The regulatory framework should seek to deal sanctions applicable not just to the ADSE. Ensuring the safety of AVs and of the general public should be a joint effort and everyone should be equally stimulated to participate, learn and improve (particularly where there may be significant costs to rectify any potential problems).*

Disagreement

G.23 Only three consultees disagreed with the proposal. Paul Bates of Prime Conduct felt that the appropriate action for infractions was "to fine the software company 1% of global revenue in order to achieve safety".[45]

G.24 Stellantis and Renault also disagreed, giving the same response. They said that in the case of a traffic related infraction:

[45] Responding in a personal capacity.

the authorities should inform the OEM and should request the defect to be resolved. Sanctions can only be imposed on the OEM when technically this has been proven. [Stellantis] [Renault]

THE RANGE OF REGULATORY SANCTIONS

Q23: We provisionally propose that the regulator which assures the safety of AVs in-use should have powers to impose the following sanctions on ADSEs:

(1) informal and formal warnings;

(2) fines;

(3) redress orders;

(4) compliance orders;

(5) suspension of authorisation;

(6) withdrawal of authorisation; and

(7) recommendation of attendance at a restorative conference.

Do you agree?

G.25 The great majority of respondents agreed. Of the 68 consultees who responded to this question, 58 (85%) thought that the regulator should have the power to impose all of these sanctions. Nine respondents answered "other" and only one answered "no".

Agreement

G.26 In agreeing with this proposal, consultees stressed the need for a wide range of graduated sanctions:

> *We agree that each of these could have a place in a regulator's toolkit, where measures are gradual and proportional. We suggest the approach taken by this regulator should encourage mutual learning in the industry during early AV deployments.* [Wayve]

> *I am in favour of providing regulators with all the powers they may need, even if some of them turn out to be rarely used. Regulators without sufficient powers can be rendered impotent and it seems to be very difficult to provide them with an additional power even if the need seems obvious.* [John Rainbird]

> *The regulator should have access to a range of sanctions to be applied depending on the circumstances. Fines should be designed to avoid ADSEs simply being able to buy themselves out of any wrongdoing and should be combined with other measures to ensure infractions do not happen again.* [Dean Hatton of the NPCC]

G.27 The Bar Council also agreed but cautioned that "care must be taken to ensure that serious transgressions receive appropriate sanctions":

> *For example, the prospect of senior managers who have cut corners to save money – that is, acted in a morally reprehensible way – and thereby holding some responsibility for a death, albeit perhaps very remotely, avoiding*

criminal liability and instead… merely meeting the deceased's relatives to discuss future improvements, is not one the public are likely to relish.

Specific concerns

G.28 The SMMT agreed with these sanctions, subject to three safeguards:

> • *The automated driving system entity must first be informed of the offence(s) and be shown the evidence;*
>
> • *Provision has been made for self-reporting, collaborative investigation, resolution of the identified issues and, if necessary, product recall; and*
>
> • *The sanction is proportionate to the offence and its consequences, and escalated appropriately, with the severest, i.e. (5) and (6), reserved for cases of gross negligence or for serial offenders.*

G.29 Pinsent Masons LLP said that the regulations should be clear about what will happen to vehicles already in use if authorisation is suspended or withdrawn:

> *Will users be prohibited to use the vehicles for the duration or the suspension or from thereon? Presumably without the oversight of the ADSE the vehicles would no longer be deemed safe. If that is the case, will users be compensated or how will the effect on individual users be dealt with?*

G.30 FOCIS highlighted that in addition to these sanctions it would be appropriate for the regulator to be able to order the ADSE to pay legal costs:

> *Yes, but we would add that in addition to fines the regulator ought to also have the power to order for the ADSE to pay reasonable legal costs both of the regulator and of adversely affected parties (notably accident victims).*

Disagreement

G.31 Only one respondent disagreed with the proposal. Instead, Craig Broadbent felt that criminal sanctions would be more appropriate. They commented that "these complex systems will at any rate make apportioning of blame near impossible".

REGULATOR DISCRETION OVER PENALTIES

Q24: We provisionally propose that the legislation should provide the regulator with discretion over:

(1) the amount of any monetary penalty; and

(2) the steps which should be taken to prevent re-occurrence of a breach.

Do you agree?

G.32 In Chapter 11, we noted that the Regulatory Enforcement and Sanctions Act 2008 provides regulators with considerable discretion. We commented that they "give for considerable discretion in this area".[46]

[46] CP3 para 11.48.

G.33 Two thirds of respondents agreed. Of the 69 respondents, 46 answered "yes" (67%), two (3%) answered "no" and 21 (30%) answered "other".

G.34 Most respondents who agreed with the provisional proposal did so without any further elaboration.

Setting the amount of monetary penalties

G.35 Several developers answered "other", arguing that monetary penalties should be subject to a clear framework and a maximum amount.

G.36 The SMMT said that the amount of any monetary penalty must be "within a reasonable range" or have "a maximum amount stated in legislation":

> *For example, the UK Data Protection Act 2018 sets a maximum fine of £17.5 million or 4% of annual global turnover, whichever is greater, for infringements, while the maximum civil penalty under the Housing and Planning Act 2016 is £30,000 per offence. Otherwise, affording the regulator complete discretion on the amount of monetary penalty could result in the regulator imposing disproportionately high fines, such as those imposed by the National Highway Traffic Safety Administration in the US. This may deter innovation in automated driving technology and discourage reasonable and proportionate risk-taking by automated driving system entities (ADSEs).*

G.37 Both Five AI and Wayve said that the regulator should develop a framework to ensure that sanctions are proportionate and consistent. Five AI went on to say that the framework should foster an open culture and ensure that penalties were not politically motivated or influenced by extraneous factors. In setting the size of the monetary penalty "it may be appropriate to take into account the overall value of the deployment and size of undertaking". However:

> *There should also be an effective mechanism to enable the type and level of penalty to be independently reviewed. An upper limit or limits should be set on the amount of any monetary penalty.*

G.38 From a different perspective, the ABI and Thatcham Research said that where a monetary fine is necessary, the amount should ensure:

> *that it is punitive and would not simply encourage the ADSE to pay the fine and not address the issue.*

Preventing re-occurrences

G.39 Only a few responses addressed the second part of the proposal, to give regulators the discretion to set out steps the ADSE should take to prevent similar breaches in the future. Oxbotica saw this part of the proposal as having similarities with the current HSE regime. They suggested an alternative approach:

> *This question suggests a regime similar to the HSE, who may issue an improvement or enforcement notice requiring steps to be taken to prevent future similar incidents, where the breach was particularly serious. The difficulty here is having the expertise within the regulator to determine those*

steps and enforce them. A better approach would be to require the ADSE to demonstrate within a certain time frame that they have taken appropriate steps to comply with the relevant standard after a breach.

G.40 NFU Mutual said that a register of sanctions should be publicly available:

> *We would suggest that the regulator should also maintain a register of improvement notices etc which can be accessed online to maintain public confidence levels.*

A SPECIALIST INVESTIGATION UNIT

Q25: We provisionally propose that a specialist collision investigation unit should be established:

(1) to analyse data on collisions involving automated vehicles;

(2) to investigate the most serious, complex or high-profile collisions; and

(3) to make recommendations to improve safety without allocating blame.

Do you agree?

G.41 A clear majority of respondents agreed with this proposal. Of the 82 respondents, 67 answered "yes" (82%), four (5%) answered "no" and 11 (13%) answered "other".

G.42 Respondents who agreed with the proposal highlighted that a specialist accident investigation would be needed for AVs as these investigations would require new types of expertise. Others also highlighted that an independent investigation of incidents could lend significant learning to the safety assurance process. Some also highlighted that an investigation branch similar to the accident investigation branches in other transport sectors would be ideal:

> *If automated cars malfunction, they are likely to do so in ways which are unfamiliar to coroners or police officers. Understanding the causes of such failure will involve new types of expertise.* [RoSPA]

> *AXA strongly agrees that to ensure accidents involving advanced driver assistance systems or driving automation systems are investigated appropriately, it is imperative to establish a specialist investigation unit or to extend training and resource to existing roads policing officers. Given the high-profile nature of this technology, a specialist investigation unit would be preferred because it would have greater scope to develop expertise, make recommendations to improve future safety and promote a no-blame collaborative culture of safety. Furthermore, public attitudes to safety and compliance may be improved by the symbolic significance of a specialist unit, putting road transport in alignment with other sectors such as aviation and rail. AXA would welcome the inclusion of a specific responsibility for the specialist unit to share their incident reports with relevant stakeholders, including insurers.* [AXA UK]

> *Given that all parties will be learning from the deployment of automated vehicles, it seems appropriate that in the first instance a specialised unit be established.* [FirstGroup]

Yes. We agree that a specialist collision investigation unit should be established to analyse data on collisions involving automated vehicles and to investigate a subset of collisions. It is important to note that the NTSB in the US also investigates near miss collisions of AVS as well as the most serious, complex and/or high-profile collisions, as significant safety learning can come from near-miss collisions. Therefore, we would recommend this is also in scope for a specialist investigation unit. [RAC Foundation]

An independent collision investigation unit with trained personnel could provide huge insight into how to reduce collisions. Especially where there is a novel pattern, for example, where oddities in the road design could have been a contributing factor across systems from multiple ADSEs. [Oxbotica]

A specialist collision unit, similar to the Air Accident Investigation Branch (AAIB) with legislative powers sounds like a logical step. With the lengthy introduction of AV's onto public roads, the police force will have little to no knowledge of how to analyse relevant data acquired from AVs involved in accidents. [Highways England]

We would propose an investigative body akin to the Rail Accident Investigation Branch who look into events occurring on the railway. [Stagecoach Group]

A road traffic investigation branch

G.43 Many respondents who agreed felt the accident investigation branch should not be limited to automated vehicles, rather it should be an accident branch for all road traffic accidents:

A road accident investigation branch, on the lines of AAIB, MAIB and RAIB has been long needed, It will be even more important with AVs, but should not be limited to AVs. [Christopher Mitchell]

It is increasingly recognised that road deaths and injuries are not inevitable and should not be accepted as such. A specialist collision investigation unit should be established – not just to investigate AV collisions – but all serious, complex and high-profile road traffic collisions where there is potential for learning that will help to improve safety in the future. [Urban Transport Group]

The scope of the new AIB

G.44 In Consultation Paper 3, we noted that some accident investigation branches do not investigate all accidents, rather they only undertake analysis of the most serious, complex or high-profile incidents. This allows the accident investigation branch to maximise learning and make the best use of their resources. The NTSB in the United States, for example, only undertakes investigation on a subset of the thousands of accidents that occur yearly on roads in the US.

G.45 However, several respondents felt that care should be taken with circumscribing the scope of the accident investigation branch. They highlighted that the branch should focus on all accidents where lessons can be learnt. These might involve less complex

incidents, “near-misses” and accidents involving conventional vehicles. One respondent felt that all collisions and near-misses should be investigated:

> *The remit of focussing upon “the most serious, complex or high-profile collisions” could potentially be to narrow. The selection of which cases to pay closer attention to should be based on the overall risk to the public, bearing in mind likelihood as well as severity. Therefore, less serious, complex and high-profile collisions would be worthy of investigation if there is a pattern in the high-level accident stats indicating that there might be an issue that a large number of people are exposed to.* [HORIBA MIRA]

> *We would also extend this to include not only AV collisions but all serious, complex and high profile collisions if this would allow for learning and improve safety*. [TfWM]

> *we do not believe it should merely investigate “the most serious, complex or high-profile collisions.” It should investigate all collisions and near-misses – in line with our previous support for the principle of investigating ‘leading’ (as well as ‘lagging’) incidents (see our response to Q18). Crucially, it should start doing this in the very early days of the development of AV technology – i.e. it should be established as soon as possible – before the number of such incidents grows to unmanageable levels. The aim must be to eliminate as many potential flaws in AV technologies as early as possible.* [Cycling UK]

> *I would go further and suggest that the specialist incident investigation unit should investigate ALL AV collisions… Minor collisions may occur which could help identify problems which might cause more severe incidents later… Also, who would decide what was serious, complex or high profile?* [Richard Morris of Innovate UK]

G.46 By contrast the SMMT thought that narrowing the remit of the investigation branch would be beneficial. Doing so would ensure that there would be no overlap with the ongoing “day-to-day” work of the police in relation to road traffic incidents:

> *We agree with the above proposals as long as the special incident investigation unit investigates only the most serious, complex or high-profile collisions and focuses on learning the lessons from incidents to make recommendations for safety improvements rather than determining where liability should lie. This will ensure there is no overlap with the police, who will continue to investigate day-to-day incidents, and with the in-use safety assurance scheme that will monitor how automated vehicles perform in real world traffic. However, it must be clarified whether the special incident investigation unit, while not allocating blame, has the power to advise the in-use assurance regulator to reduce or increase any regulatory sanctions already imposed. There should also be greater clarity on how the special incident investigation unit will work with local authorities, particularly in the context of Highly Automated Road Passenger Services.* [SMMT]

Working with the Police

G.47 Many consultees, whilst agreeing with the need for a specialist investigation branch highlighted that any such branch would need to work alongside the police:

> *We agree that the police have significant experience and expertise in attending to and investigating collisions involving human-driven vehicles. This will continue to be vital to dealing with the aftermath of HAV collisions, and understanding what happened in them (although the "what" will be potentially be simpler given the potential of HAVs to record data). However, understanding why a collision involving a HAV occurred will require an additional skillset covering AI, robotics, and error finding in complex software systems. Therefore we suggest that a specialist body is needed, but it should work very closely with police accident investigation units.* [The CertiCAV team at Connected Places Catapult]

> *This should not replace the involvement of the police, but be additional to it, given that the police cannot be expected to have the necessary expertise and resources to investigate some of the issues in full.* [Sally Kyd of the University of Leicester]

> *We agree that a specialist collision investigation unit would be useful for the reasons that have been highlighted i.e. to develop and provide expertise to ADSEs and regulators, promote compliance without formal sanctions, and promote a no-blame culture of safety. It could also address the inefficiencies of multiple police forces having specialist road traffic accident divisions as they do today. Given the automated nature of the technologies, it could be reasonably assumed that issues will be pervasive and cross-cutting. Whilst local data capture by attending traffic and police officers, analysis could therefore be done centrally.* [KPMG]

> *TfL considers the Metropolitan Police Service (MPS) role in helping keep London's roads safe absolutely critical and want to ensure the importance of local roads policing and collision investigation is not diminished through the creation of a national regulator. Where there are risks identified relating to an ADS being the cause of a collision, we could see a role for a national regulator to support the investigation into the manufacturer, but expect the MPS or relevant local police collision investigation unit to continue to lead that work with their expertise.* [TfL]

Making data available

G.48 Some consultees stressed the importance of a collaborative approach to sharing data from incidents involving AVs. The ABI and Thatcham Research highlighted that any data collected would be useful to select parties such as insurers and the findings of the specialist unit should be made available to them:

> *Yes, this needs to be multi-disciplinary and cross functional. Key questions will remain about oversight as well as how this special incident investigation is funded. We would like to use this opportunity to reinforce the need for ADS to collect data and for that data to be accessible. The findings of this specialist incident investigation unit should be made available to select parties. The*

rationale is to prevent overlap given that a large proportion of collision investigations are carried out by insurers. There also needs to be consideration for the investigation of smaller, less-serious collisions as a pattern of these incidents may pre-empt larger issues.

G.49 Pinsent Masons LLP also emphasised the sharing of data in their response. They felt that an incident investigation branch that investigates the causes of incidents, rather than allocates blame, would encourage manufacturers and developers to share safety related data:

> *In the interests of safety, a body created to investigate collisions purely in the interests of increasing the safety of road users seems like a sensible proposal. Manufacturers, developers, and other stakeholders may be more inclined to provide data on the understanding that safety improvement recommendations will be made without the consideration of allocating blame to the user, developer, or other parties.*

Disagree

G.50 Only four consultees disagreed with the proposal. The strongest theme in these responses was that the Police already have the capability to investigate collisions, therefore a specialist investigation branch was not needed. Though the IHE noted that the Police would probably require additional resources to cover incidents involving AVs:

> *UK Police forces, and specifically the MPS have dedicated collision investigation teams, that deal with fatal/serious, complex and high profile cases. The forming of a specific team to deal with AV, creates an unnecessary tiered level of investigation. Additionally local collision investigation teams provide a timely response to scenes to capture critical evidence, manage the scene, the injured party and their families, along with management of road closures.* [Andrew Cox of Lincolnshire Constabulary and the National Collision Investigation board]

> *The police have the expertise to investigate individual accidents and to follow up with any resulting processes, including identifying unregistered and uninsured vehicles and dealing with other crimes that may be encountered at the same time. A separate unit could not investigate successfully without the power to take witness statements (under caution if necessary), so would need to be in effect a police force anyway. The police will clearly need a much higher level of resource to cover this function, and it may need to be a central unit covering several (or all) police forces, but it should remain under the control of chief constables.* [IHE]

Other

G.51 Those that responded "other" did so for a wide variety of reasons. Clarity on the structure and practicalities of such a branch was a common theme. Dean Hatton of the NPCC, for example, wanted more clarity on the proposal:

> *I think this needs further explanation. I can conceive of some sort of body to offer expertise and specialist advice, but given I have also said investigations*

should be referred by police, it follows they may keep those where there is need for a criminal or coronial investigation. There is a risk of creating a hierarchical approach to investigations.

G.52 Driverless Futures? was concerned that such a branch was inappropriate in an underdeveloped industry. Care should be taken not to be seen to be promoting a system which seeks to avoid blame. Given that AV technologies are nascent and still being developed a no-blame culture would lack public credibility:

> *If the wider system is seen as avoiding blame, it will lack public credibility. Individuals and organisation may need to seek redress after a collision. We should not presume that AVs will make current patterns of liability redundant. The protection of consumers in terms of product liability and vulnerable road users may become more important than ever. The NTSB's motto that "anybody's accident is everybody's accident" is laudable, but a crash investigator will only be one part of the legal system. Other parts of the system should be asking where responsibility lies, rather than helping irresponsible actors escape blame. No-blame safety cultures are encouraged in highly-regulated, high-reliability systems where technologies are established and systems are looking to eradicate egregious mistakes. Where rules are sparse, as with AVs, such an approach could be seen as an endorsement of recklessness. A no-blame culture when prototype technologies are being tested in public could be seen as organised irresponsibility.*

A FORUM TO ADAPT ROAD RULES

Q26: We provisionally propose that the UK Government should establish a forum for collaboration on the application of road rules to self-driving vehicles.

Do you agree?

G.53 The vast majority of respondents agreed with this proposal. Of the 76 respondents, 72 answered "yes" (95%), and four (5%) answered "other. No one disagreed with the proposal.

Agreement

G.54 The main reasons for agreeing with this proposal was that it would promote safety and consistency, and would facilitate discussion between developers, regulators and road users:

> *Yes. We concur that collaboration among a range of stakeholders (to include developers and regulators) is vital to promote both safety and practicability in the application of road rules to self-driving vehicles. There is a need for consistency of approach among developers of ADSs having regard to scenario based algorithms…. As automated vehicle development is still very much in its infancy, a fluid attitude should be adopted that is able to be adapted as a bank of 'real world' use cases / evidence builds in the first few years post-deployment.* [DAC Beachcroft LLP]

> *Agree. This could be broadened to an 'AV behavioural safety' forum to encompass not only road rule compliance but also interactions with other road*

users (especially vulnerable road users), any emerging issues related to safety during transitions between automated modes and any behavioural issues associated with the emergence of new business models for AVs. Unless it has a separate forum of its own, this group could also cover issues associated with interactions between disabled users / travellers and AVs. For example, how an AV alerts a blind user to its presence, how wheelchair users be safely secured in a robotaxi etc. [Reed Mobility]

International co-operation

G.55 Some consultees thought that a UK forum was desirable but the forum should also cooperate with international work on AV safety:

> *While it is understandable that such a forum may wish to consider the application of specific road rules in Great Britain to automated vehicles, we suggest such forum must not be detached from the wider discussions and conventions adopted internationally at WP.1 of the UNECE.* [SMMT]

> *We agree so long as such a forum is neither parochial nor divorced from the wider discussion required to assure that there is no unexpected or unwarranted divergence in the expected behaviour of autonomous vehicles in different jurisdictions. This appears to us to be an area where the focus should be on international cooperation.* [Faculty of Advocates]

Calls for a full digital highway code

G.56 Some consultees saw a forum as a first step towards a full digital highway code. As Mobileye put it:

> *A dialogue between developers and regulators regarding the application of road rules to self-driving vehicles is desirable. However, eventually, it is the concern of the state, in accordance with its priorities, to determine principles and precise rules for ADSEs to follow. In Mobileye's opinion, creating a digital code for this purpose is possible and desirable, and Mobileye's RSS could serve as a basis for such code….*
>
> *Mobileye is aware that the Law Commission's current stand is that a digital highway code that sets precise rules for every instance is not possible…. However, after years of research and testing Mobileye stand behind its position that the RSS can do just that.*

G.57 Mobileye invited the Law Commissions to continue dialogue and to reconsider the feasibility of a code based on Mobileye's Responsibility-Sensitivity Safety (RSS), a safety model which formalises safe driving behaviours using mathematical formulas and logical rules. It continued:

> *Lastly, Mobileye would like to stress the importance of programming AVs so they will be allowed to depart from road rules when it is safe and in order avoid collisions. In the case of human drivers, when discretion is examined ex-post, it is clear that many times departing from road rules is found to be necessary. With AVs there is no option other than defining these scenarios ex-ante. The task of doing so might be complicated, but it is not something*

that can be neglected or postpone. Blind obedience to rules is not safe, and thus this issue must addressed pre-deployment.

G.58 Motional also advocated working with international organisations with the eventual goal of creating "a comprehensive behavioural model":

> *We would recommend working closely with developers and bodies responsible for determining acceptable AV behaviours that do not arise explicitly from rules of the road, with the goal of eventually harmonizing safety models and rules of the road into a comprehensive behavioral specification. Key entities that work on behavioral specifications include the UNECE, the Society of Automotive Engineers (SAE), and the Institute of Electrical and Electronics Engineers (IEEE).*

G.59 Sally Kyd of the University of Leicester agreed that the forum should be advisory, However, she also thought that, over time, it should develop a version of the Highway Code for AVs:

> *Such a forum should be advisory but over time it would desirable to develop a version of the Highway Code specifically for AVs, taking account of what is discussed in this forum. If developing such a Code required changes to legislation, it would of course then have to go through the relevant channels (parliament if it involved changes to legislation).*

HOW THE FORUM WOULD WORK

Q27: We welcome views on:

(1) the issues the forum should consider;

(2) the composition of the forum; and

(3) its processes for public engagement.

G.60 This question received a diverse set of responses. Most respondents concentrated on one of the components of the question rather than on all three.

Issues that the forum should consider

G.61 Consultees felt that collaboration and discussion was needed on what behaviours would be appropriate for AVs in different scenarios.

G.62 PACTS and TRL thought that a good starting point would be the behavioural rules which developers are already working on:

> *Behaviour rules have started to be developed by software developers – where possible this existing understanding should be built upon rather than starting from the beginning. There needs to be established rules and a process for adapting and amending these to reflect developments and learning.*

Composition

G.63 Most respondents felt that a diverse range of stakeholders, representing all interested parties would be appropriate. This would include regulators and developers but also a

wide range of other road user groups and the wider public. Zurich Insurance, for example, said:

> *A diverse range of relevant stakeholders including road safety organisations, emergency services, vehicle manufacturers, software engineers, data managers, insurers, etc. should be represented.*

Engagement with the public

G.64 Driverless Futures? emphasised the importance of engaging with the public:

> *The forum should commission and act upon public engagement and social research. Successful models would include the Human Fertilisation and Embryology Authority, which governs new reproductive technologies, and the Human Genetics Commission. Our project, and bodies such as Sciencewise, the Ada Lovelace institute and the Centre for Data Ethics and Innovation can advise.*

H. The user-in-charge

OVERVIEW

H.1 In Chapter 12, we developed the concept of a "user-in-charge", first introduced in Consultation Paper 1. A user-in-charge can be thought of as a human in the driving seat of a self-driving vehicle when the automated driving system (ADS) is engaged. Their main role is to take over driving, either following a transition demand or because of a conscious choice. A user-in-charge would not be responsible for the dynamic driving task but would have other responsibilities (such as carrying insurance and reporting accidents).

H.2 We asked if a user-in-charge should be defined as an individual in position to operate the controls of the vehicle, who is either in the vehicle or in direct sight of the vehicle. Although this was generally supported, consultees expressed concern about extending the definition to "direct sight of the vehicle".

H.3 We then considered the handover between the ADS and the user-in-charge. Under our proposals, a user-in-charge who resumes manual driving would become a driver and would therefore acquire the legal obligations of a driver. The user-in-charge would also acquire the obligations of a driver if they failed to take control of the vehicle at the end of a "transition demand". The majority of respondents agreed with these proposals, with many stressing the need to communicate responsibilities clearly.

H.4 There was a high level of agreement that legislation should create new offences of using an automated vehicle (AV) as an unfit or unqualified user in charge; and causing or permitting the use of an AV by an unfit or unqualified user-in-charge. A slightly smaller, but still considerable, majority agreed that it should be an offence to be carried in a vehicle without a user-in-charge, so long as the passenger had the requisite knowledge.

H.5 Building on a discussion in our first consultation paper, we considered how to deal with problems which straddle the handover from machine to human. What if an ADS initiates a problem by (for example) turning the wrong way into a one-way street – how should one allocate criminal liability if the human takes over driving but fails to prevent a collision or offence? Over three-quarters of respondents agreed with our proposal that users-in-charge should have a specific and limited defence if, given the actions of the ADS, a competent and careful driver could not have avoided the offence.

H.6 Finally, respondents agreed that the user-in-charge should be liable for criminal offences which do not arise from the dynamic driving task, such as reporting accidents and ensuring children wear seatbelts. There was near unanimous support for a regulation-making power to clarify which roadworthiness failings are the responsibility of the user-in-charge.

THE CONCEPT OF A USER-IN-CHARGE

Q28: We provisionally propose that that the user-in-charge:

(1) should be defined as an individual in the position to operate the controls of a vehicle while an ADS is engaged and who is either in the vehicle or in direct sight of the vehicle; and

(2) is not a driver while the ADS is engaged, and would not be liable for any criminal offence or civil penalty (such as a parking ticket) which arises out of dynamic driving.

Do you agree?

H.7 This question received mixed responses. Of the 79 respondents who responded, 37 (47%) agreed, four (5%) disagreed, while 38 (48%) answered "other". The part of the definition which caused respondents most concern was that a user-in-charge could be "in direct line of sight" of a vehicle. Some respondents felt this made the definition too restrictive, while others thought it too permissive, arguing that the user-in-charge should remain within the vehicle at all times. Respondents generally agreed with the principle that the user-in-charge should have immunity from dynamic driving offences.

Agreement

H.8 Just under half of respondents agreed outright:

> *I think this is a useful term that captures the role of a vehicle occupant at the controls of a vehicle but who cannot be held responsible for any offences resulting from the performance of the dynamic driving task by an ADS.* [Reed Mobility]
>
> *RoSPA agrees with the definition and the proposal that the user-in-charge is not a driver while the ADS is engaged, meaning they would not be liable for any criminal offence or civil penalty that arises out of the dynamic driving task. It would seem unfair, for example, for the user-in-charge to receive a fine because the vehicle had exceeded the speed limit while the ADS was engaged.* [RoSPA]
>
> *AVs which rely on a user-in-charge to monitor the driving task – and to be ready to resume control without warning – are dangerous, and should not be permitted for general public use. Legal responsibility for the safety of AVs must therefore rest with the ADSE [automated system driving entity] while the ADS is in operation.* [Cycling UK]

H.9 Some respondents made suggestions to clarify the definition. Five AI thought that to better accommodate the example of a user-in-charge controlling the vehicle from their phone, the definition should read: "an individual who is in a position to control the vehicle". NFU Mutual urged us to address the legal consequences of a user-in-charge becoming "physically out of position to operate the controls", such as following sudden illness.

Concerns about "direct line of sight"

H.10 Many of those who expressed reservations focused their concerns on the idea that a user-in-charge might be outside the vehicle but in sight of it.

Lack of clarity

H.11 Several respondents had concerns about clarity. AXA UK argued that the phrase "needs to be defined clearly and emphasis must be placed on the user-in-charge's ability to take over should the vehicle experience difficulties".[47] HORIBA MIRA said that the suggested limit of 20 metres (as the distance at which a number plate can be read) should be added to the definition of a user-in-charge to avoid ambiguity.

H.12 Burges Salmon LLP felt that the proposal failed to distinguish between seeing the vehicle and seeing along the path of the vehicle:

> *A dynamic driving task demands not just line of sight from user to vehicle but also functional line of sight along the path of the vehicle. Line of sight principles as applied to buses and rail (including light rail), for example, are based on how far the driver can see ahead of the vehicle along its path.*

H.13 They noted that the Civil Aviation Authority's concept of "Visual Line of Sight" also "incorporates perception of the path of the vehicle and not just sight of the vehicle per se".

Too wide

H.14 A group of respondents thought that including direct sight extended the definition too widely. The Faculty of Advocates suggested the user-in-charge should be required to be in the vehicle in all but exceptional circumstances:

> *The suggestion that a person is able to regain control of the vehicle to the extent necessary (which may not be possible remotely) merely because they are able to read its number plates also strikes us as unconvincing… This appears to us a situation that favours a bright-line rule: the user-in charge must be in the driving seat if in the vehicle or (but only if the approach taken in other respects makes it necessary to allow for the user-in-charge to be outside the vehicle) in sufficient proximity to the vehicle as to be able, within the necessary time, to get to the driver's seat and assume manual control of the vehicle.*

H.15 KPMG expressed concern that:

> *Despite clear multisensory transition demand signals, a user-in-charge that is outside of the vehicle may not be able to take over the controls of the vehicle in the same way that a user-in-charge in the driving seat can. For instance, they may use a mobile phone app to control the vehicle while not in the vehicle and therefore may not be in a position at the end of the transition demand period to re-acquire the full obligations of a driver.*

H.16 Zurich Insurance went further, arguing that the user-in-charge should be required to be in the vehicle to "be in a position to take actual control".

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[47] The IUA made a similar argument.

Too narrow

H.17 On the other hand, some respondents thought that the definition was, in the words of the SMMT, "too narrow and restrictive".

H.18 The SMMT could not envisage what sort of feature might be caught by this proviso. They pointed out that someone using current "Remote Control Parking" features would not be a user-in-charge but a driver who is "fully responsible for the operation of the vehicle". They commented that "the only known and foreseeable application of automated driving that does not require the user to be in the vehicle" is automated valet parking (AVP). However, AVP does not require the user to be in direct sight of the vehicle.

H.19 DAC Beachcroft LLP also raised AVP:

> *The forthcoming Mercedes Benz S Class will have the ability to park itself without the driver/user-in-charge being in direct sight of the vehicle provided that it is parking in a location with the required infrastructure. If the driver/user-in-charge is no longer in direct sight of the parking vehicle, will that person cease to be responsible for the vehicle? Will the car park or infrastructure operator become the user-in-charge?*

H.20 They thought that the user-in-charge should "in general" be inside the vehicle or in direct line of sight of it. However, they added that "the definition needs to account for those inevitable eventualities that will arise when neither is the case; these will increase as the technology improves".

