INTRODUCTION

1. The automotive sector is quickly changing. The innovative use of new technologies is revolutionising vehicle design and manufacture, and fundamentally changing the driving experience. At the heart of this change is the use of digital technologies to create vehicles that are more connected, via the internet, and increasingly autonomous.

2. The development of Connected and Autonomous Vehicles (CAVs) could have a significant and positive impact, not only on the automotive sector but on society as a whole. Unlocking this potential requires government, the automotive sector and adjacent industries such as telecoms and the tech sector, to work together. The government’s current commitment to the development and roll-out of CAVs, as demonstrated by the creation of the Centre for Connected and Autonomous Vehicles (C-CAV) and its commitment to spend £100 million on research and development related to CAVs, is welcome. Going forward, the government must work with industry to address legal and regulatory challenges which could undermine the development and roll-out of CAVs in the UK.

3. The Society of Motor Manufacturers and Traders is one of the largest trade associations in the UK representing more than 650 automotive companies in the UK, including international manufacturers and companies throughout the supply chain. SMMT is taking an active role in the CAV agenda. In March 2015, SMMT published a major report on the economic opportunities presented by CAVs and, through the SMMT CAV Forum, we lead cross-sector discussions on CAVs bring automotive, telecom, the tech sector and government together. SMMT welcomes the opportunity to input into this inquiry.

IMPACTS AND BENEFITS

Q1. What are the potential applications for autonomous vehicles?

Q2. What are the potential user benefits and disadvantages from the deployment of autonomous vehicles?

4. The most commonly understood application of autonomous vehicle technology is in an individual’s car. There is already a staggering level of connectivity and autonomy in vehicles on the road today. Autonomous emergency braking and lane assist technologies allow for safer driving, while internet connectivity over mobile networks provides critical real time information on road and whether conditions.

---

5. However, autonomous technology can be applied more widely than this. Recent "platooning" trials have demonstrated that the delivery of freight by road could be revolutionised through the introduction of connectivity and autonomous technologies. Autonomous vehicle technology could also be applied to public transport.

6. The potential social benefits of the deployment of autonomous vehicles are considerable. We estimate that by 2030, connected and autonomous vehicles could save over 2500 and prevent 25,000 serious accidents. More efficient driving, including through platooning, could reduce fuel consumption and emissions. Autonomous vehicle technology could increase the mobility of non-drivers (including the elderly) and boost productivity as people regain time that had previously been devoted to driving.

Q3. How much is known about the potential impact of deploying autonomous vehicles in different sectors?

Q5. What is the scale of the market opportunity for autonomous vehicles?

7. The overall economic and social benefits of CAVs are expected to be in the region of £51 billion per year by 2030, with up to 320,000 new jobs being created in the UK. 25,000 of these jobs will be created in automotive manufacturing, with the remaining jobs created across adjacent sectors including the tech sector and telecoms.

Q4. How much is known about public attitudes to autonomous vehicles?

8. A number of surveys have been undertaken regarding public attitudes regarding CAVs. These suggest that while there is recognition of the potential benefits of this technological development there remains some concern regarding associated risks.

9. If the UK is to be a world leader on CAVs, it is important that the automotive industry and government work together to address the concerns being expressed by the public. In particular, it is essential that the public understand the potential safety benefits of connected and autonomous vehicle technology and the speed with which new technologies will be introduced to the road.

CREATING AN ENABLING ENVIRONMENT

Q6. Is the scale of current and planned demonstration facilities for autonomous vehicles sufficiently broad and ambitious?

10. If the UK is to create a comprehensive offering in relation to CAV demonstration facilities, it must ensure that it provides for physical (both test facilities and on the road) and virtual testing environments.

---

11. More could be done to expand and improve the UK's demonstration facilities. The creation of a unique CAV test-bed offer would help promote the UK as a world leader on this agenda. The majority of SMMT members believe that such a test-bed should build upon already existing areas of expertise thereby creating an ecosystem-based offering. This should incorporate both physical and virtual elements and create an integrated test-bed made up of coordinated hubs and flexible, reconfigurable nodes.

12. While it is essential that the UK build upon already existing expertise, it is equally important that the ecosystem does not become too dispersed and that critical mass is created in a specific location or locations. Some SMMT members therefore favour a test-bed that has a single city or region at its heart. Such an approach would still see the CAV test-bed draw on expertise that already exists in different locations in the UK but would aim to concentrate the majority of the UK's testing facilities in a single location.

