

# Driverless Futures?

## Future of Transport Regulatory Review

### Submission from the *Driverless Futures?* project

Contact: Jack Stilgoe ([j.stilgoe@ucl.ac.uk](mailto:j.stilgoe@ucl.ac.uk)), principal investigator

July 2020

This submission is made on behalf of the *Driverless Futures?* team (Dr Jack Stilgoe, Dr Chris Tennant, Nicole Badstuber, Prof Peter Jones, (UCL) Prof Graham Parkhurst and Prof Alan Winfield (UWE)). Our project is a three-year (Jan 2019 to Dec 2021) investigation into the governance options for self-driving vehicle technologies (or Connected and automated/autonomous vehicles (CAVs)). This project is funded by the Economic and Social Research Council.<sup>1</sup>

Self-driving vehicles represent an important test case and target for future transport regulation. The challenges involved in bringing self-driving vehicles to a range of road environments, including shared spaces, are only now becoming properly understood by promoters of the technology, and due to the complexities involved, the technology is likely to be confined to narrow operational domains in the short term. For example, a distinction can be made between highly-automated but slow-speed electric shuttle vehicles operating in pedestrianised areas or reserved alignments, and automated road vehicles capable of replicating all the functionality of the human-driven private car on a general-purpose road.<sup>2</sup> In the medium to longer term, with driverless and conventional vehicles sharing the same roads, the existing Highway Code will clash with a technological preference for a fully determined code for the task of navigation. The negotiation of a 'Digital Highway Code'. Through talking to developers, stakeholders and members of the public, our project aims to lay some foundations for fundamentally different ways of understanding and governing mobility.

Our submission to the regulatory review draws on a Sciencewise public engagement exercise conducted by members of the project team on behalf of CCAV<sup>3</sup> and from approximately 40 expert interviews conducted by the research team with a range of stakeholders, and engagement in the Innovate-UK funded research projects Venturer, CAPRI and MultiCAV.

Our submission covers:

- Ensuring inclusive future transport
- Enabling trials of new modes

---

<sup>1</sup> <https://driverless-futures.com>

<sup>2</sup> Paddeu, D., Shergold, I., Parkhurst, G., (2020). The social perspective on policy towards local shared autonomous vehicle services (LSAVS). *Transport Policy* (in press).  
<https://doi.org/10.1016/j.tranpol.2020.05.013>

<sup>3</sup> CAV public acceptability dialogue  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/837958/cav-public-acceptability-dialogue-engagement-report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/837958/cav-public-acceptability-dialogue-engagement-report.pdf)

# Driverless Futures?

- Local leadership of new transport services

We start with some preliminary observations on the challenges presented by multiple policy goals, set against the present context of rapid technological change.

## Policy choices and the role of regulation

The Government's Foresight report on the Future of Mobility stresses the need for regulation to manage the trade-offs between competing objectives, and the White Paper "Regulation for the Fourth Industrial Revolution" repeats this. The anticipated trade-offs include local versus national priorities, and individual choice versus societal objectives. The Future of Mobility urban strategy provides a welcome alternative to a technology-first approach, adopting instead a principles-based approach. The challenge is to apply such principles to new technologies, for which outcomes, risk and benefits are uncertain and where there is substantial pressure to innovate for economic reasons. A holistic approach should not see regulation in opposition to (or 'stifling') innovation, but rather as a key shaper of innovative futures.<sup>4</sup>

## Ensuring inclusive future transport

Ensuring inclusive future transport is a priority for the Department for Transport as articulated in the Future Mobility Principles. The recent report by the Social Mobility Commission highlights the role transport could play in addressing inequality.

