AUTOMATED VEHICLES
A response to the Law Commission Review from Cycling UK

PART A: INTRODUCTION

1. Cycling UK was founded in 1878 and has 65,000 members. Cycling UK's central mission is to make cycling a safe, accessible, enjoyable and 'normal' activity for people of all ages and abilities. It was previously known as the Cyclists' Touring Club, or CTC, the national cycling charity. Our interests cover cycling both as a form of day-to-day transport and as a leisure activity, which can deliver health, economic, environmental, safety and quality of life benefits both for individuals and society. We represent the interests of current and would-be cyclists on public policy matters.

2. We welcome the opportunity to respond to the Law Commission's inquiry. It has long concerned us that groups representing pedestrians, cyclists and other non-motorised users of roads (NMUs) have hitherto been routinely excluded from discussions over both the technology of automated driving and the associated regulatory frameworks. The automation industry, academics and (with one exception) Government have all consistently neglected to engage with organisations such as Cycling UK. We were evidently also omitted from the Law Commission's own pre-consultation discussions leading to the current consultation (see Appendix 2). This is despite the obvious need to ensure that automated and semi-automated vehicles respect the safety of NMUs, if their use is to progress beyond very controlled environments (e.g. dedicated tracks and possibly motorways). We hope the current consultation will now start to rectify this situation.

3. We summarise our key points as follows:

   - The evolution and progressive roll-out of automated and semi-automated vehicle technologies must be regulated in a way that maximises the safety of all types of road user, in accordance with the 'Safe Systems' and 'Vision Zero' principles of road danger reduction. Unfortunately, it will initially be easier for Automated Vehicles (AVs) to avoid collisions with other motor vehicles than with pedestrians, cyclists and other non-motorised road users (NMUs). Hence calls could be made to permit widespread AV use as soon as they are achieving a net reduction in road casualties, even though they may still be more dangerous to pedestrians, cyclists and other NMUs. Decisions on when and where to permit their use must reflect their safety impacts on these groups too.
   - At present, cyclists communicate with human drivers using eye contact and hand signals. Before AVs are permitted to share space with pedestrians and cyclists, it needs to be shown that they are highly reliable not only at detecting the presence of cyclists and other NMUs, but also at predicting their movements. Equally, the rules governing the interaction of NMUs and AVs should help improve the safety and convenience of walking and cycling – rather than suppressing them – in order to maximise their role in reducing congestion, physical inactivity, energy demand and other adverse environmental and safety impacts of the over-use of motor vehicles.
   - The riskiest step in the progression towards full automation is when vehicles reach the 'conditionally automated' stage i.e. when they are largely capable of steering, accelerating and braking, and avoiding other motor vehicles, but still need a human supervision in case danger arises. At this point, many drivers will find it very difficult to maintain concentration when the vehicle is largely 'driving itself', despite playing a potentially safety critical role. These vehicles should not be permitted for public use.
   - We therefore reject the option of allowing progressive advances in the AV technologies that are publicly available – i.e. the 'something everywhere' path to automation as described in the consultation document (though limited low-speed exceptions might be made, e.g. parking assistance). Instead, we should follow the 'everything somewhere' path, progressing straight from driving assistance systems (such as adaptive cruise control) to AVs which are 'highly automated' – i.e. those which can drive themselves for at least part of their journey (e.g. on motorways only) without needing supervision (i.e. they can also stop safely when required).
   - Use of these 'highly automated' vehicles should initially be permitted only on closed tracks, progressing to motorways and perhaps to trunk roads with high-quality separated cycle tracks.

- However the next step – allowing AVs to use roads and streets which are shared with pedestrians, cyclists and other NMUs – should only be taken after a period of several years in which 'highly' or 'fully automated' vehicles (i.e. those which can complete whole journeys safely without supervision) have demonstrated a very high level of reliability, not just in avoiding collisions with other motor vehicles, but also in avoiding unexpected hazards on motorways (e.g. people walking or standing on them following breakdowns, at roadworks etc). This period would also allow for a substantial build-up of AV use and ownership, such that by the time they were permitted on roads and streets shared with NMUs, the number of non-automated vehicles on our roads would be far lower than at present. This would help reduce the problems associated with the dangerous 'messy middle' phase, where semi-automated and automated vehicles would be sharing the roads both with human drivers and with NMUs.
- After careful and thorough testing, once the decisions are made to take these two steps (i.e. to authorise 'highly automated' vehicles for public use on motorways, then to permit fully automated vehicles onto other roads), these transitions should be made as quickly and as completely as possible, albeit with comprehensive monitoring during their early stages.
- The advent of automated and semi-automated technologies should be seen as an opportunity to establish a regulatory structure, covering both criminal and civil law, aiming at least to match the very high levels of safety that have now been achieved on our railways. This structure has to include: (a) an effective 'no blame' investigatory process for learning from any failings of automated and semi-automated vehicle technologies (comparable to that provided by the Rail, Maritime and Air Investigatory Branches); (b) the ability to issue product suspensions and/or recalls pending the outcome of safety-related investigations; and (c) very strong deterrent sanctions for both companies and individuals found guilty of wilfully abusing these technologies or the associated testing regimes. The AV technology authorisation body proposed in the consultation document could also fulfil some of the above functions – e.g. it could effectively be the Road Accident Investigation Branch now being proposed by the RAC Foundation and other road safety groups. However we believe it should not fulfil all of them – e.g. there should be clear separation between the bodies responsible for 'no blame' investigations and issuing sanctions.
- These technologies should also be seen as an opportunity to introduce new road rules or to ensure that existing rules are systematically respected, thereby reducing road danger for pedestrians, cyclists and other NMUs. The Highway Code should be amended to ensure a more equitable balance of responsibility between those road user-types which impose the greatest danger and those who are most endangered by others – with AVs being programmed to respect this. The need to mount pavements in emergencies should be strictly limited and progressively eliminated, as vehicles become increasingly reliable at anticipating each other's movements and car ownership declines (reducing parking pressures on narrow streets). New rules on who has priority at junctions should give greater safety and priority to pedestrians and cyclists at junctions. Speed limits should be consistently respected.
- The UK's laws on civil compensation should be amended to create an assumption that a pedestrian, cyclist or other NMU, who suffers injury or other damages in collision with a motor vehicle, is entitled to claim damages from the 'driver' (which in practice means their insurance scheme or, in the case of an AV, the vehicle's insurer), unless the victim is shown to have been at least partly at fault. This 'presumed liability' principle, which is normal in virtually every other European country, is necessary to prevent AVs from worsening the existing imbalance in UK civil law. At present, the onus is on injured pedestrians and cyclists – who may lack legal representation and who may also have no memory of the collision as a result of their injuries –to demonstrate that the driver was at fault. Moreover they routinely have to rebut unfounded claims of 'contributory negligence', e.g. that their injuries might have been reduced had they been wearing hi-viz clothing or a cycle helmet. Without these rules, injured victims could face additional hurdles due to the lack of clarity about whether their claim should be against the vehicle or the driver, and the possibility that 'advanced driving systems entities' (ADSE's, i.e. the manufacturers of vehicles and/or their automated driving systems, who are likely to be large multi-national corporations) may prove very determined not to admit to flaws in technologies that are worth billions of pounds in annual revenues. Withholding evidence from an investigation needs to carry very serious penalties.

A note on terminology

4. The Law Commission's consultation document recognises the need to clearly distinguish the terminology used for systems which provide 'driver assistance' only (which the document's glossary describes as referring to SAE Levels 1 and 2), 'conditional automation' (SAE Level 3) and 'highly' or 'fully' automated driving systems (i.e. SAE Levels 4 and 5 respectively), with only Levels 4 and 5 being described as 'automated vehicles' (AVs) with 'automated driving systems' (ADSs). However it then confuses matters by using the term 'driving automation' to cover the whole spectrum. In any case, there is also a need for terminology to describe both the systems and the vehicles themselves.

5. We have therefore added the term 'semi-automated' to refer to systems and vehicles across the range from SAE levels 1 to 3. We therefore use 'automated and semi-automated' to describe the full spectrum, in place of the confusing term 'driver automation'. Other terms, such as 'Automated Driving Systems Entity' (ADSE), 'minimal risk condition', 'Everything Somewhere', 'Something Everywhere', 'Operational Design Domain' (ODD) and 'user-in-charge' (UiC) are used in accordance with their definitions as given in the consultation document's glossary.

<table>
<tr><th>SAE Level</th><th>Single-tier terms</th><th colspan="2">Multi-tier terms</th></tr>
<tr><td>Level 1 – can control speed or direction but not both</td><td>-</td><td rowspan="2">Driver assisted (or Advance driver assisted system, ADAS)</td><td rowspan="3">Semi-automated (our term)</td></tr>
<tr><td>Level 2 – can control speed and direction</td><td>Partially automated</td></tr>
<tr><td>Level 3 – can perform dynamic driving task but requires human driver</td><td>Conditionally automated</td><td>-</td></tr>
<tr><td>Level 4 – can perform dynamic driving task and stop safely (i.e. does not need a human driver when in operation) but not for a whole journey</td><td>Highly automated</td><td colspan="2" rowspan="2">Automated (or automated driving system, ADS)</td></tr>
<tr><td>Level 5 - can complete a whole journey without need a human driver.</td><td>Fully automated</td></tr>
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PART B: GENERAL COMMENTS

6. In terms of increasing the convenience and safety of cycling, AVs could be a huge blessing or a terrible curse, depending on how the technology and the legislation governing it evolves:

   - *Viewed positively*: if people could summon a fully automated vehicle when they needed one, this could reduce demand for private car ownership. Given that the average car spends 23 hours a day stationary, this could free up vast amounts of parking space. Finally, space for cycle provision could be freed up thanks to AVs' ability to steer very precisely – following one another as if they were on rails.
   - *Viewed negatively:* Fully automated vehicles could massively increase car ownership if every child and adult were able to own one. Moreover, fears that pedestrians and cyclists could hinder the progress of AVs could result in new laws to 'keep them out of the way', reducing the freedom and flexibility of cycle and pedestrian movement, particularly on quieter and narrower streets and lanes. There is also the more immediate concern, already borne out by trials, that drivers of semi-automated and highly automated vehicles could become increasingly inattentive, relying on technology that is actually very unreliable.

7. There may come a time when fully automated AVs become more reliable than human drivers not only at detecting pedestrians and cyclists, but also at predicting their movements. At that point, Cycling UK is likely to take the view that we should switch as quickly and completely as possible to the use of AVs – alongside a rapid switch to the shared ownership of electric vehicles. The transition period should be as short as possible, given the problems of mixing semi-automated and automated vehicle technology with conventional human drivers.

8. Until then, however, Cycling UK would strongly resist the use of AVs on roads other than on motorways or to assist with parking. Also, given that today's cyclists communicate with human drivers largely through hand-signals and eye contact, an equivalent will need to be found before they can mix safely with driverless vehicles.

9. In the meantime, legislation is needed to determine criminal (as well as civil) liability in collisions involving AVs, e.g. where a driver puts an AV into self-driving mode in inappropriate circumstances (which need to be clearly defined), or fails to resume control when the vehicle indicates that driver intervention is needed.