13. It is also important that the UK's test-bed offer it easily recognisable internationally. This is essential if the UK is to promote itself as the best place in the world to test and roll-out CAVs. A "thin" coordinating hub or promotional organisation should be created that can act as single-point-of-contact for those wishing to access the UK's CAV test-bed ecosystem.

14. Two virtual features are also central to an attractive test-bed ecosystem: virtual design verification process (vDVP) capabilities and an integrated critical and safety events database. The former is still a rare, not easily replicable and non-substitutable offering, while the latter can potentially expedite the testing of autonomous vehicles. The Government should identify how it can support the creation of a vDVP sector within automotive through a mixture of investment and its convening power in bringing together expertise currently residing outside the automotive sector. The Government, either via one of its agencies or in collaboration with a neutral body, should invest and lead in the setting up of a central critical and safety events database to facilitate shared learning that contributes to the avoidance of duplication in tests and the speeding up of development cycles.

15. Finally, the Government should keep in mind that the development of CAV technology cannot be divorced from the development of other future car technologies, such as electrification. A coordinated approach is, therefore, needed to reap the full benefits of these technologies.

Q7. Is the Government doing enough to fund research and development on autonomous vehicles, and to stimulate others to do so? Should it be doing more to coordinate UK actions?

16. We welcome the steps that Government have taken fund the development of CAVs and in particular, the creation of £100 million Intelligent Mobility Fund (match funded by the automotive sector). Given that a number of countries are trying to position themselves as world leaders in CAVs, the Government should consider now what future funding will be committed to CAVs once the Intelligent Mobility Fund is spent and where it will best be spent.
Q8. How effective are Innovate UK and the CCAV in this area?

17. We welcomed the creation of the Centre for Connected and Autonomous Vehicle (CCAV) and believe plays an essential role in joining government up on this important cross-cutting agenda. It is essential, though, that all relevant Government departments are fully involved in the development of policies related to CAVs, not just the departments for Transport and Business, Energy and Industrial Strategy. It is particularly important to involve the Department for Culture, Media and Sport given the prominent role that the telecoms and tech sectors have in the development and roll-out of CAVs.

18. Innovate UK are playing an effective role in managing and issuing Government funding in relation to CAVs. Extensive engagement and information sharing in advance of the launch of research and development and feasibility study competitions has been welcomed and should continue in the future.

Q9. Is the environment for small and medium-sized enterprises (SMEs) working in this sector sufficiently enabling?

19. While CAV technology is primarily being developed by global automotive manufacturers, there is a critical role to be played by the UK’s tech sector, which is predominantly made up of SMEs. Through the SMMT CAV Forum we are already bringing automotive manufacturers and technology providers together to discuss critical issues related to CAVs, identify common ground and agree actions that will help ensure that the UK is a world leader in the development, testing and roll-out of CAVs. However, more could be done by Government, either through the Catapults or by central Government, to act as a convener and to make SMEs aware of the business opportunities resulting from CAVs.

Q10. Will successful deployment of autonomous vehicles require changes to digital and physical infrastructure?

20. CAVs cannot be developed and rolled-out in the UK unless the right infrastructure is in place.

21. Developing the UK’s digital infrastructure is essential. Four key challenges related to connectivity will shape the speed and breadth of CAV deployment in the UK: coverage, reliability, bandwidth and capacity. Coverage is arguably the most pressing issue. the automotive industry’s top priority. Currently almost 4,600 miles (2%) of British roads have no 2G coverage from any network provider, whereas only 43,000 miles (18%) and 119,000 miles (48%) have full 4G and 3G coverage respectively. If the UK is to be the leading market for deployment of connected vehicles and V2X services in the first instance and CAVs thereafter, the Government must devise a strategy to ensure signal coverage, irrespective of the choice of technology, does not become the key stumbling block.

22. Action also needs to be taken to develop and maintain high-quality physical infrastructure. Automated driving from SAE J3016 Level 3 onwards will rely on cameras,  

---

3 Vehicle to anything communication
working in tandem with radar, Lidar and other sensors. While there may be the possibility to do away with signage and gantries on the road network in the longer term when dynamic information such as speed limits and temporal restricted access can be beamed directly to connected vehicles, this is predicated on ubiquitous connectivity on UK roads and a significant majority of, if not the entire, motorparc being connected vehicles. Given the current renewal rate of the UK motorparc this is unlikely to take place for at least twenty years, if not longer. In the meantime, it is essential that the Government ensures that the UK national road infrastructure, including as widely beyond the Strategic Road Network as possible, is of a high quality. Clear road markings are a priority, so as to ensure ADAS and automated driving functions operate correctly.