Identifying the user-in-charge

H.21 ITS UK noted it may be difficult to identify the user-in-charge where there is more than one potential driver in the vehicle. Scarlett Milligan of Temple Garden Chambers had the same concern:

> *For example, a family could all be licensed to operate their CAV, and all be taking a journey in the CAV at the same time. Assuming that modern technology will not restrict a User in Charge to a typical 'driver's seat', will all of the adults be deemed Users in Charge? What if they had agreed that one person would be the User in Charge, thus allowing the others to consume alcohol?*

H.22 She suggested that:

> *The answer to this may be a technical one: individuals may need to 'opt in' to their legal responsibilities as a User in Charge prior to using a CAV, thereby identifying – and recording – the intended User(s) in Charge.*

H.23 The joint response from the ABI and Thatcham Research, as well as the response from Aviva Insurance, similarly suggested that to avoid ambiguity, the user-in-charge could be identified by the vehicle itself, such as by "logging in" to a system.

Exempting the user-in-charge from liability arising from dynamic driving

H.24 In Question 28(2) we proposed that user-in-charge should not be a driver while the ADS is engaged and would not be liable for any criminal offence or civil penalty arising out of dynamic driving. Most consultees agreed.

H.25 DAC Beachcroft LLP gave the following reasons:

> *First and foremost, it would be wrong for the user-in-charge to be held accountable where s/he is not in control of the vehicle. … It would also undermine one of the rationales for automated driving, which is to enable the user-in-charge to engage in other activities during road travel, as users-in-charge would feel obligated to monitor the dynamic driving task when the ADS is engaged for fear of incurring a civil or criminal liability. It follows that it would also risk undermining consumer appetite for ADS, as well as undermining public trust and confidence.*

H.26 A handful of respondents queried the reference to a parking ticket as an example of a civil penalty which arises out of dynamic driving.[48] This example was included by mistake and does not reflect our policy, which is that parking is not a dynamic driving offence.

Preventing abuse

H.27 Despite the high levels of agreement, several respondents were concerned that the immunity could be abused. Oxbotica gave an example where a driver engages an ADS in a situation where a traffic infraction is already in progress, such as when the vehicle is already above the speed limit.

H.28 Several respondents (including DAC Beachcroft LLP and KPMG) thought there should be an exception to the immunity if a user-in-charge wrongly engages the ADS where it is not capable of self-driving. Shoosmiths LLP referred to section 3(2) of the Automated and Electric Vehicles Act 2018. This provides an exception for accidents "wholly due to the person's negligence due in allowing the vehicle to begin driving itself when it was not appropriate to do so".

Disagreement and qualifications

H.29 Some respondents disagreed with the proposed immunity from civil or criminal offences. George Kenneth Atkinson thought that the person in the driving seat should remain the driver at all times, "observing and accepting responsibility for the safe travel of the vehicle". Cycling Scotland said the proposed immunity would do "little to mitigate" dangerous behaviour.

H.30 The BPA disagreed with the immunity from civil penalty, pointing out that:

> *income from Penalty Charge Notices helps local authorities to pay for road and traffic management improvements (pothole repairs etc) and this includes*

[48] AXA UK; British Motorcyclists Federation; Dean Hatton of the NPCC); DLG; Faculty of Advocates; Highways England; Scarlett Milligan of Temple Garden Chambers; Senators of the College of Justice; SMMT.

making the roads safer for motorists and pedestrians (reducing emissions by switching to electric buses etc).

H.31 Kennedys Law LLP generally agreed with the proposal, with the qualification that the user-in-charge should continue to be found civilly negligent or criminally culpable where they unreasonably failed to take back control after a "catastrophic failure" of the ADS.

HANDOVER

Q29: We provisionally propose that following the end of the transition demand period:

(1) the user-in-charge should re-acquire the legal obligations of a driver, whether or not they have taken control of the vehicle; and

(2) if, following a failure to respond to a transition demand, the vehicle stops in a manner which constitutes a criminal offence, the user-in-charge should be considered a driver and should therefore be liable for that offence.

Do you agree?

H.32 In the Consultation Paper, we discussed the "handover" between the ADS and human. Following a completed handover, the user-in-charge would become a driver. They would have all the responsibilities of a driver and be liable in criminal and civil law for infringements of road rules. This would be subject to a limited defence where the actions of the ADS made a criminal offence unavoidable, as discussed below.

H.33 In some cases, a user-in-charge may fail to respond to a transition demand to take over driving. We proposed that, following the end of a transition demand period, the user-in-charge would re-acquire the legal obligations of a driver, even if they do not take control of the vehicle. The user-in-charge would then become liable in both civil and criminal law for anything the vehicle does, subject to the usual legal rules exempting drivers from failures due to incapacitation.

H.34 Of the 80 responses to this question, a slim majority of 44 (55%) respondents agreed with the proposal; 11 (15%) respondents disagreed; and 25 (31%) answered "other".

Agreement

H.35 Many respondents agreed with the proposal. For example, DAC Beachcroft LLP noted that the distinction between a driver and a user-in-charge needed to be "clear and unequivocal" so as to "ensure road safety and to promote trust and confidence" in AVs. The MIB agreed, emphasising that "from a claims handling perspective, it will be essential to ensure that there is never any doubt about where responsibility lies". Shoosmiths LLP thought that "no other legal framework could operate successfully".

H.36 Several respondents emphasised that these responsibilities needed to be communicated clearly to users. As the SMMT said:

> *The user-in-charge must be made aware of his/her responsibilities. The law must explicitly and unequivocally require the user-in-charge to respond to a transition demand to retake control of the vehicle and clearly state the only conditions under which the user-in-charge could avoid prosecution if the vehicle comes to a stop in a manner which constitutes a criminal offence.*

Concerns

Medical emergencies

H.37 In the Consultation Paper we explained that the user-in-charge's liability following the end of the transition period would be subject to the usual civil and criminal law principles. These exempt drivers from failures due to incapacitation following (for example) a heart attack or stroke.[49]

H.38 Nevertheless, several respondents raised concerns about situations where the user-in-charge is unable to respond to a transition demand due to a medical emergency. AXA UK suggested that it may be appropriate to create an explicit exemption from criminal liability for "those failing to respond to a transition demand" due to "proven health emergency". The SMMT argued for an amendment to the Motorway Traffic Regulations "and other relevant traffic laws" to clarify this issue.[50]

Clear legislation

H.39 FOCIS emphasised the need for clear legislative drafting around this issue, stressing that it will:

> *be important to update the terminology in both the civil and criminal legislation, particularly if the user in charge is not going to be deemed a 'driver' when the ADS is engaged. It should be clear that once the transition demand has been responded to (or not), the user in charge then immediately becomes a 'driver' again, and therefore subject to the relevant standard of a human driver.*

H.40 Both Stewarts Law LLP and FOCIS raised the issue of civil liability for collisions during the transition demand, arguing that "innocent victims ought not to face the cost, delay and uncertainty of any liability disputes" during this period.

Transition demands should not be safety critical

H.41 Many responses queried whether a user-in-charge could be expected to respond to a transition demand within a short period, echoing replies to Question 1.[51] It was argued that a self-driving vehicle should always be able to reach a minimal risk condition following a failed transition demand, so that a takeover should never be safety critical. For example, Aviva Insurance, Zurich Insurance and the ABI and Thatcham Research all said that it should not "be possible for an automated vehicle to come to a halt in a manner which endangers its occupants or other road users".

H.42 Allied to this, many respondents queried whether people would be able to respond to a transition demand within the 10 second window set out in the ALKS regulation. The CertiCAV team at Connected Places Catapult said:

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49 CP3, para 12.33.

50 This issue was also highlighted by: Bryan Reimer of MIT; FirstGroup; the IUA; the MIB; and Oxbotica;

51 Concerns were voiced by a wide range of respondents, including DAC Beachcroft LLP; Mills & Reeve LLP; Mobileye; the RAC Foundation; TfL; HORIBA MIRA; British Insurance Brokers' Association (BIBA); Highways England; Kennedys Law LLP, Pinsent Masons LLP, IROHMS Simulation Laboratory, Aviva Insurance, Zurich Insurance, ABI and Thatcham Research and RoSPA.

We are concerned that this is highly dependent on the time allowed for the UIC to gain situational awareness, and the degree of distraction they had prior to the transition demand. The "end of the transition demand period" may not give them time to assess and respond to the critical situation that triggered the demand.

H.43 Kennedys Law LLP worried that the user-in-charge could be held responsible for the failures of the ADS:

> *We can see that a wilful and/or negligent failure to take back control within a reasonable time after a transition demand could and should, applying some objective standard, give rise to criminal culpability (and well-made arguments on civil negligence). However, it also seems to us very regrettable to place criminal culpability (or civil liability) on a UIC where an AV failure mitigation strategy is inadequate when compared to the strategy a human driver would adopt.*

H.44 The Institute for Transport Studies at the University of Leeds argued that our proposal took insufficient account of human factors research indicating that users misunderstand the limitations of an ADS, particularly in light of the way they are marketed. They suggested a specialised training and licensing system "where drivers are provided with comprehensive instruction about their responsibilities" and safety risks, as well as giving drivers the opportunity "to experience transition in a controlled setting".

H.45 BLM Law agreed that the user-in-charge should reacquire the legal obligations of a driver if they fail to respond to a transition demand. However, they disagreed that the user-in-charge should acquire drivers' obligations immediately after the end of the transition period:

> *Instead, we propose that the (re)imposition of liability upon a user-in-charge should be triggered only (a) at the end of a minimal risk manoeuvre, or (b) at some prior stage between the beginning of a transition demand period and the end of a minimum risk manoeuvre, when the user-in-charge has actually resumed the dynamic driving task following a clear "offer and confirm".*

CAN A USER-IN-CHARGE HOLD A PROVISIONAL LICENCE?

Q30: We seek views on whether a person with a provisional licence should be allowed to act as a user-in-charge, if accompanied by an approved driving instructor in a vehicle with dual controls.

H.46 At present, learner drivers are allowed on motorways if they are accompanied by an approved instructor in a vehicle with dual controls. We asked if learner drivers should be allowed to act as users-in-charge on a similar basis. We thought that allowing learner drivers to act as users-in-charge would enable new drivers to be trained in how to use these systems. However, responding to a transition demand could be difficult even for experienced drivers – let alone learner drivers.

H.47 Of the 66 consultees who responded, a clear majority thought that a person with a provisional licence should be allowed to act as a user-in-charge if supervised by a driving instructor in a dual control vehicle.

The case in favour

H.48 The main argument made in favour of allowing people with provisional licences to act as users-in-charge was that learner drivers should have the chance to familiarise themselves with AV technology under supervision. For example, APIL said:

> *This is the only way for people to gain hands-on experience with automated technology and will teach them the limitations of different ADSs from the outset of their driving experience. This will further enhance safety in the future.*

H.49 Aviva Insurance noted that the alternative was learner drivers "waiting until they pass their test" to find that "the next day they are behind the wheel of an AV experimenting with AV systems and capability".

H.50 The Bar Council and the Faculty of Advocates both stated that the parallel with driving lessons on motorways was appropriate. The joint response from PACTS and TRL noted additionally that currently provisional licence holders are permitted to drive vehicles with ADAS features, so that allowing them to drive AVs appears a logical response to the development of the technology.

Implications for driving instruction

H.51 Several consultees raised issues about how driving instruction might change. DAC Beachcroft LLP thought that "approved driving instructors responsible for training young drivers" should "receive special training relating to ADS". FOCIS and Highways England thought that only "AV approved" instructors should be able to supervise provisional licence holders in this way.

H.52 The ABI and Thatcham Research said that learner drivers should only engage an ADS when they have mastered the fundamentals of driving:

> *It is important that provisional drivers are taught how to use an ADS, but this should only come after the basic driving task has been mastered. ADS, in this case, should only be engaged after the instructor assesses that the provisional driver is capable of driving fundamentals and can safely respond to a transition request.*

H.53 Similarly, RoSPA suggested a phased approach where the provisional licence holder "would learn to drive in a conventional vehicle first, and when they have enough experience, they would have the option of learning to assume the role of a user-in-charge".

H.54 HORIBA MIRA took a more permissive approach, suggesting that provisional licence holders could be accompanied by any licenced driver, rather than requiring an approved instructor:

It's difficult to predict whether responding to a transition demand would be more challenging or hazardous compared to the many hazardous scenarios that learners can encounter whilst driving manually, so there doesn't appear to be evidence to justify requiring the lesson to be with a professional driving instructor in a car with dual controls, as opposed to any licence holder in any car.

H.55 A handful of respondents agreed that provisional drivers should be able to operate an ADS under the supervision of an approved instructor, but thought that the instructor should be the user-in-charge rather than the provisional driver.[52] KPMG believed that this might be the "safer option":

> *This is not dissimilar to how a typical response to an emerging road hazard would take place in a conventional driving lesson today. We believe it is reasonable to expect driving instructors to maintain situational awareness and intervene if required to avoid harm to themselves, to the learner driver or to other users of the road.*

The case against

H.56 Those who thought that provisional drivers should not act as users-in-charge argued that it would be too dangerous, even with an approved driver in a vehicle with dual controls. Zurich Insurance said:

> *Any user-in charge must be capable of taking back full control of the vehicle in a situation beyond the capabilities of the automated system and those circumstances are also likely to be beyond the safe capabilities of a provisional licensed driver.*

H.57 Logistics UK suggested that a safer alternative would be to expand the situational judgment element of the theory test using computer-generated imagery.

H.58 Some argued for restricting users-in-charge to experienced drivers. FirstGroup suggested a "minimum period of experience" of twelve months specific to the "vehicle category in question". Similarly, BLM Law argued for "a form of graduated licence":

> *We would propose that newly qualified drivers may act as a user-in-charge after, for example, 1 year post qualification, and – in those circumstances – only where accompanied by an approved driving instructor in a vehicle with dual controls.*

The need to rethink driving training

H.59 Several stakeholders raised wider questions about driver training for AVs. The joint response from PACTS and TRL asked:

> *Do current driver license holders need to take further training and/or additional testing to act as a user-in-charge? Does this question have different answers*

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[52] This included Momentum Transport Consultancy, Stagecoach Group, and the Trustworthy Autonomous Systems Hub.

for different licence types? For example, should coach and HGV drivers be required to undertake training and examination, but car drivers not?

H.60 AXA UK similarly asked, "how best to categorise an automated vehicle on UK driving licences". The IUA highlighted the need to "ensure that there is sufficient training for existing drivers as well as novices". The Urban Transport Group mentioned the possibility of additional tests for drivers before being allowed to use an AV.

H.61 The ABI and Thatcham Research thought that the "function or role" of driving licenses may need to be reassessed, but at "a point in the future" rather than in the initial stages of deployment.

USERS-IN-CHARGE SHOULD BE QUALIFIED AND FIT TO DRIVE

Q31: We provisionally propose that legislation should create new offences of:

(1) using an automated vehicle as an unfit or unqualified user-in-charge; and

(2) causing or permitting the use of an automated vehicle by an unfit or unqualified user-in-charge.

Do you agree?

H.62 In response to Consultation Paper 1, consultees overwhelmingly agreed that a user-in-charge should be qualified and fit to drive. Therefore, they should hold a valid driving licence, meet the eyesight requirements, not be unfit to drive through drink or drugs and not be over the prescribed alcohol limits.

H.63 In Consultation Paper 3 we asked if it should also be an offence to cause an unfit or unqualified person to act as a user-in-charge. This would apply, for example, to a person who encouraged their inebriated friend into the driver seat, or to an employer who suspected a worker had lost their licence, but still allowed them to use an AV.

H.64 These proposals attracted a high level of support from respondents. Of the 71 respondents who answered this question, 59 (83%) agreed, 10 (14%) answered "other" and two (3%) disagreed.

Agreement

H.65 Many respondents simply agreed with the proposal without adding further comment. Among those who gave reasons, TfL thought that the new offences would have a positive impact on safety. RoSPA said:

> *A cause or permit offence could also be particularly important for employment purposes, for those who use these vehicles when driving for work and their employer.*

H.66 Several respondents (including Mills & Reeve LLP and BILA) pointed to the need to define these offences clearly. The Bar Council said that the new offences should replicate the structure of "comparable existing offences", since any "substantial divergence… would risk confusion". For example, unfitness through drink or drugs should be separate from being over the prescribed limit. Nynke Vellinga of the University of Groningen thought that, to enforce the offence, an AV should be clearly identified as requiring a user-in-charge.

H.67 The IROHMS Simulation Laboratory emphasised the need to educate users-in-charge and others about their responsibilities.

Concern over a new offence of "causing or permitting"

H.68 Although there was a consensus around Question 31(1), some concerns were expressed about a new offence of causing or permitting. DAC Beachcroft LLP worried that a passenger would be criminally liable if the user-in-charge showed signs of inebriation:

> *Firstly, the extension of permitting offences in this way places a new and unwelcome burden on passengers: they would have to be more aware of the user's state… It will be especially difficult because so many members of the public will not understand the fitness requirements for a user-in-charge…*
>
> *Secondly, expanding permit offences in this way runs the risk of reducing public appetite for automated vehicles. To provide one example: 3 people have each had 4 pints at a pub; they are, for criminal liability purposes, over the limit. 2 of them offer the third a ride home. One drives a manually operated car, and one has a fully automated vehicle. If the person agrees to a ride in the manually operated car, they is more at risk of suffering an injury but will not be found culpable for a permitting offence, whereas if they agrees to the lift in the AV, they is likely to be much safer but is criminally liable for a permitting offence.*

H.69 Pinsent Masons LLP doubted the enforceability of the proposed offences:

> *It is arguably overreaching to hold someone in the passenger seat criminally liable for making any comments which may have encouraged someone to become a user-in-charge. It may well be that the user misunderstood the passenger, or that the passenger did not know any better, etc. Tort law has well established the principle that 'we are not our brothers' keepers' and new legislation should not seek to change it.*

H.70 Highways England queried whether the creation of new offences was necessary, since the Road Traffic Act 1988 "covers these topics already in terms of not allowing someone without a licence or insurance to drive your car".

BEING CARRIED WITHOUT A USER IN CHARGE

Q32: We provisionally propose that persons carried without a user-in-charge should be guilty of a criminal offence.

Do you agree?

Q33: We seek views on whether the new proposed offence of being carried without a user-in-charge should only apply if the person:

(1) knew that the vehicle did not have a user-in-charge; and

(2) knew or ought to have known that a user-in-charge was required.

H.71 In Consultation Paper 1, we proposed a new offence of allowing oneself to be carried in a vehicle without a user-in-charge, to target cases where no one has access to the

controls. This drew widespread agreement, subject to some concerns that the offence could operate unfairly. Consultees pointed to examples where a passenger was blind and unaware that there was no-one in the driving seat, or was a child and did not know a user-in-charge was required.

H.72 In Consultation Paper 3 we suggested adding a mental element to the offence: to be found guilty a passenger must have actual knowledge that no-one was in the driving seat, and constructive knowledge that a user-in-charge was required.

H.73 The proposal for a criminal offence attracted majority support. Out of 70 respondents who answered Question 32, 44 (63%) agreed, six (9%) disagreed and 20 (29%) answered "other".

Agreement

H.74 The SMMT summarised the arguments for the proposal:

> *This proposal is important to prevent the misuse, or abuse, of the automated driving system (ADS), such as the user-in-charge vacating the driver's seat after activating the ADS… Although technical solutions such as driver availability and monitoring systems should be able to prevent such abuses, they must not be seen as a substitute for legislation that clearly forbids being carried without a user-in-charge.*

H.75 There was also agreement that there should be exceptions to "avoid inequitable outcomes" (Zurich Insurance) or "unintended consequences" (Aviva Insurance). APIL thought that for the offence to be fair, circumstances needed to be assessed "on a case-by-case basis":

> *An individual should not be expected to have known that a user-in-charge was required when they have little experience with, or knowledge of, AVs themselves. There should be good reason to hold someone criminally liable.*

H.76 BLM Law suggested that persons carried without a user-in-charge might also be excluded from insurer liability under the Automated and Electric Vehicles Act 2018:

> *We query whether, in addition to comprising a criminal offence, these individuals should also be excluded from the benefits of the compulsory insurance cover under AEVA, in accordance with the current provisions of s.151(4) RTA 1988, which apply to conventional vehicles.*

Informing passengers of their responsibilities

H.77 Respondents noted the need to inform passengers of their obligations. Mills & Reeve LLP argued that this approach required "absolute clarity as to the responsibilities and potential penalties". DAC Beachcroft LLP warned that "without a concerted public education campaign, members of the public cannot be expected to know the rules around users-in-charge".

H.78 Multiple respondents noted the potential for confusion between user-in-charge and no user-in-charge vehicles. The Suzy Lamplugh Trust said:

If the person being carried is a passenger of a taxi/PHV operator, they may not know that the vehicle required a user-in-charge…. In such contexts, it should be the responsibility of the operator to ensure the vehicle is not driven without a licensed user-in-charge, in which case the operator should be guilty of the offence not the passenger.

H.79 Similarly, DAC Beachcroft LLP asked:

If a taxi or MaaS company sent an AV without a user-in-charge, who would be liable? Would the passengers be as criminally liable as the company?

H.80 NFU Mutual urged the consideration of a "standard communication and / or minimal warning message to users as to the requirement for a user-in-charge to avoid potential confusion caused by wordings used by different manufacturers". KPMG added:

In a future world where both user-in-charge and non user-in-charge vehicles co-exist in the mobility ecosystem, appropriate measures should be taken so it is clear to a person entering a self-driving vehicle whether a user-in-charge is required or not.

Arguments that offence is unnecessary

H.81 Several respondents thought that the need for a criminal offence could be avoided through appropriate design requirements:

We wonder if this complex topic could be resolved at a technical level instead. For example, regulations could require that a UIC HAV must detect an alert human occupying the driver's seat before commencing a journey. [The CertiCAV team at Connected Places Catapult]

Regulations should require that all Path 1 AVs require a user-in-charge to be within reach of the controls at all times, and any breach will result in a mandatory transition demand leading to a shutdown of ADS. If such a regulation were put in place, this question should be largely moot. [DAC Beachcroft LLP]

If the systems of such vehicles are mandated to register and confirm their user-in-charge before allowing automated driving to be activated then the risk of their operation without a user-in-charge does not materialise… We query whether the Law Commissions need to recommend this new offence at this stage. [Burges Salmon LLP]

The mental element

H.82 In all, 64 respondents offered views on the mental element of the offence, of whom the overwhelming majority agreed with the proposal. However, some thought it was preferable to reduce the scope of liability through a defence, and others suggested a different test.

The case in favour

H.83 Sally Kyd of the University of Leicester made the case in favour of the proposed mental element:

> *The addition of a requirement that the passenger "ought to have known" that a user in charge is needed is a positive addition. Presumably this can take into account characteristics of the passenger when applying the objective test (e.g. blindness).*

Constructive knowledge that the vehicle did not have user-in-charge

H.84 A handful of respondents thought that constructive knowledge should be sufficient for both parts of the test, so it would apply to those who knew or ought to have known that a user-in-charge was required and not present. This would avoid difficulties in proving that a passenger did not know that the vehicle was without a user-in-charge.[53]

H.85 Kennedys Law LLP noted that this was "more in line with most other driving offences". The Senators of the College of Justice thought that actual or constructive knowledge for each requirement "would capture the scenario of drunk users without applying, for example, to a child or a blind person".

Knowledge requirement insufficient to avoid overexpansion of liability

H.86 Conversely, some respondents thought that the suggested mental element was insufficient to remove all the potential unfairness, particularly to children. The ABI and Thatcham Research said:

> *There may still be an instance where an individual, such as a child, is aware of the user-in-charge requirement, but cannot refute the individual, such as an adult, that is in a position of authority.*

H.87 BLM Law suggested that to avoid this, "these offences must prescribe a minimum age". KPMG suggested the offence should not apply to those under 14:

> *For instance, as a driver, you can be fined if a child under 14 is not in the correct car seat or wearing a seat belt while you are driving, so this age limit could be used to define the offence exemption for children being carried without a user-in-charge too.*

Defence rather than mental element

H.88 The Faculty of Advocates described some of the examples given as "improbable":

> *Requiring proof of knowledge therefore seems unduly burdensome. That said, we see the desirability of a defence of lack of knowledge and would suggest that knowledge therefore be removed as an element of the offence itself and replaced with a defence that, for example, the person could not reasonably have been expected to know, in light of the circumstances and their own characteristics, that there was no user in charge.*

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[53] This point was made by the IUA, Urban Transport Group and Dean Hatton of the NPCC.

H.89 The SMMT also thought that "the burden of proof should be on the person alleged to have committed the new proposed offence".

CRIMINAL LIABILITY FOLLOWING HANDOVER

Q34: We provisionally propose that a user-in-charge who takes over control of the vehicle:

(1) should be considered a driver; but

(2) should have a specific defence to a criminal offence if, given the actions of the ADS, a competent and careful driver could not have avoided the offence.

Do you agree? If not, we welcome views on alternative legal tests.

H.90 Under our proposals, a user-in-charge who takes over from an ADS becomes a driver. They would then be liable for any driving offences committed. However, in some situations it may be unfair (as where an ADS turns into a one-way street in the wrong direction, and the human who takes over cannot avoid continuing the same way). We provisionally proposed that a user-in-charge who takes over control of the vehicle should have a specific defence to a criminal offence if, given the actions of the ADS, a competent and careful driver could not have avoided the offence.

H.91 The proposal received a high level of support from respondents. Of the 71 respondents who answered this question, 54 (76%) agreed with the proposal outright, three (4%) disagreed and 14 (20%) answered "other".

H.92 Respondents almost unanimously agreed with the need for a criminal defence, but some suggested alternative tests, referring to "reasonableness" or "all the circumstances".

Agreement

H.93 The proposal enjoyed particularly high levels of support from legal respondents:

> *It is crucial that users of AVs are not discouraged from correcting a system error because of the risk of being criminally liable and prosecuted for an offence which they could not have avoided.* [APIL]

> *It seems the only appropriate test in circumstances of this nature must be in line with the current standard applied to drivers, namely they must meet the standard of a careful and competent driver.* [Kennedys Law LLP]

> *This would avoid holding the ADS responsible for actions that it did not take; equally it would protect drivers against being found guilty of criminal offences they had no [reasonable] opportunity to avoid.* [BLM Law]

Determining whether a competent and careful driver could have avoided the offence

H.94 Some respondents agreed with the proposed defence but nevertheless queried how it would be applied in practice. Burges Salmon LLP thought that the test should allow for the fact that even careful and competent drivers tend to drive sub-optimally following takeover, highlighting evidence from the VENTURER trial.

H.95 The IROHMS Simulation Laboratory noted the need for "a formal model of counterfactual reasoning and simulations for alternative realities to be played out". Nova Modus argued for expert evidence from simulations:

> *The defence will clearly depend on the opinion of expert witness. This suggests a need for a capability to replicate the offence in a virtual simulation environment and compare with responses from competent and careful drivers. A specialist AV accident investigation agency could own and operate such a facility, in a similar way to simulation by air accident investigators. Another data-driven approach would be based on pre-deployment simulation testing of ADSs. Such simulations (e.g. by the Bristol Robotics Lab in the Capri and ROBOPILOT projects) are able to differentiate incident scenarios that can and cannot be 'rescued' by competent and careful drivers.*

H.96 Insurers referred to the need for data from the AV about what had happened. In the absence of sufficient data, AXA UK were "concerned that this defence is open to abuse from dishonest users". Similarly, the IUA commented that "due attention must be given to the potential for dishonest users to take advantage of any specific defence".

The defence sets the bar too high

H.97 Some respondents thought that the test of whether a competent and careful driver could have avoided the offence set the bar too high. HORIBA MIRA said:

> *The inclusion of some form of defence based on the 'reasonableness' of the person's response is, of course, essential to avoid grossly unfair blame and penalties being applied. However, the proposed wording of "a competent and careful driver could not have avoided...." sets too high a bar - there will be many incidents where successful intervention is reasonably possible, and therefore the "could not" threshold is not reached, but where successful intervention is by no means a certainty and hence on many occasions a competent person acting reasonably would still have a collision.*

H.98 The CertiCAV team at Connected Places Catapult gave an example:

> *If a driver looks up from a secondary activity to see an immediate risk of collision, they are likely to try to take over without having had time to reengage with the driving task. In this situation, their best efforts to avoid a crash may fall below the standard of a driver who is already fully engaged. Criminalising this behaviour is unlikely to be an effective deterrent and may not improve safety.*

H.99 Similarly, the Bar Council said:

> *"Could not have" is a test that risks imposing too high a burden on the user-in-charge who takes over control of the vehicle. There is a range of acceptable human driving skill – above the level of what should be considered criminal. That range applies among individuals of course, but also within individuals: the hypothetical "competent and careful driver" cannot sensibly be considered to drive at all times at only one specific level of skill.*

Alternative wording

H.100 Several respondents who identified these concerns suggested ways to soften the language of the defence.

All relevant circumstances

H.101 Burges Salmon LLP asked for a reference to "all relevant circumstances":

> *The qualification of "given the actions of the ADS" may not describe adequately enough the full circumstances that may have been faced by the driver as opposed to "given all relevant circumstances".*

H.102 The SMMT and Five AI made similar suggestions:

> *It may be preferable to refer to "in all the circumstances" rather than limiting the relevant circumstances to the "actions of the ADS".* [Five AI]

Reasonableness

H.103 The Faculty of Advocates thought that the test should include a "reasonableness" element:

> *We would agree, if the test for the proposed defence was that a competent and careful driver could not reasonably have avoided the offence. Omission of reasonableness would mean that even the most remote possibility of avoidance would exclude the defence.*

H.104 BILA favoured a similar approach, suggesting a test of whether "given the actions of the ADS a reasonably careful driver could not have avoided the offence". HORIBA MIRA also preferred "the approach of examining reasonableness".

H.105 The Senators of the College of Justice put the point as follows:

> *We think that a defence using the objective standard of "a competent and careful driver" may set too high a test. In our view it would be sufficient to provide that it is a defence if, given the actions of the ADS, the user-in-charge could not reasonably have avoided committing the offence. The whole circumstances could then be taken into account.*

H.106 Scarlett Milligan of Temple Garden Chambers thought it was illogical to ask whether the user-in-charge was behaving "reasonably". However:

> *An alternative test to consider is whether it was 'reasonably practicable' for a User in Charge to avoid the offence: this is a test that the criminal courts are used to applying in the context of health and safety legislation, and would put the emphasis on the realities of the situation that the User in Charge finds him or herself in, rather than on his or her competence.*

Implications for other proposals

H.107 Issues which straddle the handover between AV and human can be difficult. Stakeholders raised possible implications for other proposals. For example, HORIBA

MIRA mentioned to need to compare the safety of conventional and automated driving (considered in Chapter 10):

> *Care needs to be taken in how statistics are collected and how verdicts are reported, as it would be unrepresentative for the incident to be counted within the statistics for manual driving and not in the statistics for automated driving.*

H.108 BLM Law was concerned about a possible gap in civil liability:

> *If an accident occurred, which a competent and careful driver could not have avoided, meaning civil liability would be unlikely to attach to the human driver, resulting in no route to compensation for any accident victim(s).*

H.109 The ABI and Thatcham Research said that "issues surrounding data collection and retention (discussed in Question 56) are of significance", a view echoed by several insurers.

OFFENCES THAT DO NOT ARISE FROM THE DYNAMIC DRIVING TASK

Q35: We provisionally propose that the user-in-charge should be liable for criminal offences which do not arise from the dynamic driving task, including those related to:

(1) insurance;

(2) maintaining the vehicle in a roadworthy condition (including installing safety critical software updates);

(3) parking;

(4) duties following accidents to provide information and report accidents to the police; and

(5) ensuring child passengers wear seatbelts.

Do you agree?

H.110 In the Consultation Paper, we outlined offences currently applying to drivers which do not arise from the dynamic driving task. We proposed that these offences should also apply to a user-in-charge.

H.111 A majority of respondents agreed with the proposal. Of 75 who answered this question, 47 (63%) thought that the user-in-charge should be liable for offences in all the listed areas and 16 (21%) thought that the user-in-charge should be liable for offences in some areas. One (1%) did not think that user-in-charge should be liable for any offences, while 11 (15%) answered "other".