10. These are some of the general concerns and problems that we feel must be taken into consideration in developing a new legal framework for AV technologies. We acknowledge that the Law Commission is not in a position to make decisions on issues of ethics - that is for politicians to decide. Nevertheless, the Commission is in a position to frame the paradigms of the debate and present different cases. To a large extent it has discharged that duty, but there are some key issues and questions which it has not addressed or put forward as options. These are discussed below, together with answers to the questions.

'Safe Systems' and 'Vision Zero'

11. We welcome the consultation document's statement in the introductory chapter (paragraph 1.4) that *"Our key objective is safety"*. With this in mind, we strongly advocate that the development of automated and semi-automated technologies should be guided by the 'Safe Systems' approach developed in Sweden in the 1990s, as part of the 'Vision Zero' aspiration to systematically drive out all sources of road danger. The 'Safe Systems' approach was adopted as the underlying principle of the UK Government's Road Safety Statement, *Working Together to Build a Safer Road Syste*m (2015).

12. The 'Safe Systems' approach rests on five pillars:

- Safe vehicles
- Safe roads
- Safe speeds
- Safe road use
- Safe post-crash response – including not only the roles of the emergency services but also the investigatory process to learn lessons from road safety failings, along with any proceedings in civil or criminal law.

13. The full implementation of the 'Safe Systems' approach should ultimately aim to reduce the risks of road travel to a level that is no greater than other parts of daily life, as all risks specifically associated with road travel have been successfully designed out.

14. At present though, the rate of death and injury for road users is far greater on the road network than on the rail network, let alone other areas of life. The risk of a fatality on Britain's roads over the past 10 years (2006-17) has been 2.3 deaths per billion passenger kilometres, down from 3.6 in the preceding 10 years. However, the fatality rate for the rail network has dropped from around 0.4 per billion passenger kilometres in 1996-7 to virtually zero in the past 10 years. There has not been a single fatality on Britain's railways due to a rail or train safety failure (i.e. excluding suicides, falls and trespass) since 2007.[1]

[1]: Calculated from Transport Statistics Great Britain (TSGB) 2007 table 1.7 and Reported Road Casualties Great Britain (RRCGB) 2017 table RAS53001 (passenger casualty rates by mode); RRCGB 2017 table RAS30060 (fatalities) and TSGB 2017 table 0101 (bn passenger km). 'Train fatality

15. This contrast is unsurprising, given the remarkably lax regulatory approach taken to road safety, as compared with rail, aviation or even workplace safety. Across the world, authorities grant licences to individuals based on a very short period of instruction and an often cursory and simplistic set of tests. They allow people to drive before they can vote, drink alcohol or get married, while the requirements for driver retesting are infrequent or non-existent. In Britain for instance, we allow drivers to self-certify that their health and eyesight is good enough to continue driving, even though it may have declined such that they are a serious risk to themselves and other road users.

16. Similarly, we routinely overlook offences or breaches of safety standards, or hand down very light penalties, when committing their equivalents in workplaces or on our rail or airborne transport systems would attract immediate loss of employment and/or custodial sentences. Of the hundreds of thousands of crashes resulting in injury and death annually, only a few thousand cases are ever prosecuted. There are a whole range of physical, social, cultural and political factors which have long constrained policy-makers' ability to regulate road safety effectively.

17. Yet the burden of lax approach to safety regulation falls disproportionately on pedestrians, cyclists and motorcycle users, all of whom have markedly higher rates of injury and fatality compared even with other road users[2], let alone with rail travel and other aspects of our lives. It is therefore hardly surprising that people are deterred from walking and cycling, despite their very significant net benefits for people's health. These benefits alone substantially outweigh the risks, adding significantly to one's health, well-being and overall life expectancy.[3] This is before any account is taken of its wider benefits, both for the individual (e.g. cost-savings, convenience and time-savings in many situations, and quality of life benefits) and for society (reduced congestion and more efficient use of space, along with reduced road danger, pollutant and greenhouse gas emissions and physical inactivity, with all their associated costs in terms of healthcare and absenteeism).[4]

Well-regulated road safety: an opportunity for a fresh start

18. AVs are often proposed as a potential contributor to the first pillar of the aforementioned 'Safe Systems' approach, i.e. safe vehicles (see paragraph 12 above). However this assumption relies on the other pillars also being in place, particularly the fifth one (i.e. safe post-crash response). The Law Commission's current review provides a hugely important opportunity to put in place an investigatory and legal framework that supports progress towards a zero casualty future, rather than one that is simply marginally better than that which we currently endure.

19. Media coverage of the first few crashes involving existing AV technology suggests that people are currently a lot more willing to accept tough regulations to ensure that these new technologies are introduced and used safely. However there is also a risk that, over time, the toll of deaths associated with AVs will gradually become as widely accepted as it now is with conventional motor vehicles, i.e. as an inevitable (if regrettable) cost of the convenient mobility that motorised road transport provides.

20. The advent of AVs should therefore be seen as a hugely important, but time-limited, opportunity to overcome society's passive acceptance of the dangers encountered on our roads, particularly by pedestrians, cyclists and other NMUs. Specifically, it is an opportunity to develop safety regulatory frameworks equivalent to those governing rail, maritime and aviation safety.

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[2] See https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/743658/ras30070.ods.
[3] See www.cyclinguk.org/sites/default/files/document/2017/09/health_1c_rv_brf.pdf.
[4] See also www.cyclinguk.org/sites/default/files/document/migrated/info/nat-trnspt-policy1abrf.pdf and www.cyclinguk.org/sites/default/files/document/migrated/info/economy1fbrf.pdf.

21. There are lessons to be learnt from the setting-up of the Rail Accident Investigation Branch (RAIB). It was a recommendation of the Cullen Review, following a spate of rail fatalities in the 1980s and 1990s, culminating in the Ladbroke Grove crash in 1999. The necessary legislation was passed in 2003, a European Directive gave it further impetus in 2004 and it began work in 2005.[5]

22. In the four years preceding the RAIB (2001/2 to 2004/5), there had been 18 rail movement fatalities, with another two in 2006/7. Since then, there has only been one rail movement fatality.[6] The Cullen Review's aftermath has also seen a dramatic and steady fall in the annual number of 'potentially high-risk train accidents' (PHRTAs) - from 69 in 2001/2 to 22 in 2016/17.[7]

23. The RAIB, and its aviation and maritime equivalents, all have the following key characteristics:

- They are independent of any organisation responsible either for delivering services or for regulation or enforcement of safety rules;
- They are staffed by experts;
- They have statutory powers, setting out what types of incidents must be notified to them, and enabling them to require the provision or seizure of evidence;
- Their investigations are carried out on a 'no blame' basis;
- Their investigation findings are made public.

24. We therefore propose that whatever body is tasked with authorising new ADS technologies should also play a role in monitoring and regulating their safety in use, and should have powers to impose product suspensions or recalls as required. It could also be charged with bringing prosecutions for negligent or wilful safety breaches, and with enforcing sanctions. It could alternatively be charged with conducting 'no blame' investigations. However we suggest it should not fulfil both these functions. Of these two options, the former is probably preferable, with a separate body carrying out investigations.

25. We recognise that privacy issues may make it impossible to publish the findings of investigations into road collisions ahead of possible court proceedings (given that the fault may lie with private citizens), as would normally happen with rail, aviation and maritime investigations (which generally involve the employees of public transport providers). Nonetheless, the lessons from the investigations themselves should still be circulated to help inform the practices and priorities of the automotive industry and the road safety profession.

New rules, new safety standards

26. The consultation document includes various questions on whether a new 'digital Highway Code' is needed, whether AVs should be judged by different standards from human drivers (in both civil and criminal law) and whether AVs should be allowed to break various road traffic rules. Our responses to the specific questions asked are given in Part C of this response. However we wish to make some general observations at this point.

27. The first follows on from our earlier point about the need to seize the opportunity presented by AVs for a substantial improvement in road safety standards. We believe it is essential that AVs are held to higher standards. Before AVs are allowed to share streets with pedestrians, cyclists and other NMUs, they need to be demonstrably better not only at avoiding collisions overall, but specifically at avoiding collisions with pedestrians, cyclists and other NMUs. AVs may get to a point where they are better than human-drivers at avoiding collisions with other vehicles, yet their rates of involvement in injuring NMUs may still be a lot worse. They should only be allowed

[5] See www.pacts.org.uk/wp-content/uploads/sites/2/TSC-1-RAIB-020.pdf and www.pacts.org.uk/wp-content/uploads/sites/2/170317-RTA-conference-slides-RAIB-Simon-French-final.pdf.
[6] www.gov.uk/government/statistical-data-sets/rai05-rail-accidents-and-safety#table-rai0502.
[7] www.gov.uk/government/statistical-data-sets/rai05-rail-accidents-and-safety#table-rai0503.

to share roads or streets with NMUs once they are better than human drivers at avoiding collisions with pedestrians, cyclists and other NMUs, as well as with other motor vehicles.

28. Viewed positively though, AVs could present real opportunities to significantly improved safety for all road users, providing they are well regulated. There needs to be an assumption that they will adhere to speed limits. There needs to be clarity over who has priority over whom at junctions – the current Highway Code is lamentably unclear on this. The Government has already announced plans for a revision of the Highway Code, aimed at improving pedestrian and cycle safety. This should be conducted with an eye to the future roll-out of AVs.

29. Protecting more vulnerable road users should be a fundamental principle of how automated driving systems are designed and regulated. They should categorically not be permitted to endanger vulnerable road users in order to avoid collisions with other motor vehicles: they should stick to speeds which avoid the need ever to do this. Over time, as AV's become the norm, they will no longer need to swerve or mount pavements to avoid the errors of human drivers. They will also know when they need to wait in passing places for oncoming AVs on narrow streets or lanes, and how to avoid obstructing emergency vehicles (which will also be automated). Once the technology reaches this point, AVs should not need to 'break the law' at all.

30. Conversely, if our laws end up treating AVs as leniently as human drivers when they endanger pedestrians, cyclists and other NMUs, then the makers of automated driving systems will programme them accordingly. This would lead to road safety for NMUs being further undermined, thereby worsening our public health, the congestion on our streets, and the adverse environmental impacts of excessive motor vehicle dependence. It should be strongly avoided.

Routes to automation: 'Everything somewhere' or 'something everywhere'?

31. The consultation document makes a clear distinction between true 'automated vehicles' (SAE levels 4 and 5, where the vehicle can legally 'drive itself') and 'driver assistance' systems (where a human driver is needed – paragraph 3.84 indicates that this term can include vehicles up to SAE level 3). It also describes two pathways towards full automation, referring to these as the 'something everywhere' and 'everything somewhere' pathways (see paragraph 2.44). The 'everything somewhere' pathway is based on the roll-out of vehicles which are capable of highly or fully automated driving, progressively increasing the range of locations where their use is permitted (e.g. initially on closed tracks, progressing to motorways, and only later to situations where they would regularly share road-space with pedestrians, cyclists and other NMUs).