Q11. How might a move from current levels of highly automated vehicles to their extensive deployment best be managed? What do you see as the key milestones?

23. Several parallel developments are needed to enable effective and extensive deployment of autonomous vehicles.

24. The first is a gradual escalation up the SAE-defined levels of automation from where we are today, i.e. around Level 2-3, to Levels 4 and 5. While bypassing various ADAS functions, particularly those at Level 3, may help avoid the driver being lulled into a false sense of security and dependence on what is effectively only driver assistance capabilities, a quantum leap to Levels 4 and 5 may represent a step too far too soon for the majority of drivers who are accustomed to being completely in control of their vehicles today. Taking the consumer along in the journey of gradually increasing automation, along with a targeted programme of communication and public education, is probably most helpful in easing the public into accepting autonomous vehicle technology over time.

25. The second is a rolling programme of regulatory reform, which the Centre for Connected and Autonomous Vehicles has recently launched. Extensive deployment can be hampered by a number of regulatory barriers, such as those related to insurance, the Highway Code and Construction and Use Regulations. In addition, international regulation, such as those related to lateral steering manoeuvre, is pivotal for enabling the deployment of autonomous vehicles. While our national regulatory review is step in the right direction, the UK Government must play an active role at UNECE to drive forward international regulatory reform, the current pace of which is too slow in some critical areas to enable extensive deployment of new technologies in the near-to-medium term. Specifically, HMG should utilise its role as chair of the ITS/AD-IG and GRRF at the UN ECEWP29 to bring about the complete amendment of UN R79 for ACSF (including Category E). HMG should also initiate discussions to expand the scope of ACSF (Cat B2, D, and E) to all road types.

26. The third is the need to prepare national physical infrastructure. Autonomous vehicles rely heavily on a combination of multiple sensors, including high definition cameras, Lidar and radar. Well maintained road markings and signages are pivotal for cameras to accurately perceive the path ahead and warnings of ad-hoc roadworks or disruption (e.g. lane closure).
27. The fourth is related to digital infrastructure, particularly on connectivity. Connectivity complements autonomy, and enables the autonomous system to be informed by a richer set of information from other vehicles and infrastructure (V2X), which can enhance the system’s decision making. Connectivity also provides redundancy, or fallback, should one or more of the vehicle’s sensors fail, e.g. cameras blanked out by drifting snow or blinded by the sun. Yet Ofcom data analysed by the RAC Foundation shows that only 18% of the entire UK road network has 4G coverage and 48% has 3G coverage. Safety related functions of CAVs may not necessarily require 5G, but almost certainly requires ubiquitous coverage.

Q12. Does the Government have an effective approach on data and cyber security in this?

28. Data collection, transfer and analysis is critical to the effective functioning of the digital economy. In vehicles, infotainment, telematics, vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) and vehicle-to-anything (V2X) communication all rely upon the collection and use of data. This data comes in many different forms and, even in one vehicle, can be generated by a number of different parties including the driver and the manufacturer. Businesses and individuals rightly expect their data to be dealt with in a secure manner which prevents unauthorised access to or use of that data. Equally, data is valuable. Its analysis can lead to new innovations, while open access can support competition and the development of new business models and services that promote growth. More needs to be done to create data framework that balances protection, innovation and competition and encourages the development of CAVs in the UK. Arguably the most critical issue is understanding how the General Data Protection Regulation will apply in the United Kingdom following its withdrawal from the European Union.

29. With regards to cyber security, we welcome the assistance that is being provided by the government. Increasing connectivity of digital devices including CAVs presents new challenges in relation to cyber security. A failure to ensure the security of a growing network of connected cars and devices that will increasingly be relied upon to ensure smooth traffic flows across the road network, will not only undermine public confidence in CAVs but could also present genuine risks to public safety.

Q13. Are further revisions needed to insurance, regulation and legislation in the UK to create an enabling environment for autonomous vehicles?

Q15. What does the proposed Modern Transport Bill need to deliver?

30. Changes to regulation and legislation will be needed to create an enabling environment for CAVs and the first wave of these should be delivered through the Modern Transport Bill.

31. With regards to insurance, the automotive industry supports changes that expressly seek to encourage the uptake of CAVs by:
   - Assuring the public that appropriate motor insurance cover is available for Level 4 or 5 autonomous vehicles;
• Assuring motorists that obtaining motor insurance for an autonomous vehicle is akin to obtaining insurance for a conventional vehicle today; and
• Ensuring the appropriate and fit-for-purpose regulations are in place by the time these vehicles enter the market.