Agreement

H.112 Most consultees agreed that, for offences not relating to the dynamic driving task, the liability of the user-in-charge should mirror that of a conventional driver.

H.113 Kennedys Law LLP agreed with the proposals because they were "in line with current legislation", which "should continue". Pinsent Masons LLP said:

> *It is important that there is no 'legal loophole' created surrounding these legal requirements in the automated vehicle regime, and the UIC seems to be the*

most appropriate person to assess and be responsible for these duties, particularly as they should be a licensed driver (at least provisionally).

A new model for fleet operation

H.114 Several consultees felt that the proposal might not work for hired vehicles or fleet operation. TfL noted some of the challenges:

> *Sharing or mobility as a service business models may also present a problem with this type of approach. Whilst the user-in-charge should certainly be expected to ensure a child passenger is wearing a seatbelt, it is difficult to see how they could be responsible for ensuring safety critical updates have been installed in a vehicle which they may only have access to for an hour. The question is therefore one of both competency and practicality. It may be sensible for some of the responsibilities to fall to the owner however absolute clarity would be important.*

H.115 Where user-in-charge vehicles are not privately owned, some respondents thought that the operator should be subject to criminal liability, rather than the user-in-charge employee. For example, Five AI said that "where there is a licensed operator, the licensed operator should bear responsibility for installing safety critical software updates, and maintaining the vehicle in a roadworthy condition".

H.116 KPMG agreed:

> *In a world where we are increasingly transitioning to "as a service" models where self-driving vehicles will predominantly be "robotaxis", we do not agree that the user-in-charge should be liable for insurance and roadworthiness. As is the case when hiring a conventional vehicle, individuals are not responsible for checking and maintaining the roadworthiness of the hire vehicle; the vehicle hire company is responsible for this. In the same way, we believe that the licensed operator of these vehicles should be obligated to ensure they are roadworthy and insured.*

H.117 By contrast, BVRLA found it "reassuring that the Law Commission is not proposing to impose any new liabilities on BVRLA members as the registered keeper for vehicles where there is a User in Charge".

H.118 The OTC agreed with the proposal in principle but noted that "a number of offences are absolute under current road traffic legislation". They therefore queried whether "it may be necessary to consider whether there should be some qualification to the duty on the user-in-charge such as [a] concept of reasonable practicability".

H.119 BLM Law noted that sections 40A and 143(1) RTA 1988 deal not only with using, but also with causing or permitting use by another. They requested clarification whether offences of "causing or permitting" insurance and roadworthiness violations would continue to apply in this context.

Clear communication

H.120 RoSPA mentioned the importance of communicating responsibilities. Mills & Reeve LLP thought that "with a mixed population of vehicles on the roads, the potential for

confusion would be great, with AV users unsure as to which obligations apply to them".

Responses pertaining to specific areas of liability

H.121 Alongside these more general points, respondents made specific points about each part of the question, which we look at below.

Insurance

H.122 There was widespread agreement, particularly from insurers, that users-in-charge should commit a criminal offence if they used a motor vehicle on the road without insurance. Only a few respondents disagreed. KPMG and Logistics UK thought that a licensed operator should be responsible for insurance where the vehicle was not privately owned.

H.123 DAC Beachcroft LLP suggested a technical solution:

> *Proof of insurance should be mandatory before ADS is operable, much like computers require entering a software licence number before one can use that software. Such a system would drastically cut down on the number of uninsured AVs.*

H.124 BILA noted that the obligation to insure already extended to "users", which had been interpreted broadly in a recent Supreme Court judgment.[54]

Roadworthiness

H.125 In the Consultation Paper, we discussed the current offences of using a vehicle in an unroadworthy condition. We noted that as vehicles become more sophisticated, it is increasingly difficult for conventional drivers to know if they are roadworthy. For AVs we do not yet know which faults the vehicle will be able to detect and which will fall on the user-in-charge. We provisionally concluded that in the early stages of automation, roadworthiness offence should continue to apply to users-in-charge, but that legislation should include a regulation-making power to adapt these offences. The first part of the proposal is discussed here, and the second part in Question 36.

H.126 KPMG set out the problem:

> *Even with conventional vehicles, it can be said that vehicle owners today often rely on other parties to ensure roadworthiness and detect any non-obvious mechanical issues, such as during routine servicing and MOT checks. With increasing software deployed on board vehicles, this will in turn increase the number of factors that influence roadworthiness, that need to be (a) maintained, such as regular software updates, and (b) checked for failure to meet requirements, such as software bugs. It may be considered impractical and unsafe to place the responsibility for roadworthiness on the user-in-charge, and unrealistic to expect them to have all the skills and knowledge to do this effectively.*

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[54] See BILA response; *R & S Pilling t/a Phoenix Engineering v UK Insurance Ltd* [2019] UKSC 16.

H.127 Logistics UK thought that the user-in-charge should be liable “only for those items for which a driver could reasonably be expected to check”. FirstGroup referred to the current requirement for a public service vehicle driver to conduct a "daily walk round check" of a vehicle, which could act as a model for AVs.

Software updates

H.128 Concerns centred on software updates. The ABI and Thatcham Research agreed that the user-in-charge should be similarly responsible to a driver of a non-automated vehicle and “ensure that various hardware parts of a vehicle are in working order”. However, they noted that software updates raised new complexities:

> *For example, the driver of a hired or company vehicle may not have the authority to perform such updates…. Furthermore, a difficulty also arises where the owner of a vehicle has a legitimate reason to not want to install a software update… [which] could give VMs sweeping authority to alter the vehicle in certain ways by inserting extraneous code…. We would also like to reference the ongoing “Right to Repair” movement and difficulties associated if applied to software updates.*

H.129 The SMMT also acknowledged the complexities, but considered that the user-in-charge should have some responsibilities:

> *It is the responsibility of the automated driving system entity to keep software and maps up to date. However, it is less clear whose responsibility it is to ensure safety-critical software updates are successfully and completely installed. UN Regulation 156 on Software Update and Software Updates Management System requires the manufacturer to ensure that vehicles can install updates safely, including coping with failed or interrupted updates. It would be helpful to clarify if the user-in-charge should have a responsibility to ensure the installation process is not continuously interrupted for a prolonged period and to not deliberately frustrate the installation process, for example, by turning off the vehicle’s mobile data and WiFi connectivity.*

H.130 Mills & Reeve LLP cautioned that obligations to install software updates “may be unfamiliar to users at least in the early phase of deployment”, making communication of obligations critical.

H.131 DLG and BIBA referred to section 4(1)(b) of the Automated and Electric Vehicles Act 2018. This permits an AV insurance policy to exclude liability to an insured person for accidents caused by “a failure to install safety-critical software updates that the insured person knows, or ought reasonably to know, are safety-critical”. DLG commented that the criminal law should take a similar approach: liability should only arise if the user-in-charge was aware (or ought to have been aware) of the safety critical update.

Technical solutions

H.132 Many respondents argued for technical solutions, either to alert the user-in-charge to a safety critical update, or to prevent the vehicle from being used without one.

H.133 The Faculty of Advocates argued for an alert:

If there is some mechanism intended which would alert a user-in-charge about to set off, to an uninstalled critical update, then that would allow us to agree to proposal 2. In a situation where a car is shared between two people, such as husband and wife, and each assumed the other had taken care of whatever the update was, then if the absence of the update was not made obvious to the user-in-charge next to use it, we suggest criminal liability should not automatically attach to that UIC.

H.134 DLG thought that an AV "should be designed in such a way that it is not able to be used if a safety critical software update has not been completed". BLM Law also said that a vehicle's functionality should be disabled until updates have been installed and validated: "such an approach would… promote consumer confidence, and avoid criminalising the digitally disadvantaged".

H.135 Burges Salmon LLP saw alerts and stops as part of a "safety-led" approach:

Criminal behaviours aside, a safety-led approach would mandate that systems and system checks are in place to regularly monitor safety (particularly on aspects 'hidden' from cursory examination by users-in-charge), run self-diagnostics and, ideally, to inform users-in-charge or prevent operation of ADS where the ADS system knows that it is potentially unsafe to be used.

H.136 The ABI and Thatcham Research joint response and DAC Beachcroft called for a "digital MOT". They thought that:

This system could identify software-related changes that are material to the driving task and could apply to all systems across various VMs. While it obviously presents its own challenges, it would also make enforcement significantly easier.

Parking

H.137 Although most consultees agreed that the user-in-charge should be responsible for parking contraventions, some said that the issue required further thought.

H.138 KPMG commented that "parking is an area of complexity that needs to be explored further":

For example, a situation may arise where the ADS interprets that the vehicle is permitted to park in a space based on the digital TRO map or the data available. However, there may be a physical sign that shows that this is not the case, maybe because there are temporary parking restrictions or a recent parking permissions change that has not been updated in the mapping software. The liability of a resulting parking offence may be difficult to determine in this scenario.

H.139 The BPA pointed to the complexity of civil contraventions:

There are many scenarios that need to be considered including for example exemptions in Traffic Regulation Orders like the setting down and picking up

of passengers and the loading and unloading of goods for short periods or blue badge holder exemptions in residents parking bays.

H.140 The IHE argued that a user-in-charge's responsibilities should extend to "unauthorised stopping":

> *It should be replaced by "unauthorised stopping" to cover cases where the AV had been instructed to stop to set-down or pick up a passenger or to load goods where this is not permitted. The term "parking" normally refers to leaving a vehicle stationary for a longer period.*

H.141 Logistics UK thought that criminal liability should arise for parking offences "only if it was the driver that chose to accept the parking area". The ABI and Thatcham Research (together with other insurance organisations) asked about liability for AVP:

> *While the user-in-charge should undoubtedly be responsible for parking in a manual driving mode, technology already exists to enable self-parking out of the line of sight of the user-in-charge. In such cases, if an issue related to parking arose, it may be worth exploring where the liability rests especially if it results from any problems relating to software or with the parking infrastructure itself.*

Duties following accidents

H.142 Following an accident, drivers are required to stop, provide identifying details and (in some circumstances) report the accident to the police. In the Consultation Paper, we argued that stopping was part of the dynamic driving task: the AV should either stop or issue a transition demand. However, the obligations to exchange details and report the accident should rest with the user-in-charge.

H.143 Most consultees agreed. However, the ABI and Thatcham Research noted that the user-in-charge "may not always be aware of an accident if the ADS is engaged and they are occupied with a secondary task". The MIB thought that that legislation would have to "allow for" the cases where a user-in-charge would be unaware of an accident while the ADS was in control. Similarly, DLG thought there should be "no obligation" on the user-in-charge to report accidents arising from the dynamic driving task which occur whilst the ADS is engaged "unless the vehicle notifies them of an accident".

H.144 DAC Beachcroft LLP raised a scenario in which the ADS failed to stop:

> *If we allow users-in-charge to disengage from driving because the ADS can be trusted to self-drive, we expect the defence to not fulfilling the s170 duty to report (found in Harding v Price [1948] 1 All ER 283) will be relied upon much more extensively than it is at present. Given the forthcoming changes to low value RTA personal injury claims, and the probable increase in litigants in person, it may be advisable that the Harding defence be incorporated into legislation.*

H.145 Some respondents thought that the ADSE should also report the accident. As KPMG said:

Given AVs will be fitted with event data recorders (EDRs) and Data Storage Systems for Automated Driving (DSSADs), we believe that there could also be an obligation for ADSEs and/or licensed operators to report accidents and provide information too.

H.146 Five AI also though it "may be appropriate for the ADSE and/or licensed operator to be under some form of duty to report as well". Furthermore, users-in-charge should be under an additional duty "to provide information and report accidents to the ADSE and/or licensed operator, or otherwise to ensure the police provide such information to ADSE and/or licensed operator". They noted this would enable a "richer" and larger set of data to be captured and retained by the ADSE.

Ensuring child passengers wear seatbelts

H.147 Under section 15 of the Road Traffic Act 1988 it an offence for a person to drive with a child passenger who is not wearing a seatbelt. Almost all respondents agreed that this liability should rest with the user-in-charge.

H.148 However, Kennedys Law LLP thought the responsibility should lie with an accompanying parent or guardian in the first instance. They added that:

If the child was travelling alone, a system should be considered whereby the vehicle will not start until it has detected that the passenger is wearing their seatbelt. If this does not work for any reason, the ADSE would then be responsible.

H.149 Christopher Mitchell also did not think the user-in-charge should be responsible for seatbelt use.

Other non-dynamic driving offences

H.150 Respondents raised other offences not arising from the dynamic driving task which they thought should rest with the user-in-charge. AXA UK favoured the inclusion of "exceeding the designed number of passenger in the vehicle". Cycling UK thought it should additionally be an offence for users-in-charge to "open the doors of their vehicles unsafely, or to cause or permit their passengers to do so, as is currently the case for drivers".

ROADWORTHINESS: A REGULATION-MAKING POWER

Q36: We provisionally propose that the legislation should include a regulation-making power to clarify those roadworthiness failings which are (and those which are not) the responsibility of the user-in-charge.

Do you agree?

H.151 There was overwhelming support for such a regulation-making power. Of 72 respondents who answered this question, 67 (93%) agreed and five (7%) answered "other". No one disagreed.

Agreement

H.152 Respondents pointed to the need to retain flexibility as AV technology develops. For example, the ABI and Thatcham Research noted that "as the sophistication of AVs

develop, the requirements for roadworthiness will change – especially on the software side". Similarly AXA UK said:

> *Roadworthiness standards will likely change as the technology develops, therefore it is appropriate to include a regulation-making power to clarify the full list of roadworthiness conditions that are the responsibility of the user-in-charge.*

H.153 Pinsent Masons LLP thought that a regulation-making power would be "useful to road users… from a safety perspective", as it was important "that there are continued incentives for developers and UICs to maintain the highest standards of safety". FOCIS noted that clarity over the duties of the user-in-charge would also prevent legal disputes.

H.154 KPMG added:

> *This list will have to be frequently updated based on data that becomes available from testing and deployment, as well as the evolution of the technology.*

H.155 Nova Modus emphasised that the regulation-making power should not merely clarify which failings are the responsibility of the user-in-charge, but also "which entity HAS the responsibility for failings that are NOT down to the UIC (ADSE and/or operator)".

H.156 HORIBA MIRA thought this information should be "incorporated into the Highway Code" to help members of the public familiarise themselves with the roadworthiness failings they are responsible for. They conceded, however, that:

> *Even this will have limited reach - few drivers read the Highway Code after passing their test. It is therefore important that the offences are chosen to be intuitive, such that it can be expected that a reasonable person would, through common sense, realise they are responsible for oversight of the required aspects.*

I. Remote operation: no user-in-charge vehicles

OVERVIEW

I.1 In Chapter 13, we made provisional proposals for automated vehicles that do not need a human to drive at any stage to complete a trip. We referred to these as "no user-in-charge" vehicles or NUICs.

I.2 First, we considered how to apply the "control and monitoring" tests to remote operation. We concluded that "remote driving", where an individual is steering and braking a vehicle remotely, should not be regarded as a form of "self-driving". This attracted overwhelming support from respondents. Views were more mixed on our provisional proposal that all other types of remote operation (aside from remote steering and braking) should be regarded as "self-driving". Some respondents thought it was counter-intuitive that, under our proposals, human monitoring from within a vehicle takes it outside of the "self-driving" definition, but human monitoring from outside the vehicle does not.

I.3 We then proposed a new scheme of operator licensing. Most respondents agreed that every NUIC vehicle used on the roads should either be operated by a licensed operator or be covered by a contract with a licensed operator for supervision and maintenance services. Consultees preferred the simplicity of this approach to our previous proposal that, for privately owned vehicles, responsibility for maintenance and supervision should lie with the registered keeper.

I.4 We proposed that licensed operators should be subject to two tiers of duties. Tier 1 duties (such as supervision, insurance, maintenance and reporting accidents) would apply to all vehicles, including those that are privately owned. Tier 2 duties would depend on the use case, with separate duties for Highly Automated Road Passenger Services (HARPS) and freight services.

I.5 There was considerable agreement on the list of Tier 1 duties. Our proposals on Tier 2 duties were less developed. Local transport authorities said that Tier 2 duties should allow for local decision making in response to local needs.

I.6 We said that for passenger services (HARPS), Tier 2 duties would include provisions on accessibility, safeguarding and price information. We asked specifically about accessibility. In Consultation Paper 2, we proposed national minimum accessibility standards, both for vehicle design and the whole HARPS user experience. In this paper, we also provisionally proposed that a new accessibility panel should be formed to advise on those standards. This drew wide support. Responses highlighted groups which should be considered in setting standards and the need for further research on how to most effectively ensure accessibility.

I.7 Finally, we canvassed views on who should administer the NUIC operator licence scheme. The body most often suggested was the Traffic Commissioners, with some consultees suggesting collaborative arrangements.

APPLYING THE "CONTROL AND MONITORING" TESTS TO REMOTE OPERATION

Q37: We provisionally propose that:

(1) where an individual is exercising lateral and longitudinal control (steering and braking) over a vehicle remotely, that should not be regarded as a form of "self-driving"; and

(2) where lateral and longitudinal control are exercised by an ADS, all other forms of remote operation should be regulated as "self-driving".

Do you agree?

We welcome views on whether the current definition of when a vehicle "drives itself" under the Automated and Electric Vehicles Act 2018 should be amended to deal with some forms of remote operation which may involve a degree of "monitoring".

I.8 In Consultation Paper 2, we noted two broad ways that remote operation might work. In the first, a human would be in a position to step in and exert longitudinal and lateral control of the vehicle – to steer or brake remotely in real time. In the second, the human would provide assistance and high-level commands, but have no direct control of the vehicle.

I.9 In Consultation Paper 3, we took the view that remote steering and braking should not be regulated as "self-driving". It is more accurately described as "remote driving". We thought that "remote assistance", where humans do not need to react to potential hazards in real time, would largely fall within our understanding of "self-driving". However, there is a grey area where a remote assistant is not steering or braking but might be still be monitoring the vehicle. We provisionally concluded that such systems should be regulated as self-driving.

I.10 The legal test for self-driving under the Automated and Electric Vehicles Act 2018 (AEV Act) excludes vehicles from the definition of "self-driving" if they need to be "monitored". We asked whether AEV Act should be amended in the way that if applied to remote operation.

I.11 Out of 70 responses, 51 (73%) agreed, five (7%) disagreed and 14 (20%) said "other". There was general agreement that remote steering and braking should not be regulated as "self-driving". However, part (2) of Consultation Question 37 proved more controversial. Many respondents had concerns about classifying vehicles which required remote monitoring as "self-driving".

Agreement

Remote control of steering and braking

I.12 The overwhelming majority of respondents agreed that, where an individual is driving remotely (exercising lateral and longitudinal control), that should not be regarded as "self-driving". Five AI argued that *either* latitudinal or longitudinal control should be sufficient to take the vehicle outside of being self-driving, without a requirement for both (as the wording of the provisional proposal seemed to imply). They also asked for clarification that a vehicle would only be excluded from being self-driving if the lateral or longitudinal control was exercised "directly, in real time".

I.13 However, some were concerned that this left a regulatory gap.

I.14 Pinsent Masons LLP suggested that "situations where a vehicle is being controlled remotely would fit more neatly into the self-driving regulatory landscape than not", and that it may "not be correct" for remote controllers to be considered drivers "in all instances". However, they acknowledged that "careful consideration" would need to be given to situations in which a vehicle was being controlled remotely.

All other forms of remote operation should be regulated as "self-driving"

I.15 A majority of respondents also agreed with the second statement that, where lateral or longitudinal control are exercised by an ADS, remote operation should be regulated as self-driving. The main reason was that that responsibility for problems should lie with a corporate licensed NUIC operator rather than with an individual driver. For example, AXA UK said that it:

> *understands the importance of ensuring a regulatory gap is not created for other forms of remote operation and that corporate responsibility takes precedence over individual responsibility where appropriate.*

I.16 RoSPA similarly thought that our proposal would "avoid the highly undesirable outcome, in which a low-level employee was designated as a "driver" and blamed for organisational faults".

I.17 The SMMT agreed with the proposal, with the caveat that "as discussions on remote driving and remote operations are currently at a nascent stage at the UNECE, it would be preferable for this position to be developed in parallel and in alignment with international consensus".

Disagreement: Vehicles that require remote monitoring are not self-driving

I.18 A significant minority of respondents thought that vehicles which required monitoring by a remote human operator should not be considered as self-driving.

I.19 Waymo thought that the proposal in Consultation Question 37(2) failed to follow generally agreed definitions of an "automated driving system":

> *Whenever a human driver, whether remotely located or in the vehicle, is performing any part of the DDT, the ADS is not controlling "all of the dynamic driving tasks" as contemplated by the UK Code of Practice definition of ADS. If the Commission wishes to bifurcate the DDT in the way suggested by this question, this would deviate substantially from its own construct of what constitutes an ADS…. Remote control of a vehicle is not vehicle automation and, where combined with vehicle automation, the risks of remote control should be separately assessed and addressed.*

I.20 Similarly, Mobileye said:

> *Mobileye's position is that when it comes to autonomous vehicles the control room will not drive the vehicle and will not monitor regular driving activity. Requiring a control room with supervisory responsibilities on the driving act itself would de facto create a human-remote-controlled vehicle, not an autonomous vehicle.*

I.21 Nova Modus said the general definition of self-driving should "EXCLUDE AVs that NEED to be monitored by an individual inside, in sight, or remotely, to support their Safety Case(s)".

I.22 BLM Law argued that a vehicle should not be listed as self-driving "if an individual is required to monitor a vehicle remotely, rather than merely responding to alerts or notifications from an ADS". P3 Mobility thought that the human in the control room should be able to provide path planning if the vehicle encounters an obstacle. However, "the ADS would need to judge whether the instructions received from the remote operator represent a safe path ahead and also whether the manoeuvre is legal".

I.23 NFU Mutual called the proposal "counter-intuitive" and "confusing":

> *it would be counterintuitive to include monitored operation within the definition of "drives itself", as the basic definition of self-driving is that the vehicle does not need to be monitored. Applying a conditional exemption to include 'some' other forms of remote operation risks confusing users and may also inadvertently cause some highly-automated agricultural / farming machinery to be included within the definition of self-driving.*

I.24 In their joint response, the ABI and Thatcham Research said that vehicles which required human monitoring and intervention "should be regulated as 'remote driving'". BIBA and Aviva Insurance agreed with this position.

I.25 Cycling UK was also "wary" about the proposal and the transfer of legal liability it implied, as it felt that remote operators who acted culpably should still be civilly and criminally liable for collisions.

Arguments against remote operation more generally

I.26 Finally, some respondents opposed the deployment of self-driving vehicles without a user-in-charge or expressed doubts about its feasibility.

I.27 The Road Haulage Association argued that there "must always be a driver in control, to deal with unexpected emergencies that frequently occur". Cycling Scotland expressed similarly firm opposition, arguing that remote operation of vehicles could pose a safety risk for vulnerable road users.

Amending the Automated and Electric Vehicles Act 2018

Views in favour of change

I.28 Of those respondents who provided views on AEV Act, most suggested that it should be amended to deal with remote operation.

I.29 The Bar Council noted the "undeveloped state of British AV law" and suggested that NUICs require "bespoke regulation":

> *Part I of the AEV Act 2018 is an insurance measure, to extend the existing system of compulsory third-party insurance to AVs. That insurance system grew from the use of entirely driver-controlled motor vehicles, and was established in the 1930s. The AEV Act adapts that system (largely, it appears,*

envisaging self-driving cars and lorries) to automated vehicles. But further adaptation of the law seems inevitable: evidenced both by the rapid expansion of transport technologies and by the need for the Law Commission's wide-ranging consultation.

I.30 SMMT suggested adding a new part to AEV Act:

Our understanding of the Automated and Electric Vehicles Act (AEVA) 2018 is that it extends conventional motor insurance to cover automated driving…. This implies automated vehicles with a user-in-charge. As such, we do not think the definition of when a vehicle "drives itself" under AEVA 2018 should be amended to account for remote operation. Instead, an amendment to AEVA 2018 should be considered to include an additional part, i.e. Part 3, that deals exclusively with remote operations, or automated vehicles without a user-in-charge.

I.31 Logistics UK said that legislative amendments should also consider the monitoring of, condition of, security, and weight and size of loads in the freight context.

I.32 The Trustworthy Autonomous Systems Hub suggested that any new insurance regime should consider liability for cyber-attacks:

Of course, remote operation introduces whole new categories of cyberattack, and specifically denial of service which can prevent a remote operator taking over in a timely manner, which may mean that it would be unfair to impose liability on the remote operator (or their insurer) for damage resulting from such attacks.

Too early to devise regulations

I.33 The main concern was that any amendments to AEV Act would be premature. As TfL put it:

In prospect [amendment to AEV Act] would seem sensible, however, we have seen through the ALKS call for evidence, that understanding of how something may work in legal and practical terms increases dramatically as it becomes a realistic possibility. In this case it may be too early to determine the right answer, so building in some scope for flexibility may be useful.

I.34 BILA thought that the Act might need to be amended to deal with "different types" of NUICs "as they are invented or developed".

I.35 DLG opposed changes due to the technology's nascency:

DLG considers that as not enough is known about how remote operation will work yet and this isn't set to happen in the near future, no changes should be made to the Act at this time. The Act is intended to be the first wave of legislation to allow the development of AVs and will be updated through time as technology develops; DLG feels this technology has not yet developed enough to warrant an update to the Act.

I.36 Burges Salmon LLP thought that the existing legislation could accommodate the types of remote operation envisioned by the Commissions:

> *It seems possible to interpret AEVA in the context of NUICs in a way that aligns with the Law Commissions' position on user-in-charge vehicles. If a vehicle can drive itself and make requests to an operator (including to assume the dynamic driving task) but does not rely in a safety critical manner on a positive response as it will otherwise default to a safe minimum risk condition, then in principle when it is driving itself it can be said to be safely driving itself and to be an automated vehicle under AEVA.*

THE NEED FOR A LICENSED OPERATOR

Q38: We provisionally propose that:

(1) the regulation of self-driving vehicles should distinguish between an Automated Driving System Entity (which vouches for the design of the system) and an operator (responsible for the operation of individual vehicles);

(2) all vehicles authorised for use on roads or other public places with no user-in-charge should either:

> **(a) be operated by a licensed operator; or**
>
> **(b) be covered by a contract with a licensed operator for supervision and maintenance services;**

(3) it should be a criminal offence to use a NUIC vehicle on a road or other public place unless it is operated by a licensed operator or is covered by a contract with a licensed operator for supervision and maintenance services.

Do you agree?

I.37 In the Consultation Paper, we proposed that all NUICs should be supervised and maintained by a NUIC licensed operator (who may be the ADSE or a different body).

I.38 A clear majority of respondents agreed with our approach, including most legal respondents, insurance respondents and developers. Of 74 respondents who answered this question, 58 (78%) agreed, four (5%) disagreed and 12 (16%) answered "other".

Overall agreement

I.39 Respondents who agreed highlighted that this approach would help to ensure safety. As AXA UK put it, "the approach has the advantage of ensuring the complex tasks related to supervision and maintenance is conducted by a body with sufficient expertise". John Rainbird thought the proposal was "essential".

I.40 FirstGroup emphasised the flexibility of our approach:

> *We agree with all these proposals; they retain the maximum market flexibility for delivery of a service using such vehicles whilst ensuring that the necessary controls and safeguards can be applied.*

I.41 HORIBA MIRA preferred the provisional proposal to the approach taken in Consultation Paper 2, which would not have required a licensed operator for some privately owned vehicles: "The proposal is much simpler and results in more consistent requirements being imposed relative to the arbitrary six-month cut-off."

Distinguishing between the ADSE and operator

I.42 In the Consultation Paper we explained that although an ADSE may also be a NUIC licensed operator, the two entities would be required to be the same. While a combined organisation might prevent different entities from blaming each other, it could also reduce competition. It could effectively give a few major operators a monopoly of automated passenger and freight services, reducing innovation in how services were delivered and increasing prices.

I.43 Most consultees agreed. FirstGroup said that they agreed with the proposal because it "retains the maximum market flexibility for delivery of a service using such vehicles whilst ensuring that the necessary controls and safeguards can be applied".

I.44 KPMG recognised the benefits of an integrated approach to remove "potential grey areas where it is difficult to ascertain which party is at fault" for an incident. However:

> *There is more value to advancement of the UK AV market to decouple regulatory requirements for ADSEs and operators, as this will encourage more entrants into the market and greater innovation. This would help inject more private capital into the market to accelerate uptake, such as through fleet purchase and management, which should result in more competition and higher levels of customer service.*

I.45 On the other hand, Pinsent Masons LLP commented that separate regulation would not necessarily ensure competition:

> *The argument of driving up competition may be a mere illusion, as there will be nothing stopping big OEMs or developers from having both roles, which would defeat the main argument for keeping the roles separate.*

I.46 Respondents also expressed concerns about the division of responsibilities between the ADSE and the NUIC operator, stressing the need to avoid ambiguity or gaps in the parties' responsibilities.[55]

I.47 Mills & Reeve LLP identified software updates as a particular issue:

> *Software updates, for example, will be issued by the ADSE, with responsibility to install them possibly falling to either the ADSE or the licensed operator. It must be clear in any particular instance which entity takes that responsibility so that a failure to fulfil it cannot be blamed by each on the other.*

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[55] These included Mills & Reeve LLP, Logistics UK, Pinsent Masons LLP, Transport for West Midlands, the OTC and BVRLA.

I.48 BVRLA stressed that responsibility should be carefully considered and not assigned "blindly":

> *The fact that a fleet operator may control the destination or route of a vehicle should not then signify that the fleet operator should be liable for a fault in the navigation/operation/safety systems of the vehicles.*
>
> *Even if the fleet operator was allowed to control certain aspects of a vehicle (i.e. adding additional software or devices to improve the user experience) this should not mean that all safety protocols and or reliance on the safety of a vehicle should be displaced from the ADSE to the fleet operator.*

I.49 Logistics UK drew attention to the importance of clearly delineating areas of responsibility for vehicles when towing trailers. For example, they questioned whose responsibility it would be if a trailer was poorly loaded and this impacted the safety of the vehicle.

I.50 Five AI agreed with the proposal but noted that it "may be appropriate to allow either entity to take on certain responsibilities (provided that it is clear which entity is responsible) or to mandate some responsibilities are shared (for example, recall responsibilities)".

I.51 Cycling UK disagreed, arguing that separate entities would add unnecessary legal complexity. They suggested instead that a "single publicly-run body" to operate NUICs, "similarly to how Network Rail is responsible for managing the rail network, including its maintenance and the provision of signalling services for individual operators". Alternatively, control of NUICs could be handed to Highways England and local highway authorities.

The proposed criminal offence

I.52 A few respondents offered separate comments on whether it should be a criminal offence to use a NUIC vehicle on a road or other public place without a licensed NUIC operator.

I.53 Burges Salmon LLP agreed with the proposed offence in principle, but worried about who "used" a vehicle:

> *As such vehicles will have no user-in-charge and may not be being "used" by their owner or registered keeper in the way that the term is conventionally understood for motor vehicles, it may need to be clarified who is "using" such vehicles at what point.*

I.54 The Bar Council suggested that in addition to the proposed criminal offence, "consideration should be given to other methods of ensuring NUICs remain within the licensing system". One possibility would be a form of MOT test to check "that an appropriate supervision and maintenance contract is in place and that the licensed operator is being permitted any requisite access to the vehicle".

I.55 Mills & Reeve LLP emphasised that this obligation would need to be clearly communicated to vehicle users.

I.56 Oxbotica said an exemption for developers is needed.

DEMONSTRATING PROFESSIONAL COMPETENCE

Q39: We welcome views on whether NUIC operators should be required to demonstrate professional competence through a safety management system, as set out in a safety case.