32. By contrast, the 'something everywhere' pathway could require humans to play a safety-critical role in monitoring SAE Level 3 and even potentially Level 4 vehicles (as paragraph 2.43 of the consultation document makes clear). We believe this should be ruled out categorically, on safety grounds. As noted in that paragraph, the 'something everywhere' pathway will involve *"highly automated vehicles … mov[ing] in and out of their operational design domains, passing performance of the driving task back and forth between humans and machines".* We believe this approach is dangerous, given all the problems of automation complacency and automation bias described in Chapter 4 and Appendix 3. The need for a 'fallback-ready user' to drive the vehicle (as required at SAE Level 3) should be avoided altogether.

33. We are therefore alarmed at the consultation document's statement (at paragraph 2.47) that: *"In this paper we strive to treat both paths equally,"* adding that *"The merits of the technology should determine its development path, not regulatory intervention."* We believe this approach is profoundly at odds with the document's introductory statement that *"Our key objective is safety"*.

34. It will be clear that our very strong preference is for the 'everything somewhere' pathway. As paragraph 2.42 indicates, it is much more closely aligned with the provision of 'Mobility as a

Service' (MaaS), with its potential to reduce private car ownership at the same time as increasing access to cars for those who are currently unable to drive (e.g. people with disabilities).

35. We therefore propose that AVs should initially be permitted only on closed-road situations (e.g. shuttle services), progressing in time to motorways, and potentially to trunk roads which have adjacent cycle tracks of a sufficient quality that nobody would wish to use the road (n.b. cycle tracks of this quality are regrettably very uncommon in the UK, however the design standards and funding being put in place by Highways England now give us hope that this will change in the coming years).

36. However, the next step – i.e. allowing them to share roads or streets with pedestrians, cyclists or other NMUs – should not be taken until several years' worth of safety evidence has been gathered nationally and internationally, that clearly demonstrates not only that the technology is very safe for avoiding collisions between motorised vehicles but also for avoiding collisions in more unusual situations (e.g. with people who are outside of vehicles due to breakdowns, carrying out roadworks etc).

37. That wait of several years would also allow a significant build-up of AV ownership, with a growing proportion of the vehicle fleet being capable of operating at SAE level 5. Before permitting the public to use them as level 5 vehicles though (i.e. to share roads and streets with NMUs), there would need to be an initial phase during which these 'level-5-compatible' vehicles could be trialled on shared roads and streets, albeit under the control of highly-trained 'users-in-charge' (who would need to be as capable as train-drivers and aircraft pilots at maintaining concentration during long periods of inactivity, while being ready to think and act quickly in emergencies).

38. Once the decision was taken that it was safe to allow the public at large to use these vehicles on local roads, streets and lanes, a large proportion of the vehicle fleet could then be re-programmed within a few months to operate at SAE level 5 (i.e. without a user-in-charge). In this way, the duration of the dangerous 'messy middle' phase (where AVs would be mixing with both human-driven vehicles and NMUs) would be minimised as far as possible. However the safety of this roll-out would need to be monitored very carefully.

Assisted driving systems: politics versus safety?

39. Assisted driving technologies (SAE Levels 1 and 2) are principally designed to enhance and improve the driver experience, easing the more tedious aspects of the driving task, principally on restricted, multi-lane roads. At present, the safety benefits of assisted driving systems (such as lane departure warnings/prevention, lane change and low speed automated parking) are likely to be very limited, while potentially creating new risks that might well outweigh any such benefits.

40. These disbenefits could become particularly acute as the technology progresses to SAE Level 3 (conditional automation), for the reasons outlined in paragraph 3.7 and Appendix 3 of the consultation document. As paragraph 3.19 correctly observes:

"Research shows that automation reduces human ability to perform the same tasks. The greater the level of automation and the greater the human dependence on automation, the greater the problems when the system fails and the human is required to resume manual control."

41. Hence our alarm at the Law Commission's 'even-handed' approach to the two pathways, given that the use of SAE level 3 (and even possibly level 4) vehicles on the 'something everywhere pathway could still involve human drivers needing to take over at short notice on a regular basis, potentially in safety-critical situations.

42. We fear that this perspective may reflect political pressures, partly to maximise the contribution that automated and semi-automated technologies could play in the Government's Industrial Strategy, partly because of the convenience these systems could provide for users. Specifically

we fear that pressure could be brought to bear to allow the deployment of conditionally and highly automated vehicles as soon as they are found to be delivering a net reduction in total road collisions. This could be seriously detrimental to the safety of pedestrians, cyclists and other NMUs, given that semi-automated and highly-automated technologies are initially likely to be far better at avoiding collisions with other motor vehicles than with other road users. So far, automated and semi-automated systems are still struggling even to reliably detect the presence of pedestrians and (particularly) cyclists, let alone to predict their movements.[8]

Sanctions for automated driving systems (AV) operators

43. Even if the legal framework requires operators of AV systems to be legally compliant at all times, it is likely that infringements will still occur, either due to errors in software, sensor failure, hacking or the type of test-cheating already observed as commonplace in the diesel emissions scandal.

44. Chapters 7 and 8 set out a proposed framework for enforcing the law through fines, sanctions or the withdrawal of approval. We are concerned that this is an inadequate safeguard for the very high risks that might accompany the use of millions of moving vehicles in urban areas.

45. We strongly agree with the statement that, in the absence of a human operator, there lies an accountability gap (paragraph 7.117). New offences must be created to put significant penalties - including potentially imprisonment - on the individuals responsible for the operation and development of AV systems.

46. Furthermore, the larger the operator, the less likely a threatened withdrawal of AV approval is likely to be acceptable politically. Dangerous systems might be allowed to continue to operate because they serve crucial mobility links, or are built into critical public services.

47. A potential risk with AV technology is that, as new technologies are rolled out, individuals and the economy as a whole could rapidly become very dependent on them. It is therefore crucial that system upgrades and other technological advances are monitored very carefully in the aftermath of their roll-out, so that any bugs are identified as quickly as possible, to minimise the risk of having to impose substantial system shut-downs when safety-critical flaws are identified.

48. For its part, the bodies responsible for regulating AV technology will need to have a very clear safety focus, and to be independent of political pressures, so that they can impose safety measures, including suspensions or recalls, as required. Slow-running is a common precaution on the rail network (e.g. when there are signal system faults or bridge strikes) and total system shut-downs happen with aviation (e.g. following the eruption of the Eyjafjallajokull volcano in 2010, or the recent suspected drone activity at Gatwick), even though they can cause massive inconvenience to businesses and the public.

49. There needs to be an acceptance that similar interventions may occasionally be necessary for AV systems (although steps should clearly be taken to minimise these) – along with an open discussion of the risk thresholds for deciding when to impose them. What is clear though is that whatever body is charged with maintaining and regulating the safety of AV systems, they will need to be free of political interference in order to maintain a clear focus on safety.

Over-riding the system

50. One of the issues discussed in the paper is the interaction between vehicles and pedestrians in situations where both have right of movement, but where this must be negotiated.

[8] See https://arstechnica.com/cars/2018/07/new-software-gives-self-driving-cars-intuitive-understanding-of-pedestrians and https://spectrum.ieee.org/cars-that-think/transportation/self-driving/the-selfdriving-cars-bicycle-problem.

51. As a thought experiment, consider the example of Oxford Circus, or a similar junction where high levels of motor traffic have to negotiate through a junction with very high levels of pedestrians traffic. At the end of the pedestrian phase in the signal pedestrians might still be crossing as the signal turns green for motor traffic. More pedestrians are already standing on the road edge waiting to cross. A system erring on safety would proceed cautiously, and would be unlikely to proceed through the junction at full pace. This might result in the deterioration of the junction capacity below the level that becomes politically acceptable.

52. Similar problems could arise where a group of people was obstructing a vehicle (or indeed a queue of vehicles), perhaps because they wished to cause trouble, but possibly because they were part of a much larger crowd and were genuinely unable to move out of the way. Equally, there might be a crowd surrounding someone lying in the road with serious injuries, who could not be moved safely.

53. We therefore strongly disagree with the Law Commission's suggestion (made in paragraph 9.56) that AVs should be permitted to 'edge forward' through pedestrians, given the range of situations in which they might cause very serious injuries by attempting to do so. An AV's operating system is very unlikely to have the same ability as a human driver to judge whether there was a good reason why people in the vehicle's path were unable to move.

54. Rather than allowing AV systems to make this kind of decision, a better rule might be to allow a qualified driver inside an AV to over-ride the vehicle's automated driving systems, but in exceptional circumstances only – analogous to pulling the emergency cord on a train – provided also that they were in a fit state to drive. The vehicle would only be able to move slowly, the driver's actions would be subject to close monitoring (including live video transmission showing an AV control centre what was happening both inside and outside the vehicle, allowing an operator to intervene if need be), and they could face serious sanctions for abuse. If there was no qualified driver in the vehicle who was able to take control in this way, the occupants of the vehicle would need to call for assistance from an operator in the control centre.

The Terms of Reference

55. These are as follows:

(1) who is the 'driver' or responsible person, as appropriate;
(2) how to allocate civil and criminal responsibility where control is shared between the automated driving system and a human user;
(3) the role of automated vehicles within public transport networks and emerging platforms for on-demand passenger transport, car sharing and new business models providing mobility as a service;
(4) whether there is a need for new criminal offences to deal with possible interference with automated vehicles and other novel types of behaviour; and
(5) the impact on other road users and how they can be protected from risk.

56. Although we note that (5) includes the impact on other road users of automated vehicles, there is relatively little consideration taken of this in the document, and no discussion of the current inequalities in road safety, whereby those road-user types who impose the greatest danger on others are least vulnerable, and vice versa. Rather than adopting a 'Safe Systems' approach, the road safety profession has a long history of preferring to make the most vulnerable road users (including children, people with disabilities etc) responsible for avoiding the dangers imposed on them by the most dangerous vehicles – e.g. to be trained and to adapt to the flaws in the systems – rather than designing systems to be capable of accommodating human errors.

57. We therefore urge the Commission to go beyond simply acknowledging that its key objective is safety, and to explicitly adopt the Safe Systems approach, prioritising the reduction of danger.

PART C: ANSWERS TO SPECIFIC QUESTIONS

Chapter 3: human factors

Q1. Do you agree that:

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

58. This question is paradoxical. It asks whether we think AVs should have a user-in-charge (UiC) except where they have been authorised not to have one. To answer this question effectively one would need to know under what circumstances authorisation not to have a UiC is granted, and what the consequences of doing so might be, and how UiCs gain their status.

59. We assume that the need for a UiC arises with highly automated vehicles (i.e. SAE Level 4), whereas the 'specific authorisation' mentioned in the question would be provided for fully automated vehicles (i.e. SAE level 5), or possibly for Level 4 vehicles that are only intended for use on closed circuits (i.e. where they cannot exceed their 'operational design domain' ODD). The ODD for SAE level 4 vehicles should be such that they can normally give the UiC plenty of warning before reaching the limits of their ODD, and to come to a 'minimal risk condition' safely if the UiC fails to take over.

60. The need for the vehicle to hand over at short notice should therefore be exceptional only, e.g. when the system breaks down or in some other emergency. Hence our preference for the 'Everything Somewhere' pathway (see paragraphs 31 to 34), in which the normal limits of a vehicle's ODD are geographic (e.g. they are reached at a motorway junction) rather than technical (e.g. they are reached when the road or traffic environment changes).

