ITS United Kingdom – Written evidence (AUV0036)

Introduction

1. ITS (UK) is a not-for-profit public/private sector association financed entirely by members' subscriptions and can therefore independently provide a forum for all organisations concerned with Intelligent Transport Systems (ITS). These are combinations of sensors, communications and information technology designed to assist all modes of transport. The Society works to bring the advantages that ITS can offer in terms of economic efficiency, transport safety, and environmental benefits to the United Kingdom – and at the same time expand the ITS market. It has a diverse Membership of over 150 UK organisations comprising of Government Departments, Local Authorities, Police Forces, consultancies, manufacturing and service companies, and academic and research institutions. ITS (UK) encourages discussion on issues such as public/private co-operation, standards, legislation, information provision and new technology. ITS (UK) was a significant contributor to the Parliamentary POST Note 322 ‘Intelligent Transport Systems’ published in Jan 2009.

2. We note that the enquiry is into autonomous vehicles but we would like to note that there is growing use of data from connected vehicles already on the roads to increase safety and manage congestion. This use should grow to encompass better planning and management of assets, reduced emissions and economic growth through better travel. This can all happen far more quickly that automated vehicles, and is a necessary step for them to work safely in a road network with other legacy vehicles, cyclists and pedestrians.

Responses to the questions in the Call for Evidence

1. What are the potential applications for autonomous vehicles?

1.1 For private use, either owned or (more beneficially, see below) as part of transport-on-demand provision.

1.2 They can also offer similar benefits to “traditional” private vehicles to those who cannot use these, such as teenagers and disabled people. They can also provide a better option for city centres than “traditional” cars by not needing to park where they drop off.

1.3 They can offer benefits as delivery vehicles for goods, from container transport to tools and spare parts for maintenance and building work.

1.4 They have potential to make public transport more flexible, reliable, environmentally friendly and in the long term, cheaper. Fully autonomous services are already operating in the UK, such as the Docklands Light Railway in east London, and the ULTRA pod service running between a car park and Terminal 5 at Heathrow Airport.

1.5 They are also already in use in ports, warehouses, mining operations and military applications, and their use there is likely to increase.
2. What are the potential user benefits and disadvantages from the deployment of autonomous vehicles?

2.1 Most of the potential benefits rely on the vehicles being part of a connected system of vehicles and infrastructure, commonly identified by the term “C-ITS” i.e. cooperative intelligent transport systems. By linking vehicles with each other and with the infrastructure, safety and environmental benefits will be much better than those realised if vehicles operate independently.

2.2 AVs may be a beneficial addition / eventual substitute for the fleet of private cars, if their likely capacity of being safer and more environmentally friendly is proven. They may also potentially allow users to get non-driving tasks done while in the vehicle, although this means a level of smooth vehicle travel that may not be attractive to some users as it may actually result in slower travel.

2.3 If their adoption coincides with a switch from owning to on-demand provision of vehicles as the norm for private citizens, they also have the potential to free up valuable land in towns and cities which is currently used to park privately owned vehicles.

2.4 There is also a potential benefit to accessibility. (It is no longer universally accepted that “mobility” is a worthwhile goal in itself.) AVs can improve access for disabled, older people and those too young to drive, to the locations they need to visit.

2.5 There is a potential benefit if AVs are implemented according to C-ITS principles in Government being better able to deliver transport policy objectives, by having more influence over journeys. Congestion could be reduced, bridge strikes eliminated, goods deliveries arriving at the optimum time etc. This is of course only the case if the public sector retains control of the infrastructure and data used by AVs in their decision making. This is by no means a given, bearing in mind the open data strategies and the support for private sector service providers currently adopted by Government, which may have unintended consequences.

2.6 If the adoption of AVs coincides with users switching to using them when needed rather than owning them, and they are adopted in the form of connected vehicles, then it will be possible to build demand-related road pricing into their pricing model and thus provide an important tool for highways authorities to manage congestion.

