Chartered Institution Highways & Transportation (CIHT) – Written evidence (AUV0082)

CIHT is a charity, learned society and membership body with over 14,000 members spread across 12 UK regions and a number of international groups. We represent and qualify professionals who plan, design, build, manage and operate transport and infrastructure networks. Part of our vision is to demonstrate transport infrastructure’s contribution to a prosperous economy and a healthy and inclusive society. Our values are to be Professional, Inclusive, Collaborative and Progressive.

Introduction

1 The UK lacks a coherent, integrated national transport strategy. Some elements of the transport system have had strategies determined for them, but there is no clear national motoring strategy that sets out how private vehicles integrate with other transport modes both on the highways and other networks. Such a strategy would be essential to cover the Connected Autonomous Vehicles (CAV) and related technology strategy ecosystem and overlap with strategies on infrastructure and industry.

1.2 An integrated transport strategy must work across modes, nationally and at reasonable sub-national levels. This strategy should be set in economic, social and environmental contexts to which motoring – and travel more generally – is a key factor. Transport and spatial planning should be better integrated, helped by collaborative planning by the Highways Agency and local authorities. Revisions also need to be made to the Digital Communications Infrastructure Strategy to ensure that it is able to adequately support smart transport.

1.3 The pressures to maintain an efficient, safe and functional transport system is growing. Urban areas are expanding, and the UK’s population is ever increasing and ageing. Transport activities support increasing demands from passengers and freight, however associated activities from the transport sector are affecting the environment, health and congestion. The development of smarter technologies in the automobile sector can play an important role in addressing some of these challenges. Innovations such as adaptive cruise control, autonomous emergency braking, lane departure warning systems and lane keeping assist systems available in many new vehicles today and are contributing to improved safety on the road network.

1.4 CIHT believes that the continued development of Connected and Autonomous Vehicle (CAV) technologies has the potential to significantly improve road safety, reduce congestion and enhance car users and drivers experience. However, there are many challenges and hurdles to overcome if these technologies are going to be successfully implemented and effectively used by the wider population. Safety, security and resilience should be taken into consideration when looking at future models. This must include the cyber-security of digitally-enabled technologies.

Impacts and Benefits

2 What are the potential applications for autonomous vehicles?

2.1 There are a number of potential applications for Connected and Automated Vehicles (CAVs) some more achievable in the short to medium term than others.

2.2 Initially CAVs will most likely be used on motorways and major roads where segregation is possible. The more advanced the technology becomes, moving towards a fully automated system, the more we will be able to move towards activities performed by private cars, taxis, shared cars, and vans and lorries.

- In confined geographic spaces such as University campuses, farms and some industrial complexes.
- Another potential area is providing transport for older people or people with disabilities who may feel less confident about driving themselves (particularly beyond their immediate comfort zone) as they age.
- Various taxi style demand responsive transport services are being tested e.g. Google is currently testing automated vehicles in the States in preparation for offering robo-taxi services in the coming years.
- Opportunities to contribute to the commute journey with ride sharing opportunities.
- Local trips from residential areas to transport hubs on main bus/rail/tram transit routes.
- In commercial trucking and freight. Truck platooning technology is being developed making it possible for two or more trucks to “electronically couple” this enables inter-vehicle spacing to be greatly reduced.

2.3 Many of these applications will still require the presence and potential intervention of a driver in the short to medium term. The full benefit of CAVs will only be fully realised when the technology does not require the presence or intervention of a driver.

2.4 Good examples of current automated systems in service are:

- Fixed transport - Docklands Light Railway and the Heathrow Ultra PRT
- New advanced sensor software products such as the TRL GATEway project in Greenwich or the Transport System Catapult LUTZ Pathfinder pods in Milton Keynes.
- Manufacturers are also progressing, producing more sophisticated systems such as Telsa’s AutoPilot system and trials underway in Gothenburg (Volvo) ‘Drive Me’ project².

What are the potential user benefits and disadvantages from the deployment of autonomous vehicles?

² Volvo Drive Me Project
3 Benefits

3.1 The deployment of fully automated vehicles could potentially provide major social and economic benefits. Improved road safety, accessibility, assisting an ageing population and help those with disabilities. There is the possibility of improved network performance, health benefits achieved through reduced congestion, emissions and ride sharing opportunities.

3.2 Full CAV would allow people to undertake a wide range of activities, increasing the value of journey times, as that time could be spent working, giving people back time wasted when traveling. This in turn might lead to more innovative designs, e.g. 4 seater cars with passengers around a table. However, the unintended consequence of this is that the demand for transport will increase significantly as travel time is no longer wasted time.

3.3 CAV could also encourage shared ownership via car clubs, allowing people to hire a specific type of vehicle to suit the purpose of the journey. ‘Safer’ streets could potential increase in the numbers of pedestrians and cyclists. Both of these initiatives could lead to a reduction in the provision of the need for car parking space and subsequently an improvement in place.

3.4 The nature of the technology would suggest that CAVs could lead to denser traffic flows on our major networks as platooning would achievable, resulting in shorter braking distances between vehicles effectively increasing route capacity and reducing congestion.

