1. Introduction

1.1. We welcome the opportunity, as the Mayor of London’s integrated local transport authority, to contribute evidence to this inquiry.

1.2. Our purpose is to keep London moving, working and growing to make life in London better. We deliver the Mayor’s transport strategy to deliver a modern, affordable and sustainable transport network promoting public transport, walking and cycling. We reinvest all of our income to run and improve London’s transport services.

1.3. The emergence of autonomous vehicles (AVs) is significant for transport. As stated in the Mayor’s recent consultation ‘A City for All Londoners’, we want to ensure that our investment plans can adapt to technological changes such as these, and to explore and understand the opportunities they present.

1.4. Our response focuses on the roads, where the implications of the agenda may be the most significant. We manage the city’s 580km red route network, operate all of the capital’s 6,300 traffic signals, franchise bus services, regulate taxis and the private hire trade, run the Congestion Charging scheme, and work to ensure a safe environment for all road users. There are more than 31 million journeys on our road and public transport network on an average day.

1.5. We note that the Committee’s questions refer to autonomous vehicles throughout. We believe it is useful to separate out some of the underpinning elements of what is still a rapidly evolving concept. Autonomous vehicles become possible as a result of a number of factors including better connectivity and sensing data, predictive analytics and the emergence of artificial intelligence, amongst others. If these features are combined, they can lead to fully autonomous vehicles. However, the various steps on the way towards this – such as the data and information available from connected vehicles, or the application of advanced driver assistance systems – are also potentially important in their own right.

2. What are the potential applications for autonomous vehicles?

2.1. Areas for potential application are included in comments to question 3.

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

3.1. We will focus on three areas: road safety, the need to accommodate population growth and optimising the road network.

3.2. Road safety is a key component of the Mayor’s vision to create ‘Healthy Streets’ – aiming to reduce traffic, pollution and noise, create more attractive, accessible and
people-friendly environment, and ultimately to improve people’s health. London’s road safety record has improved significantly over time, but 2015 still saw 2092 people killed or seriously injured. No loss of life is acceptable or inevitable, so the Mayor has stated his wish to adopt a ‘Vision Zero’ approach to road safety, which puts the elimination of road danger at the very heart of the transport system. If autonomous technologies – not just fully autonomous vehicles, but also driver assistance or pedestrian protection systems – can help to improve safety, it could have an important role to play in our future transport system. It will be important to ensure that such technologies operate effectively in a mixed system, when some vehicles have these safety features and others do not.

3.3. A further major theme in ‘A City for All Londoners’ is the need to accommodate growth. At 8.8 million residents, London’s population is now larger than it has ever been; and is set to reach 10 million by 2030. By 2040, an extra six million trips will be taken every day in London, exerting increasing pressure on limited road space. It is, therefore, the Mayor’s aim to encourage the use of more efficient, low-emission vehicles, and overall less car and van use. Our priority will remain to promote walking, cycling and public transport; and to bear down on congestion. It will be important to ensure that business models for deployment of autonomous vehicles do not detract from these objectives, working alongside public transport to enhance mobility in the city overall, and do not provide extra pressure on the network, particularly as the emergence of AVs could disrupt the traditional patterns of private car ownership and use. Where private car usage remains prevalent, if innovative autonomous options develop or can be shaped that promote shared use above low-occupancy or individual trips, with vehicles that are ultra-low or zero-emission, then these could help deliver transport and wider objectives, including tackling poor air quality.

3.4. Bearing down on vehicle usage by changing the way we travel to be more active and increasing public-transport capacity will not eliminate traffic, nor will it solve the challenge of needing to manage our roads and transport networks effectively. We also need to improve the reliability of existing road capacity and manage congestion, so that we can make the most of limited space. Promoting smart systems for managing the network will be fundamental to this. We have an agreed Technology and Data Strategy, with a long and progressive track record of promoting open data and exploiting technology for effective management of the transport system, including for better network management. The connected aspect to future vehicle technologies offers significant opportunity in this regard. We see the potential of new data streams that could help optimise road space management, monitor and manage air quality, provide better information to users and help identify, respond to and prevent incidents.

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

4.1. This sector is in a nascent stage. Implications could be far reaching but are hard to predict in an area so innovative in nature and which is stimulating the exploration of
disruptive business models. Impacts are being assessed through the multiple studies and research and development projects being conducted both in the UK and globally. We closely monitor the outcomes of this work.

4.2. As a place globally recognised as a home for innovation, a number of these studies and vehicle trials are being proposed or are being conducted in London, for example the ‘Gateway’ project in Greenwich and Volvo’s ‘Drive Me’ trials. Our approach as the responsible roads authority is to engage constructively with all such projects to ensure any trials will be carried out in a safe way, avoiding disruption, and to establish how we can utilise information and intelligence from them to help us develop our policies and approach to help meet the Mayor’s priorities.