2.7 The main potential disbenefits are probably congestion and the loss of low skilled jobs. Congestion may seem counter-intuitive but while highways authorities may gain more control over vehicle movement, and enable pricing models which encourage travel outside peak time, both of which will help them reduce congestion, widespread adoption of AVs by e.g. elderly and disabled travellers who currently either do not travel or travel by bus and rail, has the potential to increase the overall number of vehicles on the network. Vehicle miles could increase as currently unsustainable driving commutes become part of the working day, and rural communities become dormitories for urban workers currently not well connected by rail or road.
2.8 AVs will also sharply reduce the number of driving jobs available, whether traditional taxis, buses or freight transport – especially if “platoons” of autonomously guided trucks become a reality. The AV industry will also create jobs but these will be much more highly skilled, requiring more training and even academic education. The result will be higher unemployment at the lower end of the jobs market as not many van drivers will retrain as electronics engineers. Many driving jobs are currently only marginally financially sustainable, by being minimum-wage with zero hours contracts. In the local delivery sector, drivers sometimes work for less than the legal wage by being allocated an unachievable number of drops to make during a set time.

2.9 The unavoidable shorter term scenario of AVs sharing road space with traditional vehicles and cyclists and pedestrians will present both benefits and disadvantages. AVs will interact with vulnerable road users in a safer way, since the high risk human factor effects of inattention, moods and tiredness are removed from the picture. However, in order to function acceptably safely in a mixed environment, AVs will initially need to proceed slowly and may regularly “fail safe”, including stopping for periods of time. We know that 10% of any fleet has a noticeable effect on overall fleet behaviour, e.g. from trials of Intelligent Speed Adaptation (ISA), where vehicle speed is automatically controlled to avoid exceeding the speed limit. So once 10% of vehicles are AVs, they will influence traffic flow. In some cases this may slow traffic (particularly where overspeeding is common) and in others traffic might be smoothed.

2.10 The interaction between human drivers and AVs is not understood well yet, and needs to be a key focus for the early deployment. There are certainly issues about how much time drivers would need to take back control of their vehicle if the autonomous system could not cope and wanted to hand over to them, because their minds would be on other things. There is evidence from studies of airline pilots, when the autopilot malfunctions or cannot cope, that many seconds are needed for the human pilot to take back control and become aware of the (potentially dangerous) situation.

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

3.1 More research is needed. In these early stages funding has been more readily available for proof-of-concept trials such as the currently active Innovate UK projects, and for studies into public attitudes. More work is urgently needed on what the introduction of AVs might really mean in terms of traffic management, parking provision, public transport services, and transport to and from hubs such as hospitals and air ports. Analysis on how AVs may affect the level of control public authorities have over traffic behaviour on their networks is particularly urgently needed.

3.2 The Department for Transport’s intention is to commission trials of truck platooning, which will investigate potential benefits such as fuel savings and potential disbenefits to safety, among other aspects.

3.3 These comments are true in terms of international knowledge and research, not just relevant to the UK.
4. How much is known about public attitudes to autonomous vehicles?

4.1 There have been some studies done on this, notably by the University of Michigan (2014) and this also forms part of the work of some of the current Innovate UK projects in this area. The work already completed has focused on the technology – whether people understand it, trust it and so on. It would be very valuable to know more about public attitudes to the future ownership of vehicles. AVs, since they can be summoned and dismissed “at the touch of a button” do away with much of the argument of vehicle ownership being essential for convenience. We do not know how important the “convenience” factor is in car ownership compared to e.g. the social status conferred by ownership, or how important “being a driver” may be to a person’s sense of self. These non-technical questions are crucial to how and if AVs become widely adopted and under what ownership model.