61. On these assumptions, we would agree with the premise of the question. However we would also argue that, for such vehicles, UiC should only be able to resume manual control of a level 4 AV when it is approaching the limits of its ODD (e.g. when it is about to leave a motorway), or when the system fails or similar exceptional emergencies, analogous to pulling the emergency cord on a train. These should trigger an alert to a control room, who would be able to see via video what was happening, and intervene if required (for more on this, see our earlier comments in paragraphs 51 to 54). Improper decisions to over-ride the automation systems of Level 4 and Level 5 vehicles should incur serious penalties.

62. Conversely, if SAE level 4 AVs are to be authorised under the 'something everywhere' pathway (i.e. if it is harder to foresee when the vehicle might reach the limits of its ODD, and there is a greater likelihood of it doing so with limited warning and/or in an emergency), measures would need to be put in place to address the problems set out in paragraphs 3.7 - 3.8 and Appendix 3. In these circumstances, we believe UiCs would need to be trained and tested to significantly higher standards of skill than for normal drivers. These would include the ability to remain alert and ready to make safety-critical interventions after prolonged periods of inactivity, in a manner similar to train drivers or aircraft pilots.

63. The other examples given, such as a UiC being responsible for ensuring that children are wearing their seatbelts or that collisions are reported to the police, could, we imagine, be resolved using technology, which would be a safer means to ensure legal compliance. Already most vehicles detect where seat-belts are not being used, for instance.

64. We agree though that it should not mandatory for a UiC to be present in AVs that are approved to operate at SAE level 5. This would undermine some of the most significant equity benefits associated with AVs, namely the opportunity for them be used by older people, people with disabilities and others who cannot hold driving licences.

(2) The user-in-charge: (a) must be qualified and fit to drive; (b) would not be a driver for purposes of civil and criminal law while the automated driving system is engaged; but (c) would assume the responsibilities of a driver after confirming that they are taking over the controls, subject to the exception in (3) below?

65. We agree, subject to the same conditions and caveats outlined in response to part (1) of this question. We reiterate that UiCs would need to be qualified to higher standards than conventional drivers if they are to take charge of SAE Level 4 vehicles under the 'Something Everywhere' pathway (which we believe should be avoided).

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

66. We largely reject the premise of the question, namely that this situation could arise in situations such as that described paragraphs 3.49-3.50 (i.e. where an AV edges forward through a crowd of pedestrians, causing injury). Our answer to question 42 is that automated vehicles should not be able to do this – again, see our earlier comments in paragraphs 51 to 54. Responding to human obstructions should require human intervention, given the need for judgement on why the situation had arisen and the best way to respond to it. If done by the UiC (as might occasionally be necessary in emergencies), strict controls and sanctions should be in place to prevent abuse of this process.

67. We recognise that, however rigorous the testing and approval processes for automated driving systems, they may sometimes make misjudgements, particularly in the early stages of the technology's development (not least while significant numbers of non-automated vehicles are still using the roads). Equally the system might fail or be compromised by the malevolent actions of a third party.

68. If an AV causes danger in these circumstances, we agree that the vehicle (rather than the UiC) should be legally regarded as having been 'driving' the vehicle at the time. Such misjudgements and system errors should be reported and investigated on a 'no-blame' basis (at least as the starting assumption). Meanwhile the regulatory body should consider whether a system shut-down, a product recall or other precautions are needed while the problem is investigated and fixed.

69. At the same time, there should still be a legal obligation for UiCs to be able and ready to resume control when needed. It should be an offence to fail to resume control, or to respond safely, if a competent and attentive UiC in the same circumstances (i.e. someone who was able and ready to resume control of the vehicle in a 'normal' hand-over situation) could have been expected to recognise the danger, take control and avoid that danger.

70. The above paragraph is carefully worded. We seek to avoid creating any assumption that a UiC is expected to provide a back-up safety system and respond quickly, thereby creating an expectation that SAE Level 4 systems could be treated SAE as Level 3 systems – a concern which is rightly expressed in paragraph 3.54 of the consultation document. Primary responsibility for safety should rest unequivocally with the automated driving system when the vehicle is driving itself. Any liability on the UiC should be secondary, and should arise only if they were unable or unfit to resume control of the vehicle even in a 'normal' hand-over situation.

Q2. We seek views on whether the label "user-in-charge" conveys its intended meaning.

71. We agree that 'user in charge' is a reasonable term to describe the role of someone who is not 'driving' a SAE level 4 vehicle at a given moment, but who is legally obliged to be fit and qualified to take over the driving task at any moment (i.e. when it reaches the limits of its ODD).

72. However, if the term is to be used by the public, we wonder if 'pilot' might be a preferable alternative. Although the role is not the same as an aircraft pilot (and is certainly different from a ship's pilot), there are certain similarities. Aircraft pilots spend a significant amount of time simply monitoring the machines they are in charge of, but must intervene for take-off and landing. (N.B. the key difference is that, unlike a train driver or airline pilot, we do not believe UiC's should be expected to intervene in emergencies. They should be ready to resume control in planned hand-over situations, and might arguably face sanctions if they failed to avert danger because at the time they were unprepared or unfit to resume control even in a 'normal' hand-over. But they should not be expected to perform the safety-critical role of a 'fallback-ready user'. This is also why we do not think SAE level 3 vehicles should be approved for public use at all.)

Q3. We seek views on whether it should be a criminal offence for a user-in-charge who is subjectively aware of a risk of serious injury to fail to take reasonable steps to avert that risk.

73. As above, we agree with the view set out in paragraphs 3.54 - 3.56, that it would be dangerous to expect UiCs, who may not be paying attention, to make safety-critical interventions in emergencies. SAE level 4 systems should be fail-safe and be able to revert to a minimal risk condition without needing human intervention. The expectations on UiCs in such vehicles (both in practice and in law) should be simply that they are able and ready to resume control of the vehicle in a normal hand-over situation.

74. Hence a UiC should only face criminal sanctions if they failed to act when a competent UiC, who was able and ready to resume control, would have been expected to perceive the danger (despite possibly being engaged in another activity immediately beforehand), take control and avert it. Any emergency interventions made by a UiC, and the reasons why they had been necessary, should be carefully investigated afterwards, with serious sanctions available for making them improperly. As the technology becomes increasingly reliable, the ability to intervene in emergencies should be withdrawn, once it becomes clear that AVs' systems are more reliable in emergencies than the actions of humans.

Q4. We seek views on how automated driving systems can operate safely and effectively in the absence of a user-in-charge.

75. We believe that for vehicles to be classed as fully automated (SAE level 5), they should be able to navigate safely around the public road network and proceed cautiously on private land without the need for a human driver. As the consultation document notes, this is the point at which they become useable by people of all ages and abilities.

76. The easiest option is that set out in Paragraph 3.66 of ensuring that the vehicle operators have the means to remotely assist the vehicle and take control in the event of a software problem, or failure due to weather or malevolent action (e.g., purposefully damaging sensors). Without this, the vehicles will not be fully accessible to those without driving licences.

77. An exception might be to permit a qualified driver in a SAE level 5 vehicle to operate it at very low speeds, either in off-road settings or to move it to safety following an emergency – subject to monitoring by a remote control centre, who could intervene if need be, either to assist or to prevent abuse of this over-ride function. Such a control centre would in any event be needed if AVs are to be useable by people of all ages and abilities, or to operate with nobody in them (i.e, in Mobility as a Service applications).

Q5. Do you agree that powers should be made available to approve automated vehicles as able to operate without a user-in-charge?

78. We strongly agree that it will ultimately be desirable to be able to approve vehicles as being fully automated (i.e. SAE level 5). It is only by reaching SAE Level 5 automation that AVs can deliver

the benefits of being accessible to people who cannot drive, and helping reduce the need for private car ownership (through their use in MaaS applications). These benefits cannot be realised until AVs are freed of the requirement to have a UiC while in operation.

79. As noted above, the best back-up for situations when AVs cannot drive themselves (e.g. system breakdowns, extreme weather and limited off-road driving) is that suggested in para 3.66 and 3.74, i.e. using a remote operator to guide the vehicle away from traffic if it gets into difficulties. It is only by having a remote control function that AVs could deliver these wider benefits.

Q6. Under what circumstances should a driver be permitted to undertake secondary activities when an automated driving system is engaged?

80. This is a worryingly sloppy question - what is a 'driver' in this context? We are under the impression that 'drivers' will no longer be classified as such when an automated driving system is engaged.

81. If the question refers to 'drivers' of SAE level 3 vehicles, we do not believe that 'drivers' (as distinct from passengers/UiCs in level 4 and above Autonomous Vehicles) should be permitted to undertake any secondary activities. Level 3 vehicles are seen by many experts, including vehicle manufacturers, as highly risky, for the reasons set out in detail in the Law Commission's paper, particularly Appendix 3. It is vitally important that any proposed changes to the legal framework prevent or place highly significant safeguards on the use of all 'semi-automated' vehicles (i.e. those up to level 3).

82. Already secondary activities are worryingly commonplace in level 1 vehicles. Changing the law to permit this in certain circumstances will lead to a further degrading of driver behaviour as 'safety' benefits from level 2 vehicles lead naive drivers to feel it is safe to take their attention off the road. Enforcement of mobile phone use will become harder if it is legal in some vehicles at certain times, while remaining illegal in most others, as (presumably) it will be hard to tell from outside the vehicle what form of automation or semi-automation is in operation.

83. One option might be to require 'semi-automated' vehicles to include systems to monitor the driver for awareness and engagement, such as a combination of eye-tracking and hands-on-the-wheel technologies. This approach has already been suggested by some companies.

84. If, on the other hand, the question is intended to refer to the UiCs of SAE level 4 vehicles, the idea of permitting them to engage in secondary activities is far less problematic, at least in principle. In principle though, more research is needed into what kinds of distraction activities are most likely to ensure the driver remains ready to resume control, rather than drowsing off.

Q7. Conditionally automated driving systems require a human driver to act as a fallback when the automated driving system is engaged. If such systems are authorised at an international level:

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

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

85. See above. Conditionally automated systems require the sharing of control between a supervising driver and the driving assistance system, a hugely risky situation which should not be permitted. 'Drivers' of level 1 to level 3 vehicles should not be permitted to undertake other activities.

Chapter 4: regulating vehicle standards pre-placement

Q8. Do you agree that:

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

86. Our answer is “yes” on both points, as long as the issues raised in 4.45 - 4.49 can be resolved (i.e. that the authorising authorities can be adequately equipped and resourced to fulfil these roles).

(2) unauthorised automated driving systems should be prohibited;

87. Yes. Allowing unauthorised automated driving systems would appear to be directly contrary to the direction of Government policy as set out in the AEV Act 2018, and put road users at risk with no adequate legal safeguards. We cannot rely on the market to provide safe systems in an environment in which it has - and continues to have - a demonstrably abysmal record, involved in killing and injuring tens of thousands of people annually in this country alone.

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

88. Yes. The aim should be to bypass SAE level 3, hence anything which enables progress towards zero-human vehicles should be enabled.