32. The majority of SMMT members are in conditional agreement with proposals to extend compulsory motor insurance to cover product liability for Level 4 or 5 vehicles. Giving consumers the peace of mind and confidence to purchase these vehicles when they become available is critical to the growth of the market for this new technology. However, the support for this proposal is predicated on three important conditions:

i. That amending primary legislation to extend compulsory motor insurance to cover product liability for autonomous vehicles must not result in unintentionally hampering consumer uptake of these vehicles through actual or perceived higher insurance premiums;
ii. That event data recorders ("black box") should be made compulsory in all autonomous vehicles; and
iii. That sufficient flexibility is created in the market for different motor insurance models for autonomous vehicles to be offered.

33. Several SMMT members do not agree with proposals to extend compulsory motor insurance to cover product liability for Level 4 or 5 vehicles. Instead, they believe that recourse through existing product liability laws is sufficient.

34. With regards to regulatory and legislative reform, changes are needed to encourage the development of new technologies and match the aspiration of consumers and vehicle manufacturers.

35. The Government recently proposed a programme of rolling regulatory reviews designed to ensure that the UK’s legislative framework is fit-for-purpose in relation to near-to-market technologies. SMMT welcomes this approach, but believes that, as well as looking at near-to-market technology, the Government should take a far-sighted approach by incorporating flexibility and adaptability into the regulatory framework so as to ensure that it can respond to new technological developments.

Q14. **What, if any, ethical issues need to be addressed in the substitution of human judgement in the control of vehicles by algorithms and Artificial Intelligence?**

36. Vehicle manufacturers seek to develop autonomous systems that are geared towards avoiding ethical dilemmas. With advances in sensor technologies, AI and algorithms, and ideally complemented by ubiquitous connectivity, CAVs are expected to be able to perceive emerging risks, such as those associated with the Trolley Problem, from afar and adopt mitigating measures to avoid landing in ethical quagmire.

Q16. **How effective is the UK’s education system in delivering people with the right skills to support the autonomous vehicles sector?**
37. In order to facilitate ambitious growth for connected and autonomous vehicles in the UK it is critical that a holistic approach is taken to education and skills which focuses on both the shortage of people seeking to enter into engineering careers and the level and quality of training that is provided. Such an approach should include the ongoing revision of the curriculum to include and reflect the pace of technological development, adequate provision of careers advice information and guidance to ensure young people are aware of the opportunities available in these technologies (and that the right educational choices are chosen), and the delivery of high-quality higher and further education programmes, focusing on the skills and knowledge these technologies require.

38. It should also be noted that the skills required for the effective development of these technologies are wide-ranging and are not just those related to traditional engineering and digital skills (although these are highly important and must be prioritised). As the Transport System Catapult’s recent report into Intelligent Mobility shows, a wide range of skills covering both STEM and social bases will be needed to ensure that the UK grasps the opportunities these technologies can provide.

Q17. Is the Government’s strategy and work in this area sufficiently wide-reaching? Does it take into account the opportunities that autonomous vehicles offer in a wide range of areas, not just on the road?

39. The Government’s work, principally through the Centre for Connected and Autonomous Vehicles, is commendable. However, it is not apparent there is a Government strategy in this area yet. The automotive industry and other key stakeholders in this area would benefit from a national strategy that joins up the disparate disciplines and various parts of the government machinery in a single streamlined vision and delivery plan towards capturing identified leadership positions in the CAV sector.

Q18. What are the implications of exit from the European Union for research and development and the autonomous vehicles industry in the UK? Are specific actions from the Government needed to support or protect the autonomous vehicles sector in the short term or after the terms of Brexit have been negotiated?

40. While the terms of the United Kingdom’s withdrawal from the European Union remain unclear, it is impossible to say what the precise implications will be for CAVs. However, since CAVs developed in the United Kingdom will inevitably be sold to markets around the globe the United Kingdom’s regulatory framework must remain compatible with European and international standards (for example, the current regulatory framework under Article 20 of 2007/46/EU, should remain valid after the UK’s withdrawal from the EU so as to avoid unnecessarily disadvantaging UK industry when they introduce new technologies to UK and EU market). This is essential if international automotive manufacturers are to use the UK as a critical hub for the development and roll-out of their CAVs.

26 October 2016