4.3. From a city perspective, one consideration is the likely need for local or geographical variation. For a city or urban area of any scale, different areas will have different travel and transport requirements. ‘A City for All Londoners’ sets out the distinctions of Central London (a world-leading cultural and economic centre highly accessible by public transport); Inner London (a dense, mixed place to live and work with most travel by public transport, walking and cycling); and Outer London (a diverse place where the majority of Londoners live and a significant proportion work). Connected and autonomous vehicles will need to interact with each of these in different ways to ensure an effective and seamless system that delivers Mayoral priorities - for example, continuing to reduce car use in central areas, but seeking benefits from more shared ownership or use in outer London.

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

5.1. For such a cross-cutting area, it is a sensible move for CCAV to attempt bring together the various streams of activity across central government. Our engagement has been constructive and it will remain very important for the central organisations to have high levels of engagement with local transport authorities and cities, as we will be the locations for early deployment.

5.2. With regards to operation of their research and development, retaining the facility for local transport authorities to claim 100 per cent funding for their participation in the CCAV and Innovate UK funded projects in this area is important to stimulate engagement at a time of wider financial constraints.

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

6.1. The extent of changes required is uncertain. Some organisations or technology developers advocate the absolute need to connect to infrastructure; others believe in the capabilities for in-vehicle technology which creates a lesser requirement for connected infrastructure. We believe that we must be prepared for all potential outcomes.
6.2. An example of our approach is that we have already connected the majority of the 6000+ traffic signal junctions across Greater London (both Borough and TfL Roads) onto a wide area digital network. While the primary purpose of this network is to centrally control existing traffic signals, we have used industry standard communication technologies which could also be used to provide connectivity for autonomous vehicles. Thus if the market decides that infrastructure connectivity is required, we have already taken the first steps towards being prepared. It is important to stress however that the nature of any future vehicle-to-infrastructure communications needs to be defined, for example to determine whether the direction of communications is one-way or two-way, and the scope of data to be included.

6.3. There are further examples in our approach to our traffic management systems. We already have a sophisticated mechanism for dynamic management of the road network that combines data and information from a very wide range of sources, including sensor systems (such as ‘SCOOT’), intelligent management of junctions and traffic lights, and information from our buses, amongst others. We constantly strive to improve our effectiveness, including through new partnerships such as incorporating data from the Waze road app into our traffic management. Looking to the future, our Surface Intelligent Transport Systems (SITS) programme is being designed to maximise road network capacity through exploring data partnerships and providing the ability for others to utilise our platform. This will improve our capability to use vehicle data in real time to manage London’s roads. Access to flow data from connected and autonomous vehicles could be part of this system, improving our capability to provide effective traffic management to tackle congestion, improve safety, and manage incidents.

6.4. When designing new infrastructure for the future, we will consider the potential impacts of autonomy and greater connectivity. Given the rapid pace of change in technology, we will do so with care to ensure our investment decisions are adequately future-proofed.

7. 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?

7.1. Some milestones will be led by the market and the emergence of available technologies, while others will be linked to the evolution of the safety debate.

7.2. On the latter, the speed and scope of the internationally-driven vehicle approvals processes - for us in the UK this is delivered through the EU and the UN - will have a very significant influence on the pace of change and deployment milestones.

7.3. Given the rapid pace of technology and business model development, it is important to ensure legislative frameworks, regulations and type approval mechanisms are able to adapt at the right speed. Local and national governments, as well as the international regulators are therefore faced with the challenging imperative to work together to create a sufficiently responsive regulatory and operating environment.
8. Are further revisions needed to insurance, regulation and legislation in the UK to create an enabling environment for autonomous vehicles?

8.1. Connected and autonomous vehicles may emerge in ways that create new forms of transport and alternatives to traditional vehicle ownership. It is important for national and local government to consider where new frameworks will be required. For example, if autonomous vehicles are deployed via rental or through shared ownership models, this would raise interesting questions about whether existing type approval mechanisms would be sufficient, or if additional approaches would be required for, say, operated fleets.

8.2. Whether it is through amendments to existing structures or creation of something new, we believe regulatory frameworks will need to adapt to fit the needs of connected and autonomous vehicles in a way that allows us to secure the benefits they could offer as we pursue our policy objectives, this may include considering where the gaps are in regulation. Given the importance of local priorities and differentiation as set out above, we also believe it is important for local transport authorities to work closely with the DfT as this evolves.

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

9.1. We support the structured approach taken by the Modern Transport Bill, which seeks to address nearer term challenges and close-to-market technologies, whilst also giving flexibility for the future to allow innovation to flourish.

9.2. As mentioned above, we believe it is important to retain an agile approach that is able to react rapidly to developments in technology or disruptive business models. Importantly, we also believe it is essential to ensure the active involvement of local transport authorities, who ultimately will be the entities most directly involved in ensuring these vehicles can be incorporated into transport systems, and to help us achieve or objectives in serving the needs of our citizens.

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