Q9. Do you agree that every automated driving system (ADS) should be backed by an entity (ADSE) which takes responsibility for the safety of the system?

89. Yes. However, as noted in paragraphs 23 and 24, the regulatory system governing the role of ADSEs also needs to include the following functions (all of which need to be conducted free of political interference):

- The conduct of transparent ‘no blame’ investigations of safety failures involving AV technologies;
- The ability to impose product suspensions and recalls while investigations are conducted; and
- The ability to impose serious sanctions if evidence of culpable negligence or willful wrongdoing emerge from these investigations.

90. It remains to be seen whether the approach adopted in Australia of having an ‘authorised person’ nominated to hold the legal responsibility will really be adequate.

Q10. We seek views on how far should a new safety assurance system be based on accrediting the developers’ own systems, and how far should it involve third party testing.

91. Given the history of the current testing regime, adequate third party testing is likely to be needed. Such testing will, of course, need to assess software updates, as these are likely to be just as safety critical as the initial hardware systems. The graduated system suggested by RAND Corporation (4.116) might prove beneficial to assist and equip the regulatory agency with gradually improving its understanding of the systems. However, where we disagree with the RAND Corporation (as discussed below) is that these systems need only be slightly safer than human driving standard to permit their use on the roads.

Q11. We seek views on how the safety assurance scheme could best work with local agencies to ensure that it is sensitive to local conditions.

92. We agree that local agencies are likely to have a crucial role in two respects:
    - Creating early testing grounds for AVs.
    - In future, limiting access to their environments for human controlled vehicles.

93. Under the first of these criteria, we fear that the promise of investment or job creation may lead to local agencies welcoming technology developers to test under-developed systems in sub-optimal operational design domains on their networks, potentially placing other road users at risk. We have already seen examples of this occurring in the US, where different states have offered lower regulatory hurdles to encourage companies to transfer their business. Uber, for instance, moved some of their testing teams to Arizona to take advantage of a more relaxed regulatory environment. One of their vehicles was later involved in killing a pedestrian.

Chapter 5. Regulating safety on the roads

Q12. If there is to be a new safety assurance scheme to authorise automated driving systems before they are allowed onto the roads, should the agency also have responsibilities for safety of these systems following deployment?

94. Yes. These systems will likely have continually updated software. We therefore expect the regulatory agency will need to have access to results of testing (and test themselves) for each update of the software to ensure vehicles are minimal risk capable. As discussed below, the agency with responsibility for this area must have the legal right to be able to access data and software from vehicles to be able to determine the safety of these systems on a dynamic basis.

If so, should the organisation have responsibilities for:

(1) regulating consumer and marketing materials?

(2) market surveillance and product recalls?

(3) roadworthiness tests?

95. We would certainly agree that the body tasked with approving AV systems should also be tasked with regulating associated consumer and marketing materials. There is a good case for this body to be responsible EITHER for collision investigations OR for conducting roadworthiness tests, for market surveillance and product recalls, and indeed for investigating any suspected instances of culpable negligence or wilful malpractice, and for enforcing sanctions.

96. It could be argued that one body should fulfil all regulatory functions relating to AV (and indeed ADAS) technologies, so as to concentrate expertise in one body. On balance though, experience of the Rail Accident Investigation Branch suggests that it is probably preferable to have one body carrying out collision investigations while another carries out all other regulatory roles.

97. We therefore tend to the view that the approval of systems, the regulating of consumer materials and the conduct of roadworthiness tests should be fulfilled by the Driver and Vehicle Standards Agency, or a body like it with an expanded remit. It could also be responsible for investigating culpably negligent or wilfully-committed breaches of safety by ADSEs or their employees, and for enforcing sanctions. Crash investigations would then be done by a separate Road Accident Investigation Branch. Cycling UK shares the belief of many road safety organisations that this body needs to be created anyway. It could play a very useful role in ensuring the safe roll-out of automated and semi-automated vehicle technology, by ensuring that all road crashes involving these vehicles are investigated as thoroughly as happens with rail accidents.

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

98. Yes – whatever organisational structures are put in place to regulate AV technologies should regulate ADAS systems too. As outlined extensively above and in the Law Commission's paper, the most serious threats to safety come from ADAS and problems with automation complacency. Once again, given the fact that elements of ADAS are already in place in some vehicles (whereas AV technology remains far more limited), it is crucial that a legal framework be put in place as soon as possible. The AV industry needs to become accustomed to high regulatory standards from the outset, in order to achieve far better road safety outcomes than we have at present.

Q13. Is there a need to provide drivers with additional training on advanced driver assistance systems?

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

99. We do not believe that voluntary training should be relied on to manage the possible risks associated with new technologies. As argued elsewhere in this submission (and indeed in Chapter 4/Appendix 3 of the consultation document), SAE level 3 vehicles in particular are likely to induce driver over-reliance and automation complacency. Yet these risks are unlikely to be solved by training because, by their very nature, they will only emerge as drivers start to become more used to - and reliant upon - the vehicles systems.

100. Instead, there needs to be far closer regulatory control of the implementation of ADAS to reduce the potential dangers from these systems, with systems only allowed if they are demonstrably safe, and do not lead to the problems of automation complacency. Some of the approaches currently being used may have merit, such as that used by Cruise Automation, part-owned by GM, which actively monitors driver behaviour using cameras. Presently, though, such approaches are only voluntary - there is no regulatory control to ensure that drivers are forced into similar levels of attention when supervising ADAS.

101. We would have a different answer if the question was about the role of training in making the transition to vehicles at SAE levels 4, and then at level 5. Training may well be necessary before drivers start using level 4 vehicles as UiCs, particularly at the outset when (a) the technology will be unfamiliar; (b) it may still be fallible (even if it has already been shown to be significantly more reliable than human drivers); not least becuase (c) there will still be considerable numbers of other road users using older technologies (at least initially). If that is the case though (as seems likely), then any such training should be compulsory.

Q14. We seek views on how accidents involving driving automation should be investigated.

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

102. We strongly agree that a dedicated Road Accident Investigation Branch (AIB) is needed, in conjunction with local policing. Only a national level organisation would be able to have the resources to analyse the data from ADAS/AV and draw conclusions. It should certainly have the ability to issue product suspensions and recalls.

103. We have previously noted (in paragraphs 21 to 24 and 95 to 97) the possible pros and cons of this organisation also being the body charged with approving AV and ADAS systems and their associated consumer / marketing material, and with conducting roadworthiness tests. We have also indicated our view that these roles should probably remain separate. One advantage of keeping them separate is to ensure its investigations were conducted (at least as a starting assumption) on a 'no blame' basis. The body charged with approving the vehicles and associated systems might be better placed to bring prosecutions in cases where culpable negligence or wilful malpractice was suspected, and to enforce sanctions where guilt is proved.

104. We would however take issue strongly with the suggestion that this AIB should only investigate *"high profile accidents involving automated vehicles"* (emphasis added). We have previously argued that the advent of AVs should be seen as an opportunity for a step-change in road safety. We therefore strongly argue that the initial position should be to investigate *all* accidents and near misses involving AVs, to try and ensure that lessons are learnt quickly and to iron out any risks in these new technologies. We believe this is essential in order to maximise the potential safety benefits of this new technology, in accordance with the Government's 'Safe Systems' approach, and to avoid the continuation of wholly unacceptable levels of danger on our roads.

Q15. Do you agree that the new safety agency should monitor the accident rate of highly automated vehicles which drive themselves, compared with human drivers?

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

105. Yes - the safety agency / AIB should have the means to both investigate collisions, be given the rights to extract usable data from all vehicles, and monitor both the 'accident rate' and that of near misses, in a way that is similar to the AAIB/RAIB. If systems are persistently and obviously having near misses, the AIB should not have to wait until an injury is caused before intervening.

106. That being said, we reject the idea that it would be acceptable if crash rates are only marginally better than human driving. Furthermore, as paragraphs 5.92 and following reveal, the variation between risks is very large - using the 'average driver' as a comparison is therefore likely to lead to persistent issues of inequality of road danger presented to different modes. This is discussed more fully in our response to Question 16 (below).

107. We strongly agree that ADAS requires at least as much supervision as AV. ADAS is more likely to be adopted at scale, and (as discussed in the consultation documents and elsewhere in this response) presents much more serious risks than AV technologies will, once they mature.

Q16. (1) What are the challenges of comparing the accident rates of automated driving systems with that of human drivers?

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

108. We believe - as set out above - that equivalence in risk from human controlled vehicles is not enough to justify widespread use of ADAS or AV technologies at a level where they are only slightly lower risk than the equivalent to humans. We disagree with the position of Kilri and Groves (as expressed in paragraph 5.75 and following) that highly automated vehicles should be allowed on the roads as soon as they are marginally safer than human controlled vehicles. This is a utilitarian approach to road danger which has morally questionable undertones: by changing the law to accommodate vehicles which we acknowledge are not safe.

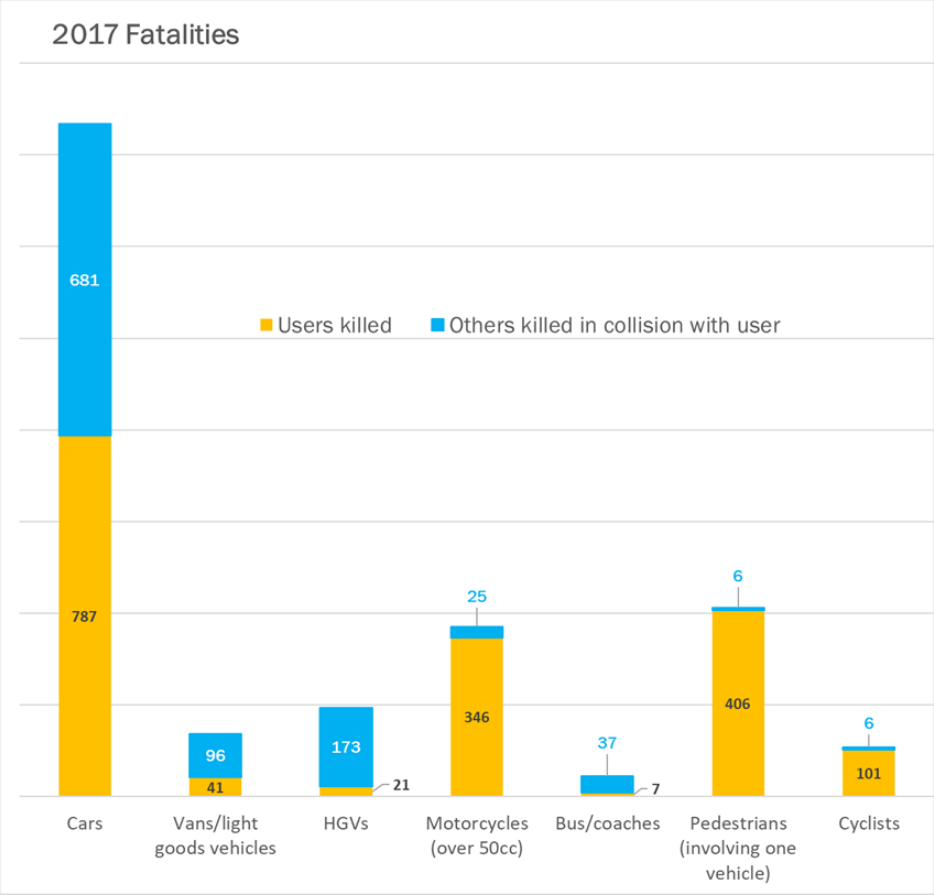
109. We also disagree with the RAND Corporation that the relative safety of AV systems is too difficult to determine without *"billions of test miles"* (Para 5.82). We understand that many operators are already testing their software virtually, and, while not perfect, might be able to identify most of the problems with the system before deployment.

