

Connected and Autonomous Vehicles: Transport for London, 2019

1. In parallel with the publication of the Connected and Autonomous Vehicles: guidance for London trials, which is aimed at organisations planning to undertake autonomous vehicle trials in London, this document sets out TfL's wider consideration of Connected and Autonomous Vehicles (CAVs).¹ We have developed this in consultation with [London Councils](#) and the London boroughs with a focus on the overarching aims of the [Mayor's Transport Strategy](#).
2. The central goal of the Mayor's Transport Strategy is to ensure that by 2041, 80 per cent of all trips in London are to be made on foot, by cycle or using public transport and that London's air quality is improved. The Strategy is underpinned by the [Healthy Streets Approach](#), which provides the framework for putting human health and experience at the heart of planning the city. A further vital element is the Mayor's ambition for [Vision Zero](#) – that by 2041, all deaths and serious injuries will be eliminated from London's transport network.
3. The future success of autonomous vehicle technology, how widely it may be deployed, and the purpose it may serve, is not certain. However, a reported \$100bn² has already been directed to CAV development worldwide, based on the potential benefits of the associated safety, health, accessibility and economic opportunities. In the UK, the Government has awarded more than £200m since 2014 for research, development and demonstration projects to further the UK's capability in this field.
4. London is a world-leading smart city and we see its future as a global test-bed for innovation. It is therefore right that we engage with all new technologies that could affect transport in the city in the future, and promote user-centred design of any new services so that these are open to everyone and meet the highest standards for all Londoners, from customer and user experience to cyber security.
5. The number of vehicles with internet connectivity is growing, and trials of highly autonomous vehicles are taking place in London this year. It is vital that TfL is operationally ready for these developments and engaged with the organisers of upcoming trials, in order to put public safety first. Trials to date are already helping us to understand the capabilities of autonomous vehicles and their potential impact on the city as well as our own network infrastructure, such as traffic signalling. It is equally important that we consider our future policies, so that if such vehicles are ever deployed on

¹ SAE International has published an internationally recognised overview of the different levels of driving automation: <https://www.sae.org/news/press-room/2018/12/sae-international-releases-updated-visual-chart-for-its-%E2%80%9Clevels-of-driving-automation%E2%80%9D-standard-for-self-driving-vehicles>

² Here are five of the biggest investments in driverless cars made in the past year <https://www.compelo.com/investments-driverless-cars/>, Compelo, 2019

London's streets in greater numbers, they are used in a way that aligns with the goals of the Mayor's Transport Strategy.

6. Research³ highlights the potential for CAVs to improve mobility choices for many, and with over 90 per cent of road incidents attributable to human driver error,⁴ the potential to reduce road danger is significant. The development and installation of semi-autonomous driving systems in 'traditional' vehicles is already improving safety on London's roads, with features like automated emergency braking and Intelligent Speed Assistance forming part of TfL's new [Bus Safety Standard](#). However, with so much industry focus on developing highly autonomous cars, we must acknowledge the operational risks to the efficient running of city road networks that large-scale deployment of these vehicles may pose, and that the safety of CAV technologies is not yet proven. Early analysis suggests that without appropriate policy interventions to control growth, CAVs could increase road congestion, discourage active travel and worsen particulate air pollution.⁵
7. TfL and the London boroughs have a network management responsibility to ensure the efficient and safe movement of people and goods on all roads in London, and are responsible for ensuring that safe and reliable services are provided to the public. To this end, the Mayor's Transport Strategy contains two specific proposals for TfL relating to CAVs:
 - Proposal I05: 'The Mayor, through TfL, will take part in trials of new vehicle technology, adopting a safety-first approach, and will consider the application of new vehicle technology in support of the Healthy Streets Approach.'
 - Proposal I06: 'The Mayor, through TfL and working with the Department for Transport and other stakeholders, will adopt an appropriate mix of policy and regulation to ensure connected and autonomous vehicles develop and are used in a way that is consistent with the policies and proposals of this strategy.'
8. In addition, Policy 23 sets out how the Mayor, through TfL, will explore, influence and manage new transport services so that they support the Healthy Streets Approach. This includes the principle that data and knowledge should be shared with TfL and the Greater London Authority to enable improved monitoring, operating, and planning of the transport network.

³ Connected and Autonomous Vehicles: Revolutionising Mobility in Society, SMMT, 2017

⁴ Mobility and Transport – Intelligent Transport Systems, European Commission, https://ec.europa.eu/transport/themes/its/road_it, 2019

⁵ Policy and society related implications of automated driving: A review of literature and directions for future research, Milakis et al, 2017

9. Our goal is for all new technologies and business models to evolve and be deployed in a way that is consistent with the vision of the Mayor's Transport Strategy:
- Making certain that the interactions of CAVs with people walking, cycling and using conventional vehicles are safe, predictable and manageable
 - Ensuring the right transport services, using the right vehicles, in the right places – with a strong preference for zero emission vehicles
 - Reducing the dominance of motor vehicles and their negative impact (road danger, impact on health and air quality) to encourage a shift to the healthiest, greenest and most efficient modes of travel: walking, cycling and using public transport
 - Contributing to improvements in the [10 Healthy Streets Indicators](#)
 - Exploring how the value of data that may be collected by operators of new transport services can be returned to London's communities (eg via data trusts).