Regulation is key to steering the trajectory of new technologies towards an inclusive transport system. An important finding of the Sciencewise dialogue on CAVs was that people wanted the technology to be available for all. The exercise revealed enthusiasm about the technology's possibilities for affordable, accessibility mobility, but also a concern that, if left to their own devices, technology developers could contribute to widening inequalities, which would fail to realise potential benefits. There was concern that CAVs would remain an exclusive luxury for the few. Workshop participants raised concerns that without intervention, such as through government regulation, the economic markets would direct the AV technology towards the biggest market, rather than where the greatest potential benefit and need is. Many of the participants concluded that AVs had the potential to improve mobility options and affordability of travel, if the technology was directed at being used in the public transport setting and to reduce public transport operational costs. Among the women participants in particular the imagined absence of a driver and lack of control over routing created concerns about personal security. And participants worried about disabled people needing support into and out of vehicles and people with learning disabilities being unsupported in their use of advanced technologies.

---

<sup>4</sup> Stilgoe, J (2020) Who's Driving Innovation? New technologies and the collaborative state. Palgrave

# Driverless Futures?

Similarly, the CAPRI project found,<sup>5</sup> through deliberative co-design engagement with the public, very strong support for the principle of synchronously-shared mobility for reasons of social inclusion and reducing the environmental impacts of mobility. However, there were conditions to this support which could be less inclusive, including requirements for the social environment to be ‘managed’ raising the potential for discrimination: some people wanting the right to ‘vet and veto’ others before they be allowed to join the vehicle. However, clearly some kind of automated access control would be required in the absence of an operative, if only to ensure the traveller who had booked a seat was actually the person joining the vehicle, and alongside that, remote surveillance at an appropriate level of intrusiveness to discourage antisocial or criminal behaviour.

Anticipatory regulation should aim to widen access and ensure safety, without specifying particulate technologies by, for example, establishing clear metrics of success and providing a framework for consumer protection. For CAVs, the risk is that the limitations of the technology mean that citizens are forced to adapt to it rather than vice versa.

Our interviews suggest that, for CAVs, new modes of innovation centred on data could rapidly reshape of markets and enable new platform monopolies. Regulators would therefore need to play a role in maintaining competition and innovation. A laissez-faire approach to innovation that is guided by consumer choices and satisfied by private enterprise leads to substantial negative externalities. Micromobility and mobility-as-a-service should provide a wake-up call to governments to assert public policy objectives to avoid regulatory surprise.

## Enabling trials of new modes

CAV developers all recognise the need for some form of on-road testing in real environments, even if some technology development can take place in simulation and on test tracks. The Government has already outlined its intention to be a destination of choice for AV testing, but there is currently little evidence of the benefits of having companies testing on British roads. Demonstrating CAV safety is a huge challenge, and a potential opportunity for the UK given the national research community and strong reputation in standards-setting.

CAV companies testing on roads have so far sought to demonstrate a responsible approach, but there are few rules in place to prevent irresponsible testing, and insufficient thinking about the risks, both to public health and to innovators’ reputations, of the sort of bad practice exhibited by Uber in Arizona. There are real questions about informed consent and local populations when technologies are tested in their communities. The de facto mode of governance currently relies upon safety drivers are safety cases. There is a strong argument for a more organised approach.

If testing happens on public roads, local authorities should consider what they are getting back in return. In addition to the innovation that happens through private data-collection, there is a case for wider social learning.<sup>6</sup> Some places, including California

---

<sup>5</sup> Paddeu, D., Shergold, I., Parkhurst, G., (2020). Op cit.

<sup>6</sup> Stilgoe, J. (2018). Machine learning, social learning and the governance of self-driving cars. *Social studies of science*, 48(1), 25-56.

# Driverless Futures?

and Massachusetts, have created or proposed obligations for data-sharing from such tests.

Within the overarching trial programme, a distinction can be made between 'demonstration' and 'experimental trialling'. In the case of demonstrations, confidence-building may be a direct objective of the activity. However, this should not be confused with building a robust evidence base around the behavioural responses to automation, and indeed, the driver-behavioural responses of people in charge of conditionally-autonomous vehicles, should they be permitted to operate on British roads.<sup>7</sup> Trialling to produce robust scientific and social scientific findings needs to be conducted in a research environment distinct from the promotion of technologies or brands, in as naturalistic an environment as possible, albeit subject to the constraints of a sound safety case. In this context, information about attitudes, levels of trust and acceptance should be considered an unprompted and unprompted finding of the research, rather than it being an objective of the activity to 'improve' them.<sup>8</sup>

## Local leadership of new transport services

CAV technologies are currently imagined by many developers as universal solutions. Their local specificity and applicability has been insufficiently explored.