110. However the real problem with this perspective is that it risks passing-up the fantastic opportunity presented by the advent of AV technology to achieve a massive improvement in road safety standards compared with what we currently endure – particularly for more vulnerable road users – in accordance with the 'Safe Systems' and 'Vision Zero' principles of road danger reduction.

111. We believe there is real public appetite for change in this respect. This was evident from the considerable public sensitivity and press attention to crashes that have occurred involving SAE level 2 or level 3 vehicles, such as Tesla Autopilot crashes and the death of the pedestrian hit by an Uber car in Arizona. It concerns us that, over time, society could become as desensitised to the risks of ADAS/AV technology as we already are with existing motor vehicles. We could then end up accepting these risks simply as the inevitable costs of mobility, tolerating around 5 deaths on Britain's roads every day, despite demanding far higher standards of safety on our rail and other transport systems.

112. This political opportunity for change is further strengthened by the substantial investments that manufacturers are now making in this emerging technology, in anticipation of future profits. Regulators must seize the moment to ensure the AV industry develops a strong road safety culture right from the outset. It cannot be allowed to start believing that current levels of risk will be tolerated, or that the convenience and comfort of vehicle occupants can continue to be prioritised over the safety of other road users, as has happened hitherto. Clear regulatory signals are needed to ensure this exciting new industry knows it will be expected to meet far higher road safety standards than have been demanded in the past.

113. This is also a crucial opportunity to redress the historic inequalities in who imposes danger on whom on our roads. Those road user types who present the greatest danger to others are least endangered themselves, and vice versa. Figure 2 in the consultation document shows that pedestrians, cyclists and motorcyclists all have much higher risks than motor vehicle occupants. What it does not show is that motor vehicles, particularly lorries, are far more likely (per billion miles travelled) to be involved in collisions where another road user is killed or injured. The chart below shows the numbers of people killed using different transport modes compared with other road users killed in collisions with each transport mode[9]:



[9] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/743290/ras40004.ods

114. The advent of AV technology could play a really valuable role in reducing this 'inequality of arms'. However there is also a risk that it could exacerbate it enormously, particularly if society decides to permit the roll out of this technology as soon as there is a marginal net gain to overall road safety. At that point, AVs are likely to have become better at avoiding collisions with other motor vehicles, but may still be significantly worse at avoiding collisions with pedestrians, cyclists and other NMUs – being in mind the relative difficulties AVs face not only in detecting the presence of NMUs, but (more seriously) in predicting their movements.

115. It is therefore vital that the safety of AVs is compared with conventional vehicles in terms of their relative involvement in causing death or injury, not just to their own occupants, but also to other road users, particularly more vulnerable road user types. This approach is vital for ensuring that the advent of AV technology contributes to the realisation of the wider health, environmental, economic and quality of life benefits of increased walking and cycling, rather than suppressing them still further.

Chapter 6: Civil liability

Q17. We seek views on whether there is a need for further guidance or clarification on Part 1 of Automated and Electric Vehicles Act 2018 in the following areas:

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

116. We are content that the intended meaning of section 3(1) is clear. However we are concerned that section 6(3) could be interpreted as meaning that AVs will merely be expected to adhere to the same standards of safety that would be expected of a fallible human driver. This would undermine the regulatory pressures on designers of systems to adhere to a significantly higher standard of safety than that of human controlled vehicles. For the reasons given in answer to question 16 (and particularly paragraphs 112 to 114), we regard it as essential that clear regulatory signals are put in place from the outset, to ensure that AV technologies deliver a real step-change in road safety, particularly for non-motorised users.

117. Having said that, section 6(3) is by no means the only element of the AEV Act which concerns us. There are two other aspects of it that we find far more worrying.

118. Firstly, section 3(2) allocates liability to *"the person in charge of the vehicle"* (rather than the insurer) *"where the accident that it caused was wholly due to the person's negligence in allowing the vehicle to begin driving itself when it was not appropriate to do so."* For one thing, we believe AV systems should be designed so that UiCs cannot do this. However, if it is technically impossible to prevent this, it must be made clear when this is *"not appropriate"* – there is currently no clarity on what this means. Finally, such an action would need to incur criminal penalties, not just civil liabilities. We return to this point in our response to Question 23.

119. Secondly, section 2(1) makes it clear that the vehicle insurer is liable for any damage *"where an accident is caused by an automated vehicle when driving itself on a road or other public place in Great Britain"*. However it is far from clear how a seriously injured pedestrian, cyclist or other road user – or their bereaved dependents, where the victim has been killed – could prove that the vehicle involved in the collision had caused that collision.

120. This is already a significant problem even in cases involving conventional vehicles, where the driver can at least be called as a witness, and where liability will in most cases lie either with the driver, the victim, or some combination of the two. We would note though that, in more serious cases, it is routine for drivers' insurance companies to raise claims of 'contributory negligence' claims against the victim, e.g. claiming (often without any evidence) that the cyclist's injuries might have been prevented or reduced if they had been wearing a helmet or hi-visibility clothing. In all such helmet-related cases which have been brought to trial, the court has concluded that a

helmet would not have made a difference. Yet insurers persist in routinely making such 'contributory negligence' claims, knowing that – unlike a motorist – an injured pedestrian or cyclist may not have an insurer (and hence the legal resources) to help them contest liability. They also have an advantage in that the injured party is less likely to have a clear memory of the collision (particularly if they have suffered concussion or more serious brain injury), making it difficult for the victim to provide reliable witness evidence.

121. In lower-value cases, we have little doubt that they are regularly successful in persuading injured cyclists to accept reduced damages in out-of-court settlements. In higher value cases (e.g. where a victim has suffered very serious brain damage), the need to contest these claims causes enormous additional costs and distress to the victims – including their families, carers or bereaved relatives – over and above what they have already suffered from the injury itself. The possibility that a blameless victim could then lose such a case (because they couldn't prove the driver's liability) is surely a far greater injustice than if the driver lost the case when the victim had in fact been at fault, as the driver in the latter case would suffer no more than the loss of their 'no claims' bonus.

122. AV technology could substantially magnify this 'inequality of arms', forcing victims to bring their claims against insurance providers who were not the driver, who held all the data on what had caused the collision, and whose credibility as witnesses would be far harder to contest.

123. The obstacles faced by claimants could be even greater in cases where it was unclear whether (a) the vehicle had been 'driving itself' at the time of the collision, or (b) it had attempted unsuccessfully to hand over control shortly before the collision, or (c) the collision had occurred during the 'blame time' period immediately following a handover, where it might have been caused by events prior to the hand-over. These uncertainties would make it very hard for the claimant to know whether to bring their claim against the insurer or the driver.

124. We therefore contend that the law should pre-empt the introduction of AVs by introducing some form of 'no-fault' liability (as suggested in paragraph 6.20) or, more plausibly, a form of 'presumed liability'. This would involve creating a presumption that the insurer of a driver (or their vehicle, in the case of a UiC) would be liable for paying compensation to an injured pedestrian, cyclist or other NMU unless it could be shown that the injured party was at least partly at fault. 'Presumed liability' rules in some form are in force in virtually every other country in Europe: the only exceptions being the UK, Ireland, Cyprus, Malta and Romania. Their introduction in the UK has long been advocated as a solution to the 'inequality of arms' faced by non-motorised road users – both practically and legally. As Lord Denning argued in 1982:

    "There should be liability without proof of fault. To require an injured person to prove fault results in the gravest injustice to many innocent persons who have not the wherewithal to prove it."

125. Against this, one counter-argument will doubtless be made that it could give 'carte-blanche' to pedestrians and cyclists to interfere with the smooth running of AVs and/or to put themselves at risk, knowing that they can always blame the vehicle if things go wrong. However there is no evidence that such rules in other European countries have this effect.

126. Another counter-argument is that, when the injured party was indeed at fault, it is unfair that the onus lies with the vehicle's insurer to prove this. Against this we would reiterate the points made above (in paragraphs 120 to 124) that, under current liability rules, it is both far harder and far more common for the injured party to have difficulties proving the liability of a driver when they were at fault, than the other way round, and that the resulting injustices are far greater. Moreover, AV technology is likely to exacerbate these differences, while also helping vehicle insurers to provide evidence of any fault that may lie with the injured party, including video recordings and other system data to show what had occurred shortly before the collision.

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

127. We feel that issues of causation are best left to the courts to resolve, for the reasons set out in paragraph 6.51. If designed with safety as the first priority, AVs will reduce collisions to a level in which incidents should be rare - as stated in the Terms of Reference, the improvement in safety should therefore be the guiding factor.

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

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

(b) how long should that period be?

128. The issue of data storage is a concern, however, we do not feel able to respond without an understanding of how these systems will operate in practice. Still, the consultation notes that, while vehicles may produce terabytes of data per day, it is unlikely that this would all need to be stored for crash investigation purposes. Hence it may be that location, speed, acceleration/ deceleration and some LIDAR data could be kept for a certain number of days without huge data storage requirements. It is also likely that technology providers will want to store some of this information in order to assess performance and defend themselves against legal actions.

Q18. Is there a need to review the way in which product liability under the Consumer Protection Act 1987 applies to defective software installed into automated vehicles?

Q19. Do any other issues concerned with the law of product or retailer liability need to be addressed to ensure the safe deployment of driving automation?

129. Many of the issues that have been raised in this section refer back to the issue of ongoing market surveillance of systems post-deployment in Question 12 (paragraph 5.13 and following). This is a particularly challenge for products the function of which can be markedly changed through remote updates.

Chapter 7: Criminal Liability

Q20. We seek views on whether regulation 107 of the Road Vehicles (Construction and Use) Regulations 1986 should be amended, to exempt vehicles which are controlled by an authorised automated driving system.

Q21. Do other offences need amendment because they are incompatible with automated driving?

130. Yes, both regulation 107 and other offences should be reviewed if they appear to be potential barriers to AV technology being deployed more widely. We also suggest there will need to be clarity on who is responsible for breaches of the Construction and Use Regulations (CUR) where faults lie with the operating system that a driver (or UiC) could not have been expected to identify visually in the way that they might previously have been expected to do with a conventional motor vehicle.

Q22. Do you agree that where a vehicle is:
(1) listed as capable of driving itself under section 1 of the Automated and Electric Vehicles Act 2018; and
(2) has its automated driving system correctly engaged;
the law should provide that the human user is not a driver for the purposes of criminal offences arising from the dynamic driving task?

