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Self-driving vehicles

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Transport Committee

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In August 2022 the Government outlined its vision for self-driving vehicles, promising early deployments in the UK by 2025 and a comprehensive regulatory, legislative and safety framework. It told us that self-driving vehicles are "the future of road travel".

We agree that it is a crucial time for self-driving vehicles. Their potential to revolutionise transport is obvious, but, as the technology matures and real-world uses become less hypothetical, many challenges remain. For the UK specifically, there may be a delicate balance to be struck between remaining at the forefront of innovation and keeping the wider public on board.

How could self-driving vehicles be used?

There is a broad range of possible uses for self-driving vehicles from HGVs and buses to taxis and private cars. We believe they have the potential to improve transport connectivity with significant safety, productivity, and mobility benefits.

However, over the last decade, progress in this technology has failed to meet many of its promoters' predictions, and this has bred understandable cynicism. Hopefully expectations of self-driving vehicle technology have become more realistic. Self-driving vehicles that can go anywhere at any time remain purely hypothetical, but in more circumscribed forms they can become reality.

In principle we welcome the introduction of self-driving vehicles, but the Government must take a cautious, gradual approach with the technology introduced only in well-defined and appropriate contexts. As such, we broadly welcome the strategy the Government has set out. However, without careful handling, self-driving vehicles could worsen congestion and exacerbate existing inequalities in transport access. The Government must ensure the introduction of self-driving vehicles is responsive to the wider population and meets the UK's transport goals.

How safe are self-driving vehicles?

While it is widely assumed that self-driving vehicles will prove safer than human drivers, this is not a given. Optimistic predictions are often based on widespread self-driving vehicle usage that is decades away, or assertions about human error that ignore other risks. Safety must remain the Government's overriding priority as self-driving vehicles encounter real-world complexity. Given this, we question the Government's proposed ambition that self-driving vehicles must be as safe as a competent and careful human driver. This is too weak and too vague. The Government should set a clearer, more stretching threshold.

Greater automation will reduce time spent driving. Over time drivers may become less practised and therefore less skilled. Conversely, the demands on drivers will grow as they will be called upon to retake control of vehicles in challenging circumstances with little notice. The Government should set out a strategy for the future of human driving in a

world of self-driving vehicles. This should include possible changes to driving tests and a plan to ensure that all drivers fully understand self-driving vehicles and both acquire and maintain the necessary skills for taking control of a vehicle in all circumstances.

The introduction of self-driving vehicles to the UK's roads will affect all road users. We believe that this should not impose new responsibilities on other road users and pedestrians, limit their access to, or use of, public infrastructure or, crucially, make them less safe.

What other risks do self-driving vehicles pose?

Self-driving vehicles pose cybersecurity risks, broadly because of their connected rather than automated capabilities. This poses new dangers, which the law must evolve to meet. A safety-led culture will require wide access to data, and this must be a higher priority than commercial confidentiality.

Ensuring self-driving vehicles are roadworthy will be more complicated than for conventional vehicles, not least because there is more that can go wrong. Legal liability also becomes more complex as it is shared between owner and operator. This may cause problems for the insurance industry. The Government explained broadly how its new regulatory regime will work but accepted that more thinking was needed about how this will work in practice.

What infrastructure will be needed?

Self-driving vehicles will need well-maintained roads and signage, nationwide connectivity, and up-to-date digital information about the road network. While some steps have been taken towards this by the Government and public bodies, these preparations are too siloed and divorced from broader planning. If the Government is serious about self-driving vehicles, it should ensure meeting their needs is an integral part of future infrastructure strategy.

What legal changes are needed?

The current laws for self-driving vehicles are archaic and limiting, especially concerning testing and legal liability. We commend the work of the Law Commissions and the Government in devising a new legal framework. That framework has broad support, albeit with more detail needed in some areas. This makes it deeply disappointing that the Government will not commit to legislating in this Parliament to put this framework in place.

The self-driving vehicle sector is a British success story. We were impressed, unfailingly so, by the energy, creativity, and expertise of all those we met, whether from industry, academia, Government or somewhere in between. We have a competitive advantage, and we must maintain it. To do this the Government must pass comprehensive legislation in the next parliamentary session to put in place the robust regulatory framework it promised. Failing to do so will do significant and lasting damage both to the UK's self-driving vehicle industry and to this country's reputation as a trailblazer.

1 Introduction

Defining self-driving vehicles

1. The Government told us that it defined a self-driving vehicle as:

> One that has at least one self-driving feature, delivering sufficiently high levels of automation that it meets a legally defined threshold and is capable of safely driving itself with no human input. Such features could provide self-driving capability for all or part of a journey.[1]

2. We chose to use the term self-driving vehicle in our inquiry predominantly as it is the one most often used by the Government, although we heard mixed views about the right words to use.[2] Suggestions included autonomous vehicles, automated vehicles, connected and autonomous vehicles, self-driving vehicles, and driverless vehicles. Several witnesses were concerned that terms such as autonomous, self-driving and driverless were misleading as they failed to convey that users may need to take back control of a vehicle.

3. There are various ways of conceptualising self-driving technology. The Society of Automotive Engineers International has established six 'levels' of driving automation.[3] The Society of Motor Manufacturers and Traders (SMMT) explained that, broadly, levels zero, one and two are driver assistance systems that support (rather than replace) the driver to park, brake or change lanes safely.[4] Most new cars have at least one of these features.[5]

4. In vehicles with levels three to five capability the technology is in control.[6] At level three, the user must be prepared to take back control. At four this is not the case, but the vehicle is only expected to drive itself in certain conditions. Professor Siddartha Khastgir, Head of Verification and Validation for Connected and Autonomous Vehicles at the University of Warwick, termed these conditions the vehicle's "Operational Design Domain", which he said could include the type of roads or weather conditions it can safely operate in.[7] At level five these conditions are removed. David Wong, Senior Technology and Innovation Manager at the SMMT, told us it was "unhelpful to even discuss level five" as it remained "hypothetical […] may not be needed, and it may not be achievable in our lifetime".[8]

5. However, Professor Nick Reed, founder of the transport consultancy Reed Mobility, told us that while these levels of automation "work from an engineering perspective […] they do not work very well from a communications perspective".[9] He continued:

> The Law Commission has described self-driving vehicles as being UIC or NUIC—user in charge or no user in charge vehicles. A user in charge is a vehicle where a driver might take control for some of the time. There are

1 DfT (SDV0052) A note on language
2 Allianz (SDV0043) para 3.1; ABI (SDV0051) para 11; Jack Stilgoe et al (SDV0009)
3 SAE International, Automated-driving graphic update, accessed 22 August 2023
4 SMMT (SDV0023) Executive Summary
5 SMMT (SDV0023) para 13
6 Q2
7 Siddartha Khastgir (SDV0046) para 1.2
8 Qq27–28
9 Q3

> controls in the vehicle, but you can allow the vehicle to do your motorway driving, for example. A no user in charge vehicle is one that is designed not to have any controls in it.[10]

Steve Gooding, Chief Executive of the RAC Foundation, offered an alternative categorisation with three levels: "hands off, eyes off and nod off".[11]

Policy context

6. The Government published a review of regulations for self-driving vehicles in February 2015.[12] Later that year, this led to publication of a non-statutory Code of Practice for testing self-driving vehicles and the establishment of the Centre for Connected and Autonomous Vehicles (CCAV).[13] CCAV is a joint policy unit of the Department for Transport and Department for Business and Trade which is responsible for policy development, research coordination and trials and stakeholder engagement.[14] The Government told us that CCAV had "enabled joint public and private investment of over £400 million [and] supported over 90 collaborative projects, involving over 200 organisations".[15]

7. During our inquiry we heard broad support for CCAV's work.[16] Professor Paul Newman, founder and Chief Technology Officer at Oxbotica, a self-driving vehicle software company, praised its cross-government approach which, he said, recognised that self-driving vehicles are not just "a transport thing".[17] Several witnesses also praised the work of Zenzic, a body which coordinates and facilitates self-driving vehicle testing.[18]

8. The Government consulted again on its regulatory approach between 2016 and 2017 and subsequently legislated with the Automated and Electric Vehicles Act 2018.[19] Also in 2018, CCAV asked the Law Commission of England and Wales and the Law Commission of Scotland to conduct a multi-year review of self-driving vehicle regulation.[20]

9. In response to the Law Commissions' first consultation paper on safety as part of their multi-year review, the Government established the Connected and Automated Vehicles: Process for Assuring Safety and Cyber Security programme (CAVPASS) in September 2019.[21] The CAVPASS programme is led by CCAV but involves various departments and agencies across Government as well as industry representatives.[22] Across six broad

10 Q3
11 Q13
12 HoC Library, Connected and autonomous road vehicles, CBP 7965, 7 May 2021, para 2.1. See paper for more detailed discussion of previous regulation.
13 HoC Library, Connected and autonomous road vehicles, CBP 7965, 7 May 2021, para 2.1
14 DfT (SDV0052) para 18
15 DfT (SDV0052) para 17
16 Qq31, 94–95, 178, 230 ; ABI (SDV0051) para 5; AXA UK (SDV0010) para 7
17 Q100
18 Qq31 [Nick Reed], 56 & 154
19 HoC Library, Connected and autonomous road vehicles, CBP 7965, 7 May 2021, para 2.2; Automated and Electric Vehicles Act 2018. For more detail, see: HoC Library, Automated and Electric Vehicles Act 2018, CBP 8118, 15 August 2018
20 DfT (SDV0052) para 41; Law Commission and Scottish Law Commission, Automated Vehicles: joint report, HC 1068, 26 January 2022
21 DfT (SDV0052) para 20; DfT, New system to ensure safety of self-driving vehicles ahead of their sale, 4 September 2019
22 Q115 [Ben Gardner]; HMG, Connected & Automated Mobility 2025, 19 August 2022, pp 46–50 [CAM 2025]

work streams, the Government said, it "aims to put in place the processes, systems and capabilities necessary for government assurance of the safety and cyber resilience of connected and self-driving vehicles by 2025".[23]

10. In March 2019 the Government published its Future of Mobility: Urban Strategy.[24] This set out nine principles to guide technological change in the transport sector emphasising safety, regional equity, congestion reduction, decarbonisation, and the importance of active travel and mass transport.[25] In November 2020 the Government consulted on a similar rural strategy, with a summary of responses published in September 2021.[26] In June 2023 the Government told us that the outcome of this consultation would be published "in the coming months".[27]

11. In June 2020 the UN agreed regulations for Automated Lane Keeping System (ALKS) technology which is level 3 automation.[28] This regulation provides a framework to allow vehicles fitted with this technology to eventually come to market and be used on roads in the UK. Following a consultation, the Government confirmed in April 2021 that it intended to allow ALKS-type approved self-driving vehicles on British roads potentially "by the end of the year".[29] This did not happen. Nor was the SMMT's prediction that "the first passenger cars fitted with ALKS could be rolled out on British roads from the end of 2022 or early 2023" fulfilled, although it told us that such technology is now available in Germany.[30]

12. In January 2022 the Law Commissions published their final report setting out their proposals for a new regulatory framework for self-driving vehicles.[31] The Law Commissions said they had "strived to keep safety at the forefront of our proposals, while also retaining the flexibility required to accommodate future development". Recommendations included:

- Clarifying the meaning of self-driving in law;
- Creating a new two-stage approval and authorisation process for self-driving vehicles;
- Creating new legal roles for users, manufacturers and service operators to remove criminal responsibility from the person in the driver's seat when the vehicle is in self-driving mode;
- Improving regulatory oversight with a new safety assurance scheme; and
- Holding manufacturers and service operators criminally responsible for misrepresentation or non-disclosure of safety-relevant information.