4.2 See also Item 2 for our comments on drivers interacting with AVs.

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

5.1 In our opinion, there are too many unknowns relating to public acceptance and to what role the public sector wishes to take (e.g. in terms of infrastructure provision, and relinquishing or tightening control over how their networks are used) to make any firm predictions in monetary terms. This has not stopped several reputable organisations offering fairly firm predictions of future market sizes. We believe that these figures, at the moment, should at most be taken as a very rough guide.

5.2 However, the market opportunity for connected vehicles has already opened. Far more could be done to exploit data already collected to make UK road travel improve.

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

6.1 The establishment of the Centre for Connected and Autonomous Vehicles by DfT and the then BIS provides a good indicator of that the Government does have a broad and ambitious scope for connected vehicles and AVs.

6.2 The technical demonstrations completed (the LUTZ project) and under way (the Innovate UK projects and some others) are as good as any similar projects completed or under way elsewhere in the world and demonstrate UK AV capability very well.

6.3 It would be good to have more work done involving C-ITS rather than stand-alone AV technology. The instrumented corridor project Kent – London is an excellent initiative and the West Midlands region is pushing ahead with a similar facility but in a city context. It would be good to see more Government support for this type of work, since the public benefits in terms of safety, environment and better journeys are greater than those we will realise from stand-alone vehicle development research.
7. 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?

7.1 See item (6) for suggestions regarding a broader and deeper research undertaking, particularly with more attention on the transport and social context AVs will have to work in, and on driver behaviour, rather than limiting work to the technology and design of the vehicles.

8. How effective are Innovate UK and the CCAV in this area?

8.1 Innovate UK and C-CAV are functioning well as co-ordinators as well as funding channels for the research, and would appear to be acting precisely according to the political priorities set for them. If these priorities could be shifted away from pure, stand-alone AV technology and broadened into cooperative systems and a more in-depth and politically neutral approach to the social and transport context, this would be more likely to deliver shorter terms results and more defined and certain benefit.

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

9.1 Yes, AV research and trials are probably one of the transport areas most welcoming to SMEs at the moment. They are well represented in all project consortia and this evidences that funding access has been designed to support their participation. However, terms and conditions for government studies (liability and insurance) mean SMEs often have to work via larger companies.

10. Will successful deployment of autonomous vehicles require changes to digital or physical infrastructure?

10.1 As before, to be most beneficial, AVs should be implemented in a cooperative context which means that the roads infrastructure instrumentation needs to be extended, the processing of data and creation of information services from and for vehicles and infrastructure needs to be enhanced, and additional services need to be designed to enable AVs and traditional vehicles to co-exist as efficiently as possible. Gaps in radio communications connectivity need filling. “No signal” is frustrating for a human being but potentially disastrous for an AV.

10.2 The current widespread popular understanding of an AV as a vehicle which is digitally isolated from other vehicles and infrastructure and which therefore collects and processes its own data, requires road markings, road signs, fencing etc. in order to function, and in many locations this is currently inadequate for this purpose. However, we regard this version of AVs as a technical cul-de-sac in terms of adoption by ordinary vehicle users and advocate taking the cooperative route forward rather than spend on enhanced road markings to support this type of vehicle. It should be sufficient to ensure that such infrastructure continues to adhere to design guidance which developers of unconnected AVs can refer to.
11. 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?

11.1 We believe that the best way forward is a gradual and “natural” evolution, in terms of acceptance both by vehicle users and by infrastructure providers, adoption of increasingly sophisticated driver assistance systems which ultimately will lead to highly automated vehicles dominating our fleet. The two key milestones would be a public acceptance of this new style of vehicle operation, and public sector acceptance that it is necessary to instrument their infrastructure to the point where these systems can function fully.

12. Does the Government have an effective approach on data and cybersecurity in this sector?

12.1 Not entirely (and this is not just the UK situation). The motor manufacturing sector is politically very powerful in the UK as in other European countries and elsewhere, and it is therefore difficult for Governments to drive through regulations regarding vehicle and driving data which the OEMs regard as harmful to their commercial competitiveness.

