

Mobility 2030 – Planning ahead for critical infrastructure challenges



Effective and efficient future mobility depends as much on having the right infrastructure in place as it will on technological innovations. Whereas software can be developed at pace, with key decisions made rapidly on a fail-fast basis, you simply can't fail fast and start again with infrastructure. You have to plan ahead and there's only one shot at getting it right.

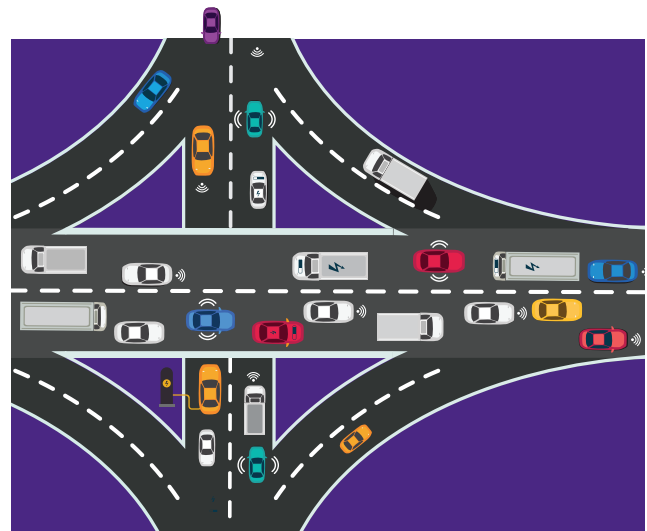
That is why transport authorities, city planners and transport operators need to be thinking now about the impact of Autonomous Vehicles (AV) and Electric Vehicles (EV) when making present decisions. HS2, for example, needs to be planned and designed with the mobility landscape of 2030 and beyond very much in mind.

Congestion and the rising demand for road space

There are a number of challenges to overcome. When it comes to AVs the biggest of these is congestion. We already suffer from a congested transport network and the problem is not going to get easier. Solving this is key to productivity, with studies having shown that the cost of congestion (£13.1bn in 2013) is expected to increase by 63% (to £21.4bn) by 2030¹.

The rise of AVs is likely to lead to a higher demand for road space capacity. There may be fewer vehicles on the road, but they will be driving many more miles. As car sharing and subscription-based services lower the cost per mile, consumers will want to use AVs more. Natural human behaviour will see people wanting to do a whole journey from origin to destination uninterrupted too!

There is only so much that advanced traffic management and road design can do. And it seems certain that we won't be able to build sufficient extra road to meet demand.



What can be done about this? Road user charging may well be used as a tool by governments to influence behaviours whilst replacing tax revenues lost from a switch from internal combustion engines to electric vehicles. We only need to look at New York City, where a \$2.75 surcharge was recently introduced for ride hailing journeys in Manhattan – the same price as a fixed fare on subways and buses. The intention is clear: discourage individual journeys and promote shared, public transport.

Our expectation is that this will lead to the use of AVs for the first and last miles of journeys, with mass transit where journeys can be completed using principal transport corridors. That is to say, consumers will travel by AV from home to the nearest station, and from station to their destination (work), AVs being provided by fleet operators in services, which could be subsidised by transport authorities. The central or 'corridor' part of the journey will be via mass transit in fast and highly efficient rail or bus services (e.g. Bus Rapid Transit).

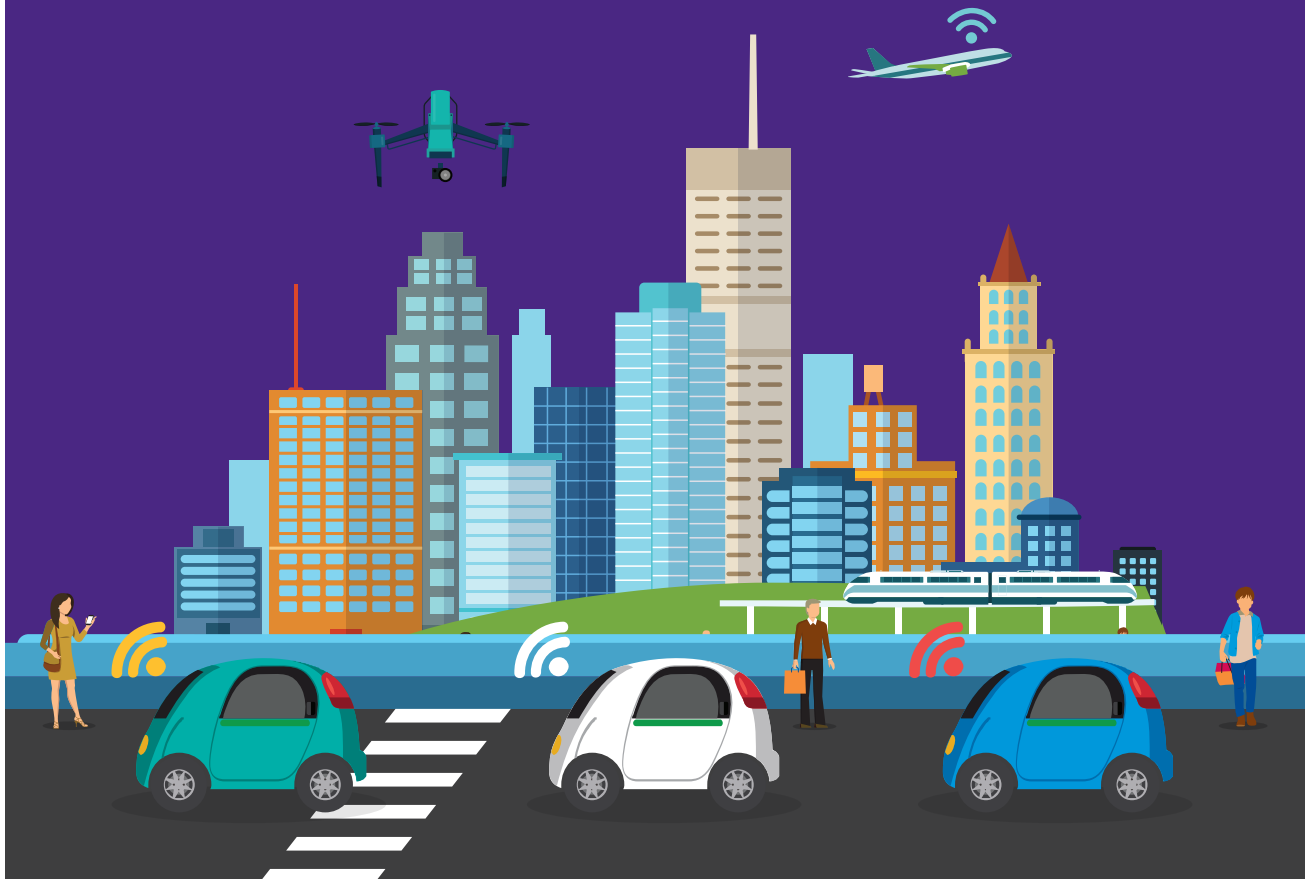
¹ <http://inrix.com/press-releases/traffic-congestion-to-cost-the-uk-economy-more-than-300-billion-over-the-next-16-years/>

