Ruth Thompson Memorial Lecture Autonomous Vehicles with David Webb 21.10.19

Summary

A summary of the fourth annual Ruth Thompson memorial lecture discussing autonomous vehicles with David Webb, Head of Innovation at the Department for Transport's Centre for Connected and Autonomous Vehicles, held at 169 Union Street, London, SE1 0LL on 21 October 2019

Present

Members
Alan Benson, Safia Iman, Arthur Leathley (Chair)

Guests

Ross Atkin	Ross Atkin Associates
Ian Baker	Kingston and Sutton
Norman Baker	Campaign for Better Transport
Sir David Bean	Sponsor
Vaibhav Bhatla	Uber
Nicholas Bosetti	Centre for London
Rachel Buck	Transport for London
Phil Carey	Transport Focus
John Cartledge	Former London TravelWatch
Susan Castillo Street	Individual
Andy Cunningham	London Borough of Hackney
Alex Crush	London Borough of Lewisham
John Dales	Urban Movement
Nigel Davies	London Borough of Bromley
Graham Evans	Airbus
Richard Fagg	London Borough of Bromley
Roger Geffen	Cycling UK
Sahil Gupta	Uber
Jeff Halliwell	Transport Focus
Geoff Hobbs	Transport for London
Andrew Hugill	Chartered Institution of Highways and Transport
Alex Ingram	Greater London Authority
Stephen Locke	Independent Consultant
Paul Lynch	Stagecoach
Ian Mack	The Green Bus Company Ltd
Daniel Milne	Ford Mobility Europe
Emily Nagler	RAC Foundation
James Nattrass	Network Rail
Tobias Newland	London Borough of Hackney
Justin Pickup	London Borough of Bromley
Howard Potter	Scott Potter Associates
Eshwyn Prabhu	London Borough of Islington

Margherita Rendel	University College London
Angeline Riley	Network Rail
Russell Roberts	London Borough of Ealing
Melinda Roylett	Uber
Elaine Seagriff	Jacobs
Nick Stevenson	London Borough of Bromley
Adam Tyndall	London First
David Webb	Centre for Connected and Autonomous Vehicles
Ian Wright	Transport Focus

1 Introduction

The Chair welcomed those present to the meeting and made the standard safety announcements. He thanked Sir David Bean for sponsoring the event.

The Chair introduced the guest speaker, David Webb, Head of Innovation at the Centre for Connected and Autonomous Vehicles at the Department for Transport. He said the Centre, established in 2015, worked across government to support the UK's developing connected and automated vehicle market. It aimed to make the UK a premier development location for connected and automated vehicles. The Chair invited Mr Webb to the stage.

2 Autonomous Vehicles – a presentation by David Webb, Head of Innovation at the Centre for Connected and Autonomous Vehicles at the Department for Transport.

Mr Webb stated that the Centre for Connected and Autonomous Vehicles (CCAV) was four years old and aimed to make the UK the primary location to develop and operate autonomous vehicles. He commented that although the organisation was relatively new, work in the area had already been happening many years before this though it was the Centre's job to bring it together and drive it forward.

Mr Webb said that there were numerous questions that had to be answered in order to make autonomous vehicles a reality on UK roads. These included ensuring that there was a safe and secure system for these vehicles to operate in, which included making sure there was the right legal framework in place. He stated that the UK was the first country in the world to have automated insurance acts which set the foundation for how a person would be insured if they had a self driving vehicle. The Centre had also put in £100 million into R&D which had been matched by the industry to look at a range of areas.

In terms of the code of practice, Mr Webb said that the main selling point for the UK was that it already had laws that allowed companies to come and develop driverless car technology. He said that as long as the vehicle was roadworthy, had the appropriate insurance and had a driver ready to take control, it was perfectly legal to operate them on UK roads.

Mr Webb said that the CCAV asked the Law Commission to do a review of the legal framework that exists in the UK to discover what needed to change in order to do full commercial operations with driverless vehicles. He said that they had also launched a consultation to look at passenger services on taxis and private hire vehicles. The key point to come out of the work was the recommendation to implement a new way to licence vehicles, as in an autonomous vehicle landscape the driver would be the car.

On cyber security, over £2 million was being spent looking at all the projects currently under way in order to ensure that they had as robust a system in place as possible. The CCAV had released a standard around one year ago though this would not prevent all forms of cyber attack. He said that instead work was being done on how best to mitigate and stop an attack once it was in train.

Mr Webb said that advanced trials were being carried out for the code of practice to ensure that safety and security was of the upper most importance. He said that the CCAV was looking at things that needed to be put in place to assure themselves and Government that safety was being prioritised.