I.57 In the Consultation Paper, we sought views on whether a NUIC operator should be required to demonstrate professional competence through a safety case. This would depart from the existing system under public service vehicle licensing, which requires a suitable transport manager to oversee operations.

I.58 63 respondents provided views on this question. Excluding responses from stakeholders who disagreed with the deployment of NUICs more broadly, most agreed that licensed operators should provide a safety case.

The case in favour

I.59 SMMT thought this approach would "avoid stifling innovation". P3 Mobility noted that the approach could provide a route into the sector for candidates who could not demonstrate their ability through qualifications or experience due to the novelty of the technology.

I.60 Pinsent Masons LLP argued that a safety case approach was likely to improve safety:

> *In the case of AVs, whether a vehicle is safe or not, will depend on a variety of factors that require different expertise. … Therefore, having an entire safety management system, as opposed to relying on one or two roles, can only drive safety levels up and ensure better compliance.*

I.61 HORIBA MIRA noted that operators would need to demonstrate the implementation of professional processes, so that approval might look "more similar to an ISO 9001 certification that a transport managers' exam". The CertiCAV team at Connected Places Catapult thought that the safety management system should "define individual roles with clear responsibilities and competence requirements".

I.62 PACTS and TRL noted the need to foster a safety culture:

> *The key here is not just having a written safety management system, but an implemented safety management system and positive safety culture where safety is prioritised and embedded in all work activities.*

I.63 Some argued in favour of form qualifications. BLM Law thought that the requirement to nominate a qualified transport manager could encourage accountability. John Rainbird thought that while a safety management system "could be appropriate" in most cases, HARPS would continue to need a transport manager.

I.64 KPMG thought that all individuals involved in operations should undergo a qualification process, including "an assessment of adequate knowledge of rules and regulations". They suggested that topics might include: rules of the road; insurance

requirements; vehicle maintenance requirements; roadworthiness; cyber-security; vehicle registration and certification; and accident reporting.

I.65 The IUA favoured an "established national standard or test that each user would be required to undergo in order to become an operator". BIBA also supported a "certification" process to ensure operators were competent, which might be regularly reviewed or updated.

I.66 By contrast, AXA UK argued that while certification may be desirable in the future it is not immediately necessary.

OPERATOR DUTIES

Q40: We provisionally propose that, irrespective of the nature of the vehicle, a licensed operator should be under a duty to:

(1) supervise the vehicle;

(2) maintain the vehicle;

(3) insure the vehicle;

(4) install safety-critical updates and maintain cybersecurity; and

(5) report accidents and untoward events (as defined by the regulator).

Do you agree?

I.67 Here we proposed that all licensed NUIC operators should be subject to a list of "Tier 1" duties to supervise, maintain and insure vehicles, install updates and report incidents. These would be in addition to sector-specific "Tier 2" duties, applying to HARPS and freight services.

I.68 The general principle attracted overwhelming support. Out of 76 consultees who responded, 60 (79%) agreed that a licensed NUIC operator should be subject to all of the duties. Six (8%) respondents thought that a licensed operator should be subject to some duties, while 9 (12%) answered "other". Only one respondent, who opposes the deployment of NUICs altogether, did not think that licensed operators should be subject to any of the listed duties.

Agreement

I.69 A large majority of respondents agreed that licensed NUIC operators should be subject to all of the listed duties. Many did not explain their reasons. For example, the Bar Council simply stated they agreed "for the reasons given" in the Consultation Paper.

I.70 The Suzy Lamplugh Trust thought that these obligations were "correct and essential". The Faculty of Advocates noted that "there is no other sensible candidate for these responsibilities".

General concerns about Tier 1 duties

I.71 A few respondents expressed general concerns about Tier 1 duties. The CertiCAV team at Connected Places Catapult asked for clarification on how to distinguish between NUIC and user-in-charge modes:

We note that vehicles with NUIC capability may also be capable of other modes of operation, including manual (e.g. a self-delivering hire car). It should be carefully considered whether these responsibilities depend on the vehicle's capability, operator (e.g. LFO) or mode of operation.

I.72 Wayve argued that regulation should consider each of these duties independently, and that the duties did not all need to be assumed by the same party – instead "different deployments may require different interface agreements".

I.73 TfL felt that the proposal provided insufficient detail on NUIC arrangements to agree that these should be Tier 1 duties. They argued that engagement with licensing authorities is "imperative" to determine the "appropriate split" between Tier 1 and Tier 2 duties.

I.74 Mills & Reeve LLP argued that "obligations to be fulfilled by a licensed operator should be kept to the minimum necessary to ensure safe use, and should not be 'gold plated'". Burdensome duties would limit affordability and access for disabled users and other disadvantaged groups.

I.75 Finally, Uber urged the Law Commissions to take into account the differences between NUIC operators and other service providers:

Although a single operator may provide multiple sets of services giving rise to these responsibilities, those same sets of services may also split among different operators -- and the regulatory framework should recognise (for example) that the customer-facing platform need not always additionally serve as the operator.

Supervision

I.76 Waymo and Wayve both thought that the use of the term "supervision" was confusing because the SAE Taxonomy uses the term to describe a human driver's activities in relation to SAE Level 1 and 2:[56]

Therefore, if "supervise" as used here is meant to convey a different meaning from the J3016 meaning, that should be clearly explained. If the intent is to require a human operator actually to supervise an ADS-equipped vehicle in the sense of monitoring the ADS, correcting errors by the ADS, or handling parts of the DDT, such a role is inconsistent with the meaning of an ADS.

I.77 Wayve made a similar point:

We suggest clarification of the definition of "supervise" in the context of an operator: passive monitoring (e.g., observation of fleet movement and sensor integrity levels), compared to active supervision with provision to control AV behaviour at a fleet level (e.g., routing vehicles around an area in which we had an accident).

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[56] Society of Automotive Engineers International (SAE), *J3016 Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles* (April 2021) (SAE Taxonomy J3016).

I.78 The IROHMS Simulation Laboratory also asked for a clearer definition of "supervision" to avoid ambiguity.

I.79 Nova Modus disagreed with imposing a duty of supervision altogether, since they thought that this would set unrealistic standards for remote connectivity.

Maintenance

I.80 Some respondents did not think that all the maintenance duties outlined in Consultation Paper 3 should necessarily attach to the licensed NUIC operator.

I.81 Some thought the ADSE should have a role in maintenance. SMMT, supported by Stellantis and Renault, thought that maintenance duties should be "shared" between the operator and ADSE "based on a contractual agreement". Nova Modus thought that it was "unreasonable" to make the NUIC operator responsible for "complex technical maintenance".

I.82 By contrast P3 Mobility argued for "caution" in imposing a maintenance duty on manufacturers, drawing attention to EU laws on repair and maintenance information (RMI):

> *It is unfair on customers and independent repairers if a vehicle can only be maintained by outfits recognised by the vehicle manufacturer. There is a risk of prices being unfairly high if this happens. We agree that certain repairs should not be carried out by inexperienced outfits or individuals, but this is already covered by the EU RMI legislation where relevant training has to be offered.*

I.83 P3 argued that initially manufacturers will own the vehicle "but once we are beyond this stage, careful thought should be given to how this repair information should be managed and cascaded by the manufacturers or ADS suppliers". On this issue, the IUA suggested the need for more engagement between trade bodies, such as SMMT and the Institute of Road Transport Engineers. This could help to ensure that "both in-house engineering and specialist third party independent repair and maintenance bodies are suitably educated to new standards".

I.84 Mobileye thought that where a NUIC was privately owned, the owner should be responsible for normal maintenance. The NUIC operator should "only be responsible for issues that require technical skills, such as installing software updates and maintaining cyber security", rather than "conventional duties which can easily be performed by the owner". They reasoned that:

> *There is no justification to require NUIC operator to perform conventional duties that can easily be performed by the owner. Further for the integration of AV's it is very important to make the experience of privately owning an AV similar to the experience of privately owning any other vehicle.*

I.85 Similarly, DAC Beachcroft thought there should be no obligation on operators to maintain the "non-ADS" aspects of the vehicle.

Insurance

I.86 There was a very high level of agreement that the NUIC operator should be responsible for insurance. However, several stakeholders asked for clarification of the scope of the duty.

I.87 BILA stated that "it should be made clear whether the insurance is intended to cover the use of the vehicle or is wider, for example, whether it is intended to cover the manufacturing of an ADS". BIBA asked us to clarify that the duty includes a duty to insure against cyber attack.

I.88 Mobileye thought that the duty to insure should fall upon the owner if the NUIC is privately owned. BIBA thought that this would produce a more competitive market:

> *Our preference is to ensure that the lessee has the responsibility for arranging cover, ensuring choice, a thriving market, competition and a natural market pressure to keep premiums down, benefiting the consumer. This is similar to the situation that exists today for many leasehold vehicles.*

I.89 Pinsent Masons LLP offered an opposing argument. They acknowledged that insurance is an obligation which could in theory be passed on to the registered keeper. However, they thought that it would be "preferable and more safe" for an operator to retain this duty "at least until the technology becomes common enough (and understood enough) so individuals can be trusted to take these responsibilities on".[57]

Safety-critical updates and cybersecurity

I.90 As with the other duties, there was a high level of agreement that the NUIC operator should be responsible for safety-critical updates and cybersecurity, though a few respondents offered qualifications.

I.91 TfWM thought the proposal needed more "clarity" on how cyber security was to be maintained.

I.92 The ABI and Thatcham Research emphasised that the duty should "complement, not remove, the duty of the vehicle manufacturer with regards to cybersecurity". In a similar vein, BLM Law agreed with imposing the duties but added that:

> *the ADS should be required to install safety critical updates automatically, i.e. without requiring intervention by a licensed operator, and to disable automated functionality until updates have been completed and validated.*

I.93 SMMT, supported by Stellantis and Renault, thought that these duties should be "shared" between the ADSE and the licensed NUIC operator on the basis of a contractual agreement. They noted that the ADSE, rather than the NUIC operator, is best-placed to determine what software updates are safety-critical.

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[57] P3 Mobility's response was similar to Pinsent Mason LLP's on this point.

I.94 Nova Modus argued it was "unreasonable" to subject NUIC operators to these duties automatically, arguing that the duties should be able to be fulfilled by either the operator or the ADSE.

Reporting accidents and untoward events

I.95 Respondents agreed with the principle of imposing this duty. However, some had concerns about the threshold for triggering the reporting duty.[58]

I.96 SMMT said:

> *The regulator should define accident reporting requirements in a clear and precise manner that facilitates legal certainty while not hindering technological advancement or service innovation by creating overly onerous obligations. Complying with such requirements must be technically feasible, and should consider intellectual property rights, data protection and anti-trust laws.*

I.97 There was particular concern about the definition of "untoward events". The ABI and Thatcham Research were concerned that "strict guidelines and thresholds should be set as to prevent a requirement for immaterial events from being reported (eg striking a small piece of debris)".

I.98 Waymo similarly noted the "vagueness" of the term and its potential to "include a wide range of occurrences, some of which have no clear link to ADS safety". While Waymo agreed that the definition should be left to a regulator, it thought that the Law Commissions should "provide some guidance so that the reporting burden could be reasonably limited to any demonstrated safety need for the information".[59]

I.99 IUA suggested that NUIC operators be required to report untoward events "beyond the pure driving task", such as illegal passenger behaviour.

I.100 Oxbotica agreed with the duty but thought that the proposal should read "untoward events (as defined by the Highway Code)" rather than making reference to the regulator.

I.101 The PACTS and TRL joint response suggested that there should be additional duties on NUIC operators "to monitor and share in use data as required" as well as to share "all critical safety learnings".

A REGULATION-MAKING POWER TO TRANSFER DUTIES TO OWNERS

Q41: We provisionally propose that legislation should include a regulation-making power by which some or all of these duties could be transferred to the registered keeper or owner, if it was shown that it was appropriate to do so.

Do you agree?

I.102 In the Consultation Paper we recognised that, as the sophistication of vehicles develops, it may become more feasible for the registered keeper or owner to perform

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58 See response from Five AI.

59 Similar concerns were expressed by BLM Law and RoSPA.

these duties. We therefore provisionally proposed that legislation should include a regulation-making power to transfer some or all of these duties, where transfer is safe and appropriate.

I.103 A majority of consultees agreed. Of 71 responses, 45 (63%) agreed, 10 (14%) disagreed and 16 (23%) answered "other".

I.104 Many consultees felt that they could not be sure until they knew more about how the market would develop. For example, the Urban Transport Group said they were "unsure" and would "need a clearer understanding of the potential benefits of such an approach before forming an opinion". Mills & Reeve LLP answered that they "probably" agreed, although the proposal "is likely to present practical difficulties". Disagreement with the proposal was similarly soft. Cycling UK were "unconvinced" but "not adamantly opposed".

I.105 Most respondents who offered a more detailed response distinguished between different duties, as set out below.

Insurance

I.106 The duty which respondents most frequently mentioned as appropriate to transfer to the registered keeper or owner was the obligation to insure the vehicle.[60]

I.107 BILA stressed that it must be possible to identify the party with responsibility to insure at all times so that the vehicle is never used without insurance.

I.108 SMMT argued that "the responsibility to insure the vehicle will depend on the model of 'ownership'". They considered that transferring responsibility for insurance to the keeper or owner would only be sensible if they owned the vehicle outright or held it on a long-term lease, but not if they held it on a subscription basis.

Maintenance

I.109 Several respondents also thought that maintenance might be an appropriate duty to transfer. The Bar Council said that "there may well be a case, once there is some practical experience of this type of scheme, for handing back responsibility for some discrete elements of maintenance to the registered keeper". RoSPA thought this would be appropriate "if safety permits".

I.110 SMMT saw a need for specific contractual arrangements:

> *As regards maintenance, the contracts should be specific, such as whether they cover only tyres and running gears, or also software. Unlike supervision contracts, which are likely to be offered by one entity at a time, there should be flexibility to choose from multiple maintenance providers, just as registered keepers of private passenger cars today have the right to access services provided by franchised dealers or the independent aftermarket. However, the registered keeper or owner has a responsibility to ensure the vehicle is roadworthy.*

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[60] Respondents who specifically mentioned insurance included BILA, RoSPA, P3 Mobility and the Bar Council.

Supervision, software updates, cyber security and accident reporting

I.111 Fewer respondents thought that other duties should be transferrable.

I.112 DAC Beachcroft LLP thought that aside from insurance and maintenance of the non-ADS aspects of the vehicle, other duties should not be transferrable "for reasons of safety" and "consistent monitoring". Similarly, SMMT did not consider transfer of supervision duties to be feasible:

> *In reality, we struggle to see how the registered keeper or owner could supervise the remote operation of a no-user-in-charge (NUIC) automated vehicle.*

I.113 IUA expected transfer of responsibility for safety-critical updates and cyber-security to be subject to "the most stringent requirements" of any of the duties listed.

I.114 The PACTS and TRL joint response stated that transfers should apply only to duties which "are not safety critical and do not require a level of technical competency beyond that can be reasonably expected based on training and licensing requirements".

The need for caution and clarity

I.115 Some consultees urged caution. Kennedys Law LLP thought that a transfer of duties would need to be "exceptional and carefully prescribed". The Suzy Lamplugh Trust specified that for HARPS all duties should remain with the operator "to ensure that passengers are protected". By contrast, HORIBA MIRA highlighted the need for flexibility and for regulation-making powers to be "as wide as possible", since "it is very difficult to predict what use cases, business models and unforeseen hazards will emerge".

I.116 The need for clarity was a further theme in the responses. DAC Beachcroft LLP said:

> *Whatever the Law Commission recommends, it must ensure that all recommended requirements be abundantly clear. Registered keepers will need to be comfortable with the requirements placed upon them. Additionally, the Law Commission should recommend the consequences of not satisfying the requirement.*

I.117 Several insurance respondents thought the mechanism for transfer of duties was too vague. They asked us to provide "further clarity about whether the transfer of duties will be mandated at a specific point or if it will occur on the back of a request to transfer duties".[61] They also requested further guidance on the meaning of the phrase "appropriate to do so".[62]

I.118 Nova Modus suggested that a regulation-making power should also provide for transfer of some duties to "competent professional entities". These entities could deal

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61 ABI and Thatcham Research. See also DLG; Aviva Insurance.

62 ABI and Thatcham Research. See also DLG; Aviva Insurance; AXA UK.

in particular with "the complex technical maintenance such as safety-critical updates, cyber security, and calibration of sensors".

Disagreement

I.119 KPMG and the British Motorcyclists Federation both took a stronger stance on private ownership, arguing that owners should be able to operate vehicles themselves. KPMG said:

> *We believe individuals should be able to privately own a NUIC vehicle and should have the option to assume liability for its supervision and maintenance, such as updating software in a timely manner. We are of the view that mandating NUIC vehicle owners to pay a third party to do this would be too significant a departure from how the automotive system works today. Such a restriction would likely result in large additional costs and may discourage or price prospective consumers out of the market.*

I.120 By contrast, the Institute and Faculty of Actuaries thought that a power to transfer duties might be "premature". Similarly, Burges Salmon LLP said:

> *it would be premature to introduce this power unless and until potentially appropriate circumstances when it might be used are identified.*

I.121 The OTC opposed the power, arguing that putting all responsibilities on the operator has "many benefits", including increased "clarity of responsibility".

I.122 TfL also opposed a regulation-making power:

> *We would question under what circumstances it would be appropriate to transfer these duties and the potential benefits. Given that some of the responsibilities, such as installing critical software updates, are likely to require a high degree of expertise and the operator will have had to demonstrate their competence it is unclear how this would work if the duties were transferred to the registered keeper or owner. Would they be expected to prove their individual competence under a separate scheme?*

I.123 BLM Law similarly argued that facilitating a transfer of responsibility to a registered owner of keeper "may succeed only in transferring liability for the obligations, rather than ensuring they are effectively discharged".

ACCESSIBILITY

Q42: We welcome views on how accessibility standards for Highly Automated Road Passenger Services (HARPS) might be developed.

We provisionally propose that:

(1) an accessibility advisory panel should be formed to include:

(a) the Equalities and Human Rights Commission; and

(b) representative groups for disabled and older persons;

(2) the Secretary of State should be obliged to consult with the accessibility advisory panel prior to setting any national minimum standards on HARPS;

(3) there should be a duty to periodically re-consult the accessibility advisory panel at set intervals to ensure requirements keep pace with developing evidence of technical feasibility and changing needs.

Do you agree?

We welcome views on what the set interval for periodically re-consulting the accessibility advisory panel should be.

I.124 Consultation Question 42 considered "Tier 2" operator duties – additional duties which would apply only to operators of HARPS, which carry passengers as a commercial service. Some of the most significant Tier 2 duties for HARPS operators are likely to be those relating to ensuring accessibility. We sought views on how to best ensure the optimum development of national minimum standards for HARPS accessibility. We also proposed the creation of an accessibility advisory panel, which the Secretary of State would be obliged to consult prior to setting minimum standards. Finally, we proposed a duty to periodically re-consult the advisory panel, and asked for views on how frequently this should occur in order to keep pace with developing evidence and technology. The responses to the different parts of Consultation Question 42 are set out in turn below.

Developing accessibility standards

I.125 Overall, responses overwhelmingly agreed on the need to set accessibility standards and to prioritise accessibility in the development of HARPS. As ALBUM put it:

> *This is an absolutely critical area to define. In many, if not all, instances HARPS will be designed from the drawing board and hence we as a society have an opportunity to design in [equality] from the very beginning… Failure to address this now, at the outset, before anything hits the road is absolutely crucial if we as a society are to avoid building in discrimination. The Victorians, made this mistake with railway platform heights and we are still living with the legacy more that a 150 years after they had an opportunity to build in accessibility and missed it.*

Suggestions for how accessibility standards should be developed

I.126 Stakeholders offered various suggestions on how accessibility standards might be developed.

I.127 Several stakeholders noted that standards should be based on existing standards for passenger transport vehicles, such as the PSV Accessibility Regulations 2000.[63] RoSPA argued that accessibility standards for HARPS should be guided not only by existing legal standards but by more ambitious "best practice":

> *Some of the best practice already in place in the public transport system is likely to Ito form a good basis for the requirements of an automated vehicle system. For example, it is very likely that human transport assistants will be required at transport hubs to help people board these vehicles safely. Staff at these hubs will need to receive training to help all groups access the vehicles.*

I.128 However, some of these respondents acknowledged that the absence of a driver poses new challenges. For example, FirstGroup pointed out that the requirements under the PSV (Conduct of Drivers, Inspectors, Conductors and Passengers) (Amendment) Regulations 2002, which require a driver to provide assistance to passengers with particular needs, cannot be met in NUIC vehicles. Conversely, Guide Dogs noted that one advantage of HARPS could be to eliminate the risk of discrimination against dog owners by human taxi and minicab drivers, which their research has found to be widespread in practice.

I.129 Respondents suggested a range of methods with which to consider solutions to the novel accessibility standards posed by NUIC vehicles. Amey proposed the use of "focus groups highlighting the needs of the user". Guide Dogs highlighted the focus group they conducted in 2020 conjunction with the Law Commission:

> *Participants identified a range of issues, including the accessibility of the technology used to summon a passenger service, preventing discrimination by staff or other passengers, the accessibility of interacting with the vehicle during the journey, and ensuring passengers can make their way to and from the vehicle at either end of a journey.*

I.130 Burges Salmon LLP suggested the establishment of technical groups to develop and promote standards, "potentially through BSI and where available drawing in international work on the same area".

I.131 George Economides of Oxfordshire County Council highlighted the general need for more research on "what is needed, how it is communicated and how these are audited". Other respondents suggested existing research which may assist in developing standards for HARPS. The RAC Foundation suggested that this should involve work on this subject by design researchers, such as the Royal College of Art project on "GATEway Driverless Transport". The Suzy Lamplugh Trust suggested that standards should build on the accessibility recommendations in the report of the Task and Finish Group on Taxi and Private Hire Vehicle Licensing. ITS UK highlighted the expertise of DPTAC.

[63] See responses by FirstGroup, Nova Modus, Stagecoach Group, TfWM. and Urban Transport Group.

Groups and accessibility needs to be considered when developing standards

I.132 Several responses, in particular those from vulnerable road user and safety and disability groups, provided helpful insight about what groups should be considered when developing safety standards.

I.133 Respondents generally agreed with the Consultation Paper's emphasis on the needs of older persons and those with disabilities. For example, RoSPA recognised that these groups were "crucial" as they were the ones likely to "receive the most benefit from the introduction of the technology".

I.134 Guide Dogs highlighted the needs of passengers with sight loss:

> *For people with sight loss using passenger services, both identifying and reaching a vehicle at the start of a journey, and leaving it and making their way to their destination at the end of a journey can be difficult, even with a human driver to assist. Automated passenger vehicles should be able to make their location clear to passengers with sight loss when making a pickup, perhaps with an audible signal. They should also be equipped to provide clear directions to get a passenger from the vehicle to their destination.*
>
> *During the journey, there may be instances where a passenger may need to give further input to the automated driving system or remote operator. For instance, if a vehicle is delayed or diverted, the passenger may be asked whether they wish to continue with their journey or stop at an alternative destination. This information must be presented in an accessible format which does not require the visual cues of a map or sight of the situation outside the vehicle to respond to.*

I.135 TfWM stressed that engagement with disability groups should also include those with upper body limitations. They also noted that aside from disabled users there were groups not mentioned in the Consultation Paper whose interests should be considered, including low income groups, women, children/parents and ethnic minority passengers. Driverless Futures? also noted that accessibility considerations should "not just focus on potential passengers" but should also represent the views of cyclists and pedestrians.

I.136 KPMG emphasised the complexity and nuance of accessibility issues, and identified three types of accessibility which standards need to address:

> *- physical access point accessibility, the most obvious example of which is wheelchair accessibility;*
>
> *- digital and information accessibility, such as whether the data used in self-driving decisions supports accessible journey planning;*
>
> *- interchange accessibility, where HARPS may fit into a wider accessible multi-modal transport system.*

Concerns about stifling innovation and cost

I.137 Some respondents expressed concern about accessibility standards stifling innovation.

I.138 Many of these concerns came from developers. For example, HORIBA MIRA said:

> *It is important that industry supports mobility for those with disabilities, but there is a risk that the measures required could prevent or delay rollout. If AVs are shown to be safer than manual vehicles, this delay would result in more people being killed and seriously injured. Such fundamental safety considerations should receive even higher priority than ensuring equality, and therefore it must be ensured that accessibility requirements don't unreasonably inhibit the rollout of AVs.*

I.139 Developers made a number of suggestions on how to avoid stifling innovation. BVRLA suggested that the threshold for accessibility standards should be set lower for "providing companies providing a commercial service" than for those providing a "public service". HORIBA MIRA thought that a since it is difficult to foresee exactly how HARPS services are likely to look, initially a voluntary code of practice would be preferable to legally binding accessibility standards.

I.140 Wayve and P3 Mobility suggested that accessibility standards should consider the transport service as a whole rather than individual vehicles.[64] P3 Mobility said:

> *There may be some items that would apply to all vehicles as part of achieving good accessibility to all, such as clear instructions to the passengers through signage or other means, but others should be applied to the service, such as the availability of wheelchair-accessible vehicles.*

I.141 P3 Mobility noted the provision of human assistants as an example of an adjustment which should be required for some, but not all vehicles in a fleet:

> *Those that need assistance entering or leaving the vehicle, correctly tethering a wheelchair, or just need some reassurance during the ride, would struggle with a fully autonomous vehicle without any human assistant. An operator of HARPS would not want to provide an assistant with all vehicles, as this would heavily compromise the design of the vehicle, therefore not every vehicle should be required to be fully accessible to all members of society. The calculation of the required ratio of fully accessible vehicles within the fleet would need to be calculated and may differ from one region to another.*

I.142 However, responses from stakeholder who were not AV developers cautioned against placing too much emphasis on economic factors. Driverless Futures? noted that "'technical feasibility' is likely to be defined by economic feasibility, favouring existing systems already established in the trial phase". However, their response recognises the complexity of this issue:

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[64] The CertiCAV team at Connected Places Catapult also made this suggestion.

> *The existing mobility system is unfair to many groups… The challenge for AV regulators is to enable testing to progress the technology without committing to technologies or business models that are likely to create or exacerbate inequalities. AV regulators will need to impose these wider mobility system goals and avoid prioritising the introduction of ADS technology as the goal itself.*

I.143 RoSPA argued that the increased costs of providing services for disabled passengers must not be passed on to those passengers through higher prices.

Formation of an accessibility advisory panel

I.144 The proposal on an accessibility advisory panel received overwhelming support from respondents. Of 63 respondents who answered this question, 53 (84%) agreed, three (5%) disagreed and six (10%) answered "other".

I.145 Almost all respondents who answered this question supported the formation of an accessibility advisory panel. In total, 49 respondents were in favour of forming a panel. For example, Five AI thought that creating such a panel while AVs were being developed presented a unique opportunity to "design in" accessibility considerations. The Urban Transport Group noted that TfGM had successfully used a panel approach to ensure that disabled people "are placed at the heart of the design and testing" of their services.

I.146 Notable stakeholders in favour of a panel included DPTAC and the EHRC, which expressed a desire to "contribute to the success" of any panel.

I.147 Only three respondents disagreed with the formation of an advisory panel. FirstGroup disagreed because it thought that DPTAC "already fulfils this role and its remit should be extended".

I.148 Respondents offered views on how the advisory panel should be composed and how it should operate.

I.149 DPTAC said that aside from the EHRC and representative groups for disabled and older persons, the panel should also include: "a professional body consisting of manufacturing stakeholders"; DVSA and Motability; "disabled drivers associations and vehicle adapters"; and "software companies that develop or do the electronic adaptations". Burges Salmon LLP agreed that the panel should include ADSEs and AV manufacturers to enable it to "focus on feasible standards". Anxiety UK thought the panel should include a range of patient organisations including anxiety disorder organisations, other hidden disability organisations and condition-specific charities.

I.150 The Urban Transport Group said:

> *We suggest that membership of the panel should also include other groups who have frequently been excluded from consideration in the past, including women, children, people from black and minority ethnic backgrounds and people on low incomes. Many people who fall into these categories are less likely to drive and it is therefore important that HARPS meet their needs.*

To be effective, the panel should not only be invited to discuss accessibility standards, they should also have the opportunity to test their effectiveness in practice before standards are finalised and before vehicles and services are launched.

Feedback from the panel should be acted upon to ensure consultation is meaningful and makes a difference. It is not enough for the Secretary of State to consult – there must also be an obligation to have due regard to the views expressed and to take action where necessary.

I.151 KPMG said:

we would suggest working with other public transport bodies to leverage the accessibility panels and forums that have already been established. We also believe that people who take part in these panels should be remunerated for their time.

I.152 Finally, Highways England noted that decisions by the panel should take into account the impact of decisions on government agencies and the importance of ensuring continuity of public transport service provision:

Any local authority / government agency would need to comply with all minimum requirements and if found to be non-conforming, could face the removal of their HARPS licence. This could result in the loss of key public services that rely on these vehicles such as trams, buses and taxi's.

Views on interval for re-consulting the accessibility advisory panel

I.153 There were a broad range of views expressed about the appropriate interval for re-consulting the accessibility advisory panel. Aside from FirstGroup's suggestion that there should be "continuous ongoing dialogue",[65] the shortest interval was proposed by TfL, which suggested every two to three months. The longest interval proposed was by BLM Law, which suggested every three to five years. The most popular answer was that the group should meet annually,[66] but a handful of respondents were in favour of consulting every other year,[67] and a similar number favoured re-consulting several times per year.[68]

I.154 Most respondents who answered this question agreed that the advisory panel should be consulted more frequently when there are important developments in the sector or

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65 Note FirstGroup did not support the formation of a separate accessibility panel and so thought continuous dialogue should be with DPTAC.

66 This suggestion was made by Wendy Owen of Bangor University, Stagecoach Group, Richard Birch of Acromas Insurance Company (responding in a personal capacity), Nova Modus, Five AI, the Suzy Lamplugh Trust, the Trustworthy Autonomous Systems Hub and P3 Mobility. Robert Houghton of Imperial College London suggested an interval of between 10 months to one year.

67 This included Pinsent Masons LLP (one to three years), Anxiety UK (two to three years) and TfGM). KPMG did not suggest what it considered an appropriate interval but cautioned that "care should be taken that [it] is not too short and does not result in requirements that change so often that automotive and technology companies are discouraged from innovating and funding projects in the AV space.

68 Oxbotica, Dean Hatton of the NPCC and Reed Mobility (every six months); DPTAC, RAC Foundation and John Rainbird (every three months); TfL (every two to three months).

in the legal framework[69] and/or in the initial years of its existence.[70] Several respondents also argued the panel should be able to convene ad-hoc meetings. The Faculty of Advocates referred to this kind of function to deal with unforeseen issues in the early stages as an "on-demand facility".

ADMINISTERING THE OPERATOR LICENSING SCHEME

Q43: We welcome views on who should administer the operator licensing scheme.

I.155 In Consultation Paper 2, we said that we were not well placed to decide who should administer an operating licensing scheme. One possibility was the Traffic Commissioners, who could draw on their experience of administering the PSV and goods vehicle operator licensing schemes. Another possibility was the in-use safety assurance regulator, who would be well-placed to develop expertise in the challenges of automated driving. We welcomed observations.

