Written evidence submitted by WSP (SDV0016)

The Transport Select Committee is scrutinising the development and deployment of self-driving vehicles for use on the roads (also known as connected and autonomous vehicles).

This response has been prepared by WSP, one of the world's leading engineering and environmental professional services consultancies, with over 60,000 talented people based in more than 500 offices across 40 countries. WSP has over 7,500 technical specialists and strategic advisers in the UK and is growing at pace.

In the UK we have a particular interest in the Future of Mobility,[1] with a dedicated team providing advice at all levels of national, sub-national, regional and local authorities, the private and 3rd sectors – helping our clients plan futures for their networks, assets, portfolios, places and communities.

We are a sponsor of the APPG for Connected Autonomous Mobility and as such have a particular interest in how such technology can deliver improved outcomes for the economy and society enabling services and solutions which are commercially viable and beneficial.

As per our approach to the future mobility sector, this response considers a human centric, outcomes led approach to the questions posed and we have structured these as per the call for evidence.

This submission, prepared by *Giles Perkins, Head of Profession, Future Mobility,* is made as part of our ongoing contributions across the sector to accelerate the potential benefits that such technologies could play.

Likely uses, including private cars, public transport and commercial vehicles.

In our work WSP has for a long time segmented markets into the different types of users / customers based on a number of factors, including life stages and socio-economic factors, to understand their needs and the propensity of them taking up new solutions, services or opportunities. Our work for England's Economic Heartland in the First Mile, Last Mile study (2019)[2] was the start of this journey.

We recently extended this thinking to consider similar, so called "personas" for businesses to again understand their needs and propensity for change. Coupling this with a deeper segmentation of the types of places that communities and business reside and are active provides us with a much richer

picture of how new forms of mobility could exist, shape and contribute to future societies.

WSP's work for the soon to be published South West Mobility Strategy for the Western Gateway and the Peninsular Sub-national Transport Bodies[3] has embraced this thinking, taking this human centric, needs-based approach, enhancing it with segmentation with 40 different types of places and 80 different movement use cases covering everything from agricultural needs to the commute.

Therefore, we have segmented the likely use cases for self-driving vehicles on the roads and have also taken roads to mean public highway and private spaces. For each use case we have illustrated the potential use case, its potential benefits, any challenges therein and, how a commercial use case could be formulated.

Commercial trunk haul – the use of self-driving technologies between ports, distribution centres and major production facilities (such as food, fuels, aggregates etc.). These regularised point-to-point flows, which could not be handled by rail (as it is energy inefficient to replace rail with road), could be encompassed by a use case where the driver was initially in a supervisory role for some or part of the time (such as on the Strategic Road Network), SRN) or in full (between hubs near to the SRN) overnight when quiet. Benefits could include reduced drivers' hours and associated costs and reduced energy consumption through automated driving efficiency. However, these would need weighing up against security risks associated with any high value or dangerous loads, so further segmentation by type of flow / commodity would need very careful consideration. Any commercial case would need to balance on-vehicle costs (which as per most technology adoption curves would be expected to fall over time) with any associated infrastructure costs on designated "corridors" which one could assume to be state funded as well as any unexpected costs to operators such as enhanced security, measures for manual driving (in emergencies) or the last miles to any from hubs.

Commercial last mile – as we have seen with applications such as the Starship's pavement droids in places such as Milton Keynes[4], there is a role and appetite for self-driving technologies to meet last and first mile demands whether for deliveries or to potentially provide passenger or other services. Given the rise in home deliveries over the last decade it is conceivable that self-driving technologies could be employed but again through so called zero occupancy

vehicles[5], commercial viability will be key including safety and security concerns with respect to goods in transit.

Commercial (closed depots) – we have identified a potential within closed environments such as depots or distribution hubs, terminals etc. for automated technologies to reduce the dangers to human operatives in these environments. The ability to marshal vehicles for parking (or in the case of electric vehicle charging) or trailers in distribution hubs could reduce / eliminate incidents and accidents and the associated impacts.

Commercial applications (agriculture and industrial) – similarly the opportunities in other 'closed' environments such as for agricultural use cases[6] or extending the automated warehousing concepts[7] to across whole estates could improve efficiency and outcomes. However, an end-to-end systems approach is needed to consider applications and benefits.

Public transport – self-driving technologies promise to improve public transport, but as with other automated transit operational benefits, will have to be balanced with customer impacts in terms of real and perceived safety and security concerns. The CAV Forth project[8] won't eliminate operatives on board but effectively swap the drivers role to that of a 'Captain' with customer care responsibilities.

Shared transport – as discussed in the last question in this document, the role of shared transport in the context of "robo-taxis" has been discussed at length and whilst they promise a new form of transportation, safety and security concerns may exist for vulnerable and lone travellers and there is the potential for significant dead mileage 'hunting' for fares or returning from trips.

Private transport (car) – subject to legislation, like other car technologies we expect a ripple down over the coming decades. This could provide use case potential for those who are unable to drive or don't want to drive but certainly in the early years costs could be prohibitive. It is conceivable that commercial shared solutions could eliminate the need for ownership for that segment of the population.