Urban planning implications

The rise of AVs will pose some key urban design and planning issues. For example, over the last 30 years or so there has been a move towards desegregating traffic from pedestrians. Metal fences or railings by the side of roads in cities have been taken away, partly because they were unsightly and didn't create a pleasant environment but also because they could lead to crowding and congestion on pavements. However, when AVs become more common, people may begin to step out into the road to get where they want to go, knowing that vehicles will stop for them. Pedestrian interference could cause gridlocks and blockages. So, we may need to erect more fencing again to separate pedestrians from traffic.

If travellers start to use AVs for the first and last miles of their journeys, we may also need to redesign our train stations and their taxi ranks. We all know how bad queues for a taxi can be at busy stations. Rail operators and authorities would be advised to look at how some airports have begun to design their drop-off and pick-up points. For example, Singapore airport has a highly efficient despatching system for taxis, with staggered positions at an angle. Heathrow and Gatwick have also redesigned their systems to optimise throughput.

Then there are alternative uses for car parks, which take up large volumes of premium space in cities and may be much less needed in an AV world, where vehicle sharing becomes the dominant model. Can car parks be converted to become charging stations for EVs, or loading areas where the AV an individual is due to use in the evening is automatically loaded with their shopping during the day? Could car parks also become areas for vehicle maintenance and servicing?



Electrification, communications...

There are two other major infrastructure issues: electrification (battery and/or fuel cell) and communications networks. Both of these will require significant investment – leading to the question of course of who will fund them.

As EVs reach mass uptake, this will place a host of new pressures on the local grids. It will be a major challenge to get the charging point and/or alternative fuel (e.g. hydrogen) distribution network up to standard. For battery electric vehicles, distribution networks currently don't have the resilience or capacity to meet the demand that will arise in the future. There is also the question of installing enough charging points.

With home charging likely to predominate as the means for charging EVs, smart charging will need to be in place to manage surges during peak periods, such as early evening when drivers return from work. Particularly in areas with high EV take-up, demand-management tools could help to distribute energy usage across off-peak periods.

Then there is the volume of data that AVs will produce through vehicle to vehicle and vehicle to roadside communications. The majority of OEMs and AV software providers have indicated that vehicle to infrastructure (V2X) communications are

not needed for AVs to operate. However, at scale, connectivity solutions to expand the range and scale of collaborative communications between vehicles, and to enable effective systems operations, will be required. ITS-G5 is the current standard for V2X communications but this is unlikely to provide the high bandwidth, low latency services required for high-speed connection with high volume data transfer to a large number of AVs. These will need 5G – but will it be ready with sufficient density and coverage in time?

We can be confident that, one way or another, both the electrification and communications network challenges will be met. However, what is less clear is who will foot the bill. How much will Government fund and, indeed, pay for this given the aforementioned loss of fuel duties? How much will private investors be attracted to invest through PFI and other financing vehicles? There are many potential beneficiaries in the ecosystem – from OEMs to energy companies and mobility service providers – so how much will they each invest in developing the infrastructure? We have already seen Shell buy Dutch EV charge point supplier and operator NewMotion and the recent acquisition of ChargeMaster by BP – and we are sure to see much more activity as players position themselves for the future.



Forward-thinking needs to start now

We cannot afford to take our eye off these physical infrastructure issues. Projects being planned today must build in the flexibility to meet the demands of the future. There is little point, for example, in building a new train line with a traditional fixed-block signalling system when the world is moving to digital, moving-block signalling.

It is sometimes said that if you spend an extra pound in planning you will save £10 in the future. With the infrastructure investment required for a truly integrated mobility ecosystem likely to run into the billions, the importance of planning ahead is critically important. Without it, the future will be a whole lot harder and significantly more expensive to build.



Find out more here:

kpmg.com/uk/Mobility2030FS

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