23 DfT (SDV0052) paras 55–56; CAM 2025, p 132. For more detail see: CAM 2025, Annex 5
24 DfT, Future of Mobility: Urban Strategy, 19 March 2019
25 DfT (SDV0052) para 80
26 DfT, Future of Transport: rural strategy – call for evidence, 24 November 2020; DfT, Future of Transport: Rural Strategy Call for Evidence Summary of Responses, 28 September 2021
27 Transport Committee, Implementation of the National Bus Strategy: Government response to the Committee's Fourth Report, HC 1431, 22 June 2023
28 HoC Library, Connected and autonomous road vehicles, CBP 7965, 7 May 2021, para 2.7
29 DfT, Safe use of Automated Lane Keeping System on GB motorways: call for evidence, 18 August 2020; DfT, Safe Use of Automated Lane Keeping System (ALKS) Summary of Responses and Next Steps, 28 April 2021, p26; DfT, Government paves the way for self-driving vehicles on UK roads, 28 April 2021
30 Qq7 & 58; SMMT (SDV0023) Executive Summary
31 Law Commission and Scottish Law Commission, Automated Vehicles: joint report, HC 1068, 26 January 2022

The Government's vision for self-driving vehicles

13. The Government told us it believed that self-driving vehicles are "the future of road travel".[32] In its August 2022 policy paper, 'Connected & Automated Mobility 2025: Realising the benefits of self-driving vehicles in the UK' (CAM 2025), the Government set out its "vision":

> By 2025, the UK will begin to see deployments of self-driving vehicles, improving ways in which people and goods are moved around the nation and creating an early commercial market for the technologies. This market will be enabled by a comprehensive regulatory, legislative and safety framework, served by a strong British supply chain and skills base, and used confidently by businesses and the public alike.[33]

14. The CAM 2025 policy paper states that this work will be "driven via three pillars of activity": ensuring safety and security; securing industrial and economic benefits; and delivering societal benefits such as better transport provision and decarbonisation.[34] It also sets out "four core considerations":

- Advanced Connected and Automated Mobility (CAM) technologies and services are starting to transition from R&D demonstrations to commercial deployments in global markets. Government views passenger transport, logistics and freight, and private land use as areas of particular interest for early self-driving vehicle services in the UK.
- The UK is acting from a position of strength and opportunity, but this cannot be taken for granted given intense global competition.
- To accelerate the societal and economic benefits of CAM we must help the sector progress rapidly from R&D towards the safe commercial deployment of early technologies and services.
- Self-driving vehicle technologies and services will not be successful in the UK without a robust regulatory framework that provides certainty for innovators and investors, as well as confidence for the public that the technologies are safe, secure and work in the interests of society.[35]

Our inquiry

15. It is a crucial time for self-driving vehicles. Their potential to revolutionise transport is obvious, but, as the technology matures and real-world uses become less hypothetical, many challenges remain. For the UK specifically, there may be a delicate balance to be struck between remaining at the forefront of innovation and keeping the wider public on board. Our aim, in this inquiry, was not just to scrutinise the Government's policy ambitions but to ask how self-driving vehicles will fit into the broader transport landscape and what more needs to be done to ensure their introduction improves the lives of people up and down the country.

32 DfT (SDV0052) para 3
33 CAM 2025, p11
34 CAM 2025, p12
35 CAM 2025, p11

16. We launched our inquiry in June 2022.[36] We received 53 written submissions and held four oral evidence sessions, hearing from witnesses including self-driving vehicle manufacturers and developers, academics, trade bodies and Rt Hon Jesse Norman MP, the Minister for Decarbonisation and Technology. We also visited Wayve, a London-based self-driving vehicle software developer, and held informal virtual discussions with manufacturers and regulators in the United States. We are grateful to all those who contributed to our inquiry.

36 Transport Committee, Inquiry launch: Transport Committee to investigate development and deployment of self-driving vehicles, 27 June 2022

2 How could self-driving vehicles be used?

17. We asked the Minister, Rt Hon Jesse Norman MP, how quickly he thought self-driving vehicles would be deployed on the roads and what uses they would be put to. He told us that in ten years' time "there will not necessarily be that many" self-driving vehicles but he expected "to see take-up gear up very hard" in 15 years' time.[37] Commenting on possible use cases, Claire Wren, Director for Future Transport Systems and Environment at Department for Transport, said that "it is often the day-to-day things, like freight and mass transit, that we are likely to see first".[38] The Minister added:

> I do not think there is any reason why we should not see a whole bunch of different, new shared-use automated vehicles coming through. Those could be pods or buses. They could be smaller, intermediate vehicles such as the seven to 10-seater used in defined suburban areas. I think we will see all of those things.[39]

In February 2023 the Government announced £81 million in grants to "help roll out commercial use self-driving vehicles across the UK from 2025".[40] Projects included self-driving buses, taxis, HGVs and shuttle services.

Private cars and shared usage

18. The Government told us that "by 2035, 40 per cent of new cars in the UK could have self-driving capabilities".[41] It added:

> The UK market alone could be worth as much as £42 billion by 2035, creating as many as 38,000 jobs in the sector; and the technologies could increase UK productivity by allowing drivers to benefit from optimised route planning, improved traffic flow and by giving them more productive time in their vehicles.[42]

David Wong from the SMMT stressed, however, that because vehicles stay on the road for an average of roughly 14 years:

> It is very unlikely that at some point in the next 20 years, or even 30 years for that matter, the majority of the 40.5 million vehicles will be automated vehicles. For a long time, there will be co-existence between automated vehicles and manually driven vehicles.[43]

19. We heard concerns that widespread introduction of private self-driving vehicles could increase congestion, discourage modal shift to active travel or public transport

37 Q265
38 Q268
39 Q266
40 HMG, UK government backing helps launch world first self-driving bus, 1 February 2023
41 DfT (SDV0052) para 2
42 DfT (SDV0052) para 2
43 Q25

and widen inequalities in access to transport.[44] The Government's twenty-five-year road traffic projections include a scenario in which self-driving vehicles eventually account for half of all vehicles.[45] This scenario forecasts "fast-growing traffic demand", although it suggests that users of self-driving vehicles may feel less inconvenienced as they could work and relax while stuck in traffic.[46] Asked about the potential for increased congestion, the Minister told us it could "go either way" but what "will really make the difference is cost".[47]

20. However, it is unclear whether private ownership will be the dominant model of self-driving vehicle use. The initial cost is likely to be high which may incentivise shared usage rather than individual ownership.[48] Dr Alex Kendall, founder and Chief Executive of the self-driving vehicle software company Wayve, argued that the introduction of self-driving vehicles was an opportunity to move towards "fewer vehicles on the road being used more efficiently and more effectively".[49] Professor Nick Reed from Reed Mobility argued that this could "make mobility more accessible for many more people".[50]

Taxis and private hire

21. Several self-driving taxi services such as Waymo and Cruise operate in the United States.[51] Regulators in California, where both companies operate, told us that rollout was still limited to certain times and locations, but that operators hoped to expand.[52] In order to operate, they explained, self-driving taxi firms must produce a passenger safety plan, which also covers their operation on the road and other road users. Dr Alex Kendall was supportive of greater use of self-driving taxis. He told us:

> If you fly to Phoenix in Arizona, you can download an app, call a vehicle and it will come. There will be no one in the front seat. It will self-drive you around an area of that city. That is available today. I visited there and had a go at that. It is remarkable.[53]

22. However, we heard several concerns about the possible introduction of self-driving taxis in the UK. WSP, an engineering consultancy, suggested there was the potential for "significant dead mileage" as fares were sought.[54] It also questioned how safe such trips would be for vulnerable and lone travellers, a worry shared by Ed Houghton, Head of Research and Service Design at DG Cities, who told us that its research had found that women were particularly uncomfortable with the concept of ridesharing in such vehicles.[55] A broader question was whether self-driving taxis would necessarily prove a cheaper option given the high cost of the vehicle and the relatively low cost of human drivers.[56]

44 Qq22 & 157 [Ian Wainwright]; David Metz (SDV0003); Reed Mobility (SDV0008) para 10; Stagecoach (SDV0044) para 14; TfL (SDV0049) para 2.2
45 DfT, National Road Traffic Projections 2022, 12 December 2022, para 3.4.3
46 DfT, National Road Traffic Projections 2022, 12 December 2022, paras 4.5.1 & 4.62
47 Q263
48 Qq6 &22; BIBA (SDV0047) para 22; WSP (SDV0016)
49 Q70
50 Q18
51 Q19 [David Wong]; DfT (SDV0052) para 26; David Metz (SDV0003); Tech UK (SDV0027) section 1
52 Informal discussions with the Californian Public Utilities Commission and Department of Motor Vehicles
53 Q85
54 WSP (SDV0016)
55 Q247
56 Q159; David Metz (SDV0003)

Buses and other public transport

23. The Government said that "self-driving mass transit could provide an additional public transport service that is safe, zero-emission, demand responsive, alongside being flexible and cost effective".[57] Several self-driving bus trials are underway, or are planned, in the UK.[58] Stagecoach, a large operator conducting several trials including the CAVForth pilot in Scotland, told us that as its routes are "typically predictable [and] planned in advance" they are "well suited" for self-driving applications, although development costs and customer awareness and acceptance remained barriers.[59]

24. We heard from Peter Stephens, Stagecoach's Policy and External Affairs Director, who explained that in order for self-driving vehicles to be introduced across the country they must prove safe, cost-effective, reliable and acceptable to passengers.[60] He told us that as part of its trial it was piloting a role of "bus captain", a member of staff on each bus who is there to be a "reassuring presence […] able to intervene if there are any unacceptable incidents, and giving people a sense of safety on board".[61] The need for such a role, somewhat analogous to that of a bus conductor, was also emphasised by the RAC Foundation whose Chief Executive, Steve Gooding, was optimistic that self-driving buses could "change the economics and improve the passenger experience" of public transport.[62]

Freight and logistics

25. In its CAM 2025 policy paper the Government was optimistic about the potential for self-driving technology "to improve the resilience of the supply chain and the reliability and cost efficiency of the freight and logistics sector".[63] In the UK there have been trials of self-driving delivery vehicles, albeit with humans needed to load and unload the goods, and lorry platoons in which the speed and braking of a convoy is controlled by a lead vehicle.[64]