Mr Webb commented that the Ford Mondeo was a model of car that was very popular among autonomous vehicle companies as it can easily be adapted to be driven by a computer. At the other end of the spectrum, there were vehicles such as driverless pods that could not be driven on UK roads but could be used on university campuses, airports and other similar locations. He remarked that within five years it would be fairly common to see the pod type vehicles in operation whereas autonomous cars that could be used on public roads would be more likely to arrive in around 15 years.

Mr Webb commented that although the law allowed driverless cars on public roads there must be a human driver ready to take control of the vehicle at all times. Therefore, in order to have fully autonomous vehicles on UK roads without a human driver ready to take over this would require a change in the law. He commented that it was his job to ensure driverless vehicles were as safe as possible in order for this change in the law to happen.

Mr Webb remarked that much of road law had been introduced in the 1800s, though government was slowly beginning to work internationally to get the right framework in place. He said that he was funding work on the pod vehicles to measure their safety, and in 2020 there would be trials with Addison Lee to deploy 10 driverless vehicles. Mr Webb commented that they were also engaged with the University of Warwick, University of Leeds and Imperial College London. He stated that later on in the year there would be a trial where a driverless Nissan Leaf would take a 230 mile trip from Cranfield University to Nissan’s plant in Sunderland, covering a mixture of rural roads, motorways and motorway junctions.

As mentioned previously, the CCAV had invested £100 million into R&D which had been matched by industry. They were working with over 200 companies on 82 projects which were producing a mixture of hard research

all the way through to services. One project involved a bus garage with autonomous vehicles that was already doing monotonous tasks such as moving themselves around the depot. He commented that they planned to have autonomous buses in operation and picking up passengers in the near future.

Mr Webb stated that although the CCAV encouraged companies to test their vehicles on the road they had also set up test environments at six locations around the country. One location in Hinkley had a large 'flat disc' area where people could do a multitude of trials on their vehicles. This included blowing tyres as they were going along, simulating busy junctions or forcing the car to veer off in a certain direction. They had also made inflatable robot cars for vehicles to drive into to simulate crashes without causing damage to the cars, which would otherwise be very costly.

Mr Webb stated that in countries such as Germany the focus was on improving driver aids rather than on purely autonomous vehicles. He said technology such as automated cruise control and rain sensing windscreen wipers had been around for a decade and were a stepping stone to a fully autonomous landscape. He remarked that these driving assist tools also helped to build trust with users as it showed the technology worked and was of benefit to them.

Mr Webb turned to the technical complexities that went into driverless vehicles. He said that an F35 jet had around 25 million lines of code, a modern day Mercedes had around 100 million lines of code and a driverless car had over 250 million lines of code. He said that in 2015 8% of vehicles had some form of driving assist built into them, though 50% of users actually turned the system off. However, by 2025 62% of vehicles would have autonomous capabilities.

Mr Webb said that a driverless car had many ways of being able to 'see' the road and hazards on it. This included short, medium and long range radar, ultra sound, sound waves and lasers. He commented, however, that there would still be potential blind spots where the car would be vulnerable to collisions.

Mr Webb said that to answer the issue with blind spots there were a number of fixes that could be put in place. This included vehicle-to-vehicle communication and putting sensors on infrastructure to, for example, tell cars when it was safe to turn onto the road. He said that such data could help create a 'God's eye view' which could enable things like allowing traffic lights to turn green if an ambulance was trying to get through or increasing road pricing mechanisms if a certain road was particularly polluted by traffic.

Mr Webb said in order to prove that driverless cars were safe it would require the vehicles to drive millions of miles to encounter all forms of road hazards to prove that they could handle any situation. Due to the obvious difficulties with this they instead were looking at replicating that work in a simulator. He commented that in order for the simulation to be trustworthy it had to replicate the real behaviour of vehicles on the road – not everyone

driving in straight lines and at the speed limit. He said that they were working alongside a number of companies including COSMOS, OmniCAV, FiveAI and VeriCAV in order to make the simulation as accurate to real world conditions as possible.

3 Q&A

The Chair thanked Mr Webb for his interesting presentation. He invited Sir David Bean to say a few words. Sir David said that the topic of autonomous vehicles was one of the most fascinating and important social issues of his lifetime. He asked, being 65, whether at some point in the future, when he was too old to drive, whether he would be able to use a driverless vehicle.

Mr Webb said that there would be a huge advance in driver assistance very soon though it would likely be around 15 years until he would be able to use a fully autonomous vehicle to get around on public roads. He commented, however, that if he wanted to take a ride in one of the pod vehicles he had mentioned this could be done within the next couple of weeks.

Graham Evans from Airbus asked what the problem was the Government was trying to solve by investing in driverless car technology. Mr Webb replied that around 4,500 people are killed on UK roads each year with 90% of those fatalities caused by human error. He said that if driverless technology could be used to decrease those numbers that could only be a benefit to society.