Progress of research and trials in the UK and abroad.

We would like to make a general observation in this regard – to date the focus of research and trials has generally been the demonstration of the technology for a very limited number of use cases with little (and sometimes no)

consideration of complexities of the potential use cases and the commercial models therein.

The recent CAV funding round[9] has been very useful in providing this much needed focus but more work is required in considering the segmentations described above and the potential commercial models that could bring such technologies to life. WSP's New Mobility Now report of 2017[10] made this exact point – that business models are critical to the uptake of new solutions, something we have seen play out in our body of work since.

Potential implications for infrastructure, both physical and digital.

Taking a similar approach to segmenting the system in which self-driving vehicles will have to exist we suggest that there are two primary approaches to considering the implications in terms of physical and digital infrastructure.

Existing infrastructure and networks – this being the existing state in which any emerging vehicle technologies are having to exist within, take cognisance of physical and digital networks which we note explicitly designed to accommodate them. The retro fitting of the 247,800 miles of the UK road network[11] would be a mammoth task and probably impossible, meaning that it is conceivable that some of the more remote parts of the network (in terms of geography or digital access) may not be feasible to enable such technologies. Whilst the UK has a lines and signs regime that is envied worldwide, self-driving vehicles will need consistency and clarity of such to be able to "read" the road either via observation (cameras etc.) or through reference to a live "digital" map which will need to be equally accurate.

The debate around "what will be needed" should be framed not only in terms of the self-driving debate but also the wider decarbonisation / net zero debate. The £30m, DfT funded ADEPT Live Labs 2[12] innovation programme, which is focusing on the decarbonisation of local road assets, has asked bidders to consider the existing and future needs of the network so that net-zero innovations take account of future needs such as automation.

Planning for a transition to self-driving technology needs to consider the roads eco-system in the round – the physical and digital infrastructure, the use cases, the geography, the maintenance regimes and the vehicles. Increasingly the links between mobility (in all its forms), the networks (energy and digital) and the vehicles are becoming intertwined and no single part can be considered in isolation.

Future infrastructure and networks - once a clear trajectory is visible for the sector, with standards being agreed and mandated, it will then be possible to start the transition with new infrastructure being design in that way and a programme of key corridors or hubs being similarly addressed. The risks in abortive work or approaches could be significant (for example see the early history of rail electrification in the UK[13] where difference and standards let to geographies that were incapable of interoperability). There will be inevitable down-stream implications with both physical and digital infrastructure requiring different operational and maintenance regimes as well as an associated shift in the skillsets needed to support.

The transition to new standards needs to be informed by what we have now and be outcomes focused at all times in terms wider socio-economic benefits. We are not aware of any particular Theory or Change[14] work or Systems Thinking[15] being undertaken for the transition to self-driving and feel that some high-level framing would be useful to provide that focus on use cases and commercial realism.

The regulatory framework, including legal status and approval and authorisation processes.

WSP awaits with interest how the forthcoming Transport Bill will provide the appropriate mechanisms, as well as the consultation on safety ambition for self-driving vehicles to form the foundation of a new self-driving vehicle safety framework

Given our views on potential use cases and the need to enable sustainable commercial models of operation, we would not wish to see a highly prescriptive approach which does not give the latitude for as yet unknown commercial use cases or models to flourish.

We recognise it is challenging for legislators to create a framework for unknowns, but we suggest some cross sectoral work considering perhaps similar, recent disruptive technologies such as the emergence of the internet or mobile communications could be useful starting points to consider how to frame such an agile approach.

Safety and perceptions of safety, including the relationship with other road users such as pedestrians, cyclists and conventionally driven vehicles.

Given the recent changes to the Highway Code, in particular the hierarchy of road users importance and needs of vulnerable road users,[16] we suggest that industry needs to counter against the sometimes-prevailing view that such users should be segregated from technology or have to equip themselves to be seen.

It should be incumbent upon CAV manufacturers / operators to be setting a very high bar with regards to road safety; namely, it has to be better that the existing (non-automated situation). It should not be permissible that those walking, wheeling, cycling, riding horses or micro mobility should have to be segregated to eliminate potential harm (with associated significant infrastructure costs) or have to have a "beacon" or similar device to be "seen" by self-driving vehicles (with again an assumed cost to that user).

Until the technologies are mature enough to be able to deliver improved safety and handle all but the most unusual of edge cases (detecting unusual movements, situations, reactions etc.), they should not be operating commercially (by companies or individuals) in areas where inherent risks have not been mitigated in an equitable way.

The role of Government and other responsible bodies, such as National Highways and local authorities; and potential effects on patterns of car ownership, vehicle taxation and decarbonisation in the car market.

Considering the suggestions above, the roles of the various highway authorities could be quite different but there will be a need for cross boundary working between the various levels of networks.