26. Logistics UK, a trade body, told us that changing or reducing the role of the driver could bring various benefits, although it stressed that the sector "operates on low margins and this could be a barrier for investment and adoption".[65] Ian Wainwright, Chair of the Freight and Logistics Policy Group at the Chartered Institute of Logistics and Transport (CILT), was more sceptical, stating that platooning trials had proved less efficient than expected.[66] Such changes could bring job losses, although new jobs related to self-driving vehicles may be created in parallel.[67]

57 DfT (SDV0052) para 84
58 Stagecoach (SDV0044) para 4; HMG, UK government backing helps launch world first self-driving bus, 1 February 2023; CAVForth, Welcome to CAVForth, accessed, 22 August 2023
59 Stagecoach (SDV0044) paras 3, 9, 11 & 13
60 Q198
61 Q220
62 Qq21 & 24; RAC Foundation (SDV0026) section 1
63 CAM 2025, p 20
64 Q85; POST, Digital technology in freight, PN 692, 3 February 2023, p 2; BBC News, Asda launches self-driving grocery delivery trial, 19 April 2023
65 Logistics UK (SDV0006). See also: Tech UK (SDV0027) section 1
66 Qq160–163
67 Q24

Delivery robots

27. Self-driving pavement-based delivery robots already operate in parts of the UK.[68] Lisa Johnson, UK Director of Public Affairs at Starship Technologies, told us its delivery robots "behave like a cautious pedestrian" operating "at level 4 autonomy, so […] autonomous 98 per cent of the time, backed up by a remote assistant".[69] She explained that "we map where we go and tell them […] what confines they are allowed to be autonomous within".[70] Ms Johnson told us that significant further rollout was circumscribed by a lack of charging infrastructure.[71]

Transport for disabled or vulnerable passengers

28. In its CAM 2025 policy paper the Government argued that self-driving vehicles "could improve access to transport for people with mobility issues".[72] Several witnesses agreed, with Becky Guy, Road Safety Manager at the Royal Society for the Prevention of Accidents, suggesting they could be particularly helpful for older people in rural areas.[73] Transport for All, an accessibility charity, set out several ways self-driving vehicles could reduce barriers to access for disabled people, such as providing a door-to-door service to and from rail stations and transporting individual passengers within stations.[74]

29. Transport for All, however, cautioned that self-driving vehicles should not be viewed as a "silver bullet to the inaccessibility of the public transport network".[75] It called for disabled and vulnerable people to be "actively included and consulted" about self-driving vehicles, not least to ensure appropriate safeguards are in place in case of vehicle malfunction, and that the vehicles are reliable, affordable and accessible to all.[76] Similarly the RAC Foundation questioned:

> How is the person going to access the vehicle if, as may be the case, they find moving difficult? It is hard to see how, by itself, an automated vehicle could perform the same functions as, say, a minicab driver in assisting a passenger.[77]

In its CAM 2025 policy paper the Government committed to setting up a non-statutory advisory panel to "help design a national minimum standard for the accessibility of self-driving passenger service vehicles".[78]

68 POST, Digital technology in freight, PN 692, 3 February 2023, p2
69 Q191
70 Q191
71 Q202
72 CAM 2025, p19
73 Qq18 & 157; SMMT (SDV0023) para 6
74 Transport for All (SDV0045) section 6
75 Transport for All (SDV0045) Key messages
76 Transport for All (SDV0045) Key messages & section 5. See also CILT (SDV0031) para 49
77 RAC Foundation (SDV0026) section 1
78 CAM 2025, p 125

Is there demand for self-driving vehicles?

30. Professor Jack Stilgoe, Professor of Science and Technology Studies at UCL, argued that technology developers had "deliberately postponed [addressing] questions of business models, use cases and fit with other transport modes" and had not resolved who would benefit from self-driving technology and what problems it would solve.[79] He added:

> They are questions, ultimately, that we need to ask of the technology. We have let ourselves be led by the idea that more technology is good. Yes, but in what direction? […] if self-driving vehicles are the answer, what is the question? We still don't have a good signal on that.[80]

However, Professor Paul Newman from Oxbotica told us that "everything works back from the customer".[81] He explained:

> That could be the user, but also the public who are not electing to use it […] That is why the point about commercialisation and the first programmes that are commercially viable […] is so important. The customers and the public start to think, "That's helping us," and the economy sorts it out for you.[82]

31. Other witnesses were sceptical about self-driving vehicles. Christian Wolmar, author of the book 'Driverless Cars: On a Road to Nowhere', argued that little progress had been made in developing and introducing self-driving vehicles over the last decade despite "constant efforts by […] enthusiasts and companies to suggest that this is just around the corner".[83] He told us:

> You cannot have a half-driverless car. There has to be a moment when you rely completely on the technology […] taking the leap, particularly the leap to level four, where the car can drive itself all the time, even within a constrained area, might prove to be impossible in rain, at night-time and in places where there are lots of pedestrians—in every use case.[84]

He questioned the prudence of the Government's spending on self-driving vehicles, when "training somebody to drive a car or even a bus is not that difficult, and it doesn't take long".[85]

32. More broadly, Ed Houghton from DG Cities told us:

> Societally, we place driving licences, gaining the freedom of driving, as almost a part of our identity […] The vehicle becomes part of how we gain freedom […] The challenge that industry […] face[s] is that you have to disconnect the vehicle, the object, from somebody's identity.[86]

79 Jack Stilgoe et al (SDV0009)
80 Q165
81 Q86
82 Q86
83 Q234
84 Qq235 &238
85 Q235
86 Q246

33. **There is a broad range of possible uses for self-driving vehicles, and we believe they have the potential to improve transport connectivity with significant safety, productivity, and mobility benefits. However, over the last decade, progress in this technology has failed to meet many of its promoters' predictions, and this has bred understandable cynicism.**

34. **Hopefully expectations of self-driving vehicle technology have become more realistic. Self-driving vehicles that can go anywhere at any time remain purely hypothetical, but in more circumscribed forms they can become reality. Nobody is likely to be taking a self-driving vehicle the whole way from Land's End to John o' Groats anytime soon, if ever, but self-driving bus services may become commonplace sooner rather than later.**

35. ***In principle we welcome the introduction of self-driving vehicles, but the Government must take a cautious, gradual approach with the technology introduced only in well-defined and appropriate contexts. As such, we broadly welcome the strategy the Government has set out. However, without careful handling, self-driving vehicles could worsen congestion and exacerbate existing inequalities in transport access. The Government must ensure the introduction of self-driving vehicles is responsive to the wider population and meets the UK's transport goals.***

3 How safe are self-driving vehicles?

Possible benefits

36. The Government believes self-driving vehicles could make our roads safer.[87] In its CAM 2025 policy paper, the Government argued:

> Self-driving vehicles won't get tired or distracted. They won't worry about the children in the back seat, stress about their next meeting or be anxious to get home for dinner. They are likely to react more quickly than a human, remaining consistently able to assess how to drive safely in a fraction of a second.[88]

Setting out its case for the safety benefits of self-driving vehicles, it quoted research by the Institute for Engineering and Technology that for every 10,000 errors made by drivers, a self-driving vehicle will make just one.[89] It added that "human error […] is currently a factor in over 80 per cent of collisions that result in personal injury".[90]

37. Several witnesses also stressed the potential safety benefits.[91] The SMMT told us that its modelling showed "3,900 lives could be saved, and 47,000 serious accidents prevented this decade" by deploying self-driving vehicles.[92] Mark Shepherd, Assistant Director and Head of General Insurance for the Association of British Insurers, told us that more limited assisted driving systems, such as automated emergency braking, already appeared to be reducing collisions.[93] The trade body cautioned, however, that overall safety still depended on "the interactions between the human and the driving system".[94]

38. Not everyone was convinced.[95] While accepting that self-driving vehicles could potentially reduce casualties—by speeding less than human drivers, for example—Becky Guy from the Royal Society for the Prevention of Accidents told us that while many collisions involved human error there were often other contributory factors.[96] This view was shared by the Parliamentary Advisory Council for Transport Safety (PACTS) which said that accidents attributed to humans are often also caused by poor road and vehicle design and difficult driving conditions.[97]

39. More broadly, Christian Wolmar argued that "existing human drivers are better than you might think".[98] Dr David Metz, formerly Chief Scientist at the Department for Transport, agreed, stating that "in Britain there is one fatality per 140 million miles driven, so if [self-driving vehicles] are to do better than a human driver, fatalities will be exceedingly rare events".[99] National Highways said that there were several unanswered

87 CAM 2025, p 6
88 CAM 2025, p 6
89 DfT (SDV0052) para 59
90 DfT (SDV0052) para 2
91 Q20; Logistics UK (SDV0006); National Highways (SDV0039)
92 SMMT (SDV0023) para 22
93 Q120
94 ABI (SDV0051) para 7
95 Qq157 [Becky Guy] & 236; David Metz (SDV0003); PACTS (SDV0053) section 2; TfL (SDV0049) para 3.2
96 Q157
97 PACTS (SDV0053) section 2
98 Q236
99 David Metz (SDV0003)

questions about how self-driving vehicles will respond in emergency situations, such as how they would safely come to a stop and how they would make decisions on what to prioritise.[100]

40. The Minister told us his view was that "the safety benefits [of self-driving vehicles] are so great that once you get to a critical mass in particular uses, that is highly desirable".[101] He explained that the Government's modelling suggested that "you start to get that when 30 per cent or 40 per cent of the cars in a given context are self-driving […] If you have 80 per cent or 90 per cent, you get incredible benefits".[102] Asked how the Government would judge whether self-driving vehicles were making the UK's roads safer, he said "pretty close liaison" with the police would be needed as "the Department does not always have as much access as it would like to the specific circumstances of particular injuries or deaths".[103]

The Government's 'safety ambition'

41. The Government told us that in setting standards for self-driving vehicles it aims to "balance safety, innovation and public expectations".[104] To this end, it proposes that self-driving vehicles will be "expected to achieve an equivalent level of safety to that of a competent and careful human driver".[105] It explained that this was higher than that of the average human driver.[106] Between August and October 2022 it consulted on this "safety ambition", but it has not yet published an outcome to this consultation.[107] In time, the Government said, the ambition will inform a set of National Safety Principles.[108]

42. We heard two broad concerns about the Government's proposal: firstly, that "competent and careful" was too vague a formulation.[109] David Wong from the SMMT told us it lacked clear legal meaning, although he stressed that the organisation agreed with the term and the ambition.[110] Professor Khastgir from the University of Warwick said it would be difficult to "translate [the] abstract concept into something that can be implemented by engineering".[111]

43. Secondly, several witnesses thought the ambition too lax, and that a more stretching target should be set.[112] Ed Houghton from DG Cities told us that when conducting research on public attitudes to self-driving vehicles he asked participants:

> "How much safer does it need to be for you to want to use it over the longer term?" People said, "It needs to be twice as safe or 10 times as safe for me to use it." […] That is the level of expectation that consumers have […] It has to be the best they could ever experience for them to be able to trust it.[113]