- Benefit of not having to drive, or indeed to hold a licence.
- Possible reductions in insurance premiums for e.g. younger drivers.
- Benefits of not having to own a car (or a second car) with potential cost savings.
- Health & safety benefits - removing driver error from the roads – improved air quality
- Automatic compliance with speed limits, thus creating a calmer and more reliable environment in which to walk and cycle.
- Improved mobility for the disabled, elderly and young people.
- Users could spend travel time engaged in other activities, so the costs of travel time and congestion are reduced.
- Improved fuel efficiency.
- Because such vehicles won’t need proximate urban parking, space used for parking could be repurposed.

4 Disadvantages

4.1 It is important to note that there is relatively little data available to substantiate the listed potential benefits and there maybe unintended consequences that could provide dis-benefits. The technology may benefit society in the long term, but there is

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3 WSP/Parsons Brinckerhoff/Farrells ‘Making Better Places: Autonomous vehicles and future opportunities
a great deal of work that has to be undertaken. There will be a period over which there will be a mix between non, partially, highly and fully automated vehicles. This throws up issues with different user expectations and behaviours, not just with the owners of the vehicles but interactions with pedestrians and cyclists.

4.2 CAVs will be designed to be risk-averse, this could result in more congestion as they give absolute priority to pedestrians and cyclist. Pedestrian and cyclist behaviours may change as they begin to cross randomly rather than using a pedestrian crossings knowing that CAV will always stop rather than hit them.

4.3 CIHT notes there are other key issues, such as environmental concerns with perceived increased vehicle miles leading to increased congestion, demand for more road infrastructure and knock on dis-benefits in terms of road danger, noise and emissions.

- More vehicles on the road due to the potential increase in the numbers of people who could use them and increased mileage overall.
- Failure of the technology. Passengers will need to have confidence in the technology and safety to accept.
- Drivers over reliance on the technology – will they be ready to take over control when required
- If CAVs are only available via a car club people would need confidence that a vehicle will be available when they need it and in a condition that is safe.
- Increased use of (autonomous) cars will abstract demand from public transport, which may as a result deteriorate or become more dependent on subsidies.
- There are fears that CAV technology may be risky and unsafe and cannot match the information processing, reaction and communication skills that humans bring to driving.
  - What road markings (quality, type) are required to enable full CAV operation? Destination markings; lane lines; edge lines etc. – CAVs will only be as good as the infrastructure it uses.
  - What will be the impact on permanent signage requirements and how will this effect TSRGD?
  - How will roadworks notifications; layout and sign design and maintenance work? E.g. How will the vehicle know that an emergency roadworks permit is in operations.

5 How much is known about the potential impact of deploying autonomous vehicles in different sectors?

5.1 The real evidence of the impact on different sectors of CAVs is unknown. Some sectors such as agriculture and truck freight will perhaps feel the immediate impact sooner than others.

- We can also see this technology being deployed in commercial trucking – with platooning. There is research that concludes that these sectors offer stronger business propositions such as improving fuel economy, reduced frequency and

4 Traffic Signs Regulations and General Directions
severity of accidents and more. Highways England will be conducting trials in the near future.

- Sectors and economies based on public transit, crash repair, and automobile insurance might suffer as the technology improves making certain aspects of these occupations obsolete. Thus impacting socially and economically.

6 How much is known about public attitudes to autonomous vehicles?

6.1 Transport System Catapult published a study on Traveller Needs last year and 39% of people said they would consider using driverless cars today. In a recent consultation response on UK testing ecosystem for connected and automated vehicles by the Centre for Autonomous and Connected Vehicles, CIHT provided a joint response ITS UK. The response reported that there is currently some confusion in public perception as to what CAV is or can do and little awareness of Connected Vehicles themselves, let alone the potential benefits. The model being used in testing suggests that each test bed user will be responsible for all outreach and publicity activities. Whereas engagement with, and support from, road authorities and network operators (e.g. Highways England) and other stakeholders including the public will be essential.

PR and marketing, particularly the communication of benefits, therefore, need to be a core and coordinated activity of the testing facility.

6.2 Developing the right stories and messages will be essential – and this activity needs to be coordinated so that messages are consistent and meet the needs of the various target audiences.

- The government-funded on street activity in Bristol, Milton Keynes, Greenwich and Coventry is probably the best way of communicating effectively and positively with citizens – there is no substitute for seeing and experiencing the real thing.
- The upcoming lorry platooning trials will also be important in this regard, providing an opportunity for public engagement in another type of CAV functionality.
- Safety and land use benefits are important but harder to get across to the general public. Rigorous testing of technologies and systems is need to raise confidence.
- Government information needs to be clear on the difference between CV and AV. It can already demonstrate that government (for example Highways England) uses CV data to reduce costs to taxpayers. It can also help to create opportunities for businesses outside transport infrastructure to provide solutions.
- Once possible, the public sector can do something very important by switching to CAV fleets wherever possible. This approach has been important in the adoption of Intelligent Speed Adaptation (ISA) and alcolock technology in other countries.

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5 IM Traveller Needs and UK Capability Study
6 CIHT ITS response on UK Testing Ecosystem
7 What is the scale of the market opportunity for autonomous vehicles?