12.2 Cyber security is also vital. There have already been examples of “connected vehicles” being hacked, and controlled remotely (for example opening their doors) – though as yet only in trials and demonstrations. But an AV could potentially be a guided weapon. The National Cyber Security Centre provides a good starting place for an integrated and coherent cyber security policy. The threats to connected and automated vehicles are technically similar to other cyber environments, though the consequences of successful penetration are unique. The technical mitigation can easily be derived from existing guidance, but the threat analysis needs to be dedicated to the sector.

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

13.1 Yes. All three areas currently contain plenty of reasons why aspects of AVs are either illegal or at best highly irregular and liable to causing complex and costly litigation when something goes wrong. However, there is plenty of evidence that C-CAV and DfT are working effectively in these areas, and we can vouch for their positive and meaningful engagement with stakeholders. At a slightly informal level, Governments are usefully exchanging information about their work in these areas too, which is sensible and will save time.

14. 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?

14.1 There are “urban myths” in this area about whether an AV will be programmed to kill a child or a pensioner, whether it will care about dogs, and so on. This is media driven froth and in reality an AV will not encounter these moral dilemmas more often than a human driver, in fact less often since it will get into highly dangerous situations less often. And when it does happen, the AV’s automated decision is unlikely to be worse than that of a human driver, since it will have been programmed by a team of people.
14.2 The need is not for any formal addressing of ethical issues, it is for an effective information campaign to highlight how much safer highly or fully autonomous vehicles can be both for their occupants and for other road users. Research already undertaken (for instance by TRL) suggests that the number of killed and seriously injured road users we as a society apparently accept now as a result of the use of standard vehicles, is larger per kilometre driven that what AVs will cause.

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

15.1 Commitment to further legal and regulatory reform including in the insurance sector, commitment to appropriate data collection, processing and sharing regulation even when OEMs will object, and enablement of UK innovation to proceed so that we continue to be among the leading nations in this field.

16. How effective is the UK’s education system in delivering people with the right skills to support the autonomous vehicles sector?

16.1 We can see from the current UK AV projects that there is a pool of very good people with the right expertise. However, most of the skills needed are in sectors where we know there is a skills shortage already which on current trends will worsen: the STEM disciplines. It follows that if the UK is to have a thriving, world leading AV sector, we must recruit and retain more staff in these sectors. This is an issue much wider than AV skills, but if everybody working in STEM does their bit to improve recruitment, training and retention, we have some chance of making a successful change.

17. 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?

17.1 The media friendliness of the various “pods” on trial in the UK and the glamour of Tesla is no doubt contributing to steer political priorities away from more prosaic applications such as warehousing and ports, and connected vehicles. One might ask why the on-road AV industry deserves political support and public funding more than, say, a UK company developing automated mining vehicles. However, as with all public funding, this is not an either / or scenario and we welcome the fact that the Government is providing political and financial backing to any part of the UK technology sector. However, as stated in item 14, for long-term success it also need to have some focus on achieving public trust and acceptance of these new vehicle technologies.

18. What are the implications of exit from the European Union for research and development and the autonomous vehicle 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?

18.1 It is absolutely impossible for the UK to make a success of its AV industry if it is isolated from international research and development in this field. If UK Government wants to hold on to the UK’s current position as, say, in the four top countries for AV expertise, then access to
these international contacts must be safe guarded. If the Government does only one thing, this should be to enter into a Norway-style arrangement to pay in order to maintain UK access to European Union research programmes. If it does two things, let the second one be to make it simple for UK organisations to hire foreign staff to work on AVs. This fills shortages in the short term and grows the UK skills base in the longer term, as the foreign experts share their knowledge with colleagues even if they limit their stay in the UK to a few years. Conversely it is enormously beneficial for UK experts to be able to work abroad for sections of their career, acquiring expertise from foreign research teams that they can then bring back to the UK.

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