Autonomous vehicles: challenges, opportunities for London

Tim Armitage explores the opportunities and challenges for the capital

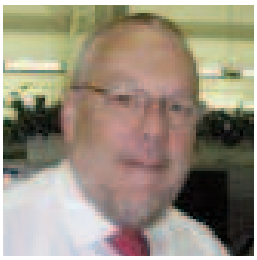
Last month saw the Arup-led consortium, UK Autodrive, take to the streets of Coventry to hold the country's largest trial and demonstration of autonomous and connected vehicles on public roads. Autonomous vehicles are on their way. So what do cities such as London need to be thinking of now?

The challenges of developing technology to automate the driving task should not be underestimated. Nor should the challenges of regulation and certification, and of preparing our cities to maximise the benefits of this disruptive new form of mobility. A future where all vehicles are fully autonomous is relatively easy to imagine; the film industry has given us glimpses of how that might look. Less clear, however, is the view of the world as we shift from manual driving to autonomous driving in the coming decade.

We are already rushing headlong into this 'fog' of mixed methods of controlling road vehicles. Vehicles with advanced driver assistance systems such as adaptive cruise control or lane assist are already widespread. The number of these vehicles will increase rapidly over the coming years as will their autonomous capability which will be motivated by consumer choice and insurance premiums.

The impact on cities such as London will be profound. Imagine a scenario where a car can 'drive' into a city, negotiating with a city authority 'system' for a car park space which is then allocated to the vehicle. A development of this scenario may see the car being directed to an out-of-town car park. There the passengers will leave the car and travel the last mile by public transport or turn to some form of active travel such as walking or cycling. An alternative to these scenarios may see a car delivering its occupants to a programmed destination where they disembark and the vehicle then goes off to perform another service. These scenarios are not works of science fiction but are being demonstrated with prototype vehicles today.

These new capabilities will provide challenges to a city like London; a city with a complex and congested network of roads. Careful consideration of the developments to come will be needed to avoid any negative impacts from the growth in connected and autonomous vehicles. However, the new forms of mobility will also offer opportunities, not only to manage the introduction of connected and autonomous vehicles into London's urban realm, but also to harness the benefits they bring. So what does London need to do to prepare?



Tim Armitage is Arup Project Director for UK Autodrive

Challenges for London

We are living at a time of unprecedented change that will affect the way we move within and between cities. The introduction of CAVs is only one amongst a group of developments, which includes low carbon fuels, big data, the sharing economy, mobility as a service and more. All of these developments will combine to change the way in which we consume mobility services and the way in which London's authorities will have to provide them.

The challenge for London is how to embrace the new technologies to enhance the way that the city functions, whilst managing the transition period from today into a truly low-carbon and digital future.

Opportunities

A major international car company recently announced at an event in London that its future vehicles will be based around four pillars. They will be low carbon, connected, autonomous and shared. Many other manufacturers are heading in the same direction and these four attributes provide a good basis from which to consider the opportunities in future urban mobility.

Low Carbon vehicles will provide an immediate benefit in terms of the quality of London's public realm. They will directly improve air quality in the urban environment and also contribute to a reduction in traffic noise, ultimately making a city a much nicer place for its citizens.

Together, a fleet of battery electric vehicles could act as an aid to managing the energy system in London helping to balance demand and control frequency at peak times. So called vehicle-to-grid (V2G) technologies have the capability to remotely control when an electric vehicle is charged. Vehicles that can be charged when the general demand for energy is low, and in some cases return energy to the grid when demand is high, will contribute to an efficient energy system.

Connected vehicles will provide a rich source of data that >>>

>>> will be valuable to the city in understanding how its citizens and visitors move around the urban environment. Data analytics will provide real-time information on vehicle flows and traffic jams. The flow of information will be bi-directional, the city will be able to provide information on parking and drop-off places to visitors and will also be able to manage traffic flows by providing preferred routes to traffic negotiating the city streets.

The bulk availability of real traffic data from connected cars and the adoption of data analytics will allow transport planners to apply interventions to improve the flow of vehicles through the city.

Real-time traffic signals can be broadcast into the connected car, such technology will enable vehicles to negotiate the city in a more efficient way, reducing congestion and corresponding pollution from legacy internal combustion engine vehicles.

Autonomous vehicles have the potential to radically change the way in which both people and goods move around a city environment like London. Perhaps the most noticeable change will be a reduction in the number of car park spaces as cars are able to drop their occupants off at a destination then move without a driver to an out of town car park, or indeed to go to fulfil another journey or service. This valet parking will mean that there will be an increase in demand for drop-off points with a corresponding opportunity to re-purpose the space currently given over to parking.

New forms of autonomous transport will facilitate last mile journeys using on-demand low-speed autonomous vehicles that will operate in shared spaces. This will allow planners to restrict larger passenger and freight vehicles to the outskirts of cities, thereby improving the quality of the urban realm.

Shared ownership - vehicle ownership is changing, direct purchase has been losing popularity and vehicle lease models are becoming more common. This change is set against a backdrop of fewer young people learning to drive and 'owning' car. Many reasons are cited for this change, with the two most common being the cost of insurance for young drivers and the acceptance of car ownership as a 'right of passage' amongst customers of the new millennium. These trends are especially apparent in cities like London where efficient forms of public transport are present in conjunction with car clubs and affordable taxis.

Connected and autonomous vehicles will become increasingly common in our towns and cities. The digital innovations which are enabling their development are beyond what we are used to in transport systems. Their introduction is being encouraged by our national government, an action which fuels the pace of innovation. These innovations will lead to the evolutionary development of current passenger and freight vehicles (including busses) and will also lead to the revolutionary development of other forms of mobility such as the last mile 'pods' being demonstrated in Milton Keynes and Greenwich.

As traditional passenger cars become fully autonomous, moving from place to place independent of occupants, the value in personal ownership will decrease. This will almost certainly lead to the introduction of Mobility as a Service (MaaS), small examples of which are already appearing.

New business models will be needed as revenues from parking (£819m for English councils[1]) reduce as fewer parking spaces are need. London's authorities and businesses will need to embrace the changes precipitated by connected and autonomous vehicles if they are to achieve the full benefit that they can bring. Perhaps the most exciting outcome will be that city planners will be able to start to design for the needs of people first and not for the needs of the car. The car is no longer king.

[1] *Local Authority Parking Operations Revenue Outturn for England, RAC Foundation 2017*
http://www.racfoundation.org/research/mobility/council-parking-revenue-in-england-2016-17