7.1 CIHT believes that if the technology is going to be successfully implemented in the UK then the scale of the market opportunity could be large and many sectors could benefit from the technology. Previous Transport Systems Catapult research has suggested that this global market will be worth around £900bn annually by 2025. However we believe that the scale of the market would depend on the depreciation of current fleet and cost of replacing conventional cars with the technology and the provision of appropriate support infrastructure. It is envisaged that these vehicles will cost more than conventional vehicles as manufactures add the electronic functionality and other complexities needed to operate them therefore impacting on affordability.

7.2 CIHT notes that although alternative power sources such as gas, electricity and hydrogen cells have been available for years take up by the public has been low due to issues of cost, demand and infrastructure.

7.3 Research by the SMMT show that based on current trends, it is expected that all vehicles produced in the UK by 2027 will have at least Level 3 (conditional automation where the driver does not need to monitor the dynamic driving task nor the driving environment at all times; must always be in a position to resume control) technologies embedded in them and that there will be a 25% penetration of fully autonomous vehicles by 2030.

8 Creating an enabling environment & Real world operation

8.1 CIHT and ITS UK reported recently, that testing ecosystem should include both “urban” and “interurban” environments to enable the widest set of use cases and scenarios to be tested.

8.2 A “rural” road environment is less essential and could be developed later if it becomes desirable. The focus should be on real road testing and less on the pre-road trials phases which will, more likely, be undertaken by manufacturers in closed conditions to protect IPR, “brand” and commercial advantage, etc. Current testing model seems designed more for R&D type tests than real-life - the UK should concentrate on attracting real-life tests using commercially available cars and ordinary drivers, as by Volvo in Gothenburg and London. This will require more emphasis on nurturing public interest and engagement, currently, public perception is based upon news stories generated by software corporations and is not based on the potential use cases or benefits.

8.3 CIHT and ITS UK believe that understanding the various human factors issues (both of vehicle users and of other highway users) is essential for the success of CAVs and should be given a higher priority and more emphasis in the testing model. Many of the ingredients in the testing model – connectivity, mapping, virtual testing, and cyber

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7 Intelligent Speed Adaptation
8 alcolock
9 IM Traveller Needs and UK Capability Study
10 SMMT – CAV’s The UK Economic Opportunity
security – evolve very quickly and it should be made clear in the model that the test bed operators will be expected to keep pace with these developments. This would make the offer more confidence inspiring.

8.4 The UK is at a comparatively advanced stage compared to many countries.

- The government has undertaken a review of the regulatory framework and established that CAVs can be tested on any road in the UK and consulted on necessary changes to regulations.
- Published a Code of Practice to for testing CAVs on UK roads.
- The government has helped fund research, development and demonstrations through the creation of the Centre for Connected and Autonomous Vehicles (CCAV) and Innovate UK. It is important that the government continue to provide support to both.
- There are several test and research programmes underway, including GATEway at Greenwich, Bristol, Milton Keynes - LUTZ Pathfinder pods and Coventry

8.5 There will need to be changes to the digital or physical infrastructure to realise the full benefits of CAVs. There will be issues around the quality of the infrastructure (road markings etc) and the quality of 3D mapping and security of digital data etc. Failure of either poses huge safety and cyber security issues. Manufacturers will have to ensure robust cyber security measures within their systems to guard against identity theft and deliberate collisions. Government will need to ensure that the regulatory framework holds manufacturers to account when meeting minimum security standards.

8.6 Appropriate insurance for CAVs, as with insurance currently for conventional vehicles, will need to be in place to protect those affected by accidents. Manufacturer liability will need to be in place for incidents involving fully autonomous vehicles. There will be a requirement for:

- Extended compulsory insurance requirements for CAVs.
- Compulsory product liability
- Correct insurance classification requirements

These have been consulted on by the Government.

9 Modern Transport Bill

9.1 The Bill will need to enable innovation whilst ensuring safety security and privacy.

10 Education and Skills

10.1 Skills development is a key area of concern for the growth and progression of the highways and transportation industry. Industry trends show that with fewer graduates entering and an ageing current workforce, action must be taken to secure the pipeline of skilled engineers and transportation professionals for the future\(^\text{11}\). It is

also essential to widen the talent pool from which new entrants are drawn to increase recruitment and create a more diverse and inclusive workforce. In a recent survey of CIHT’s Corporate Partners, 96% of respondents anticipated having a skills shortage in the next few years.

10.2 CIHT has recently launched a suite of career materials and guidance as part of a programme to help the industry deal with the range of technical skills shortages. This includes a diversity and inclusion toolkit\(^\text{12}\) which provides practical guidance on data gathering, attracting and retaining a more diverse workforce and on changing culture and behaviour. It is the first toolkit of its kind for the highways and transportation sector and provides a route map to success through diversity and inclusion.

10.3 CIHT welcomes the Department for Transport Skills strategy\(^\text{13}\) and is actively with the Department for Transport in exploring the key action points for taking this forward.

26 October 2016

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\(^\text{13}\) Department for Transport Skills Strategy 2016