Government – the Government's role should be to enable the commercialisation and application of self-driving technologies to meet its wider socio-economic objectives. As stated earlier this should be done in such a way as to not stifle innovation but provide clarity as to what is legal. It is important that the messaging is also clear in terms of what "self-driving" means in a consumer context to unsure that 'over selling' does not happen resulting in misunderstanding of the technological capabilities and associated responsibilities of the driver. To that effect, WSP welcomes the recent announcement from the Department for Transport package of support for self-driving vehicles, including £100 million to support industry investment and fund research on safety developments.

National Highways – the SRN performs a critical role in keeping the nation moving particularly for the Light Commercial Vehicle (LCV) and Heavy goods Vehicle Sectors (LGV)[17] as well as private car. Given its largely segregated nature, the environment could be ideal for longer distance self-driving applications and as such the role of National Highways could be to enable that transition with a laser sharp focus on how to develop a commercially sustainable business model and associated investment case. As described earlier this significant asset could play a pivotal role particularly for non-rail trunk haul freight.

Sub-national Transport Bodies (STBs) – with responsibilities for the Major Roads Network (MRN), the numerous local roads that link major centres to and from the SRN the STBs could play a role in enabling the conditions for SRN solutions to extend to the key distribution hubs and attractors / generators. For instance, The Transport for South East Future Mobility Strategy[18] considers the role of automation in meeting the high level objectives for the region.

Local Highway Authorities (LHAs) – the LHA network is the part of the national network that links everywhere to everywhere. There would be little point in individual LHAs setting local standards that don't mesh with National Highways and the aspirations of the STBs but as a collective that are critical in ensuring that use cases, customer needs, consequences etc are considered as this is where the majority of people and businesses reside. A collective view through bodies such as ADEPT[19] could be useful in considering the system as a whole and any challenges / opportunities therein.

With regards to car ownership, the transition to an unclear self-driving future needs to be considered alongside factors such as increasing urbanisation and city living and a move to more shared rather than owned car-based solutions. CoMo UK report that car share membership has increased significantly in recent years with 20 cars taken off the roads for each car club car[20]. Whilst largely focused in urban and peri urban areas we are aware of work being undertaken examining harder use cases such as rural. Whilst ride hailing / sourcing solutions (enabled by digital apps) have become much more prevalent across the UK in recent years, analysis from other geographies has indicted that such services could result in increased vehicle miles and reduced efficiency[21].

It is expected that, subject to approval in the UK, self-driving technologies for private cars would be part of the steady technological enhancement seen over

recent decades, with early adopters who are prepared to pay for the technology being observed initially with normalisation over the following years. It remains to be seen whether the technology would increase car use, but as well have seen with the transition to electric vehicles, mileage has increased[22].

The impacts of self-driving technology within the current framework would arguably have little impact as it's the move to electric vehicles which has had an obvious impact on Vehicle Excise Duty (VED) revenues[23] with the exception or recent impacts due to the cost-of-living crisis. Again, we would suggest a systematic approach to taxation considering self-driving impacts and benefits in the round as part of the move to net-zero solutions across all vehicle types. It is probably safe to assume that any self-driving technologies associated with the private car will be on electric only vehicles given the 2030 ban on sales of Internal Combustion Engine (ICE) vehicles and the commercial immaturity of self-driving vehicles.

August 2022

Endnotes

[1] https://www.wsp.com/en-GB/campaigns/future-mobility
[2] First_Last_Mile_International_Best_Practice_Review.pdf
[3] WSP to design Rural Mobility Strategy for South West of England | WSP
[4] Milton Keynes celebrates 4 years of delivery robots - MKFM 106.3FM - Radio Made in Milton Keynes
[5] Oxbotica on LinkedIn: #AutonomousVehicles #Innovation
[6] The Future of Farming Technology | John Deere
[7] Optimizing warehouse automation for retailers | McKinsey
[8] CAVForth – The world's most ambitious and complex autonomous bus pilot.
[9] Competition overview - Commercialising Connected and Automated Mobility: Deployments - Innovation Funding Service (apply-for-innovation-funding.service.gov.uk)
[10] Whitepaper New Mobility Now - It's the Time to Take Action | WSP
[11] Road lengths in Great Britain: 2021 - GOV.UK (www.gov.uk)
[12] Live Labs 2 | ADEPT (adeptnet.org.uk)
[13] Railway electrification in Great Britain - Wikipedia
[14] 15412_1.DefraToCTool_Summary_.pptx
[15] Systems thinking for civil servants - GOV.UK (www.gov.uk)
[16] Cyclists and horse riders among those applauding the Highway Code changes for 2022 — here's what you need to know (driving.co.uk)
[17] Road traffic statistics - Summary statistics (dft.gov.uk)
[18] Future mobility - Transport for the South East
[19] Welcome to ADEPT | ADEPT (adeptnet.org.uk)
[20] Shared cars > Overview and benefits (como.org.uk)
[21] Evaluating the mileage and time efficiency of ridesourcing services: Austin, Texas case (tandfonline.com)
[22] New car mileage based on analysis of MOT data (racfoundation.org)
[23] Fuel duty revenue (racfoundation.org)