131. Yes. However the corollary to this is that there need to be sufficiently tough sanctions against those responsible for AVs and their operating systems to ensure that they uphold very high standards of safety. Large firms managing tens of thousands - or millions - of vehicles must not be allowed to regard fines for safety breaches as an acceptable cost of doing business (in much the way that delivery companies often regard parking fines).

132. The transition phase between human control and the ADS remains a critical issue. However as explained previously (see paragraphs 72 and 73), we would not wish to see the law putting pressures on UiC's to fulfil safety-critical functions. It might not be unreasonable for them to face criminal penalties for safety failures which arose because they were unable or unfit to resume control, if a competent UiC in the same circumstances could have been expected to respond to the hazard (even if they had not been paying attention immediately beforehand). But this should be a secondary liability: primarily liability should rest with the ADSE.

Q23. Do you agree that, rather than being considered to be a driver, a user-in-charge should be subject to specific criminal offences? (These offences might include, for example, the requirement to take reasonable steps to avoid an accident, where the user-in-charge is subjectively aware of the risk of serious injury (as discussed in paragraphs 3.47 to 3.57)).

133. Notwithstanding the point made above (in paragraphs 72, 73 and 132), we do believe that a UiC in charge of a SAE level 4 vehicle should have various responsibilities, and should face sanctions for failure to discharge them.

134. One is not to render themselves incapable of taking over when the vehicle reaches the limits of its operational design domain (ODD) (though we reiterate that this should not amount to pressure to take over at very short notice – the ADS must be able to provide plenty of warning, and to bring the vehicle to a minimal risk condition if the UiC fails to respond).

135. Another is not to programme the vehicle to park itself in a place that might amount to a parking infringement (or indeed an obstruction offence) once the UiC has left the vehicle, e.g. on a part-time yellow line, or in a part-time bus lane or mandatory cycle lane. For more on this, see paragraph 144.

136. More generally, we believe greater clarity is needed as to how AVs will know how to follow road traffic regulations, including temporary traffic regulations (e.g. those put in place by the police to deal with emergencies). We return to this point in answer to Question 38.

137. However our most serious concern is the need to make it an offence to instruct an AV to drive itself when this is not appropriate – a situation that is contemplated, but not criminalised, by section 3(2) of the AEV Act. It should equally be an offence to do the opposite, i.e. to assume control of an AV when this was inappropriate, and/or to over-ride its safety systems in ways that would have been obviously dangerous to a careful and competent driver.

Q24. Do you agree that:

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

138. Yes. This also reinforces the need to ensure that vehicle operators (or the vehicles themselves) store basic data about their location and status for a reasonable ongoing period.

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

139. Yes. As explained in response to question 14, we strongly support the setting-up of a Road Accident Investigation Branch which would be charged with conducting 'no blame' investigations of all collisions and near-misses involving AVs (as well as other road collisions). The regulatory framework also needs to include mechanisms for imposing product suspensions, recalls or other precautions, and to impose sanctions that provided a sufficient deterrent to ensure safe behaviour by ADSEs (though these mechanisms might be administered by another regulatory body, e.g. the DVSA if that was the body responsible for authorising ADSs).

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

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

140. These are the issues where we have greatest concern with AV technology. As set out previously (paragraphs 47, 48 and 131), we are concerned that need to suspend AV operations or withdraw approvals could cause major political problems, given the scale at which these systems will (eventually) operate and the consequences this might have on general mobility.

141. It is therefore vital that this body is able to fulfil its functions free of political pressures to 'keep the system moving'. The threat of suspension needs to be real, despite the huge inconvenience it might cause, and the regulatory body should not be afraid to use it.

Q25. Do you agree that where a vehicle is listed as only safe to drive itself with a user-in- charge, it should be a criminal offence for the person able to operate the controls ("the user-in-charge"):

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

(2) to be disqualified from driving;

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

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

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

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

Q26. Where a vehicle is listed as only safe to drive itself with a user-in-charge, should it be a criminal offence to be carried in the vehicle if there is no person able to operate the controls?

142. Yes. These are essential requirements for users-in-charge of SAE level 4 vehicles.

Q27. Do you agree that legislation should be amended to clarify that users-in-charge:

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

143. Yes, though it should be recognised that UiC's may find it harder to know whether an AV was unroadworthy than with a conventional vehicle.

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

144. Yes. It should also be an offence to park an AV in a prohibited place, or to leave it where its presence will amount to a parking infringement at some other time (e.g. leaving it such that it is infringing yellow-line restrictions, or parking it in a part-time bus lane or mandatory cycle lane so that it will still be there when it becomes an offence for the vehicle to be left there). The fact that the vehicle was driving itself (rather than being 'driven' by a human) at the time when it was parked should not exonerate the UiC.

Q28. We seek views on whether the offences of driving in a prohibited place should be extended to those who set the controls and thus require an automated vehicle to undertake the route.

145. The issue of vehicles driving themselves in off-road environments should not arise at all while AVs are still at SAE level 4, i.e. while the technological capability to avoid collisions with pedestrians, cyclists and other NMUs is still developing. These vehicles should only be authorised for use in environments that are not shared with these users. Given that this restricts them in practice to closed road environments and to motorways (and possibly trunk roads with high-quality protected cycle tracks), they should never 'drive themselves' off the public road network at all.

146. Once SAE level 5 is reached, questions will need to be resolved as to how AVs travel to or from destinations that are not on the public road network (including both public and private car parks, private driveways, and parking in fields with the landowner's permission). There would need to be an agreed 'electronic map' of where AVs were permitted to go when 'driving themselves'. In England and Wales, this would obviously include the public road network and Byways Open to All Traffic (BOATs), but not footpaths, bridleways or tracks without rights of way. It could also include public car parks, though it is a moot point as to whether it could also include private car parks and private driveways. However it could not reasonably be expected to include fields where a landowner might sometimes permit people to park. Hence there will always be a need for at least some manual intervention at the starts and ends of some journeys.

147. Our suggestion is that, where a SAE level 5 vehicle needs to be driven to or from a start or end point which was not on this authorised 'electronic map', a qualified driver could be authorised to make the manoeuvre manually, under a carefully monitored procedure (to prevent its abuse). Where there is no qualified driver in the vehicle, the manoeuvre would need to be made by a remote controller (as suggested in our response to questions 4 and 5). If a vehicle breached these rules, this should be the responsibility of the ADSE, as the software should not permit the vehicle to drive itself in other locations

Q29. Do you agree that legislation should be amended to state that the user-in-charge is responsible for:

(1) duties following an accident;

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

(3) ensuring that children wear appropriate restraints?

Q30. In the absence of a user-in-charge, we welcome views on how the following duties might be complied with:

(1) duties following an accident;

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

(3) ensuring that children wear appropriate restraints.

Q31. We seek views on whether there is a need to reform the law in these areas as part of this review.

148. Assuming that question 29 only relates to SAE level 4 vehicles, the answer to question 29(1) is "yes", and probably also for question 29(3). However should be noted that a UiC may not be able to give an account of what had happened prior to any incident, if they were (perfectly legitimately) not observing the road at the time.

149. It is more difficult to see how UiCs in level 4 vehicles could be expected to comply with the directions of police or traffic officers, given that (as noted above) they might legitimately not be paying attention to the road. This problem becomes even more acute for the passengers in a level 5 vehicle, or indeed for a level 5 vehicle that was carrying no passengers.

150. For level 4 AVs, the potential problem is largely avoided by our very strong recommendation that these vehicles should be confined to closed road environments and motorways (perhaps also including trunk roads with high-quality protected footways or cycle tracks) – as police and traffic officers rarely direct the traffic on these roads (for obvious safety reasons). However, in any circumstance where a police or traffic officer needs to be able to direct AVs (whether at level 4 or at level 5), they will need to have a technological means to bring those vehicles to a minimal risk condition if they fail to respond to the officer's directions. In these circumstances, there is also likely to be a need for a remote operator (as suggested in our response to questions 4 and 5) to intervene, in order to avoid serious danger and disruption.

151. The occupants of level 5 vehicles might also be unable to comply with the existing duties following an 'accident', given that they would be more akin to the passengers in a taxi. It is possible that the occupant(s) might be blind, or children. Equally, there might be no adult in the vehicle to ensure that any children in it were wearing seatbelts (though this is surely a problem to which there would be a technical solution – the vehicle could be prevented from moving, or could be brought safely to a halt, if a seat was occupied but the relevant seatbelt was not being worn).

152. We reiterate that these points reinforce our view, expressed several times in this response, that AVs to be programmed and regulated to very high levels of safety, particularly once level 5 operation is being contemplated. It needs to be possible for children to travel in them without needing an adult to monitor whether they are wearing seatbelts, and for blind people to be able to travel in them who may be unable to respond to the directions of police or traffic officers.

153. We would highlight one other role for which the law can currently hold drivers responsible, which will need to be addressed differently in AVs. That is the responsibility for ensuring that passengers (including children) do not open motor vehicle doors in ways that might endanger other people.[10] As Cycling UK has documented elsewhere,[11] such offences can prove lethal.

154. In the context of AVs, such incidents could be particularly problematic in law if they do not involve direct contact between the door and the person injured - for instance, if a vehicle door is swung open into the path of cyclist, who swerve to avoid it but loses control and/or is then hit by another vehicle. We suggest that responsibility for 'car dooring' offences will still need to be shared between anyone who opens the door and any responsible adult who 'causes or permits' this to happen. However we recognise that it would be to prosecute children, hence there may be nobody who could be held liable if a child opened a car door dangerously when there was no adult in the car. Blind people might also find it hard to know when they could safely open a car doors if there was nobody else in the vehicle with them. It may be that rules will need to be put in place that require the use of sliding doors, at least for children and blind people to be allowed to travel unaccompanied in AVs.

[10] Section 42 of the Road Traffic Regulation Act 1984 and regulation 105 of the Road Vehicles (Construction and Use) Regulations 1986 make it an offence to *"open, or cause or permit to be opened, any door of a vehicle on a road so as to injure or endanger any person"*.

[11] www.cyclinguk.org/article/how-could-law-protect-cyclists-better-car-dooring-or-drivers-who-fail-stop

Q32. We seek views on whether there should be a new offence of causing death or serious injury by wrongful interference with vehicles, roads or traffic equipment, contrary to section 22A of the Road Traffic Act 1988, where the chain of causation involves an automated vehicle.

155. We strongly support this.

Q33. We seek views on whether the Law Commissions should review the possibility of one or more new corporate offences, where wrongs by a developer of automated driving systems result in death or serious injury.

156. We support the concept of corporate offences which might place a more powerful incentive on the developers to ensure safety, knowing that they might be potentially imprisoned as a result of their negligence. We note, however, that the current law is weak in this area: as the consultation notes, the offence of Corporate Manslaughter is seldom used and requires a high burden of proof of senior management awareness of the negligent behaviour.

Chapter 8: Interfering with automated vehicles

Q34. We seek views on whether the criminal law is adequate to deter interference with automated vehicles. In particular:

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

157. We agree with the principle of re-enacting laws to give courts and the general public clear understanding of Parliament's intentions. The opportunity should be taken to review whether they are fit for purpose given the advent of AVs.

Q35. Under section 25 of the Road Traffic Act 1988, it is an offence to tamper with a vehicle's brakes "or other mechanism" without lawful authority or reasonable cause. Is it necessary to clarify that "other mechanism" includes sensors?