Mr Webb said that certain jobs, such as haulage driving, were becoming less appealing to young people. He said that the average age of a truck driver was 60 and that the sector was at 60%-70% capacity. Therefore, autonomous vehicles could be used to plug gaps within that field. Mr Webb added that the number of young people that held a driving licence was on the decline, so having autonomous vehicles that all people could use made sense.

Andrew Hugill from the Chartered Institution of Highways and Transport said it appeared that Mr Webb was suggesting that there would be far more journeys and trips thanks to the advancement of autonomous vehicles. He asked how that squared with the issue of climate change and the need to reduce emissions.

Mr Webb said that there was a dystopian and utopian world that autonomous vehicles could fit into. He commented that there needed to be a change in the perception of transport and how it was balanced between the different modes. He remarked that in many places like London and Birmingham there was not a need to drive in the city centre. However, for people in more rural parts of the country a driverless vehicle could be of real benefit to them.

Roger Geffen from Cycling UK said that there had been very little engagement by Government with his organisation with regards to autonomous vehicles and where the technology was at in general. Mr Webb

said that the CCAV held open events, the next one being in February 2020, which would be open to the industry, charities and NGOs, which he was welcome to attend. He said that the current technology on cycle detection was ‘not good at all’ however within a year or two the capability of the technology would be at a much better level.

Stephen Locke said that he was one of the 50% that turned off the parking assist on his car, and did not always trust when his windscreen wipers automatically came on. He said that trust with users was fickle and asked if there had been any modelling done to find out how trust could be built up to get people to want to use the technology. Mr Webb said that they had done some engagement with the public though understood that it was an area that they needed to focus more on.

Phil Carey from Transport Focus asked how reliant the technology was on clear road markings, which on some parts of the road network had been either worn away or were not visible at all. Mr Webb said that it would depend on the company that they were working with. Some did a lot of the mapping themselves and did not rely on the road network. Others did rely on the road markings but would base this on the worst possible examples that the vehicles could encounter. This also included signs being put the wrong way up or written over.

Margherita Rendel from University College London asked whether an autonomous car would be able to recognise unusual road hazards such as flocks of sheep on the road and notify the appropriate party according. She also asked if there had been any thought put into having communal transport rather than individual private cars.

Mr Webb replied that there had been a lot of research done on what was the right size of communal transport. He remarked that services such as Uber Pool had not taken off in the UK as people did not want to travel in close proximity with complete strangers. However, if they were travelling in a larger vehicle they may be more open to such a service. With regard to unusual circumstances such as a flock of sheep on the road, he said that the autonomous vehicle would be able to handle it. In future driverless vehicles may not have traditional front and rear parts and would have a 360 degree view of the road with four wheel drive and four wheel steer making most road blockages easy to get out of.

Tim Bellenger from London TravelWatch asked what the crossovers were with other sectors of the transport industry. He also asked if the CCAV were taking any lessons from the automation of trains. Mr Webb replied that the CCAV worked alongside other areas of transport including the aero industry and had acquired knowledge on AI alongside other government departments, particularly the Department for Digital, Culture, Media and Sport.

Jeff Halliwell from Transport Focus said that he was not convinced that private ownership of driverless vehicles would take off unless the vehicles were substantially cheaper or could be hired on demand. Mr Webb said that

on the latter point, the average vehicle was used only 3% of the time. Therefore, if people could be convinced to pay a monthly subscription to use an autonomous vehicle this would reduce the numbers of vehicles on the road and make for a more efficient road network. Mr Halliwell commented that you would still have a problem of peak demand which to meet that supply would mean cars would have to be located somewhere where they are still not being utilised fully.

Ian Wright from Transport Focus asked in relation to the point about insurance, in an autonomous vehicle landscape who would be deemed to blame when there was a collision. He added at times of an incident whether the car would preserve the life of the passengers it was carrying over that of those in another vehicle or on the road/pavement.

Mr Webb said that there was not a single right answer in the scenario of choosing which lives to save in a crash. However, as the technology improved this would lead to fewer accidents making such judgements rarer. On the insurance point, he said that it would be up to the manufacturers of the various autonomous cars to fight it out amongst themselves in court.

Alan Benson from London TravelWatch said that given the complexity of the technology to run an autonomous vehicle (250 million lines of code) it seemed inevitable that regular accidents would occur. John Cartledge said that many of the trucks on the road carried foreign registration plates. He asked how an autonomous vehicle from different countries would work with the system set up in the UK.

Mr Webb said on the second point there would always be a development period to understand the rules of the road for vehicles coming in from outside the UK. However, this was not unlike the situation at present where vehicles from outside the country had to comply with the regulatory environment in the UK. Mr Webb commented on the cyber point that they would never be able to prevent all forms of attack or software crashes and would simply have to be as diligent as possible to make them as infrequent and harmless as they could be.

Sir David thanked Mr Webb for a fascinating evening and wished him luck in making the vision for autonomous vehicles in the UK a reality.