Being operationally ready for trials of CAVs

10. Small scale non passenger carrying trials of CAV technologies are already happening on the London road network, and we're engaging and working collaboratively with the organisations leading trials. The majority of trials taking place during 2019 are part-funded by Government, and TfL is party to these initiatives as they develop. However, forthcoming trials may have no direct Government support and may be larger in scope. Regardless of the scope or scale, TfL and London boroughs want to engage with all trialling organisations to promote responsible and safe trials, consistent with the goals of the Mayor's Transport Strategy.
11. To achieve this we have set out our expectations of responsible trialling organisations in the [Connected and Autonomous Vehicles: guidance for London trials](#) (the TfL guide). The TfL guide will be utilised as a platform for building positive relationships with industry to help build our understanding of CAV technology, and associated opportunities. We already have one of the most sophisticated traffic management systems in the world and we are currently developing it further to ensure it is compatible with future requirements and data sources. CAVs are part of this, and understanding how new vehicle technology could interact with our systems may lead to improved traffic management in London. As CAV activity evolves in London, so will the TfL guide. An increase in the number and scope of trials, and the number of vehicles deployed may require the TfL guide to be updated over time.

Establishing policies for the future

12. If technology matures to the point where the use of CAVs becomes widespread, substantial changes may occur on the road network and in the every day lives of Londoners. We must ensure that the potential for reductions in road danger can be harnessed, and avoid any new or unforeseen safety-related risks, as well as avoiding an increase in motorised traffic or a shift away from walking, cycling and using public transport. Furthermore, new vehicle technologies could provide an opportunity to reduce the number of single occupancy vehicle trips. At this early stage of trials in London, our initial areas of focus for policy are:

- Licensing passenger services safely
- Congestion Charging
- Land use

Licensing passenger services safely

13. TfL is the regulator for taxi and private hire services in London and all regulation is designed to ensure passenger safety. Passenger carrying vehicles must obtain the relevant licences from TfL to operate within the capital.
14. While TfL cannot determine the commercial ventures CAV developers may propose, existing national legislation for the licensing of passenger carrying taxi and private hire services was not designed to include autonomous vehicles (for example, a remote safety driver operating an automated vehicle as opposed to a human driver).
15. The Government has acknowledged the above, along with a number of other areas where legislative changes may be necessary to enable the safe use of CAVs on UK roads. A number of decisions will be required at national level to agree what approach should be taken to licensing arrangements for CAV passenger services. To this end, the Law Commission has been instructed to carry out a wholesale review of motoring-related legislation by 2021 in order to propose changes for the Government to consider.
16. TfL will work with the Department for Transport and the Law Commission to establish what might need to change within existing legislation to ensure that any new licensing arrangements prioritise the safety of both passengers and the wider public.

Congestion Charging

17. Any deployment of fleets of new vehicles on London's roads raises the prospect of increased congestion. Should CAVs be deployed to undertake

licensed passenger services, it will be imperative that they do not circulate without passengers. Consideration will be given to how fleet operators are incentivised to refrain from deploying CAVs in this way. This may be via changes to how they are licensed, and what charges are payable for such vehicles running without passengers while in service.

Land use

18. The Healthy Streets Approach aims to improve air quality and create street environments where people choose to walk, cycle or take public transport, and where they can interact and socialise. If CAVs are to be deployed extensively in the future, TfL and London boroughs need to consider the potential impact on street design.
19. Research to date suggests that CAVs may be able to utilise carriageway space more efficiently than conventional vehicles,⁶ therefore presenting additional opportunities to re-allocate space for cycling and walking and thus the potential to improve air quality. CAVs could also enhance opportunities to rethink how kerb access is made available and controlled, both for passenger and freight vehicles.
20. In the future, if highly autonomous vehicles reach a higher concentration in the vehicle fleet, TfL will continue to work with the London boroughs and other key stakeholders to ensure future street design is focused on the Healthy Streets Approach, and reflects international best practice.

Conclusion

21. TfL will continue to work with key stakeholders and trial operators as more CAVs are deployed on London's streets. We will ensure safety and the Healthy Streets Approach remain central to all policy development, and will work with trial operators, the Greater London Authority and London boroughs to consider the correct approaches to important related areas such as infrastructure and data. As a first step, as noted above, we have published guidance for organisations planning to run trials in London. This is intended to be a living document, which will be updated to reflect legislation, best practice and the interests of the public.

⁶ Blueprint for Autonomous Urbanism, NACTO, 2017