100 National Highways (SDV0039)
101 Q267
102 Q267
103 Q276
104 DfT (SDV0052) para 60
105 DfT (SDV0052) para 61
106 DfT (SDV0052) para 61
107 HMG, Self-driving vehicles: new safety ambition, accessed 22 August 2022
108 DfT (SDV0052) para 43
109 Connected Places Catapult (SDV0035)
110 Q35. See also: PACTS (SDV0053) section 7
111 Q213. See also: Q33
112 Qq 134 & 239 [Simon Morgan]; PACTS (SDV0053) section 7. See also: Q172 [Jack Stilgoe & Ian Wainwright]
113 Q250

44. The Minister told us his ambition was "to put [the] standard into primary legislation". He was worried, however, that this could make it harder to raise the standard in future, so he was also considering an alternative approach such as "an ancillary piece of public communication—perhaps a speech by a Minister—which then allows the Department to upgrade it".[114] He said he expected the Government was "going to turn the screw a bit to try to get better performance overall".[115] Asked to define a competent and careful driver, Claire Wren from the Department for Transport said they would not break the speed limit, jump a red light or crowd a cyclist when overtaking.[116]

The role of the 'driver'

45. In its CAM 2025 policy paper, the Government explained that there will be two broad categories of self-driving vehicle: those expected to drive an entire journey without intervention and those in which the person in the driver's seat will be expected to take control in some circumstances.[117] As of September 2023, there are no self-driving vehicles of either sort that can be legally used on British roads in non-testing scenarios, although, as the Minister told us, he had just approved the use of Ford's BlueCruise technology, a level two assisted driving system in which the driver can take their hands off the wheel but remains legally in control of the vehicle at all times.[118]

46. In July 2022 the Highway Code was updated to clarify that when a self-driving vehicle in which the person in the driver's seat may be asked to retake control is in self-driving mode, that person may turn their attention from the road but must "always be able and ready to take control" when prompted.[119] This is not the case for more limited driver assistance systems where the drivers are required to "exercise proper control […] at all times".[120] The Government said it planned to put in place "a clear legal distinction between driver assistance and self-driving technologies".[121] While travelling in self-driving mode the 'driver' must stay awake, sober and in the driving seat and not use a hand-held passenger device such as a mobile or tablet so they are ready to take control.[122] The Association of British Insurers argued that this ban "should also extend to other forms of media such as e-readers, books, and related items".[123]

47. According to the Highway Code, if a self-driving vehicle needs to return control to the driver, "it will give you enough warning to do this safely".[124] This is known as a 'transition demand'. It is unclear how long that warning should be, although the Law Commissions made several recommendations about the form it should take.[125] The Government has

114 Q277
115 Q277
116 Q277
117 CAM 2025, pp 40–41
118 Q271; HMG, Self-driving vehicles listed for use in Great Britain, accessed 22 August 2023
119 DfT, The Highway Code, accessed 22 August 2023, Introduction
120 DfT, The Highway Code, accessed 22 August 2023, Rule 149
121 DfT (SDV0052) para 15
122 DfT, The Highway Code, accessed 22 August 2023, Rule 149; CAM 2025, p 105
123 ABI (SDV0051) para 25. See also: DfT, Safe performance of other activities in conditionally automated vehicles, 28 April 2021
124 DfT, The Highway Code, accessed 22 August 2023, Introduction
125 DAC Beachcroft LLP (SDV0012); Pinsent Masons LLP (SDV0048); RoSPA (SDV0021); Law Commission and Scottish Law Commission, Automated Vehicles: joint report, HC 1068, 26 January 2022, para 3.23–3.25

previously proposed at least ten seconds, which the Law Commissions said "may be adequate".[126] Professor Siddartha Khastgir from the University of Warwick told us there was no academic consensus, with "numbers of between two and 40 seconds" suggested.[127]

48. Pinsent Masons LLP, a law firm, told us that "considerable care" would be needed in deciding the "consequences if the transition demand is not accepted".[128] Professor Nick Reed from Reed Mobility told us:

> The risk is that the driver is not ready to resume control and that control is handed back. I think we will need monitoring of the driver, or the occupant of the driving seat, to show that they are indeed ready and able to take over, and also that the vehicle is capable of managing the situation should the driver not be ready or able.[129]

In its CAM 2025 policy paper the Government said that a user would not be prosecuted for failing to respond if the "vehicle issues a transition demand in a dangerous situation" or "if at the end of a transition demand the vehicle does not perform the expected minimum risk manoeuvre" such as finding a place to stop safely.[130]

49. A broader concern is how greater automation may affect drivers, both experienced and newly qualified, whose skills may fade or fail to develop.[131] This may be exacerbated by how self-driving technology changes the relationship between user and vehicle. Becky Guy from the Royal Society for the Prevention of Accidents told us:

> The role of the driver effectively moves from operating the vehicle to becoming a system supervisor. The real challenge is keeping that person engaged and in the loop of the vehicle […] Far from alleviating the driver of the driving task, these systems ask the driver to take control of the vehicle and make quite complex decisions.[132]

50. Several witnesses also stressed that users of self-driving vehicles must fully understand the capabilities and limitations of the technology.[133] Professor Khastgir termed this "informed safety", arguing that it should be the responsibility of self-driving vehicle developers to "impart this knowledge".[134] Several witnesses criticised manufacturers that gave their technology names which misrepresented its capabilities and called for greater regulation.[135] The SMMT told us that as part of AV-DRiVE, a government-led group of industry experts, it had published guiding principles for the marketing of self-driving vehicles.[136]

126 DfT, Safe use of Automated Lane Keeping System on GB motorways: call for evidence, 18 August 2020, para 2.6; Law Commission and Scottish Law Commission, Automated Vehicles: Summary of joint report, HC 1068, 26 January 2022, para 2.3
127 Q213. See also: Law Commission and Scottish Law Commission, Automated Vehicles: joint report, HC 1068, 26 January 2022, para 3.28
128 Pinsent Masons LLP (SDV0048)
129 Q38
130 CAM 2025, p 124
131 IAM RoadSmart (SDV0014) section 2; RoSPA (SDV0021)
132 Q172
133 Allianz (SDV0043) paras 3.1 & 3.3; Siddartha Khastgir (SDV0046) para 1.3
134 Siddartha Khastgir (SDV0046) para 1.3
135 Siddartha Khastgir (SDV0046) para 1.3; Pinsent Masons LLP (SDV0048)
136 SMMT (SDV0023) paras 101–102

51. The Minister told us it was "potentially likely to be an offence [for the user] not to be available for a transition request from a vehicle", for which there would be "severe sanctions".[137] He felt driving skill was unlikely to decline in the short term, with self-driving vehicle usage limited to major roads, but that it was something the Government was "going to have to watch".[138] The Government told us it intended to make it an offence "to market a vehicle as self-driving (or to use terminology that suggests self-driving) where that vehicle has not been authorised to drive itself".[139]

Interaction with other road users

52. Initially self-driving vehicles on British roads will only be permitted to drive themselves on certain roads and in certain conditions.[140] Nevertheless, self-driving vehicles will need to co-exist with other road users such as conventionally-driven vehicles, pedestrians, cyclists, motorcyclists and micro-mobility vehicles.[141] This co-existence will be conditioned by the speed and nature of the rollout of self-driving vehicles with, for example, motorway applications requiring fewer interactions.[142] We heard concerns from some witnesses that access to certain roads could be restricted in future to preclude certain interactions and ease the introduction of self-driving vehicles.[143] Dr Alex Kendall from Wayve told us in contrast that he expected different road users to coexist, at least "initially".[144]

53. Dr Kendall and Professor Paul Newman from Oxbotica, told us how vehicles with their technology worked. Professor Newman explained how self-driving software could be designed to understand its surroundings:

> You start by saying the first thing that we want to be able to explain is all the stuff around us, without saying what category of stuff it is […] You do not try to say, "I need to know what kind of object it is." You say, "There's an object over there and it's moving. I will be cautious. I will not get myself into a situation where, if it behaved unpredictably at the speed it's going, I would get myself into trouble."
>
> The interactions get built up through, if you like, a hierarchy from, "It's stuff; it's moving stuff; it is moving in the following way; I can predict its pattern. Oh, it's actually a cyclist or a tank or a horse," if you needed that at the top. Those interactions are built in. It is important to think of safety by design and not afterwards.[145]

Dr Kendall told us that Wayve's technology is designed to be "integrated and not to add nuisance or contradict".[146]

137 Q279
138 Q281
139 Qq307–308; CAM 2025, p 40
140 Qq54 & 310; Met Office (SDV0042) Overview & section 5; CAM 2025, p 40
141 Q25; Institute of Highway Engineers (SDV0013)
142 Qq35 & 169; WSP (SDV0016)
143 Q166; Historic and Classic Vehicles Alliance (SDV0029)
144 Qq 64 & 71
145 Q63
146 Q71

54. However, this "scenario-based" approach concerned some stakeholders. IAM RoadSmart, a road safety charity, felt it would be unable "to cover all the possible incidents that can arise on our roads".[147] Other witnesses were concerned that self-driving vehicles' sensors may be less able to detect and identify disabled, female or ethnic minority pedestrians.[148] David Wong from the SMMT told us that is "quite difficult to fine-tune the system to an acceptable level of safety that is robust and resilient enough to take into account reasonable edge cases".[149] However both he and Professor Nick Reed from Reed Mobility were confident that, in time and with sufficient resources, technical barriers could be surmounted.[150]

55. Professor Jack Stilgoe from UCL told us that there is "an important and potentially difficult set of conversations to be had about renegotiating the rules of the road which are currently designed around human navigation […] rather than machine readable".[151] He explained:

> zebra crossings are a really interesting one, a conversational piece of infrastructure in which there is negotiation between a pedestrian and a driver. That makes it a very hard thing for a self-driving vehicle to navigate, dealing with those moments of uncertainty.[152]

Other witnesses raised similar concerns, with Ian Wainwright from CILT suggesting that negotiating access to the kerbside could pose problems, particularly for commercial vehicles.[153]

56. We also heard concerns about how other road users would identify whether a vehicle was self-driving and how they might respond.[154] Becky Guy from the Royal Society for the Prevention of Accidents told us that many proposed solutions, which involve visual cues on the exterior of the vehicles, "might work where there is a single road user" but she struggled "to understand how they would work at busier and more complex junctions where there are lots of different road users".[155] David Wong from the SMMT told us about trials in another European country in which people were "playing chicken with these vehicles because they know the vehicle will stop if they step in front of it".[156]

57. The Minister told us he expected that the interaction of self-driving vehicles with "pedestrians and others who are road users" was something the Government was "going to be looking at".[157] Claire Wren from the Department for Transport, explained that CAVPASS was developing standards, but it had "only just started, and it is a really complicated thing".[158] She added:

147 IAM RoadSmart (SDV0014) section 2. See also: British Horse Society (SDV0004)
148 Q173 [Becky Guy]; Transport for All (SDV0045) section 3
149 Q30
150 Qq23 & 30
151 Q173
152 Q173. See also: Q215
153 Q175
154 Q254
155 Q173
156 Q30
157 Q278
158 Q278