Traffic Commissioners

I.156 Out of 50 respondents, 17 thought that the Traffic Commissioners were best placed to administer the scheme, at least in the first years of deployment:[71]

> *There are clear advantages of having one licensing regime, including: simplified system, enabling owners to use one authority for both traditional and ADS vehicles, the ability to draw from existing practices, etc. We understand the concerns and the argument for requiring specialised individuals to deal with the licensing of AVs, but we believe this could be easily dealt with by additional hiring and training under the Transport Commissioner's authority. [Pinsent Masons LLP]*

> *Although there are doubtless challenges in funding and timescale to upskill the Traffic Commissioners to have the technical capabilities required to make judgements about AVs, it will be quicker and cost less than to establish, fund and populate an entirely new entity. We also agree that a new in-use safety assurance regulator lacks the experience of dealing with public transport issues, operators, etc. for very many decades. [Nova Modus]*

> *In order to cover the demand for wheelchair-accessible vehicles, it is most likely that in the early stages of rollout conventional vehicles will be mixed with autonomous vehicles. It would be more convenient if this meant that a single licence was required from a single body. [P3 Mobility]*

I.157 HORIBA MIRA highlighted that the Traffic Commissioners "would be less likely to be subject to regulatory capture".

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69 See, for example, Five AI.

70 See, for example, ABI and Thatcham Research.

71 AXA UK; ALBUM; Bar Council; Burges Salmon LLP; Cycling UK; DAC Beachcroft LLP; FirstGroup; HORIBA MIRA; John Rainbird; Nova Modus; OTC; George Economides of Oxfordshire County Council; Pinsent Masons LLP; P3 Mobility; Shoosmiths LLP'; Stagecoach Group; Suzy Lamplugh Trust.

I.158 The OTC expressed confidence that the Commissioners would be able to administer the scheme:

> *As a regulatory and tribunal body that has been in existence since the 1930s the traffic commissioners have remained relevant despite the many changes in road usage during that time. There will undoubtably be a requirement to gain further knowledge, the Traffic Commissioner Board has a diversity of background and experience. Skills required as a result of changes in technology may be developed through appropriate recruitment of traffic commissioners.*

Other views

I.159 Only a few respondents thought that the in-use safety assurance regulator should administer the operator licensing scheme. Wayve preferred this option because they questioned whether the Traffic Commissioners may have the "deep technical capability" necessary to "assure technical operation and safety, rather than transport operation". Mills & Reeve LLP made similar comments.

I.160 A handful of respondents suggested that the two entities could collaborate or assist each other. BLM Law suggested that the Traffic Commissioners could be "transferred" or "seconded" into the safety assurance scheme to administer the licensing scheme. John Rainbird suggested that staff members from the in-use regulator could be placed with the Commissioners to establish a "collaborative structure", of which the Commissioners would remain the "face".

I.161 Some respondents suggested alternative options including the Driver and Vehicle Standards Agency (DVSA)[72] or the Driver and Vehicle Licensing Agency (DVLA).[73] or. Some, such as Highways England thought it should be the Department for Transport more generally.[74]

I.162 Local government stakeholders emphasised local authority involvement. TfGM commented:

> *The DfT should administer the overall national system, however local government should be allowed to mandate additional criteria for their local areas. Local government should also have powers to rescind licences where local operators are not in compliance with the licencing requirements.*

I.163 TfL drew a distinction between Tier 1 and Tier 2 requirements. Tier 1 imposed generic safety requirements and could be administered nationally. Tier 2 involved specific requirements for passenger and freight services and required local decision-making:

> *Key to the tier 2 requirements will be the power to manage numbers appropriately and to ensure only vehicles licensed to operate in a given area*

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72 ALBUM; ABI and Thatcham Research joint response; Richard Birch of Acromas Insurance Company; the British Motorcyclists Federation. The Faculty of Advocates suggested that the DVSA should operate the scheme "on behalf of the Traffic Commissioners".

73 Amey; ABI and Thatcham Research joint response; Richard Birch of Acromas Insurance Company; BIBA.

74 Highways England; TfGM; Xinyi Wu of the University of Edinburgh (responding in a personal capacity).

are able to do so. Local and transport authorities are uniquely placed to understand the needs of their areas. In London this role is fulfilled by TfL as the regulator of taxi and private hire services and the London Service Permit system (operated by London Bus Services Ltd on behalf of TfL) and through the franchising model for buses.

I.164 Future Transport London similarly thought that "local transport authorities are best placed to determine licensing of HARPS to ensure they serve local needs and objectives", and ensure that HARPS do not crowd out public and active transport. TfWM and the Urban Transport Group also argued that local transport authorities should be responsible for licensing.

I.165 Several stakeholders emphasised the importance of ensuring the licensing scheme is independent, regardless of who is administering it.[75]

[75] PACTS and TRL (joint response); SMMT (supported by Stellantis and Renault); Alastair Shipman of Imperial College London.

J. Criminal offences by ADSEs and their senior managers

OVERVIEW

J.1 In response to our first consultation, the great majority of consultees thought we should review possible criminal offences where wrongs by an ADSE result in death or serious injury. The results of our review were set out in Chapter 14 of Consultation Paper 3.

J.2 We looked at the eight existing offences that currently apply to drivers who cause death or serious injury.[76] We noted the trend towards increasing penalties for these offences and to creating new offences.[77] An ADSE could not be charged with these offences, leading to a perceived "blame gap". Other offences might apply, such as corporate manslaughter or section 3 of the Health and Safety at Work etc Act 1974. Individuals might be charged with gross negligence manslaughter. However, manslaughter offences only apply on death (not serious injury) and the 1974 Act has not been applied in a road traffic context.

J.3 We did not think that an ADSE should be blamed or prosecuted simply because a human would be blamed in circumstances that look similar. Nor did we wish to criminalise an ADSE for negligence. Instead, our aim was to encourage an open no-blame culture that promotes learning from mistakes. However, safety assurance will rely heavily on information provided by the ADSE to the regulator in the safety case and subsequent discussions. It would be vulnerable to any lack of candour in this process. We therefore wished to deter serious wrongdoing that actively undermined safety assurance. Examples of wrongdoing might include misreporting test results, supressing poor test results or installing a "defeat device" that made a system respond differently in tests than in real life.

J.4 We considered how this issue is dealt with in three other high-risk sectors (pharmaceutical, aviation and nuclear). All three regulatory schemes include offences of making false statements to the regulator, though the specific offences are different. We focused on Regulation 95 of the Human Medicines Regulations 2012, under which it is a criminal offence to make non-disclosures and misrepresentations "relevant to the evaluation of the safety, quality or efficacy of the product". The offence does not have a mental element, so the prosecution does not need to show that the defendant knew that the statement was false. However, the defendant has a defence if they

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[76] Six offences relate to causing death - by dangerous driving; careless driving; careless driving while under the influence of drink and drugs; or while uninsured, unlicensed, or disqualified. Two relate to causing serious injury - by dangerous driving or by driving while disqualified.

[77] For example, the Police, Crime, Sentencing and Courts Bill 2021, increases the maximum penalty for causing death by dangerous driving from 14 years to life imprisonment, and creates a new offence of causing serious injury by careless, or inconsiderate, driving.

"took all reasonable precautions and exercised all due diligence to avoid commission of the offence".

J.5 We provisionally proposed that it should be an offence for an ADSE to omit safety-relevant information or include misleading information when putting a vehicle forward as self-driving or responding to requests from the regulator. These offences would be committed by the ADSE as a corporate body and would be subject to a due diligence defence. An offence would also be committed by senior managers, where the conduct took place with their consent or connivance or was attributable to their neglect. Where the wrongdoing was associated with a death or serious injury, the offence would be aggravated, and higher penalties would apply. We asked if consultees agreed with this policy. We then set out drafts of four offences and asked for views.

J.6 Two thirds of consultees agreed with our provisional proposals, describing them as essential to protect safety, create accountability and ensure public trust. Only one consultee disagreed. However, there were some areas of controversy:

(1) Some consultees thought that "safety-relevant information" required more specific definition.

(2) Consultees worried about the definition of "senior managers". Although this concept is currently used on the statute book,[78] it may not correspond with the practical reality of safety responsibility. Some thought that the ADSE should designate a single responsible senior manager. Others thought more junior employees should also be guilty of an offence, especially if the employee knew that information was misleading.

(3) Several industry members argued that, rather than requiring the defendant to show due diligence, the prosecutor should prove knowledge or intent.

(4) A few consultees pointed to difficulties in defining when the non-disclosure or misrepresentation caused the death or serious injury. This led some consultees to take a different approach, by (for example) taking the result into account in sentencing.

J.7 Finally, we asked whether ADSEs should be under a duty to submit information to the regulator in a clear and accessible form. Three quarters of consultees thought they should. A minority of consultees, however, were concerned that such a duty would be imprecise and judged only in hindsight. Consultees argued that the regulator should give guidance and develop standard forms for the submission of information.

J.8 Consultees' responses to the individual questions are set out in more detail below.

[78] See Insurance Act 2015, s 4(8)(c) and Corporate Manslaughter and Corporate Homicide Act 2007, s 1(4)(c).

NEW CRIMINAL OFFENCES

Q44: We provisionally propose that:

(1) it should be a criminal offence for an ADSE to omit safety-relevant information or include misleading information when putting a vehicle forward for classification as self-driving or responding to information requests from the regulator;

(2) the offence should apply to senior managers (where it was attributable to the manager's consent, connivance or neglect);

(3) the offence should not apply to more junior employees;

(4) the offence should carry a higher sentence if it is associated with a death or serious injury;

(5) the offence should be prosecuted in England and Wales by either the regulator or the Crown Prosecution Service and in Scotland by the Procurator Fiscal.

Do you agree?

J.9 These proposals were met with strong agreement. Out of 73 consultees who answered the question, 49 (67%) agreed; only one disagreed; and the remaining 23 (32%) responded "other".

J.10 We then set out four "draft" offences. To summarise:

(1) Offence A applied where a vehicle is put forward for classification as self-driving. The ADSE would commit an offence if they failed to provide information, or provided false or misleading information, which was "relevant to the evaluation of the safety of the ADS or the vehicle". This would be subject to a "due diligence" defence by the ADSE.

(2) Offence B made similar provisions where a regulator requests specific information.

(3) Offence C applied to senior management. A "director, manager, secretary or similar officer" would be guilty if the offence was committed with their "consent or connivance" or was "attributable to their neglect".

(4) Under Offence D, the first three offences would be "aggravated" and carry a higher sentence where they were linked to a death or serious injury. We said this would apply where the misrepresentation or non-disclosure is "related to an increased risk of a type of adverse incident"; an "adverse incident of that type occurred"; and "the adverse incident caused a death or serious injury".

J.11 In all, 57 consultees provided views on our proposed offences. Of those, the majority expressed conditional support, and 17 gave unconditional support for the offences as drafted.

J.12 As the points made to each question were similar, we deal with them both together below.

Agreement

J.13 The majority of consultees agreed with our proposed offences, on the grounds that they would promote openness, honesty and increase public trust. Support was particularly strong among law firms and legal associations:

> *AVs being an entirely new technology, and one about which many people will feel considerable apprehension in the early period of their introduction, it is entirely appropriate to do as the Commission proposes, and adopt the more restrictive elements from existing offences that apply to comparable industries.* [Bar Council]

> *It is right that the provision of misleading information should be criminalised. It is key that the industry complies with the standards set and often, the only way to achieve that is to set down clear legal requirements with an ability to enforce them.* [Kennedys Law LLP]

> *The ADSE will have access to all available data in respect of a vehicle put forward for classification as self-driving. It is crucial that the ADSE can be relied upon to submit an honest and clear safety case. Failure to do so creates a risk to vehicle users, other road users, pedestrians and property*. [DAC Beachcroft LLP]

> *On balance we consider an offence of this type is necessary for public safety assurance, to reinforce the critical importance of safety transparency and to address the potential information / experience imbalance between ADSEs and regulators (especially at the outset of the technology's deployment).* [Burges Salmon LLP]

J.14 RoSPA noted the crucial role of the safety case:

> *The safety assurance scheme will rely crucially on the ADSE to submit a safety case. All those involved in the process need to be honest, open and accurate in putting the case together. We hope that the proposed offences would deter ADSEs from compromising safety standards to gain a competitive advantage. For example, ADSEs might suppress poor test results; install a "defeat device" so that the software performed better in tests than in real life or disable safety-critical features.*

J.15 The British Motorcyclists Federation pointed out that AVs can be directly responsible for injuries and death:

> *It should be incumbent on the ADSE to be explicit and accurate about what the ADS can and cannot do in plain English. These are computer systems which can be directly responsible for injury and fatalities of humans. Failure to be honest about their capabilities must incur penalties.*

J.16 The Health and Safety Executive also agreed with our proposals, noting that it would be wrong to rely exclusively on section 3 of the Health and Safety at Work etc Act 1974 (HSWA) to hold ADSEs responsible

HSE has of course always been aware of the broadness of the general duties under HSWA and we have developed policies which direct the focus of our regulatory regime. Our policy states that HSWA is not generally used to enforce in respect of road traffic accidents when more specific and detailed legislation applies. Our guidance points away from HSWA being used to enforce in relation to vehicle design and roadworthiness of vehicles, and further that HSE enforcement action should not be taken to fill gaps in the law.

Disagreement

J.17 Oxbotica was the only consultee to disagree with all aspects of our proposals:

> *The sanction of a criminal offence, and prosecution of an individual, is a very serious one regarding omission of information for classification of self-driving. This is particularly the case where a) the technology is continually developing, b) it is not clear what is classified as 'safety-relevant information' in this context, and c) the defendant could be an individual who relies upon a team of engineers to supply them with accurate information. It is not practicable to expect the individual to know each piece of information relating to every piece of technology.*

Qualified agreement: the views of other industry members

J.18 The SMMT and Mills & Reeve LLP gave identical responses on this issue, which were supported by Stellantis and Renault. They accepted that "criminal offences may need to be introduced as a part of the overall scheme of safety assurance", but advised caution "in introducing onerous criminal sanctions":

> *Attaching criminal liability to wrongdoing by ADSEs brings with it serious risks, including stifling innovation, unfairly penalising inevitable problems arising from development, treating the AV sector more harshly than other industries and incentivising cover-up rather than transparency. These risks are real, and an overemphasis on criminal liability could endanger the substantial safety gains that are expected from the introduction of AVs.*

J.19 The SMMT and Mills & Reeve LLP responses also queried any comparison with the penalties on human drivers:

> *The context is very different: the need to discourage careless and dangerous driving by a human driver is not the same as the need to incentivise responsible and transparent systems development. Any form of negative finding applied to an ADSE will have a series of other adverse effects, such as loss of public reputation and confidence, as well as loss of trust with regulators and commercial partners.*

J.20 That said, SMMT and Mills & Reeve LLP were not wholly against new offences in this area. Subject to specific comments (discussed below) they supported "introducing specific offences that are closely aligned with the safety assurance scheme, and similar to the systems of penalties for failure to comply with safety assurance schemes in other potentially high-risk industries". Furthermore:

The approach of penalising lack of transparency rather than negligence is a sensible one in the context of a fast-moving, innovative industry. However, we would recommend an approach that encourages cooperation with the regulator and reserves criminal liability for extreme behaviour only.

J.21 Intel's Mobileye supported new offences, provided that key terms could be defined, such as "safety-relevant information" and managers' "neglect":

> *Mobileye believes it is crucial for the safe implementation of AVs that ADSE will supply all relevant information accurately. Thus, Mobileye strongly supports making the submission of false information and the omission of safety-relevant information to the regulator a criminal offence. Mobileye would like to suggest a few clarifications regarding the following propositions:*
>
> *(1) Mobileye holds that the "safety-relevant information" should be specified in detail: what exactly is the information that ADSE's failure to submit will result in criminal offence.*
>
> *(2) Mobileye holds that when it comes to neglect, it is important to clearly define in advanced what reasonable precautions and due diligence are expected from senior management in this context. The reason for this is to minimize the uncertainty for the companies involved and prevent over deterrence.*

J.22 Five AI said that conduct should only be criminalised "to the extent that it falls sufficiently far below the bar of what society would expect":

> *An ADS is a complex product with many components and the ADS itself is sensitive to small changes. The ADSE will be reliant on information from many different sources inside and outside of the ADSE, and senior managers cannot be expected to have intimate knowledge of all the different parts of the systems. Furthermore, with hindsight certain matters can take on an importance that was not evident at the time. Any offences should be proportionate to the maleficence of the conduct.*

J.23 The joint response by the ABI and Thatcham Research, as well as Aviva Insurance, requested "more careful differentiation between criminal offences and negligence", as this "may impact the ability of insurers to rightfully seek subrogation".

Calls for a wider review

J.24 Industry consultees were particularly concerned that AVs should not be treated more severely than other industries. Several consultees thought that this issue should form part of a wider review of corporate liability. SMMT/Mills & Reeve LLP stated:

> *The consultation paper notes some difficulties in relation to the existing offences, such as the lack of mechanisms to hold senior management accountable. The proposed Law Commission project on Corporate Criminal Liability would be an appropriate forum to address these broader issues than the current consultation, as it will be able to consider the question broadly and recommend a consistent approach across all sectors.*

J.25 Similarly, HORIBA MIRA commented:

> *A person killed as a result of a collision caused by a CAV is no more or less dead than a person killed by a fire resulting from faulty electrical goods, a train crash, a bridge collapse or contaminated food. Or, for that matter, a traditional manually driven vehicle that has a dangerous defect. Whilst it is fair that conduct which the public would be outraged by should be prosecuted, it would not be fair to hold CAVs to a higher standard.*
>
> *Therefore, whilst changes to legislation are needed, this should be done as part of the wider, cross-industry review of the accountability gap referred to in the document, and should treat all industries equally.*

SPECIFIC CONCERNS ABOUT THE PROPOSALS

Defining safety-relevant information

J.26 The first concern was that it would be difficult to define "information relevant to the evaluation of safety". As P3 Mobility said:

> *The requirements regarding supply of information to the regulator need to be clearly defined, as well as the timeframe in which the information shall be provided. If the ADSE is deliberately withholding information, this should be punished, but we do not want a situation where fines are levied for poor information if the requirements are not clear.*

J.27 TfWM thought that the regulator should provide "minimum reporting standards" so that ADSEs are aware of what is expected of them.

J.28 Several consultees stressed that the concept should be narrowly defined. Kennedys Law LLP thought it was important that the information be "of significance on an objective basis" so that ADSEs do not fall foul of the offence "in minor or inadvertent situations". Oxbotica felt the term was too wide:

> *This term is very wide - everything concerning the operation of a vehicle on a public road could be construed as safety-relevant. For example, accidents usually occur because of the confluence of two or more low-likelihood events, and it would be impractical to provide information on all possible low-likelihood events and how they might interact with one another.*

J.29 SMMT/Mills & Reeve LLP saw the lack of a comprehensive definition as an argument against using the "safety-relevant" test in the early stages of deployment:

> *We would point out that the pharmaceutical industry, on which these offences are modelled, provides established and extensive guidance to market participants to enable them to understand their obligations. Clearly, this would not be available in the early stages of development of AVs. Until a substantial body of practice and guidance has been built up, ADSEs would not be able to tell whether the information package that they are presenting in fact meets all of the requirements to satisfy the "relevant to the evaluation of the safety of the ADS or the vehicle" test. It may therefore be appropriate to introduce this kind of test once the industry has developed further. We have concerns that at*

this stage it could act to deter innovators, especially smaller players, from entering the market.

A continuing obligation?

J.30 Two consultees thought that the obligation to provide information should continue throughout the deployment of an AV. Burges Salmon LLP stated:

> *Whilst the offences are intended to relate to the period when putting a vehicle forward for classification as self-driving or responding to information requests from the regulator, it is also not clear whether or not there is any proposed offence in terms of any continuing obligation to disclose to the same authority if new information emerges or key information changes. This may be particularly relevant for products such as AVs where functionality may evolve in-use over its lifetime.*

J.31 BLM Law stated:

> *There seems to be no obligation – and corresponding offence – to update information within a safety case (or elsewhere) when, despite being accurate at the time a vehicle is classified, safety critical information later becomes inaccurate because of developments in technology. By way of example, there is an ongoing obligation to update software, yet there does not seem to be any corresponding obligation to update the safety case at the same time, which could also provide an audit trail in the event new updates inadvertently introduce defects into the AV or otherwise compromise the accuracy of the safety case originally submitted.*

J.32 Nova Modus argued:

> *It seems necessary that these non-disclosure and misleading information offences apply to both the pre-deployment Type Approval regulator and to the in-use safety regulator.*

J.33 Mobileye thought that the ADSE should pass on new information, but this should not be used to retrospectively challenge what was said before:

> *Mobileye holds that although ADSE should be obliged to present any new information, it should not influence the examination of previously provided information. For example, information submitted to the regulator will not be held insufficient or misleading retrospectively, even if later information contradicts the former, or changes the conclusion made with respect to it.*

Senior management culpability

J.34 Many consultees supported the idea that senior managers should be criminally liable if the ADSE's non-disclosure or misrepresentation was proved to be committed with their consent, connivance, or was attributable to their neglect. DAC Beachcroft LLP said this:

> *focuses the minds of senior managers on implementing a safety first culture and encourages honesty, openness and transparency.*

J.35 By contrast, SMMT/Mills & Reeve LLP had "concerns that this could drive inappropriate behaviour within an organisation":

> *A situation could arise in which decision-making is driven to junior levels, or development is compartmentalised into smaller business units, in order to separate senior managers from any wrongdoing. In addition, we consider that it will be difficult to ascribe blame to particular individuals in a way that is fair and does not single out a person who is, in reality, working in a team context.*

Defining senior management

J.36 One specific concern raised by several respondents was that senior management was hard to define, and would be a difficult concept to apply in an AV context.

J.37 In Chapter 14, we provisionally proposed to use the same definition as section 37 of the Health and Safety at Work etc Act 1974, which refers to "any director, manager, secretary or other similar officer of the body corporate".[79]

J.38 In response to our proposals, Wayve pointed out that the person with the greatest technical knowledge about the issues in the safety case may not necessarily be either a director or manager:

> *We would welcome clarity on the definition of senior and junior staff, particularly as it related to technology companies where some of the most senior people in the company are technical leads with no direct managerial responsibility, but significant cross-functional influence.*

J.39 Five AI said that many directors would have no direct responsibility for the safety case:

> *A number of those who fall within the definition of officer (such as a CFO or Company Secretary) would have no direct responsibility for safety or the requisite knowledge to able to meaningfully input into this, and hence it is important the offence is delineated so that in practice it only captures those with real responsibility who ought to bear culpability, not merely those who may hold a senior position.*

J.40 Nova Modus described the senior and junior distinction as "very vague", while Wendy Owen of Bangor University thought it was arbitrary:

> *the people involved may vary - in the development and deployment of safety critical systems, everyone involved has responsibility and a no blame culture should be encouraged to enable people to speak up if there is a problem, from concept design stage through into operations.*

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[79] The Corporate Manslaughter and Corporate Homicide Act 2007 provides an alternative definition of senior management. Section 1(4) includes persons at board level ("persons who play significant roles in the making of decisions about how the whole or a substantial part of its activities are to be managed or organised"). However, it also includes managers who play significant roles in the "actual managing or organising of the whole or a substantial part of those activities".

J.41 HORIBA MIRA pointed out that many people in the middle layers of the organisation may play a crucial role in assessing safety:

> *For very junior staff, such as graduates and apprentices, sufficient oversight should be in place and therefore the organisation can be held accountable, but there are a large body of engineers within any industrial organisation who are senior enough to have a high level of autonomy and low level of supervision, whilst being far below what could reasonably be termed 'senior management'.*

J.42 We think that there is merit in these observations, and return to the issue at the end of the paper. The safety case is likely to rely on the input of engineering specialists and technical leads, who will not necessarily be senior managers or officers of the company. It may be arbitrary to exclude a technical expert but include (for example) a Chief Finance Officer or company secretary, who has little understanding of the technology.

Designating a senior manager with responsibility for the safety case

J.43 In the Consultation Paper we suggested that a senior manager should sign the safety case, imposing a duty to take care that the statement is correct.[80]

J.44 HORIBA MIRA that that such a senior manager "would be putting themselves at excessive personal risk given that they cannot reasonably be expected to have digested and understood the full content".

J.45 However, other consultees suggested that ADSEs should formally designate a senior manager to be responsible for the safety case. DLG supported the proposal and suggested it should:

> *go further by including some form of approved/responsible person(s) scheme whereby senior managers formally assume responsibility over aspects of the application for classification and the information within the application. This would enable the regulator or the Crown Prosecution Service/Procurator Fiscal to apply the offence to the correct senior manager.*

J.46 Similarly, Stewarts Law LLP thought that:

> *We consider that defining 'senior managers' could be difficult and suggest that the legislation allows for a compliance officer who is personally responsible for the provision of the relevant information, and who is then required to ensure that they have the relevant knowledge of the AV and to report the same as and when required. If someone was required to be placed at board level with this responsibility, it would be easier to both police and enforce safety controls.*

J.47 We accept that not all senior managers will have the technical expertise to evaluate the safety case. However, we continue to think that a nominated senior manager should sign the safety case and take responsibility for it. The nominated person

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[80] CP3, para 14.98.

should take reasonable precautions and exercise all due diligence to avoid misrepresentations and non-disclosures. We would expect them to document the steps they took, so as to establish a due diligence defence at trial.

Including junior employees with an intention to mislead (or generally)

J.48 Several consultees thought that the offence should apply not only to senior managers, but also any employees who acted intentionally to mislead or omit relevant information.

J.49 ALBUM thought inclusion of junior employees should "depend on the level of culpability and/or the deliberate omission of critical information by a junior employee when passing information to a senior colleague". FirstGroup thought that the offence should apply to any individual where "the action leading to the offence was deliberate and without coercion". TfWM suggested the offence should apply where there is "substantial evidence that the junior employee was deliberately acting against the advice of superiors for any reason". The ABI and Thatcham Research proposed the following test:

> *While the onus should largely rest on senior managers, wilful omission, or purposeful dissemination of misleading information by junior employees should not preclude repercussion. With that being said, it is important not to create a system where junior employees end up taking the blame for the decisions of senior employees.*

J.50 The Senators of the College of Justice suggested a separate, lower level offence to apply to junior employees:

> *We agree however that the primary focus should be on commission of an offence by the corporate body itself and by senior managers. Any offence committed by a junior employee would be of a different order, and probably not attracting the same penalty.*

J.51 Similarly, Kennedys Law LLP thought that:

> *A separate offence for more junior employees might sensibly be introduced also, as is a breach of the section 7 HSWA duty to take reasonable care for the safety of those who might be affected by one's activities while at work. Alternatively, there could be a more junior employee offence with an element of knowledge, wilfulness or recklessness, for example a "knowingly omitting or misleading" offence.*

J.52 Other consultees thought the offence should apply to all employees, regardless of rank. Mobileye thought that in cases of intent, "all level employees should be prosecuted evenly." Dean Hatton of the NPCC thought that "the offences should be applied to those with the responsibility irrespective of senior / junior". AXA UK pointed out that treating senior and junior employees equally would "would be consistent with other industries in which negligent acts can cause serious harm or death e.g. pharmaceutical sector". The Faculty of Advocates stated:

> *We do not agree that the offence should be limited to senior managers. We suggest that there should be discretion allowed to the prosecuting body to*

decide whom it is appropriate to prosecute. A problem with the approach indicated is that egregious conduct by more junior staff could not ever be prosecuted, and convictions for senior staff duped by underlings would either be unjust or unattainable from decision makers who perceive the injustice. The definition of 'senior managers' might be problematic within widely varying business structures.

J.53 By contrast, RoSPA thought that application to junior employees is unnecessary, because "existing criminal offences already cover some cases where junior staff may be guilty of serious wrongdoing". In the Consultation Paper we explained that a junior employee would be guilty of fraud if they acted dishonestly to make a gain for themselves or a loss to another.[81]

J.54 We note the desire of many respondents to penalise middle ranking staff who knowingly contributed to misrepresentations or non-disclosures. While an employee might be guilty of fraud in these circumstances, the prosecution would also have to prove dishonestly, together with an intention to make a gain for themselves or cause a loss to another. This might be difficult.

J.55 If we are to rethink the senior management/non-senior management distinction, there is a case to criminalise middle ranking staff who act with knowledge. It would not assuage public concerns to exclude everyone from prosecution except the company and nominated manager, if it was clear that other people were aware of the wrongdoing.

An aggravated offence in the event of death or serious injury

J.56 DAC Beachcroft LLP made the case for an aggravated offence:

The risk of an adverse incident resulting in death or serious injury is very real. The threat of prosecution for an aggravated offence carrying a significant maximum sentence will act as a deterrent from compromising safety standards to gain competitive advantage and also avoids a radical asymmetry between the treatment of human drivers and ADSEs.

J.57 The Faculty of Advocates "reluctantly" agreed with the suggestion, so long as the test included some foreseeability element, "such that the act or omission invited more serious consequences of the sort that eventually occurred". FirstGroup thought there should be a "direct link", not a mere association.

J.58 Some industry members saw the difficulties of determining causation as a reason against an aggravated offence. SMMT/Mills & Reeve LLP wrote:

We consider that the issue of causation is problematic. As is discussed in Chapter 16 of the Consultation Paper, causation is difficult in the context of this evolving and interconnected technology. The three-step test for aggravation is uncertain and potentially exposes employees working within an

[81] See Fraud Act 2006, s 2 (false representation) and s 3 (non-disclosure).

ADSE to very substantial penalties, without a sufficient degree of clarity and certainty.

Suggested alternatives to a separate offence

J.59 The Bar Council noted that the human desire to punish for results as well as conduct may raise ethical dilemmas:

> *We have a natural desire to impose higher penalties when a bad outcome arises. What are sometimes referred to as "result" crimes, as opposed to "conduct" crimes, are common in the criminal law, particularly with driving offences. Distracted fiddling with the car radio leads to no more than penalty points and a modest fine. The same action, the same wrongdoing, which just so happens, as a matter of chance, to result in a death, might lead to several years imprisonment.*

J.60 The Bar Council reluctantly accepted that "this irrationality is a part of our natural human moral compass which is required to be instantiated in law". However, they felt that an aggravated offence should only apply where the bad outcome was clearly caused by the act.

J.61 In a detailed response, the Bar Council referred to the new causation test for fatal driving offences set out in *R v Wilson,*[82] namely that there must be a "significant increase in risk" for bad driving to have "caused" a death in law. The test we proposed was even wider. However, they acknowledged that a broad approach might be justified in the AV context:

> *The causal terrain between an ADSE's misrepresentation and a death is so broad and so murky, and the risk arising from a misrepresentation so obvious and so serious, that there is a good argument that the burden of proving good luck, to escape the more severe penalty, should fall on the ADSE, rather than requiring the prosecutor to prove bad luck.*

J.62 They suggested an alternative approach, in which the burden of proof would be on the defendant to prove that their actions did *not* cause death or serious injury. Under this approach, the "severe punishment" would apply:

> *Whenever the risk is increased – unless it can be shown that no bad outcome was in fact caused, either because no bad outcome occurred or because no sufficiently strong causative chain exists. In other words, the wrongdoer is in all cases punished severely for increasing the risk, but is given the benefit of good luck; rather than being punished leniently other than in cases of bad luck.*

J.63 Kennedys Law LLP argued for a flexible approach to sentencing rather than a separate offence:

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[82] [2018] EWCA Crim 1184; [2019] 1 WLR 3916. The Bar Council note that a similar approach had been taken in the controversial mesothelioma tort case *of Fairchild v Glenhaven* [2002] UKHL 22, [2003] 1 AC 32, "but it is entirely novel in the criminal law".

> *The causation element of this offence might be difficult to assess/prove and a more flexible and effective approach might be to dispense with the need for a separate aggravated offence in favour of dealing with what are likely to be rare cases of this nature through appropriately formulated sentencing guidelines and the application of the Court's good sense and discretion*

Other approaches to aggravation

J.64 Some consultees suggested that the offence should be aggravated on a basis of intent rather than the result. Mobileye thought the gravity of the offence should depend on "intent or mental state" and "the nature of the information that was omitted". The ABI and Thatcham Research and Aviva Insurance thought there should be a greater sanction if there was intention to mislead than if there was an honest mistake.