In England, 98% of roads are governed by local government. Local authorities are responsible for the usage of key public space and transport infrastructure including kerb space, road space and parking space. With this level of control, local authorities can be interventionist in setting the framework for the use of new mobility solutions including CAVs in their jurisdiction. Simply put, deciding whether and where vehicles can occupy physical space, they determine whether and where a mobility option such as CAVs can be used.

In hindsight the adoption of the private motorcar led to the implementation of new road infrastructure to accommodate the new motor vehicles and to cars claiming public and road space previously used by pedestrians and other road users. Initially the car was only available to the wealthy and their widening of mobility options came at the cost of others losing access and space. There is a risk of history repeating itself with driverless cars. For this reason regulation and local leadership is needed to ensure an inclusive future transport system.

---

<sup>7</sup> Due to uncertainties about how to manage the machine-to-human 'handover' problem, the current legal position following the Automated and Electric Vehicles Act 2018 is that conditionally-autonomous vehicles (often referred to as SAE 'Level 3') will be treated not as automated vehicles but as vehicles fitted with advanced driver assistance systems, which require complete human driver engagement, with the driver remaining legally responsible for the vehicle at all times, which means hands on the wheel and eyes on the road. [Parkhurst, G., Cockburn, M., Murphy J., Wong, B. (2021, Forthcoming). Coevolution of the regulatory and legal framework to enable CAVs to use the highway. In Zhang, X. (Ed) Cities for Driverless Vehicles. Thomas Telford, London.]

<sup>8</sup> Paddeu, D., Parkhurst, G., Shergold, I. (2020). Passenger comfort and trust on first-time use of a shared autonomous shuttle vehicle. *Transportation Research C: Emerging Technologies*, 115. <https://doi.org/10.1016/j.trc.2020.02.026>

# Driverless Futures?

In particular, the responsibilities of local highway authorities will continue to be to maintain, manage and develop the road network for the safe usage of all user groups, including pedestrians, cyclists, motorcyclists and those continuing to want to drive themselves and others in motor vehicles. Some of the many unsolved issues that remain include:

- Maintaining the level of service offered to pedestrians in the context of automated vehicles, where there might be temptations to limit and regulate their movements due to the inability of AI to replicate the complex communication and negotiation that pedestrians and drivers display when sharing space
- Allowing for the presence of motorcyclists: vehicle with dynamics similar to the private car, but with no prospect of automation, and little debate about them becoming connected vehicle
- Delivering the safety benefits promised by CAV proponents to groups such as cyclists, whilst maintaining highway capacity, and in the absence of highway code rules that can be coded into automated driving systems
- Regulating the behaviour of mixed automated and human-driven vehicles in the same traffic stream, where the appetite for rule-following may be lower amongst the human drivers than exhibited by automated driving systems coded by responsible technologists cognisant of the rules of corporate manslaughter.

An initiative to develop a digital, indeed a 'digitisable' highway code, should be promoted, with an active debate around that process to consider the various interest groups.

Currently, most CAV developers imagine that their vehicles will be independent and not require any infrastructure modifications from local and national road authorities. Our interviews with key actors in the field suggest that the reality may look very different. Successful CAVs may require changes to roads, road furniture and other road users' behaviour. As it stands, there is no clear strategy for how this additional infrastructure will be funded in an equitable way, in the context that the UK Government, along with many others particularly in Europe, will be experiencing declining revenues from fuel duty<sup>9</sup> as the vehicle fleet is evolved to electric operation. Alongside the enthusiasm for new technologies, the public debate around 'future mobility' needs to face the less enthralling issue of how road congestion is going to be restrained and maintenance funded in a context in which cars become much cheaper to use.

The Sciencewise dialogue revealed that members of the public currently see an accountability gap and want to be clearer on who will shape and take responsibility for the development of CAV technology.

---

<sup>9</sup> Worth in the order of £30 billion per year to HM Treasury.