> The different ways the different technologies think about, or rather consider that issue—"think" is probably the wrong word—are among the things that we will need to unpick and that will need to be presented as evidence.[159]

Public attitudes

58. Professor Khastgir from the University of Warwick told us the biggest challenge facing the sector was convincing the public that self-driving vehicles are safe. He argued that "we can have the safest technology […] but if we cannot convince the public […] they will never use it".[160] Professor Nick Reed from Reed Mobility explained that in his research most participants were soon bored by travelling in a self-driving vehicle, which he said was "what we want people to feel".[161] In contrast, Ed Houghton from DG Cities told us when conducting research as part of a self-driving vehicle trial, almost all participants said they would not have participated if the vehicle had not had a safety driver (a person in the driver's seat ready to retake control if necessary).[162] More broadly, DG Cities argued that self-driving vehicle developers were not engaging enough with the public and risked creating products that did not meet their needs.[163]

59. The Government's annual survey of public attitudes to transport technology found in 2023 that knowledge about self-driving vehicles is low compared to other new transport technologies.[164] Moreover, people identified disadvantages more readily than advantages, with those surveyed concerned about over-reliance on unproven technology and personal safety.[165] Fewer respondents identified advantages, such as reduced driver fatigue and better speed regulation, with older respondents far more likely to identify no advantages to greater use of self-driving vehicles.[166]

60. The Government told us its deliberative research had identified two key factors that influenced the public's perception of self-driving vehicles: evidence of safety, and regulation and oversight.[167] It also identified a potential tension between road safety and personal safety as "the removal of the human driver on public or shared transport led to the perceived risks to personal safety feeling more pronounced".[168] In July 2023 the Government published a broader qualitative report of attitudes to self-driving vehicles.[169]

61. The Minister told us that he expected "scare stories, particularly in the early stages" about self-driving vehicle safety and that it was "a really interesting question" whether the country would be "able to weather that moral panic in the pursuit of a future that might lead to an enormously larger number of people not dying".[170]

159 Q278
160 Q197
161 Q19
162 Q250
163 DG Cities (SDV0020)
164 Ipsos, Technology Tracker: Wave 9, 23 February 2023, p 16
165 Ipsos, Technology Tracker: Wave 9, 23 February 2023, p 16
166 Ipsos, Technology Tracker: Wave 9, 23 February 2023, pp 18–19
167 DfT (SDV0052) para 67
168 DfT (SDV0052) para 69
169 DfT, The Great Self-Driving Exploration A citizen view of self-driving technology in future transport systems, 13 July 2023
170 Q274

62. ***While it is widely assumed that self-driving vehicles will prove safer than human drivers, this is not a given. Optimistic predictions are often based on widespread self-driving vehicle usage that is decades away, or assertions about human error that ignore other risks. Safety must remain the Government's overriding priority as self-driving vehicles encounter real-world complexity. Given this, we question the Government's proposed ambition that self-driving vehicles must be as safe as a competent and careful human driver. This is too weak and too vague. The Government should set a clearer, more stretching threshold.***

63. ***Greater automation will reduce time spent driving. Over time drivers may become less practised and therefore less skilled. Conversely, the demands on drivers will grow as they will be called upon to retake control of vehicles in challenging circumstances with little notice. The Government should set out a strategy for the future of human driving in a world of self-driving vehicles. This should include possible changes to driving tests and a plan to ensure that all drivers fully understand self-driving vehicles and both acquire and maintain the necessary skills for taking control of a vehicle in all circumstances.***

64. **The introduction of self-driving vehicles to the UK's roads will affect all road users. We believe that this should not impose new responsibilities on other road users and pedestrians, limit their access to, or use of, public infrastructure or, crucially, make them less safe.**

4 What other risks do self-driving vehicles pose?

Cybersecurity

65. Self-driving vehicles pose cybersecurity risks, broadly because of their connected rather than automated capabilities.[171] David Wong from the SMMT explained that—whether conventional or self-driving—if a "vehicle is not connected it is very difficult to hack it or penetrate its communication system […] as long as it is connected it presents a cybersecurity risk".[172]

66. Nevertheless, cyberattacks may prove more dangerous if a vehicle is self-driven. Ashley Feldman, Transport and Smart Cities Programme and Policy Manager at Tech UK, a trade body, set out several "significant" risks:

> safety features of a vehicle could be hacked […] your steering, your braking, your acceleration and even the operation of the airbags […] could be taken over by a malicious actor […] Vehicles store within their infotainment systems, or similar systems, potentially personal and sensitive information […] that data could be breached […] A final way is something like a ransomware attack.[173]

Clyde and Co, a law firm, warned that fleets or models of self-driving vehicles could be targeted by "malicious, possibly terrorist, systemic hacking".[174]

67. Much of the regulation concerning cybersecurity for self-driving vehicles is formulated at an international level.[175] We heard that the UK has been heavily involved in this process, and that good work had also been done within the UK by various bodies.[176] We did, however, hear some concerns about a lack of skilled cybersecurity professionals in the UK.[177] We note that as part of a recent consultation, the Government acknowledged the growing demand for people with cybersecurity skills in the transport sector.[178]

68. In its CAM 2025 policy paper, the Government said it planned to consult on cybersecurity regulation for self-driving vehicles.[179] Ben Gardner, Senior Associate at Pinsent Masons LLP, explained how the Government proposes UK regulation will work in practice:

> The car manufacturer/systems developer will need to have […] certain systems and safeguards in place […] otherwise the vehicle will not be approved. There is an ongoing obligation to keep those systems up to date. There is then an obligation on the user, the owner, of the vehicle to

171 Qq 37 & 147; David Metz (SDV0003); NCC Group (SDV0011); SMMT (SDV0023) para 86
172 Q37
173 Q147
174 Clyde and Co (SDV0050) para 4.2
175 Qq 37 & 147–148
176 Qq 37 & 90
177 Q144; NCC Group (SDV0011)
178 DfT, Transport Labour Market and Skills Call for Views and Ideas Summary of Responses, 11 August 2022, p7
179 CAM 2025, p 123

> download those updates, to not jailbreak the vehicle, and to keep the vehicle security system to the required standard, as dictated by the entity that sold the vehicle to them in the first place.[180]

69. We heard mixed views about who should bear legal responsibility for ensuring software is up to date. The British Insurance Brokers' Association argued that the Government's proposal placed an "unreasonable burden" on consumers and instead manufacturers should be broadly held responsible for ensuring safety-critical updates were made.[181] Allianz, a large insurer, disagreed, stating that until software updates can be carried out automatically customers should be responsible.[182] A broader question, raised by Allianz, was how software would be maintained if a manufacturer or software developer ceased trading.[183]

70. The Minister told us that "in some respects it looks like it is inevitable, that there will be [cyberattacks] and that some of them will be successful", although he argued that "more autonomous the vehicle is, the less you can get the mass destructive effects".[184] The Government told us it was working with the National Cyber Security Centre to forestall potential threats.[185]

Insurance

71. The Automated and Electric Vehicles Act 2018 set out how self-driving vehicles involved in road traffic accidents are treated for insurance purposes.[186] Mark Shepherd from the Association of British Insurers, explained that the legislation extended compulsory motor insurance requirements "to cover the vehicle as well as the driver" when a vehicle is classified as self-driving.[187] It also set various limitations on insurers' liability as well as requiring that the Secretary of State maintain a list of relevant self-driving vehicles to which the legislation would apply.[188] This list has, to date, been empty.[189] Mr Shepherd told us it was unclear how this listing process would work in practice.[190]

72. Mr Shepherd predicted a period of "great uncertainty" for the insurance sector with "different types of vehicles with different technologies interacting with each other in real-world driving situations".[191] The Motor Insurers' Bureau, a not-for-profit organisation which compensates victims of accidents involving uninsured drivers, told us it was concerned that "as things stand, third party victims of accidents caused by uninsured [self-driving vehicles] may potentially have no route to compensation".[192] This concern

180 Q148
181 BIBA (SDV0047) paras 2 & 14
182 Allianz (SDV0043) para 2.6
183 Allianz (SDV0043) para 2.6
184 Qq286–287
185 DfT (SDV0052) para 38
186 Automated and Electric Vehicles Act 2018
187 Q111
188 HoC Library, Automated and Electric Vehicles Act 2018, CBP 8118, 15 August 2018, section 2. See also: Q111 [Mark Shepherd]
189 HMG, Self-driving vehicles listed for use in Great Britain, accessed 22 August 2023
190 Q137
191 Q113
192 MIB (SDV0040)

was shared by the law firm Clyde and Co LLP.[193] In its CAM 2025 policy paper, the Government said it would "work closely" with the Bureau to solve the issue before self-driving vehicles are on the road.[194]

73. A related concern was that a large cyber-terrorist attack targeting the operating systems of many self-driving vehicles simultaneously could cause mass casualties. Such an event could also bankrupt insurance companies.[195] Clyde and Co LLP questioned the current legal liability framework, suggesting:

> Alternative solutions may be required because of the very wide potential exposures. Those might involve government bodies or funds or even innovative reinsurance approaches modelled, for example, on the protection afforded by Pool Re for property terrorism risks.[196]

The Minister accepted that such a "black swan event" could affect insurance companies, the Motor Insurers' Bureau and other stakeholders in unanticipated ways and assured us that the Treasury was aware of the issue.[197]

74. Mr Shepherd called for insurers to have access to basic collision data from self-driving vehicles to help them establish liability.[198] He argued that this should be "stored on an independent and secure third-party server".[199] Professor Jack Stilgoe from UCL told us that "a regime of data sharing […] is absolutely key" to ensure self-driving vehicles operate safely, although Ian Wainwright from CILT warned that some firms may be concerned about commercial sensitivity.[200]

75. The Minister told us that he expected insurance of self-driving vehicles "to be a very live topic of conversation over the next two or three years".[201] He used the analogy of the police having "powers now to check someone's mobile phone if they want to work out what their movements were" to explain how self-driving vehicle data may be used in future accident investigations.[202] Concerning retention of vehicle data, he reiterated the Government's position that a period which "reflects the three years' personal liability plus an extra three months to be on the safe side […] is probably the right balance".[203] In its CAM 2025 policy paper the Government committed to consult on a new data regime and code of practice on data disclosure.[204]

Roadworthiness and inspection

76. Most road vehicles must pass an MOT after three years and then each subsequent year.[205] The Government told us it planned to "establish a new regulatory regime to

193 Clyde and Co (SDV0050) para 2.4
194 CAM 2025, p 126
195 Q289; Clyde and Co (SDV0050) para 4.1–4.3; MIB (SDV0040)
196 Clyde and Co (SDV0050) para 4.3
197 Qq289–290
198 Q150
199 Q150
200 Q173
201 Q291
202 Q292
203 Q391
204 CAM 2025, p 126
205 HMG, Getting an MOT, accessed 22 August 2023

monitor the ongoing safety of self-driving vehicles".[206] Under this regime owners of self-driving vehicles with the functionality to both be driven or drive themselves for some or all of the journey will remain legally responsible for their vehicle's roadworthiness, but not the behaviour of the vehicle when it is driving itself.[207] The DVSA, which regulates and accredits MOT providers, told us it was working with the Department to understand what changes may be needed.[208]