J.65 Five AI suggested the aggravation should relate to the risk caused, not to a single unlucky result:

> *A person who is responsible for an offence that relates to an issue which, although widespread, was unlikely to have severe consequences but unluckily happened to cause a fatality would seem less culpable than a person responsible for an offence that relates to a widespread issue that was very likely to have severe consequences but by good fortune had not happened to cause a fatality before it was discovered.*

Due diligence defence and its alternatives

J.66 Under our proposals, an ADSE would have a defence if it had exercised due diligence. Consultees who commented on it were mostly in favour. Kennedys Law LLP noted that "the defence of taking reasonable precautions and exercising all due diligence is a common, well-worn defence in the regulatory context." John Rainbird thought that due diligence should include "evidence of thorough research to show that any deficiencies and errors really were unknown and unknowable."

J.67 SMMT/Mills & Reeve LLP requested regulatory guidance as to what actions will satisfy the defence in practice:

> *At this early stage of development, it will be difficult for an ADSE to understand exactly what is required to fulfil this standard. Those innovators who are early to market should not be made an example of by criminal enforcement when the standard expected of them is not fully understood. Regularly updated guidance issued by a safety regulator, under statutory authority, would be a sensible way to inform ADSEs what standard is expected of them. Until this is developed, an ADSE could not easily make use of the defence.*

J.68 They also pointed to the reverse burden of proof for the due diligence defence in the Human Medicines Regulations 2012. Regulation 101(4) states:

> Where evidence is adduced that is sufficient to raise an issue with respect to the defence in paragraph (3), the court or jury must presume that the defence is satisfied unless the prosecution proves beyond reasonable doubt that it is not.

J.69 SMMT/Mills & Reeve LLP thought that a similar provision should be included in our proposed offences.

Fault liability

J.70 Some industry members suggested that rather than including a due diligence defence, the offence should include a mental element, requiring the prosecution to prove knowledge, dishonesty or intent to deceive. Mobileye said:

> *The basic elements of the suggested offences should be dishonesty or serious wrongdoing made by any employee of the ADSE (not necessarily by senior managers) in order to establish a criminal offence.*
>
> *Establishing offences A and B solely by strict liability creates extreme legal exposure for the ADSE, which is inconsistent with the guiding principles of dishonesty and wrongdoing that were suggested by the Law Commission, and also represents a significant deviation from criminal jurisprudence. Thus it is important that even in strict liability offences that apply to an ADSE, it will be necessary to show that an employee conducted some kind of wrong doing.*

J.71 SMMT and Mills & Reeve LLP looked to the aviation industry to suggest a requirement of "intent to deceive":

> *The aviation industry provides a useful model…. We note that the "false representations" offence set out in the Air Navigation Order 2016 Article 256(1)(c) is qualified with a mental element of "having an intent to deceive". This is a more stringent test than is currently envisaged in proposed Offence A.*

J.72 We address the issue of knowledge below. We do not think that the corporate offence, on the ADSE of itself, should require proof of knowledge, as it is often difficult to prove what a company "knows". Nor do we think that the prosecution should be required to prove that the nominated manager acted with knowledge. Instead, the onus should be on the ADSE and its nominated manager to exercise due diligence. This provides the opportunity to mitigate their legal exposure by recording what they did, and to show the court the steps taken. However, we accept that other employees should only be found guilty of offences if they can be shown to have acted with knowledge.

Penalties

J.73 A few consultees commented on the proposed penalties for the offences we outlined.

An unlimited fine on the ADSE

J.74 Where the offence is committed by the ADSE as a corporate body we suggested the penalty should be an unlimited fine (as it is not possible to imprison a company). TfWM thought this may result in a lack of consistency, so "thought should be given as to how penalties are decided and how this is kept consistent for all scenarios". Oxbotica thought it was too high:

> *A tariff of penalties reflecting the seriousness of an offence is preferable, taking into account the fact that many small businesses are engaged in*

developing this technology and may be unable to continue to do so in an environment of unlimited fines. Any tariff of penalties should reflect the overall benefit to society (enhanced road safety) arising from the technology.

J.75 Two consultees thought that a wider range of penalties should be available. DAC Beachcroft LLP suggested "that other ancillary sanctions should be available to the courts, such as suspension or withdrawal from ADS approval". The Faculty of Advocates also argued that "the limitation of punishment to a fine might well not fit the crime".

J.76 The Scottish Courts and Tribunals Service noted:

where it is proposed that the regulator may issue fines, the SCTS would wish to be kept informed of the policy development in the context of enforcement of those fines should these proposals be taken forward.

Penalties for senior managers

J.77 For a non-aggravated offence by a senior manager, we saw the offence as equivalent to offences under the Human Medicines Regulations 2012 and General Product Safety Regulations 2005, which carry a penalty of an unlimited fine and/or up to two years' imprisonment.

J.78 The few consultees who commented on this were split. For example, DAC Beachcroft LLP thought our proposals appropriate. By contrast, Oxbotica thought the penalty disproportionate:

It is clear that while AVs may reduce the number of accidents, they may also cause new categories of low-occurrence accidents which are accepted by society as part of the trade-off. It would be unfair to prosecute the ADSE, or officers of the ADSE, for such low-occurrence accidents simply because their analysis did not cover every possible eventuality.

Penalties for the aggravated offence

J.79 In the Consultation Paper we described the aggravated offence as equivalent to causing death by dangerous driving, which carries a maximum prison term of 14 years. As with penalties for senior managers, only a few consultees commented on penalties for the aggravated offence, and those who did comment were split. SMMT/Mills & Reeve LLP argued the maximum prison term was too long:

The comparison with the maximum penalties that can be imposed upon human drivers is not appropriate, because individuals working within an ADSE are unlikely to be solely responsible for an incident in the way that a driver often is, and the attribution of blame to an individual is not appropriate in the same way.

J.80 By contrast, the Faculty of Advocates suggested life imprisonment. We note that legislation currently before Parliament would increase the maximum penalty for causing death by dangerous driving from 14 years to life.[83]

Prosecution by the specialist regulator, CPS and Procurator Fiscal

J.81 In the Consultation Paper, we provisionally proposed that the offences should be prosecuted in England and Wales by either the regulator or the Crown Prosecution Service and in Scotland by the Procurator Fiscal. The majority of consultees agreed with our proposal, but did not provide reasons. In relation to Scotland, the Faculty of Advocates stated:

> *We agree that, in Scotland, the offence should be prosecuted by the Procurator Fiscal. Procurators Fiscal are capable of developing the required speciality in the way they have done with Health and Safety prosecutions, and general road traffic crime.*

J.82 Some consultees thought that the new regulator would be better placed to prosecute than the CPS. The HSE stated that:

> *Enforcement should be carried out by the body best placed to do so and in the event of a new regulatory body being created, they would be the obvious choice for any enforcement, including under HSWA, should they wish to use the legislation in that way.*

J.83 SMMT/Mills & Reeve LLP also thought that a specialist regulator would have greater expertise:

> *A specialist regulator is more likely to be able to assess whether particular behaviour is culpable in the context of developing technology, and this approach is consistent with that taken in relation to the other high-risk industries discussed in the Consultation Paper.*

J.84 Similarly, BLM Law stated:

> *We are concerned that the Crown Prosecution Service may lack the specialist knowledge to successfully prosecute offences arising out of the use of automated vehicles. On the basis any prosecutor – not being the specialist regulator – would be heavily reliant on the regulator, it may be preferable for the regulator to maintain responsibility for criminal prosecution in common with other high risk industries, particularly the Aviation industry. A duty of fair presentation.*

Q46: We welcome views on whether an ADSE should be under a duty to present information in a clear and accessible form, in which safety-critical information is indexed and signposted.

J.85 In the Consultation Paper we explained that assessing the ADSE's safety case was central to our scheme. We raised the possibility of "data dumps" – where an ADSE provides so much unstructured information that the crucial tests are hidden in

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[83] The Police, Crime, Sentencing and Courts Bill 2021, cl 85.

thousands of pages of material. In insurance law, a business insured is under "a duty of fair presentation" to present information to the insurer in a "reasonably clear and accessible" way. This means that information must be structured, indexed and signposted so that crucial issues are not lost. We asked if ADSEs should be required to present information to the safety regulator in a similar way. We suggested, however, that any penalty should be less than that for other offences.

J.86 This was met with strong support. Out of 67 consultees who provided views, 50 (75%) fully supported such a duty. However, several industry representatives felt that it would be too easy to judge the issue in hindsight, leading to criticism that the ADSE should have emphasised the failure which took place (rather than the many other possible failures which did not).

The case for a duty of fair presentation

J.87 The main argument for the duty was that it would allow the regulator to assess the information provided. RoSPA said it would "allow the safety assurance scheme to properly assess the safety case and to identify non-disclosures and misrepresentations". P3 Mobility pointed out that the information involved is likely to be "complex and extensive". Dean Hatton of the NPCC thought it important that information is "presented in simple language so there can be no mis-interpretation".

J.88 Pinsent Masons LLP put the case for the duty in the following terms:

> *Whilst this is quite a high standard, it is nonetheless an important and proportionate one: It should not be an available option for ADSEs to be able to 'hide' safety-critical information in a lengthy report or safety case, running the risk that the regulator may not appreciate the impact of such information, or fail to note it at all. This can be an easy attempt to remove such a danger without imposing an unreasonable obligation or undue burden on ADSEs.*

J.89 Other consultees made similar points:

> *There should be no opportunity presented to an ADSE to 'hide' behind such information being present but obscured by / by being within other content that is not necessarily safety related.* [Richard Birch of Acromas Insurance Company]

> *Whilst we anticipate ADSEs will act in good faith, sanctions must exist to guard against the risk of ADSEs attempting to conceal or underplay adverse information by purporting to disclose it in such vast volumes that it effectively becomes effectively hidden.* [BLM Law]

J.90 The Faculty of Advocates foresaw practical difficulties in prosecuting breaches of the duty but thought it would still be useful:

> *The attendance of such difficulties should not be seen as a bar to the creation of such a duty though, since the duty would seem certain to act towards the improvement in communication of safety critical information.*

J.91 Consultees also mentioned that information should be accessible and understood by other parties, including operators and users. The NEPC strongly agreed, pointing out

that transparency is "a standard contract requirement in many, if not all fields of engineering".

The case against a duty of fair presentation

J.92 Several industry representatives considered that the duty would be too uncertain at this early stage of development. While SMMT/Mills & Reeve LLP agreed that the presentation of information in a clear and accessible way should be incentivised, they thought that:

> *At the current stage of development, it will be very difficult for developers to know exactly how the information should be presented to enable the safety regulator to understand it appropriately, and to signpost the elements that, perhaps only later, prove to be most relevant.*
>
> *A situation could arise, for example, in which a minor part of the overall operation of the system turns out, in practice, to introduce a dangerous state in particular circumstances (the presence of an unexpected road user, or very unusual weather conditions). This could lead to an accident. It would be unfair to expect developers to be able to foresee this as being potentially significant when presenting their information for approval, and they could later be criticised for not highlighting relevant information.*

J.93 They therefore considered it preferable to focus on "transparency and cooperation with the safety regulator, and the development of guidance on how best to organise and present supporting information and data". A duty of presentation might, however, be introduced at a later stage, when standards for presenting information have become more standardised.

J.94 Burges Salmon LLP also thought the duty premature:

> *As the approval process is as likely to be novel to ADSE's in the early stages as to the regulators, we would consider it more consistent in approach and transparent for regulators to make their requirements as to structure and how technical information is presented clear at the outset of a process.*

J.95 Oxbotica agreed in principle but raised the same concerns:

> *In principle, yes, but in practice it is likely to become a discussion about whether a particular failure mode was properly sign-posted amongst the other thousands of potential failure modes. The standards for presenting such information should be set by the regulator.*

J.96 Similarly, Five AI agreed in principle but worried that the issue would be judged in hindsight:

> *An ADSE should… attempt to at least signpost and summarise more complex safety critical information so that it is digestible. On the other hand, by signposting certain information as a result the prominence of other information is necessarily downgraded…. Again, hindsight could play a part here.*

Regulatory rather than criminal sanctions

J.97 Two industry members argued for a regulatory obligation and against the enactment of a criminal offence.

J.98 Mobileye supported the duty:

> *Mobileye strongly believes that the regulator's ability to assess the information presented to it accurately is crucial, and that the way the information is presented can have a significant impact on its ability to do so.*

J.99 However, they argued that regulatory actions "are much more appropriate tools in this context". HORIBA MIRA also viewed criminalisation as disproportionate:

> *It would be perfectly reasonable to reject an approval application on the basis that the information provided is insufficiently clear, but the regulator should be able to make this judgement and request changes at the application time. The idea that a person could receive up to a year in prison for producing a document that is subjectively judged to be insufficiently clear (for such a decision could only be subjective) is extremely alarming!*

Guidance about the safety case

J.100 Many consultees suggested that the issue was best resolved by detailed guidance for what should be in a safety case, coupled with a standard form in which the information is to be provided:

> *In view of the potential safety implications to other road users, it is appropriate for the Government to work with [vehicle manufacturers] to develop acceptable formats and language, and to standardise the delivery and presentation of safety-critical information where possible.* [NFU Mutual]

> *In order to guard against this risk we would propose standardising, in a uniform format, the information required, which could facilitate chronological comparisons between the safety cases of an individual ADSE, and comparisons between unrelated ADSEs where, for example, there appear to be common defects in AVs or ADSs.* [BLM Law]

J.101 Other consultees made similar points. Peter Whitfield thought the regulator should set out "key tests and best practice". Nova Modus thought the duty should apply "following some guidance, template, example, by the regulator". Kennedys Law LLP thought that a standard form would "increase efficiency, clarity and certainty for all, and may help to reduce the burden of 'red tape'".

J.102 By contrast, Amey thought that guidance "must not be so restrictive" that relevant information is "excluded because of restrictions to the form".

J.103 There was also some debate about how far a safety case should be written for a broader, non-technical audience. The British Motorcyclists Federation thought the information should be provided "in plain English". Similarly, the IROHMS Simulation Laboratory argued that "information should be provided in a way that is intelligible to non-technical users". By contrast, AAIP stated:

Consideration needs to be given to the intended audience for the information and the level of expertise that can be expected of a regulator (and/or the need to have specialist technical advisors to the regulator).

K. New wrongful interference offences

OVERVIEW

K.1 In Chapter 15 we considered the criminal offences related to interference or tampering with AVs. We explained that this could range from sophisticated computer hacking, to simply spray painting a vehicle's sensors. In Consultation Paper 1, we asked whether the existing criminal law was adequate to deter and penalise wrongful or unauthorised interference with AVs. Our analysis of response to Consultation Paper 1 concluded that most conceivable forms of interference are already criminal offences.

K.2 In Consultation Paper 3, we provisionally proposed several amendments to existing law to ensure a comprehensive scheme with deterrent effect existed. We provisionally proposed to extend parts of the Road Traffic Act 1998 to cover AVs and to introduce an aggravated offence when interference with an AV causes death or serious injury. We also sought views on whether an approved work defence to section 22A was desirable.

K.3 Consultees overwhelmingly expressed views in favour of extending the tampering offences and introducing an aggravated offence for AVs. A common theme was the safety of AVs and other road users. Consultees recognised that the complexity of AVs meant any interference or tampering increased the potential for harm to other road users.

K.4 Views were more balanced on introducing an approved work defence. Consultees agreed that it was important to provide clarity and certainty on the interpretation of section 22A, however, there was no consensus on whether this should be achieved by introducing the defence, amending the law or leaving it to the courts.

NEW WRONGFUL INTERFERENCE OFFENCES

Q47: We provisionally propose that legislative amendment should clarify that the tampering offence in section 25 of the Road Traffic Act 1988 applies to anything that is physically part of a vehicle and any software installed within it.

Do you agree?

K.5 Overall, there was strong support for extending the offence to cover anything that is part of a vehicle's system, including sensors and software. Out of 69 responses, 59 (86%) agreed with the proposal and 10 (15%) made other comments. No respondents disagreed.

K.6 Respondents providing other comments agreed that sensors and software should be covered but thought that either existing law was adequate or that the offence should be limited to the parts of a vehicle which are material to performing the driving task.

Agreement

K.7 Respondents who agreed cited safety reasons for their decision and argued that tampering with an AV could endanger passengers and other road users:

> *Due to the potential gravity of tampering with safety-critical physical parts and software of the vehicle, a legislative amendment would be helpful to ensure dangerous behaviour is appropriately criminalised and public awareness of the consequences of such offences is raised.* [SMMT]

> *Yes, the offence of tampering should apply to any and all physical and software elements of a vehicle. This is particularly important for brakes and sensors on automated vehicles, as they are heavily reliant on sensors/sensor technology to detect other vehicles and road users and are essential to ensure their safe operation on the road.* [Cycling Scotland]

Other

K.8 A small minority thought that the existing law was adequate as "mechanism" could be interpreted widely to cover sensors and software without amending the Road Traffic Act. One such respondent was the Bar Council, who accepted "that it would certainly be helpful to clarify that 'mechanism' applies to software installed within the vehicle."

K.9 Others agreed with extending the offence but thought that this should be limited to those parts which are safety-critical or paramount to performance of the driving task. ABI and Thatcham Research and Aviva Insurance gave the example of modifying an infotainment system as falling outside of the offence. Instead, they argued the offence should only apply to parts or software that is "material to the driving task" or part of the "key driving system". Similarly, Zurich Insurance agreed with extending the offence "so far as it relates to safety aspects of the vehicles performance".

Q48: We welcome views on whether the tampering offence should apply to external infrastructure required for the operation of the AV.

K.10 We sought views on whether the tampering offence should be extended to include parts physically separate from an AV, but which AVs may rely upon to function. This might include external infrastructure such as networks, beacons or data held within the system. We noted that in England and Wales, a similar offence exists for tampering with railway infrastructure.[84]

K.11 The overwhelming majority of respondents supported the extending the offence to external infrastructure, for example, RoSPA commented:

> Automated vehicles are likely to rely heavily on infrastructure to operate safely. Therefore, we believe that the tampering offence should apply to external infrastructure required for the operation of the vehicle.

K.12 DLG and TfL agreed and suggested the tampering should cover tampering with road signs:

> *DLG supports this proposal, for example, tampering with road signs may result in being unreadable to the sensors of the AV even though the sign can still be understood by a human driver; this should be considered tampering and the offence should apply*. [DLG]

> *Interfering with temporary traffic management is the most common occurrence, ie temporary direction signage, diversion signage and temporary traffic lights. This should also be considered as a possible offence, because an AV may attempt to blindly comply with signage that has been tampered with, whereas a human driver is more likely to identify that the signage has been tampered with.* [TfL]

K.13 Similarly, HORIBA MIRA proposed that cyberattacks to a vehicle's software, especially if directly affecting the dynamic driving task, should be covered by the tampering offence:

> *Yes. External infrastructure is, in general, less of a safety concern, as any incorporation of offboard systems would have to be designed to include suitable system redundancy, plausibility checks on data etc. to ensure functional safety and cybersecurity are achieved - it is not possible to rely on wireless communications to the same degree as onboard systems when it comes to real-time processing of safety critical tasks. However, there may be other tasks that could be interfered with that could have safety implications, e.g. jamming of wireless signals preventing an over-the-air software update, or tampering with map data to affect the route the vehicle takes. Furthermore, there could be instances where there is a flaw in the functional safety and/ or cyber security such that it becomes possible for a skilled (or lucky) attacker to exploit the vulnerability and directly affect the dynamic driving task. It therefore would be appropriate for legislation to cover such attacks,*

[84] CP3, para 15.9.

particularly for any instances where the attack is (or could plausibly be) safety critical.

Amend existing law or introduce new legislation?

K.14 The Bar Council recognised that existing tampering offences may not necessarily apply to AVs in all circumstances:

> *It is understood that by this question, the Law Commission has in mind infrastructure such as "networks, beacons, or the data held within the system" (CP3 at 15.9). Tampering with physical infrastructure such as beacons would generally already come within Section 1(1) Criminal Damage Act 1971. However, in that Act, "property" means property of a tangible nature, whether real or personal – s.10. As such, it seems that intangible networks or data would not be covered by that Act. It is possible that some relevant harms would be caught by, for example, s.3ZA of the Computer Misuse Act 1990, which is designed to cater for computer misuse where the impact is to cause damage to critical national infrastructure including power plants and transport networks. However, depending on the method of tampering used, this offence would not necessarily apply in all cases.*

K.15 Most respondents thought that the existing law should therefore be extended to apply to AVs:

> *The initial presumption should be that the law as it currently applies to infrastructure should be extended to apply to automated vehicles, with appropriate extensions to encompass dedicated external infrastructure, rather than starting with new legislation designed to be all-encompassing.* [FirstGroup]

K.16 Others thought that having all the tampering offences involving AVs under one regime would improve clarity and consistency:

> *We consider that this is essential as there is the potential for severe harm to arise from either damage to critical infrastructure on which AV's rely or a cyber-attack on central control systems. Whilst these are likely to constitute separate offences, we consider that it would be helpful if there was a single regime dealing with all offences involving AV's to ensure clarity and sentencing consistency.* [Shoosmiths LLP]

Different offences based on the level of harm

K.17 Some respondents went further than the proposal and suggested introducing an additional more serious offence based on the severity of tampering and the harm caused:

> *We agree that it should be an offence to interfere or tamper with any part of a vehicle, any software installed in it and any external infrastructure required for AVs to operate. However, the maximum penalty for a s25 offence is currently level 3 on the standard scale (i.e. a £1,000 fine). There may need to be a range of offences with different maximum penalties, depending on the seriousness of the actual or potential consequences. In particular, interfering*

with the operating systems which AVs rely on should potentially carry very serious consequences… [Cycling UK]

We are concerned, however, that the penalties for tampering may be inadequate to deal with a more serious degree of tampering with infrastructure. This could affect the operation of several vehicles at once, with consequently serious effects, and would therefore merit a more serious penalty. We suggest that consideration be given to creating a new offence that reflects this more serious and dangerous type of activity. [SMMT]

NEW AGGRAVATED OFFENCE OF CAUSING DEATH BY WRONGFUL INTEREFERENCE

Q49: We provisionally propose that there should be an aggravated offence of wrongfully interfering with an AV, the road, or traffic equipment contrary to section 22A of the Road Traffic Act 1988, where the interference results in an AV causing death or serious injury, in:

(1) England and Wales; and

(2) Scotland.

Do you agree?

K.18 Overall, there was overwhelming support for an aggravated offence which applies across Great Britain. Out of 63 responses, 60 (95%) agreed that there should be an aggravated offence in both England and Wales and Scotland, and three (5%) disagreed by selecting that there should be no aggravated offence in either jurisdiction.

K.19 Stakeholders who agreed thought that it was desirable for there to be a uniform approach across Great Britain, with some arguing that the aggravated offence should also apply to conventional vehicles. A minority disagreed arguing that section 22A does not currently apply in Scotland and therefore introducing an aggravated offence could cause confusion and uncertainty.

Agreement

K.20 There was overwhelming agreement for the aggravated offence to apply across Great Britain:

We agree with this proposal for both England and Wales, and Scotland. We support the need for a clear and consistent offence in both jurisdictions. [Mills & Reeve LLP]

We agree with the proposal that there should be an aggravating offence, however section 22A of the Road Traffic Act 1988 does not apply in Scotland. Offences that would be charged under that section elsewhere are charged under the common law crime of "culpable and reckless conduct". This would appear to be an ideal and logical time to ensure that the aggravated offence, once agreed upon, is applicable across the UK. [Kennedys Law LLP]

K.21 Burges Salmon LLP agreed that there was a gap in legislation and noted that even if manslaughter could fill any gaps in the existing law, this would only solve the problem in respect of deaths:

> *We note again the potential gap between human offences of causing death or injury by driving and the Section 22A offence of causing danger to road-users, as regards wrongful interference with automated vehicles causing death or injury. That is a gap which unlawful act or gross negligence manslaughter or corporate manslaughter could eventually fill but only ever in respect of deaths – not serious injury.*

K.22 Kennedys Law LLP agreed on the basis that the consequences are more severe but noted that a "causative link" should be established between the tampering and death or serious injury:

> *Yes, if there be a causative link between the 'tampering' and indeed the death, then it is right and proper that a new offence is considered to mark the severity of the consequences much in line with the current range of offences that are already available under the Road Traffic Act.*

K.23 DAC Beachcroft LLP noted that an aggravated offence would grant the courts greater sentencing powers for the most serious offences:

> *Under existing legislation in England & Wales (s.22A of the Road Traffic Act 1988 and Schedule 2 of the Road Traffic Offenders Act 1988), a person who interferes (directly or indirectly) with traffic equipment, in such circumstances that it would be obvious to a reasonable person that to do so would be dangerous, is liable on conviction on Indictment to a maximum sentence of 7 years imprisonment. Legislation creating a new aggravated offence could afford the courts greater sentencing powers for the most serious offences which result in serious injury, death, or multiple serious injuries and/or deaths.*

K.24 Some stakeholders thought the proposal should be extended further to cover conventional vehicles as well as AVs:

> *An aggravated offence of wrongfully interfering with a any vehicle, the road, or traffic equipment contrary to section 22A of the Road Traffic Act 1988, where the interference results in death or serious injury, seems to be sufficient and should not require an explicit extension to the special category of AVs, nor or to special infrastructure to support them.* [Nova Modus]

Disagreement

K.25 A small minority disagreed to the proposal.[85] The Faculty of Advocates thought that the offence was not a "principal part" of the legislation framework for AVs and that its introduction could cause uncertainty in Scotland:

> *On reflection, we now consider that the better option is not to create a new offence in Scots law. We note that s22A does not currently apply to Scotland*

[85] This included Craig Broadbent, Henry Carter and the Faculty of Advocates.

and we are not aware that the issues which led to that offence being created in England and Wales have been encountered in Scotland, given the inherent flexibility of the relevant Scots common law offences.

The justifications mentioned in the consultation document do not persuade us. We consider that this criminal offence is not a principal part of the legislative regime for automated vehicles, so any consideration of harmonisation of the law about unlawful interference with autonomous vehicles or their associated infrastructure is outweighed by the importance of harmonisation of the criminality of culpable and reckless conduct of any nature across Scots law. Similarly, the Scots courts and Scottish prosecutors are well able to deal with the established Scots common law offences and develop any caselaw within the framework of Scots law. Creating a new statutory offence (which would presumably also require the enactment of the existing s22A offence into Scots law) would in reality add uncertainty to Scots law and complicate prosecutions here.

Mental standard: intent to interfere

Q50: We provisionally propose that the appropriate mental element for the aggravated offence is intent to interfere with a vehicle, the road or traffic equipment.

Do you agree?

K.26 Overall, there was strong support in favour of the proposal. Out of 64 responses, 45 (70%) agreed, two (3%) disagreed and 17 (27%) made other comments.

K.27 Respondents who agreed thought that the proposed offence should mirror the standard in section 22A. However, a significant minority of respondents provided other comments which gave differing views on what the mental standard should be. Some even suggested a reverse burden should be placed on the defendant to prove that they did not intend to interfere.

Agreement

K.28 Respondents who agreed thought the proposed offence should mirror the mental standard of section 22A and that the mental standard corresponded with the severity of causing death or serious injury:

> *RoSPA agrees. As the consultation paper states, the mental standard of our proposed offence should mirror that of section 22A: the act of interference which forms the basis of the offence must be intentional, but there need not be an intent to bring about the consequences of that act, nor a subjective appreciation of the risk of those consequences.* [RoSPA]

> *We agree that the mental standard for the proposed aggravated offence should be "intent to interfere with a vehicle, the road or traffic equipment" and that there need not be an intent to bring about the consequences of that act, nor a subjective appreciation of the risk of those consequences, thus mirroring the mental standard of an offence contrary to s.22A of the Road Traffic Act 1988 (in England & Wales).* [DAC Beachcroft LLP]

Disagreement

K.29 Respondents who disagreed appreciated the reasons for the proposed mental standard but noted how the offence could be committed by trivial acts:

> *We find this a difficult question. Given the seriousness of the criminal offence compared to the trivial acts that could trigger it (e.g. scuffing white lines) on balance we would favour the offence requiring an appropriate mental element in relation to the consequences of the act.* [Five AI]

Other

K.30 A significant minority of respondents provided other comments which set out different views on alternative mental standard to an intention to interfere.

K.31 Zurich Insurance agreed that there should be an intention to interfere but believed "that the intent must be related to deliberately and wrongfully compromising the safety of the vehicle".

K.32 Shoosmiths LLP thought the offence should include recklessness, particularly in relation to causing cyber damage:

> *Whilst we cannot comment on the risk of harm arising from damage to physical road infrastructure, our experience of cyber incidents is that considerable damage is often caused by hackers acting recklessly or causing disruption for other criminal purposes and we would consider that an intent element similar to that for offences under Section 3 of the Computer Misuse Act may be appropriate to incident involving cyber-attacks on a vehicle or central control system.*

K.33 Some stakeholders suggested considering whether the offence would apply where there was negligence:

> *We agree that the appropriate mental element should be intent to interfere, but would urge consideration of negligence thresholds too. For example, there could be lesser penalties for innocent negligence than for knowing negligence.* [Pinsent Masons LLP]

K.34 In response to Q51, Pinsent Masons LLP also added:

> *Although we believe that intent to interfere is the right test, there should be an element of that test in respect of the appreciation of the risk of those consequences. It is very possible, at least whilst the technology will be new, that individuals may not fully understand what tempering may result in, or simply not fully grasp that an act may constitute tempering. Therefore, we believe that there should be element of understanding attached to the test. Although the law has to act as a deterrent, it must also allow for the different levels of understanding that may exist in respect of AVs.*

K.35 Others thought that the offence should require the harm to have been foreseeable:

Should it be interference with 'obvious foreseeable consequences' as well as deliberate intent? Or should there be a separate perhaps lower offence? [Dean Hatton of the NPCC]

K.36 Cycling UK and George Kenneth Atkinson recognised that proving intention in court is a high threshold. To overcome this, they suggested inferring intent from the defendant's actions and placing a reverse burden of proof on the defendant to prove otherwise. As Cycling UK put it:

> *However we suggest there are real risks to requiring prosecutors to prove intent beyond reasonable doubt, just as there were with proving 'intent' beyond reasonable doubt with the former offence of 'reckless' driving. We suggest that a better approach may be to include an element of intent in the definition of the offence, but to add that intent can be inferred from the defendant's actions unless they are able to provide a satisfactory alternative explanation for them (in other words, to create a reverse.*

An "approved work" defence

Q51: We seek views on whether an approved work defence for repair or maintenance operations authorised by a vehicle manufacturer or Automated Driving System Entity is desirable.

K.37 There was a range of views in response to this question. There was no consensus over whether the two exceptions in section 22A of lawful authority and reasonable excuse were cumulative or alternative. However, many stakeholders argued that an approved work defence was not necessary and instead the law should clarify how the section should be interpreted.