158. If necessary for the sake of clarity, yes. This is likely to be a question that needs resolving as AV technology matures further.

Q36. In England and Wales, section 12 of the Theft Act 1968 covers "joyriding" or taking a conveyance without authority, but does not apply to vehicles which cannot carry a person. This contrasts with the law in Scotland, where the offence of taking and driving away without consent applies to any motor vehicle. Should section 12 of the Theft Act 1968 be extended to any motor vehicle, even those without driving seats?

159. Yes - although, as with the consultation document's example of the pizza delivery vehicle, this does not appear to be a hugely significant issue at present, nor, perhaps in future.

Q37. In England and Wales, section 22A(1) of the Road Traffic Act 1988 covers a broad range of interference with vehicles or traffic signs in a way which is obviously dangerous. In Scotland, section 100 of the Roads (Scotland) Act 1984 covers depositing anything a road, or inscribing or affixing something on a traffic sign. However, it does not cover interfering with other vehicles or moving traffic signs, even if this would raise safety concerns. Should section 22A of the Road Traffic Act 1988 be extended to Scotland?

160. Again, if necessary for the sake of clarity, yes.

Chapter 9: "Machine Factors" - adapting road rules for artificial intelligence decision-making

Q38. We seek views on how regulators can best collaborate with developers to create road rules which are sufficiently determinate to be formulated in digital code.

161. Cycling UK has long campaigned for a review of the Highway Code.[12] We feel that this is a unique opportunity to look at the way the Highway Code operates and examine some of the underlying principles. Much of the current Highway Code is, we believe, a weak compromise between what is publicly or politically acceptable and the ideal interactions between road users.

162. We are therefore pleased that the Government has agreed to a review of the Highway Code to benefit of pedestrian and cycle safety. We urge that this review is undertaken with an eye to the advent of AVs, and the much higher standards of road safety that we hope they will deliver.

163. Our streets should ideally be safe enough for children to be able to walk or cycle unaccompanied to school from a young age. Yet in many places the road environment is deemed too risky by parents to permit this. This is, in part, because the current Highway Code attempts to 'share' responsibility between users, including - by extension - children. Under a more equitable system, those with the capacity to do harm should be (almost wholly) responsibility for ensuring the safety of more vulnerable users. An informal coalition of pedestrian, cycle and road safety groups has already agreed to collaborate in calling for this principle to be central to the Highway Code's forthcoming revision. We will be calling for it to be written into the revised Code's introduction, and to be reflected in its rules on issues such as priority at junctions (these are currently unclear and, in some respects, contradictory) and leaving plenty of space when overtaking NMUs.

164. We would certainly wish to see these issues incorporated into a revised and digitalised Highway Code – e.g. by codifying how much space motor vehicles should leave when overtaking pedestrians, cyclists and horse riders, or that motor vehicles should give way before turning at a junction to any pedestrians and cyclists going straight ahead across their path. This would help fulfil the Government's stated aim to make walking and cycling the normal choices for short journeys or as part of a longer journey, thereby helping to reduce the adverse health, economic and environmental impacts of over-dependence on motorised vehicles.

Q39. We seek views on whether a highly automated vehicle should be programmed so as to allow it to mount the pavement if necessary:

(1) to avoid collisions;

(2) to allow emergency vehicles to pass;

(3) to enable traffic flow;

(4) in any other circumstances?

165. We start by reiterating that we do not believe SAE level 4 vehicles should be allowed to drive themselves on streets that are shared with pedestrians, cyclists and other NMUs, until and unless they have been shown to be more reliable than human drivers both at detecting NMUs and at predicting their movements. Until then, the ODD of level 4 vehicles should be restricted to motorways (and possibly trunk roads with high quality cycle tracks). However, once that point is reached, the switch to level 5 vehicles should be made as quickly and as completely as possible.

[12] Articles covering some of the key changes we wish to see can be accessed via www.cyclinguk.org/tags/highway-code.

166. Hence questions about mounting pavements should rarely arise for 'highly automated' (i.e. SAE level 4) vehicles. In the earlier stages of AV technology (i.e. while improvements are still being made to the ability of level 4 vehicles to detect and avoid collisions with NMUs), they should not be allowed to 'drive themselves' on roads or streets with pavements, let alone to mount them. If at this stage it is decided to permit their use on other dual-carriageways (e.g. on trunk roads as well as on motorways), these should have crash barriers to protect any NMUs using any adjacent footways or cycle tracks.

167. If the question were to be about 'fully automated' vehicles mounting the pavement, we suggest that by this point they should rarely need to do so, and that this need should be progressively eliminated over time. As level 5 technology becomes the norm, vehicle ownership should be declining (thereby relieving parking pressures on narrow streets). Meanwhile AVs should be capable of detecting another oncoming AV on narrow streets or lanes, and 'deciding' between them where one of them will wait for the other to come past.

168. Automated emergency vehicles will similarly be able to alert other AVs of the need to pull in to avoid causing delays. Admittedly, emergency vehicle operators will sometimes need to suddenly change their route, and this could then make it necessary for another AV to mount a pavement to unblock its path. However the technology should by this stage be sufficiently reliable that the AV should be able to do this safely.

169. As regards swerving to avoid collisions, this too should become increasingly necessary as level 5 AVs become the norm. They should be programmed only to drive at speeds where they can stop safely, without endangering pedestrians, cyclists or other NMUs. If an exceptional event occurs that gives rise to the need to swerve, this should be treated as a serious safety failing – particularly if it results in injury to a NMU – and investigated accordingly.

170. If it becomes necessary to move a vehicle onto a pavement to park it safely following a breakdown or other emergency (this is permitted under section 34 of the Road Traffic Act 1988), this should be done under manual control. If the vehicle is a SAE level 5 vehicle with no qualified driver inside it who can carry out this manoeuvre, it should be done by a remote controller – see our response to questions 4 and 5.

Q40. We seek views on whether it would be acceptable for a highly automated vehicle to be programmed never to mount the pavement.

171. As explained in response to question 39, we do not believe 'highly automated' (i.e. SAE level 4) vehicles should be allowed to 'drive themselves' at all on roads or streets that have adjacent pavements (with a possible exception for trunk roads with adjacent pavements or cycle tracks that are protected by crash barriers). Hence there is no need to permit them to mount pavements when driving themselves.

Q41. We seek views on whether there are any circumstances in which an automated driving system should be permitted to exceed the speed limit within current accepted tolerances.

172. No. We suggest that the 'current accepted tolerances' practice might simply encourage low level law-breaking on the roads. Most vehicles now come with highly accurate systems for measuring accuracy of speed, so it seems somewhat archaic to continue to offer a degree of leeway. The worst drivers will simply drive to the leeway, treating it as a new limit.

173. As noted in paragraphs 20, 104, 110 and elsewhere, we feel that the advent of AVs offers an opportunity to strengthen the regulation of road safety, including the lax approach to enforcement of traffic law and driving standards, primarily for political reasons. There are also opportunities for greater flexibility. As AVs become the predominant form of transport, speed limits could be reassessed to be more dynamic, more sensitive to local environmental or social

conditions, or tuned to ensure better junction capacity. Thus a speed limit of 10 mph could become enforceable, or 15 in some circumstances. There might be temporary speed limits - say of 3 mph for delivery vehicles in pedestrianised areas. All these could be remotely enforced.

Q42. We seek views on whether it would ever be acceptable for a highly automated vehicle to be programmed to "edge through" pedestrians, so that a pedestrian who does not move faces some chance of being injured. If so, what could be done to ensure that this is done only in appropriate circumstances?

174. No - it is highly risky to imagine that a machine can be programmed to "edge through" pedestrians and not risk causing harm. This is fundamentally unacceptable.

175. As with our answers to questions 4, 5, 29 and 30, this is an issue where it might be suitable to employ a remote operator who can diagnose the issues and take legal responsibility for any subsequent actions.

Q43. To reduce the risk of bias in the behaviours of automated driving systems, should there be audits of datasets used to train automated driving systems?

176. We agree that the regulatory authority will need to develop an extensive battery of challenging scenarios against which ADSEs would have to show competence. Even this, however, may be insufficient if the regulatory authority is weak or subject to regulatory capture by operators (as demonstrated by the Dieselgate scandal of 2015).

Q44. We seek views on whether there should be a requirement for developers to publish their ethics policies (including any value allocated to human lives)?

177. No, we do not believe ADSE's should be responsible for making ethical choices at all. They should be designed, and regulated, to avoid such 'ethical dilemmas' arising in the place. We agree with the comment quoted in the consultation document that it is absurd to contemplate the idea of a machine that was so unsafe that it created lethal situations, yet was then capable of making complex ethical decisions. AVs should not be authorised for public use until they can demonstrate a high level of reliability at avoiding collisions. Once authorised, they should drive at safe speeds such that they can always stop if, for instance, a child were to run out suddenly from any 'blind spot' in its field of 'vision'. There could be 'failsafe' processes to deal with truly exceptional emergencies, whereby any qualified driver inside the vehicle could take over, or a remote operator could do likewise. But in normal circumstances, they should operate as safely as is expected of driverless train systems.

Q45. What other information should be made available?

178. As stated above, full transparency is required - particularly in early phases of the technology's development - on numbers of disengagements and any other incidents. But the availability of data does not always correspond to good use of that data - the regulatory authority must have the resources behind it to conduct detailed, high quality investigations into both the developing technology, and any collisions that occur.

Q46. Is there any other issue within our terms of reference which we should be considering in the course of this review?

179. We are surprised that no consideration has been given to the question of how to prevent the potential advantages of AVs from being held back by the continued use of human-driven cars. It is only when AVs no longer have to anticipate the fallibilities of human drivers that their full benefits can be realised, in terms of improved safety and efficient use of road space (i.e. when they can follow or pass one another very space-efficiently, freeing up space for walking, cycling or improved urban design).

180. We have suggested that, once the decisions have been made to authorise new AV technologies for public use (both to permit SAE level 4 AVs onto motorways and to permit level 5 AVs to share space with pedestrians, cyclists and other NMUs), the transition to the new technology should be made as quickly and as completely as possible, consistent with careful monitoring of the initial roll-out and the need for safe fall-back processes.

181. It is perhaps worth reiterating some of the other points flagged up earlier in this response that we do not believe the review has properly considered:

- The opportunity to achieve far higher standards of regulation of AVs and the ways they are used, thereby delivering a step-change in road safety standards;
- The reasons why the 'something everywhere' path should be followed, rather than the 'everything somewhere path;
- The need to prevent AVs being used on roads and streets shared with non-motorised users (NMUs) until they are demonstrably safer at avoiding collisions with these groups (not just at avoiding collisions in general);
- The need for remote controllers to provide a back-up safety role, not least to ensure that AVs will eventually become useable by people who currently cannot drive, but also to handle situations that are currently dealt with by human police or traffic officers;
- How to enable and regulate the movements of AVs in off-road environments;
- The need to consider the liabilities for parking offences where vehicles 'drive themselves' legally into parking places where there are time-limited parking restrictions that are only infringed after the vehicle has been left.

Cycling UK
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