77. Designing this new regulatory regime may be challenging given the greater complexity of self-driving vehicles.[209] Steve Gooding from the RAC Foundation explained:

> Historically, we have had very clear demarcation. Testing whether a vehicle is roadworthy is largely an engineering exercise, and we test drivers as a human exercise. Now, we are going to have to put the two together and find a way of testing a vehicle that takes real-time decisions.[210]

More specifically, the Association of British Insurers recommended the new regime should ensure cameras and sensors work and that safety-critical software updates are up to date.[211]

78. Claire Wren from the Department for Transport, accepted that "we will absolutely need to think about the roadworthiness of vehicles".[212] She told us that cars with limited self-driving capabilities such as automated lane keeping would be "MOT-ed in the same way" but was less clear about how what she described as "the pods, no-driving-wheel situation" vehicles would be tested.[213] The Minister said he could "imagine that sensors will become like tyres".[214] Ms Wren explained that if one broke the "organisation responsible for the vehicle" would be responsible for getting the sensor fixed promptly.[215]

79. **Connected vehicles pose new dangers, which the law must evolve to meet. A safety-led culture will require wide access to data, and this must be a higher priority than commercial confidentiality. Ensuring self-driving vehicles are roadworthy will be more complicated than for conventional vehicles, not least because there is more that can go wrong. Legal liability also becomes more complex as it is shared between owner and operator. The Government explained broadly how its new regulatory regime will work but accepted that more thinking was needed about how this will work in practice.**

80. ***The Government has put good structures in place, but it is not enough just to participate in or facilitate conversations about unresolved policy issues, including access to data, verifying roadworthiness, legal liability and insurance implications. If self-driving vehicles are to be deployed on our roads by 2025, safely and successfully, the Government must take the lead to resolve these issues.***

206 DfT (SDV0052) para 48
207 Q293–295; DfT (SDV0052) para 12
208 HC 1645, Qq2 & 70
209 Q31 [Steve Gooding]; ABI (SDV0051) para 33; Pinsent Masons LLP (SDV0048)
210 Q31
211 ABI (SDV0051) para 33. See also: Allianz (SDV0043) para 2.6
212 Q297
213 Q297
214 Q298
215 Q298

5 What infrastructure will be needed?

Physical infrastructure

81. To operate safely, self-driving vehicles, like conventional vehicles, will require well-maintained roads, distinct markings, and unobscured signage.[216] Good quality road marking and signage are particularly important so self-driving vehicles can, using their cameras and sensors, recognise, and react to, the road environment.[217] National Highways told us that self-driving vehicles may require better maintained roads than conventional vehicles, although Professor Paul Newman from Oxbotica disagreed.[218] Irrespective of this, some roads, particularly those managed by local authorities, are in poor condition and need improvement.[219]

82. We heard mixed views about whether self-driving vehicles would require new physical infrastructure such as tailored signage.[220] Wayve told us vehicles using its technology would "coexist safely with current road designs".[221] However, Allianz doubted that the UK's roads were ready for the "widespread adoption" of self-driving vehicles.[222] Given this uncertainty, maintaining consistency in the design of key road features seems the best approach for now.[223]

83. In future, balancing the infrastructure needs of self-driving vehicles, conventional vehicles and other road users may be challenging. Professor Jack Stilgoe from UCL cautioned that transport planners will have to consider whether "investments will provide wider benefits across modes of transport, or if the benefits will accrue disproportionately to developers and users of self-driving vehicles".[224] Ultimately, as the Royal Society for the Prevention of Accidents stressed, shared infrastructure must be open to, and suitable for, all.[225]

84. The Minister ruled out a specific budget to prepare the UK's roads for self-driving vehicles, although he acknowledged the difficulties some smaller local authorities could face in doing so.[226] Claire Wren from the Department for Transport told us that self-driving vehicles "will need to be able to use existing infrastructure", although new signage such as hazard warnings around corners may be considered in the future.[227]

216 Qq52, 72 & 223 [Peter Stephens]; National Highways (SDV0039); IAM RoadSmart (SDV0014) section 3; SMMT (SDV0023) para 95; Jack Stilgoe et al (SDV0009); Tech UK (SDV0027) section 3; Urban Transport Group (SDV0022) para 3.22; WSP (SDV0016)
217 Qq35 & 52; Reed Mobility (SDV0008) para 3; SMMT (SDV0023) para 86
218 Q72; National Highways (SDV0039). See also: Q223; Urban Transport Group (SDV0022) para 3.22
219 Qq 53 & 252; Institute of Highway Engineers (SDV0013); Road Safety Markings Association (SDV0041)
220 Qq52–53; Allianz (SDV0043) para 1.2; ABI (SDV0051) para 28; National Highways (SDV0039); Tech UK (SDV0027) section 3
221 Wayve (SDV0036)
222 Allianz (SDV0043) para 1.2
223 Reed Mobility (SDV0008) para 11; Urban Transport Group (SDV0022) para 2.8
224 Jack Stilgoe et al (SDV0009)
225 Royal Society for the Prevention of Accidents (SDV0021)
226 Qq304–306
227 Q305. See also: DfT (SDV0052) paras 31–35

Digital infrastructure

85. To work well, most self-driving vehicles need at least intermittent digital connectivity.[228] As Professor Newman from Oxbotica explained, "if you want to tell [the vehicle] what to do […] you have to be able to communicate with it".[229] David Wong from the SMMT told us:

> The [vehicle's] path planning software will require information on, for example, what is happening a mile ahead or five miles ahead. That means vehicle-to-network connectivity must be decent enough on the roads in this country.[230]

DAC Beachcroft LLP, a law firm, emphasised the importance of connectivity to the provision of timely security updates.[231]

86. However, digital coverage across the UK's roads is uneven, and generally worse in rural areas.[232] As part of the Shared Rural Network project, mobile network operators have targeted 95 per cent 4G coverage by at least one operator across the UK by the end of 2025.[233] Ashley Feldman from Tech UK praised the work of the Government, alongside National Highways, in this area, but called for it to play a more "co-ordinating role" between local authorities, mobile network operators and the self-driving vehicle sector.[234]

87. Several witnesses called for greater digitisation of traffic restrictions and kerbsides to allow self-driving vehicles to navigate the road network.[235] National Highways told us about the broader work it is undertaking as part of its Digital Roads Strategy.[236] We will examine these issues more broadly as part of our inquiry into the future of transport data.[237]

88. The Minister said that it was "not acceptable" that there are parts of the country that do not get a 4G signal and are therefore "inaccessible" to self-driving vehicles, but that he was sure mobile network operators were aware they must upgrade their networks.[238] He stressed the importance of the Government's National Data Strategy.[239] The Government said that self-driving vehicles would need physical networks and digital records to match, and that work may be needed to "reconcile the two".[240]

89. ***Self-driving vehicles will need well-maintained roads and signage, nationwide connectivity, and up-to-date digital information about the road network. While***

228 Qq 52, 72, 80, 90 & 224; DAC Beachcroft LLP (SDV0012); DfT (SDV0052) para 33; Reed Mobility (SDV0008) para 11; SMMT (SDV0023) paras 87–89; Urban Transport Group (SDV0022) para 2.7
229 Q72
230 Q52
231 DAC Beachcroft LLP (SDV0012)
232 Q52; DfT (SDV0052) para 33; Tech UK (SDV0027) section 3.1; Ofcom, Connected Nations 2022, 19 December 2022, p 35
233 Shared Rural Network, Forecast Coverage Improvements by Region, accessed 22 August 2023; DCMS, Shared Rural Network, 9 March 2020
234 Q142; Tech UK (SDV0027) section 3.1
235 Q168; British Parking Association (SDV0028)
236 National Highways (SDV0039)
237 Transport Committee, Transport Committee launches new inquiry into future uses of data to improve transport, 30 June 2023
238 Q303
239 Q317; HMG, National Data Strategy, 9 December 2020
240 CAM 2025, p 88

some steps have been taken towards this by the Government and public bodies, these preparations are too siloed and divorced from broader planning. If the Government is serious about self-driving vehicles, it should ensure meeting their needs is an integral part of future infrastructure strategy.

6 What legal changes are needed?

Current legal framework

90. We heard that the laws governing self-driving vehicles have not kept pace with innovation in the sector.[241] Ben Gardner from Pinsent Masons LLP explained:

> A lot of the UK road legislation was drafted esoterically […] there are gaps and grey areas, which create some uncertainty as to whether certain types of technology and functionalities in road vehicles are legal or not.[242]

The law firm told us the "the scale of the task is huge", with legislation needed to cover vehicle approvals, liability for accidents, cybersecurity, and the use of personal data.[243]

91. This legal uncertainty causes problems across modes. Peter Stephens from Stagecoach, a large bus operator, told us that it "is not just about the passenger car", as sector-specific regulation would be needed.[244] Lisa Johnson from Starship Technologies, a delivery firm, said it was "crying out for regulation" as its pavement-based robots were "operating in a grey area legislatively".[245]

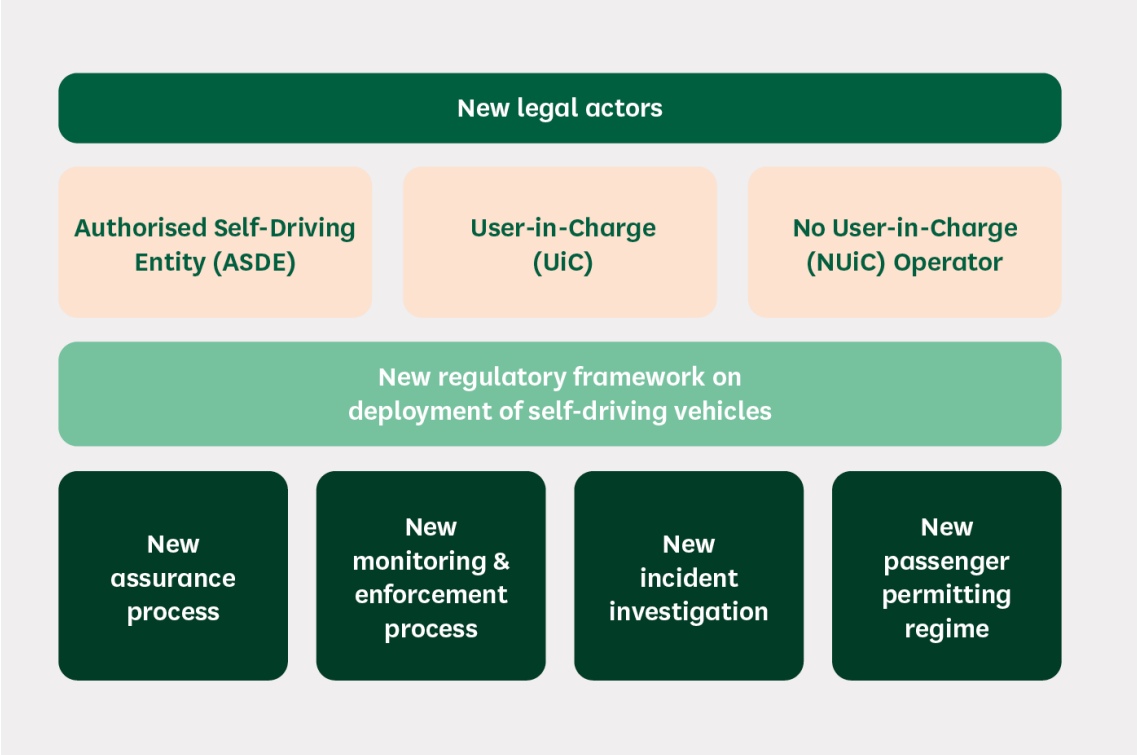
92. While witnesses praised the UK's testing environment for self-driving technology, and the non-binding code of practice, several told us that regulatory changes were needed to allow more advanced trials.[246] David Wong from the SMMT told us that the "next frontier […] is to remove the safety driver altogether, whether the safety driver is inside the vehicle or remote".[247] Other recommendations from witnesses were to clarify the validity of virtual testing and to increase oversight with the introduction of a national trials database.[248] The Government told us it was considering updates to the code of practice to "further support advanced trials".[249]