Agreement with the proposal

K.38 Stakeholders that agreed with the proposal thought that an approved work defence would provide clarity over the type of repair and maintenance work which could lawfully be undertaken:

> *Given the uncertainty about the application of the wording "without lawful authority or reasonable cause" highlighted by the Law Commissions, we can see the benefit of clarifying that manufacturer or ADSE approved work should be a defence. Where functionality is dependent on software in particular, it provides a clear direction as to what type of work can be undertaken and that it should first be certified as compatible and safe by a third party.* [Burges Salmon LLP]

K.39 Similarly, some stakeholders commented on the importance of ensuring that legitimate maintenance or repairs are not criminalised:

> *The issue being dealt with here is unauthorised interference which needs to be distinguished from legitimate changes, so a repair garage recalibrating the sensors of an AV should not be considered to be a criminal act.* [DLG]

> *We do not disagree with the inclusion of the approved work defence. We consider it to be important that repair and maintenance operations that have*

been authorised by a vehicle manufacturer or automated driving system entity (ADSE) are not at risk of being criminalised. [SMMT]

K.40 John Rainbird raised the technical complexity of AVs as an issue. He explained that a minor software update could inadvertently modify part of the system which is integral to the driving task. He suggested the two exceptions in section 22A were not helpful and instead it was crucial to obtain approval of the work from the vehicle manufacturer or ADSE:

> *CP3, 15.58, concerns the installation of software intended to improve the functioning of some aspect of the vehicle but which was not absolutely necessary. What would be the position if this software modified something other than the ADS but affected it incidentally? At the purely practical level, 'lawful authority' and 'reasonable cause' seem irrelevant for avoiding undesirable unintended consequences, whereas approval of the work by the vehicle manufacturer or the ADSE seems essential. This extends the scope for requiring approval of alterations beyond the ADS itself to anything which may affect the performance of the vehicle.*

K.41 Several stakeholders agreed that the vehicle manufacturer should provide maintenance and repair guidance. Some thought that the person carrying out the maintenance or repairs should only be able to rely on the approved work defence if they follow the guidance properly:

> Vehicle manufacturers must specify how the systems are maintained and checked as a part of routine maintenance or repair to ensure the system is still safe and operating as required. There should be an approved work defence for repair or maintenance if they are authorised by a VM or ADSE and properly following that guidance, but this would not be a defence for the VM or ADSE if there was an issue with the guidance that was issued. *[Aviva Insurance, Zurich Insurance and ABI and Thatcham Research]*

K.42 The SMMT raised concerns over approved repairs or maintenance carried out by an unauthorised provider. They suggested considering whether there should be pre-requisites for carrying maintenance or repairs of AVs:

> *However, in practice not all independent service, repair and maintenance providers necessarily seek vehicle manufacturer or ADSE authorisation, especially since only qualified providers should be in a position to offer such repair or maintenance services. In the event an unnecessary operation or software installation is performed leading to injury or death, such providers should not have recourse to approved work defence even though the operation or software is manufacturer- or ADSE-approved. It may also be beneficial to separately look into the pre-requisites for a service, repair and maintenance provider to be suitably qualified, or recognised for upholding a code of conduct, for carrying out the repair or maintenance of complex automated vehicles.*

K.43 Others agreed but noted their concerns of market abuse from a vehicle manufacturer or ADSE if they were required to approve maintenance work carried out by third parties:

This seems appropriate as long as it does not result in market abuse due to exercise of market dominance. [FirstGroup]

Cumulative exceptions

K.44 Some stakeholders thought that the section intended to criminalise actions taken without lawful authority and without reasonable excuse:

> *As a point of interest, looking at the logic of the clause from the perspective of Boolean algebra (i.e. from a software engineer's perspective), it is unambiguous. It is an offence if the following is satisfied: NOT('lawful authority' OR 'reasonable cause'). This can be rewritten as: (NOT 'lawful authority') AND (NOT 'reasonable cause'). In other words, it can only be an offence if there is both an absence of lawful authority and absence of reasonable cause. This is in line with the preferred interpretation suggested in the consultation, and on this basis the literal interpretation of the law should be unambiguous (although in practice, this would of course depend on the way it is presented to the court in a particular case, and the way the court understands that evidence).* [HORIBA MIRA]

K.45 BLM Law argued that an approved work defence was not desirable, but that legislative amendment should clarify that the exceptions are "cumulative":

> *We do not consider such a defence to be desirable, but would instead propose appropriate amendments should be made to clarify that the "lawful authority and reasonable cause" are actually conjunctive and not disjunctive.*

Alternative exceptions

K.46 Other stakeholders took the opposing view that lawful authority and reasonable cause were separate restrictions of the scope of the offence. However, there was some agreement that an approved work defence was not necessary:

> *In the light of the concerns set out in Consultation Paper paragraph 15.61, we suggest that a clarification of section 22A of the Road Traffic Act 1988 be considered, to make clear that "lawful authority" and "reasonable cause" are separate restrictions on the scope of the offence.* [Mills & Reeve LLP]

> *The Bar Council agrees with para 15.59 – i.e. that "lawful authority" and "reasonable excuse" are separate restrictions on the scope of the offence – and with the thrust of 15.61 – i.e. that an "approved work" defence is not required.* [Bar Council]

> *We see "lawful authority" and "reasonable cause" as providing separate exceptions to criminal liability and so question the need for an approved work defence to ensure protection to those undertaking bona fide approved repairs, or maintenance operations, authorised by a vehicle manufacturer or ADSE.* [DAC Beachcroft LLP]

Other reasons for disagreeing with the proposal

K.47 Some stakeholders questioned whether introducing a new approved work defence was the correct means for clarifying how section 22A should be interpreted:

Without subsequent clarification of the existing Section 22A "without lawful authority OR reasonable cause" very much suggests they would be alternatives rather than cumulative. Using a new AV-specific offence to clarify or correct this seems to be using such a new offence (which does not seem necessary see Q49) for the wrong purpose. [Nova Modus]

As noted, introducing a clause to deal with the incorrect literal interpretation within the narrow CAV context could be used as justification for taking a purposive interpretation that the law was intended to be interpreted the 'incorrect way' outside this narrow context, which would be concerning. [HORIBA MIRA]

However, IUA would expect the interpretation of this law to be in line with the Law Commission's interpretation that it would only criminalise actions taken without lawful authority for which there is also no reasonable cause, such as a vandal damaging brakes or side mirrors. It would not be the intent of the law to criminalise the actions of a mechanic that installed a new piece of software. [IUA]

L. Civil liability

OVERVIEW

L.1 Chapter 16 considered civil liability. In Consultation Paper 1 we looked in detail at the Automated and Electric Vehicles Act 2018 (AEV Act). In response, consultees showed significant support for the principles behind the AEV Act, coupled with concern over some details, particular causation and contributory negligence.

L.2 In Consultation Paper 3 we reached the conclusion that the AEV Act is "good enough for now". Its provisions are sufficient to meet the Act's objective, which is to ensure that victims are paid without undue legal wrangling. However, we thought that how well the Act is working should be reviewed in the light of practical experience. We asked consultees if they agreed.

L.3 We then considered what would happen if an injury was caused by an uninsured vehicle which was driving itself. Under the current state of the law, victims might not be compensated in these circumstances. We therefore provisionally proposed that the Government should put measures in place to fill this gap. This drew near unanimous agreement.

L.4 Under the AEV Act, the insurer must pay the victim even if the vehicle is defective. However, the insurer would then have the right to bring a claim against the vehicle producer under the Consumer Protection Act 1987. In response to Consultation Paper 1, consultees identified several problems in applying the 1987 Act to detective software, particularly if software is supplied over-the-air, without a physical medium. In Consultation Paper 3 we provisionally proposed that product liability law should be reviewed to take account of the challenges of emerging technologies. However, we thought that this was best done for product liability law as a whole, not simply for automated vehicles.

L.5 Most consultees agreed with us. They pointed to many issues that need to be considered, but thought that similar issues applied to any inherently dangerous technology that could be changed by software updates. However, some consultees highlighted the urgency of the situation and expressed concern that a general review might take too long.

CAUSATION AND CONTRIBUTORY NEGLIGENCE

Q52. We provisionally propose that the way the Automated and Electric Vehicles Act 2018 deals with contributory negligence and causation is:

(1) adequate at this stage; and

(2) should be reviewed by the UK Government in the light of practical experience.

Do you agree?

L.6 Most people agreed that a review of how the AEV Act deals with causation and contributory negligence should be postponed until we have an understanding of how the Act works in practice. Out of the 58 respondents who answered this question, 38 (66%) agreed, five (9%) disagreed and 15 (26%) gave other responses.

Agreement

L.7 The consultees who agreed with the proposal thought the current law was adequate, and that problems would only become apparent after deployment:

> *We consider that it would be prudent for the UK Government to review the legislation in line with relevant practical experience. We do not foresee a need for the legislation to be reviewed after any specific period of time. This should be reviewed if it is felt that this would be beneficial in light of any difficulties in applying this regime, the outcomes for parties to claims, and any relevant policy developments.* [Law Society of Scotland]

> *AXA agrees that AEVA 2018 adequately deals with contributory negligence at this stage of the development of automated vehicles and shares the Government's objective of making it as easy as possible for consumers to understand the cover they need and ensure injured parties can have their claims settled as quickly as possible. The sections on contributory negligence are clear and we believe they will work in practice. However, AXA has always viewed AEVA 2018 as the first major step towards an insurance framework that is conducive to the roll-out and uptake of automated driving systems. Further changes will likely be necessary as technology develops and becomes common place. Furthermore, AXA believes that the insurance industry will be in a better position to determine how well the contributory negligence provisions of the Act work in practice once there is exposure to automated vehicles claims.* [AXA UK]

Guidance

L.8 Many consultees who accepted that the Act is adequate at this stage and should not be changed nevertheless asked for guidance on how to interpret its provisions, particularly on causation. The IUA said it would be helpful if guidance showed how the Act applied to a variety of scenarios:

> *We have received views from members stating that there remains uncertainty that could ultimately impact upon the ability for insurers to accurately price for exposures relating to automated vehicles. It is suggested that further clarity could be brought through the development of automated vehicle accident scenarios, which could be used to illustrate the application of the legislative framework to a range of different potential incidents.*

L.9 Mills & Reeve LLP and the SMMT wrote in identical terms, asking the safety regulator to produce regular guidance:

> *For both contributory negligence and causation, we propose that guidance be developed as soon as real-world situations begin to arise and are dealt with by the enforcement authorities or the courts. Non-statutory guidance, falling within the statutory remit of the safety regulator, could be issued and updated on a regular basis in response to experience and developing technology. It would be sensible to provide for this in primary legislation.*

Statutory changes

L.10 Some consultees said that statutory change was needed, echoing the concerns expressed in response to Consultation Paper 1.

Strict liability

L.11 Several raised the uncertainties over how far the AEV Act introduced a system of strict liability. NFU Mutual asked:

> *Is it the Government's intention that parties would financial benefit by virtue of an AV being involved, whereas the injured victim of an incident involving non-automated vehicles may not receive compensation if no drivers' actions fell below the requisite standard?*

L.12 While insurers thought that, generally, the victims of AVs and conventional vehicles should be treated alike, claimant representatives asked for clarification that the AEV Act introduced strict liability. Stewarts Law LLP said:

> *We still consider that some redrafting is required of Section 2 of the AEV Act to ensure it provides true strict liability. The current reference to an accident "caused by" including 'partly caused by', by interpretation in s8, leaves scope for insurers to argue against compensating victims on the grounds that the accident was unavoidable by the AV.*

L.13 Stewarts Law LLP thought that any legal uncertainty would disadvantage victims:

> *Leaving this issue to practical experience of AVs and to ask the courts to decide, using inadequate legislation, will leave many victims fighting lengthy and costly legal battles, whilst insurers seek guidance on applicability from the Court.*

L.14 APIL reiterated its view "that if a vehicle is fitted and capable of self-driving then strict liability under s.2 AEVA should arise".

Contributory negligence

L.15 Some consultees thought that the contributory negligence provisions should be amended. The Senators of the College of Justice said:

> *In our response to the first consultation paper we expressed the view that the provisions in relation to contributory negligence should be replaced by a simpler, bespoke provision dealing with AVs. We remain of that view.*

L.16 Cycling UK argued that the law on contributory negligence prejudiced non-motorist road users:

> *The law on contributory negligence in the UK is already prejudicial against non-motorised road users when compared with most other European countries. The advent of AVs could make the situation considerably worse, and the AEV Act does nothing to avert this risk.*

L.17 Cycling UK said that the problem is exacerbated when the driver's insurance company makes a contributory negligence claim:

> *Drivers' insurance companies routinely make such claims when cyclists are injured, e.g. for failure to wear a helmet or hi-vis clothing, without providing evidence that this would have made any difference to the likelihood of their injuries occurring, let alone to their seriousness. Where cyclists defend such claims, they never succeed. Yet we suspect that they routinely lead to reduced out-of-court compensation settlements, with high street solicitors advising their clients that they risk losing their claim entirely if they contest the claim of contributory negligence.*

The person in charge cannot claim if the system is engaged inappropriately

L.18 Section 3(2) of the AEV Act states that the insurer is not liable to the person in charge of the vehicle where "the accident… was wholly due to the person's negligence in allowing the vehicle to begin driving itself when it was not appropriate to do so". James Marson of Sheffield Hallam University and Katy Ferris of the University of Nottingham thought this should be reconsidered:

> *Allowing an insurer or insured to escape, partially, through the operation of s. 3(2) should be reconsidered.*

Extending the AEV Act to driver assistance

L.19 APIL thought that the AEV Act 2018 should be extended to Level 2 driver assistance systems, where problems might also lie with the software rather than the driver:

> *The current definition is unnecessarily limited and will exclude a number of automated vehicles, especially those that are already present and being used on UK roads. Under the current definition, if the vehicle requires any form of monitoring (for example the ALKS), it will not be covered by s.2 AEVA… Widening the scope of the definition will allow injured claimants to benefit from strict liability in s.2 AEVA so they are not forced to pursue a costly and complex product liability claim against an ADSE.*

Secondary claims

L.20 Some insurers raised the cost and expense of bringing secondary claims against vehicle manufacturers (VMs). As NFU Mutual said:

> *Not only do VMs have access to "war-chests" to finance the defence of claims which may prove damaging to their brand, they also have the luxury of prolonging the product liability claim process, the Insurer having already paid out the compensation to the injured party. Smaller insurers may find*

themselves unable to afford to pursue litigation for recovery of their outlay, or consider it uneconomical to pursue small damages amid costs of complicated data-driven product liability claims against VMs.

L.21 NFU Mutual flagged the cost of hiring experts to examine data, making it expensive to defend claims. They also mentioned the difficulties of recovering outlay from individuals who fail to install safety critical updates or who tamper with vehicle systems.

UNINSURED AUTOMATED VEHICLES

Q53: We provisionally propose that measures should be put in place to compensate the victims of accidents caused by uninsured AVs. Do you agree?

L.22 This drew near unanimous agreement. Out of 73 respondents who answered this question, 65 (89%) agreed, and eight (11%) gave other responses. No-one disagreed.

Agreement

L.23 Most consultees agreed that processes must be in place to compensate the victims of uninsured AVs. As the RoSPA put it:

> *RoSPA strongly agrees that it is vital to ensure that victims would be compensated for accidents involving uninsured vehicles which are self-driving, as would be the case in an incident involving a conventional vehicle, where the Motor Insurers' Bureau steps in as a last resort insurer. This process must be in place before any self-driving vehicle is deployed on our roads.*

L.24 It was thought unfair to treat the victims of uninsured AVs less favourably than the victims of other uninsured vehicles:

> *There seems an innate unfairness in not providing compensation to victims of accidents for which uninsured self-driving vehicles are responsible, where there would be an insurer of last resort in the case of vehicles being driven manually by uninsured drivers.* [Faculty of Advocates]

L.25 A few respondents thought that even if it was unlikely that AVs would have no insurance at all, they might have the wrong sort of insurance or the insurance might be void*:*

> *Some vehicles are AV-capable but this function is disabled when the policy is incepted. It would seem that the same vehicles would not then be covered, would be considered uninsured, if and when the user maybe activates the AV functionality and uses the vehicle as an AV but does not then have in place appropriate cover.* [Kennedys Law LLP]

> *Furthermore, there may be additional issues related to scenarios in which a motor insurer has grounds to void cover e.g. the automated vehicle has been materially modified in a manner not notified to the insurer.* [AXA UK]

Funding

L.26 The MIB confirmed that no agreements are currently in place and welcomed a debate about how uninsured claims should be funded:

> *At present, there are no Agreements in place between the MIB and the Secretary of State for Transport to deal with these claims. There are important questions to be addressed around the compensation of victims in specific circumstances – for instance, if critical software has not been updated – and how it should be funded. Should the ADSE contribute and if so, how should this be structured? The MIB would welcome a debate around these issues.*

L.27 Several consultees suggested that ADSEs should contribute to a compensation scheme for uninsured AVs.[86] As Zurich Insurance said, "there may also be a role for ADSE to contribute to this fund". Shoosmiths LLP wanted an assessment of the ability of the ADSE to pay for any claim, without the need for a separate compensation scheme.

Technical solution

L.28 Around seven respondents thought that technology could be used to prevent uninsured AVs from operating:

> *We wonder if there is a technical solution possible here, for example a public authority could maintain a database of all HAVs that are insured. Then an approval requirement for an ADS would be that it connect to this database to confirm it is insured before commencing any journey.* [The CertiCAV team at Connected Places Catapult]

> *Proof of insurance should be mandatory before ADS is operable, much like computers require entering a software licence number before one can use that software. Such a system would drastically cut down on the number of uninsured AVs. This will reduce the number of victims of accidents caused by uninsured AVs, ease pressure on the MIB and lower premiums.* [DAC Beachcroft LLP]

> *How the AV could be connected to the DVLA database and restrict its use, using its ADAS, could be explored as a technical mitigation with consideration of public acceptability.* [NEPC]

Software updates

L.29 Several consultees queried whether victims would be left uninsured where an incident resulted from unauthorised software alterations or failure to update software. Under section 4 of the Automated and Electric Vehicles Act, the insurance policy may exclude liability to the insured person in some circumstances. This is where the insured person made or knew about prohibited software alterations or failed to install software updates that they knew (or ought reasonably to know) were safety-critical.

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[86] This included AXA UK, Zurich Insurance, Thatcham/ ABI and Aviva Insurance.

L.30 However, the possible exclusion covers only payments to the insured person themselves. The insurer must still pay other victims (though the insurance policy may allow for recovery against the insured person). Thus section 4 does not leave third parties unable to claim in the same way as an uninsured AV.

PRODUCT LIABILITY

Q54: We provisionally propose that:

(1) product liability law should be reviewed to take account of the challenges of emerging technologies;

(2) any review should cover product liability as a whole, rather than be confined to automated vehicles; it should not, therefore, form part of this project on automated vehicles.

Do you agree?

L.31 Most people agreed that product liability law should be reviewed as whole, rather than specifically for AVs. Of 60 respondents who answered this question, 42 (70%) agreed, three (5%) disagreed, and 15 (25%) gave other responses.

Agreement

L.32 Consultees pointed to many difficult issues in how product liability law applied to new technologies. However, those who agreed with the proposal thought that it was important to keep consistency between AVs and other consumer products:

> *Product safety law and the Consumer Protection Act 1987 undoubtedly has limitations with the advent of more advanced technologies. However, these limitations are not unique to automated vehicles. We consider that evidence of automation decision making ("black box" data), state of art defences and the interrelation of software to hardware would all benefit from consideration at some stage. However, seeking to construct an autonomous vehicle only framework would, in our view, lead to inconsistency with other consumer products. This inconsistency is likely to be detrimental in an area of law where consumer "expectation" plays such a major role.* [Shoosmiths LLP]

> *We agree that any review of product liability law should not be confined to automated vehicles. We note the ongoing EU project to review the Product Liability Directive and bring it into alignment with new technologies. It is uncertain at this stage what approach the UK will take to developing the law in this area. However, in our view, it would not be appropriate to review the application of the Consumer Protection Act (CPA) 1987 specifically in the context of automated vehicles. The issues raised in relation to software updates, the definition of defect and proof of a defect having occurred, and establishment of causation merit substantial consideration for innovative technologies more broadly.* [SMMT]

> *Piecemeal reforms on specific categories of products may jeopardise the overall clarity and coherence of the existing body of law on product liability.* [Law Society of Scotland]

L.33 Similarly, Trustworthy Autonomous Systems Hub thought that a review "should aim to review the existing product liability law as a whole". This should "address the lacuna within the act which has yet to be fully addressed by the judiciary in the existing body of case law". Trustworthy Autonomous Systems Hub listed some of the difficulties including issues of causation and the definition of a defect under section 3:

> *Elements such as section 3 of the Consumer Protection Act 1987's definition of defectiveness, which was intended when drafted to be enhanced and further defined through judicial dicta. However, some three decades later, Section 3's definition remains to be ill-defined and continues to present challenges for claimants, defendants and the judiciary.*

L.34 The Bar Council mentioned several problems, including the 10 year "long stop":

> *The CPA 1987 provides for a ten year 'long stop' provision, which means that a claim can only be made in the first ten years of a product's lifespan. This limits its utility in the context of vehicles which may be used for much longer. These factors again point to the need for a review. However, as the Law Commission identifies, this is a matter that should be reviewed generally, rather than simply for AVs. Many of the same issues arise in the context of, for example, medical AIs.*

L.35 The IUA also supported the proposal to review product liability law to take account of the challenges of emerging technologies. They pointed out that the Consumer Protection Act 1987 only deals with physical products that are unchangeable. Once products can be changed by software updates, many problems come to the fore. This includes the development risk defence, which "enables liability for defective products to be avoided by showing that the defect could not have been discovered in the current state of scientific and technical knowledge":

> *This is because it can be complex to capture the state of scientific and technical knowledge at the time a product was put into circulation. Difficulties are also posed by the complexity of software updates and the need to identify the point at which a product became defective, whether that be at the time it was put into circulation or following a software update.*

AVs are sufficiently different to justify their own review

L.36 Some consultees were concerned that a general review of all product liability law might take too long and could be used to "kick the issue into the long grass". They argued that AVs are sufficiently different from other consumer products to justify an immediate review:

> *Because AEVA makes AVs liable, ADS is fundamentally different to other technological innovations. There should be a specific review of whether existing product liability is able to deal with the changes ADS will introduce once those systems are on the road network. The public risk otherwise is that adequate liability insurance to use ADS-equipped vehicles may not be affordable.* [DAC Beachcroft LLP]

The review should cover product liability as a whole rather than be confined to AVs. However, in our view AVs are distinct enough to warrant their own review of appropriate product liability laws. [Kennedys Law LLP]

L.37 The Faculty of Advocates believed that there was "a very high imperative to reviewing product liability in relation to self-driving vehicles". They pointed out that "the operation of a physical object which is capable of causing serious injury or death is, more than ever before, wholly dependent upon the use of software":

It would not be appropriate to conduct such a review in the context of self-driving vehicles in isolation; but the urgency of the issue suggests that there is an immediate imperative for a wider-ranging review of product liability.

L.38 A similar point was made by Thompsons Solicitors LLP:

In our view, given that AV technology is fast-moving and comes with considerable risk to human life, it should not be ranked for review with products which represent limited danger and are subject to limited technological developments. Accordingly, in the absence of more information on the time period proposed for review of 'product liability as a whole', AVs should be separated from other product liability reviews and the review take place whenever the industry makes a step-change in technology or usage extends.

L.39 One respondent made a strong statement that it would be irresponsible to delay a review specific to AVs:

Product liability law should be reviewed to take account of the challenges of emerging technologies. However, the costs and responsibilities for this review are not clear and timescales are certainly not defined. With AV technologies and commercial models evolving rapidly, but no prospect of a timeline for this, it seems irresponsible to delay a specific review of the situation for AVs. When recommending future legislation for AVs, it is surely prudent to recommend a review of product liability law for specifically AVs? [Nova Modus]

M. Access to Data

OVERVIEW

M.1 Most data protection issues are outside the scope of our project. However, some are integral to our proposals. Chapter 17 considered the data needed for our proposed legislative scheme to work. We looked particularly at the data that would need to be collected, stored and shared to investigate collisions and traffic infractions and to decide insurance claims.

M.2 We started by summarising initiatives at both EU and UNECE level to introduce "event data recorders" (or EDRs). An EDR is triggered by a sharp deceleration and records key data about the event (such as speed and braking). However, the data must be anonymous: EDRs do not record information which would allow the vehicle or event to be identified (such as the VIN, or the time or location of the collision). Nor do they include audio or video data. EDRs are intended to allow authorities to analyse patterns of problems - not to investigate any individual collision, or to determine criminal or civil liability.

M.3 AVs will have a second system of data capture, known as a Data Storage System for Automated Vehicles (or DSSAD). Under the ALKS Regulation, the DSSAD must record each time an ALKS is activated or deactivated or issues a transition demand (together with a date and time stamp). It also records when the vehicle is involved in a detected collision, but the system may miss "soft" collisions, for example with motor cyclists.

M.4 The ALKS Regulation leaves issues of access to data, privacy and data protection to national laws. The system must be capable of including 2,500 time stamps, equivalent to around six months of use. However, contracting states can require that the data are stored for longer.

M.5 Our aim is to enable the police, insurers and regulatory authorities to discover whether the ADS was engaged at the time of an incident. In our scheme important consequences flow from this: if a motorcyclist is killed, for example, and a human is driving, the driver could face many years in prison. Conversely, if the ADS is engaged, the ADSE could face regulatory sanctions.

M.6 As EDRs cannot be used to determine liability, we focused on the DSSAD. We were concerned that some "soft" collisions would not be detected by the system. Nor would witnesses be able to pinpoint an exact time. Witnesses are more likely to know the exact place where the collision happened, but the ALKS regulation does not require location to be recorded. Our understanding is that it would be technically feasible to add GPS co-ordinates to the time stamp, but this was omitted from the UN Regulation due to privacy concerns

M.7 We provisionally proposed that the DSSAD should record location. Following a short review of data protection law, we felt that this would be compatible with data protection principles. We received strong support from consultees, who thought that

location data was necessary to establish liability and ensure safety. Consultees saw a need to balance these aims with privacy concerns and suggested possible safeguards.

M.8 We then proposed that those controlling AV data should be under a legal duty to disclose data to insurers, where this is necessary to decide claims fairly and accurately. We received strong support, particularly from insurers. However, insurers and manufacturers expressed divergent views. While insurers wanted clear and enforceable duties to provide a range of data within set time limits, industry representatives wanted to restrict data to that which is strictly necessary.

M.9 We also proposed that DSSAD data should be retained for a period of three years, to reflect the standard limitation period. Consultees were split on this issue. Half of consultees agreed, on the basis that three years struck the right balance between the rights of claimants and the burden of long-term mass data storage. Other consultees were split between those who thought three years was too long and those who thought it was too short.

M.10 Consultees who felt the period should be shorter focused on the cost and practical difficulties of data storage, referred us to standards in Germany and international instruments (which indicate six months). Consultees who thought the period should be longer were against undermining the policy underlying longer limitation periods, for example where the claimant is a minor. There was little agreement as to how long any additional period should be, with consultees arguing for many different periods between four years and 21 years.

M.11 In addition, we provisionally proposed that ADSEs should present regulators with details of how data will be recorded, stored, accessed and protected. The regulator should only categorise a system as self-driving if these systems complied with data protection law. Consultees were resoundingly in favour of this proposal. However,

M.12 Finally, consultees raised many other questions about how data protection law applies to AVs, which we had not addressed. There were calls for further guidance on many aspects of AV data.

LOCATION DATA

Q55: We provisionally propose that:

(1) for a vehicle to be classified as self-driving, it needs to record the location as well as the time at which the ADS is activated and deactivated;

(2) the Government should work with the UNECE to ensure data storage systems for automated driving record these data; and

(3) any national system to approve an ADS should require these data to be collected, subject to safeguards.

Do you agree?

M.13 There was strong support these proposals. Out of 85 consultees, 67 (79%) agreed, two disagreed and 16 (19%) responded "other".

Agreement

M.14 A large majority of consultees agreed that location data was required - both to determine whether the ADS was engaged at the time of an incident, and to prevent fraud.

M.15 Many insurers saw location data as crucial. Richard Birch of Acromas Insurance Company said that, without it, "the whole AV proposition will become uninsurable and potentially open to fraud in addition". The MIB called the information "essential for claims handling and determining responsibility". The ABI and Thatcham Research commented:

> *Insurers must have access to enough information to establish whether a vehicle's system or a human driver was in control should an accident occur. If insurers are unable to access this data, the provisions of the Automated and Electric Vehicles Act 2018 will be unworkable in practice….*
>
> *The lack of appropriate location data and corresponding timestamps will also leave room for fraud. The associated increase in cost of investigating fraudulent claims will only serve to harm regular customers.*

M.16 Law firms and lawyers' associations also argued in favour of location data. Kennedys Law LLP described location and time stamps as "essential data to determine handover, which feeds back to who is potentially liable between the user and the ADSE responsible for the ADS". APIL thought recording location data "will aid police investigations and establish whether a driver or the ADS was liable at the time of a collision". FOCIS stated:

> *Data such as speed, location and time stamp, as well as tracking whether the vehicle was in ADS mode at the time of any accident is crucial and should be one of the benefits of such technology.*

M.17 Burges Salmon LLP described the proposals as "sensible":

> *We agree with the Law Commissions' proposals that location and other specified data need to be collected by an ADS…. We further agree that the*

recording of such data is not incompatible with UK GDPR. To the extent data recorded constitutes personal data, the requirements of UK GDPR will apply including in respect of appropriate technical and organisational measures to ensure a level of security appropriate to the risk of processing such data.

M.18 Mostly industry stakeholders were also in favour. Mobileye said:

> *The state and the industry both have a strong interest in investigating traffic violations and mishaps not only in order to find a human culprit but also, and mainly, to understand the origin of the mishap, to correct it, and to prevent its recurrence. To facilitate the investigations and enhance their efficiency in view of the innovative nature of the technology, Mobileye supports a compulsory recording of location as well as the time of activation.*

M.19 The SMMT pointed to the sensitivity of the issues, particularly from a data privacy perspective. It noted that the UNECE has decided to omit a location stamp from the data elements required by Automated Lane Keeping System.[87] However, on balance, it thought that location data were required:

> *We understand that it is technically possible for the DSSAD to include a location stamp among its data elements and that there is a precedent in requiring the recording of location stamp in the form of Section 63(a)1 of the German Straßenverkehrsgesetz. Partly on those bases and partly because location data could better facilitate civil, criminal and regulatory investigations, we agree in principle with the proposals above subject to satisfactory safeguards and compliance with the Data Protection Act 2018, the UK General Data Protection Regulation and the EU ePrivacy Directive.*

M.20 Five AI agreed with location data would be useful in some circumstances, but disagreed that this should be part of the classification decision:

> *We agree that it seems useful to record the location in certain circumstances, although it may not be necessary for all deployments. We do not agree that this should be part of the requirement for a vehicle to be classified as self-driving - rather it should be a requirement that any self-driving vehicle has an appropriate data recorder before being deployed on the road.*

Disagreement

M.21 Only two consultees argued against recording location. Oxbotica pointed out that not all AVs use GPS:

> *It is also worth noting that GPS data is notoriously unreliable, especially if required on start-up, where the GPS may still be searching for satellites, or perhaps where the controlling system is looking to corroborate base location with other local features. And GPS data simply does not exist in some scenarios - for example underground car parks and urban canyons. More importantly, not all AVs use GPS, and not all AVs actually know their location*

[87] The SMMT also referred to European Data Protection Board Guidelines on Processing Personal Data in the Context of Connected Vehicles and Mobility Related Applications and the EU ePrivacy Directive.

in an absolute frame (i.e., GPS coordinates). Insisting on the recording of location will place a significant and unnecessary burden on those ADSEs that have chosen not to use GPS.