Government's proposals

93. In its CAM 2025 policy paper the Government set out its plans for new primary legislation intended to ensure the safe and responsible deployment of self-driving vehicles by defining a self-driving vehicle, creating new legal roles and clarifying how self-driving vehicles will be approved and authorised.[250] It told us that this framework will be based on the multi-year review of legislation it had asked the Law Commissions of England and Wales and of Scotland to conduct.[251] The main elements of the Government's proposals, as taken from CAM 2025, are shown below:

241 Qq106, 115 [Ben Gardner], 118, 140 [Ben Gardner], 198 [Lisa Johnson] & 229; DfT (SDV0052) para 40
242 Q140
243 Pinsent Masons LLP (SDV0048)
244 Q229
245 Q198
246 Qq108, 111 & 213; Tech UK (SDV0027) section 2.3
247 Q19
248 Qq 34 & 213; TfL (SDV0049) para 3.4
249 Q324; DfT (SDV0052) para 20
250 CAM 2025, p 32–53
251 DfT (SDV0052) para 41; Law Commission and Scottish Law Commission, Automated Vehicles: joint report, HC 1068, 26 January 2022

Figure 1: Key elements of the proposed primary legislation



Source: CAM 2025, page 45

94. The new legal actors, and related terminology, include:

- **User-in-Charge (UiC)**: an individual who is in the vehicle and in a position to be in control when the vehicle is not driving itself. When the vehicle is driving itself, the UiC is no longer responsible for the behaviour of the vehicle.
- **No User-in-Charge (NUiC)**: refers to a vehicle that can be self-driving for an entire journey, during which any human in the vehicle would be merely a passenger.
- **Authorised Self-driving Entity (ASDE)**: the entity responsible for the behaviour of a vehicle when it is self-driving. It is likely to be a vehicle manufacturer or software developer (or a partnership between the two). If a self-driving vehicle breaks a traffic law while it is driving itself, for example by driving in a bus lane, the human occupants will not be responsible; instead the ASDE will be responsible and could be subject to regulatory sanctions.
- **NUiC operator**: a licensed operator which would be responsible for overseeing the wider operation of a NUiC vehicle and taking on the non-dynamic driving task responsibilities, such as ensuring the vehicle has appropriate insurance, that would otherwise remain with the User-in-Charge.[252]

95. Concerning the proposed authorisation process, the Government said:

> Before any self-driving vehicle is allowed to drive itself on our roads, it must go through two stages. It must first meet appropriate technical safety

252 DfT (SDV0052) paras 51–54; CAM 2025, p 32–53

> standards […] It must then be 'authorised' to drive itself by government […] Once authorised, a UiC vehicle would be able to lawfully drive itself on public roads in authorised circumstances. Any vehicle authorised with a NUiC feature could only have that feature engaged under the oversight of a licensed NUiC operator, and subject to conditions set at authorisation.[253]

96. We heard broad support for the Government's legislative proposals, and the work of the Law Commissions underpinning them.[254] Dr Alex Kendall from Wayve told us it was "really happy" with the Law Commissions' "balanced […] proactive approach".[255] He said that "the recommendations, in particular for primary legislation, are what we need".[256] Professor Nick Reed of Reed Mobility described the Law Commissions' work as "superb" while Professor Paul Newman from Oxbotica told us they were the "best-thought-out plans" he had seen globally.[257] Christian Wolmar, however, was less impressed, arguing that "none of the fundamental questions have been answered […] They need to be answered first before you get the legislation".[258]

97. We note that the Government's proposals do not address every concern our witnesses had about self-driving vehicle legislation. For example, while the Government accepts that there is "no specific provision" for delivery robots it has only committed to consider "research to inform possible ways forward in this area".[259] Simon Morgan, Chair of the Traffic Signs Panel at the Institute of Highway Engineers, worried that the Government had paid too little attention to how civil penalties will be enforced on self-driving vehicles that commit traffic law infractions.[260]

Legislative timetable

98. The Government told us that self-driving vehicle technologies and services will not be successful in the UK unless "a robust regulatory framework" is put in place.[261] Prospective legislation was included in the May 2022 Queen's Speech.[262] In its CAM 2025 policy paper, published in August 2022, the Government said that it was "committed to bringing forward legislation on self-driving vehicles in the forthcoming Transport Bill".[263] It said that this would set out "the broad structure of the framework, with further detail to be developed and set out in secondary legislation".[264] However, in April 2023, Rt Hon Mark Harper MP, the Secretary of State for Transport, could not guarantee this would happen. He warned us that parliamentary time was likely to be "very congested" and that other sectors' needs may be prioritised.[265]

253 CAM 2025, p 42
254 Qq 123, 131–132, & 227; IAM RoadSmart (SDV0014) section 5
255 Q87
256 Q87
257 Qq 58 & 87
258 Q258
259 HC Deb, 27 March 2023, 169239W
260 Q256
261 DfT (SDV0052) para 40
262 HMG, Queen's Speech 2022, 10 May 2022; HMG, Queen's speech 2022: background briefing notes, 10 May 2022, pp 30–31
263 CAM 2025, p 27
264 CAM 2025, p 26
265 HC 163, Q541–2

99. Throughout our inquiry we heard widespread concern about the delay to primary legislation.[266] We were told repeatedly that progress was urgently needed lest the UK miss its 2025 target, fall behind its international competitors and risk innovative firms moving elsewhere.[267] Tech UK warned that "the EU, France and Germany all have regulations in place" for self-driving vehicles.[268] Professor Paul Newman from Oxbotica told us that the Government had "done the hard part of the thinking" but now it had to do the "do-age".[269]

100. Moreover, Professor Khastgir from the University of Warwick told us:

> If we had a magic wand and tomorrow, we had primary legislation, we still could not approve the technology because we do not know what the detailed safety requirements are […] That is somewhere that I feel they need to do more.[270]

Professor Jack Stilgoe from UCL agreed that "some of this is about primary legislation, but a lot of it will be about the redesign of institutions and the design of regulatory functions—a sort of secondary legislative process".[271]

101. The Minister told us that he thought the Government was "in a very good place and ahead of the game", although he accepted that "we need to get legislation through".[272] He said that legislative preparations were "highly" advanced, and it was not "impossible at all" that some self-driving vehicle applications would be "in place" to meet the 2025 deadline.[273]

102. **The current laws for self-driving vehicles are archaic and limiting, especially concerning testing and legal liability. We commend the work of the Law Commissions and the Government in devising a new legal framework. That framework has broad support, albeit with more detail needed in some areas. This makes it deeply disappointing that the Government will not commit to legislating in this Parliament to put this framework in place.**

103. ***The self-driving vehicle sector is a British success story. We were impressed, unfailingly so, by the energy, creativity, and expertise of all those we met, whether from industry, academia, Government or somewhere in between. We have a competitive advantage, and we must maintain it. To do this the Government must bring forward and pass comprehensive legislation in the next parliamentary session to put in place the robust regulatory framework it promised. Failing to do so will do significant and lasting damage both to the UK's self-driving vehicle industry and to this country's reputation as a trailblazer. We recommend that legislation be brought forward as a matter of urgency, with an expectation that any legislation will have to be regularly reviewed and updated subsequently as technology evolves.***

266 Qq 58, 87–88, 152 & 229; Tech UK (SDV0027) section 4; Wayve (SDV0036)
267 Q32
268 Tech UK (SDV0027) section 1. See also: Q31 [David Wong]; European Scrutiny Committee, Twelfth Report of Session 2022–23, 17 January 2023, HC 119-xi, Chapter 1
269 Q87
270 Q227
271 Q178
272 Q318
273 Q318–320

Conclusions and recommendations

How could self-driving vehicles be used?

1. There is a broad range of possible uses for self-driving vehicles, and we believe they have the potential to improve transport connectivity with significant safety, productivity, and mobility benefits. However, over the last decade, progress in this technology has failed to meet many of its promoters' predictions, and this has bred understandable cynicism. (Paragraph 33)

2. Hopefully expectations of self-driving vehicle technology have become more realistic. Self-driving vehicles that can go anywhere at any time remain purely hypothetical, but in more circumscribed forms they can become reality. Nobody is likely to be taking a self-driving vehicle the whole way from Land's End to John o' Groats anytime soon, if ever, but self-driving bus services may become commonplace sooner rather than later. (Paragraph 34)

3. *In principle we welcome the introduction of self-driving vehicles, but the Government must take a cautious, gradual approach with the technology introduced only in well-defined and appropriate contexts. As such, we broadly welcome the strategy the Government has set out. However, without careful handling, self-driving vehicles could worsen congestion and exacerbate existing inequalities in transport access. The Government must ensure the introduction of self-driving vehicles is responsive to the wider population and meets the UK's transport goals.* (Paragraph 35)

How safe are self-driving vehicles?

4. *While it is widely assumed that self-driving vehicles will prove safer than human drivers, this is not a given. Optimistic predictions are often based on widespread self-driving vehicle usage that is decades away, or assertions about human error that ignore other risks. Safety must remain the Government's overriding priority as self-driving vehicles encounter real-world complexity. Given this, we question the Government's proposed ambition that self-driving vehicles must be as safe as a competent and careful human driver. This is too weak and too vague. The Government should set a clearer, more stretching threshold.* (Paragraph 62)

5. *Greater automation will reduce time spent driving. Over time drivers may become less practised and therefore less skilled. Conversely, the demands on drivers will grow as they will be called upon to retake control of vehicles in challenging circumstances with little notice. The Government should set out a strategy for the future of human driving in a world of self-driving vehicles. This should include possible changes to driving tests and a plan to ensure that all drivers fully understand self-driving vehicles and both acquire and maintain the necessary skills for taking control of a vehicle in all circumstances.* (Paragraph 63)

6. The introduction of self-driving vehicles to the UK's roads will affect all road users. We believe that this should not impose new responsibilities on other road users and pedestrians, limit their access to, or use of, public infrastructure or, crucially, make them less safe. (Paragraph 64)

What other risks do self-driving vehicles pose?