M.22 Oxbotica did not see any clear benefit in collecting GPS co-ordinates, as they will "only serve as a confirmation that a vehicle was in a certain place at a certain time, and not that it was involved in an incident". Furthermore:

> *There would be significant public concern about privacy if location data was collected without specific rationale - for example following an incident. The examples given suggest that an authority (perhaps the police) would be able to search databases to identify which vehicles were in a particular place at a particular time. This level of state scrutiny will undoubtedly cause much public concern, and an ability to retrospectively track users is likely to act as a disincentive to the AV industry.*

M.23 The Motorcycle Action Group was also particularly concerned about privacy:

> *In terms of data-monitoring, if everything is monitored, nothing is private. In this scenario, where every journey can be recorded, privacy evaporates and is replaced by data storage. Maybe that doesn't matter to some. Anyone with reservations about the reach of the State into our personal affairs ought to be uncomfortable about what one might call the eternal memory of the digital mind.*
>
> *MAG is not accepting that the State is capable of managing such a level of information with sufficient levels of security or integrity to make this mass collection of data safe.*

Privacy safeguards

M.24 Many consultees acknowledged privacy concerns but thought that they could be dealt with through appropriate safeguards. The ABI and Thatcham Research said:

> *There must also be established ways to access relevant data without accessing personal, protected, or non-related data. We once again need to ensure that this data is properly collected and stored in a neutral third-party. As we have seen in the past, there have been instances where VMs have been incentivised to intentionally obscure data.*

M.25 SMMT said that data access:

> *should be underpinned by a clear identification of specific categories of data required for specific use cases. Where the data is later accessed for accident investigation, legal certainty must be provided as to who the data controller and data processor are, and how data protection obligations are upheld.*

M.26 Shoosmiths LLP suggested "a combination of storing data locally on the AV only and/or data being collected by the manufacturer on an anonymised basis". They also thought that "the UNECE position on data retention creates a potential inconsistency with the treatment of similar data which is already collected regarding road users by mobile phones, satnav and telematics systems".

M.27 AXA UK referred to the existing literature on privacy safeguards.[88] This included a report by AXA UK and Burges Salmon LLP which "outlined a list of best practice principles for protecting data in the CAV sector including ensuring there is accountability at board-level, identifying a lawful basis of processing, building privacy by design and following best practice guidance on cyber security.[89]

M.28 Paul Erdunast, a barrister at Temple Garden Chambers, thought that the balance lay with collection location data:[90]

> *When one considers the weighty public interest in investigating crimes and settling or deciding civil cases fairly, in my view it is clear that the balance lies in favour of recording location and timestamp data, and disclosing it in appropriate circumstances….*

M.29 He then suggested that any data not needed to investigate specific incidents should be anonymised:

> *When data is collected for the purposes of investigating a criminal matter or provided to insurers for the purposes of dealing with claims, the investigation relates to an identifiable individual, and therefore the data would not be anonymised. However, there is no reason that I can see not to anonymise data in the context of learning lessons from investigation of high-profile collisions and generalised monitoring of the risks to vulnerable road users from AVs.*

More data should be recorded

M.30 Some consultees thought that more data is required for the purpose of traffic investigation. Connected Places Catapult thought it seemed likely that "collision investigations may require data to be recorded over and above the timestamp, location, and ADS activation status." Alastair Shipman of Imperial College London thought "far more data" is needed, "including local conditions, reason for handover, etc". PACTS thought that the data requirements should be reviewed and "updated as lessons are learned". Burges Salmon LLP commented:

> *Our work as a technical co-author on BSI PAS 1882:2021 suggests that mandatory data collection requirements should extend beyond location data and time-stamps for the purposes of both specialist investigation, insurance purposes and for the purposes of the safety in-use regulator drawing additional learning from incidents and to apply appropriate regulatory sanctions.*

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88 ABI/Thatcham, Defining Safe Automated Driving (September 2019): see https://www.abi.org.uk/globalassets/files/publications/public/motor/2019/defining-safe-automation-technical-document-aug-2019.pdf.

89 AXA UK/Burges Salmon LLP, *Insurance & Legal Report*, (2019) produced for the FLOURISH consortium: see https://www.burges-salmon.com/-/media/files/publications/open-access/flourish-report-2019.pdf.

90 Responding in a personal capacity.

M.31 DLG suggested that location data should be recorded throughout the time that the ADS is engaged:

> *Only recording the beginning and end points of control will not be adequate to establish if the vehicle was involved in the accident in question. DLG considers recording the location for the entirety of the time that the ADS is engaged will help to determine whether or not the ADSE or driver is liable for the incident and also provide claims evidence.*

M.32 Some consultees suggested that camera footage should be retained. The Suzy Lamplugh Trust stated:

> *We would also advocate the recording of CCTV to protect passengers and users-in-charge/drivers as per recommendations of the Task and Finish Group. However, such data must be securely stored to protect privacy in accordance with the Information Commissioner's guidelines.*

M.33 Cycling Scotland said it "would like to see dash cams included as standard in all automated vehicles":

> *Automated vehicles can capture a lot of data; however, it is unclear if such data will be able to be used to improve the safety of people cycling. For example, if an automated vehicle knocks a person cycling off their bike, or carries out a dangerous close pass, there is no evidence that the police will be able to recover data from the vehicle (or other witness vehicles).*

M.34 The IUA said it was "of the utmost importance that an agreement with insurers is reached to ensure that in-vehicle data is provided to them in a usable format, following an incident". That data should not only include time and location of event and whether the ADS was engaged but several other factors, including "speed of vehicle prior to and at collision" and "camera footage".

M.35 Reed Mobility thought access would be needed to understand the AV's decision making. This should include:

> • *how the vehicle was being driven (velocity (3 axes), acceleration (3 axes), automation mode, ODD status etc.);*
>
> • *what objects the vehicle had detected;*
>
> • *how those objects had been classified (pedestrian, vehicle, cyclist etc.);*
>
> • *what predictions were being made about the movement of those objects;*
>
> • *how those predictions affected the planned trajectory of the vehicle;*
>
> • *what desired control inputs should be implemented as a result;*
>
> *Although they need not be collected explicitly for every drive, it should be possible for an AV operator to derive these data for any drive.*

International cooperation and compliance

M.36 In Question 55(2) we proposed that the Government should work within the UNECE on these issues. Several consultees commented on the need for international collaboration:

> *AVs are very unlikely to be confined to use solely within the UK. It is sensible to expect all national systems to adopt a collaborative approach and work towards the same standards for the purposes of allowing AVs being used on an international scale.* [Kennedys Law LLP]

> *The proposal for Government to work with the UNECE to ensure data storage systems for automated driving is a sensible proposal which recognises the global nature of the UK vehicle manufacturing and technology market.* [Burges Salmon LLP]

M.37 Pinsent Masons LLP thought that international co-operation could avoid barriers to the international transfer of data:

> *There may also be issues surrounding the transfer of that data if the any data centres are overseas. This is the case particularly for US-based ADSEs, where could be issues flowing from the recent Schrems II judgement as it may not be legally permissible to transfer that data to the US. Collaboration with the UNECE should help the government to avoid, or at least face head on, these challenges, and cooperate at an international level to resolve any barriers to data collection which could have a negative impact on safety assurance.*

M.38 Mills & Reeve LLP highlighted the need to have regard to EU developments:

> *The UK now has greater freedom to adapt and evolve its privacy regime (and indeed the UK Government has its expressed enthusiasm for doing so). However, any divergence from the EU model will need to be done carefully so as not to put at risk the EU's view on adequacy.*

M.39 Mills & Reeve LLP mentioned some of the key developments since the Consultation Paper was published in December 2020, suggesting that they should be "followed and assessed for any impact on the proposals":

> *The EU-UK transition period has ended, and UK law has been amended to reflect this. The "UK GDPR" now applies within the UK in place of the GDPR, with amendments made by Statutory Instrument to apply this law appropriately. The EU-UK Trade and Cooperation Agreement provides a period of up to six months for continuing flow of personal data between the EU and the UK….*[91] *A draft adequacy decision has been published by the European Commission recognising the adequacy of UK data protection laws. In addition, a negotiating mandate on the draft ePrivacy Regulation has been*

[91] Article FINPROV.10A: Interim provision for transmission of personal data to the United Kingdom.

approved by the EU Council for negotiation with the European Parliament, with an expectation that this legislation is now close to being finalised.

Privacy and Electronic Communications (EC Directive) Regulations 2003 (PECR)

M.40 A few consultees noted that retaining location data may not be compatible with the way that the e-Privacy Directive had been transposed into UK law through PECR. Therefore, PECR may need to be amended.

M.41 DAC Beachcroft LLP explained the nature of the problem:

> *The processing of location data is, as the consultation paper notes, also governed by the ePrivacy Directive 2002/58/EC ("ePrivacy Directive"), implemented into domestic law by the Privacy and Electronic Communications (EC Directive) Regulations 200 ("ePrivacy 2003 Regulations")….*
>
> *The ePrivacy 2003 Regulations sit alongside the Data Protection Act 2018 and the UK GDPR; therefore the obligations and restrictions governing location data (as set out in the ePrivacy 2003 Regulations) will still apply in the UK.*
>
> *The Law Commission is correct that the ePrivacy Directive (and ePrivacy 2003 Regulations) was not drafted with AVs in mind and therefore… it is arguable that it was not intended to prevent location data from being retained at all without consent. With that being said, the view set out in paragraph 17.60 that there is a public security exception (from obtaining consent to process location data) which can be relied upon is undetermined as it has not yet been tested or defined*.

M.42 KPMG felt that the ePrivacy Directive was outdated:

> *It could be argued that self-driving is as novel a concept as when telephone handsets were introduced, if not more novel. Therefore, it is not surprising that existing data privacy and protection laws cannot reasonably be expected to cover AV technology as they were not drafted with this type of technology in existence. The successful operationalisation and integration of AVs into the existing mobility ecosystem will need a shift in data privacy and protection mindset.*

M.43 By contrast, the Information Commissioner's Office (ICO) described the ePrivacy Directive as "technology-neutral":

> *It is important to note that both PECR and the ePD are intentionally technology neutral, and intend to provide specific rules for terminal equipment on the basis that it is part of the individual's 'private sphere' and requires protection from unwarranted intrusion. Therefore, care must be taken when interpreting the legislation, so that its underlying rationale, and technology neutral approach is fully understood and any proposals accord with its objectives.*

A DUTY TO PROVIDE DATA TO INSURERS

Q56: We provisionally propose that legislation should impose a duty on those controlling AV data to disclose data to insurers, where the data is necessary to decide claims fairly and accurately. Do you agree?

M.44 The great majority of respondents agreed with the proposal. Out of 80 respondents who answered this question, 63 (79%) agreed, five (6%) disagreed and 12 (15%) gave other responses.

M.45 However, this high level of agreement masked some underlying tensions between insurers and manufacturers. Insurers wanted ADSEs to be under clear duties to provide data in a timely fashion, with sanctions if they failed. They feared that otherwise insurers could favour their own insurance partners over independent insurers. Conversely, manufacturers worried that insurers would go beyond the data needed to settle claims with victims, and search for data that might be used in product liability claim against them. These differences in perspective made it difficult to find a consensus about which data should be provided, when and in which format.

Agreement

M.46 Insurers agreed strongly with this proposal, describing it as essential to the operation of the insurance market. As AXA UK said:

> *For liability disputes to be fairly resolved, the insurance industry has continuously stated that data must be equally and equitably accessible to the manufacturer and insurer to enable a speedy review of whether the driver or vehicle was in control at the time of an incident. Moreover, if insurers are unable to access vehicle data it will ultimately be detrimental to the insured, as claims management will be less effective and more expensive.*

M.47 Many insurers called for the legislation to specify which data must be shared, in what form and the consequences of not doing so. NFU Mutual put the argument in the following terms:

> *Yes – we consider this to be essential and the duty imposed must provide sanctions for failure to do so within the specified period.*
>
> *The AEV will put Insurers in the position where they must pay compensation to injured parties where the AV is responsible (or partly responsible) for the accident, without any automatic right to the data to establish liability / causation.*
>
> *The Civil Procedure Rules set out strict time limits for the investigation of liability following a road traffic accident and infers costs consequences in numerous scenarios (e.g. the MOJ Fixed Costs Regime) where a party does not acknowledge / agree damage within a set period of time. Unless it specifically legislates, the Government will have created a scenario where an Insurer is forced to make and communicate a decision on liability to the third party before it has had the opportunity to access or review the relevant accident data.*

Insurers ultimately have a choice whether take offer cover on a certain make or model vehicles, so leaving a regulatory gap by which VMs can circumvent or frustrate the process may limit the number of insurers willing to provide cover. Although it is anticipated that vehicle manufacturers may look to underwrite AVs themselves, this restriction in options could severely damage opinion and adoption of AVs within private ownership, particularly in second-life.

M.48 DLG asked for "regulatory controls" to ensure compliance:

DLG recommends implementing regulatory controls to ensure that insurers have access to this data, rather than insurers having to obtain court orders which ultimately results in unnecessary delay and increases the cost of insurance for customers.

M.49 The IUA asked for the data to be provided in a useable format:

IUA welcomes the focus on data within this consultation and is strongly supportive of the proposed legislation to ensure that in-vehicle data is provided to the insurance industry in a usable format following an incident. We would encourage data owners to be required to give due consideration to the ability for data provided to be easily interpreted and utilised; it may also be appropriate for written reports on specific events to be issued to insures to support and increase the efficiency of the claims management process.

M.50 Some legal respondents supported the proposal for the reasons we gave in the consultation paper - namely an obligation to provide data would resolve uncertainties within the data protection law. As BLM Law put it:

From the ADSE's point of view, it would be simpler to fall within Article 6(1)(c) [of the GDPR]. This applies where "processing is necessary for compliance with a legal obligation to which the controller is subject". However, for this basis to apply, legislation would need to impose a duty on those controlling AV data to disclose them to insurers.

M.51 DAC Beachcroft LLP thought that insurers would also need information about the risk:

We also note that the data is also likely to be required by insurers for underwriting purposes / to calculate an appropriate premium / terms and/or to decide whether or not to offer cover at renewal.

Disagreement

M.52 By contrast, SMMT strongly disagreed with the proposal. Its main concerns centred around the word "necessary".

M.53 Burges Salmon LLP described the test in the following terms:

The term "necessary… does not mean that processing has to be absolutely essential. However, it must be more than just useful, and more than just

standard practice. It must be a targeted and proportionate way of achieving a specific purpose.[92]

M.54 SMMT thought this test was far too broad:

> *We also strongly disagree with the notion of "where the data is necessary" to decide claims fairly and accurately, as we regard this as far too broad, imprecise and risks giving a carte blanche for insurers to demand a disproportionate and unreasonable amount of data under the pretext of necessity. Legislation must go further and provide legal certainty by clearly specifying the data elements that must be disclosed to insurers for the fair and accurate processing of claims. For example, under Article 32 "Access to vehicle data" of the French Mobility Law (LOM), clause 5 of Article L1514-6 clearly stipulates that "only the data strictly necessary to determine whether driving delegation of the vehicle is activated or not, or the conditions of take-back, for the purposes of compensating the victims …… shall be transmitted".*

M.55 Oxbotica said it would be wrong to share location data with insurers as it may result in the disclosure of information about vehicles who were close to but not directly involved in any incident, potentially infringing their rights to privacy.

M.56 Several in the industry (including Stellantis, Renault, and SMMT) argued that data should only be shared with the consent of the AV owner or registered keeper. This had not been part of our proposal. A primary purpose of the disclosure is to establish whether a human or AV was driving at the time in question. We feared that owners might refuse consent if the data showed that they were driving and at fault at the time of the incident.

Guidance

M.57 Several respondents thought there should be further guidance on this issue.[93] For example, DAC Beachcroft LLP suggested a template data sharing agreement:

> *Additionally, if this disclosure of data were to become a legal requirement, it would be prudent and in both the interests of ADSEs and insurers to be able to rely on a universal/template data sharing agreement – this would involve liaising with insurance bodies and working groups.*

M.58 Highways England made a similar suggestion for the creation of an industry standard dataset.

M.59 Four respondents argued that the data should be transferred to a central database, where a neutral third party would be responsible for storing and handling the data.[94] As the MIB said:

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92 Burges Salmon LLP referred to ICO guidance at https://ico.org.uk/fororganisations/guide-to-data-protection/guide-to-the-general-data-protection-regulationgdpr/lawful-basis-for-processing/.

93 This included DAC Beachcroft LLP, Highways England, AXA UK, and the National Physical Laboratory.

94 See BLM Law, ABI and Thatcham Research, MIB, and AXA UK.

The idea of accident-relevant data being sent automatically from the controller's server to a national neutral server (which we understand has been discussed in the UNECE) should be considered urgently as a pre-requisite for the introduction of AVs onto UK roads.

Other parties' access to data

M.60 Finally, respondents raised the need to share data with other parties, including local authorities and the police. BIBA said asked for data to be shared with insurance brokers; while APIL and FOCIS mentioned the needs of victims, their families and lawyers. AXA UK asked for the Government to prepare "data map" to identify all those who need to access data:

> *AXA has continually urged government to place greater focus on the data and connected element of automated technology. One approach that could support further collaboration in this area is the creation of a 'data map' to identify clearly who needs to access data, what type of data and when. Far reaching analysis into data requirements and ensuring the data is processed, stored and protected appropriately is needed.*

STORING DSSAD DATA FOR THREE YEARS

Q57: We provisionally propose that:

(1) initially, DSSAD data from self-driving vehicles should be stored for three years; and

(2) the issue should be reviewed in the light of experience.

Do you agree?

M.61 Out of 73 consultees who responded, just under half (36) agreed that three years was a good compromise. Among the rest, views were split between those who thought three years was too long, and those who thought it was too short. Alternative suggestions ranged from six months to 21 years.

M.62 Consultees who agreed with the proposal thought it struck the right balance between competing considerations. Those who argued for a shorter period were concerned about the cost and technical feasibility of long-term data storage, coupled with privacy concerns. Those who argued for a longer period were concerned about the just disposal of claims, especially from claimants subject to longer limitation periods.

Arguments in favour of a three-year retention period

M.63 Those who argued in favour of three years thought it balanced the just disposal of claims against the burdens of data storage. It also corresponded to the period in which most claims are brought:

> *We would favour storage of data for three years as that is the usual limitation period for personal injury claims. We appreciate that there may be practical problems in storing data for long periods but this may be overcome in the future.* [BILA]

A significant proportion of personal injury actions are commenced close to the expiry of the three-year limitation period, often because the injured person does not seek legal advice until the last minute. Cases do occur in which claims by persons under a legal disability are not intimated until many years after the alleged incident, but these would not seem to be sufficiently numerous to justify the retention of vast quantities of data for more than three years. [Senators of the College of Justice]

We anticipate that – even where a third-party claimant is under a disability, or treated as such because they are a minor – three years should provide claimants with ample opportunity to notify a compensator and to investigate liability, irrespective that legal proceedings would not need to be commenced during that time. [BLM Law]

M.64 Five AI thought that the DSSAD data requirements could be managed to prevent prejudice to ADSEs:

Agreed, assuming DSSAD data is kept at a level that the volumes of data to be stored are not onerous (e.g. if about 1MB of data is captured per minute of driving this would equate to about 1TB per ADS over 3 years which seems sustainable).

Arguments for a shorter period

M.65 Industry members were concerned about the cost of retaining data for three years, with many suggesting a shorter period of six months.

M.66 SMMT called the proposal "disproportionate":

Current regulation on Data Storage System for Automated Driving (DSSAD) and Section 63(a)4 of the German Straßenverkehrsgesetz require data to be stored for six months for a reason. In addition to upholding the storage limitation and data minimisation principles of both the EU and the UK General Data Protection Regulations, there are likely to be physical and technical limitations to the amount of data that can be stored by the DSSAD. Increasing the physical storage capacity of the DSSAD could be one option to address the limitations. Another… is to upload the data onto an offboard server for longer-term storage. Either measure will result in the automated driving system entity (ADSE) incurring huge additional costs solely for its automated driving system to operate in the UK, whereas currently there is no other jurisdiction known to have mandated this disproportionate storage requirement.

We suggest the Government should not merely consider tailoring the DSSAD data storage requirements to fit into the existing limitation period for personal injury claims, but should likewise consider amending the limitation period to better align with data storage requirements set out in internationally harmonised regulation on DSSAD.

M.67 ITS UK thought three years "onerous and unnecessary" and pointed out that German law prescribes six months. Oxbotica thought that local regulation should reflect international standards.

M.68 Mobileye did not disagree with our proposal but thought care was required in its implementation:

> *In view of the relatively long proposed period of time (three years), the scope of information gathered and the cost of retaining it over time, storing the data might place an exaggerated burden on those controlling it. Thus, Mobileye holds that regulator should specify the information that must be retained and the method to be used in retaining it. Mobileye's proposition is to focus on several minutes preceding a safety event.*

M.69 Some non-industry members also raised concerns. George Economides of Oxfordshire County Council noted that three years "is much longer than most CCTV footage, and impractical given the amount of data." The Bar Council called for further research into the issue:

> *We suggest that more research may be needed as to the typical volume of data which would be involved in this process, and the attendant cost (which would have to be borne by one of the relevant parties) and other implications, such as the ecological and cybersecurity consequences of the storage of vast amounts of data, some of which may be sensitive. We note that a three-year period would be much greater than the six month period adopted elsewhere - that may not be a sufficient reason to adopt the policy of other countries, of course, but their choices in this regard, and the rationale for those choices, will inform the debate.*

M.70 The Faculty of Advocates was particularly concerned about the privacy implications of retaining data for such a long period:

> *No matter what supposed benefits a period designated in years might be thought to bring, we entertain severe doubts whether any such retention period would be judged to be proportionate in relation to the fundamental right to privacy under ECHR article 8 and whether it would be compliant with both the data minimisation principle under Article 5(e) and the requirement for privacy by design under Article 25 of the GDPR.*

Arguments for a longer period

M.71 Two main arguments were put for a longer period. The first was to deal with claims that arrive on the day the three-year limitation expires. In these cases, the insurer will need time to find and preserve the data before it is wiped. The second is the deal with claims with a longer limitation period. APIL put both arguments in the following terms:

> *Often there are delays to bringing a claim and it would be unjust for data to be wiped the day after proceedings have been issued. In addition, the limitation period is longer for cases involving children or those who lack capacity. Therefore, by the time they are able to bring a claim, the data may have*

already been wiped. This will cause problems in terms of liability and will force claimants to attempt to prove that the ADS was engaged at the time of the collision. Without the data showing when the ADS was activated/deactivated, it would be extremely challenging to prove.

M.72 The ABI and Thatcham Research also noted that personal injuries may deteriorate, leading to late claims:

> *While three years is a good start, we believe that data should be held for even longer. Some symptoms from certain injuries, like whiplash, can persist and even get worse over a period of years.*
>
> *We understand that the threshold for three years is derived from the maximum amount of time to file a personal injury claim. However, for minors and other protected parties, the maximum time could be a lot longer and will need to be reflected in the access to data*.

M.73 Paul Erdunast of Temple Garden Chambers pointed to insurers' right to bring product liability claims against producers:

> *Such data would be helpful not only to the insurer in defending the claim and the Claimant for proving the claim, but additionally to the insurer in making a potential product liability claim against the ADSE under s5 Automated and Electric Vehicles Act 2018, which they have two years to do from the settlement of the insurer's liability: s10A Limitation Act. Accordingly, a three-year time period until destruction risks serious problems down the line. Erring on the side of caution, in my view a four-year time period for retention would appear sensible.*

M.74 Some consultees went beyond a discussion of DSSAD data and considered EDR safety data. Wendy Owen of Bangor University said that "safety data for other safety-critical transport sectors is kept and monitored for significantly longer periods", which has "helped to build a comprehensive database of accidents, incidents and near misses". The Urban Transport Group argued:

> *The availability of longer time series data could be very valuable in building up a picture which identifies patterns of incidents and risks over time and could be used to improve safety.*

Alternative periods

M.75 Among those arguing for longer periods, there was little agreement on what the period should be. DAC Beachcroft suggested an extra year "to retain the data for limitation period plus one year to allow for some degree of error and flexibility." DLG suggested six years "to ensure the data is stored for the minimum amount of time in which a claim can be brought against the insurer". Amey suggested eight years, to reflect the average life length of a vehicle. The RAC Foundation thought 5 or 10 years appropriate. FOCIS (with whom Stewarts Law agreed) suggested 10 years where the accident report involves serious injury or death, to deal with claimants who lack capacity.

M.76 Trustworthy Autonomous Systems Hub was concerned about "disadvantage for young people" caused by data unavailability where the limitation period begins to run once the claimant reaches age 18. The MIB suggested a retention period of 21 years to address this concern. Momentum Transport Consultancy advocated an unlimited retention period:

> *Three years seem like a very short duration given the duration of some investigation and judicial processes. An unlimited time frame should be adopted for the foreseeable until there is enough evidence to prove a suitable timeframe for data storage.*

Reviewing in light of experience

M.77 No consultee disagreed with our proposal to review the period in light of experience. FirstGroup suggested that "the review should be at the latest after 12 months experience." Future Transport London thought that "the period could be initially "sine die" and then reviewed after three years".

M.78 KPMG thought that the likely effect of such review would be shorter retention periods, which would require a shorter limitation period to match:

> *We do believe that with practical experience, the data retention period could be shortened in the future if economical and less cumbersome data storage solutions are not found in the meantime. However, the limitation period for claims would need to be reduced to match. From a data perspective, the limitation period would only need to be changed for incidents involving a self-driving vehicle. However, from a practical perspective, we think the limitation period would need to be changed for all driving incidents, as claimants could not be expected to know whether the vehicle that is the subject of their claim has self-driving capabilities or not. Additionally, it would make policies on the limitation periods for claims more complicated for the public to understand.*

ADSES TO SHOW HOW THEY WILL MEET DATA PROTECTION DUTIES

Q58: We provisionally propose that:

(1) When an ADSE applies for categorisation of its vehicles as self-driving, it should present the regulator with details on how the data will be recorded, stored, accessed and protected;

(2) the regulator should only categorise a system as self-driving if it is satisfied that the ADSE has systems to abide by its obligations under the GDPR.

Do you agree?

M.79 Consultees were resoundingly in favour of this proposal. Out of 78 responses, 68 (87%) agreed. Only three consultees disagreed, and the remaining seven responded "other".

Agreement

M.80 A large majority of consultees thought that including data protection within the categorisation scheme would help ensure compliance. DAC Beachcroft LLP thought "this proposal would ensure that privacy and data protection by design is being

considered from the outset". The Suzy Lamplugh Trust thought that "all proposals around the recording, storage and protection of data should be transparent and approved by the regulator".

M.81 Pinsent Masons LLP noted the novel risks that AVs pose, and thought our proposal would serve to address them:

> *We would agree with this approach based on the high risk of hacking, cyber attacks and misappropriation of personal data as a result of these technologies. It is also of course key that manufacturers and developers comply with data processing laws and are able to demonstrate this at the earliest stage.*

M.82 DAC Beachcroft LLP and Five AI both pointed to the need for collaboration with the ICO:

> *The regulator would need to liaise with the relevant data protection regulator such as the ICO, to ensure that it can properly and adequately satisfy itself that an ADSE can adhere to its obligations under protection laws. Therefore, we would suggest that the regulator would benefit from the publication of a code of practice or guidance from the ICO which specifically addresses such data protection matters in the context of ADSEs and AVs.* [DAC Beachcroft LLP]

> *It would be important for decisions of the regulator on such matters to align closely with the approach of the ICO to avoid an ADSE having to comply with divergent regimes simultaneously. It would seem beneficial to give further thought to how the regulator and ICO could cooperate to make best use of their respective resources and expertise in carrying out the assessment.* [Five AI]

M.83 KPMG thought that the obligation should not be confined to the GDPR but should "be extended to a broader set of data protection and security compliance requirements". KPMG provided a detailed list of issues to cover, based on its own Advanced Data Management (ADM) Framework. These included, among other things, "classification, retention periods, access and third-party legal disclosure obligations"; "how the organisation will enforce the data standards"; how it will "alert necessary bodies" in the event of data breaches; and mechanisms "to mitigate and manage unauthorised access".

M.84 Cycling Scotland agreed with our proposals but thought that privacy should not be at the expense of safety:

> *Although GDPR considerations are important, the primary consideration of any data system is how it can be used to protect human life and improve safety. Collecting accident rate data should enhance the evidence base, when captured alongside data from driver-operated vehicles*

M.85 Both HORIBA MIRA and Five AI thought that the ADSE should provide data protection information, but separately from the safety case:

Data management sits outside the scope of safety, and it would generally be different people with different expertise who are in a position to develop or scrutinise a data protection policy when compared to a safety case. It is therefore better to avoid conflating the two issues and to give each a separate focus within separate documents. [HORIBA MIRA]

M.86 Wayve agreed with our proposals but noted the challenges of processing personal data caught on video:

> *We anticipate that location data associated with recording images in public spaces will be challenging, where we will only be able to make reasonable steps to ensure we are able to meet rights to erasure.*

Concerns and disagreement

M.87 Burges Salmon LLP (who responded "other") raised three concerns with the proposal:

> *- such measures may not permit flexibility in the assessment compliance with UK GDPR and may have the unintended consequence of stifling competition in the market;*
>
> *- requiring a regulator to make this assessment will require the regulator to have access to legal and technical experts able to make this assessment;*
>
> *- a finding of adequacy by a regulator in categorising a vehicle is self-driving may be used as a 'defence' by an ADSE in in the event of a data breach which is investigated by the Information Commissioner. Essentially, our concern here is with a regulator being seen to validate or sign-off on an ADSE's data protection compliance.*

M.88 Similarly, the RAC Foundation thought that "the regulator should not have to shoulder the burden of establishing GDPR compliance – that should be a matter for the ADSE, and if found not to be compliant any liability should rest with the ADSE".

M.89 SMMT agreed with the first part of the proposal (that the ADSE should present the regulator with details of its data privacy strategy) but disagreed that the categorisation decision should depend on the regulator being satisfied with the contents:

> *It is rather confusing and slightly preposterous if we were to have an ADS categorised as not self-driving just because it did not satisfy the regulator regarding GDPR obligations.*

M.90 Oxbotica also disagreed on the basis that "data access parameters should be part of a regulatory standard". It commented:

> *The whole concept seems unworkable from a GDPR perspective. The regulator should specify exactly what systems the ASDE should have in place.*

Additional requirements

M.91 Some consultees suggested additional requirements. DPTAC thought that "it might also be useful to set out milestones to review how well each approach is working and accordingly, implement any changes which may be required".

M.92 The Faculty of Advocates thought that compliance extended beyond the GDPR. The measures should comply with the ePrivacy Directive, be proportionate in terms of ECHR Article 8 and not infringe ECHR Article 6.

FURTHER ANALYSIS OF DATA PROTECTION LAW AND AVS

M.93 As we explained in the Consultation Paper, "data protection and privacy" were specifically excluded from our terms of reference. Chapter 17 had a limited purpose, which was to consider what data would be required to make our proposals work.

M.94 The ICO pointed to many other issues which will need to be explored before guidance can be given on how to process the huge quantities of data AVs produce.

> *Automated vehicles pose particular challenges in relation to personal data, as often they will process the personal data of several individuals: owners, drivers, passengers and even pedestrians.*

M.95 The ICO raised questions about how ADSEs would identify "special category data", which involves distinguishing between "an inference and a factual record". They then asked "what anonymisation techniques will be used and how they will render personal data truly anonymous":

> *Consideration needs to be given to whether, via means reasonably likely to be used, individuals are identifiable as this would only constitute pseudonymisation, not anonymisation and would thus still be in scope of data protection legislation. True anonymisation is difficult to achieve and there needs to be a thorough and documented risk assessment of the risk of reidentification.*

M.96 The ICO also asked how privacy information would be given to individuals as "this is a fundamental right under the data protection legislation":

> *The provision of privacy information is particularly of importance in relation to automated vehicles as the data subjects may not be limited to the owner of the vehicle, but include other drivers and passengers as well as those whom are observed through sensor technology on the vehicle, such as pedestrians….*
>
> *The limited, and sometimes non-existent, physical interfaces on automated vehicles pose challenges when trying to inform data subjects about the use of their personal data.*

M.97 The Faculty of Advocates raised a specific concern about legally privileged data "where the vehicle is used by a solicitor or advocate in the course of his or her business or an individual in visiting his or her lawyer":

This is not, at root, a new problem, and has been considered by the CCBE in its Recommendations on the protection of client confidentiality within the context of surveillance activities and Recommendations on the protection of fundamental rights in the context of 'National Security'… However, the problem has hitherto manifested itself in more conventional contexts.