7. Connected vehicles pose new dangers, which the law must evolve to meet. A safety-led culture will require wide access to data, and this must be a higher priority than commercial confidentiality. Ensuring self-driving vehicles are roadworthy will be more complicated than for conventional vehicles, not least because there is more that can go wrong. Legal liability also becomes more complex as it is shared between owner and operator. The Government explained broadly how its new regulatory regime will work but accepted that more thinking was needed about how this will work in practice. (Paragraph 79)

8. *The Government has put good structures in place, but it is not enough just to participate in or facilitate conversations about unresolved policy issues, including access to data, verifying roadworthiness, legal liability and insurance implications. If self-driving vehicles are to be deployed on our roads by 2025, safely and successfully, the Government must take the lead to resolve these issues.* (Paragraph 80)

What infrastructure will be needed?

9. *Self-driving vehicles will need well-maintained roads and signage, nationwide connectivity, and up-to-date digital information about the road network. While some steps have been taken towards this by the Government and public bodies, these preparations are too siloed and divorced from broader planning. If the Government is serious about self-driving vehicles, it should ensure meeting their needs is an integral part of future infrastructure strategy.* (Paragraph 89)

What legal changes are needed?

10. The current laws for self-driving vehicles are archaic and limiting, especially concerning testing and legal liability. We commend the work of the Law Commissions and the Government in devising a new legal framework. That framework has broad support, albeit with more detail needed in some areas. This makes it deeply disappointing that the Government will not commit to legislating in this Parliament to put this framework in place. (Paragraph 102)

11. *The self-driving vehicle sector is a British success story. We were impressed, unfailingly so, by the energy, creativity, and expertise of all those we met, whether from industry, academia, Government or somewhere in between. We have a competitive advantage, and we must maintain it. To do this the Government must bring forward and pass comprehensive legislation in the next parliamentary session to put in place the robust regulatory framework it promised. Failing to do so will do significant and lasting damage both to the UK's self-driving vehicle industry and to this country's reputation as a trailblazer. We recommend that legislation be brought forward as a matter of urgency, with an expectation that any legislation will have to be regularly reviewed and updated subsequently as technology evolves.* (Paragraph 103)

Formal minutes

Tuesday 5 September 2023

Members present:

Iain Stewart, in the Chair

Mike Amesbury

Jack Brereton

Ruth Cadbury

Paul Howell

Grahame Morris

Gavin Newlands

Report considerartion

Draft Report (*Self-driving vehicles*), proposed by the Chair, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 103 read and agreed to.

Summary agreed to.

Resolved, That the Report be the Seventh Report of the Committee to the House.

Ordered, That the Chair make the Report to the House.

Ordered, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

Adjournment

[Adjourned till tomorrow at 9.30 am

Witnesses

The following witnesses gave evidence. Transcripts can be viewed on the inquiry publications page of the Committee's website.

Wednesday 26 October 2022

Steve Gooding, Chief Executive, RAC Foundation; **David Wong**, Senior Technology and Innovation Manager, Society of Motor Manufacturers and Traders (SMMT); **Professor Nick Reed**, Founder, Reed Mobility — Q1–58

Professor Paul Newman, founder and Chief Technology Officer, Oxbotica; **Dr Alex Kendall**, founder and Chief Executive, Wayve — Q59–104

Wednesday 16 November 2022

Ashley Feldman, Transport and Smart Cities Programme and Policy Officer, techUK; **Mark Shepherd**, Assistant Director and Head of General Insurance Policy, Association of British Insurers (ABI); **Ben Gardner**, Senior Associate, Pinsent Masons LLP — Q105–154

Becky Guy, Road Safety Manager, Royal Society for the Prevention of Accidents; **Professor Jack Stilgoe**, Professor of Science and Technology Policy, University College London; **Ian Wainwright**, Chair of Freight and Logistics Policy Group, Chartered Institute of Logistics and Transport (CILT) — Q155–187

Wednesday 8 March 2023

Lisa Johnson, UK Director of Public Affairs, Starship Technologies; **Professor Siddartha Khastgir**, Head of Verification and Validation for Connected and Autonomous Vehicles, University of Warwick; **Peter Stephens**, Policy and External Affairs Director, Stagecoach — Q188–232

Simon Morgan, Chair of Traffic Signs Panel, Institute of Highway Engineers; **Mr Christian Wolmar**; **Ed Houghton**, Head of Research and Service Design, DG Cities — Q233–260

Wednesday 17 May 2023

Rt Hon Jesse Norman MP, Minister of State, Department for Transport; **Claire Wren**, Director for Future Transport Systems and Environment, Department for Transport — Q261–324

Published written evidence

The following written evidence was received and can be viewed on the inquiry publications page of the Committee's website.

SDV numbers are generated by the evidence processing system and so may not be complete.

1 AXA UK (SDV0010)

2 Allianz Insurance (SDV0043)

3 Association of British Insurers (SDV0051)

4 British Horse Society (SDV0004)

5 British Insurance Brokers' Association (SDV0047)

6 British Parking Association (SDV0028)

7 By Miles (SDV0032)

8 Carsten, Professor Oliver (Professor of Transport Safety, University of Leeds) (SDV0018)

9 Cha, Dr Kyungjoo (Senior lecturer, Bournemouth University) (SDV0005)

10 Clyde & Co LLP (SDV0050)

11 Connected Places Catapult (SDV0035)

12 DAC Beachcroft LLP (SDV0012)

13 DG Cities (SDV0020)

14 DRIVING MOBILITY (SDV0007)

15 Department for Transport (SDV0052)

16 Estevez, Julian (Assistant Professor, Faculty of Engineering of Gipuzkoa, University of the Basque Country (UPV/EHU)) (SDV0017)

17 Historic and Classic Vehicles Alliance (SDV0029)

18 Huda, Dr M Nazmul (Senior Lecturer, Brunel University London); and Galvao, Mr Luiz (PhD Student, Brunel University London) (SDV0015)

19 IAM RoadSmart (SDV0014)

20 ITS United Kingdom (SDV0034)

21 Institute of Highway Engineers (SDV0013)

22 Khastgir, Dr Siddartha (Head of Verification and Validation, Intelligent Vehicles, WMG, University of Warwick) (SDV0046)

23 Logistics UK (SDV0006)

24 Metz, Dr David (honorary professor, Centre for Transport Studies, University College London) (SDV0003)

25 Motor Insurers' Bureau (SDV0040)

26 Murray, Mr Ian (SDV0001)

27 NCC Group (SDV0011)

28 National Highways (SDV0039)

29 Papafoti, Dr Lamprini (SDV0037)

30 Parliamentary Advisory Council for Transport Safety (PACTS) (SDV0053)

31 Pinsent Masons LLP (SDV0048)

32 Plant, Dr Katherine (Associate Professor, University of Southampton); and Merriman, Miss Siobhan (PhD student, University of Southampton) (SDV0038)

33 Project 3 Mobility R&D UK (SDV0033)

34 RAC Foundation (SDV0026)

35 Reed Mobility (SDV0008)

36 Road Safety Markings Association (SDV0041)

37 Schafer, Professor Burkhard (Professor of Computational Legal Theory, The University of Edinburgh) (SDV0030)

38 Society of Motor Manufacturers and Traders (SMMT); and Members of SMMT (SDV0023)

39 Stagecoach (SDV0044)

40 Starship Technologies (SDV0019)

41 Stilgoe, Professor Jack (Professor of science and technology policy, University College London); and Parkhurst, Professor Graham (Professor, UWE) (SDV0009)

42 Stones, Dr Hannah (Lecturer in Law (Technology Law), University of Plymouth) (SDV0002)

43 Taylor, Mr Christopher; and Taylor, Mrs Nicole (SDV0025)

44 techUK (SDV0027)

45 The Chartered Institute of Logistics and Transport (UK) (SDV0031)

46 The Met Office (SDV0042)

47 The Royal Society for the Prevention of Accidents (RoSPA) (SDV0021)

48 Transport for All (SDV0045)

49 Transport for London (TfL) (SDV0049)

50 Urban Transport Group (SDV0022)

51 Vesos Solutions Limited (SDV0024)

52 WSP (SDV0016)

53 Wayve (SDV0036)

List of Reports from the Committee during the current Parliament

All publications from the Committee are available on the publications page of the Committee's website.

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2nd	The Integrated Rail Plan for the North and Midlands	HC 292
3rd	Fuelling the future: motive power and connectivity	HC 159
4th	Implementation of the National Bus Strategy	HC 161
5th	Maritime 2050	HC 160
6th	Strategic road investment	HC 904
1st Special	UK aviation: reform for take-off: Government response to the Committee's Fifth Report of Session 2021–22	HC 542
2nd Special	Road freight supply chain: Government response to the Committee's First Report	HC 701
3rd Special	Road Pricing: Government Response to the Committee's Fourth Report of Session 2021–22	HC 1178
4th Special	Fuelling the future: motive power and connectivity: Government response to the Committee's Third Report	HC 1382
5th Special	Maritime 2050: Government Response to the Committee's Fifth Report	HC 1420
6th Special	Implementation of the National Bus Strategy: Government response to the Committee's Fourth Report	HC 1431
7th Special	The Integrated Rail Plan for the North and Midlands: Government response to the Committee's Second Report	HC 1729

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5th	UK aviation: reform for take-off	HC 683
1st Special	The impact of the coronavirus pandemic on the aviation sector: Interim report: Government Response to the Committee's Fifth Report of Session 2019–21	HC 28

Number	Title	Reference
2nd Special	Road safety: young and novice drivers: Government Response to Committee's Fourth Report of Session 2019–21	HC 29
3rd Special	Trains Fit for the Future? Government Response to the Committee's Sixth Report of Session 2019–21	HC 249
4th Special	Safe return of international travel? Government Response to the Committee's Seventh Report of Session 2019–21	HC 489
5th Special	Zero emission vehicles: Government Response to the Committee's First Report	HC 759
6th Special	Rollout and safety of smart motorways: Government Response to the Committee's Third Report	HC 1020
7th Special	Major transport infrastructure projects: Government Response to the Committee's Second Report	HC 938

Session 2019–21

Number	Title	Reference
1st	Appointment of the Chair of the Civil Aviation Authority	HC 354
2nd	The impact of the coronavirus pandemic on the aviation sector	HC 268
3rd	E-scooters: pavement nuisance or transport innovation?	HC 255
4th	Road safety: young and novice drivers	HC 169
5th	The impact of the coronavirus pandemic on the aviation sector: Interim report	HC 1257
6th	Trains fit for the future?	HC 876
7th	Safe return of international travel?	HC 1341